VOL. XXII. No 2. FEBRUARY 1937

MECCANO MAGAZINE

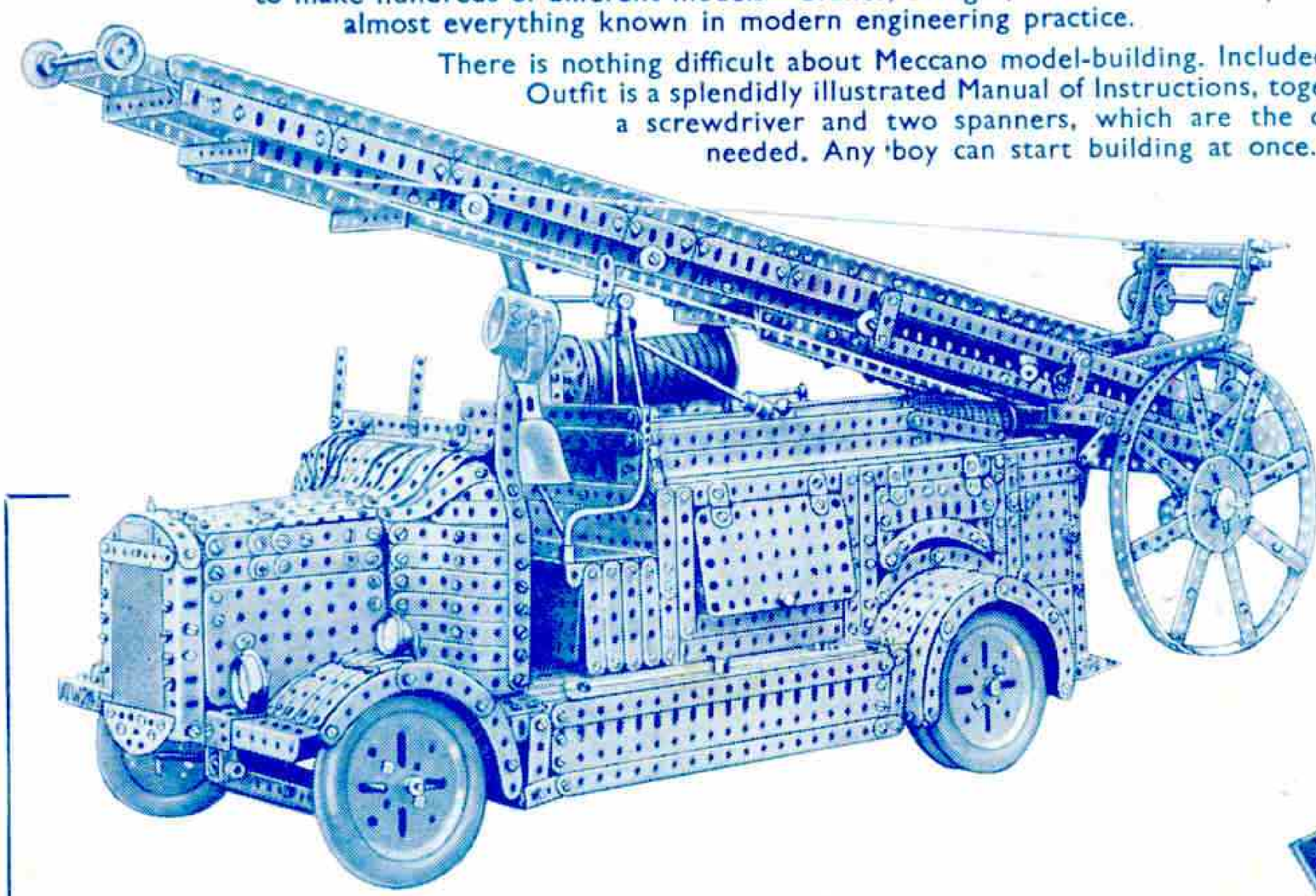
LOOKING AHEAD – A ROTARY AERODROME
(see page 70)

MECCANO

Boys! Build Real Engineering Models Like This—with Meccano

There is no other hobby in the world to equal Meccano Model-building; and none that is so full of thrilling interest for boys. Meccano is REAL engineering in miniature. The models are built with REAL engineering parts, accurately made of steel and brass, which can be used over and over again to make hundreds of different models—Cranes, Bridges, Motor Cars, Aeroplanes, in fact almost everything known in modern engineering practice.

There is nothing difficult about Meccano model-building. Included in every Outfit is a splendidly illustrated Manual of Instructions, together with a screwdriver and two spanners, which are the only tools needed. Any boy can start building at once.



This fine Meccano model is a reproduction to scale of the big Scammell Fire Engine illustrated at the foot of this page. The model is remarkably realistic in detail and is fitted with front and rear semi-elliptic springs, modified Ackermann steering gear, and gear-box incorporating three forward speeds and one reverse. The pump control apparatus is worked on exactly similar principles to those followed in the prototype, while the fire escape extends to a length of nearly eight feet. The motive power by which the model is propelled is supplied by a Meccano Electric Motor.

B Meccano Outfit

Prices of Meccano Outfits

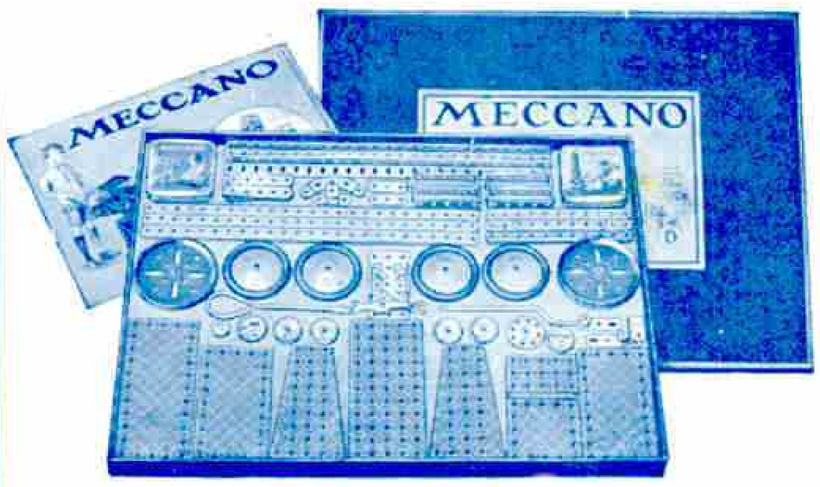
COMPLETE OUTFITS

O	Outfit ... ... each	3/6
A	" ... ... "	5/-
B	" ... ... "	7/6
C	" ... ... "	10/-
D	" ... ... "	15/-
E	" ... ... "	20/-
F	" ... ... "	30/-
G	" ... ... "	55/-
H	" (Carton) ... ... "	72/6
Hw	" (Cabinet) ... ... "	97/6
K	" (Carton) ... ... "	132/6
Kw	" (Cabinet) ... ... "	157/6
L	" (") ... ... "	400/-

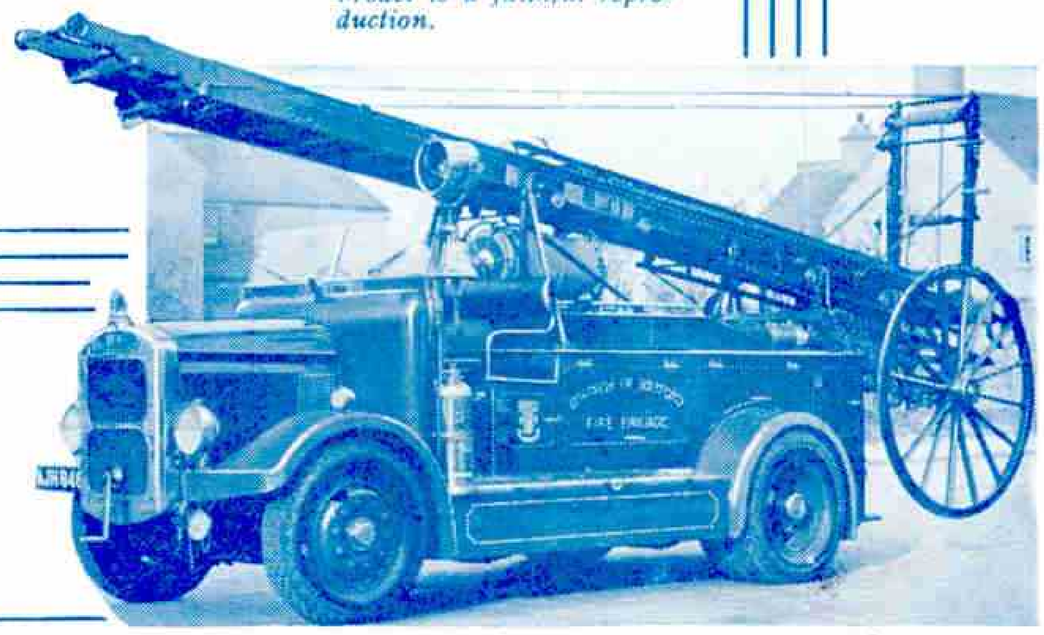
ACCESSORY OUTFITS

Oa	converts O Outfit into A ... ... each	1/6
Aa	" A " " B ... ... "	2/6
Ba	" B " " C ... ... "	3/-
Ca	" C " " D ... ... "	5/6
Da	" D " " E ... ... "	5/6
Ea	" E " " F ... ... "	11/-
Fa	" F " " G ... ... "	26/6
Ga	" G " " H ... ... "	17/6
Ha	" H " " K ... ... "	60/-
Ka	" K " " L ... ... "	225/-

The illustration below shows the "Silver Jubilee" Scammell Fire Engine owned by the Borough of Watford Fire Brigade, of which the above Meccano Model is a faithful reproduction.



D Meccano Outfi



MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

EXTRA SPECIAL EDITION

A NEW COMPLETE HOME CINEMA

Hamley's News

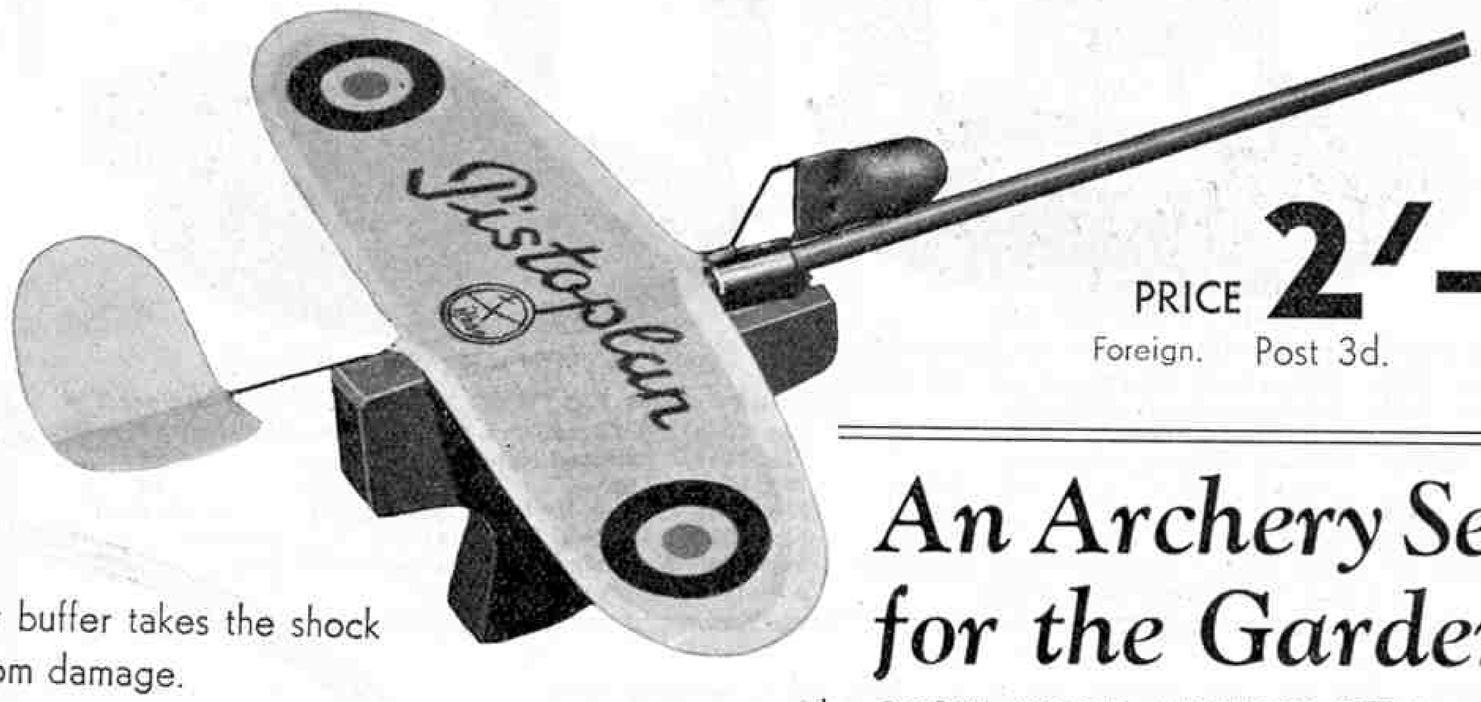
·HAMLEY · BROTHERS · LTD · ESTABLISHED · 1760 ·

200-202, REGENT ST., LONDON, W.I. OUR ONLY ADDRESS

No. 17 *February, 1937*

SPLENDID ARCHERY SET

PLANE–FIRED FROM GUN–LOOPS, ZOOMS AND ROLLS AT BREAKNECK SPEED!



Fired from a powerful, spring-loaded gun, a touch on the trigger sends the Pistoplane soaring off at terrific speed. The system of launching is similar to that used on naval aircraft carriers, from which high-speed planes are catapulted straight into the air. The Pistoplane can, by simple adjustments to the wings or frame, be made to loop the loop, glide or roll and is almost unbreakable. A large rubber buffer takes the shock of landing, protecting the lightly-built frame from damage.

PRICE **2/-**
Foreign. Post 3d.

An Archery Set for the Garden

The ROBIN HOOD ARCHERY SET is more than a toy. The bow is 3′ 6″ long, properly constructed in best quality lancewood and is complete with six feathered arrows.

Price
13/6
Post 6d.

A complete Home Cinema of your own!

No need now to leave a warm room to go to the 'pictures'. This new Home Cinema can be operated from the ordinary mains house lamp, takes a 9.5 mm. film and has rotary shutter and double claw movement. Films simply rewound.

PRICE **15/-**
Foreign. Post 6d.

PRIZEWINNERS IN MODEL AEROPLANE CONSTRUCTION CONTEST

Senior Section

FIRST PRIZE–TROPHY:
Mr. D. J. E. Jackson, Eastcote, Middlesex
SECOND PRIZE–£3-3-0 VOUCHER:
Major A. H. Gatehouse, M.C., Frimley
THIRD PRIZE–£2-2-0 VOUCHER:
Mr. H. J. Pomeroy, Sidmouth, S. Devon
LADIES' PRIZE:
Miss Joan R. Hooper, Ipswich, Suffolk
SPECIAL AWARD FOR MILES HAWK
£5-5-0 VOUCHER: Mr. R. Duck, Acomb Rd., York

Junior Section

FIRST PRIZE–TROPHY:
Master Dennis Elmes, Woodford Avenue, Ilford
SECOND PRIZE–£2-2-0 VOUCHER:
Master James Anderson, Darwen, Lancs.
THIRD PRIZE–£1-1-0 VOUCHER:
Master Stanley Carroll, Eltham, S.E.9
SPECIAL AWARD
CENTRAL AIRCRAFT KITS:
Master C. B. Atkinson, Catford, S.E.6

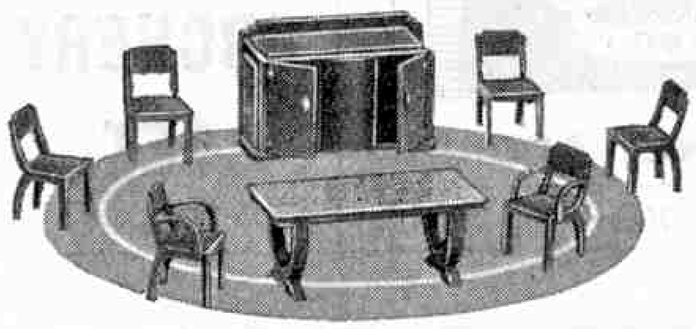
DOCKING THE 'QUEEN MARY'

Filled with water, the tray holds replicas of real docking berths and the idea is to steer–with the aid of a powerful magnet–the ships into dock. The cost of this new and fascinating pastime is only **7/6**
Post 6d.

Dinky Toys

DOLL'S HOUSE FURNITURE

A WONDERFUL SERIES OF ACTUAL SCALE MODELS

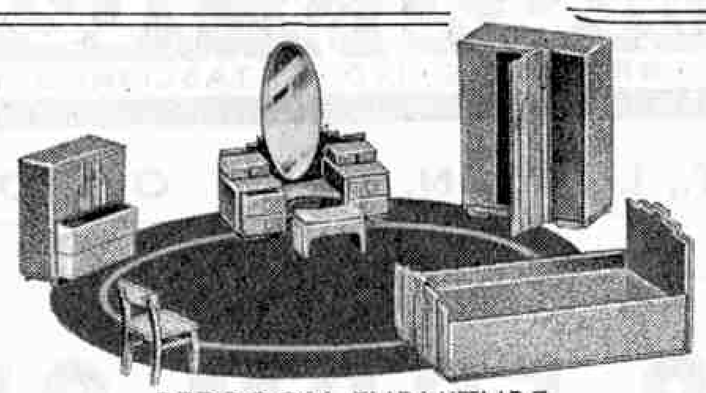


DINING-ROOM FURNITURE

Dinky Toys No. 101 Price of complete set 2/3

No. 101a.	Table	5d. each
No. 101b.	Sideboard (Opening doors)	9d. ,,
No. 101c.	Carver Chairs	3d. ,,
No. 101d.	Chairs	2d. ,,

Supplied in walnut brown finish only.

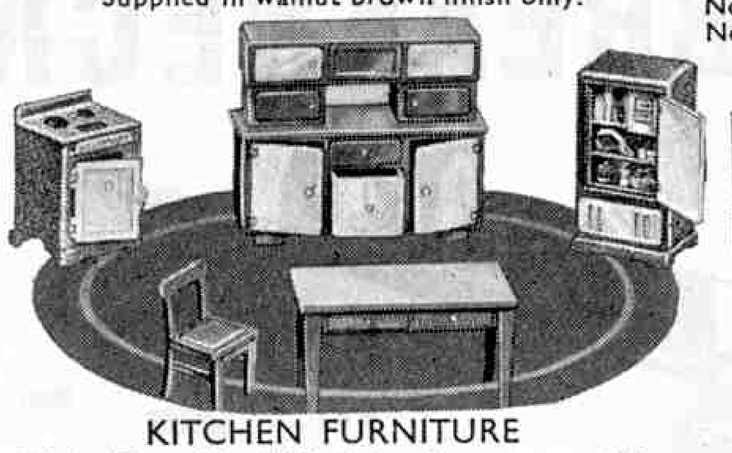


BEDROOM FURNITURE

Dinky Toys No. 102 Price of complete set 2/11

No. 102a.	Bed	6d. each
No. 102b.	Wardrobe (Opening door) ...	9d. ,,
No. 102c.	Dressing Table (Opening drawers)	10d. ,,
No. 102d.	Dressing Chest (Opening drawers)	6d. ,,
No. 102e.	Dressing Table Stool	2d. ,,
No. 102f.	Chair	2d. ,,

Supplied in colour or walnut brown finish.

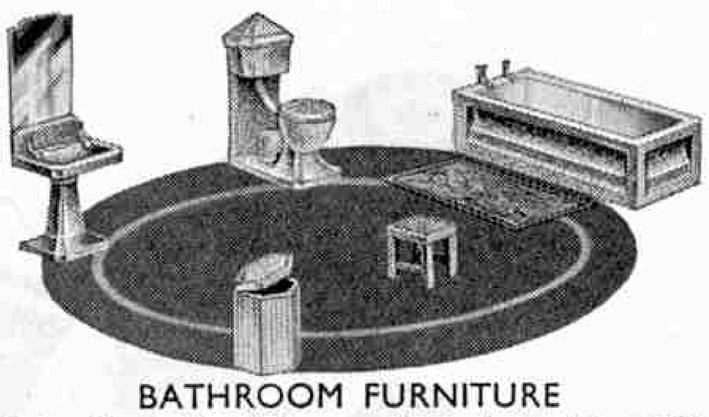


KITCHEN FURNITURE

Dinky Toys No. 103 Price of complete set 2/6

No. 103a.	Refrigerator (Opening Door)	8d. each
No. 103b.	Kitchen Cabinet (Opening doors and drawer) ...	10d. ,,
No. 103c.	Electric Cooker (Opening door)	6d. ,,
No. 103d.	Table	4d. ,,
No. 103e.	Chair	2d. ,,

Supplied in two colour schemes—light blue and white; light green and cream.



BATHROOM FURNITURE

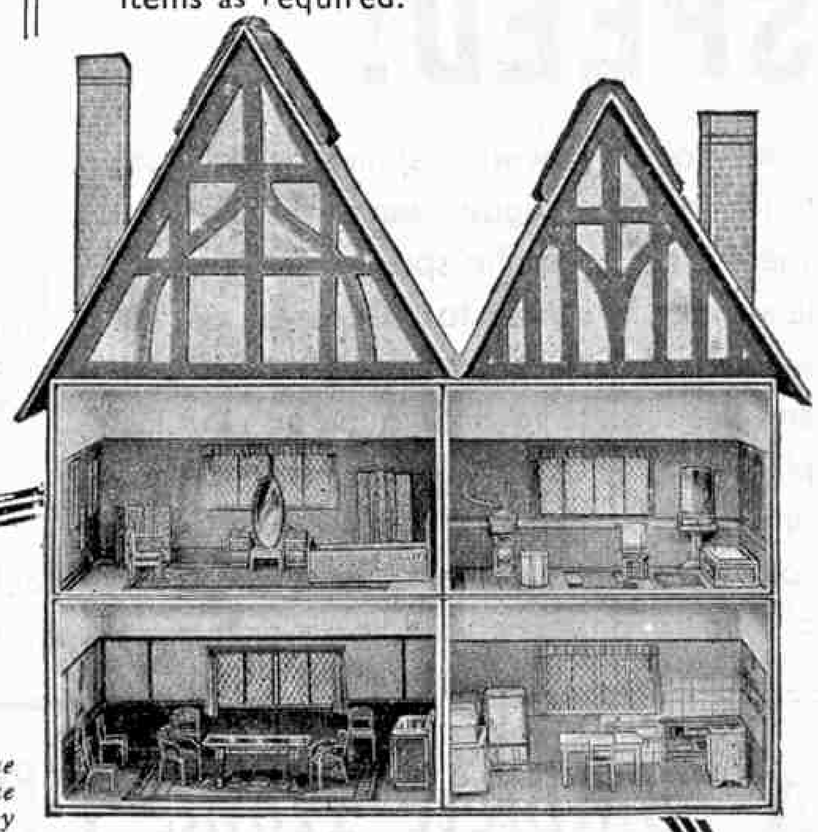
Dinky Toys No. 104 Price of complete set 2/-

No. 104a.	Bath 6d. each	No. 104b. Bath Mat 1d. each
No. 104c.	Pedestal Hand Basin	6d. ,,
No. 104d.	Stool	2d. ,,
No. 104e.	Linen Basket (Opening lid) ...	4d. each
No. 104f.	Toilet (Lifting lid)	6d. each

Supplied in two colour schemes—pink and white; light green and white.

The jolly Doll's House Furniture that forms a special exension of the range of Dinky Toys has gained wonderful popularity. Every piece is a perfect miniature scale model based on a typical example of modern design, and with a beauty of finish that must be seen to be appreciated. All are made to a scale of 7/16th of an inch to one foot, which is as nearly as possible 1/27th full size. The different items of the four complete suites—dining-room, bedroom, bathroom and kitchen—are fascinating to handle, and there is a real thrill in manipulating the tiny opening doors and drawers.

Each of the suites can be bought either as a complete set or in separate items. It is thus possible to increase the size of any one set by adding more chairs or other items as required.



This back view of the Doll's House shows the four suites of Dinky Toys Doll's House Furniture tastefully arranged in position.

"DOLLY VARDEN" DOLL'S HOUSE

FOR DINKY TOYS FURNITURE

THE IDEAL GIFT FOR GIRLS

The "Dolly Varden" Doll's House provides a perfect setting for the Dinky Toys Doll's House furniture.

The exterior of the house is designed to represent a half-timbered dwelling, while the interior decorations, which are printed in nine colours, are in an attractive modern style.

Reinforced leather board is the material of which the house is constructed, and although it is collapsible it is as strong as a wood structure when set up. The container, which also is made of reinforced leather board, opens out to show a lovely garden with Tennis Lawn, Carriage Drive, and Rockery, providing an exquisite setting for play with Dinky Toys and Hornby Trees, Hedging, etc. The arrangement of the Dinky Toys Furniture, shown in the illustration on the right is intended only as a suggestion. Great fun is to be had from re-arranging the various items, perhaps on the lines of some familiar real rooms.

Price of "Dolly Varden" Doll's House—9/6

DIMENSIONS

The following are the overall dimensions of the "Dolly Varden" Doll's House when built up ready for play. Length, 1 ft. 6¾ in. Depth, 10¼ in. Height, 1 ft. 6¾ in.

The open container on which the house stands measures 3 ft. 3½ in. by 2 ft. 5½ in.

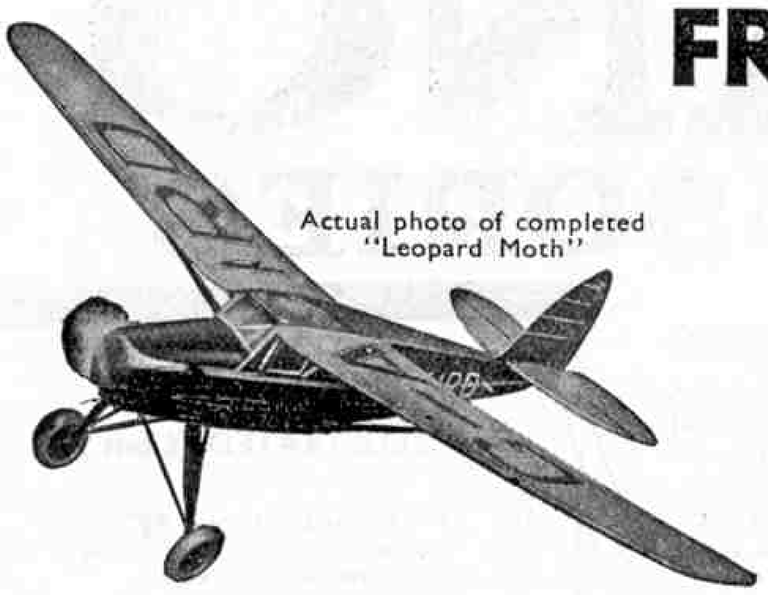
When the house is dismantled and packed in container, the overall dimensions of the complete parcel are ¾ in. x 1 ft. 7½ in. x 2 ft. 5½ in.

The Couch Hammock, Tennis Net, Garden Seats, Dinky Toys Garage, Motor Cars and Figures, and the Hornby Trees and Hedging featured in the illustration on the left are not included with the Doll's House and Garden.

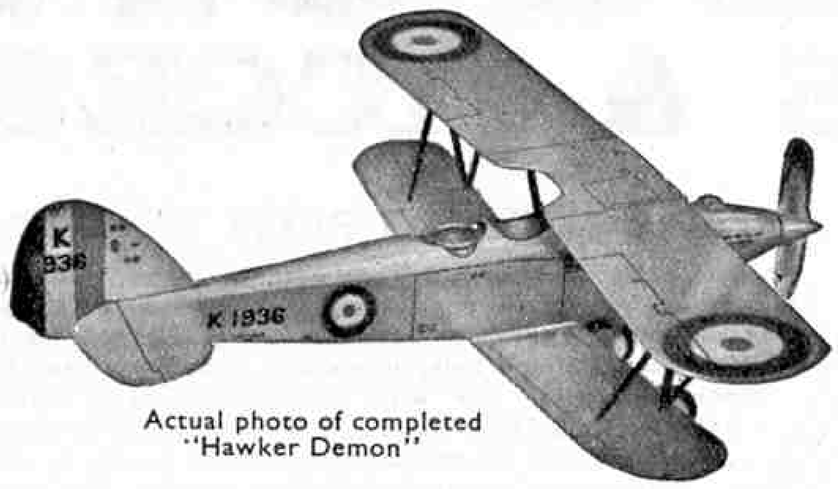
MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

EASY TO BUILD—EASY TO FLY

FROG flying scale-model constructional kits



Actual photo of completed "Leopard Moth"



Actual photo of completed "Hawker Demon"

De Havilland "LEOPARD MOTH"
Wing Span 12¼ ins. Length 9½ ins. **2/6**

De Havilland "HORNET MOTH"
Wing Span 11 ins. Length 9½ ins. (Not illustrated.) **3/6**

Hawker "DEMON" 2-seater fighter
Wing Span 12¼ ins. Length 11 ins. **4/6**

And for the more experienced model maker
The Miles "HAWK MAJOR" Construction Kit 10/6

These construction kits enable the enthusiast to build his own Flying Scale Models. They are easy to build and no tools are required. All parts are blanked out and fit together perfectly, only needing to be glued. (This is supplied.) Wire parts are already bent to shape. No paint is required, all coverings are printed in the correct colours. Supplied complete with motor lubricant and spare motor.

NO TOOLS REQUIRED—ALL PARTS CUT OUT

CONSTRUCTIONAL UNIVERSAL HAND WINDERS!

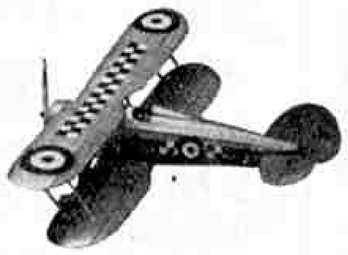
A Constructional Kit is now available for building a geared-up Universal Hand Winder for use with FROG Scale Model Construction Kits or any FROG Model with a propeller not exceeding 5½ ins. diameter. All parts are **cut ready to assemble** and only require gluing together.

GEARED-UP WINDER MECHANISM IS COMPLETELY ASSEMBLED.

PRICE **1/-**

The **FROG** "PENGUIN" Series of realistic non-flying scale-models

These FROG models are designed as non-flying scale models and can therefore be made to a degree of accuracy and detail otherwise unobtainable. Even the cross-sections of the wings, struts, etc., are to scale so that the model would give accurate results if tested in a wind-tunnel. The single-seater fighters are available with the markings of any of the leading fighting Squadrons, while the Blackburn "Shark" carries the insignia of H.M. Aeroplane Carrier "Courageous." The completed models are finished in the correct colours while the kits include transfers, full-scale drawings, cements, etc. All parts are correctly shaped needing only to be assembled and the transfers added.



Gloster "Gladiator." Represents the last word in single-seater fighters to come into production. Model has a wing span of 5⅜".

CONSTRUCTION KITS 3/-
MADE-UP MODEL 6/6

Hawker "Fury." Probably the best known fighting aeroplane in the world. Model has a wing span of 5".

CONSTRUCTION KITS 3/-
MADE-UP MODEL 6/6

Blackburn "Shark." Latest and largest Torpedo Bomber in the Fleet Air Arm. Model has a wing span of 7½".

CONSTRUCTION KITS 5/-
MADE-UP MODEL 12/6

Obtainable at all good toyshops and stores

FROG MODEL AIRCRAFT

TRADE MARK REGD.

All FROG Model Aircraft are covered by World Patents granted and pending.
Made in England by International Model Aircraft Ltd.

Sole Concessionaires:
Lines Bros. Ltd., Tri-ang Works, Morden Road, London, S.W.19

LATEST ADDITION!

THE **FROG** HIGH-PERFORMANCE
COMPETITION MODEL

This Model conforms to the S.M.A.E. formula and is eligible for official competitions. It has a maximum power duration of 90 seconds, but because of the efficient design and low wing loading, it will fly for much longer periods. When the elastic motor is unwound the combined free-wheeling and tensioner device allows the propeller to idle and at the same time prevents the elastic becoming loose enough to upset the centre of gravity. The elastic motor is enclosed in a balsa-wood cylinder, a unique feature which serves the double purpose of stiffening the fuselage and protecting it in case of a motor breakage.
Wing Span 38 ins. Weight 4 oz. Wing Loading 3.87 oz. per sq. foot.

READY TO FLY—PRICE **49/6**

Ask your dealer to show you the
"WAKEFIELD TROPHY WINNER" Construction Kit. Price 30/-

B.I.F.

Olympia, February 15–26

Many new FROG models will be shown on

Stand No. J.1265

COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19

Please send me your new "Frog" coloured leaflet with particulars of the "Frog" Flying Club and of how to obtain handsome enamelled Air Force pilot Badges.

Name .....

Address .....

.....

Please write in block letters. 2/37

MECCANO
PARTS & ACCESSORIES

REAL ENGINEERING PARTS IN MINIATURE

Meccano parts, many of which are here illustrated, combine to form a complete miniature engineering system with which practically any movement known in mechanics can be correctly reproduced. New parts are always being introduced in order to keep Meccano model-building in line with the most modern engineering requirements. The greatest care is taken in the designing of these parts to ensure that they function exactly as their counterparts in actual engineering practice. Ask your dealer for the latest complete illustrated price list.

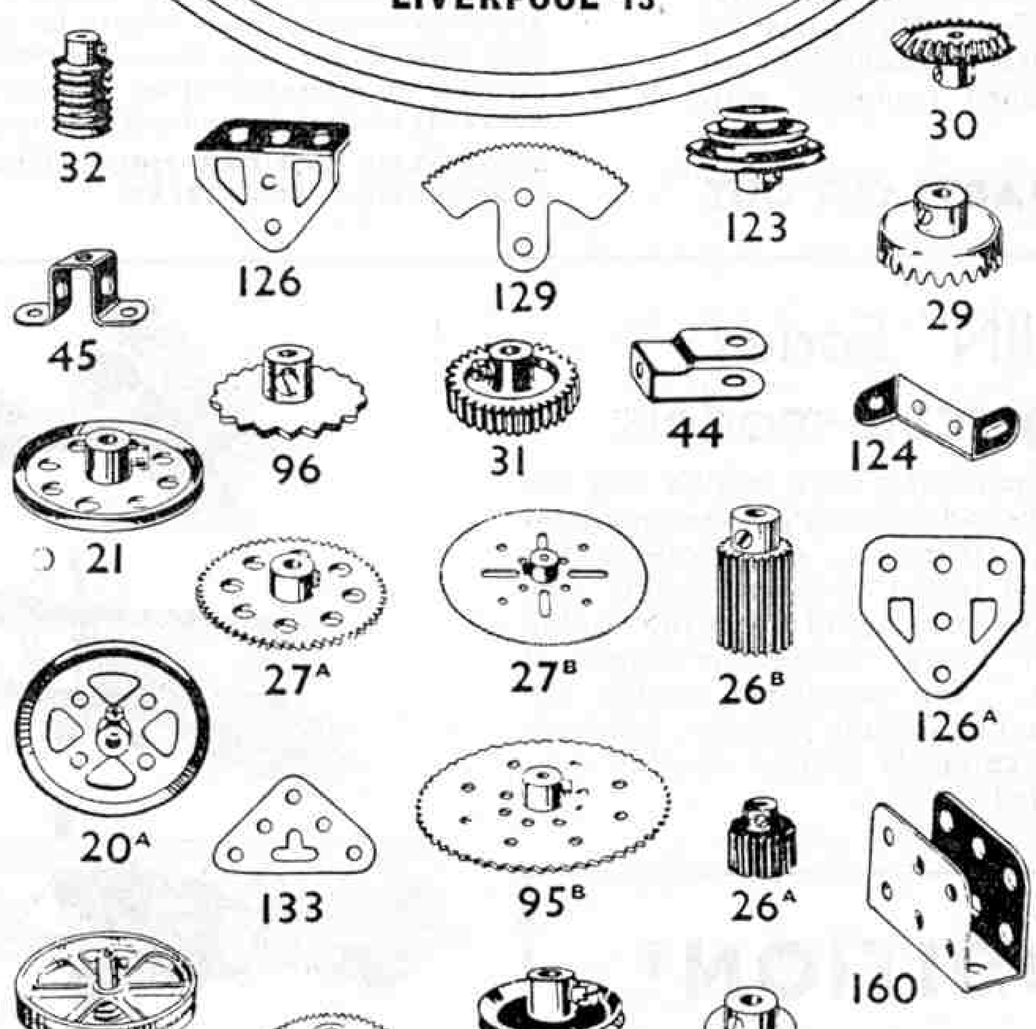
MECCANO LTD., Binns Road
LIVERPOOL 13

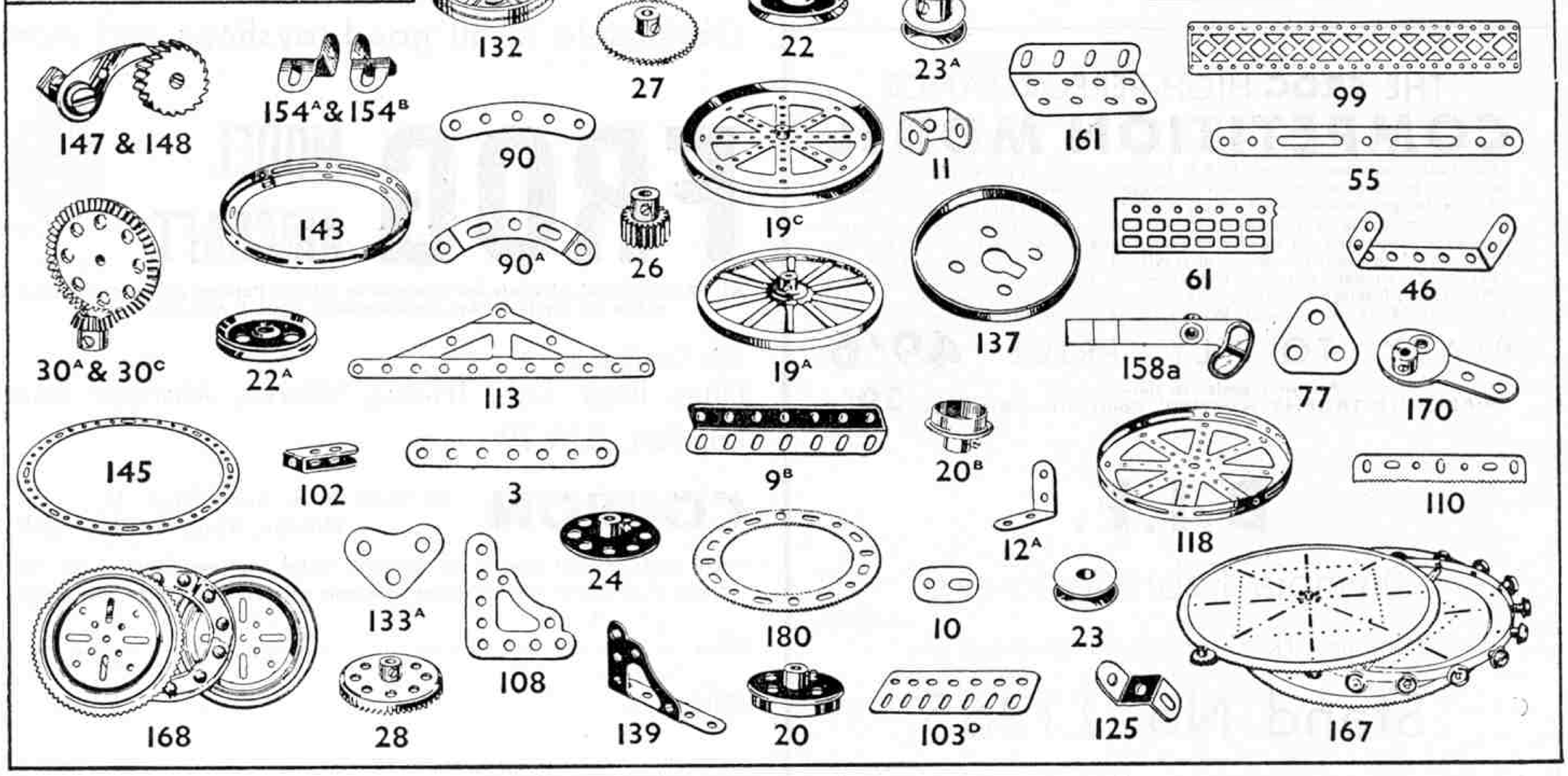
PRICES OF PARTS ILLUSTRATED

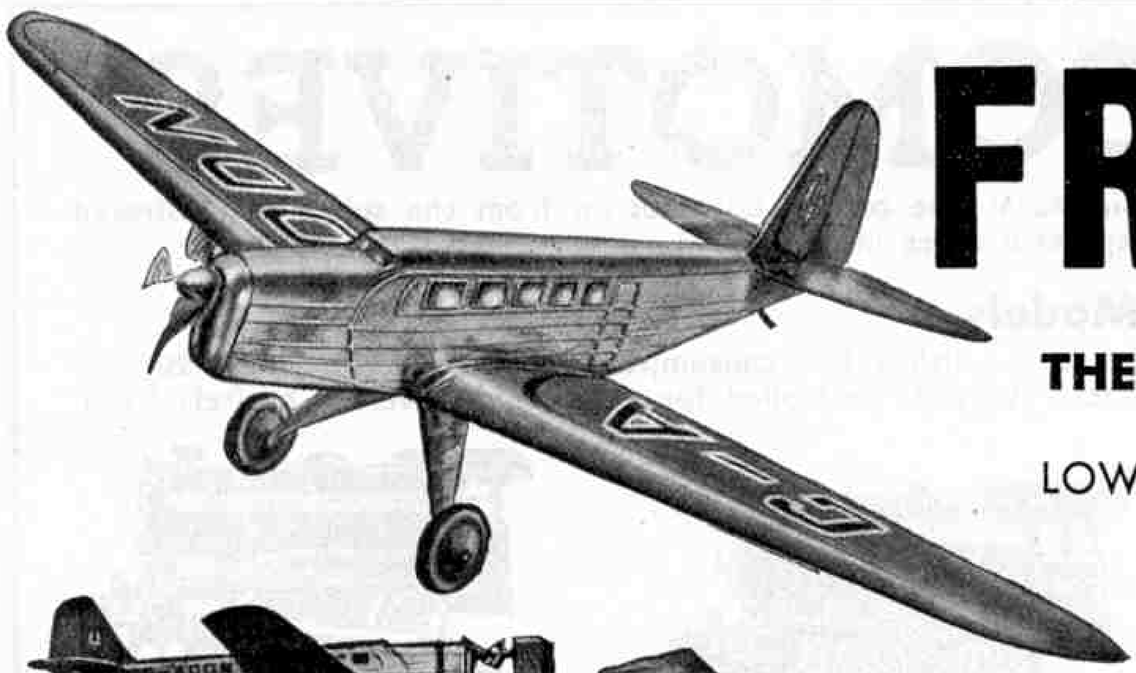
No.			s.	d.
3.	Perforated Strips, 3½" ...	½ doz.	0	4
9b.	Angle Girders, 3½"	"	0	8
10.	Flat Brackets	doz.	0	1
11.	Double Brackets	"	0	3
12a.	Angle Brackets, 1" x 1" ...	"	0	6
19a.	Wheels, 3" diam., with set screws	each	0	6
20.	Flanged Wheels, 1⅛" diam.	"	0	5
20b.	" " ¾" "	"	0	3
	Pulley Wheels			
19c.	6" dia. with centre boss and Set Screw	each	1	9
20a.	2" " " "	"	0	4
21.	1½" " " "	"	0	4
22.	1" " " "	"	0	3
23a.	½" dia. with centre boss and Grub Screw	"	0	3
22a.	1" dia. without centre boss and Grub Screw	"	0	2
23.	½" " " "	"	0	2
24.	Bush Wheels	"	0	4
26.	Pinion Wheels, ½" dia., ¼" face	"	0	4
26a.	" " ½" " ½" "	"	0	5
26b.	" " ½" " ¾" "	"	0	6
	Gear Wheels			
27.	50 teeth to gear with ¾" pinion	each	0	5
27a.	57 " " " ½" "	"	0	6
28.	Contrate Wheels, 1½" diam.	"	0	9
29.	" " ¾" "	"	0	6
30.	Bevel Gears, ½", 26 teeth ...	"	0	7
30a.	" " ½", 16 " ...	"	0	6
30c.	" " 1½", 48 " ...	"	1	6
	(*30a and 30c can only be used together*)			
31.	Gear Wheels, 1", 38 teeth	each	0	10
32.	Worms	"	0	4
44.	Cranked Bent Strips	"	0	1
45.	Double " "	"	0	1
46.	" Angle Strips, 2½" x 1"	½ doz.	0	6
55.	Perforated Strips, slotted, 5½" long	doz.	1	6
61.	Windmill Sails	4 for	0	6
77.	Triangular Plates, 1"	each	0	1

PRICES OF PARTS ILLUSTRATED (Cont.)

No.			s.	d.
90.	2½" Curved Strips, 2⅜" radius	each	0	1
90a.	2½" Curved Strips, cranked, 1⅜" radius, 4 to circle ...	"	0	1
95b.	Sprocket Wheels, 56 teeth, 3" diam.	"	0	6
96.	Sprocket Wheels, 18 teeth, 1" diam.	"	0	3
99.	Braced Girders, 12½" long	½ doz.	2	6
102.	Single Bent Strips	each	0	1
103d.	Flat Girders, 3½" long ...	½ doz.	0	7
108.	Architraves	doz.	1	6
110.	Rack Strips, 3½"	each	0	2
113.	Girder Frames	"	0	3
118.	Hub Discs, 5½"	"	1	3
123.	Cone Pulley	"	1	3
124.	Reversed Angle Brackets, 1"	½ doz.	0	4
125.	" " " ½"	"	0	2
126.	Trunnions	pair	0	3
126a.	Flat Trunnions	each	0	1
129.	Rack Segments, 3" diam.	"	0	5
132.	Flywheels, 2¾" diam. ...	"	2	0
133.	Corner Brackets, 1½" ...	"	0	1
133a.	" " 1" ...	"	0	1
137.	Wheel Flanges	"	0	3
139.	Flanged Brackets (right) ...	"	0	2
143.	Circular Girders, 5½" diam.	"	1	0
145.	Circular Strips, 7½" diam. over all	"	0	9
147.	Pawls, with Pivot Bolt and Nuts	"	0	3
148.	Ratchet Wheels	"	0	6
154a.	Corner Angle Brackets, ½", right hand	½ doz.	0	
154b.	Corner Angle Brackets, ½", left hand	"	0	6
158a.	Signal Arms, Home ...	each	0	5
160.	Channel Bearings, 1½"x1"x½"	"	0	2
161.	Girder Brackets, 2"x1"x½"	2 for	0	3
167.	Geared Roller Bearings ...	each	20	0
168.	Ball Bearings, 4" diam. ...	"	3	0
170.	Eccentrics, ¼" throw ...	"	0	9
180.	Toothed Gear Ring, 3½" diam. { 133 external teeth, 95 internal " }	"	2	0







FROG MODEL AIRCRAFT

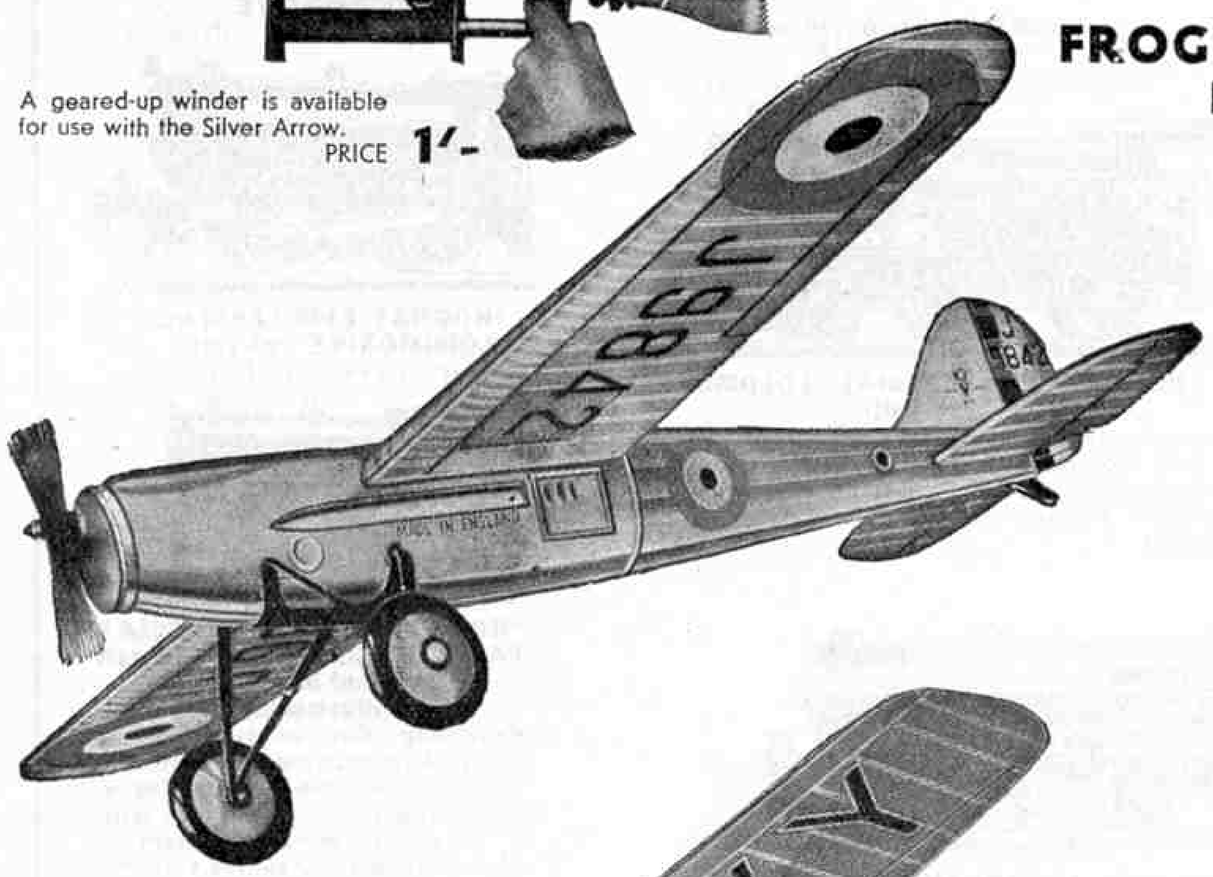
All FROG model aircraft are covered by World Patents granted and pending. Made in England by International Model Aircraft Ltd.

FROG TRADE MARK REGD.

THE "SILVER ARROW"
NON-SCALE
LOW WING MONOPLANE AIR LINER

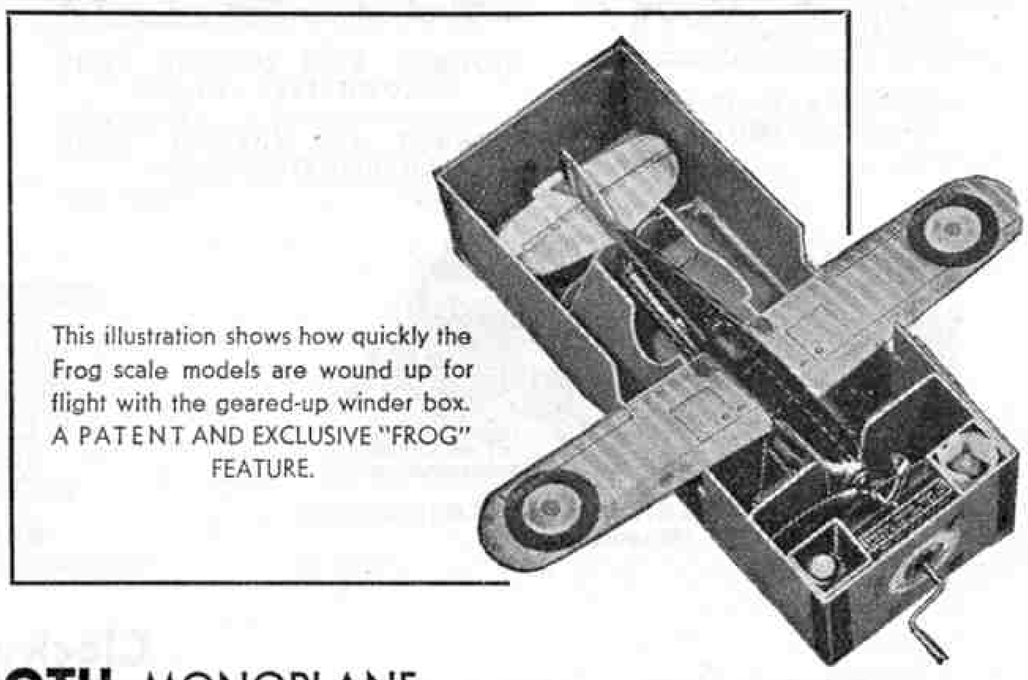
A ready-to-fly model specially designed and perfectly made by the famous "FROG" Aeronautical Engineers. It has an Aluminium Fuselage, Transparent Windows, Double Service Detachable Wings, correct pitch Airscrew, Adjustable Tail Unit. Wing span 16½", will fly approximately 120 feet. PRICE **2/6**

A geared-up winder is available for use with the Silver Arrow. PRICE **1/-**

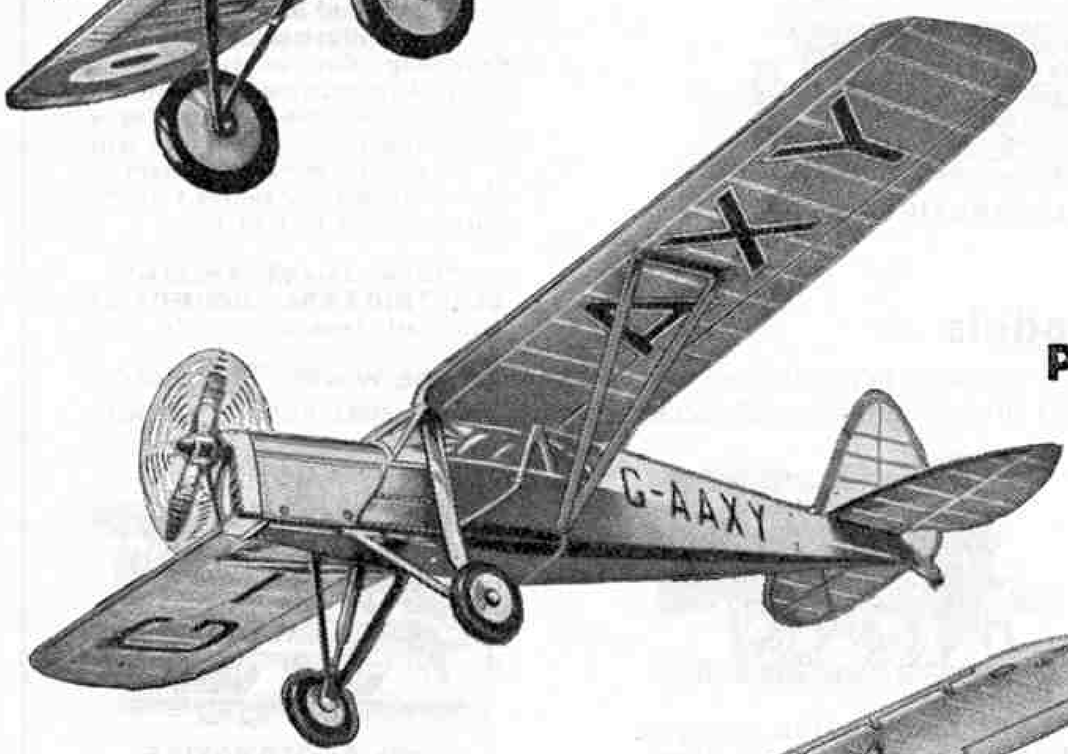


FROG MK IV INTERCEPTOR FIGHTER
FLYING SCALE MODEL

All-metal Fuselage of Tubular Construction, Patent Detachable Undercarriage, and Hollow Wings, Powerful Motor, coupled to a Precision-cut Gearbox, accurately carved Airscrew. Complete with Patent High-speed Winder Box, Motor Lubricant, Gearbox Oil, two spare Motors and Inserter Rod, and fully illustrated Flying Manual. Wing span 11½". With practice will fly 300 feet. PRICE **5/-**



This illustration shows how quickly the Frog scale models are wound up for flight with the geared-up winder box. A PATENT AND EXCLUSIVE "FROG" FEATURE.



PUSS MOTH MONOPLANE
FLYING SCALE MODEL

All-metal Tubular Fuselage with strengthening Bulkheads. Fitted with Transparent Windows. Quickly Detachable Hollow Wings with Internal Supporting Ribs and Streamlined Struts. Powerful Dual Motor with Step-up Gearbox. Adjustable Controls. Patent High-speed Winder Box, Motor Lubricant, Gearbox Oil, Spare Motors, Dual Inserter Rod and fully illustrated Flying Manual. Wing span 18½". With practice will rise off the ground and fly 600 feet. PRICE **17/6**

HAWKER HART MK II DAY BOMBER
FLYING SCALE MODEL

A scale model of the world-famous R.A.F. High-speed Day Bomber. Complete with extra strong Patent High-speed Winder Box, Lubricant for Gearbox and Motors, Triple Inserter Rod, Spare Motors and profusely illustrated Flying Manual. Wing span 19". Length 15¾". Flies 700 feet, if handled skilfully. PRICE **42/-**

FREE FLIGHT INSTRUCTION

Lines Bros. will give free flight instruction by appointment on the Frog Aerodrome at Merton. Telephone: Liberty 1041.

Obtainable at all good Toyshops and Stores

COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19.

Please send me your NEW "Frog" coloured leaflet with particulars of the "Frog" Flying Club and how to obtain handsome enamelled Air Force pilot badges.

Name.....

Address.....

.....

Please write in block letters. 2-37

Sole concessionaires:

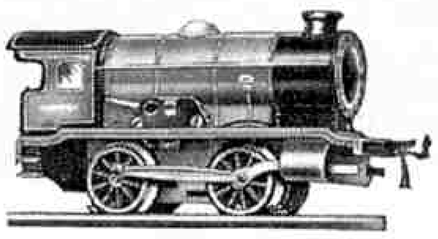
LINES BROS. LTD., TRI-ANG WORKS
MORDEN RD., MERTON, LONDON, S.W.19

HORNBY LOCOMOTIVES

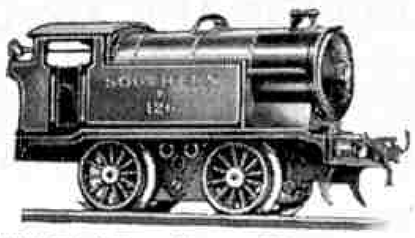
Boys! Increase the scope and efficiency of your model railway by adding to it one or two Locomotives from the selection illustrated and described below. These are the finest Locomotives of their respective types in the world.

Electric Models

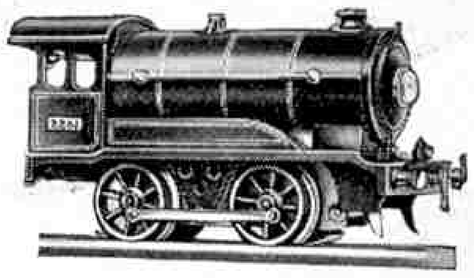
The Hornby Electric Locomotives have powerful smooth-running motors, with a low consumption of current. The new 20-volt Locomotives fitted with automatic reversing mechanism can be started, stopped, controlled for speed, and reversed entirely from the lineside. All Hornby Electric Trains are perfectly safe to operate.



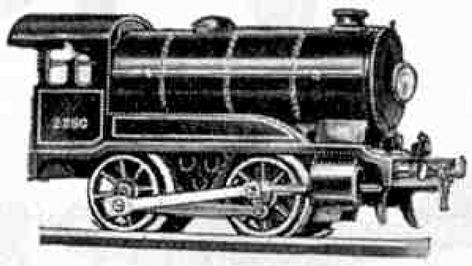
EM120 (20-volt) or EM16 (6-volt) LOCOMOTIVE
Non-Reversing. Available in either red or green. Price 8/6



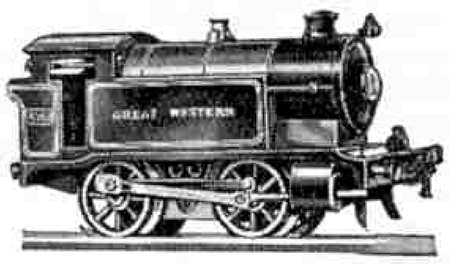
EM320 (20-volt) or EM36 (6-volt) TANK LOCOMOTIVE
Reversing. Available in red, with L.M.S.R. lettering, or green with L.N.E.R., G.W.R. or S.R. lettering ... ... Price 16/6



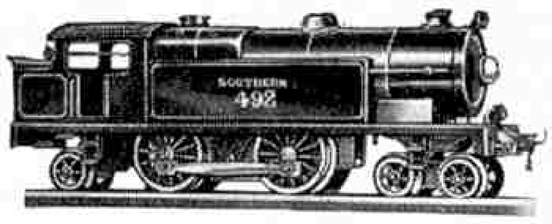
***HORNBY E020 (20-volt) LOCOMOTIVE**
Reversing ... ... Price 22/-



***HORNBY E120 (20-volt) LOCOMOTIVE**
Reversing . . ... Price 24/-

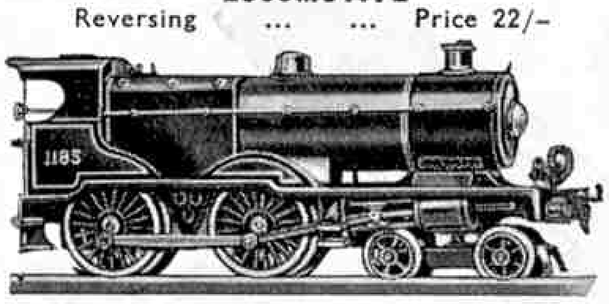


***HORNBY E120 (20-volt) TANK LOCOMOTIVE**
Reversing ... ... Price 24/-

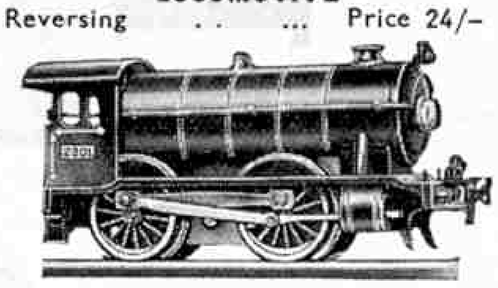


***HORNBY E220 SPECIAL TANK LOCOMOTIVE (20-volt)**
Automatic reversing ... Price 32/6

***HORNBY E26 SPECIAL TANK LOCOMOTIVE (6-volt)**
Reversing ... ... Price 30/-



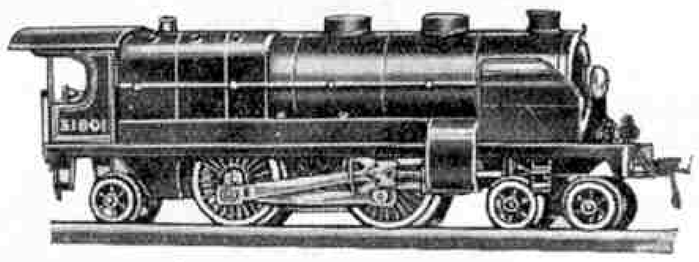
***HORNBY E220 SPECIAL LOCOMOTIVE (20-volt)**
Automatic reversing: L.M.S.R. "1185" ("Standard Compound" class), G.W.R. "County of Bedford" ("County" class), L.N.E.R. "Yorkshire" ("Shire" class), S.R. "A759" ("L1" class) ... ... Price 37/6



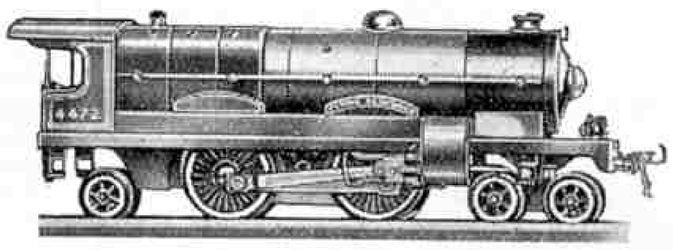
***HORNBY E120 SPECIAL LOCOMOTIVE (20-volt)**
Automatic Reversing. Price 30/-

***HORNBY EPM16 SPECIAL TANK LOCOMOTIVE (6-volt Permanent Magnet Type) (illustrated)**
Reversing. Can be run from a 6-volt Accumulator or from the mains through the Meccano Transformer-Rectifier. Complete with a 6-volt Terminal Connecting Plate, Speed and Reverse Control Switch and 3 feet of flex.
Price 33/6

***E120 (20-volt) SPECIAL ELECTRIC TANK LOCOMOTIVE**
Automatic reversing. Price 30/-



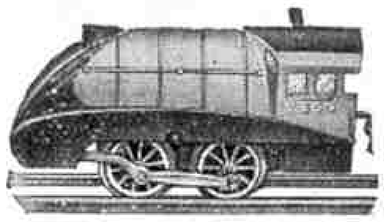
HORNBY E320 RIVIERA "BLUE" LOCOMOTIVE (20-volt)
Automatic reversing ... ... Price 35/-



***HORNBY E320 LOCOMOTIVE (20-volt)**
Automatic reversing ... ... Price 35/-

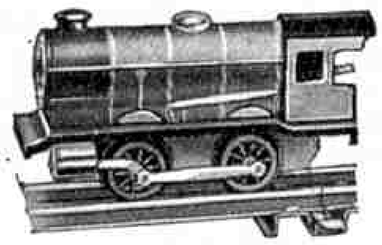
Clockwork Models

Hornby Clockwork Locomotives are the longest running spring-driven locomotives in the world. The motors fitted are of the highest quality, being perfect pieces of mechanism with accurately cut gears that ensure smooth and steady running.

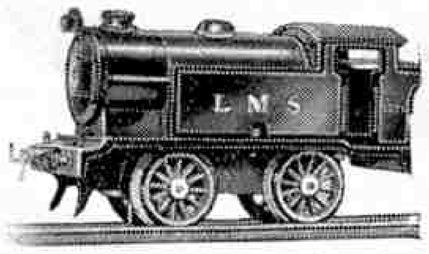


No. 0 "SILVER LINK" LOCOMOTIVE (illustrated)
Streamline Type.
Non-reversing. Price 3/6

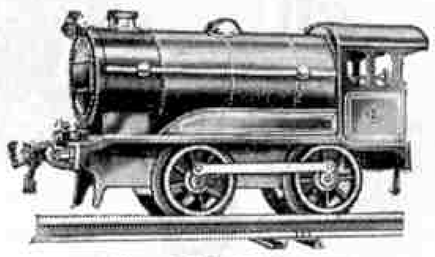
MO CLOCKWORK LOCOMOTIVE
Non-reversing. Available in either red or green. Price 2/9



M1/2 LOCOMOTIVE
Reversing. Available in either red or green ... Price 4/6

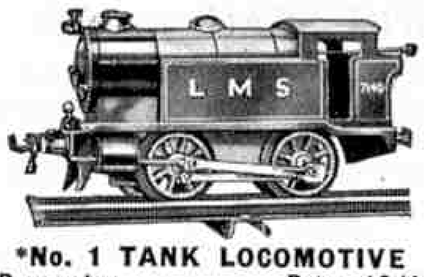


M3 TANK LOCOMOTIVE Reversing. Available in red with L.M.S.R. lettering, or green with L.N.E.R., G.W.R. or S.R. lettering. ... Price 7/6



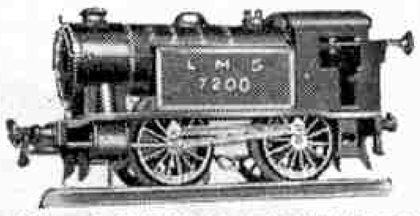
***No. 0 LOCOMOTIVE**
Reversing ... Price 10/6

***No. 1 LOCOMOTIVE**
Reversing ... Price 12/6

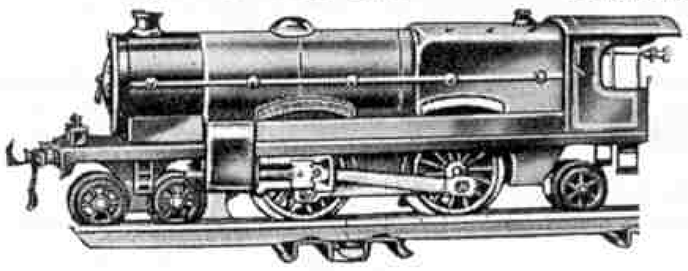


***No. 1 TANK LOCOMOTIVE**
Reversing ... ... Price 12/6

***No. 1 SPECIAL LOCOMOTIVE**
Reversing ... ... Price 17/6

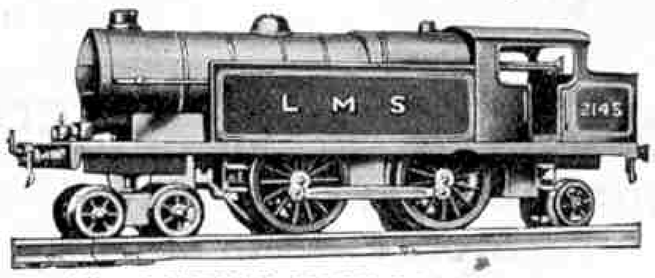


***No. 1 SPECIAL TANK LOCOMOTIVE**
Reversing ... ... Price 17/6



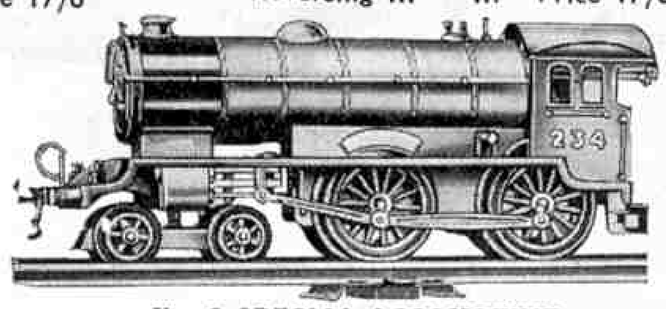
No. 3C LOCOMOTIVE (illustrated)
Reversing. "Caerphilly Castle" (G.W.R.), "Flying Scotsman" (L.N.E.R.), "Royal Scot" (L.M.S.R.), "Lord Nelson" (S.R.) ... ... Price 24/-

No. 3c RIVIERA "BLUE" LOCOMOTIVE
Reversing ... ... Price 24/-



***No. 2 SPECIAL TANK LOCOMOTIVE**
Reversing ... ... Price 21/-

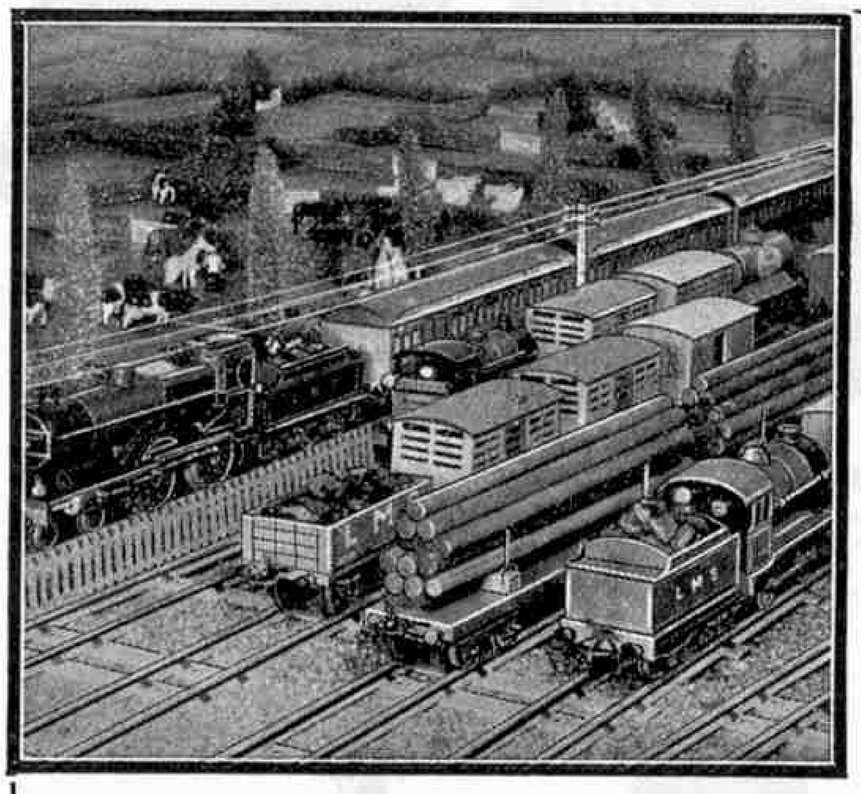
**Lettered and coloured to represent L.M.S.R., G.W.R., L.N.E.R. and S.R. Locomotives.*



No. 2 SPECIAL LOCOMOTIVE
Reversing. L.M.S.R. No. 1185 ("Standard Compound" class), G.W.R. "County of Bedford" ("County" class), L.N.E.R. "The Bramham Moor" ("Hunt" class), S.R. No. 1759 ("L1" class).
Price 27/6

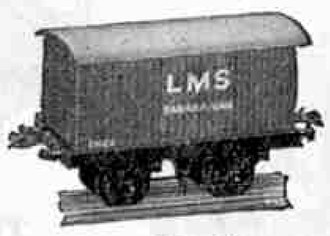
Manufactured by MECCANO LIMITED, Binns Road, LIVERPOOL 13

HORNBY ROLLING STOCK

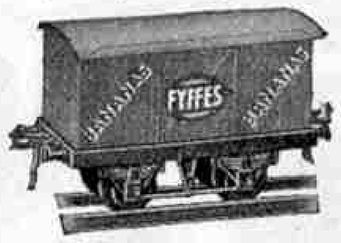


The Hornby Series includes a splendid range of realistic Rolling Stock. Each item is fitted with patented and exclusive automatic couplings, a special feature that places it in a class entirely of its own. There are Pullman Cars, Passenger Coaches, Guards' Vans, Tipping Wagons, Lumber Wagons, and many other types, all beautifully finished.

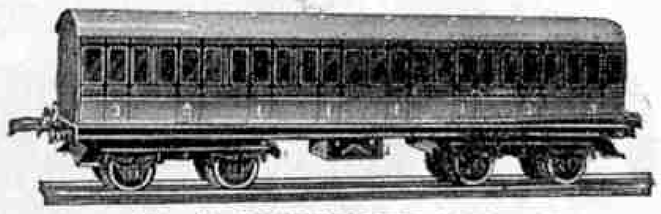
An attractive selection of Hornby Rolling Stock is illustrated and described on this page. Ask your dealer for a complete price list.



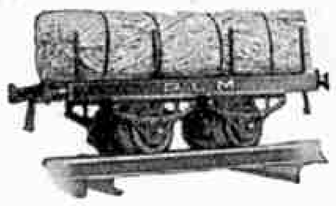
No. O BANANA VAN
Lettered L.M.S. only.
Price 1/9



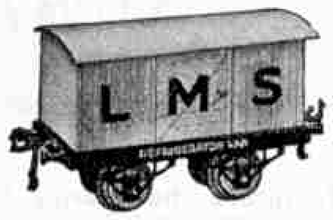
No. 1 BANANA VAN "FYFFES"
Sliding doors.
Price 2/9



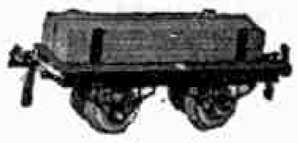
No. 2 PASSENGER COACH
Suitable for 2-ft. radius rails only First-third, or Brake-third. Available in the colours o the L.M.S., L.N.E., G.W. or S. Railway groups.
Price 7/6



FIBRE WAGON
This is an interesting model of a type of wagon used in France and other European countries.
Price 1/3

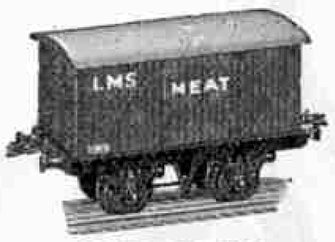


***GUNPOWDER VAN**
Finished in red. With opening doors. Price 2/9

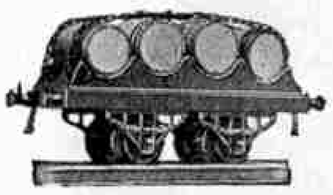


No. 1 TIMBER WAGON
Beautifully enamelled in yellow and red.
Price 1/6

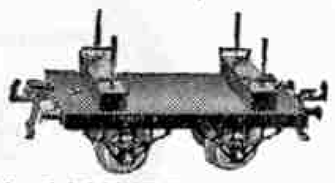
No. 1 SIDE TIPPING WAGON
Excellent design and finish. Lettered "Robert Hudson Ltd."
Price 2/-



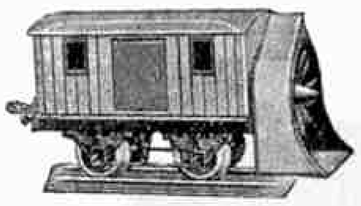
MEAT VAN
This is a very realistic model. Available lettered L.M.S only. Price 1/9



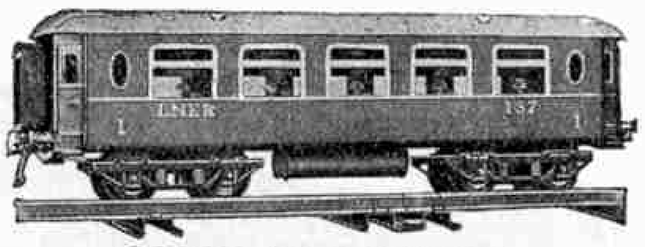
BARREL WAGON
This is another interesting model of a type of wagon used in France and other European countries.
Price 2/6



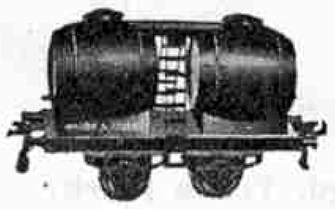
No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Price 1/6



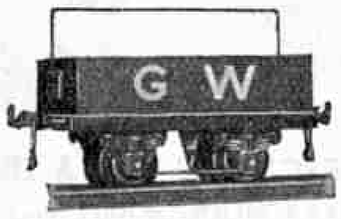
SNOW PLOUGH
With revolving plough.
Price 3/9



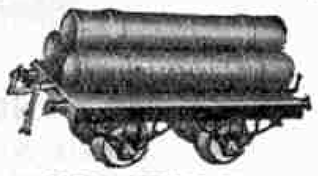
COACH, No. 2 SALOON
Realistic in design and beautifully finished. Two types are available: L.N.E.R. (as illustrated) enamelled brown, and L.M.S. enamelled maroon. Suitable for 2-ft. radius rails only.
Price 9/6



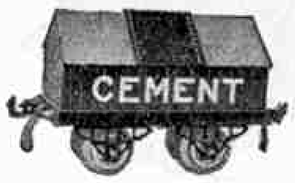
WINE WAGON DOUBLE BARREL
An attractive model artistically enamelled in red and green. Price 4/6



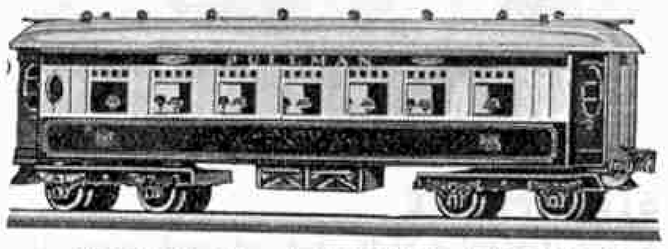
***OPEN WAGON "B"**
Similar to Hornby Wagon No. O but fitted with centre tarpaulin supporting rail.
Price 2/-



GAS CYLINDER WAGON
Finished in red, lettered gold. Price 1/11

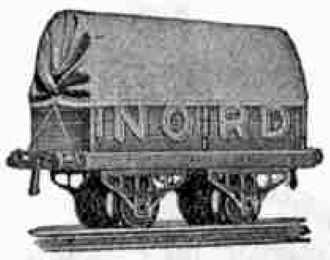


CEMENT WAGON
The door at the top opens. Finished in bright red.
Price 2/6

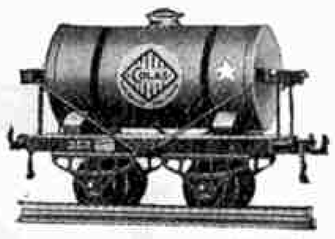


COACH, No. 2 SPECIAL PULLMAN
For 2-ft. radius rails only. Price 13/-

COACH, No. 2 SPECIAL PULLMAN COMPOSITE
For 2-ft. radius rails only. Price 14/-



COVERED WAGON (French Type)
This wagon is fitted with frame and sheet. Lettered "Nord."
Price 2/6



BITUMEN TANK WAGON "COLAS"
Finished in blue.
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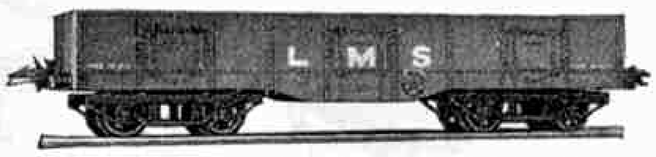
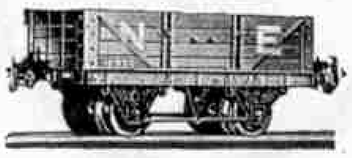
TROLLEY WAGON
Finished in brown and blue. Suitable for 2-ft. radius rails only. Price 3/9

TROLLEY WAGON
Fitted with two Cable Drums. Price 4/3



No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W.R. and L.M.S.R. "Loco Coal" Wagons, or L.N.E.R. "Brick" Wagon. For 2-ft. radius rails only. Price 3/9



***No. O WAGON**
Price 1/6

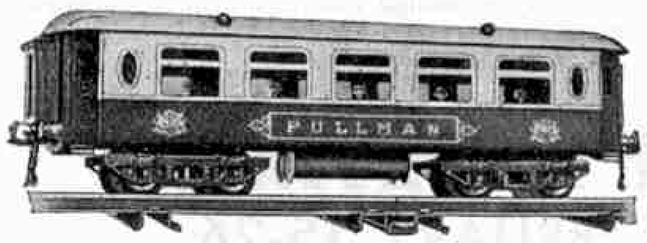
***No. 1 WAGON**
(Illustrated).
Price 1/9

COAL WAGON
Similar to Hornby Wagon No. O. Fitted with an embossed representation of coal. Price 2/3

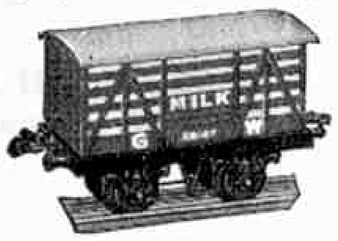
OIL TANK WAGON "MOBILOIL"
Finished in battleship grey. Price 2/-

No. 1 PETROL TANK WAGON, "SHELL-B.P."
Price 2/-

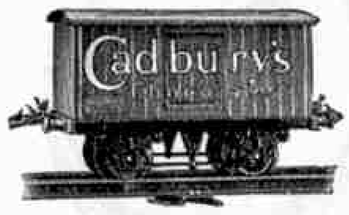
COACH
No. O "SILVER JUBILEE"
Articulated. Finished in silver and grey. Price 1/9



COACH, No. 2 PULLMAN
For 2-ft. radius track only. Price 9/6



No. O MILK TRAFFIC VAN
An attractive model. Available lettered G.W. only. Price 1/9



CHOCOLATE VAN "CADBURY'S"
This van is beautifully enamelled in blue with white roof. Price 2/9

No. 2 TIMBER WAGON
For 2-ft. radius rails only. Price 2/6

Lettered L.M.S., N.E., G.W. or S.R.

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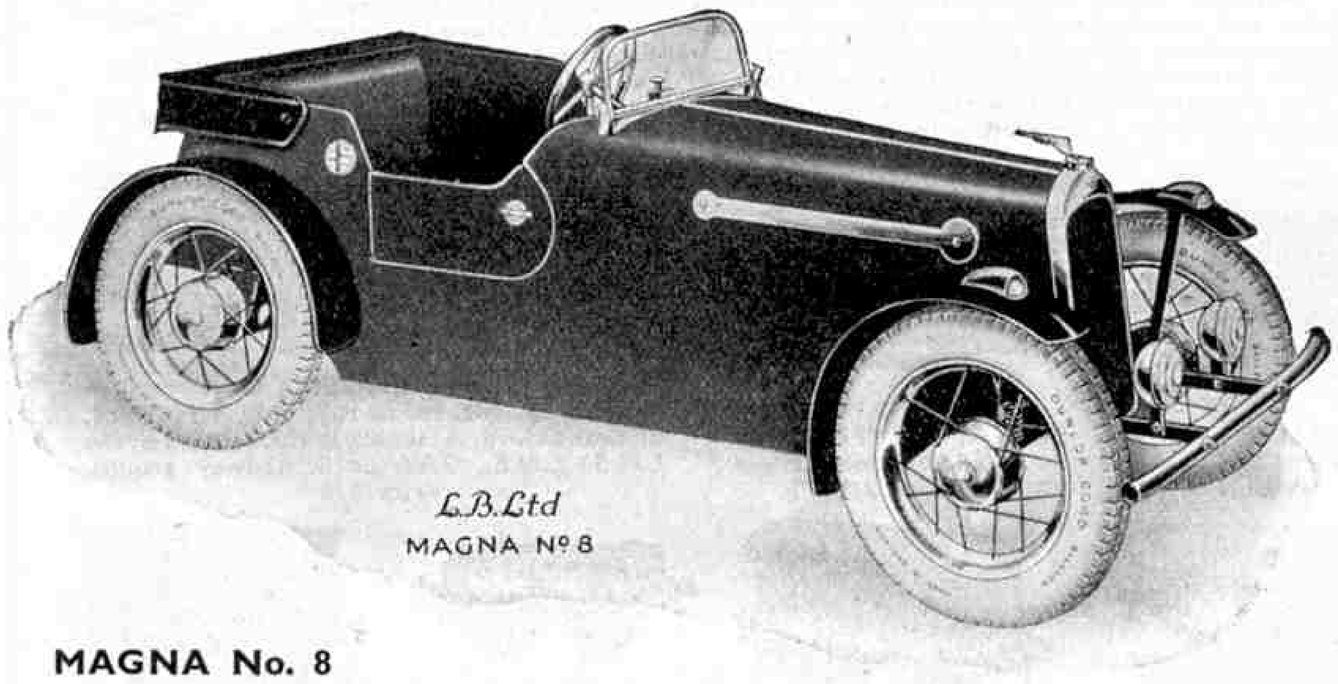
TRI-ANG

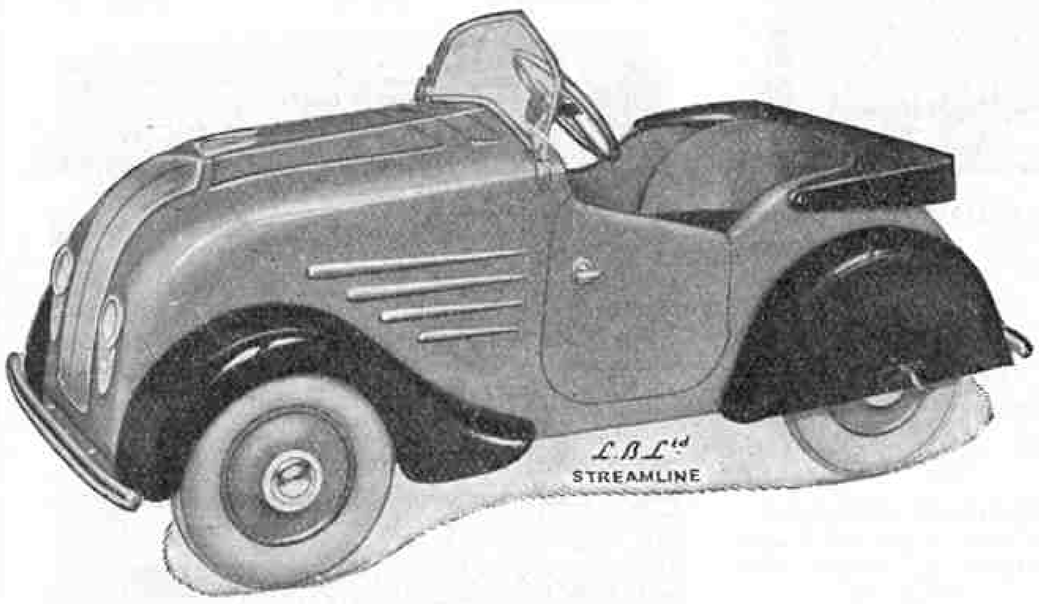


MAGNA No. 8

A magnificent sporting car, coach-built body fully sprung, ball-bearing back axle, opening side door, windscreen, dummy hood and lamps, tubular bumper, Dunlop pneumatic tyres on tangent spoke wheels, all bright parts CHROMIUM PLATED, including hubs and rims, louvres, bumper and stream- line mascot. Length 54 in.

TRI-ANG SPORTS

Realistic streamlined model, with opening side door and luggage boot, 8 in. balloon disc wheels, ½ in. rubber tyres, plated bumper and streamlined dummy side lamps, windscreen, direction indicator and dummy hood. Length 41 ins.



STREAMLINE

A real streamline body made of steel, crank drive on ball-bearing back axle, facsimile airflow radiator, four dummy lamps, tubular bumpers back and front, windscreen and direction indicator, balloon disc wheels and rubber tyres. Length 45 in.

TRI-ANG TRICYCLE No. 5 (Regd. Trade Mark)

FITTED WITH REAR MUDGUARDS, cycle chain drive with free-wheel, frame best quality weldless cycle tubing, 14 in. wheels, 1⅛ in. jointless sponge-rubber tyres, rim brake, coil-spring saddle, CHROMIUM FITTINGS. Black, blue or maroon.

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Tubular frame, 14 in. wheels, 1⅛ in. grey imitation pneumatic tyres, ball-bearing pedals, rim brake, two-coil saddle, chain cover, stand, CHROMIUM-PLATED FITTINGS. Black, blue or maroon.

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MECCANO MAGAZINE

Editorial Office:
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Vol. XXII. No. 2
February, 1937

With the Editor

Rotary Airports for Large Cities

This month's cover is of exceptional interest in that it gives some idea of what our great cities may look like in the future. The purpose of the huge rotating elevated platform shown is to allow aeroplanes to take off from the heart of a busy city, or to land there, and an article on page 70 of this issue explains how it will work.

Some means of bringing passengers by air into the very centres of thickly populated areas undoubtedly will have to be found if air traffic is to be developed to the full. The rotary airport, the invention of Captain Frobisher, seems to afford a solution of the problem, and possibly the day may not be far distant when huge landing platforms, mounted on a single immense building or on a ring of skyscrapers, will be prominent features of all large cities. There is nothing to worry modern engineers in their construction. In effect it is only like asking them to build a cantilever a little longer than any one of the three cantilevers of the Forth Bridge, on a giant reinforced concrete structure.

Most people will want to know if there would be any danger from machines using a rotary airport. There would be little fear of aeroplanes running over the edge, for they would have plenty of room in which to land; but Captain Frobisher has foreseen this possibility, and has included among the inventions connected with his airport magnetic retarders that would act as brakes in the event of any threatened over-running. The risk of accident due to engine failure immediately after taking off actually would be less than it is to-day at ordinary aerodromes, for machines would begin their flights at heights of 400 ft. or more. Thus, even if the engines failed, there would be more time for finding an emergency landing ground and gliding into it.

Railway Centenaries in 1937

This year is one of exceptional interest to the railway world, for it brings with it a number of notable centenaries. By 1837 railways were springing up in all directions, or were being eagerly planned, and many of the small lines that were first brought into operation during that year have since become parts of great and important systems. For instance, the first sections of the London and Birmingham Railway were opened in 1837, that from Euston to Boxmoor on 20th July and from Boxmoor to Tring on 16th October. The London and Birmingham Railway became a part of the London and North Western Railway, which is now a very important section of the present L.M.S.R. This centenary is of special interest in view of the plans now being made for reconstructing Euston Station, the oldest of the great railway termini of London.

Another centenary of 1937 is that of the railway from Birmingham to Warrington, known as the Grand Junction Railway. This was opened throughout on 4th July 1837, and completed railway communication between Birmingham and Liverpool and Manchester.

Railway pioneers were equally busy 100 years ago in Scotland, where several short lines were opened. As was not uncommon in those early days, the line from Paisley to Renfrew, 3¼ miles in length, was worked by horses.

It is interesting to find that the centenary of the opening of the railway out of Euston is also that of the application of the electric telegraph to railway working, for Wheatstone's apparatus for this purpose was tried out between Euston and Camden Town a few days after the section from Euston to Boxmoor had been opened. There were other interesting railway events in 1837, and I hope to include descriptions of many of these during the year.

"M.M." Writer's Tragic Death

I am sure that all my readers will be sorry to hear of the recent death in tragic circumstances of Mr. R. D. Gauld, whose articles in the "*M.M.*" on railway engineering matters have always been very highly appreciated. His last contribution appeared in November 1936, and dealt with old locomotives and where to see them. Mr. Gauld was Resident Engineer, Bridges, of the L.M.S.R. (Manchester). In the course of his duties he was examining a bridge across the River Derwent at Brigham, near Cockermouth, that was in course of demolition, when the structure collapsed and he and Mr. Riddett, the foreman, and two other men were thrown into the river, which was swollen by floods. Two of the men reached the bank, but Mr. Gauld and Mr. Riddett were swept away by the swift current.

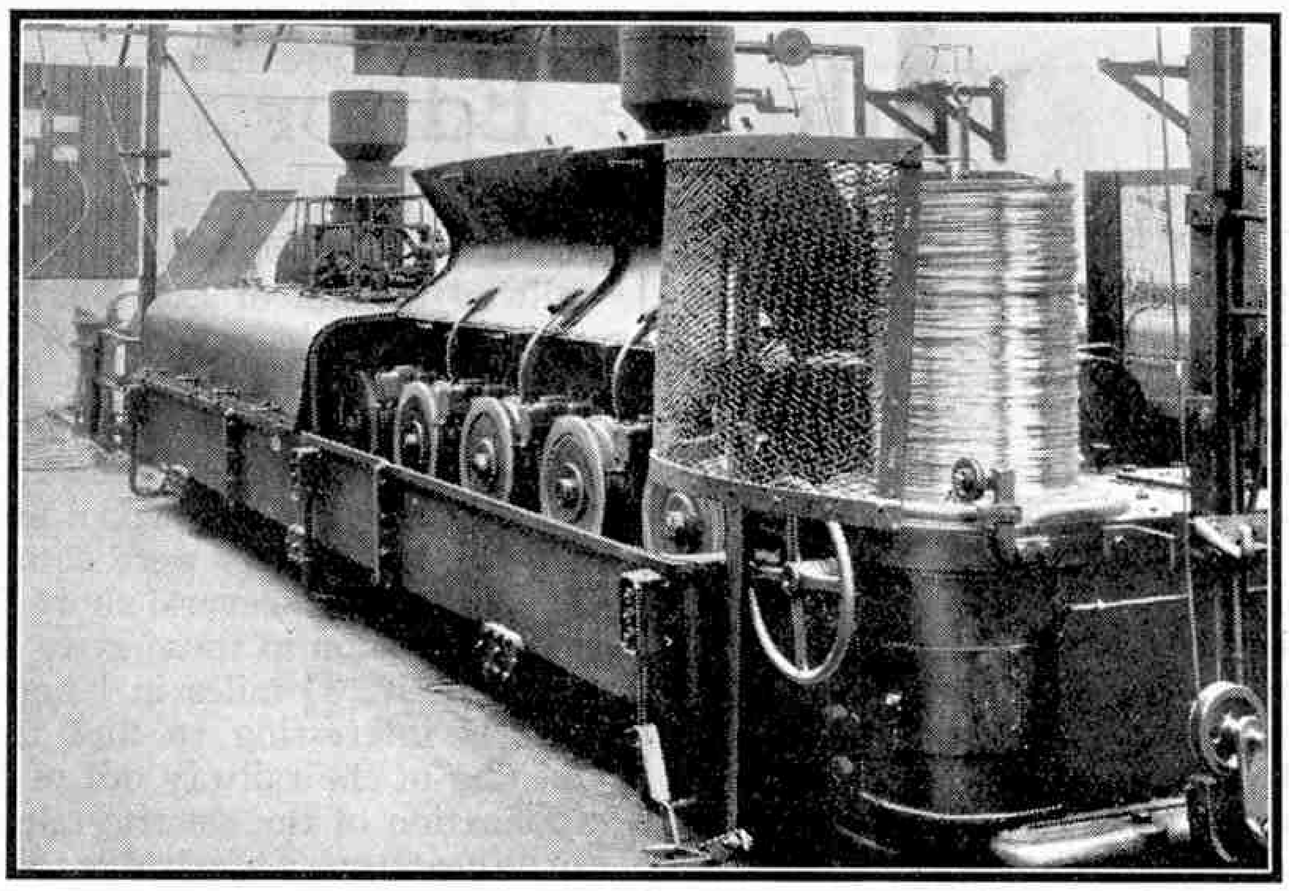
Everybody who met Mr. Gauld liked him. A correspondent of "*The Railway Gazette,*" in an appreciation, wrote: "Gauld was a man who endeared himself to everyone with whom he worked and had a charm that was all his own. After hours of rains and cold on works he could still summon up that pleasing smile, which wrinkled up round the corners of his eyes, either to labourers or others. His keenness for work was tremendous. . . . We have lost one who could ill be spared, a courageous engineer, always sharing the place of danger with his men. His last words as he floated down that cruel river in terrible spate were 'look after Riddett,' after which characteristic expression he very shortly met his end."

Making Electric Cables

Interesting Machines and Processes

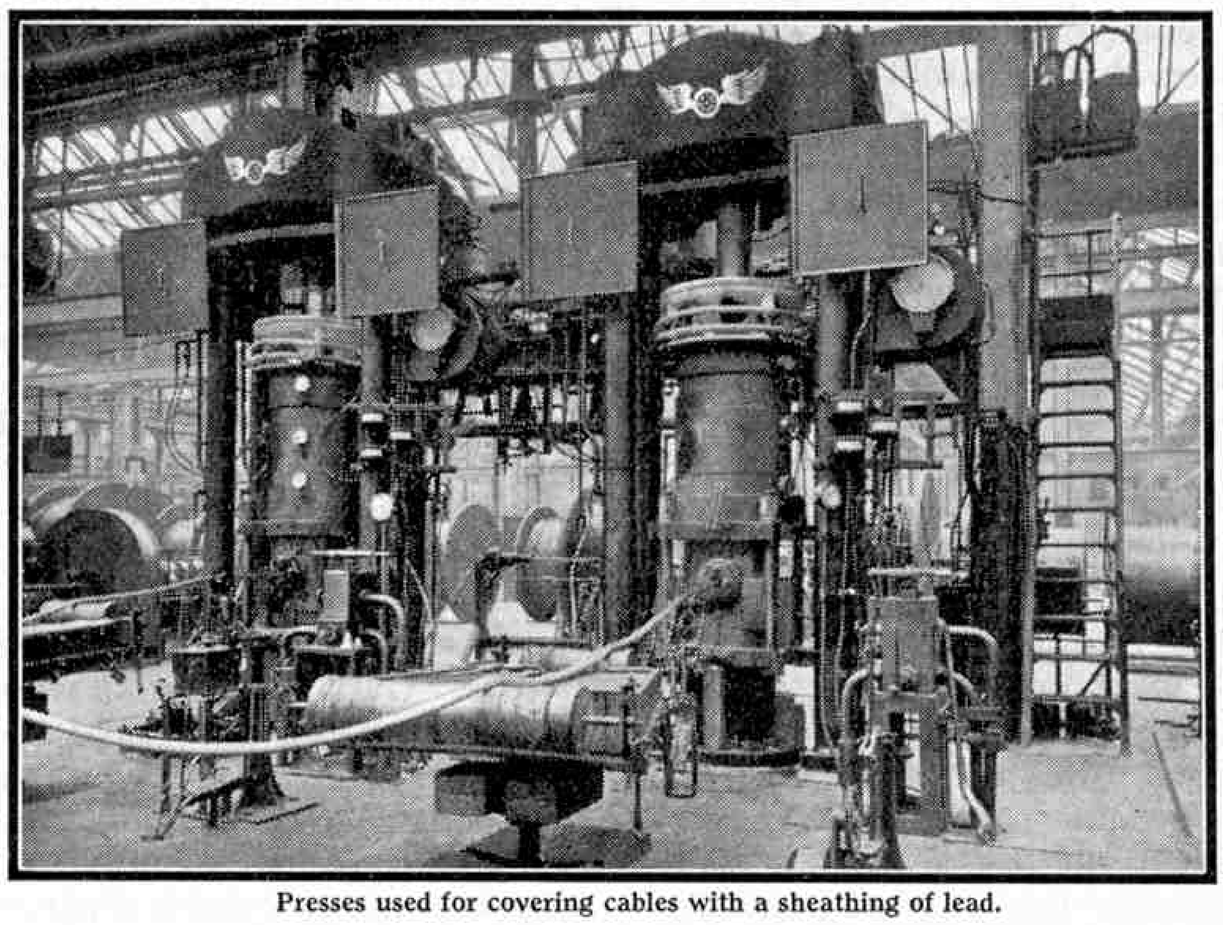
ALTHOUGH there does not appear to be much connection between ladies' dresses and hair curlers for Lancashire mill girls on the one hand, and high tension electric cables on the other, it was interest in the manufacture of the former articles that led to the establishment of the famous firm of W. T. Glover & Co. Ltd., cable makers of Trafford Park, Manchester.

In the days when the crinoline was the fashion for ladies, those weird and wonderful creations were supported on a framework of steel strips or wires. At first these strips were uncovered, but it was found that the steel was liable to damage the containing fabric, or cut through it, especially if it became rusty. As a protection against this action, the strips were braided with cotton, a development that was brought about by Mr. Walter Glover in association with a Nottingham engineer, Mr. James, towards the close of the sixties of last century when crinolines were most fashionable.



A heavy gauge wire drawing machine used in making electric cables. We are indebted to W. T. Glover and Co. Ltd., Trafford Park, Manchester, for the illustrations to this article.

At that period the mill girls of Lancashire, no less than mill girls of to-day, were anxious to make themselves attractive. Bobbed and shingled hair were then undreamed of, and the girls of the time tried to look their best by developing a fine display of curls. Screws of paper and strips of rag were used to produce these, but a better means was introduced in the form of pieces of lead wire about 3 in. to 4 in. in length. These were braided with cotton in the manner mentioned. The braiding kept the lead from making contact with the hair. As the wire was soft and pliable, it became an easy matter, after the hair had been rolled on to it, to bend it so that there was no uncurling.



Presses used for covering cables with a sheathing of lead.

In the early days of electricity it became necessary to provide some form of protection and insulation for the conductor wires. A braiding of some kind seemed to be the solution to the problem, and the machines used by Glovers for braiding hair curlers proved to be exactly what was needed to cope with such requirements.

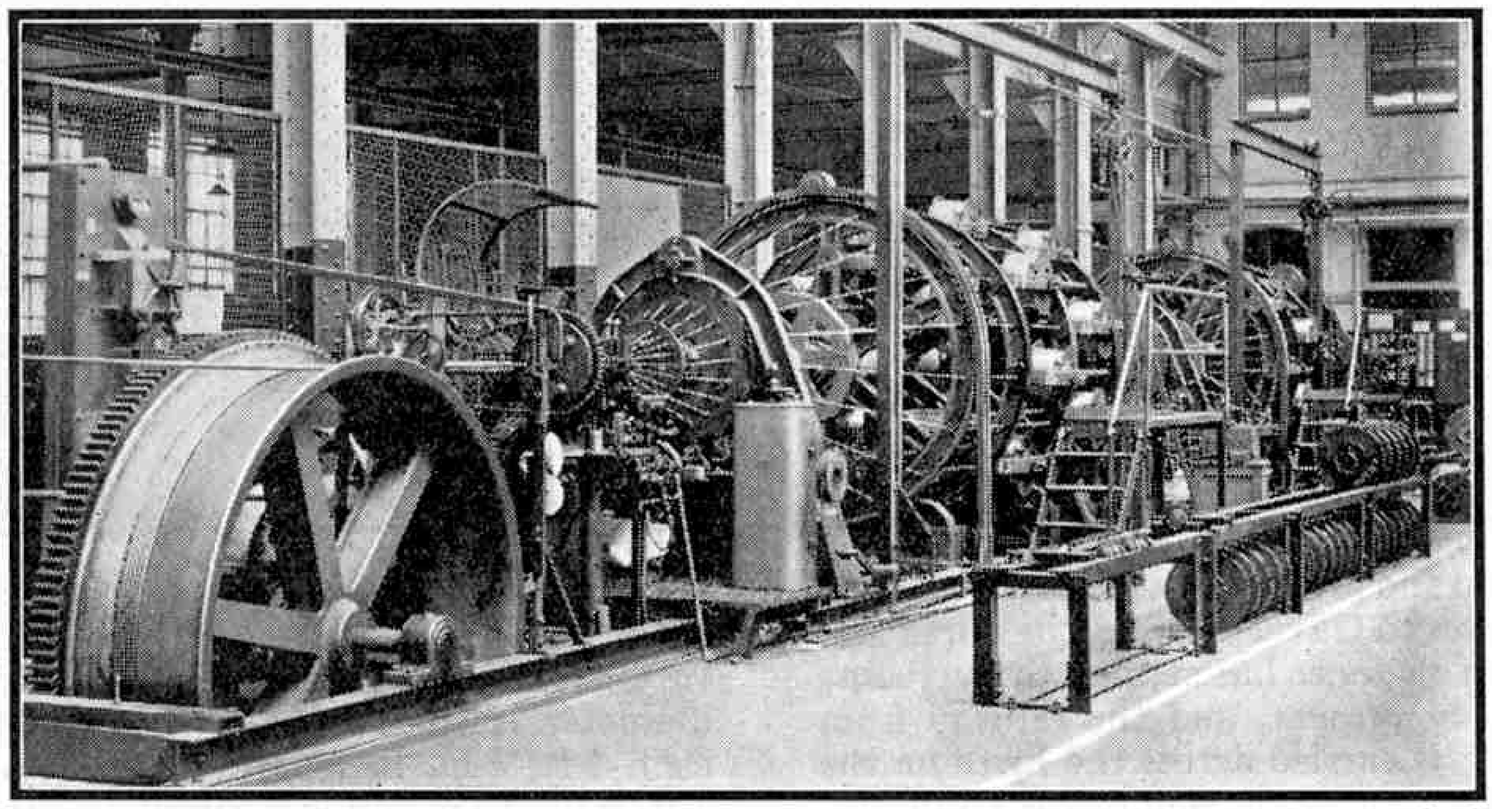
It was soon found that something better was required, however, and a wrapping of pure rubber was then applied to the copper before braiding it. At a later date the braids were made more effective by treating them with pitch compounds. Further layers of rubber and tapes afterwards were embodied. The art of vulcanising was next applied, and eventually a stage was reached when something very like the taped and braided rubber insulated cable, commonly known as V.I.R., or vulcanised indiarubber cable, of the present day came into being.

At first the developments were chiefly in connection with telegraph, telephone and bell requirements, but the introduction of electric lighting led to a demand for insulated conductors of an improved character. For technical reasons, as well as on account of cost, it was found inadvisable to use rubber cables as underground electric mains, and there came into use a system of copper conductors with jute wrappings, impregnated with an oily insulating compound, and sheathed over all with lead. Subsequently cables insulated with impregnated paper and bitumen were introduced. The former came into use about 1896 and the latter about 1898.

The manufacture of cables entails a number of very interesting processes and the use of highly ingenious machines, some of which are illustrated on this and the opposite page. The cables turned out at the Trafford Park Works have copper conductors of various sizes, ranging from those suitable for ordinary lamp flex to those required for extra high tension cables, which have diameters up to 5 in.

The metal from which the conductors are made is received from the rolling mills in the form of coils of copper rod. This is drawn down through dies in order to reduce it to wire of the size required. The larger dies are made of special steel, and the smaller ones contain diamonds perforated with holes of the necessary diameter.

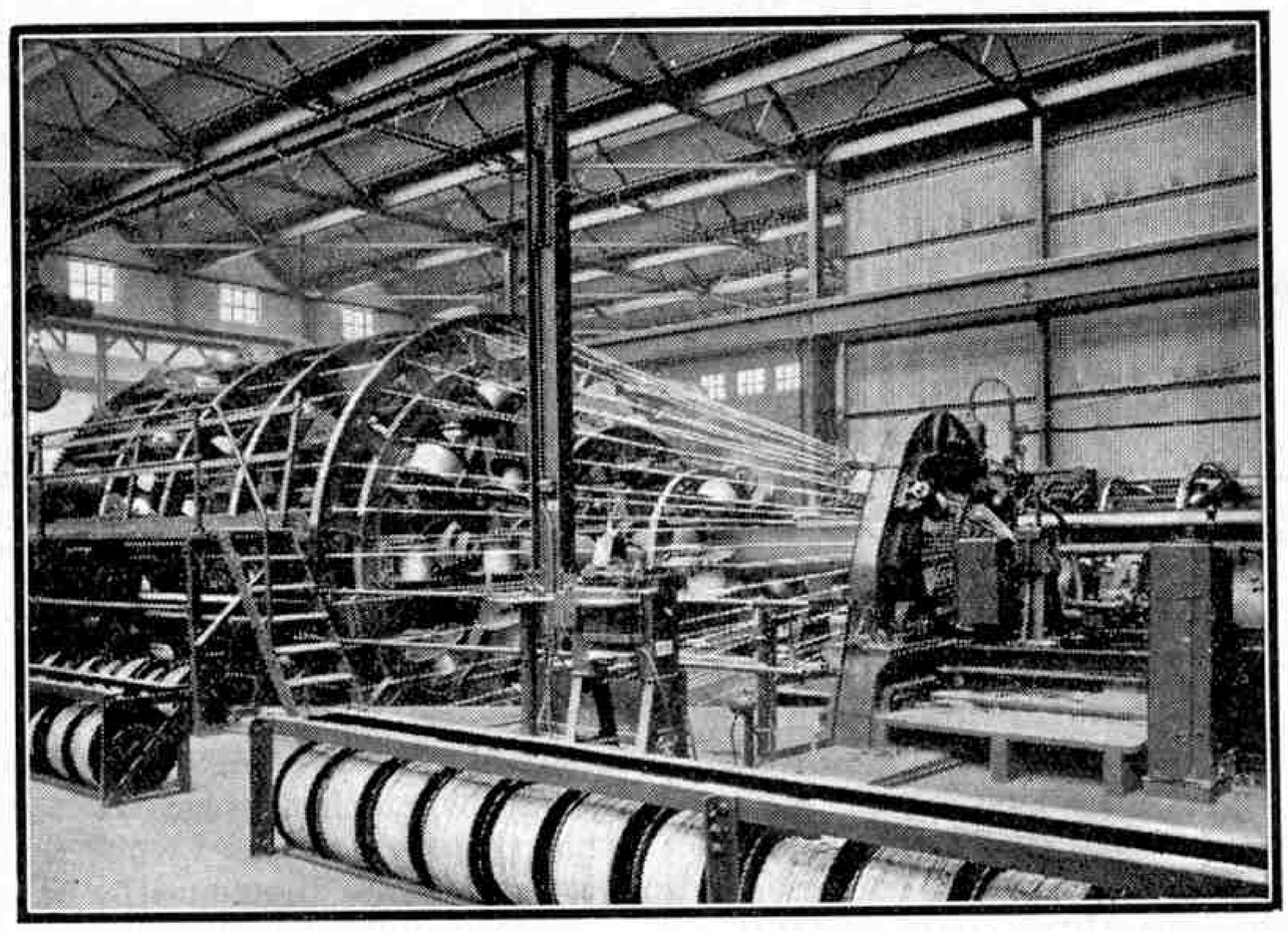
After softening or "annealing," the wire that is to be used in conjunction with vulcanised insulating materials is next tinned. The purpose of this is to protect the insulating material, or "dielectric," as it is usually called, from chemical action that would be caused by contact with the copper. The wire is then stranded on ingenious machines according to the size and flexibility of the conductor required.



One of the great stranding machines at the Trafford Park Works, in which a number of separate wires are twisted together to give a conductor of the required size.

The wire is next passed on to the sections of the works devoted to the insulation of conductors, and the processes through which it passes there depend on the purpose for which the finished cable is needed. The materials used include rubber, bitumen and paper, and these are fed in from the mills in which the rubber and bitumen are treated and the department in which the paper is prepared.

The rubber mills are chiefly notable on account of the large calenders or rollers through which the material is passed during the cleaning and mixing processes. Pure rubber is used next to the conductor. In preparing it for use it is converted into sheet, and later into strip, and both it and the mixed rubbers used for outer coverings are applied to the conductor either by lapping, pressing or forcing machines. The last-named machine used for forcing is almost a replica of the apparatus used for turning out sausages.



Cables for use underground are usually protected with steel wire or tape, which is applied to the wrapped conductor by a machine such as that shown in this illustration.

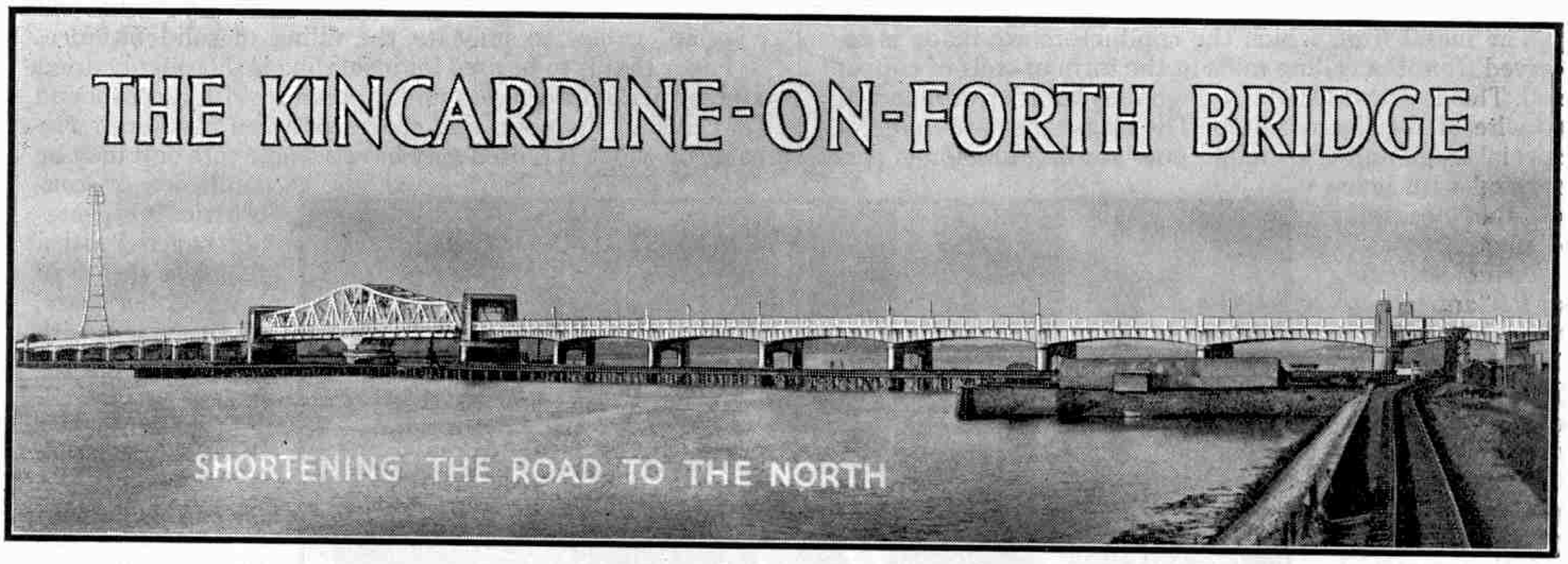
Bitumen insulation has the water-resisting properties usually associated with rubber, and cables incorporating it are very largely used in connection with mines and similar places. These cables are now constructed without the fibrous wrappings over the insulated cores, on which it has hitherto been customary to depend for mechanical strength. Their stranded copper cores are filled with the bituminous compound in such a manner that it is impossible for moisture introduced as the result of mechanical damage to travel along the interior of the cable. They are known as "Solbit" cables to indicate the filling of solid bitumen.

Paper that is to be used for insulating is thoroughly dried, and is then impregnated under pressure with a compound that fills all the pores and spaces between the fibres. The cable on which it is used may have a single core or it may be multicore or concentric. It is generally covered with a seamless sheath of lead, either bare, or protected with armour in the form of steel wires or tapes. It is used for many purposes, but chiefly for underground work in connection with the transmission of electrical energy in bulk. Cables of this type are generally worked at pressures varying between 250 and 66,000 volts.

High tension feeders are often protected by means of a copper test sheath under the lead, the two metals being separated by a thin wall of paper. This is a device, patented by W. T. Glover and Co. Ltd., whereby it is possible to detect the presence of moisture that may have entered through a fault before it penetrates to the conductors. Such a cable can be cut out automatically when a fault occurs, and the position of this can readily be found.

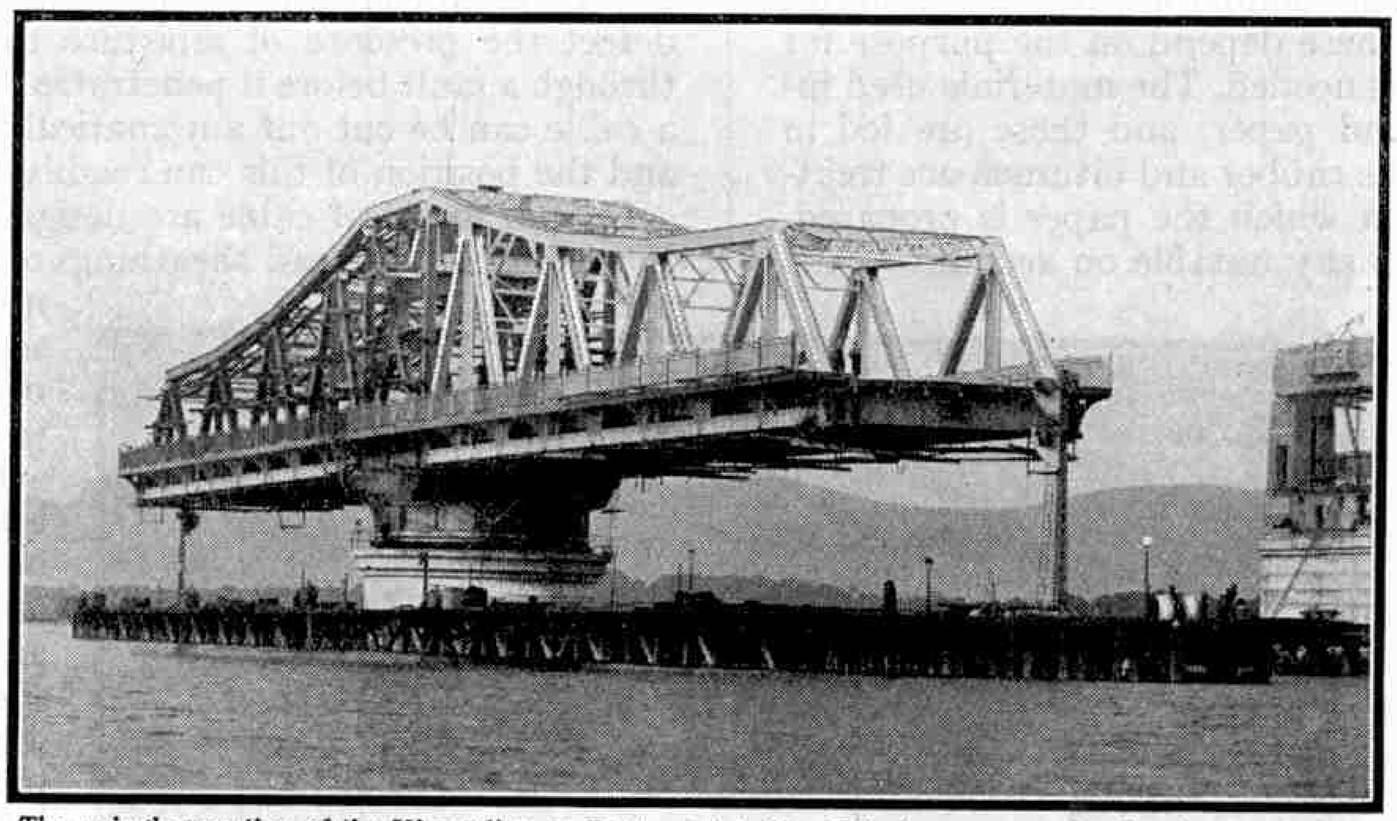
Special forms of cable are designed for particular uses. For example, the lead sheathings of ordinary cables would not be serviceable in some positions because of their liability to electrolytic or corrosive action. Leadless or paper bitumen cable can then be used. This has paper insulation, covered with an overall watertight sheath of bitumen instead of lead, and can withstand higher electrical stresses than if the insulation were composed solely of bitumen.

A particularly interesting special form of conductor is the dry core cable used for trunk, telegraph and telephone services. This is almost always drawn into conduits laid in the ground, and has come into existence because of the constant interruptions that bad weather causes in overhead line services. It consists of a large number of wires of small diameter, each insulated with unimpregnated paper. Coloured papers are used to make the different circuits easily recognisable, and there is no difficulty in making joints even in a cable that has as many as 2,000 conductors. The insulation is lapped loosely, so that moisture can be removed by pumping dry air through any section of cable between one manhole and the next.



THE River Forth and the Firth into which it flows have always been obstacles to travel between the north and south of Scotland. The engineer has striven to overcome the difficulties that they present, and the railway from Edinburgh to the north is carried across the Firth on the Forth Bridge, one of the greatest of engineering triumphs. Until recently crossings by road could only be made at Stirling Bridge or points above it, however, and the Firth and the river below this bridge penetrate so far inland that it was necessary to go a long way round when travelling between Edinburgh or Glasgow and places on the north side of the waterway.

In order to shorten journeys to and from the north a magnificent new road bridge has been built across the Forth at Kincardine, about 10 miles nearer the sea than Stirling. It was opened on 29th October last year, and shortened the distance by road between Edinburgh and Glasgow and important cities and industrial areas in the north by about 20 miles, thus reducing the travelling time considerably.



The swinging portion of the Kincardine on Forth road bridge. This turns on a roller bearing nearly 37 ft. in diameter, mounted on the circular concrete pier, and when opened leaves a passage 150 ft. in width on each side for river traffic. Photograph by courtesy of the General Electric Co. Ltd.

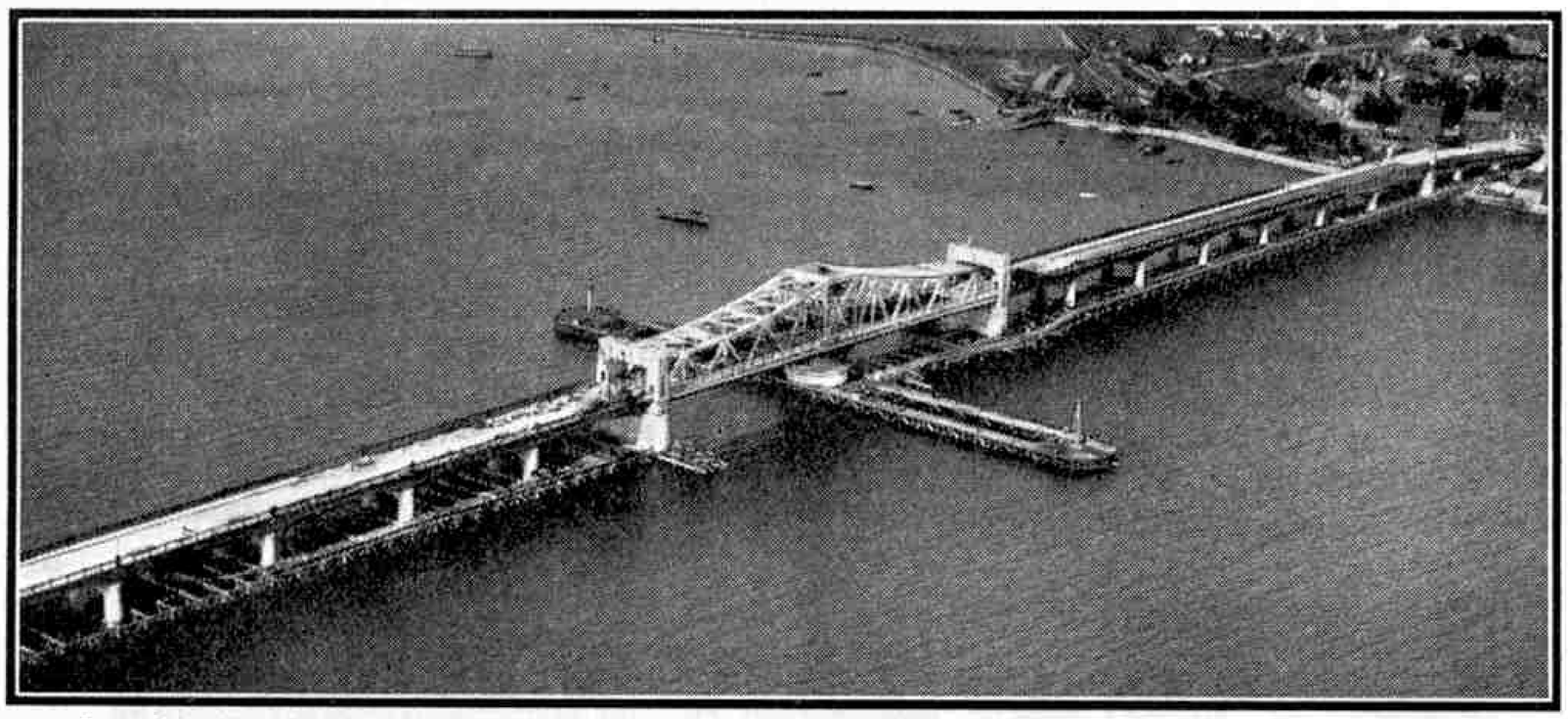
The new bridge stretches between Kincardine on the Fifeshire shore and Higgins Neuck in Stirlingshire. It is of great length and is built in three sections. From each shore there stretches a fixed structure of seven spans, each 100 ft. long, and the two are connected by a swing bridge in the middle of the stream. This moving part of the bridge is 364 ft. long. On the north shore three spans of 60 ft. each carry the road over the tracks of the L.N.E.R., and at the south end of the bridge there is a structure of nine spans, each 50 ft. in length and a reinforced concrete viaduct 263 ft. long. Thus the bridge is 2,675 ft., or about half a mile in length, and is one of the longest road bridges in the country. In addition, on the north and south there are embankments 400 ft. and 450 ft. long respectively.

Apart from the great length of the bridge the most impressive feature is the massive swing span, the heaviest in Great Britain. It weighs altogether 1,600 tons, and when it swings open leaves a passage 150 ft. in width clear for navigation on each side. It is a double cantilever structure, carried on an enormous roller bearing nearly 37 ft. in diameter. In this bearing there are 60 tapered steel rollers, each 1 ft. 4 in. in length, with an average diameter of 1 ft. 8 in. They run in a circular path between the upper and lower members of the bearing. The upper member is bolted to the underside of a drum girder forming part of the steelwork of the moving span and eight radial girders each 3 ft. 3 in. in depth connect it to a collar round the pivot of the swing span. This pivot rests on a base with a diameter of 7 ft. 6 in.

The moving span was built in the open position, in order not to interrupt the passage of vessels up and down the river, and special care had to be taken during its erection to make sure that the lower roller track was level and that the pivot was centrally placed. The whole of the top of the pier on which the swing span is supported was enclosed in a hut to protect the surveying instruments used. The position of the ring forming the lower roller track was accurately adjusted by driving wedges in pairs under it, and the concrete bed was completed by pouring cement into the spaces between the wedges when these were in place. A final test then showed that the engineers had worked to an accuracy of between two and three thousandths of an inch.

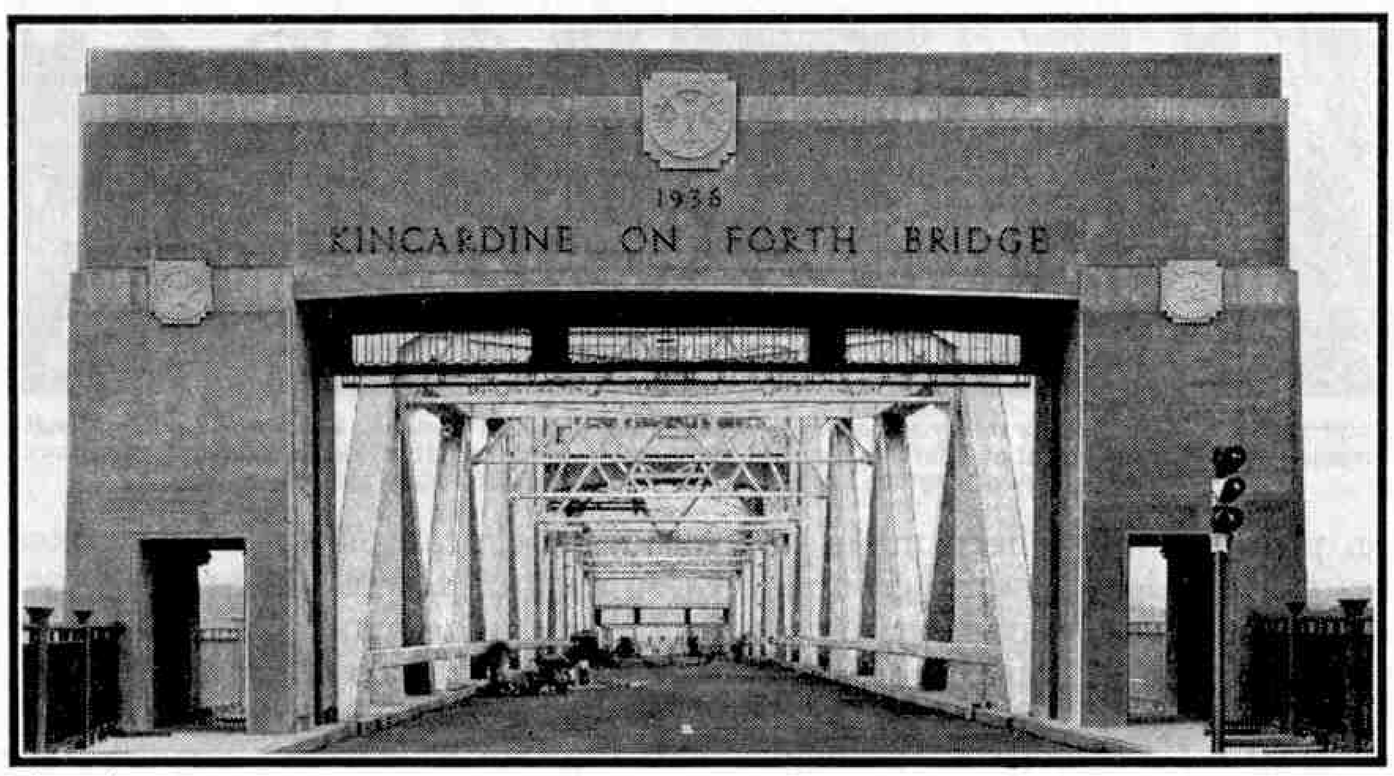
So carefully has the bridge been designed and constructed that the great mass of 1,600 tons can be swung round with ease and brought to rest in exact line with the fixed part of the bridge. The cabin for the operator in charge is in the centre of the span, 30 ft. above the roadway, and from it he controls the turning gear and the various signalling devices installed, and opens and closes the traffic gates at the ends of the roadways on the fixed portions. On his desk are coloured lights that show him the exact position of the bridge and the indications of his signals.

The machinery that turns the span is housed under the roadway, and above the drum girder at the base of the steelwork. It consists of two 50 h.p. direct current motors. These obtain current from an 80 kW motor generator set, which is connected to the mains through brush gear and slip rings on a column bolted to the pivot round which the bridge turns. A submarine cable from shore leads the mains current to the rings carried by the column. There are 60 of these, and the supply is taken also to the lamps and signals, and the motors that open and close the traffic gates. A sheet steel casing encloses the slip ring column and the current is automatically cut off when the door bolt of this casing is shot back to open it for inspection or adjustment. No risk of being unable to turn the bridge can be allowed. An auxiliary Diesel engine plant therefore is installed to supply power to operate the bridge in the event of failure of the mains supply, and with it the swing span can be turned at half the usual speed.



An aerial view of the bridge, showing the jetty under the swing span, with semaphore signal masts at each end.

Entrance to the swing span is given at each end through a portal on the fixed part of the structure, and is controlled by means of traffic lights. When the bridge has to be opened to allow ships to pass, the operator in the control cabin closes switches that give the necessary current supply to the motors and then turns a handwheel, which passes over studs that bring about in their correct order the many operations that are necessary. The green traffic lights on the bridge are changed through amber to red and warning bells are rung, while lights above the footpaths also are changed to red. When all is clear an assistant operator on the roadway at the span signals to the operator in the control cabin by means of a bell, and the latter is then able to close the gates on the fixed span, for ringing the bell releases an interlocking device. The gates then descend in the same manner as the portcullis of a castle, rapidly until they are about a foot above the surface of the bridge and then more slowly.



The swing span seen through one of the portals giving access to it. We are indebted to the Cleveland Bridge and Engineering Co. Ltd., Darlington, the builders of the bridge, for the illustrations on this page.

The warning bells are silenced when the gates have been lowered, and a semaphore arm at the end of each jetty falls to indicate to waiting vessels that the bridge will be open in about four minutes. The wedges and bolts that lock the span in position are then withdrawn and the bridge swings round. The current is cut off when the movement is nearly completed, and the speed of the span decreases until it comes to rest fully open. The brakes are then applied, not to stop the movement of the bridge, but to prevent movements due to side winds. Normally it is easy for the operator to see exactly where the span is at any time during its movement, but in bad weather he can make use of an indicating dial in his cabin for the same purpose.

When the bridge is open a second semaphore arm on each jetty is lowered, and a short blast is sounded on sirens, as signals that the bridge is open for river traffic. At night the appearance of two amber lights, one below the other, shows that the waterways are clear for shipping. It is not always necessary to open the bridge to allow shipping to pass through, however, for there is a clear headway at high tide of 30 ft. and a large proportion of the vessels using the river can pass under the swing span when it is closed.

The bridge is closed by moving the handwheel in the opposite direction, when operations are reversed. The swing span must be accurately lined up before the gates can be opened and the road traffic lights changed to green, and two independent means of ensuring this have been adopted. One of these is visual. A vertical wire is fixed in the control cabin in the exact centre of the bridge, and the movement is continued until the operator sees this exactly in line with a target on the fixed span portals. The target is a narrow vertical strip brilliantly illuminated with white light, and it is easy for the operator to know when it is coming into view, whatever the direction in which the bridge is turning, for on one side of it is a red light and on the other a green one. This sighting system works well by day or night. In the second system photo-electric cells are used to intercept beams of light, the result of which is to cause a signal lamp on the operator's desk to light up when the bridge is exactly in position. A warning bell is rung when the bridge slightly overshoots its mark. The movement of the bridge can then be reversed through very slow motion gear. A safety device makes it impossible for the bolts that secure the bridge to the portal to be closed until the bridge is exactly in line.

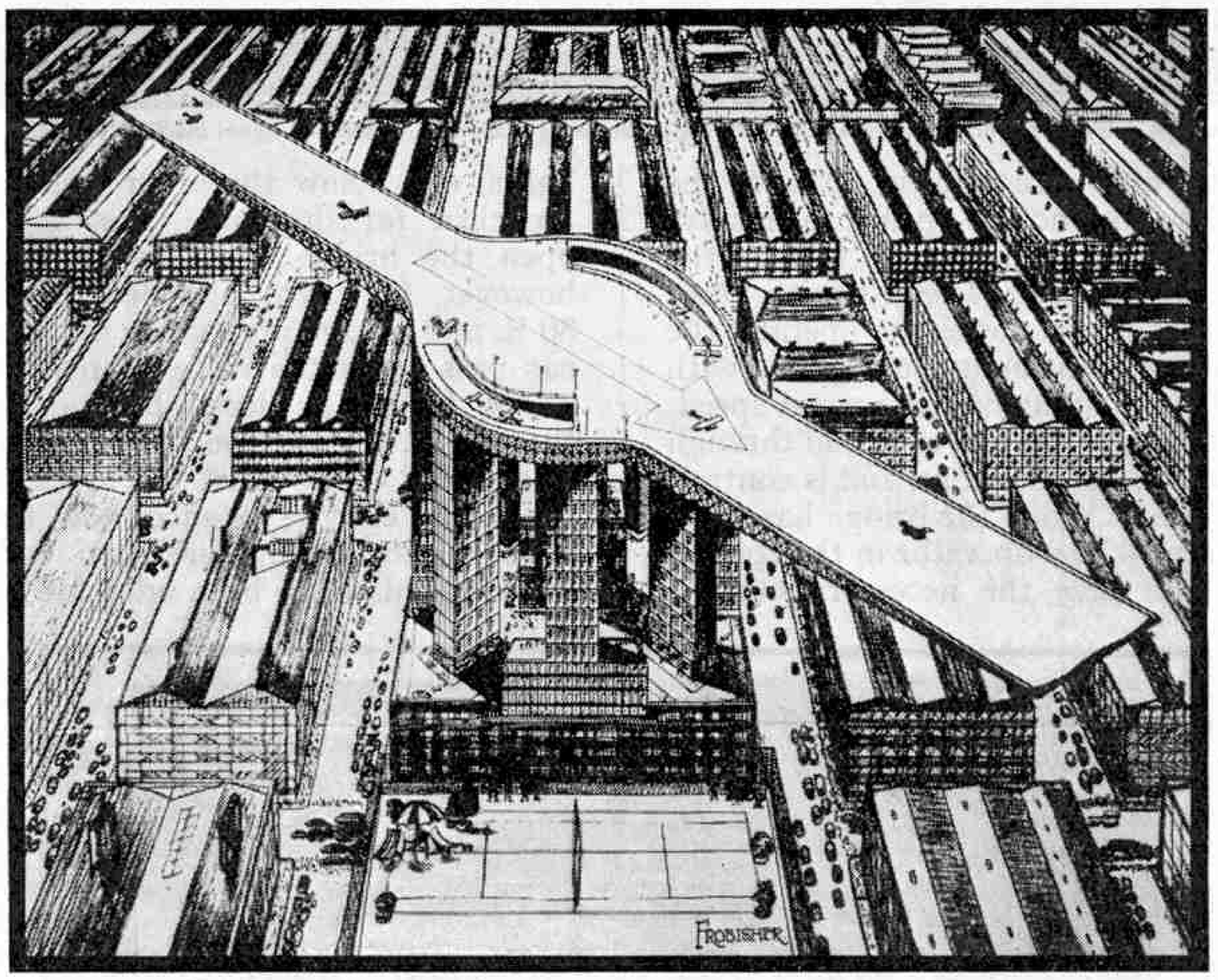
City Airports of the Future

Elevated Rotating Runways

ONE of the greatest obstacles to the development of air lines is the absence of airports and aerodromes in our principal cities. A journey by rail to such cities as London or Liverpool takes the traveller into the heart of the built-up area, and on his arrival he is within easy reach of the business centres of these cities. On the other hand, a journey by air must end at an aerodrome on the outskirts, and time is then wasted in passing through the streets, often congested with traffic, to the centres. Delays of this kind are perhaps of little importance in large and comparatively undeveloped countries such as Australia and Canada, but in the smaller and more densely populated areas of Great Britain the effect is serious, and passengers actually may spend more time journeying to and from aerodromes than in the air.

In order to overcome these difficulties various suggestions for the creation of aerodromes in the hearts of our cities have been made. For instance, it has been suggested that large stations should be transformed into airports by building roofs strong enough to withstand the shock of landing aeroplanes, and in London proposals have been made to roof in part of the Thames to provide a landing ground. Schemes also have been put forward for the construction of elevated airports. A London airport of this kind, to be built in the vicinity of St. Pancras and King's Cross, was described on page 340 of the "*M.M.*" for May 1933. It would take the form of four runways, each about half a mile in length, with their ends joined up by a circular runway, and this immense system would be carried on buildings 120 ft. in height.

A city airport that is more practicable and less costly than any of these schemes has been suggested by Captain C. Frobisher. This consists of a platform at a great height that can be turned round in order that machines can land on it, or fly off it, exactly against the wind. Our cover shows an airport of this kind as it would appear from above the Mersey if it were built in Liverpool, and is based, by kind permission of the Editor, on an illustration that appeared in the Liverpool "*Evening Express.*"



An impressionistic drawing of a rotary airport in New York. The platform would be a third of a mile in length and would have to be at a height of 740 ft. to clear the giant buildings of that city. This illustration is reproduced by courtesy of Captain Frobisher, the inventor of the rotary airport.

The idea of a rotary airport occurred to Captain Frobisher as long ago as 1921, but the scheme was not then made public, chiefly because there was no steel suitable for the erection of such a gigantic elevated runway. To-day the need for immense airports in crowded centres is becoming more apparent, and steels of sufficiently high tensile strength are now available.

In the proposed rotary airport eight huge towers carry a rigid steel ring and kerb fitted with vertical and horizontal rails, rollers and sliding surfaces and provided with means of resisting wind and shock from any other cause. The airport landing stage is built upon the steel ring. It may be from 1,500 ft. to 1,800 ft. long and 250 to 350 ft. wide, and in the centre it broadens out to form a circular section 500 ft. in diameter, on each side of which are runways leading to and from the aerodrome hangars immediately underneath.

The most remarkable feature of this immense landing stage is that it can be moved round slowly by means of high geared motors acting through a worm and rack drive. The landing stage itself is carried on a steel ring, and this rotates slowly on the fixed steel ring on the eight supporting towers. The stage therefore can be adjusted to the changing wind. The inclined runways are fixed to the rotating stage and their lower ends slide over the fixed floor of the hangar beneath its centre.

Captain Frobisher's airport has many advantages over one with fixed runways. The first of these is its lower cost. Fewer supporting buildings are required and the number of runways is reduced, and it has been calculated that the cost of a rotary airport probably would not be more than £1,250,000. A rotary airport could be built nearer the centre of a large city such as London or Liverpool, and as machines would use a platform so high above street level, there would be ample clearance above surrounding buildings. For instance, the runway of the rotary airport shown on our cover would be well above the towering Liver Building seen on the left, although this reaches a height of 320 ft., and would be above many of the fogs and ground mists that often are a menace to machines using aerodromes on the ground.

Hydraulic Cranes on Thames Jetty

Discharging 500 Tons of Coal an Hour

THE illustration on this page shows one of two 10-ton hydraulic travelling grab cranes installed at the coaling jetty of the Wandsworth and District Gas Company. These cranes are the largest of their kind in London and are designed for discharging coal from steamers alongside the jetty by means of grabs. The coal is lifted from the ship and discharged into hoppers provided in the jetty itself, and from these it is taken by conveyors to the Gas Works.

The cranes were designed by Mr. C. M. Croft, M.Inst.C.E., M.I.Mech.E., the Chief Engineer and General Manager of the Wandsworth and District Gas Company, and were built by the East Ferry Road Engineering Works Company Ltd., London. Together they can discharge 500 tons of coal an hour. This can be lifted to a height of 90 ft. at the rate of 180 ft. a minute, and the jib can be slewed in a complete circle in one minute. Each crane has a total weight of 130 tons and can travel at the rate of 10 ft. per minute. All the movements are carried out by means of hydraulic power, and separate rams and cylinders are provided for lifting, slewing and luffing, and for opening and closing the grab.

Each crane consists of a rectangular casing mounted on four two-wheel bogies, which are pivoted on cast steel pads at the four lower corners of the casing. One wheel in each bogie is driven through gears and chains by a hydraulic engine; which is totally enclosed in the casing and is controlled by a piston valve moved by a lever situated on a platform at the foot of the casing.

One of two 10-ton hydraulically operated coaling cranes installed at Wandsworth. They are used for discharging coal from ships alongside the jetty. Photograph by courtesy of The Wandsworth and District Gas Company.

In the centre of the casing is a revolving column, which supports the jib, balance weights and the operator's control cabin. The column is pivoted at its base on a bronze thrust block that runs in an oil bath, and its upper part contains the hydraulic cylinder for luffing the jib. The cylinder is set at an angle, and its ram moves a crosshead that is connected to the jib by steel links. The rear member also supports a short tail jib to which are attached cast iron balance weights.

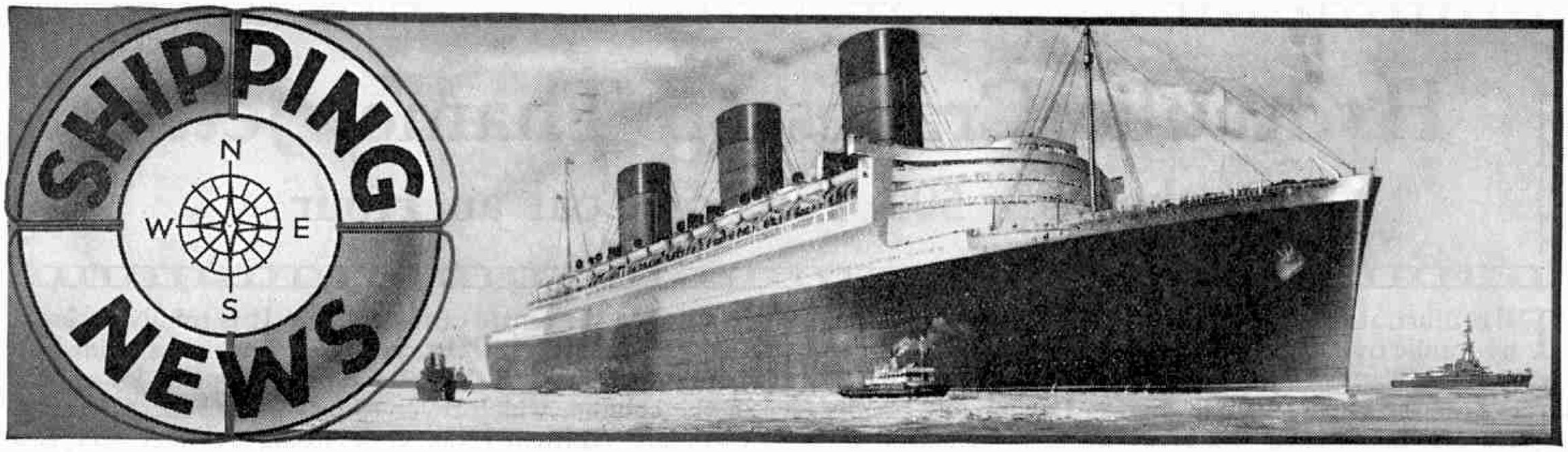
On the front of the column are heavy lugs that carry cast steel bearings for the inner end of the jib, and on the sides of the column are brackets that support the control cabin and valves, and also form a housing for the pipes that supply the valves with water.

The cylinder that operates the grab lifting gear is situated in the centre of the column. It is totally enclosed and has a single ram, the crosshead of which is guided on runner bars fixed to the column plates. On the lower part of the column, which revolves inside the tapered casing, there are positioned the grab-closing cylinder and two cylinders for slewing the jib. The latter cause the column to revolve by means of chains attached to a fixed drum, which is in two sections and is bolted to the underside of the casing top. The chains lie in a spiral on the drum and then pass around pulleys on the slewing cylinders, and motion one way or the other of the rams causes the column to revolve.

All the rams act vertically, and the driver is able to control their motion with the lightest touch on the levers that operate the valves, through which water is supplied at a pressure of 750 lb. per sq. inch. As the cranes must be free to travel backward and forward along the jetty, no rigid arrangement of the water supply pipelines was permissible, and the difficulty was overcome by means of a system of parallel-jointed pipes, which extend and retract as the cranes move along, in a somewhat similar manner to the opening and closing of an engineer's folding metal rule. This system of pipes is arranged vertically, and a portion of it can be seen behind the crane on the left of the illustration on this page.

In order to prevent trouble from frost during severe winters a gas radiator is installed in the crane casing. This heats the air that circulates around the hydraulic cylinders and all other parts containing water. The jib of each crane has a maximum radius of 50 ft., and can be luffed inward to a minimum radius of 20 ft.

When the crane is in operation the open grab is dropped on to the coal and the water in the "lifting" cylinder is slightly exhausted to allow the grab to bury itself and take a full load. Simultaneously water is let into the "closing" cylinder and its ram then closes the grab. Full pressure is then put on the lifting cylinder, and the grab and coal is lifted and slewed until it is over the hopper. The water under the closing ram is then exhausted, and the ram sinks in its cylinder allowing the grab jaws to open and the coal to fall into the hopper.

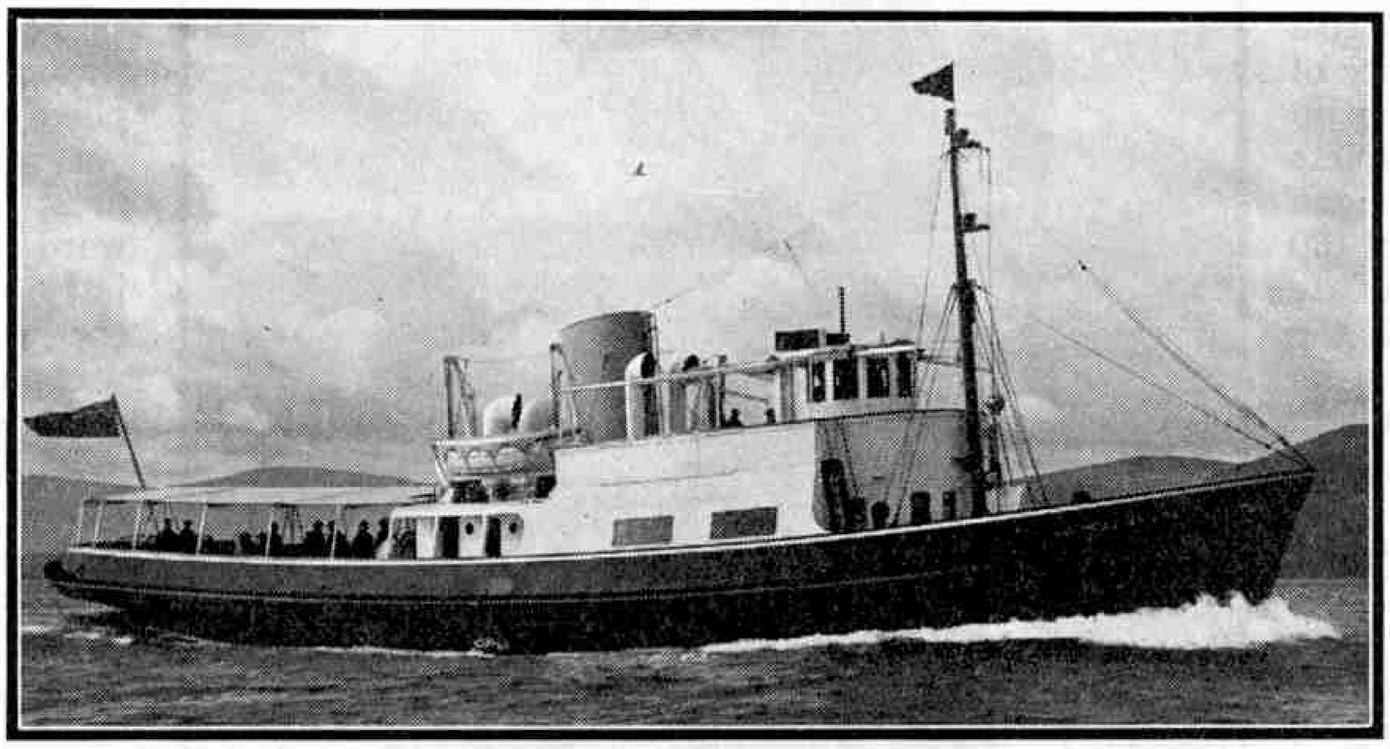


New Fire Tender for Belfast

The illustration on this page shows the twin-screw fire-fighting tender *"Duchess of Abercorn,"* recently built by Harland and Wolff Ltd., Belfast, for the Belfast Harbour Commissioners. This vessel, which has a length of 115 ft., has taken up the duties of the steam tug *"Musgrave,"* recently withdrawn after 40 years' service. In addition to her duties as tender, the new vessel is used for salvage work. An interesting feature of the vessel is the installation of Diesel-electric machinery, as this is a departure from normal practice for vessels of this type. It gives the vessel a designed speed of 12 knots.

The fire-fighting and sea-salvage equipment with which the *"Duchess of Abercorn"* is fitted was supplied by Merryweather and Sons Ltd., of Greenwich. The main fire-fighting pump is of the high-lift, three-stage centrifugal type, having suction and delivery branches 10 in. in diameter. It is capable of delivering 2,000 gallons of water a minute, and can throw a single jet to a height of 200 ft. The pump is coupled to a 350-volt D.C. electric motor of 300 h.p. running at 1,000 r.p.m., and both are mounted on a steel bedplate. A delivery head, for fixing to the deck, is provided, and this has a cast-iron body with six 2¾ in. gunmetal delivery outlets, each controlled by a separate rack valve.

The vessel is equipped with a 5 in. fire monitor, or deck pump. This has gunmetal castings and a polished copper branchpipe with three gunmetal nozzles of suitable sizes. Other fittings include 10 ft. lengths of 6 in. rubber hose, rigid steel pipes and quarter bends, and 100-ft. lengths of 2⅝ in. delivery hose.



The twin-screw tender "Duchess of Abercorn," employed by the Belfast Harbour Commissioners for fire-fighting and salvage work. The fire-fighting equipment was supplied by Merryweather and Sons Ltd., London, to whom we are indebted for our illustration.

Seaman's Heroic Swim

The heroism of Harold Hansen, a 26-year old Norwegian seaman, saved the lives of 33 members of the crew of the Norwegian steamer *"King's County"* when this vessel was wrecked recently in a fog off the rocky coast near St. John, New Brunswick, Canada. The vessel drifted off her course when bound from Montreal to St. John. The men who were in their bunks were awakened by a crash and rushed on deck, to see through the heavy mist and rain a great rock cliff only 100 ft. away. A gaping hole had been torn in the hull of the ship, which lurched heavily, and it was impossible to lower the lifeboats owing to the weather and the high seas. Water poured into the hold and the ship was in imminent danger of becoming a total wreck.

At this critical moment Hansen plunged over the side of the ship with a rope tied round his waist. He had stripped off most of his clothing, and being a powerful swimmer steadily drew nearer to land. After battling with the seas for 20 min. he reached the cliff and was able to cling to the jagged rock edges. The ship's crew, who had anxiously followed his progress with the aid of a searchlight, then saw him scramble on to a rock and fasten the rope securely to a huge boulder.

By this time the ship was settling down and the crew were in peril of being thrown into the sea. They were able to swing themselves hand-over-hand along the rope to the rock, however, and afterwards scrambled across the rocky coast to the nearest point of habitation, from which they proceeded to St. John, a few miles distant. Their vessel became a total loss.

The Bravest Rescues of 1936

During 1936 R.N.L.I. life-boats were launched 466 times to the help of vessels in distress, an average of nine launches a week. Never before have there been so many launches in one year. The number is 88 more than in 1935, and eight more than in 1911, the next busiest year, when there were 458.

The outstanding service of the year was by an Irish crew. During the February gales the motor life-boat at Ballycotton, Co. Cork, went out to the help of the Daunt Rock Lightship in a sea so heavy that the spray was flying over the lantern of the lighthouse, 196 ft. high. The whole crew of the lightship was rescued, but the life-boat was out for 63 hours. During that time her crew had only three hours sleep, and for 25 hours they had no food. They were swept by rain and sleet, and washed continually by heavy seas. For this rescue, one of the most exhausting in the whole history of the life-boat service, Coxswain Sliney was awarded the gold medal of the Institution, the "life-boat V.C.," and each of the six members of his crew the silver or bronze medal.

Three other bronze medals were awarded during 1936, two to Scottish coxswains and one to an English coxswain. Coxswain Sim of Fraserburgh, Aberdeenshire, won it in January for the rescue of the whole crew of the trawler *"Evergreen,"* wrecked in a snow storm. It was awarded to Coxswain Dass of Longhope, Orkneys, who in February rescued 41 lives from the French trawler *"Neptunia,"* and to Coxswain Blewett, of Penlee, Cornwall, for the rescue in January of the whole crew of the steamer *"Taycraig,"* which sank in a gale in Mounts Bay.

Trials of H.M.S. *"Penelope"*

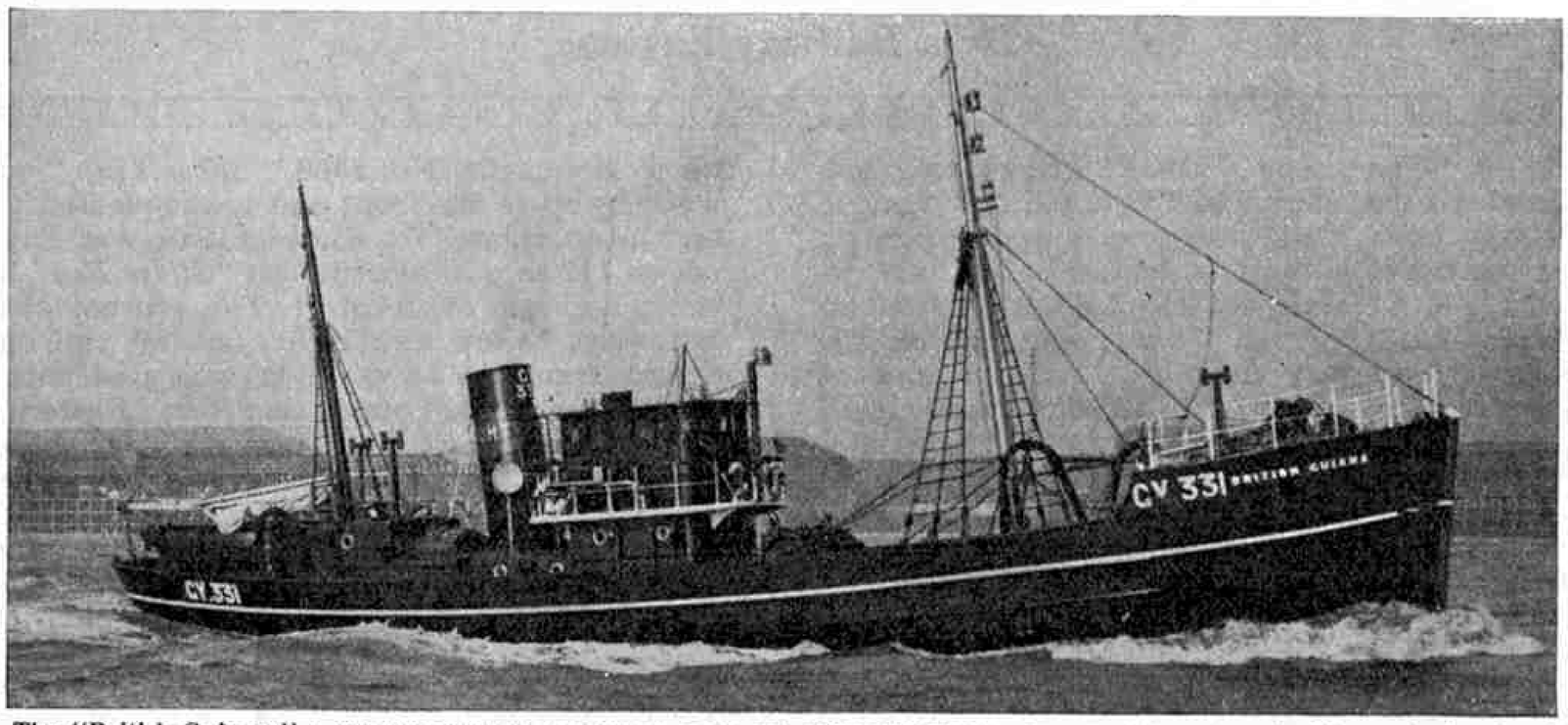
The acceptance trials recently took place of H.M.S. *"Penelope,"* a light cruiser of the *"Arethusa"* class, commenced in May 1934, and launched in October 1935. The trials were carried out in the Irish Sea, after which the vessel proceeded to Portsmouth. The *"Penelope"* was built by Harland and Wolff Ltd., and was the first warship built at their Queen's Island Yard, Belfast, since the war.

The *"Penelope"* has a length of 480 ft. and a breadth of 51 ft., and a standard displacement of 5,200 tons on a corresponding mean draught of 13 ft. 10 in. She has geared-turbine propelling machinery developing 64,000 s.h.p., giving a speed of 32½ knots. The armament includes six 6 in. guns, 4 in. anti-aircraft guns, and machine guns. A seaplane, which can be launched from a catapult, is also carried.

The cruiser has been succeeded on the stocks by H.M.S. *"Belfast,"* the thousandth vessel to be built by Harland and Wolff Ltd., in the past 77 years at their Belfast and Clyde shipyards.

A Modern Motor Trawler

The deep-sea fishing industry is the sixth most important in Great Britain, and the craft employed in it include some of the most interesting ship types in the world. The *"British Guiana,"* illustrated on this page, is a good example of a modern motor trawler. The vessel was built for Grimsby Motor Trawlers Ltd., by Cochrane and Sons Ltd., Selby. She has a length of about 100 ft., a beam of 21 ft., and a depth of 11 ft., and other characteristics are a raised forecastle deck, a slightly raised quarter deck, a cruiser stern and two steel tube masts. Her propelling machinery consists of a six-cylinder Diesel engine manufactured by Ruston and Hornsby Ltd., Lincoln, that is rated at 300 s.h.p. at 375 r.p.m., with a propeller speed of 125 r.p.m. The total capacity for oil storage is 30 tons, giving the vessel a cruising range of 5,000 miles.



The "British Guiana," a modern trawler. The vessel has a six-cylinder Diesel engine, and is equipped with an electric trawl winch. Photograph by courtesy of the builders, Cochrane and Sons Ltd., Selby.

The deck machinery includes an electric trawl winch with two drums, driven by a totally enclosed and watertight electric motor. The designed output is for a steady pull of 2½ tons at 200 ft. per minute, and the control is of an electrical design by which the winch will stall with a load of 4 tons, and will reverse slowly with a load of about 6 tons. A hand wheel on the after side of the winch drives a rope-coiling trolley through a rack and pinion. This coiling gear can be instantly disconnected when paying out.

The fishroom is insulated on the sides and bulkheads with 4 in. insulation, finished with reinforced seamless waterproof facing. The under deck is insulated with slab cork and two thicknesses of 1 in. board below the beams.

Windows of the railway carriage type are fitted in the wheelhouse on the bridge, where electric heating is provided for use in cold weather. A Marconi Echometer for finding the depth of the water in which the vessel is floating is installed. The captain's cabin is below the bridge and in it is a Marconi 60-watt wireless telephone transmitter and receiver. Four berths and a similar number of lockers are arranged in the forecastle, and aft are two separate staterooms.

Electric lighting is fitted throughout and includes four floodlights arranged on deck for night fishing. As a standby, a 12-volt battery is provided.

On trials that were carried out in a strong gale and choppy sea, the *"British Guiana"* proved her seagoing qualities and attained a speed of 10.25 knots.

Shipbuilding in 1936

Although new ships of varying sizes are always under construction, the total gross tonnage of ships in existence varies little, for vessels are lost at sea or scrapped as new ones are built. In the year ending 30th September, 1923, the total for all vessels upward of 100 tons was 61,342,952 tons. In 1931-32 the total was 68,722,801 tons, the highest yet recorded, and that for 1935-6 was 64,004,885 tons.

From 1st October 1935 to 30th September 1936, 1,001,806 tons of new shipping were constructed. This is the highest since 1930-31, when 1,734,089 tons were built, and is a great improvement on that for the corresponding period in 1933-4, when only 348,197 tons were constructed. A much greater increase is still necessary, however, to reach the 1919-20 record of 4,186,882 tons.

Oil-burning machinery is fitted in 81.1 per cent. of the new world tonnage constructed in 1935-36. Of the total power the engines of these develop, 60 per cent. is accounted for by Diesel engines and 40 per cent. by steam engines. In Great Britain and Ireland the position is reversed, steam engines accounting for nearly 60 per cent. of the total power of the new ships built. This is natural in view of the great coal output of this country.

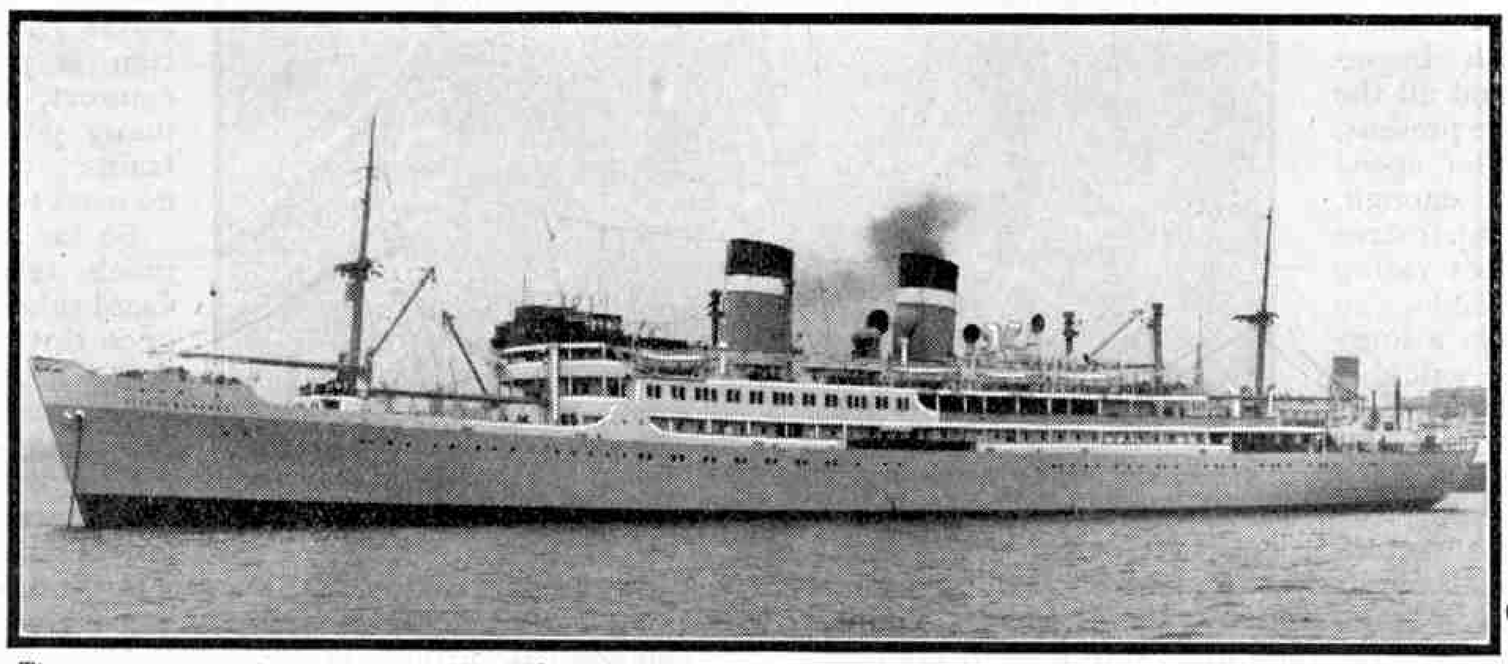
In spite of the growing popularity of the internal combustion engine, steam engines propel almost four-fifths of the existing tonnage. Reciprocating engines are still used in two-thirds of the world's shipping, steam turbines accounting for 14.2 per cent. and Diesel engines for the other 19.2 per cent.

The *"City of Benares"*

The lower illustration on this page shows the passenger and cargo steamship *"City of Benares,"* to which reference was made in the *"Shipping News"* pages of the *"M.M."* for December 1936. This vessel was built by Barclay, Curle and Co. Ltd., to the order of the Ellerman Lines Ltd. She has been specially designed for service between the United Kingdom and India, and ran her maiden voyage late last year from Liverpool to Karachi and Bombay, via Marseilles.

The *"City of Benares"* has an overall length of about 510 ft., a breadth moulded of 62 ft. 4 in., and a gross tonnage of 11,081. The vessel has a distinctive appearance, emphasised by the smartly raked stem. The stern is of the cruiser type. Two funnels are fitted, making the vessel the first of the line to have this feature. The hull has a cellular double bottom that is divided into a number of separate compartments suitable for carrying water ballast, fresh water or oil fuel. Accommodation is provided for 219 passengers, all in one class.

The propelling machinery of the vessel consists of a single set of Parsons impulse-reaction turbines, driving through single-reduction mechanical gearing. The turbines are supplied with steam at a pressure of 275 lb. per sq. in. Two forced lubrication pumps are employed for the turbines and gearing, and each has a capacity of 16,000 gallons an hour. Five single-ended cylindrical boilers are installed, and these are fitted with superheaters giving a final total temperature of 615 deg. F. The propeller is of the built-up type, with four manganese-bronze blades.


The passenger and cargo steamship "City of Benares," described on this page. This vessel is the first of the Ellerman Lines Ltd., to have two funnels. Photograph by courtesy of B. and A. Fielden, Blundellsands, Liverpool.

During her trials in the Firth of Clyde the *"City of Benares"* easily attained a speed of 17¼ knots.

A New P. and O. Liner

An important order was recently placed with Alexander Stephen and Sons Ltd., of Linthouse, Govan, for a passenger steamship of over 14,000 tons gross. The order was given by the Peninsular and Oriental Steam Navigation Co., and the vessel will be the second largest under construction on the Clyde. The largest is "No. 552," the great Cunard White Star liner now being built at Clydebank by John Brown and Co. Ltd.

The new vessel is to be somewhat larger than the 14,000-ton liners *"Corfu"* and *"Carthage,"* which the builders constructed for the P. and O. Line in 1931, and her passenger accommodation will be considerably improved on that of these two vessels.

A Run with "The Silver Jubilee"

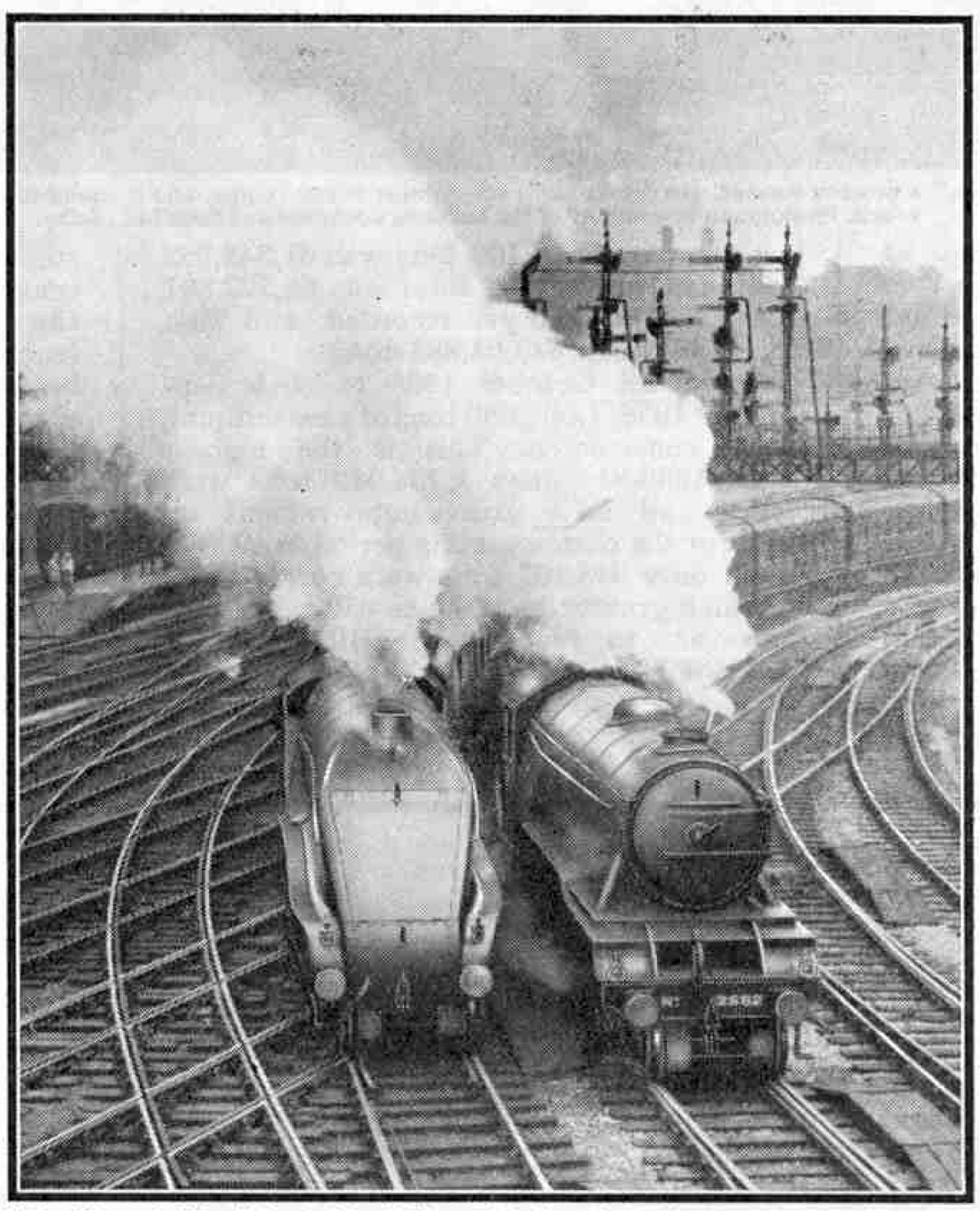
The perfection of Modern Travel

By a Railway Engineer

THE mere mention of *"The Silver Jubilee"* brings to mind visions of streamlined engines, speeds of 100 m.p.h., or more, a strange-looking silver-grey train, and altogether a conception of breathless haste. It is the novel unfamiliar features that have so taken popular fancy. I asked a Hartlepool friend what he thought of it. "Absolutely marvellous," he said, "You know, the engine driver wears a black beret, and they let you go into the guard's van to watch the speedometer; we did 97!" And so, amid this welter of thrill-mongering, the real purpose of this fine train service has become somewhat obscured—except to its regular patrons.

"The Silver Jubilee" is essentially a business man's express. Modern standards of travel are becoming so high as to make the public conscious of defects to a greater extent than ever before. It is not only so in railway working. Not long ago I was talking to the Purser of a Transatlantic liner about vibration in ships, and he remarked: "The public have become vibration conscious. The old *"Mauretania"* used to vibrate tremendously when she was going all out and nobody thought anything of it; but now—!" So it is on the railways. The ordinary L.N.E.R. expresses were already second to none for smooth riding, and even though *"The Silver Jubilee"* took him home in 1½ hours less than the old 5.30 p.m. from King's Cross, a Newcastle business man would hardly appreciate the merits of a burst at 90 or 100 m.p.h. if the train rolled and lurched, the coach bogies jangled and "hunted," and all the ingredients of a thrill were present.

To the modern traveller speed and punctuality are not enough. He must have space, comparative quiet, and as near perfect riding of the coaches as possible. To many travellers nowadays a four-hour journey is so much valuable time for reading, study, calculations, or even for the transaction of business; big deals have been put across the dining car tables of express trains before now. It does not take much oscillation to make it quite impossible to read, let alone write in a train, and travellers between London and Newcastle, educated up to a very high standard of comfort, would be quick to notice any imperfections resulting from higher speed. But the riding of the coaches is one of the greatest triumphs of *"The Silver Jubilee."* In this train one is less conscious of the speed when going 90 to 95 m.p.h. than in many another when travelling 20 m.p.h. slower. As far as the passengers are concerned the thrills simply do not exist, and rightly so.



"The Silver Jubilee," hauled by "Silver Link," and the 10 a.m. Liverpool express, headed by "A1" Pacific No. 2582, "Sir Hugo," leaving Newcastle. Photograph by courtesy of the L.N.E.R.

But as a spectacle *"The Silver Jubilee"* is pre-eminent among the railway sights of Britain. When I travelled by the train in September last, a year after its inauguration, little groups of sightseers had gathered at points all down the line to watch the flyer pass. Not only around the bigger towns, but even in the depths of the country we were greeted by many a waving handkerchief. She casts her fascinating spell over young and old alike, so that even a cold, matter-of-fact engineer, whom I never suspected of having the slightest interest in railways, came back from business in the North and described to me in glowing terms the superb spectacle of the "Jubilee" picking up water at Wiske Moor troughs.

However, it is high time we were done with preliminaries and off to Newcastle. No. 2509, *"Silver Link,"* was the engine, and on walking up to the front end I was pleased to find two old friends on the footplate. At the regulator was Driver G. H. Haygreen, whose 113 m.p.h. record with *"Silver Fox"* had thrilled the whole world a month or so before. This journey of mine was made in his last week before retirement, and his run on this occasion was a fitting climax to 40 years' service, first with the Great Northern, and then with the London and North Eastern Railway. His fireman was C. Fisher, who so ably assisted Driver Worboys on that tremendously exciting run with the *"Queen of Scots"* Pullman express that I described in the *"M.M."* for September 1935. The load of *"The Silver Jubilee,"* with passengers and luggage, is 235 tons.

The start out of King's Cross was, of course, infinitely faster than anything one experiences with the 500-ton Anglo-Scottish expresses; *"Silver Link"* fairly sailed up the 1 in 105 of Holloway bank and we swept through Finsbury Park at 57 m.p.h. Then the engine was held strictly in leash until we were through Wood Green tunnel. There is a succession of reverse curves between Harringay and Hornsey. With the ordinary expresses, rarely up to 50 by this time, they are of no consequence; but if *"Silver Link"* had been let go we should have been doing somewhere about 80 m.p.h., and the riding of the coaches very much on the rough side in consequence. With *"The Silver Jubilee"* the strictest attention is paid to the passengers' comfort, and speed is reduced at many points where the ordinary trains, travelling slower, have no need to ease up.

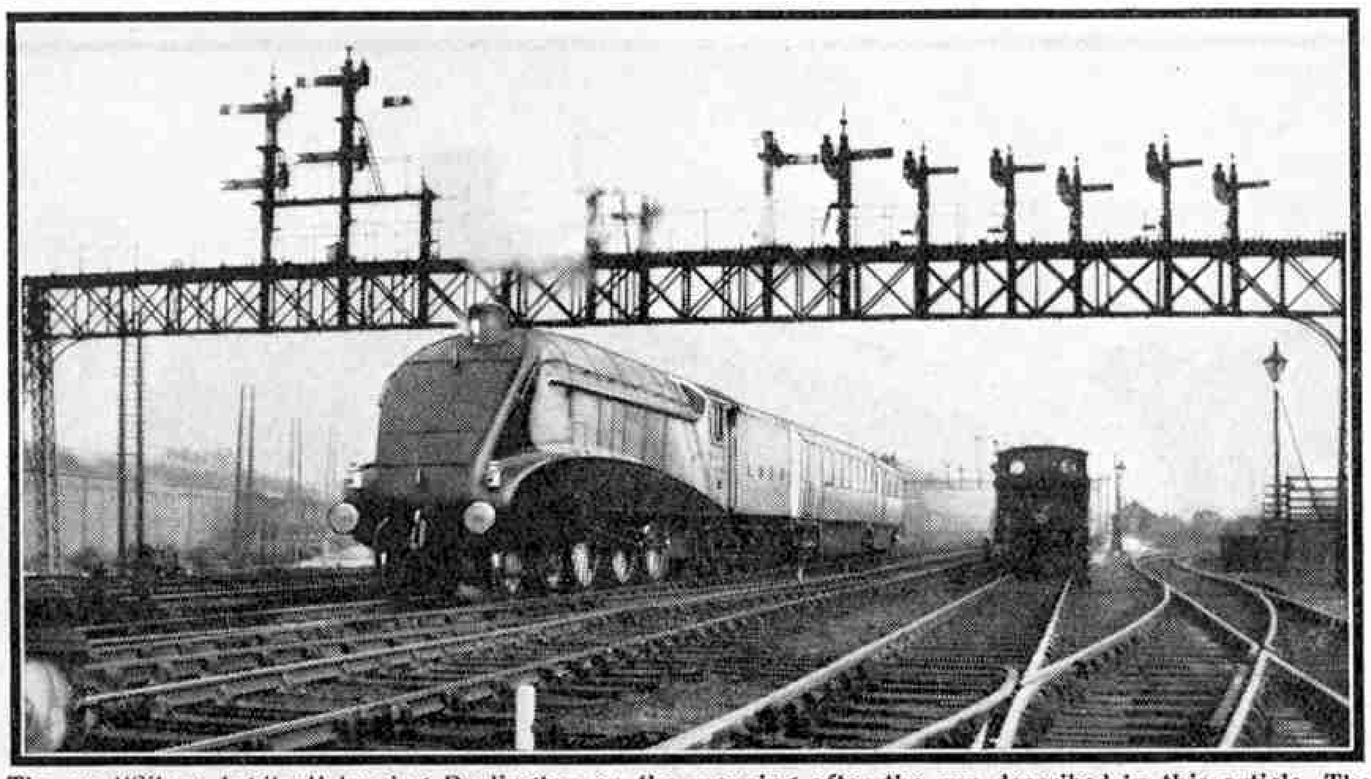
So far our speed had not been much faster than that of the Cambridge buffet-car flyers, but once through Wood Green tunnel things began to happen. We passed New Southgate at 61½ m.p.h., and then, on the continuous 1 in 200 ascent to Potters Bar, No. 2509 steadily accelerated to 69 m.p.h. The summit point, 12.7 miles out of London, was passed in no more than 14¾ minutes—a remarkable figure in view of the easy spell after Finsbury Park. The descent through Hatfield was taken rather quietly, by *"Silver Jubilee"* standards, as speed was not allowed to exceed 82 m.p.h.; but we did not fall below 70 on the 1 in 200 bank through Welwyn tunnels, and passed Langley Junction at 79 m.p.h.

Just beyond this point speed was reduced to 55 m.p.h., for Stevenage troughs. It is customary with *"The Silver Jubilee"* for some reduction to be made when picking up water, because above a certain speed a very large amount is flung out as spray. Tests have shown that the maximum quantity of water is picked up at about 40 m.p.h., and at one time it was the regular practice on the Great Northern Railway for all crack trains to slow up to 30 m.p.h. when picking up water. *"The Silver Jubilee"* has thus revived an interesting custom, though in a much less pronounced form. Such easings, and also those for curving stretches of line, add not a little to the difficulty of working the express, even though they do not involve any reduction of speed below about 60 m.p.h.

But now the flyer was really getting into its stride. We passed Hitchin at 87 m.p.h., reached 92½ at Three Counties, and maintained an average speed of 89 m.p.h., for 20 miles on end. I was in the

restaurant car at the time, and but for the evidence of my two watches it would have been really difficult to believe we were going at such a pace. The car, with its panelled walls of figured Australian maple and soft blue upholstery, is a restful, soothing place that dispels a good deal of the sense of motion; the curtains quivered ever so slightly, the blue Highland Scabias swayed in their vases as from the gentlest breeze, and yet we were tearing northward at 90 for mile after mile. We had taken 29½ minutes to cover the 31.9 miles out to Hitchin, but when St. Neots was passed, 51.7 miles from London, we had been on the run only 43¾ minutes.

Haygreen eased to 73 m.p.h., for the S curve round the bank of the Ouse at Offord, and then for the first time in the run *"Silver Link"* was really opened out. The high-speed stretch just concluded is on fairly favourable gradients and the engine had been worked under very easy steam; but now the regulator was opened to about three-fifths. In three miles of partly rising gradient speed rose to 80 m.p.h., and then, beyond Huntingdon, No. 2509 went up Stukeley bank at a steady 77 m.p.h., on a 1 in 200 gradient! Once over the top we were very quickly doing 85 again, but the regulator was brought right back once more, and in descending to the fringe of the Fens, at Holme, speed did not exceed 89 m.p.h. The working times are planned so as to give as even a pace as possible to both uphill and downhill, and in ordinary circumstances 90 m.p.h. is about the highest speed reached; but there are times when very much faster running is made, after signal or permanent way checks have occurred, and then these remarkable engines get well into the hundreds.



The up "Silver Jubilee" leaving Darlington on the morning after the run described in this article. The engine is No. 2509, "Silver Link," with Driver Haygreen and Fireman Fisher in charge.

Right to the outskirts of Peterborough 85 m.p.h. was kept up, but then Haygreen made a scrupulously careful passage through the station, with speed right down to 15 m.p.h. The 76.4 miles from King's Cross had taken exactly 63 minutes. Directly we were through the platforms *"Silver Link"* was put to it with tremendous vigour and the resulting acceleration was truly astounding. In 1½ miles speed rose from 15 to 66 m.p.h., and just four miles farther on we were doing 82! But the most surprising thing of all was that Haygreen was using only 18 per cent. cut-off, that is just one-third full gear. This 82 m.p.h. was not the limit of acceleration by any means, for *"Silver Link"* got progressively faster till we touched 91 m.p.h., at Tallington, only 8½ miles out of Peterborough, and on the dead level too!

Driver Haygreen and Fireman Fisher on the footplate of No. 2509, "Silver Link," the engine on which they made the brilliant run described in this article. Photograph by courtesy of the "Northern Echo."

The question naturally arises as to how far streamlining is responsible for these truly magnificent feats of speed. The spectacular-looking outer casing is of no little value in reducing air resistance, and tests have shown that whereas an ordinary "Pacific" requires to develop 450 horse power to propel itself at 80 m.p.h., in perfectly still air, one of the *"Silver Link"* type needs only 330. On this basis, streamlining saves over 200 tons of coal a year in the working of *"The Silver Jubilee"* express. But *"Silver Link"* and her three sister engines differ from the ordinary Super-Pacifics also in the very important respect of the valves. The steam passages leading in and out of the cylinders have been very carefully designed so as to give streamlined flow of steam and the freest possible exhaust, and I am inclined to think that these features of the engines are to an even greater degree responsible for their immense success than the external streamlining.

The extent of their superiority over the ordinary "Pacifics" is not generally realised. Here is a comparison that throws a vivid light on the subject. When No. 4472 *"Flying Scotsman"* made the lightning run to Leeds on 30th November, 1934, the load was 147 tons, and she climbed the 15.3 miles from Tallington to Stoke Summit at an average speed of 82.6 m.p.h. On the same day that *"Silver Fox"* did 113 m.p.h. with the up *"Silver Jubilee,"* a test run was made with the down express, and on that trip *"Silver Link"* exactly equalled *"Flying Scotsman's"* time up the bank with very nearly double the load—270 tons against 147. But that is not all; No. 4472 was being driven very hard on no less than 40 per cent. cut-off, whereas *"Silver Link"* needed only 18 per cent.—a simply amazing difference.

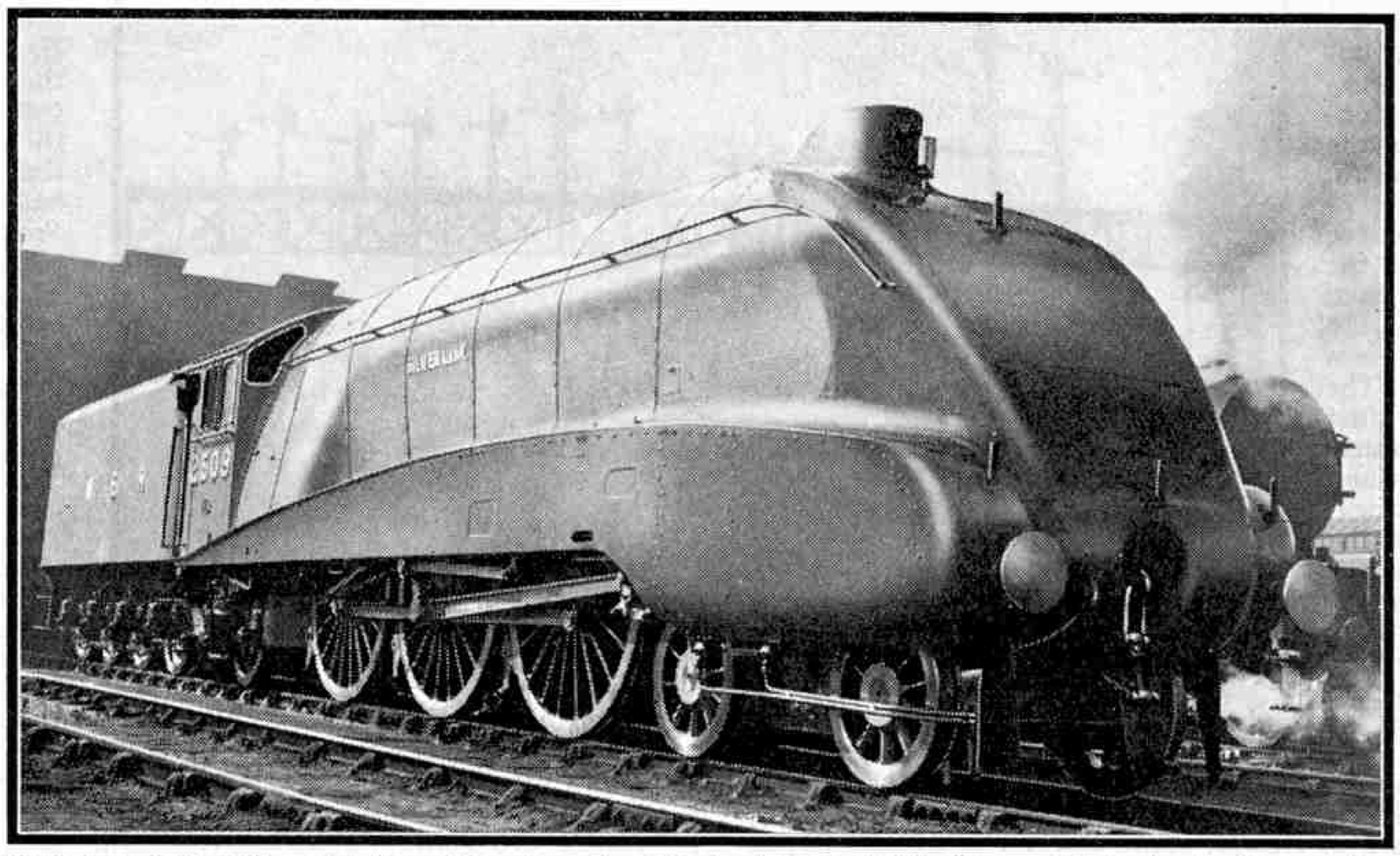
On this run of mine, speed settled down to a steady 76 m.p.h. up the 1 in 200 past Little Bytham and then rose to 81 through Corby; and after the final three miles rising at 1 in 178 we stormed over Stoke summit at 78 m.p.h. I should very much doubt whether any passenger on the train was dimly conscious that we were climbing. Stoke signal box is just 100 miles from King's Cross and we had covered the distance in 82¼ minutes. Descending to Grantham we were very soon doing 92 m.p.h., but speed was carefully reduced to 70 through the station and yard. Another long spell at 90 m.p.h. followed on the descent to the Trent valley, and at Newark we were very nearly three minutes early; the 120.1 miles had been covered in 96¾ minutes. So, after slowing to 72 m.p.h. over Muskham water troughs, Haygreen drove rather more easily until we were in sight of Doncaster. But even so what is easy running for *"The Silver Jubilee"* would be very fast for any other train, and between Carlton-on-Trent and Black Carr Junction we averaged 71 m.p.h.

Approaching Doncaster signals were against us; right through the yard we crawled from box to box, until we drew practically to a stand at Decoy. It then transpired that the home signal was out of order and could not be pulled off. Green flags waved us on, and once he was assured that the road was clear, Haygreen got *"Silver Link"* away in electrifying style. For half a mile the exhaust was as sharp and staccato as a pneumatic riveter and we were actually up to 53 m.p.h. when we passed Doncaster station, only half a mile beyond the point of delay. But although we had recovered magnificently, the 7 miles from Black Carr Junction, through Doncaster, to Shaftholme Junction had taken 10¾ minutes and we passed the latter point 2½ minutes late. From here onward to York the train is very sharply booked. Although we got up to 89 m.p.h. on the dead level beyond Templehirst, we could not do better than keep bare time from Shaftholme to Selby, 14.2 miles in 11½ minutes.

The subsequent timing of 12½ minutes for the 13.8 miles from Selby to York is a counsel of perfection even to such competent engines as the "Silver Links." The section is begun dead slow, over Selby swing bridge, and then just over 10 miles farther on speed must be reduced to 50 m.p.h., over Chaloner's Whin Junction. Haygreen spurred his engine to one of the most brilliant

accelerations of the whole journey, and less than eight minutes after passing Selby, at 25, we flashed through Naburn at 86½ m.p.h., but in spite of this we did not keep time. Speed was carefully checked at Chaloners' Whin and there was scarcely time to accelerate again before we were approaching York. So, with a prolonged note on 2509's mellow chime whistle, we wound our way through the station at 15 m.p.h., watched by a hundred or more sightseers. The 188.2 miles from King's Cross had taken 160½ minutes.

And now the run became thrilling beyond description. We got away from York at a terrific pace. Poppleton Junction, only 1½ miles out, was passed at 61 m.p.h., then came 72½ at Skelton Bridge, 82 at Beningborough, 88 at Alne, and 90 at Raskelf—all this on a dead level track. Up the slight rise at 1 in 880 past Sessay Wood Junction speed fell off very slightly to 88 m.p.h., but approaching Thirsk we were doing 91. This brilliant effort had regained nearly four minutes, and we passed Thirsk only 20 seconds late.



L.N.E.R. No. 2509, "Silver Link," one of the streamlined "Pacifics" that haul "The Silver Jubilee," showing the formation of the front end and the generally striking appearance. Photograph by courtesy of the L.N.E.R.

But once again the thrills on this stretch were apparent only to a person timing the train. It was dark now, and inside a cosy compartment we seemed cut off completely from the outside world. Noise is very effectively deadened by a double thickness of glass in the window, the space between the two panes acting as a sound insulator, and the beat of the wheels came in a distant pleasing rhythm. Vertical strip lights in the four corners of the compartment and the blue walls combined to produce a soft restful light; loose cushions on the seats, a thick Wilton carpet, and curtained windows gave one the impression of a quiet corner in a private house rather than a railway train. It seemed incredible that we were speeding through the night at 90 m.p.h. One of my fellow travellers was deep in a book, another was hard at work surrounded by a mass of documents and calculations. So we sped on.

Although Haygreen had eased to 83½ m.p.h. through Thirsk, we were up to 88 again very quickly and maintained 83½ up to 1 in 626 rise beyond Otterington. Northallerton, 218.2 miles from London, was passed in 182¾ minutes, and approaching Wiske Moor troughs we were going 87 m.p.h. once more. Speed was carefully checked to 73 while *"Silver Link"* picked up water, the first time we had gone below 80 for nearly 30 miles, but now the day was won, and won handsomely. No. 2509 recovered to 77 m.p.h. up the rise to Eryholme Junction, and then, running under the very easiest of steam, we bowled down through Croft and so into Darlington, 232.2 miles in 195 minutes—three minutes early.

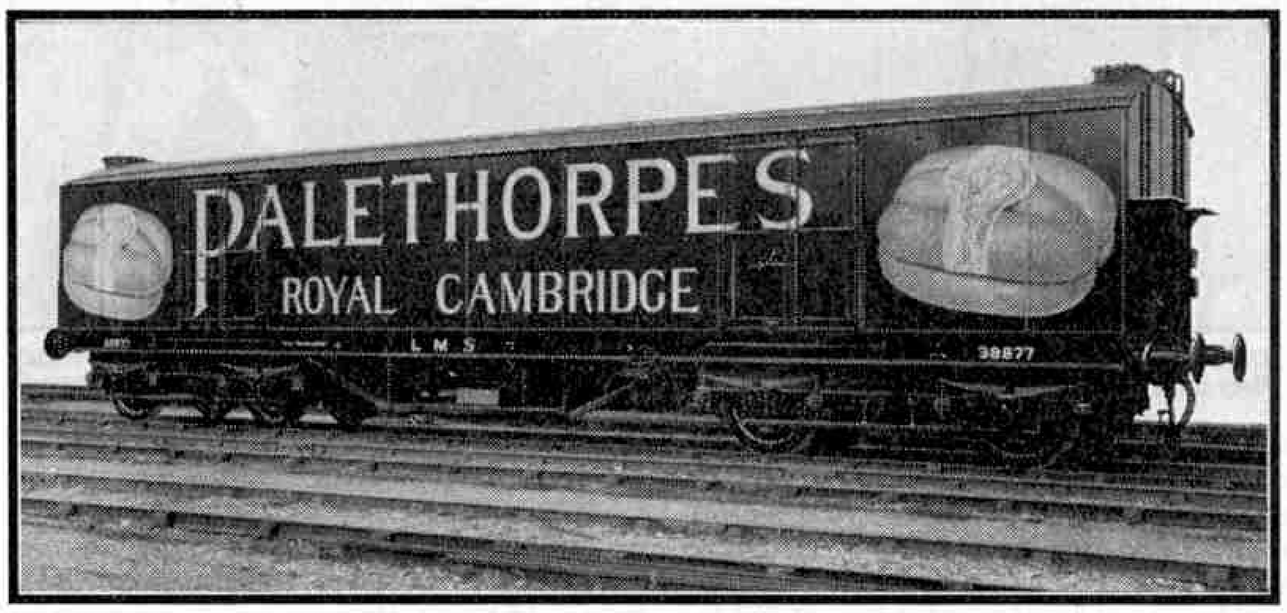
A strange and vivid sight awaited us in Bank Top station. When we ran in, the 4 p.m. Glasgow-Leeds dining car express had just arrived headed by another of the famous streamlined quartet, *"Silver King"*; silhouetted against the gleaming silvery paint of No. 2511 was hoary old *"Locomotion,"* engine No. 1 of the Stockton and Darlington Railway, standing on a pedestal of honour on the platform. Here at the end of one of the finest runs one could wish for was a striking little tableau that summed up, more than any words, 110 years of locomotive development. One cannot help thinking of the opening of the Stockton and Darlington Railway, and of *"Locomotion"* trundling along with George Stephenson at the regulator. What would those sneering spectators, who prophesied an early doom for railways, have thought of this evening's run!

At nine different points on this rousing journey we reached or exceeded 90 m.p.h., while out of the whole 232 miles between King's Cross and Darlington, no less than 185 miles were run at an average speed of 80 m.p.h. But of all this brilliant performance my most vivid recollection was of that swift almost silent dash across the Plain of York, whereby the driver wiped out the four minutes of arrears and took us through Northallerton well before time. I was not travelling beyond Darlington that night, but there was just enough time for me to run up to the front end for a word with the crew before they got away again. Fisher met me with: "What d'you think o' that for a bit o' stuff?" I feel sure that every reader will answer the question just as enthusiastically as I did that night.

New Vans for Sausage Traffic

The L.M.S.R. have recently completed at their Wolverhampton Carriage Works eight insulated vans designed specially for the conveyance of sausages. These are built in three different sizes having 3, 6, and 7 tons capacity. The two smallest are of the four-wheeled variety and are each 21 ft. in length, and there are four six-wheeled vans, each 31 ft. in length and two double-bogie 50 ft. vans.

One of the most interesting features of the new vans from a technical point of view is the provision of special equipment in the 6-ton and 7-ton vans for interior lighting and air circulation. These are fitted with "Wolverton" train lighting equipment, which serves for lighting and also for the operation of axial-flow streamlined fans. There are two of these fans in each of the largest vehicles, and one in each of the six-wheeled vans. They deliver 600 cu. ft. of air per minute and circulate the air over ice bunkers. An air-duct running along the ceiling of the vans is provided with fans, the flow through which can be regulated by shutters.



One of the 50 ft. vans built by the L.M.S.R. for the conveyance of sausage. It has a capacity of seven tons. Photograph by courtesy of the L.M.S.R.

Each of the four access doors of the vans is provided with a switch, operated automatically by the opening or closing of the door. The electric circuits are so arranged that the fans can operate only when the four doors are closed, and on the outside end of each van there is a pilot light to indicate when they are working. The opening of any one door stops the fans and at the same time switches on the lights. The lights are automatically switched off when all doors are closed.

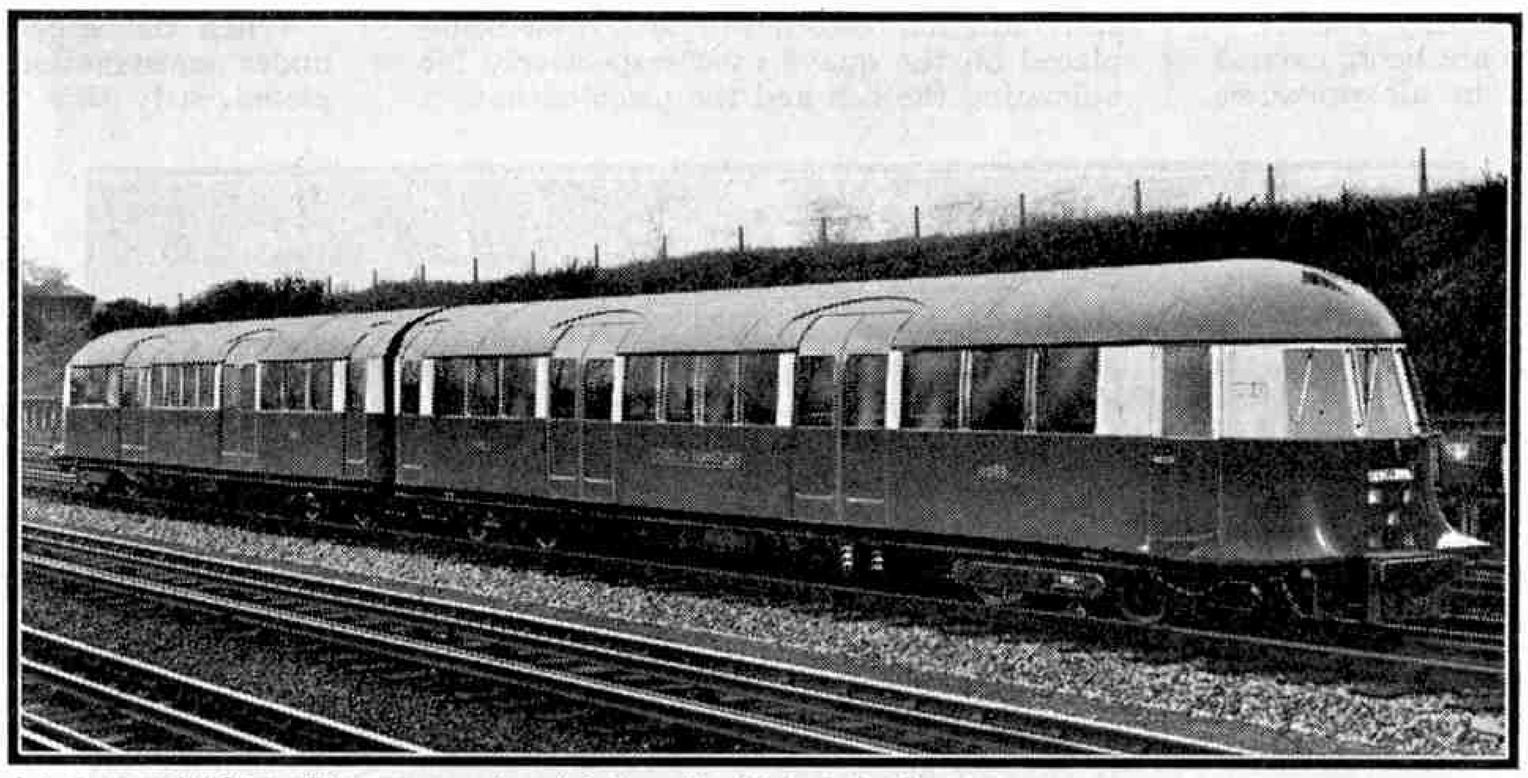
The small four-wheeled vans are not fitted with any lighting equipment, nor are they supplied with fans, apart from a portable fan operated from the factory mains supply. The object of this fan is to furnish the circulation for free cooling prior to despatch, when the fan is removed. The small vans are equipped with ice bunkers similar to those fitted in the two larger vans.

Streamlined London Tube Trains

Increased Power and Higher Speed

THE London Underground System is famous all over the world for its efficiency and as a means of rapid passenger transport. To further this efficiency, and with a view to the extended operation of tube trains over the outer suburban railways, where there are long intervals between stations, the L.P.T.B. has ordered four six-car streamlined tube trains that incorporate many experimental features. Several new trains are ultimately to be built, but before the final design is decided upon, the results and performances of the new trains now in service will be carefully studied and alterations in the design will be made where these are found desirable.

On existing tube trains, special compartments are provided for the accommodation of the electrical equipment, space for which is not available underneath the train. The construction of the new experimental stock is designed so that all the electrical gear for controlling the train is placed underneath the floor. This arrangement avoids the necessity of special compartments for equipment, and all the body space is available for passengers, with the exception of that required for the driver's compartment.



A two-car unit of one of the new experimental streamlined tube trains for the London Underground System. Photograph by courtesy of the London Passenger Transport Board.

A six-car train of the new type has approximately the same passenger carrying capacity as a seven-car train of existing stock. Each car has seating accommodation for 40 passengers, in addition to the usual two tip-up seats at the ends for use during peak periods.

The new trains have three times as many motors as the existing tube trains and are nearly twice as powerful. A six-car train of the old type has four driving motors, totalling 960 h.p., compared with the 12 of a new six-car train, with a total of 1,656 h.p. The effect of this high power is to give the highest rate of acceleration ever achieved on the L.P.T.B. underground system. Speed is increased at the rate of two miles per hour in a second, but in operation the trains accelerate with absolute smoothness and no jerking is noticeable.

The braking of the trains also has received special attention so that the passengers suffer no discomfort, although the trains come to a stop rapidly. The control of the brakes, which is electro-pneumatic, is the result of a considerable amount of experimental work, and a new system has been devised that gives a higher rate of retardation than the present standard. The new rate of braking is three miles per hour per second, and the system includes an automatic retardation controller, which keeps the deceleration constant over the whole speed range.

The comfort of the passengers has not been overlooked and special gears and wheels with new silencing devices have been employed. In a further effort to reduce noise the interior of some of the car sheeting is sprayed with a special noise-deadening composition.

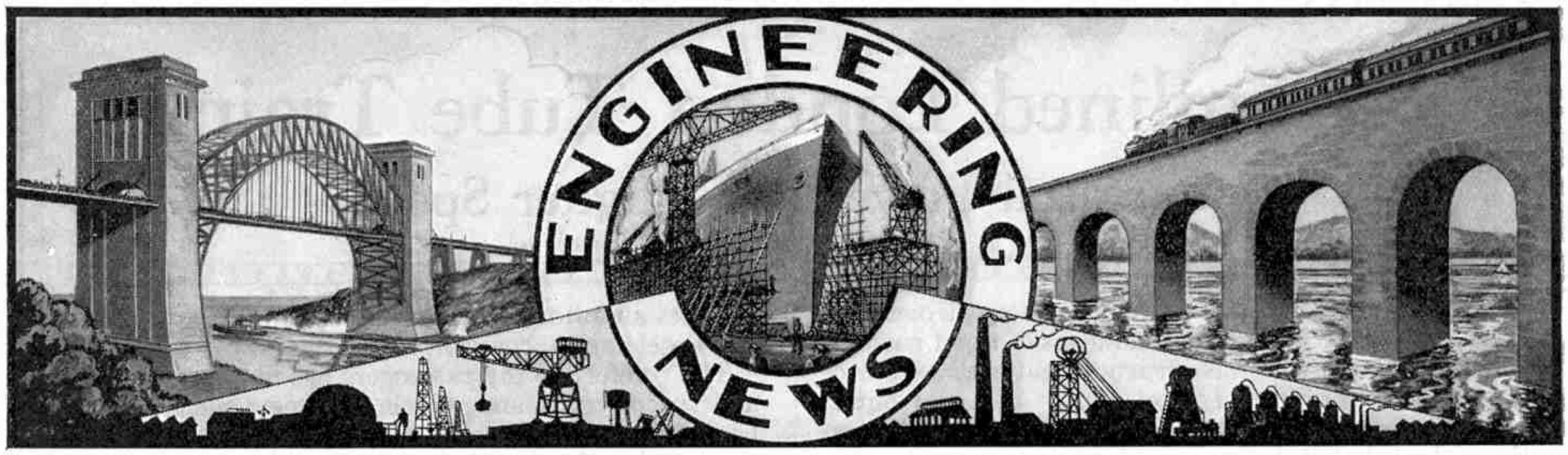
The new coaches are fitted with three air-operated sliding doors on either side. Two of these are double doors, and all have been designed so that the windows fit flush with the bodywork. In addition to forming part of the streamlining effect, this arrangement facilitates the cleaning of the stock. The main pillars between the windows are smaller than is the usual practice and they are triangular in section. The main advantage of this construction is that it enlarges the outlook of the passengers. The triangular pillars have a chromium finish and the metal strips between the windows are reduced to a minimum.

The normal type of ventilation has been eliminated and experimental systems of forced ventilation have been introduced in its place. These systems will maintain a continual supply of fresh filtered air. The temperature of the air supply to the coaches is controlled by means of a thermostat, and during the winter months on the open sections of the line, power for electric heating will be obtained from the 600-volt traction line.

The lighting of most electric trains calls for a considerable amount of improvement. The continuous flickering causes annoyance to passengers, but in the new tube trains the lighting is arranged from an independent 50-volt supply, which results in much steadier illumination. A special type of fitting for diffused lighting has been provided on all cars, and this is arranged to give adequate light without shadows.

Automatic couplers are fitted at the end of each two-car unit and the inner ends of each pair of cars are coupled together semi-permanently. The couplers are controlled by a push button operated by the driver, and the electrical, pneumatic and mechanical connections are made and broken instantaneously without the driver leaving his position. On existing stock these connections have to be made by hand, thus causing a considerable amount of delay.

The driver's seat is situated in the centre of a semi-circular cab with an aeroplane "joy-stick" type of control. There are actually two "joy-sticks," one for driving the train, and the other for braking purposes.



The Dartford-Purfleet Tunnel

On page 625 of the issue of the "*M.M.*" for November 1936 we referred to the Dartford-Purfleet Tunnel that is to be constructed under the Thames. The preliminary work will comprise the driving of a pilot tunnel 12 ft. diameter and 20 ft. to 25 ft. below the bed of the river, and the construction of ventilation shafts and chambers for the boring shields.

While these operations are being carried out the men will work in air pressures varying from 5 lb. per sq. in. up to 50 lb. per sq. in., which is probably the highest pressure under which workmen have yet operated in tunnel construction in this country. In order to supply the necessary air a compression plant capable of delivering 12,000 cu. ft. of compressed air per minute will be installed. The plant will be located in two engine-houses, one on each side of the river, and each will contain four air compressors, two of which will have a capacity of 1,000 cu. ft. and the others a capacity of 2,000 cu. ft. The compressors will be directly coupled to oil engines. A special feature of the plant will be equipment to maintain the air at the desired pressure within fine limits and to keep it free from oil.

Improvements at Grimsby Fish Docks

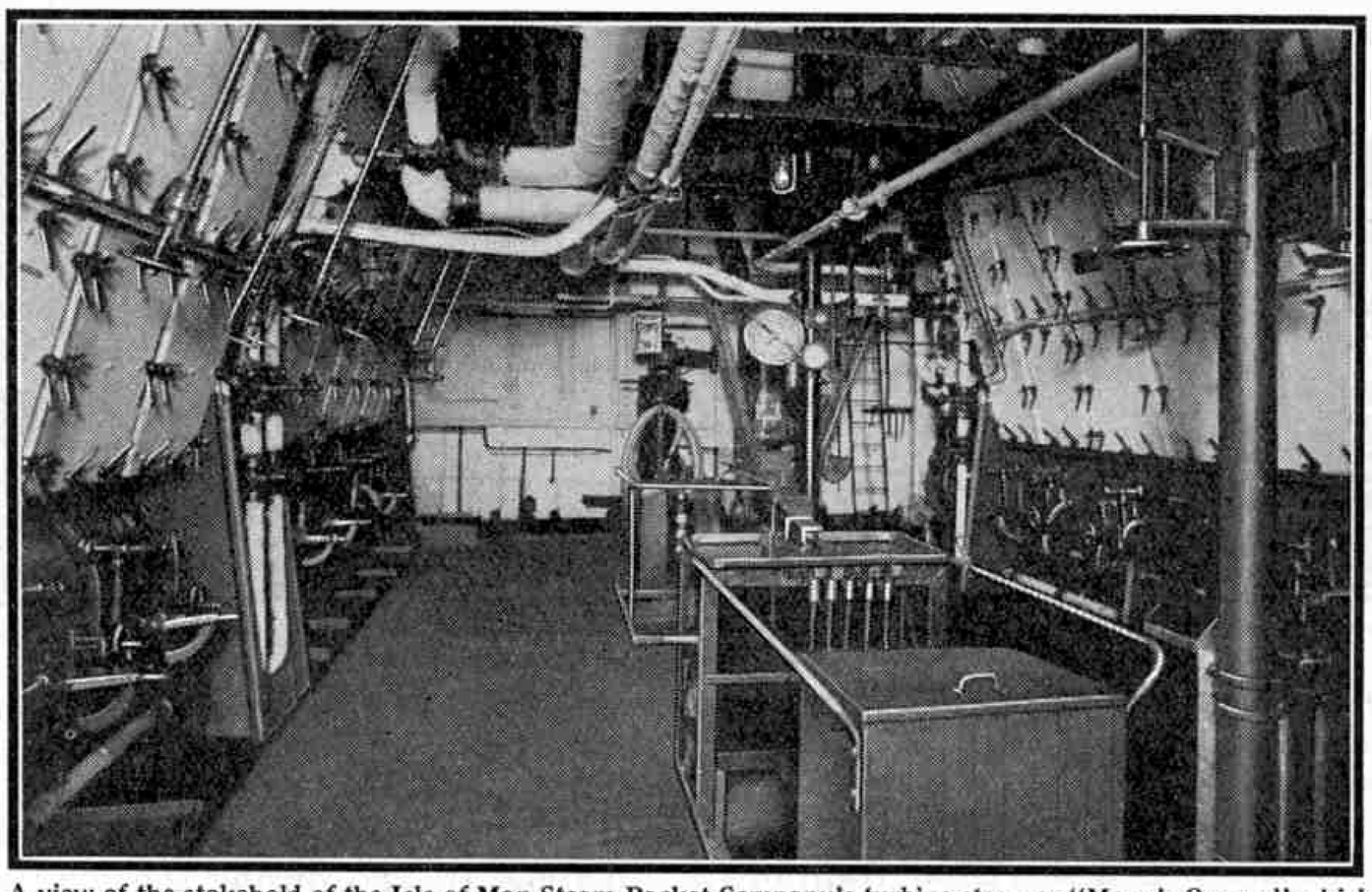
Considerable expansion in the Grimsby dock area has taken place within the last few weeks, and nearly £1,700,000 has been spent on improvements. The new works, which are now completed, add a water area of 37 acres to the original docks, and the completed scheme includes a new quay 2,000 ft. long, three new coaling jetties, new slipways with electrically driven winches, two outfitting jetties with travelling cranes and 26 miles of railway sidings.

Some idea of the great activity in the dock can be realised from the fact that an average of 600 tons of fish is landed and distributed each day. In order that this enormous quantity of fish may be brought in and rapidly distributed, it is necessary to carry on work day and night, and an elaborate system of artificial lighting has been installed to facilitate operations during the hours of darkness. When a trawler arrives in dock the cargo has to be unloaded, bunkers have to be filled with coal, and frequently repairs have to be made to the engine or gear.

To guide trawlers towards the dock miniature lighthouses have been erected at the ends of the piers, and the lamps flash on and off to a definite time cycle. Once the trawler has entered the dock area, the pilot is guided by two ribbons of light, one to starboard and the other to port, these being placed on the quays used respectively for unloading the fish and the disembarkation of the crew. Red lights indicate the outfitting jetties and slip-ways, while blue units indicate the coaling jetties. Two additional green lights are mounted on 24-ft. steel masts at the dock exit.

Artificial lighting arrangements are employed also on the three coaling plants. These consist of 90 ft. steel towers each supporting two cantilever arms. Each tower is placed in the centre of a jetty, so that ships can be moored on either side with the cantilever arms projecting over them and clear of their masts and funnels. Most of the trawlers have to be coaled through circular manholes in the port and starboard decks, and this is done by means of mechanically operated buckets or skips fed by belt conveyors on the jetty. The buckets are then hauled up, traversed along the cantilever arm over the ship and lowered over the manholes and the bottom opened. To enable the operator to see clearly the exact positions of the man-holes four 500-watt floodlights have been installed on each of the cantilever arms.

The repair slipways are provided with a floodlighting system of such an intensity that a 600-ton trawler can be hauled completely out of the water at night for repair work to be effected on its hull. The railway sidings are lighted by powerful 1,000 watt floodlights mounted in groups.



A view of the stokehold of the Isle of Man Steam Packet Company's turbine steamer "Mona's Queen," which was built by Cammell Laird and Co. Ltd., Birkenhead. Photograph by courtesy of Babcock and Wilcox Ltd.

New Belgian Canal Nears Completion

When the Albert Canal, which is now under construction in Belgium, is completed early this year, the great Port of Antwerp will be linked by a fine water highway with the nation's industrial centre at Liege. The construction of the Albert Canal was commenced in 1930 and when completed the work will have entailed an outlay of £16,000,000.

The new canal will help Belgium's industries to make the most of the nation's natural resources by providing a cheap method of transportation from the industrial areas to the port. It is about 76 miles in length and runs in a south-east direction from Antwerp until it nears the River Meuse in the vicinity of the Dutch frontier city of Maastricht, where it curves southward and follows the west bank of the Meuse to the terminal point near Liege.

There is an existing canal that links the Meuse with the Scheldt at Antwerp, but vessels using it have to pass through a bottleneck 5¼ miles long, and there are many swing bridges, sharp turns and tunnels. Further disadvantages are that the canal has 24 locks and part of it is outside Belgium.

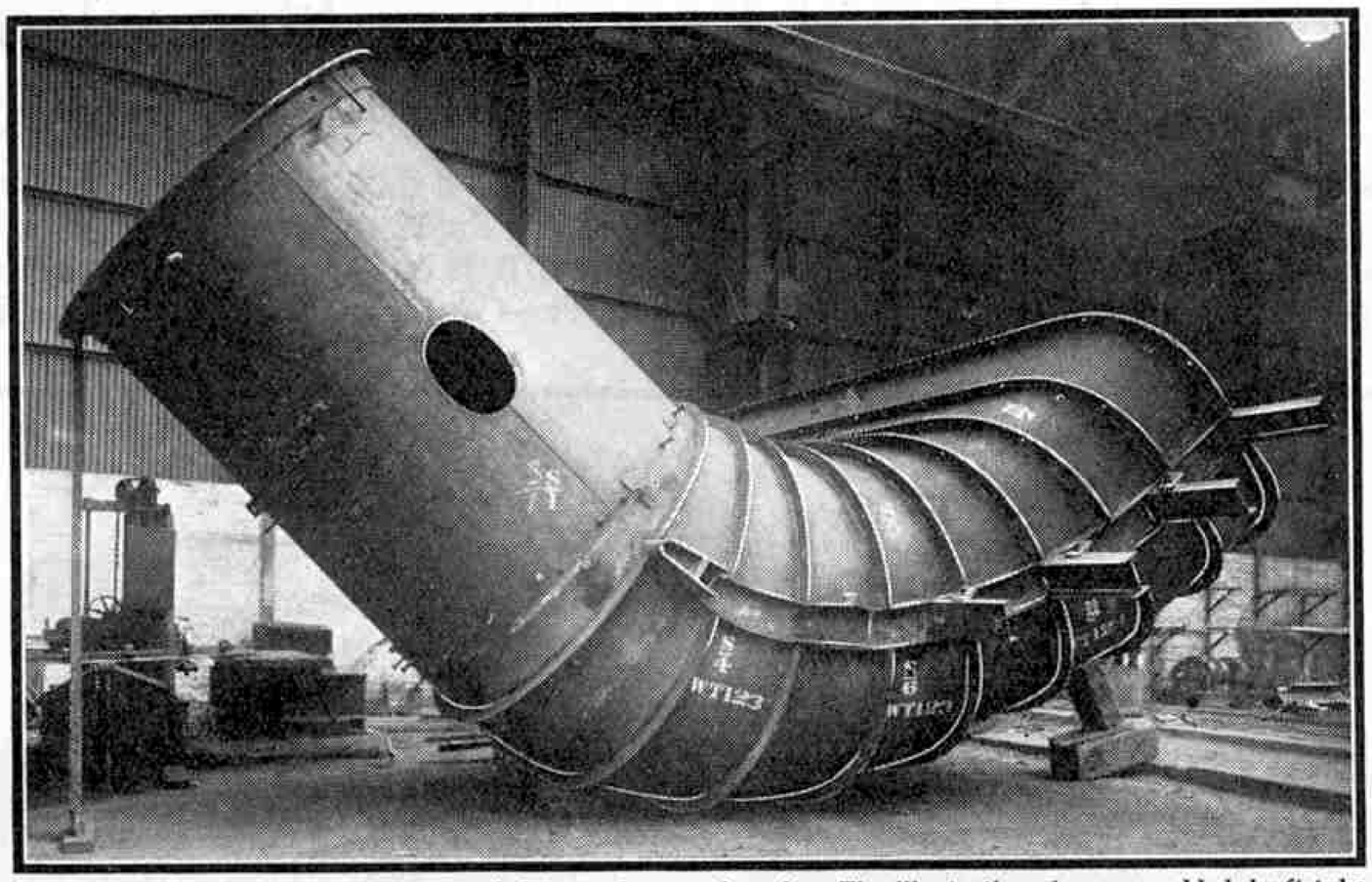
The new canal is 20 miles shorter and has only six locks, all electrically operated. It will accommodate barges up to 2,000 tons capacity, and its banks are reinforced to permit vessels to travel at full speed without endangering structures built alongside.

At one point the new canal is carried at a height of nearly 33 ft. above the ground surface, and is held aloft by a massive wall-dike reinforced by a backfill consisting of many millions of cubic yards of earth. A few miles northward of Liege the canal crosses two ridges where two cuts 213 ft. and 187 ft. in depth had to be excavated through difficult ground. The making of one of the cuts involved the removal of a total of 23,540,000 cu. yds. of rock and gravel.

Automatic Welder for Motor Car Bodies

The lower illustration on this page shows a large automatic electric welding machine that is installed at the works of the Pressed Steel Company Ltd., Cowley, Oxford, for welding together the side, front and rear panels of steel motor car bodies. During welding, the various panels that go to form the body are held by pneumatically operated clamps, and once they have been assembled on the machine welding is carried out automatically. When the current is switched on, and the mechanism is set in motion, the two side panels approach the front or rear panels at a predetermined speed, and an electric arc is maintained at the seam for a period of eight seconds. The current is then switched off and the assembled body removed.

The machine can turn out 40 welded bodies per hour, and after it has been set in motion requires no further attention from the operator. The total time required for loading the machine with panels, welding, and unloading, is under two minutes. The machine was built by the A-I Electric Welding Appliances Company, London.



A fine example of electric welding applied to modern engineering. The illustration shows a welded draft tube constructed to the design and order of the English Electric Co., for the Kendoon Power Station of the Galloway Water Power Company.

A Great Russian Power Line

A great electric transmission line, more than 700 miles in length, and carrying 220,000 volts, is being laid in the Ural Mountains in Russia. It runs from the south to the north, cutting through thick forests and across swamps and mountain ranges, and connects with all the important industrial centres of the Urals. The line will be fed by 13 new electric power stations, and will supply energy to industrial regions rich in raw materials. The first portion of the line, which is about 140 miles long, is now almost completed.

Dyeing Aluminium

Aluminium can be dyed in beautiful permanent colours by means of a new process that has been perfected by a young Surrey chemist. The process is electrical, and is claimed to give a protective covering that becomes actually part of the metal, and not merely a surface deposit, as in chromium and nickel plating. A factory has been opened in Birmingham for the operation of the new process.

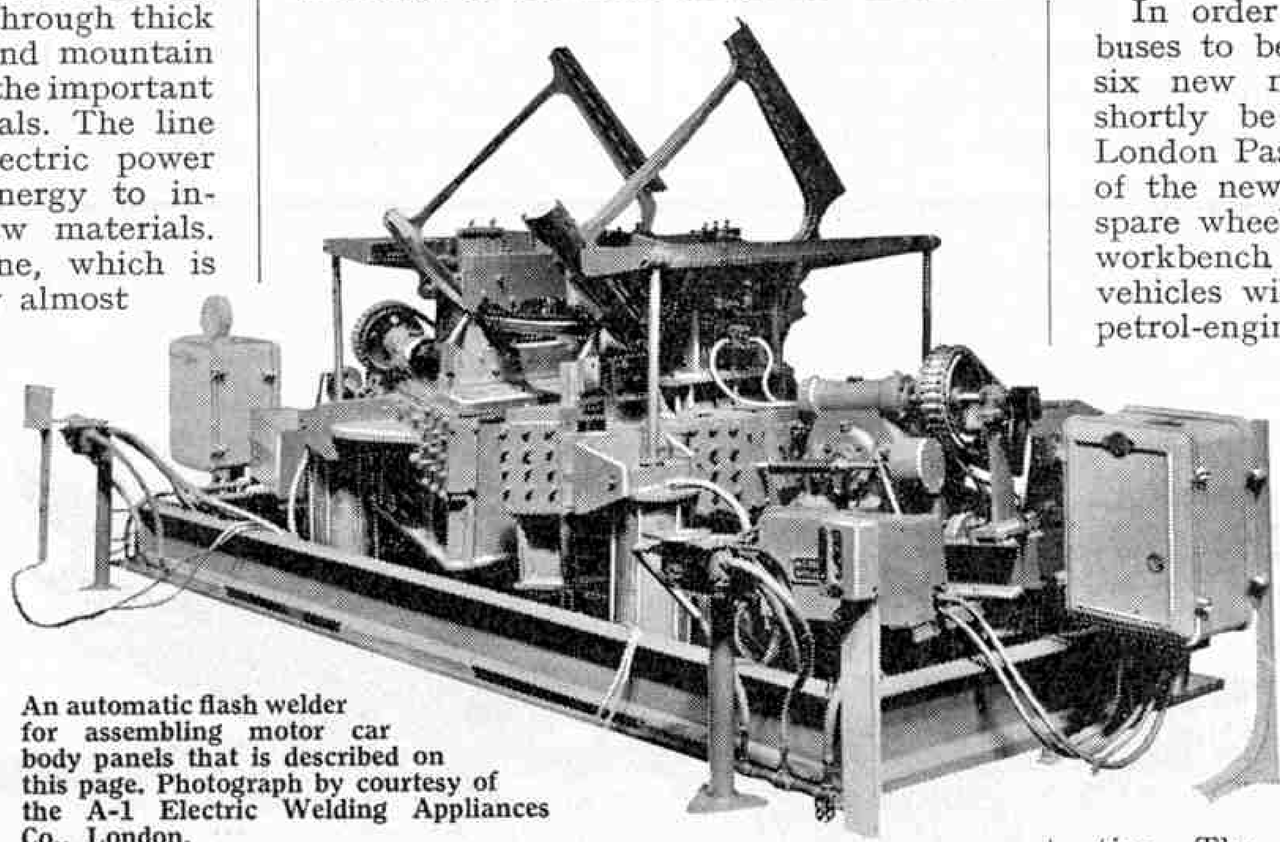
Aluminium that has been dyed in this manner is an insulator against electric currents up to 500 V, and it will not corrode. The colours are permanent and are said to be light and heat resisting. It is expected that their application to various aluminium goods, such as electrical fittings, will create an increased demand for these articles. A similar process is employed in America in the making of motor car pistons, by means of which the need for decarbonising has been greatly reduced.

Freezing Earth to Prevent Landslides

Trouble has been experienced at the Grand Coulee Dam in the United States of America, owing to landslides near the granite abutments of the dam arch. The earth refused to stand on a 2 in 1 slope, and efforts were first made to stop the slide by construction of a concrete retaining wall and by re-sloping the earth. These methods proved ineffective, however, and the method finally chosen to stop the trouble was to sink brine freezing pipes into the ground and create a dam of frozen earth and clay at the base of the slide.

New Trams for Bombay

A number of fine double-deck trams modelled on the latest design now in use in England and equipped with a special suspension system, are being built in India for the transport service of Bombay. The new trams will provide seating accommodation for 96 people, and will have air-cooled ceilings. Air-operated doors with safety buffers, which will be controlled from the driver's cab, will allow easy and safe entry and exit for the passengers. The entrance will be in the centre of the tram and access to the upper deck will be given by a spacious staircase. The cab will be fitted with a seat and windows protected by wire mesh.



An automatic flash welder for assembling motor car body panels that is described on this page. Photograph by courtesy of the A-1 Electric Welding Appliances Co., London.

Cinema Theatre in a Factory

A theatre for the entertainment of visitors, which is probably the first to be built actually inside a factory, has just been opened at the Dagenham works of the Ford Motor Co. Limited. The theatre is designed on most modern lines and is fully equipped with sound and projection apparatus. Seating is provided for 250 people and every member of the audience has an excellent view of the screen. A special feature is the air-conditioning plant, which completely changes the air in the cinema every six minutes, and maintains a constant temperature summer and winter. The cinema is built on a balcony overlooking the engineering shops, but sound-proof walls prevent the hum of the machines from reaching the audience.

A cafe in which 150 visitors can be accommodated at one time adjoins the cinema, and there is also a comfortable reception hall, where visitors may inspect examples of the latest Ford passenger cars and other products or watch working demonstrations.

One of the films shown in the theatre is based on a story woven around the new Ford V-8 car. Other films tell the story of the Ford car from the earliest days to the building of the works at Dagenham, and explain modern features of car design.

Mobile Workshops for Trolley-bus Service

In order to enable repairs to trolley-buses to be carried out while in service, six new mobile repair workshops will shortly be put into operation by the London Passenger Transport Board. Each of the new vehicles will carry trolleybus spare wheels and other equipment and a workbench with vice and tools. The vehicles will be standard forward-control petrol-engined Leyland "Cub" chassis fitted with specially constructed bodies, and complete will weigh under 50 cwt.

Europe's Longest Bridge

What is claimed to be the longest bridge in Europe was completed recently when the final span of the Storstrom Bridge, an important connecting link on the main route between Copenhagen and the principal towns of Europe, was lifted into position. The new bridge connects the two Danish islands of Seeland and Falster and is two miles in length. Over 21,000 tons of steel, supplied by Dorman Long and Co. Ltd., the famous British engineering firm, were used in its construction.

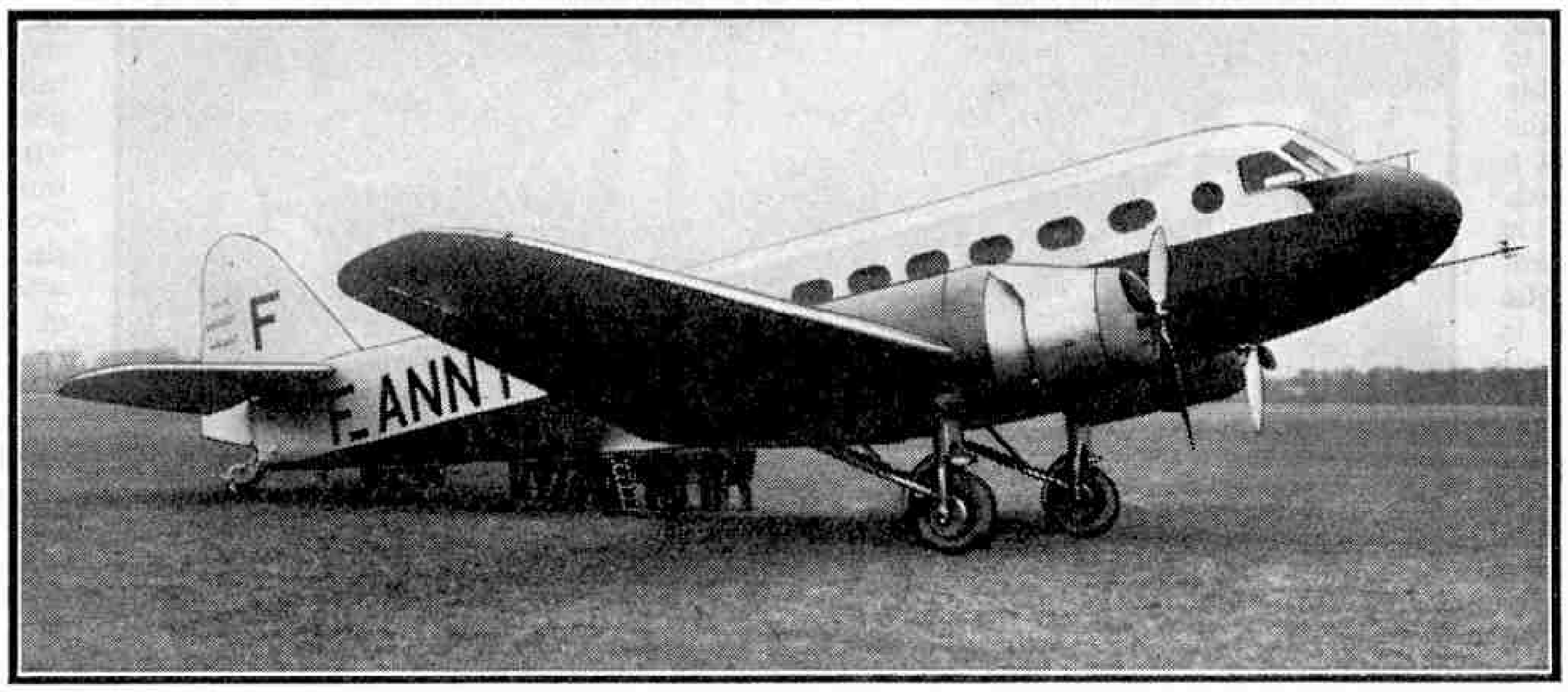
* * * *

A new transmitting station for radiating ultra short-wave television programmes is being built near Moscow. It will have an aerial nearly 490 ft. high, which will ensure good reception of pictures within a radius of about 40 miles.

French Air Liners

Modern High and Low Wing Monoplanes

FRANCE has always been in the forefront of air line development, and many important types of heavy commercial aircraft are produced there. It is interesting to find that practically all of the many types of air liners built in France are monoplanes. There does not seem to be any marked preference in that country for high wing as against low wing machines, however, and the number of makes of each type are about equal. There are some interesting types of triple - engined French air liners, but the majority are twin-engined aircraft.



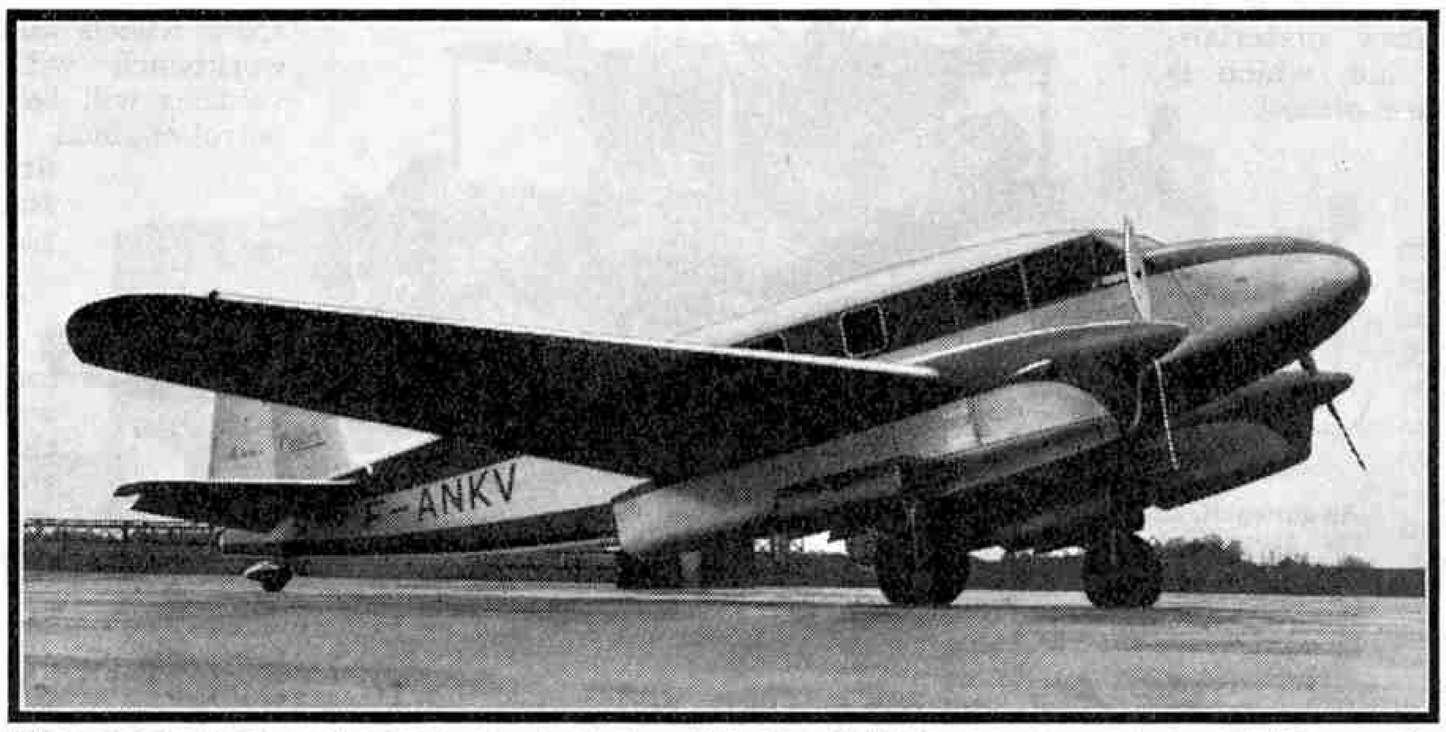
Breguet-Wibault 670 low wing monoplane. This twin-engined air liner can fly at 219 m.p.h. The long passenger cabin has seating for 18 people, and each chair is alongside a large window.

The Breguet-Wibault 670 shown in the upper illustration on this page is a typical French low wing monoplane. It is a twin-engined machine with a wing span of 80 ft. 9 in. and a length of 60 ft. 9 in. The pilots' cabin, which is equipped with dual control, is well forward of the wings and the outlook from it is exceptionally good. Immediately behind the cabin is a compartment for the wireless operator, and to the rear of this is a long passenger cabin with 18 armchairs arranged in two rows of nine, each chair being alongside a large window.

The wings of the Breguet-Wibault 670 are of duralumin. Slotted ailerons are fitted along about two-thirds of the length of the trailing edge of each wing, and slotted trailing edge flaps along the remainder of the length. The fuselage is of rectangular section for most of its length, and is covered with duralumin. The undercarriage can be drawn up into recesses in the underside of the fuselage when the machine is in flight. The two Gnôme-Rhône "Mistral Major" engines occupy unusually large nacelles, one on each side of the fuselage. The engines each develop 900 h.p., and enable the machine to attain a maximum speed of 219 m.p.h. at 5,000 ft.

The Breguet Company also produce a slightly smaller air liner called the "Fulgur," the passenger cabin of which has seating for 12 to 14 people. This twin-engined machine, like the 670, is constructed almost entirely of metal.

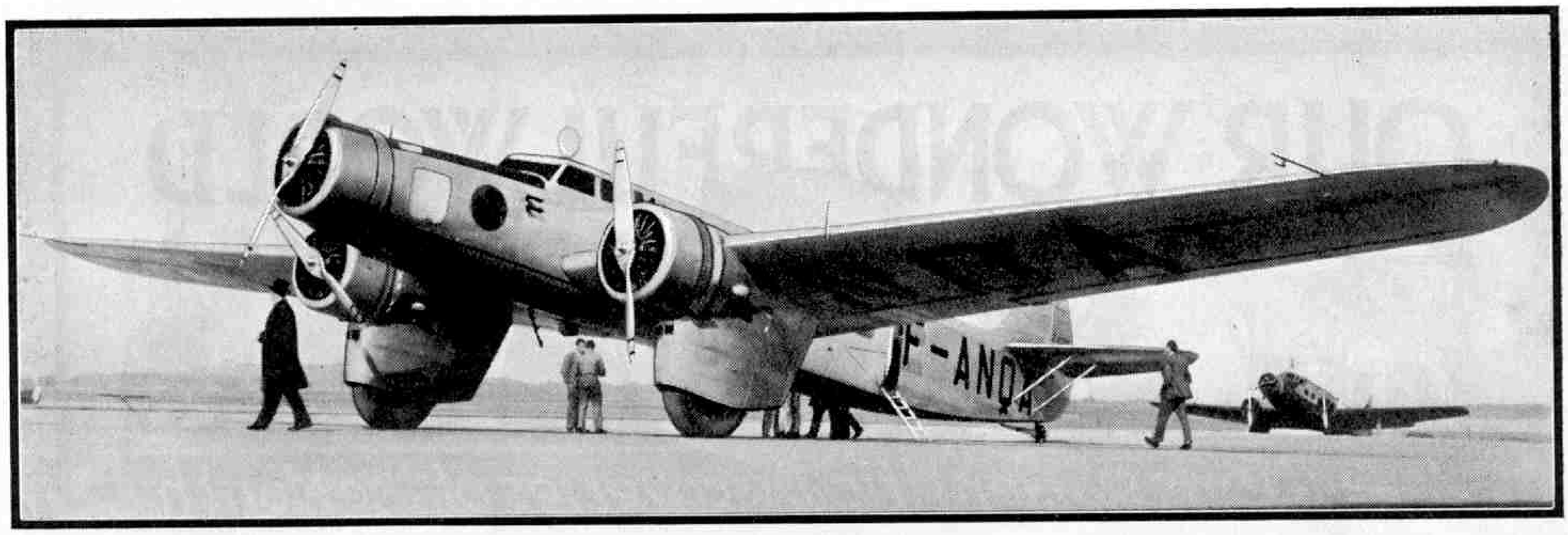
The Caudron "Goëland" shown in the lower illustration on this page is the largest civil aeroplane built by the Caudron Company. This firm produce many types of light aeroplanes, and several of their machines of this kind were described in a special article in the September 1936 "*M.M.*" The "Goëland" is a low wing monoplane, and the extensive streamlining of the fuselage and engine nacelles reflects the modern trend of aircraft design. The wing is built in one huge piece, and is of the cantilever type, that is, it is not supported by any external bracing. The centre section of the wing is rectangular, and the outer sections are sharply tapered, the leading edge being swept well back. The wing is built up of spruce and plywood spars and ribs, and has a stressed plywood covering. The centre section is fitted with flaps to facilitate the landing of the machine.



The Caudron "Goëland," a good example of streamlining applied to large commercial aircraft. This machine carries six passengers. Photograph by courtesy of Société des Avions Caudron.

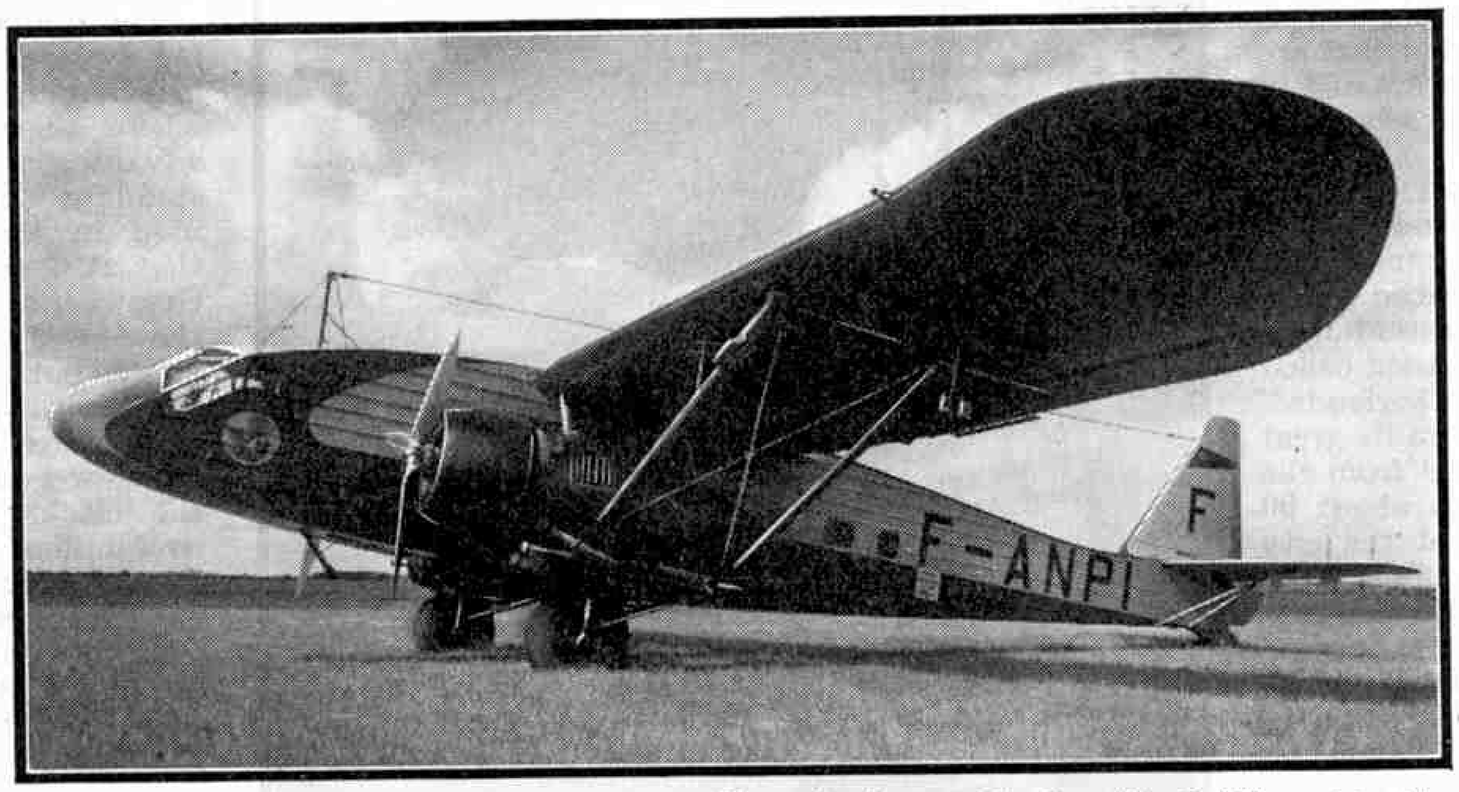
Both the fuselage and the tail unit are wooden structures, the covering of the fuselage being partly light metal panels and partly fabric. The rudder and elevators of the tail unit are covered with fabric, but the fixed surfaces of the unit have plywood covering. The undercarriage is retractable, and is operated hydraulically, the wheels rising backwards into special recesses in the long nacelles of the engines. The large passenger cabin behind the pilots' cabin is roomy and is very comfortably equipped with seating for six passengers, with a central gangway.

The "Goëland" has two 180/220 h.p. Renault "Bengali-Six" engines, and these are mounted in the leading edge of the wing, the usual practice in the case of monoplanes fitted with two or more engines. Variable-pitch airscrews are



employed. The aeroplane has a top speed of 180 m.p.h., and cruises at 162 m.p.h., and even if one engine is disabled it can maintain a speed of 136.6 m.p.h. The ceiling, or greatest height to which the machine can climb, is 16,400 ft., and sufficient fuel is carried in the four tanks in the wing for a non-stop flight of 1,242 miles. The wing span of this fast passenger and freight carrier is 57 ft. 8 in., and the length is 43 ft. 9 in.

The other low wing air liner shown here is the Dewoitine D-333, the product of a company who for many years have specialised in the construction of large commercial aircraft. The men near the machine in our illustration give one a much better idea of the great size of a modern air liner than can be gathered from figures. The D-333 is not exceptionally large for a triple-engined aeroplane. The span is 95 ft. 2½ in., the length 56 ft. 3 in., and the height is 17 ft. 7 in. The wing is built in five sections, the centre one of which fits neatly into the underside of the fuselage, and its "backbone" is a long central girder to which the various ribs are attached. Landing flaps are fitted to the inner portion of the trailing edge, and the outermost portions are hinged so that they can be operated as ailerons.



The fine triple-engined monoplane shown in the upper illustration is one of the Dewoitine D-333s used by Air France, by whose courtesy the photographs on this page are reproduced.
The lower photograph is of one of the company's Potez 62 type air liners. The engine nacelles are slung beneath the wing instead of being mounted in its leading edge, as is the usual practice in twin and multi-engined monoplanes.

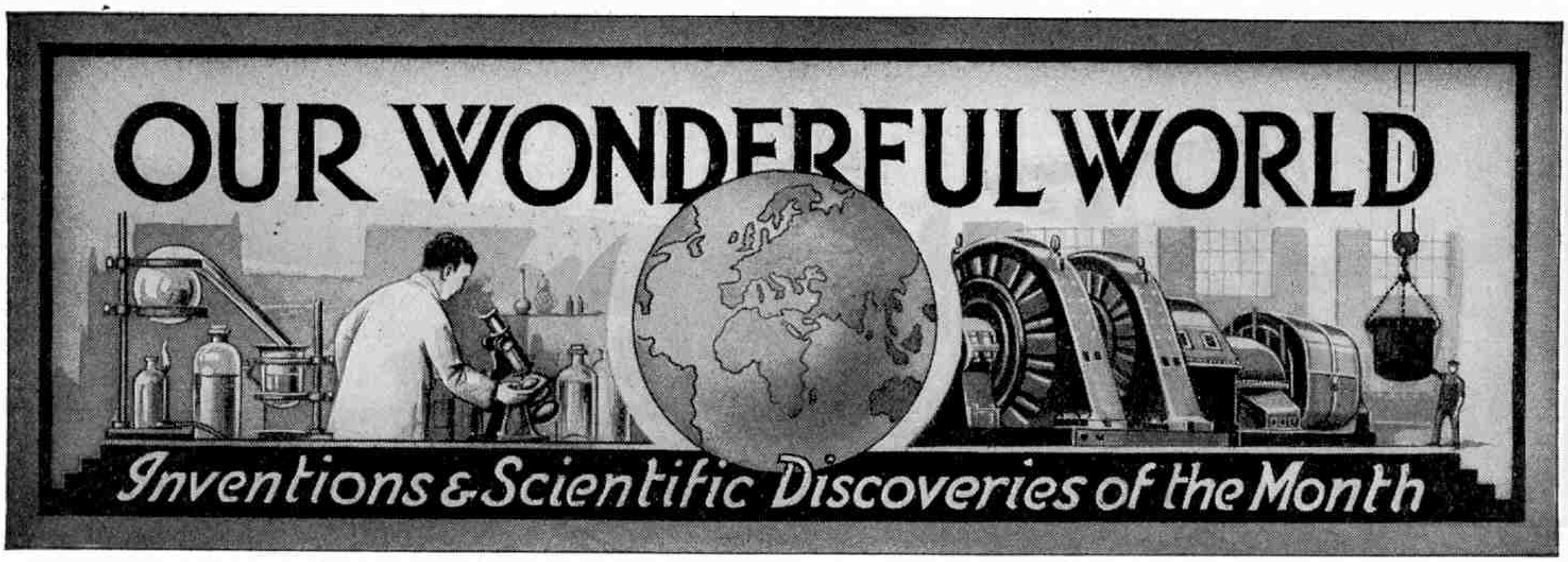
The fuselage is a duralumin structure and is covered with metal sheeting. The undercarriage is not retractable, and each leg is enclosed in a massive streamlined fairing, the great size of which can be gauged from our illustration. The nose of the fuselage is occupied by one of the three engines, as is usual in a triple-engined machine. Behind it is a baggage compartment and at the rear of this the pilots' compartment, with the usual side-by-side seating. The wireless operator's compartment is situated between that of the pilot and the extensive passenger cabin, in which there is seating for eight people. When the machine is engaged in night flying, the seats can be extended, presumably to form sleeping berths. In addition to the usual luggage compartment aft of the passenger cabin, room for baggage is also provided in the wings, to the rear of the central girder already mentioned.

The three engines of the D-333 are of the Hispano-Suiza 9V type, and each develops 575 h.p. One is mounted in the nose of the fuselage, as already stated, and the other two occupy special nacelles, one on each side of the fuselage and faired into the leading edge of the wing.

Another series of French air liners, that have proved very successful in actual service, are the Potez types produced by the Potez Company of Paris. Probably the best known is the Potez 62 shown in the lower illustration on this page. About 20 of these machines were added to the fleet of Air France last year, and in regular service on the widespread air routes of the company they have proved their high efficiency under all sorts of climatic conditions. About six of the aeroplanes are operating on the company's London-Madrid route, and a similar number on the Damascus-Hanoi section of the Far East route. The company's South American service has also benefited, and several of the remaining machines are operating over the Natal-Buenos Aires route.

The Potez 62 differs greatly from the other types of air liners illustrated in this article. It is a twin-engined high wing machine with a span of nearly 74 ft. The wing is built in two sections each built up of "I" section light metal spars and light alloy ribs, and with the exception of the leading edge is covered with fabric. Metal covering is provided for the leading edge. The fuselage is of wood and is covered by panels of reinforced plywood. The undercarriage is retractable.

The most interesting feature about the aeroplane is that the two engines are carried in nacelles that are slung beneath the wing, instead of being faired into its leading edge. The strong inclined struts that act as bracing for the wing are attached at their lower ends to these nacelles. The Gnôme-Rhône engines give the Potez 62 a top speed of just over 200 m.p.h. It has a range of 1,056 miles.

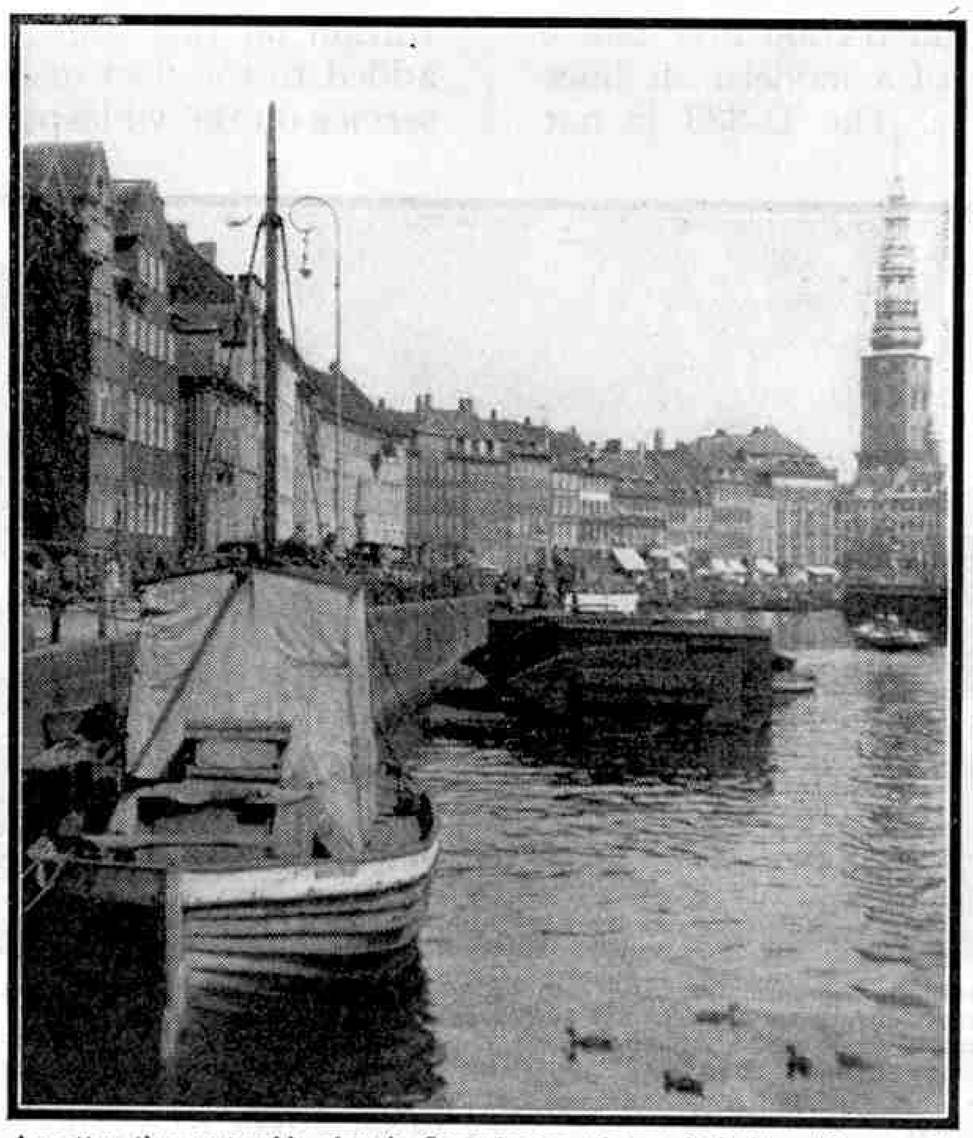


Cities of Waterways

The photograph of a scene in Copenhagen reproduced on this page is a reminder of the many cities in which waterways play a far more important part in actual daily life than is usual in Great Britain. In Copenhagen there is a waterway that divides the town into two parts and is crossed by lift bridges carrying footpaths and roads with tramway tracks. The bridges have to be crossed often and quickly, for there is intense traffic on the water below them. There are also many small canals that run right into the city itself, and seem to bring the local fishing industry to the very doors of the houses. Visitors to Copenhagen have often commented on this, and on the live eels by the thousand that are to be seen in the street market and in the shops, gliding ceaselessly over each other.

The most famous of all cities of waterways of course is Venice, which is so much intersected by canals that these can literally be described as the highways of the city. Amsterdam is another example that has been called "The Venice of the Netherlands." This name was derived from its great commercial reputation, and from the canals that cut it up into about 90 islands. The very name of the city is derived from a dam across the River Amstel, and to-day there is in it a large square called the Dam because it is the eastern boundary of the original dam around which the city was built.

Of all the cities of waterways the most remarkable undoubtedly is Canton, in China, however, for there several hundred thousand people actually live on the water. The River Pearl flows through the city, and is crowded so thickly with small boats, or sampans as they are called, that the banks of the stream are hidden for several miles on both sides. The mass indeed constitutes a floating city, and there are many of its inhabitants who have practically never set foot on land. The sampan is small, but seems to be capable of accommodating an entire family, often with a lodger or two thrown in. The sides of the river present a very interesting picture as evening comes on, when fires are lighted on the poops of the sampans and their occupants settle down to cook their evening meals. Altogether this floating city is one of the most amazing sights in the world.



An attractive waterside view in Copenhagen, the capital city of Denmark. Photograph by B. Unne, Harrogate.

Canada's Time Zones

Breakfast time at the end of Canada is lunch time at the other. Between Nova Scotia, on the Atlantic sea-board, and Yukon, the most westerly of the provinces of Canada, there is a difference in time of five hours. This is one of the results of the immense size of Canada, which stretches more than one-fifth of the distance round the world at the northern latitude in which the country is placed.

It would be very inconvenient to have the same time system throughout, for even if the time suited for the prairie provinces, half way across Canada, were chosen as the standard, noon in Nova Scotia would be 2½ hours after the Sun was directly overhead, and it would be a corresponding time earlier in Yukon. In order to avoid this difficulty six standard time zones have been arranged. These are known as the Atlantic, Eastern, Central, Mountain, Pacific and Yukon zones, and there is a difference of an hour between each successive zone. It is therefore possible to leave a place on the western boundary of one zone, and to arrive at one just over the eastern boundary of the next zone nearly an hour earlier. There is of course a corresponding loss of practically an hour on making a similar journey in the opposite direction.

To add to the difficulties of timing in Canada, there are townships in which the time used by the local railways is adopted, and in certain instances this differs from the standard time. In addition, there are villages where the time that suits the convenience of the inhabitants best is observed, and during the summer months daylight saving time is used in several cities and communities, particularly in the area between Quebec City and Windsor, Ontario.

The difficulties involved in a timing system are not well appreciated in a country such as Great Britain, where there are no practical disadvantages in the use of the one standard time throughout. The time used in this country of course is that at Greenwich. Noon throughout Great Britain is the time at which the Sun is directly overhead at that point, but the Sun does not reach the zenith at Liverpool until about 12 minutes later, and local noon at Glasgow is about 17 minutes behind the clock. Broadcasting has made us familiar with the differences between British and continental time, and most readers will now know that time in Central Europe is one hour ahead of that in Great Britain, and will appreciate the reason for this.

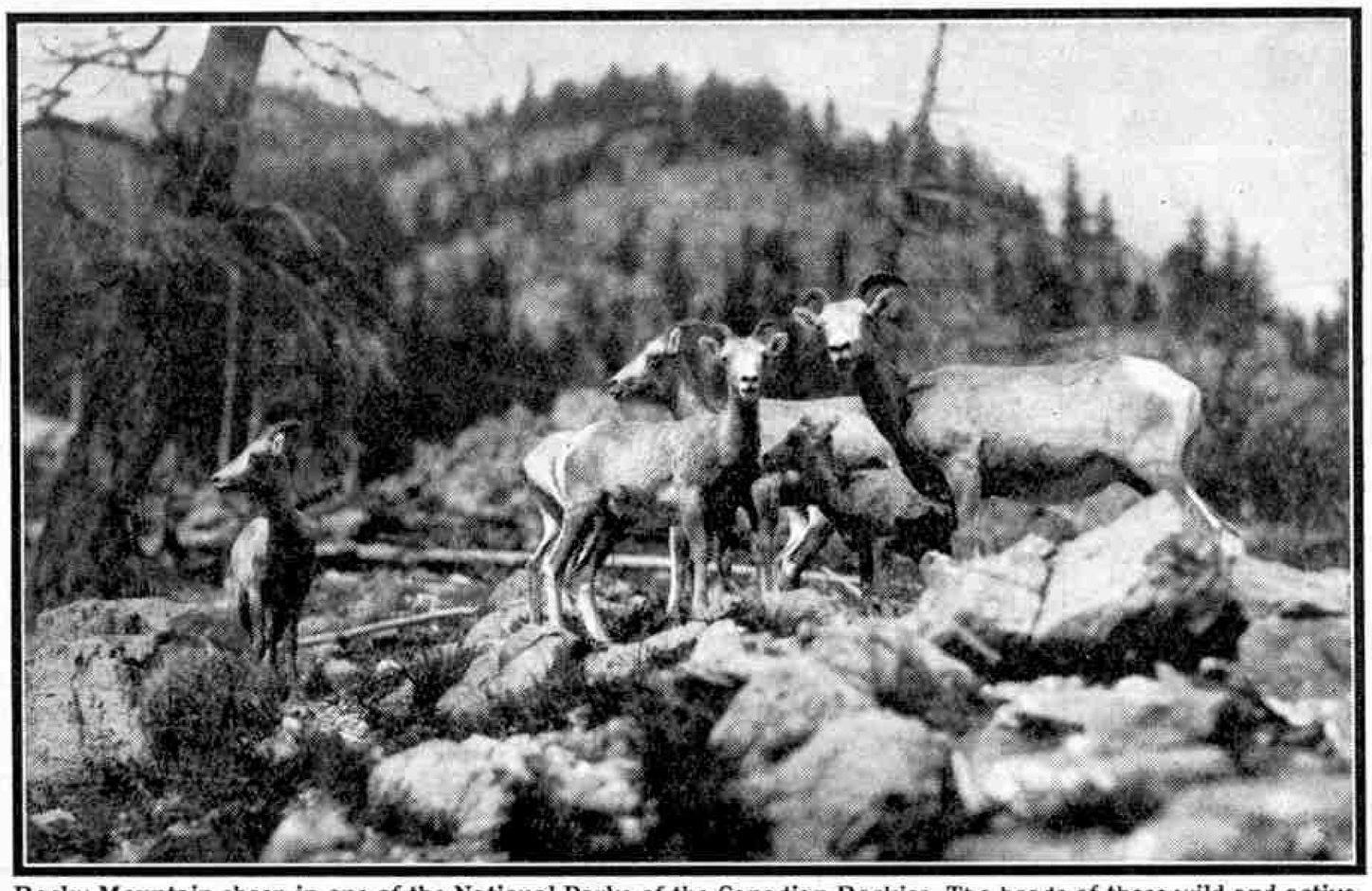
Roasting Meat on Ice

There seems to be no limit to the wonders of the shortest radio waves. They can have disastrous effects on life, for it has been discovered that animals lose their hair, become listless, and finally die when exposed to them, effects that are said to be electrical in character. But there are others that are beneficial. The rays penetrate bones and fat, and in passing through the body cause a rise in temperature. It is possible to tune in radiation to particular organs, because of the varying capacities of these for absorbing the rays, and they can be used in perfect safety for creating artificial fevers or temperature rises that are healing in character, and also for treating abscesses and such disease as tuberculosis. Their value for curative purposes undoubtedly will increase as more is learned of them and of their effects on the body.

The heating effect produced by the passage of the short wireless waves depends on the density of the body through which they are passed. The result is that they can be used to cook fish in water that remains practically cold, and to roast meat while it is resting on a block of ice. The fish and the meat become heated more rapidly than their surroundings because they are denser.

The Rocky Mountain Sheep

One of the most interesting creatures of the western mountains of North America is the Rocky Mountain sheep, illustrated on this page. It is remarkable for the massive curled horns of the male, and the heads carrying the horns are much coveted trophies. Hunters need all their skill and energy in order to obtain these heads, however, for unlike the domestic sheep with which most of us are familiar, the Rocky Mountain sheep is agile and swift, and is perfectly at home at dizzy heights and on crags that are almost inaccessible to any but these sure-footed creatures.



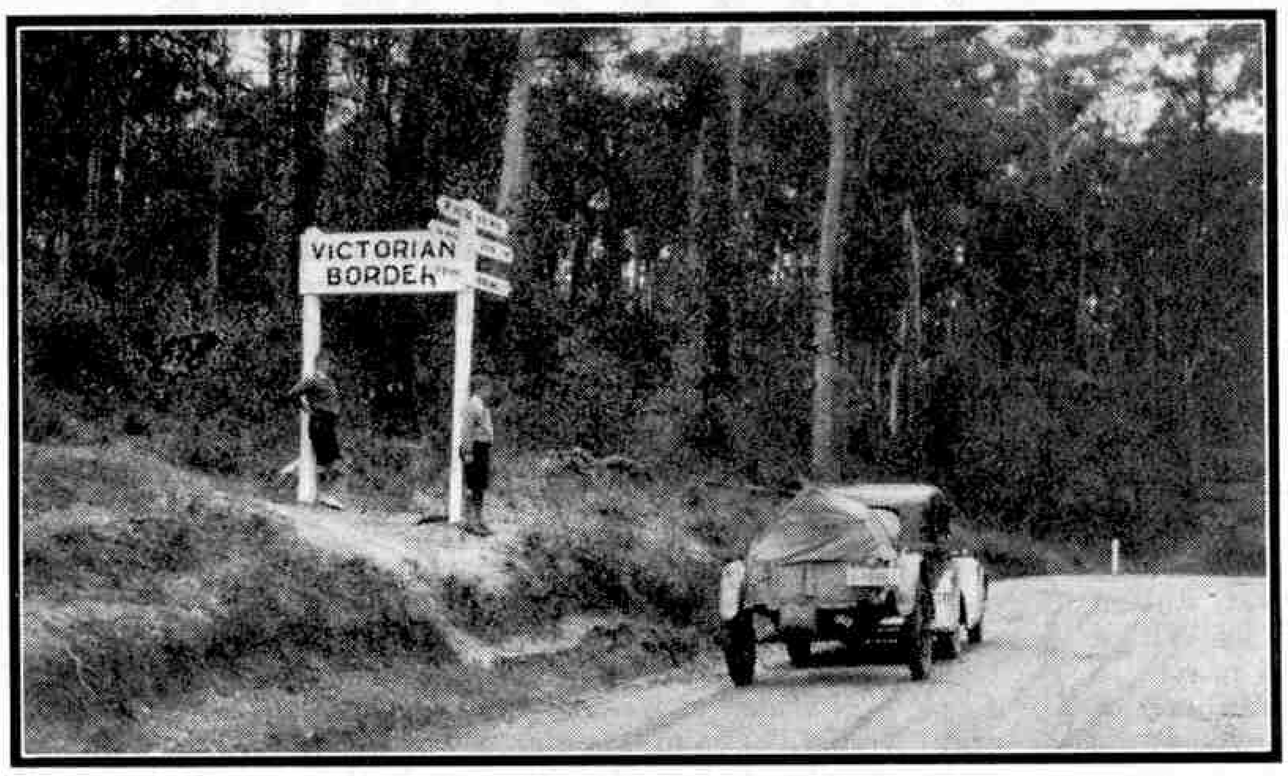
Rocky Mountain sheep in one of the National Parks of the Canadian Rockies. The heads of these wild and active creatures carry massive curled horns that attract the trophy hunter.

This remarkable sheep is about 3 ft. 4 in. in height. It may weigh as much as 300 lb. and have horns 3 ft. 6 in. in total length. It was becoming rare, like other interesting wild creatures of North America, but has found congenial homes in the National Parks of Canada, where it is to be seen in large numbers.

Colorado's Death Valley

There is a valley in Colorado where death seems to lurk. Of a herd of 200 sheep driven into the valley one night nearly six years ago, all but three were dead next morning, and shortly afterwards 71 of another flock that spent a night there also died. Few people now go near the valley, and its evil reputation has earned for it the name of Suicide Gulch. Its unusual character is detected immediately on entering it, for vapours that smell faintly of garlic rise from the soil and its flowers have a smell like that of bad eggs.

Chemical tests have now shown that the evil factor in the Gulch is selenium. This is a non-metallic element that resembles sulphur in many respects, but its strangest property is its power of changing in electrical conductivity under the influence of light. Because of this uses have been found for selenium in television systems and in controls for light ray apparatus. It is valuable for this purpose, but dangerous as a food, for it is very poisonous. In the soil of Suicide Gulch there are five parts of selenium in a million, but in the plants the proportion is greater, for these seem to absorb the element readily from the soil. One plant was found to contain 670 parts of selenium in a million, and the concentration in another was twice as high. The presence of 10 parts of selenium in a million is said to be sufficient to make a plant dangerous to sheep eating it. It is little wonder therefore that so many of these creatures died after being in the valley only one night, for the selenium present has converted the otherwise harmless plants into deadly poisons, and transformed the Gulch into a death valley.



The borderline between New South Wales and Victoria, Australia. The boys seen in this illustration have a foot in each State. Photograph by C. J. McBain, Sydney.

A Giant Rhinoceros of the Past

The rhinoceros is regarded as one of the most formidable and terrifying of all creatures. The largest species is 6 ft. high at the shoulder, but the modern rhinoceros is only a pigmy in comparison with one of its prehistoric ancestors, however, for this stood more than 13 ft. in height and in bulk was five times as large.

The existence of this gigantic rhinoceros of prehistoric ages was unknown until recently, when its fossilised bones were dug up on the shores of the Aral Sea, in Central Asia, by members of an expedition sent out by the Academy of Sciences of the Soviet Republic. The bones were found in the neighbourhood of a great dried-up lake, which has proved to be a storehouse of the bones and teeth of prehistoric monsters.

Where the Planets were Born

How the planets came into existence is a problem that has long attracted scientists, and many interesting suggestions have been made to account for them, and for their nearly circular orbits round the Sun. All of these have given interesting pictures of what may have happened in the past, but in practically all cases something remained unexplained. For instance it has been suggested that some wanderer through space approached our Sun while this was still a mass of glowing gas. As it swept by, the gravitational attraction of this intruder is supposed to have pulled out a great cigar-shaped streamer into space, stretching many millions of miles, and in the course of time the matter in this condensed into the smaller masses that now form the planets.

This idea was satisfactory in many respects, particularly as an explanation of the remarkable fact that the largest planets are in the middle of the progression of the Sun, the smallest being those nearest and farthest away respectively. Unfortunately there were other difficulties, and to overcome these it has now been suggested that our Sun originally had a companion revolving round it, and that a third star passing by collided with the companion, or went very close to it. The effect of such a collision would be to leave the fragments formed under the control of the Sun, while the main bodies themselves would be swept away into space. If this is correct, it seems that our planets never were part of the Sun itself, as has been so far supposed, but were actually born out in space and held captive by its powerful attraction.

North American Land Tilt

The harbours on the southern or United States side of the Great Lakes are becoming deeper, while those on the Canadian side are becoming shallower. This change seems to be due to a tilting of the land round the Great Lakes about a line running roughly north west. It is believed that the cause of the tilt is the continued rise of the land in Canada, which is still reacting from the tremendous squeezing it endured during the Ice Ages of thousands of years ago, when enormous masses of ice pressed remorselessly upon it.

If the tilting continues it is possible that some day the waters of the Great Lakes will find their way down the Mississippi River system instead of the St. Lawrence. The rate of movement is so slow that danger of this is very remote, however.

The *"Queen of Scots"* Pullman

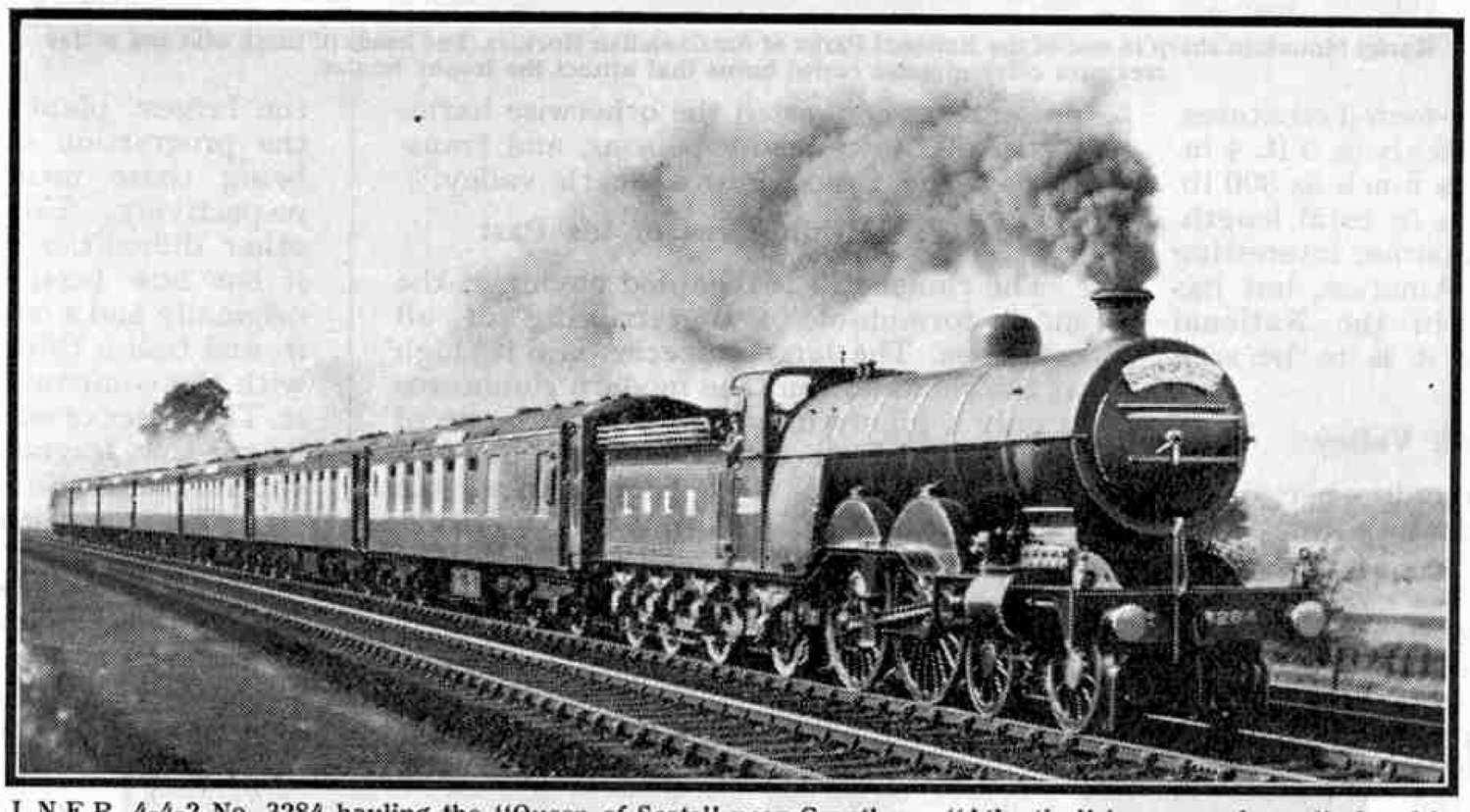
At long last the L.N.E.R. (G.N. section) "Atlantics" have been displaced from the duty of working the *"Queen of Scots"* express and its Sunday counterpart between King's Cross and Leeds. Two Pacifics, No. 2553, *"Prince of Wales,"* and No. 2555, *"Centenary,"* are now stationed at Copley Hill shed, Leeds, and regularly haul the famous Pullman train. Drivers who have for so long been used to much smaller engines might well have looked askance at such giants as the "Pacifics," but Nos. 2553 and 2555 have already become great favourites with the Leeds men.

As a farewell tribute to the "Atlantics," readers will be interested in the following details of a magnificent run made shortly before the "Pacifics" arrived on the scene. This journey was not on the *"Queen of Scots"* but on the up *"Harrogate Sunday Pullman."* The load was one of seven cars, weighing 300 tons with passengers and luggage, and the engine was 4–4–2 No. 3280, in charge of Driver Bird. On this memorable occasion the express was only four minutes late at King's Cross after a series of delays costing 23½ minutes.

After a fine start with a sustained speed of 34 m.p.h. up the 1 in 100 bank to Ardsley, the train was two minutes early no farther out than Wakefield. Speed rose to 77½ m.p.h. on the descent towards Doncaster, but approaching that station came the first of many signal checks. With a brilliant recovery, from 5 to 63 m.p.h. in three miles, Retford was passed ahead of time but almost immediately afterwards came a dead stand for signals, lasting two minutes, at Grove Road crossing. In the hope of avoiding more checks the driver went more easily for a while, but after Newark came an astonishing climb to Peascliffe tunnel at an average speed of 63 m.p.h. throughout.

Very serious delays followed, right through Grantham and in spite of a top speed of 84 m.p.h. on the descent to Peterborough the latter station was passed 8¼ minutes late. From here real record-breaking began, the running from Huntingdon to Hitchin being some of the fastest ever known with an "Atlantic." Hitchin was passed only three minutes late, but the train was slowed by adverse signal five times before London was reached; otherwise time would easily have been kept. From Huntingdon to Hitchin speed averaged 70.4 m.p.h. over a stretch that is definitely against the engine. The 185.8 miles from Leeds to King's Cross took 210 minutes actual, but the net time was only 186½ minutes. This performance was one of considerable merit, especially in view of the age of the G.N. "Atlantics." One of these engines is illustrated on this page at the head of the *"Queen of Scots"* Pullman.

We are indebted to Mr. O. S. Nock for details of this run.



L.N.E.R. 4-4-2 No. 3284 hauling the "Queen of Scots" near Grantham. "Atlantics" have now been displaced by the more powerful "Pacifics" on this service. Photograph by M. W. Earley, Reading.

L.N.E.R. Streamlined "Pacifics" Named

The first batch of the 17 streamlined "Pacifics" now under construction at Doncaster Works for hauling the new L.N.E.R. streamlined express, *"Coronation,"* have been named after birds. They are *"Golden Eagle," "Falcon," "Merlin," "Kingfisher,"* and *"Kestrel."* The first engine of the batch to be completed, No. 4482 *"Golden Eagle,"* commenced last month the first of a series of severe trial runs.

The new locomotive now under construction at Darlington for service on the West Highland line of the L.N.E.R. is to be named *"Loch Long."*

Demand for Rail Containers

The demand for rail containers for all types of traffic is increasing so rapidly that the G.W.R. have found it necessary to build a further 250, bringing their total number to over 2,100.

L.N.E.R. Schemes for 1937

The L.N.E.R. are to carry out several gigantic works during 1937, including the Sheffield, Wath and Manchester electrification scheme. Colchester Station is to be rebuilt and the track will be doubled between Colchester and Clacton. York passenger station also is to be remodelled and extended. Two additional platforms are to be provided and the existing platforms will be considerably lengthened. Work has already been commenced on the Doncaster station, which is being entirely rebuilt on modern lines.

New and improved signalling apparatus is to be installed at Edinburgh (Waverley), Newcastle (Central), York, Doncaster, Hull, Glasgow, and between Shenfield and Chelmsford, York and Darlington and Clapton and Chingford.

To provide for increased merchandise traffic the L.N.E.R. plans to build 7,550 open goods wagons, 300 of which will be adapted for the conveyance of containers. Other new rolling stock will include 430 covered goods wagons and 150 fish wagons, all of which will be fitted with the continuous brake, 1,256 bolster wagons for iron, steel and timber traffic, 700 cattle wagons, 1,600 coal wagons, of which 1,200 will have a capacity of between 20 and 32 tons, 14 special trestle wagons for exceptional loads, 250 brake vans, 59 horse boxes and 300 large covered containers.

Bulk Grain Vans for L.N.E.R.

The L.N.E.R. is introducing an additional fleet of 50 bulk grain vans for the regular conveyance of barley between Hull and Burton, and Hull and Sleaford. The vans will carry loads of 22½ tons.

The new vehicles will be used in conjunction with the L.N.E.R. 40,000-ton grain silo at the King George Dock, Hull. By means of elevators in the ship's hold and belts working in ferro-concrete tunnels underneath the quays, the grain will be mechanically discharged from the ship, passed through the silo, automatically weighed and then fed through openings in the roofs of the vans by gravity. At the destination it will be discharged from the vans through self-discharging hoppers.

New Name Boards for L.M.S.R. Expresses

Following a recent experiment on the Birmingham-Euston service, the L.M.S.R. are to introduce a new type of coach nameboard on the principal express trains. The nameboards are 12 ft. long and are placed in a prominent position on the sides of the coaches above the windows instead of on the roof. These boards show in distinctive lettering the name, starting point and destination of the train, or if the train is unnamed, the starting point and destination only.

The change-over from the old to the new type of nameboard will be effected gradually.

L.M.S.R. Building Programme

The L.M.S.R. building programme for this year includes the provision of 105 locomotives, 210 locomotive boilers, 751 carriages, 12,305 wagons, 450 containers, and 500 motor vehicles and trailers.

Many new features are embodied in the coach designs to give greater comfort to the traveller, as well as increased reliability in service. The programme will include 17 restaurant cars and 5 kitchen cars, 151 vestibule, 180 corridor and 293 non-corridor passenger coaches, 20 horse boxes, 50 luggage and parcels vans, and 25 covered combination trucks. The stock will be of special light-weight construction, making possible savings in constructional and maintenance costs, and operating costs also will be lower, as the weight to be hauled will be reduced.

Over 96,000 tons of steel rails will be required in connection with the permanent way renewal programme, affecting altogether 835½ miles of track. Requirements will include 448,000 new sleepers and 3,700 standards of crossing timbers will be required, in addition to 2,575,000 wooden keys, 878,000 steel keys, 9,884,000 chair screws and ferrules, 67,000 tons of chairs, 219,000 fishplates and 437,500 fishbolts.

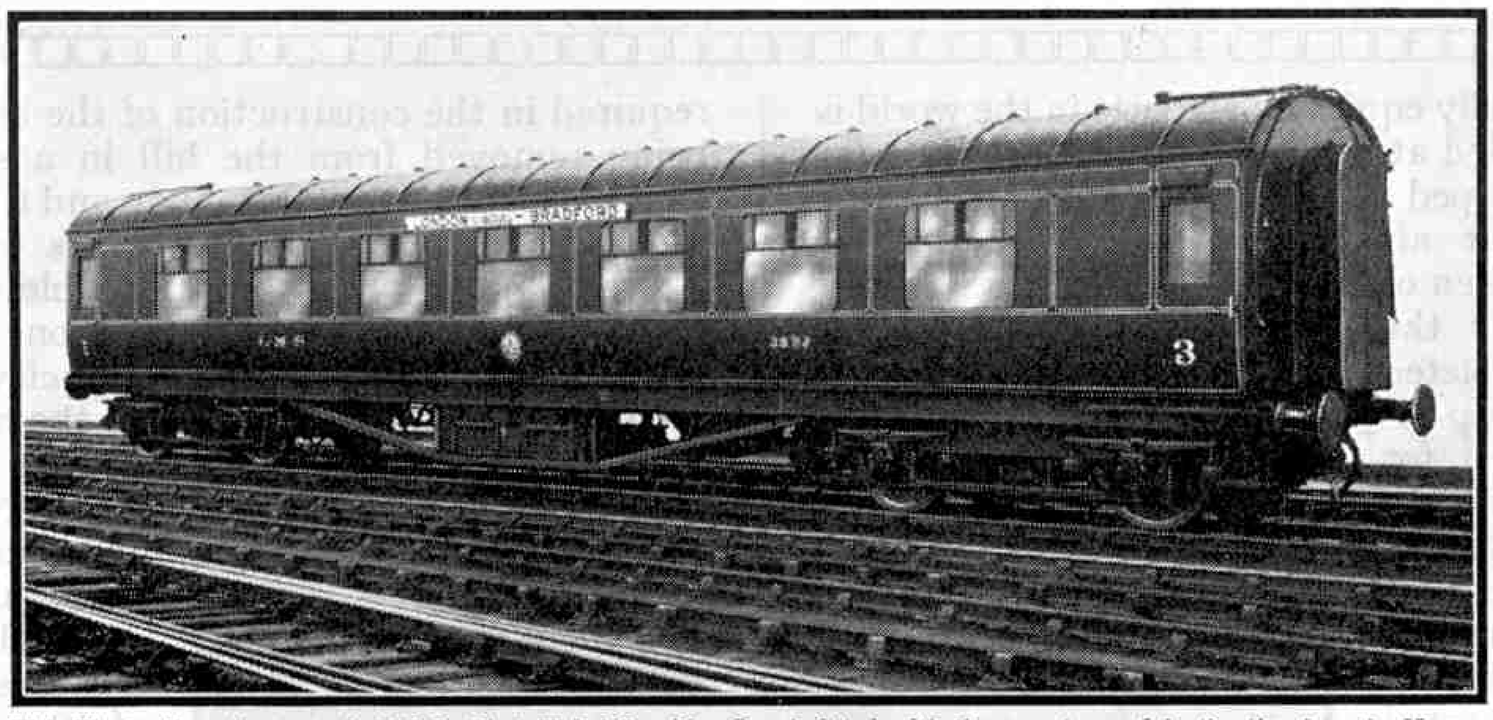
G.W.R. Rail Depot for "Seasonal" Traffic

A new goods depot designed specially for dealing with heavy seasonal traffic coming into London, is to be built by the G.W.R. at Westbourne Park, near Paddington Station. It is to have a platform 400 ft. in length by 30 ft. in width, and a two-storey warehouse constructed so that other floors can be added as the necessity arises.

Lifts will connect the platform with the upper floors, and the latest equipment for rapid handling of perishable traffic will be provided. When completed, the seasonal perishable freight train traffic coming into London will be dealt with at the depot, which will become the West Country's "Key" to Covent Garden and other London Markets.

Extensions to S.R. Electric Services

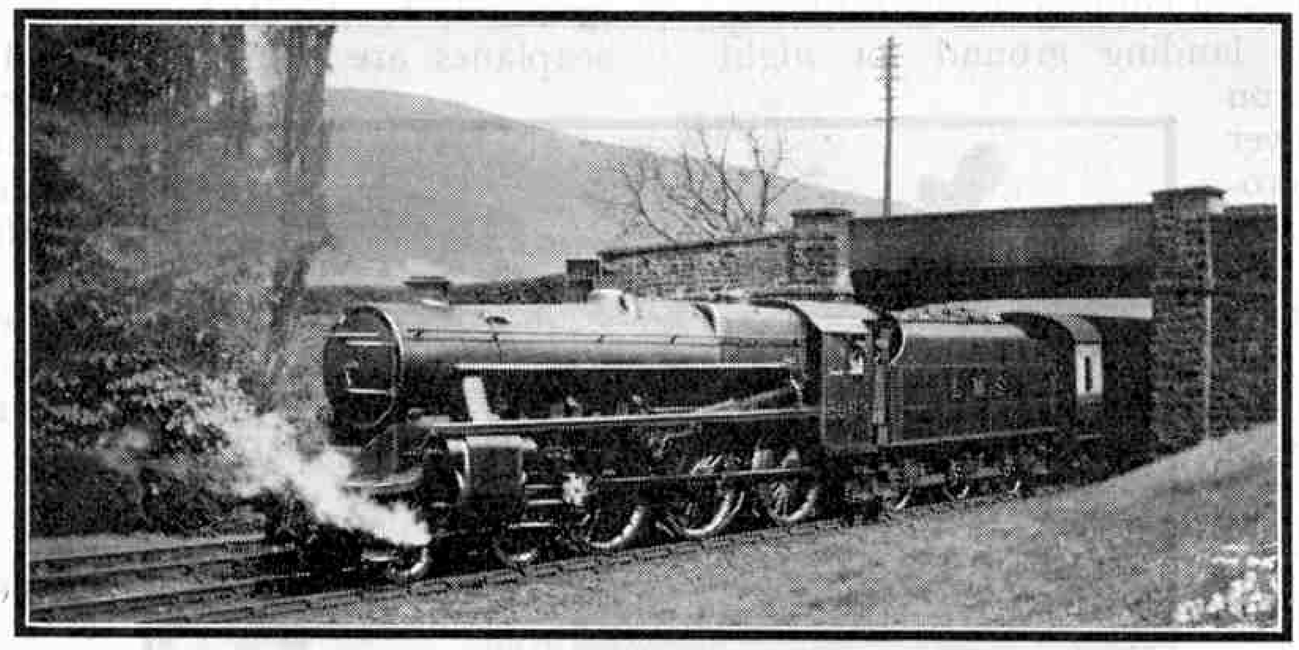
On the 3rd of last month the Southern Railway brought into regular use the electric service between Waterloo and Weybridge, via Staines. This new extension adds another 18 route miles to the existing electrified system. On the same day certain steam services operating between Waterloo, Guildford and Farnham via Woking were replaced by electric services in both directions.



This illustration shows an L.M.S.R. First-Third Corridor Coach fitted with the new type of destination boards. Nameboards and destination boards are, in future, to be carried on the sides of L.M.S.R. coaches, instead of on the roof. Photograph by courtesy of the L.M.S.R.

New "Mikados" for C.N.R.

Five 2–8–2 freight locomotives built by the Canadian Locomotive Company at Kingston, Ontario, have been placed in service by the C.N.R. These engines, which have a working pressure of 265 lb. per sq. in. weigh 151 tons 10 cwt. in working order. The weight of the tender, which is carried on two six-wheeled bogies, is 124 tons 10 cwt., making a total weight for engine and tender of 276 tons. The cylinders are placed outside the frames and drive on to the third pair of coupled wheels, which have a diameter of 5 ft. 3 in. The tractive effort of the new "Mikados" is 56,200 lb.



L.M.S.R. 2-cylinder 4-6-0 No. 5089 on a G.W.R. excursion train at Little Stretton Station. Photograph by M. Heap, Birkenhead.

G.W.R. Locomotive to be Named *"King George VI"*

The G.W.R. announce that by permission of His Majesty the King, engine No. 6028, one of the latest "King" class locomotives is to be named *"King George VI."*

* * * *

In future all new wagons and vans of the L.M.S.R. will be painted a dark brown colour instead of the familar grey now used.

Windsor Station Improvements

A scheme of improvements is to be carried out by the G.W.R. at Windsor Station to cope with the increasing excursion traffic. Last year more than 100,000 people were taken to Windsor for a tour of the Castle combined with steamer trip on the Thames, and during the summer 300 long distance excursion trains were handled at the station. It is anticipated that this number will be considerably increased this year, especially in view of the Coronation in May. The scheme provides for the extension of No. 1 Platform, and for the accommodation of longer trains. The station is to be redecorated and improvements carried out to the roof.

G.W.R Line to be Doubled

The G.W.R. announce that the 4½ miles length of single line from Hatton, near Warwick, to Bearley, near Stratford-on-Avon, is to be doubled. This will involve the widening of five bridges, the extension of one level crossing and the removal of 27,000 cubic yards of earth.

The "up" and "down" platforms at Bearley Station are to be extended to 440 ft. and 550 ft. in length respectively. The intermediate station at Claverdon is to be rebuilt at a point 150 yds. nearer Bearley, and is to be provided with a new booking office, which will be built level with the roadway, and set back to provide a bay for standing vehicles. Accommodation is to be provided also for 24 bicycles adjacent to the building. Access to the platforms will be by pathways and ramped approaches. Electric lighting is to be installed in place of the present oil lamps.

New L.M.S.R. Locomotives in Traffic

Engines now in service include 3-cylinder 4–6–0s Nos. 5733-37 of Class 5X, built at Crewe, and 2-cylinder engines Nos. 5269-83 of Class 5, delivered by contractors. Class 4, 2–6–4 tank engines Nos. 2467-70, built at Derby, and Nos. 2594-2602, built by contractors, also have been delivered and are doing useful work on suburban services. Nos. 8061-70 of the Class 8, 2–8–0 freight series, are in traffic.

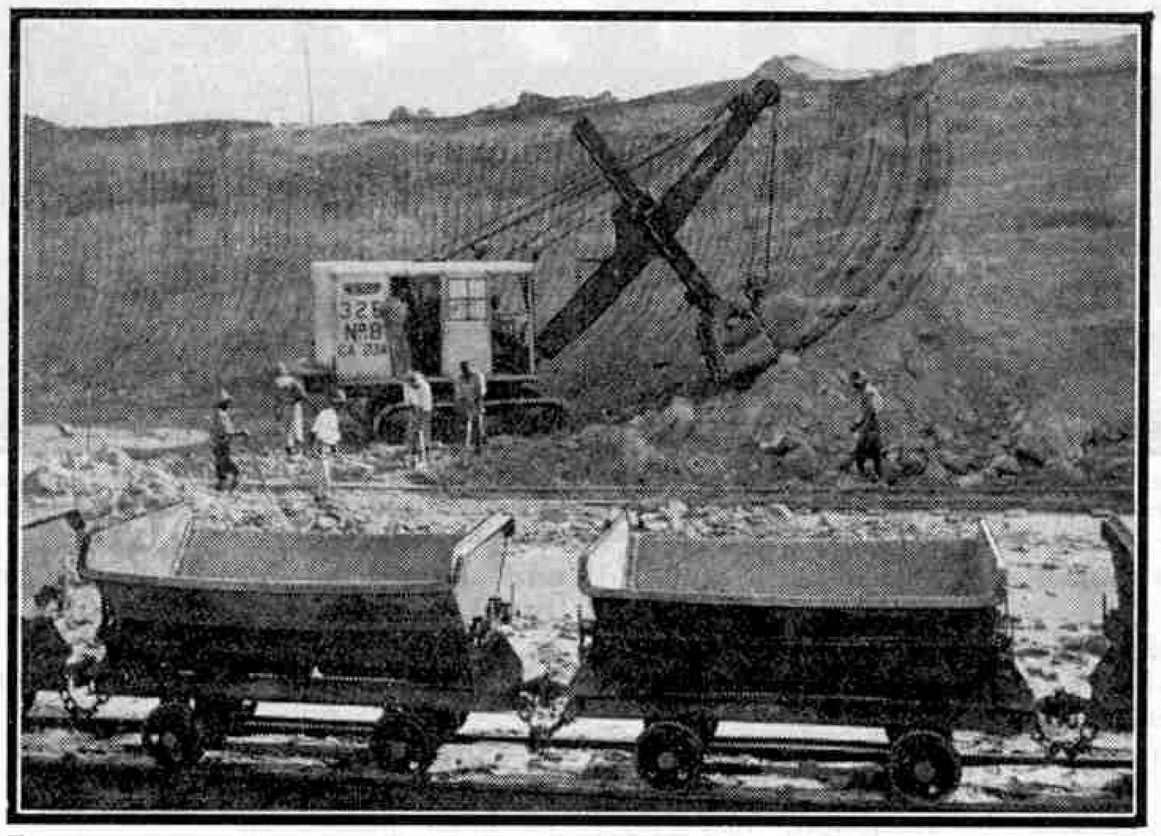
Railway Collisions by Arrangement

In order to prove the strength and resistance of L.M.S.R. goods wagons in which the underframes have been assembled by a new welding process, deliberate collisions have been "arranged" at the Wolverton Carriage and Wagon Depot. Welded underframes for 12-ton covered goods wagons have already been constructed at Wolverton and have successfully emerged from exacting tests in which they were run into condemned wagons.

New Airport at Singapore

How the "Croydon of the East" is being built

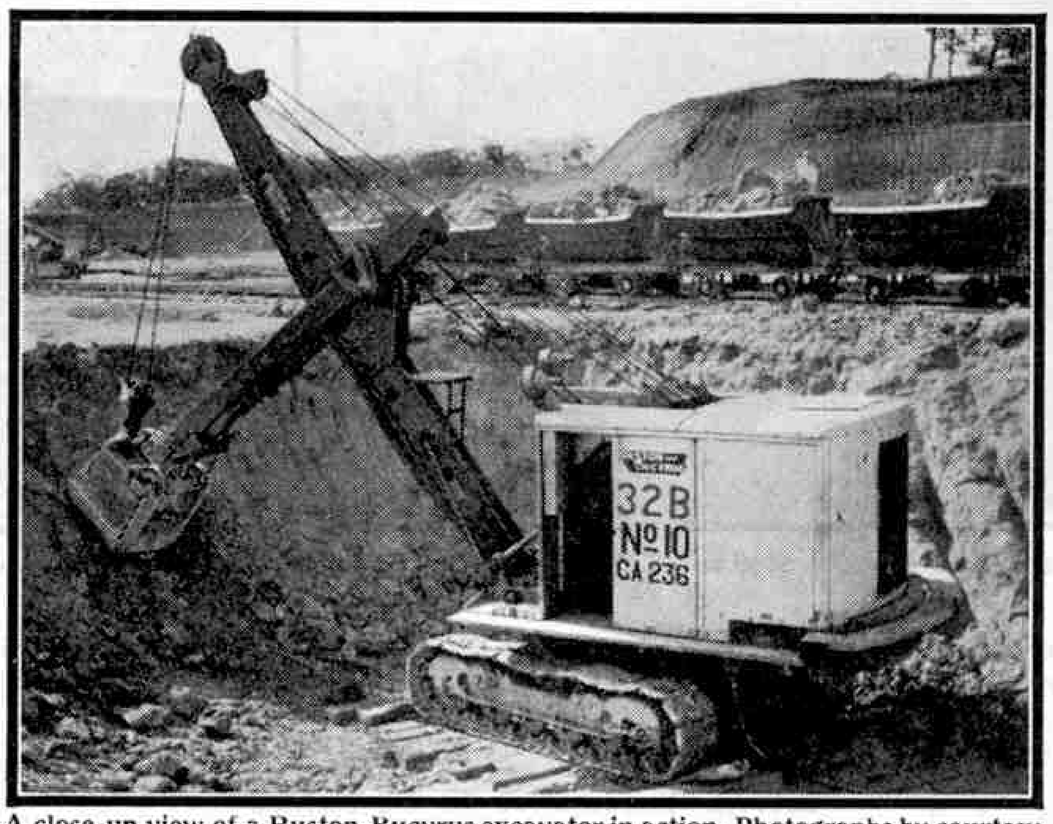
ONE of the most fully equipped airports in the world is now being provided at Singapore, and work is so far advanced that it is hoped to complete the whole scheme this year. This great air station is already spoken of as the "Croydon of the East," and when completed will provide the most up-to-date flying facilities for both land and marine aircraft. There will be safe and extensive anchorages for the latter, and concrete slipways, equipped with travelling cradles operated by electric gear, will enable flying boats to be hauled up into their huge hangars.



Excavating material for reclaiming the marsh land on which the Singapore Civil Aerodrome is being constructed. The excavated material is transported to the aerodrome site in trains of side tipping wagons, one of which is shown in the foreground.

The site chosen for the aerodrome is actually within the municipal boundary of Singapore, and is so near the centre of the city that passengers will be able to reach hotels and offices within 10 minutes of landing from an air-liner. Another advantage is that it is remarkably free from obstructions of any kind. There are no neighbouring mountains or hills to cause awkward winds, and no large buildings of any kind to add to the difficulties of landing. Powerful floodlights will illuminate the landing ground for night descents, and a neon beacon on top of the control tower will serve to locate the aerodrome by night. The pilots of approaching aircraft will be able to identify the airport by means of a beacon flashing the letter "S" in Morse code.

The aerodrome site covers approximately 250 acres, almost all of which is being reclaimed from swamp land round the estuaries of three small rivers. This land is being drained, dried and levelled, and where necessary it is being raised to the required level. Some idea of the enormous amount of work involved in its preparation is given by the fact that the quantity of material required for the earth filling, raising and levelling totals over 7,000,000 cu. yds. This material is being obtained from a large hill about four miles from the site of the aerodrome. There 11 Ruston-Bucyrus excavators, nine 1 cu. yd. electric shovels, several grabbing cranes, and two $\frac{3}{8}$ yd. oil-engined excavators are digging it from the hillside, or are engaged in other excavation work required in the construction of the airport. The earth is being removed from the hill in a series of shelves or benches, each about 20 ft. high, and the excavated material is dumped into steel double side-tipping railway wagons, each of 3 cu. yd. capacity, which transport it to the aerodrome site. The wagons are made up into trains of 40 wagons each, and about 8,000 cu. yds. of material is handled daily.



A close-up view of a Ruston-Bucyrus excavator in action. Photographs by courtesy of Ruston-Bucyrus Ltd., Lincoln.

To fill in the swamp the site was divided into areas of 10 to 25 acres in extent by means of dividing walls or bunds. The water was then pumped out of each of these areas in turn, and the ground was then allowed to dry and harden in the heat of the tropical sun in order to form a solid base for the filling material. This is being dumped in layers, and when it has been spread over the ground and levelled, it is consolidated into a hard mass by means of caterpillar tractors and road rollers. The ground will eventually be covered with a special top dressing, and turfed over with special grass selected for its hard-wearing qualities. Channels for seaplanes are being excavated by means of grabbing cranes mounted on pontoons.

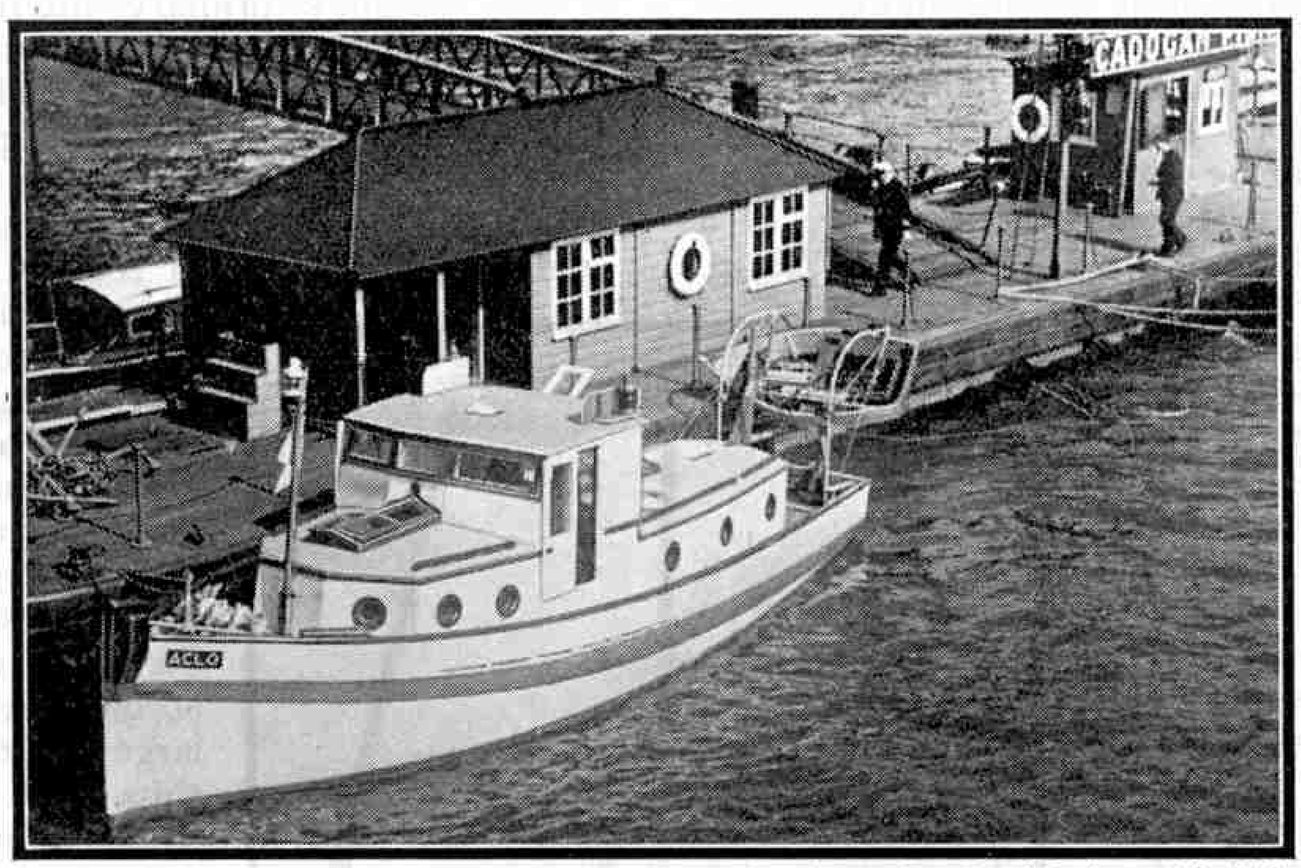
The terminal buildings to be erected at the aerodrome will be the most modern of their kind to be found anywhere. Outward and inward bound traffic will be separated, and for visitors other than passengers, there will be a large flat roof, from which they will be able to watch in safety the coming and going of the aircraft. The principal building is a great central hall, which is built on pile foundations and resembles a railway station. Opening on to this are a post office and offices for the staff of the operating companies. At the sides are accommodation for outgoing and incoming air traffic respectively, comprising offices for passports, Customs and medical services and refreshment and waiting rooms. Surmounting the building and reaching a height of 70 ft., will be a control tower, from which all traffic will be regulated.

There will be two hangars each 300 ft. by 150 ft. and a slipway 100 ft. wide for flying boats.

The Motor Yacht "Aclo"

Vessel in which the Engines can be Changed

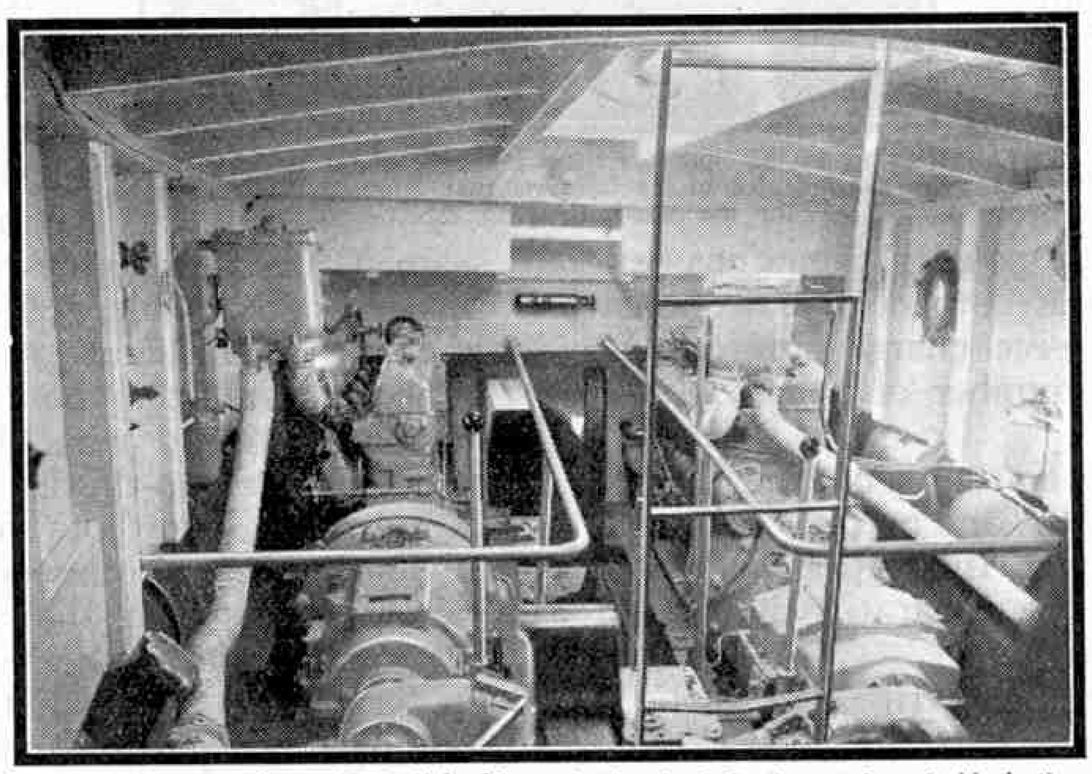
A MODERN motor vessel of outstanding interest is the sea-going yacht "*Aclo*," the green and white hull of which is now a familiar sight among the small power craft sailing the tidal reaches of the Thames. The "*Aclo*" has latterly been acquired by the Associated Equipment Co. Ltd., of Southall. This company carries out exhaustive research work of a practical kind in order to improve the qualities of its marine units, and makes use of the "*Aclo*" for trials and demonstrations. She has proved capable of working efficiently and well in the stern conditions that often prevail in the mouth of the Thames.



The M.Y. "Aclo," used for research work and demonstrations by the Associated Equipment Co. Ltd., Southall, to whom we are indebted for the illustrations on this page.

The "*Aclo*" was converted from a North Sea fishing bawley, a type of sailing vessel built for shrimping and whitebait fishing. She has a length of 43 ft., a beam of 12 ft. and a draught of 6 ft. 6 in. As can be seen from the upper illustration on this page, the wheelhouse is wide and fully enclosed. A short stairway gives access to a small saloon forward, while there is also an entrance to the engine room aft. The controls for each of the two engines installed are separately mounted on horizontal panels, one on each side of the wheel. Each panel carries the small throttle lever and a tachometer for measuring variations in the speed of the engine. In addition there are a water temperature meter, an oil pressure gauge, an ammeter, and starter and heater push buttons.

The yacht is fitted with two engines, one with six cylinders and the other with four. The six-cylinder engine is mounted on the starboard side of the engine room. It develops 100 h.p. at 1,650 r.p.m., while the four-cylinder engine, on the port side, develops 47 h.p. at 1,250 r.p.m. Each engine is complete with a reverse box, and a reduction gear box installed enables the single propeller to be driven by either engine. Chain drive of the double triplex roller type, giving a reduction of 2.1 is used, and provision is made for "taking up" slack by an easily accessible hand tensioner. The chain box contains a sliding dog meshing with either the six-cylinder or four-cylinder unit chain sprocket, and it also includes a ball race for taking the backward thrust of the propeller.



The engine room of the "Aclo," looking aft. On the left, the starboard side is the 6-cylinder A.E.C. marine engine, while on the other side is the 4-cylinder unit.

The engines are started electrically by means of a 24-volt motor engaging a flywheel gear ring. The heater plugs give an instantaneous start from cold. The batteries supplied consist of the 24-volts, 130-ampere hour type, while a 400-watt, 24-volt dynamo is provided for charging. The water temperature is controlled by a thermostat which maintains the water at a constant temperature in all conditions of load and speed.

The throttle lever by means of which the engine in use is controlled is of the ratchet type, allowing extremely accurate adjustments of engine speeds to be made, and the maintenance of any set position. To ensure that the engine is not completely cut off suddenly in an emergency, a device fitted to the lever prevents the lever being unwittingly pulled right back so as to close the throttle. Normally, the movement of the lever downward therefore limits the speed to "idling," but the engine can be stopped when a special plunger is depressed. There is complete remote control of the engines from the wheelhouse as well as from the engine room itself. The roof of this is removable to enable new engines to be put in for experimental work.

Each engine is provided with oil coolers, to which water is drawn up from the sea-cocks by a make-up pump, and also with Parson's water injector type silencers, through which the exhaust gases are passed. Entirely separate fuel supply and water cooling systems are supplied.

The bawley from which the "*Aclo*" was converted was designed for travelling at very slow speeds whilst fishing, and therefore the form of her hull is no assistance in attaining high speeds. Despite the disadvantage of this broad beam, however, the vessel when operated by the larger engine, has attained a speed of over 11.0 knots.

Mysteries of The Ocean Floor

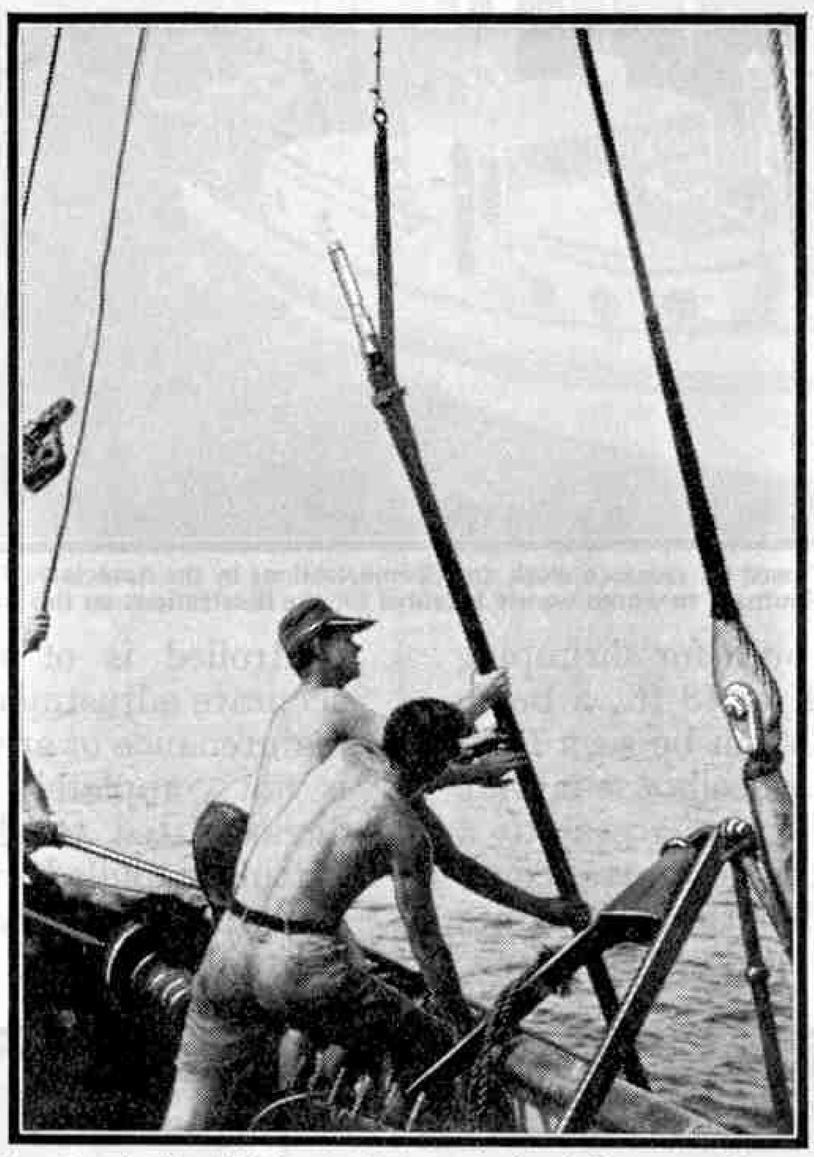
Samples from Depths of Three Miles

DR. CHARLES S. PIGGOT, of the Geophysical Laboratory of Carnegie Institution of Washington, has recently returned from a trip across the North Atlantic that may well prove to have been epoch making.

For two years or more Dr. Piggot has been developing a mechanism by means of which he hopes to bring up from the great ocean abysses "core" samples of the sea bottom. The apparatus, which may be attached to any sounding line strong enough to raise it, consists essentially of a "gun" of cold rolled steel, 10 in. in diameter and 20 in. long, to the lower end of which a steel tube, the "bit" so-called, is fixed. The bit is $2\frac{1}{4}$ in. in diameter and its length determines the possible length of the sample; bits of different lengths may be attached, the one used in the tests herein described is 10 ft. long.

The gun is so constructed that a cartridge loaded with cannon powder can be inserted. When the apparatus is lowered, contact with the bottom releases a mechanism which causes an explosion that drives the bit into the ocean floor. Lining the bit is a thin brass "sample tube" which, with its enclosed core, admits of removal when the apparatus is drawn to the surface and of replacement by an empty sample tube in preparation for another shot.

Dr. Piggot has found that the best type of explosive charge consists of one gram of high-speed black powder, one gram of rifle powder, and a varying number of pellets of 155-mm. howitzer powder. The two grams of small powder play the double role of promoting ignition and of quickly building up a pressure, in which environment the large-grained powder functions explosively. Since the energy required to do the necessary work is supplied by the explosive charge this can be varied at will by varying the number of pellets of the big powder.



Drawing in the "bit" carrying a sample of the ocean floor. We are indebted to the Carnegie Institution of Washington for the illustrations to this article.

Experimental trips off Cape Hatteras on the United States Lighthouse Tender "*Orchid*," and on the "*Atlantis*," of the Woods Hole Oceanographic Institution, all made during 1935, led to changes in the apparatus that called for testing under rigorous conditions.

Again, the trial soundings on these trips had all been made within depths ranging from 1,200 to 7,500 ft. The behaviour of the apparatus at much greater depths needed to be observed.

The reason becomes apparent upon recognition that, taken as a whole, the oceans are very deep. More than three-quarters of the ocean floor, for example, is deeper than 1,000 fathoms, or 1.1 miles, while well over one-half lies between 2,000 and 3,000 fathoms, or 2.3-3.4 miles. Moreover, soundings have disclosed that there are approximately sixty locations, known as "deeps," where the bottom is from 3,000 fathoms, or 3.4 miles, to 5,350 fathoms, or 6 miles, below the surface.

Dr. Piggot's primary interest lay in study of the radioactive content of ocean-bottom sediments. Apparently, the concentration of such substances is greatest in the sediments of the deeper parts; indeed, the radium content at the bottom of the deeps, for some unknown reason, appears to be many times greater than that of the sediments of shallower regions. It was the need for core samples, suitable for extensive tests, brought from these great depths, that led Dr. Piggot to a two-years' effort to devise a suitable contrivance.

Opportunity to test the apparatus under severe conditions came last May through the courtesy of officials of the Western Union Telegraph Company who invited Dr. Piggot to accompany the "*Lord Kelvin*," the largest of the company's cable repair ships, on a trip to the North Atlantic where a break in one of the trans-Atlantic cables had occurred.

The "*Lord Kelvin*" proved to be extraordinarily well suited for making the tests. The vessel is of steel construction with clipper bow and cruiser stern. It is equipped with powerful steam-driven winches and sufficient gear to reach the greatest depths. Twin sets of triple expansion engines enable the vessel to take a location at sea and to hold it steadily against wind and current. This is essential in keeping a line in vertical position in water too deep for anchorage. Moreover, its officers and complement of 85 hardy Nova Scotia seamen are thoroughly trained to co-ordinated action through months and years devoted to the care and repair of cables which lie at great depths at many points.

The course of the "*Lord Kelvin*" lay between Newfoundland and Ireland with the objective, the break in the cable, about two-thirds the way across. When off the Grand Banks two shots were made, primarily for the sake of developing smoothness of procedure.

Subsequently on the voyage 11 vertical cores were obtained, two from the region where the cable was picked up for repair. South of the Irish Coast, on the way to Falmouth, a twelfth attempt was made at 2,000 fathoms, but a wire rope broke and the bit was lost. The depths represented by the cores obtained range from 700 fathoms, or four-fifths of a mile, the shallowest, to 2,640 fathoms, or three miles, the deepest. Based upon the tests, it is believed that after certain minor changes have been made the apparatus will function satisfactorily at any depth to which it may be sent.

The first sample of record obtained from the deep-sea

bottom was secured in 1773 in the Norwegian Sea. The captain spliced together all the sounding-lines on board his vessel, attached a weight of 150 lb., and reached bottom in 683 fathoms, or four-fifths of a mile. Upon bringing the weight to surface he found clinging to it particles of fine soft blue mud.

Much of the information about deep-sea sediments since obtained has been secured through use of the sounding lead, usually cone-shaped and weighing from about 7 to 30 lb. The leads are generally hollowed out at the base and filled with tallow or soap. Upon striking bottom, bits of mud, sand, gravel, and other material frequently adhere to the tallow and are brought to the surface when the line is pulled in.

An improvement in bottom samplers came when a pair of powerful spring jaws was attached to the sounding lead. These jaws are held apart by a device which is released on striking bottom, allowing the jaws to close, biting out and holding securely a portion of the sediment.

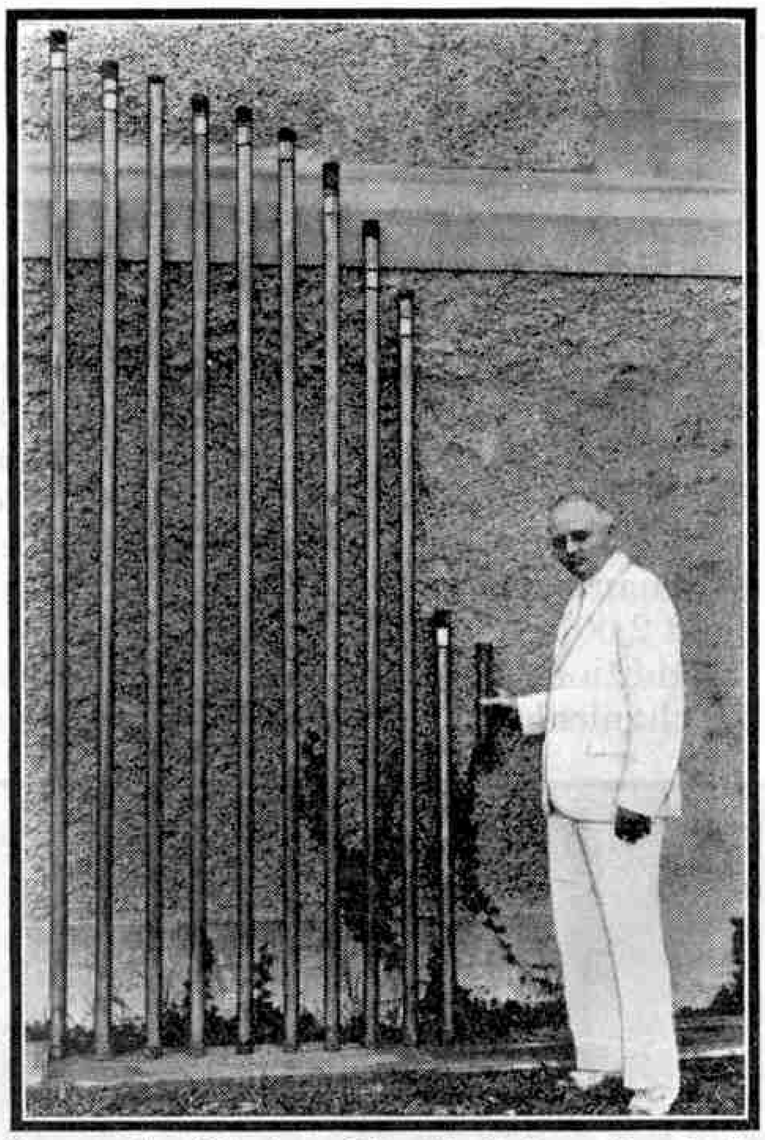
Although many bottom sampling devices have been tried, with varying degrees of success, they are all subject to the limitation that the sediment they bring up is obtained only from the surface of the deposits; none, heretofore, have been able to penetrate below the surface more than a few inches. Yet, the fact is that the greater the depth of the undisturbed vertical sections of the ocean bottom that the scientist can examine the greater will be the value of the conclusions that he can draw.

Development, therefore, of an apparatus by which vertical cores of the ocean bottom, as much as 2 in. in diameter and 10 ft. in length, as with the Piggot apparatus, marks an epoch in study of submarine sedimentation. It bids fair to open up to scientists a great new unexplored world.

Dr. Piggot very aptly characterises the sediments, lying layer upon layer at the sea bottom, as the "depository of the historical records of the ocean." For millions of years, he points out, the sediments dropping from above have been accumulating on the bottom below. Filed away in the mud, the clay, the ooze is the record of what happened in the water above. He adds:

"The rocks and pebbles and sand brought by ice, the clay and mud brought by rivers and ocean currents, the skeletons of marine organisms which lived and died and evolved into various forms throughout the ages constitute this record. Some types of these organisms live only in cold water, others in warm water; some live in shallow lagoons, others in the depths of the open sea; some prefer fresh water while others survive only in salty water; some lived a long time ago while others have evolved into their present forms comparatively recently.

"Besides these records of past life and its many changes there exists a chemical and a physical record. Oxidation and reduction and the nature of the dissolved matter in the water have all left the record of their changes in the bottom, and the nature and size of the minerals and rock fragments bear evidence of the direction and strength of former ocean currents, the movements of ice, and the depths of the ocean in the past.



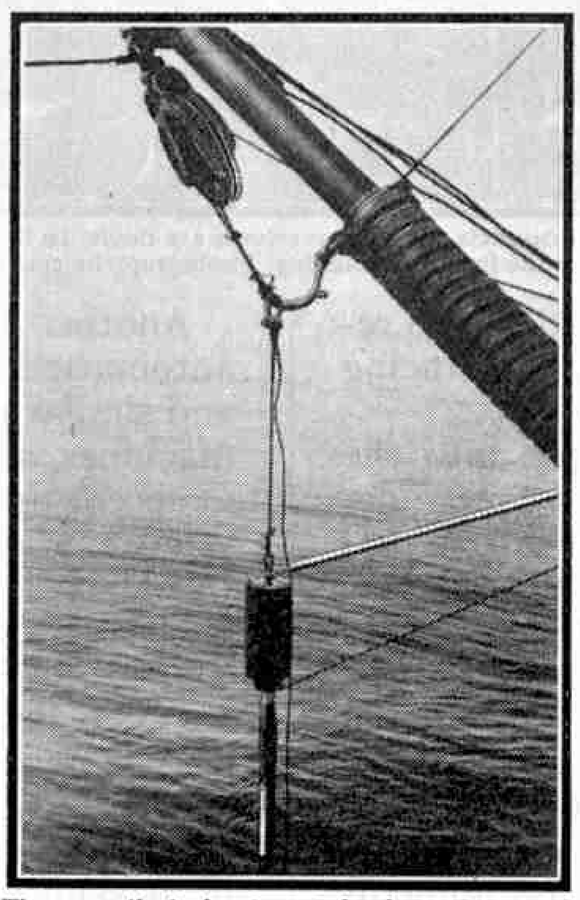
Core samples of the floor of the Atlantic Ocean from depths up to three miles. On the right is Dr. Piggot, the inventor of the apparatus used for obtaining them.

"Far out from land, in the undisturbed depths of the open ocean, the record has accumulated very slowly, so that a few feet of depth may represent a very long interval of time. Although this great historical record has long been known to exist we have been unable to profit by it, for we could read only the topmost page.

"Heretofore, the samples obtained from the deep ocean bottom have been 'grab samples,' a mere handful of material taken from the very surface of the bottom. These samples give information of present conditions only, and reveal nothing of past events. If we could bring up a vertical section of several feet of this bottom, in its original, undisturbed condition, we might read the history of oceanic events as the geologist deciphers the record in the rocks."

It is just this that the Piggot sampler accomplishes—it brings up a vertical core in its original, undisturbed condition. In practice, after a shot has been made and the apparatus is raised to the vessel's deck, the brass sample-tube which lines the bit with the mud core inside it, is withdrawn and corked at both ends, whereupon it may be shipped and kept without alteration for examination in the laboratory.

When opening it, it has been found desirable to cut the tube longitudinally into two equal parts. This can be done in a way such that when the two parts are spread out, hinge-fashion, each contains an undisturbed half-portion of the core sample. One of these halves in its original case can thus be kept for reference purposes, while the other can be used for such studies as may be desired.



The gun that shoots a tube into the ocean floor when taking core samples.

Core samples taken of ocean bottoms are of interest to scientists representing various fields of research. In commenting upon this fact Dr. Piggot said:

"The marine biologists and micropaleontologists will find in them the remains of marine organisms which lived ages ago in the waters above.

"The sedimentologist by a study of the minerals and the size of the particles of rock will be able to trace the changes of direction and possible force of ocean currents through past ages.

"Some chemical and mineral constituents are of great significance. They include metals such as manganese and iron, with small concentrations of copper, tin, gold or radium. The radium is of particular interest. The material at the bottom of the deeper parts of the ocean generally consists of so-called red clay, and this material appears to contain much more radium than any rocks yet examined on land."

We are indebted to the Carnegie Institution of Washington for the information in this article.

The Romance of Radio Manufacture

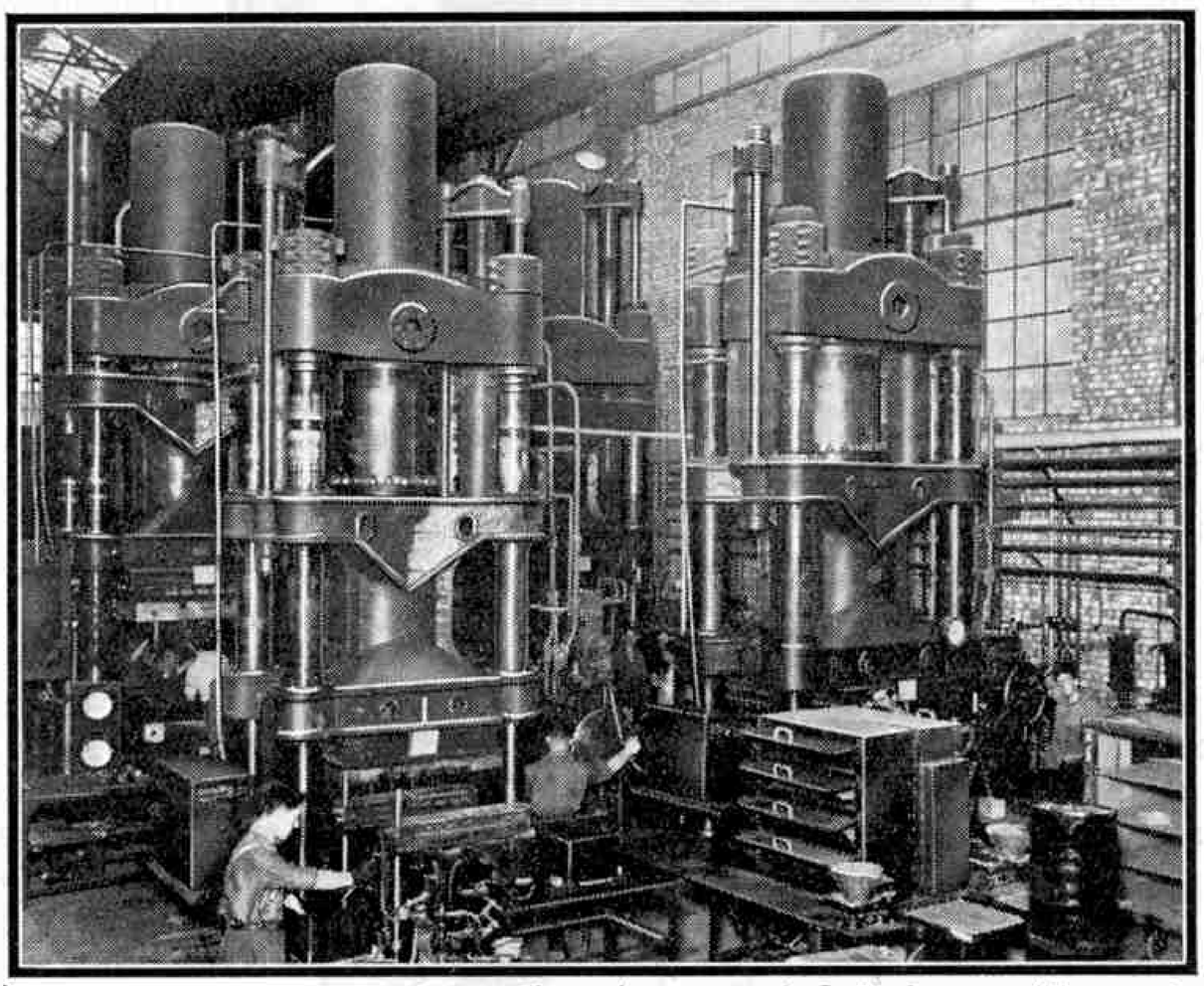
How Receivers are Designed and Produced

By F. G. Taylor

IT is not generally realised that a modern radio set contains from 300 to 2,000 separate parts. When it is remembered that some of these parts pass through 12 or more separate manufacturing operations, it will be seen that the production of radio sets is a task calling for careful organisation and the latest mass production methods. Six operations is a fair average for each part, so that the number of individual operations required to manufacture a modern radiogram, in which there are about 2,000 parts, reaches the prodigious figure of 12,000. In addition there are about 1,000 routine tests, both mechanical and electrical.

How is it possible to complete 12,000 operations and make 1,000 tests in an instrument that sells for say £25? The result is achieved by a wonderful co-ordination of scientific knowledge and organising ability, together with the expert use of marvellous modern machinery and the earnest desire to produce the finest goods in the world at the lowest possible cost.

On entering a radio factory one is struck by the outstanding predominance of youth. There are no old men in it. The industry is young and progressive, for radio design is always advancing and improving, and young men with energy and ideas are required to keep abreast with the rapidly advancing science and ever changing technique of radio.



Bakelite presses in which cabinets for radio receivers are made. In the foreground the operator is preparing to remove the finished moulding. Photograph by courtesy of E. K. Cole Ltd.

Our tour should commence with a glimpse into the research and experimental laboratories. There new designs are created and tested before being put into actual manufacture, keen-eyed young men juggling with wonderful pieces of apparatus, which to the uninitiated appear to be intricate robots of graduated dials, knobs and valves.

The laboratories are built on specially constructed foundations, designed to isolate them from all external vibrations. Soundproof walls also are provided in order that tests may be carried out without interference by external noises. If an express train were to pass immediately outside, neither the vibration nor the noise would penetrate into the laboratory.

Very near to the research section are the experimental workshops, where working models of all new designs are made up. These models are exhaustively tested, changed and improved to absolute perfection before the final design is passed to the factory for manufacture. Even then, many weeks must pass before the model can be produced in large quantities. Special tools have to be made and fitted to the mighty machines in the factory. The machines themselves have to be arranged for what is known as straight line production, so that no time is lost as the manufactured parts pass between them for the various operations.

The factory itself is a scene of great activity. One of the most important sections is the press shop, where various parts are stamped out of sheets of steel and brass. The presses are capable of exerting pressures up to about 250 tons and the noise of hundreds of presses in operation is continuous. The centre ram of each press is fitted with a punch shaped to the same form as the part which is to be manufactured. This punch fits into a die of similar shape fixed in the bed of the press. The sheets of metal are pushed across the top of the die, and the punch, which is continually rising and falling, stamps out the parts at high speed. Some of the presses are fed with coils of metal that are automatically unrolled and pushed under the rapidly moving ram. With these machines some parts, such as terminal tags and condenser vanes, are produced at the rate of more than 4,000 an hour.

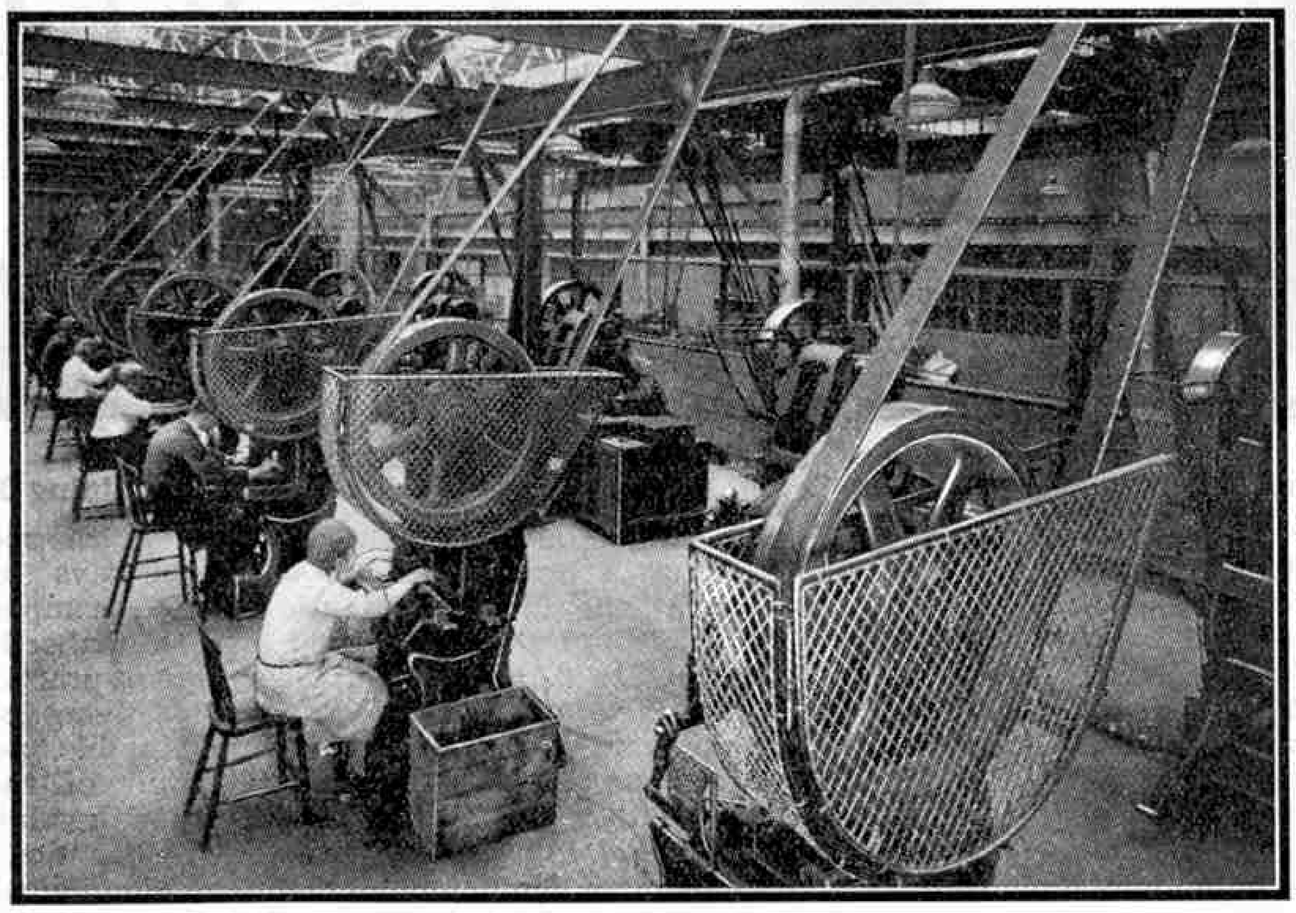
Another interesting section of the factory contains automatic lathes for the production of screws, nuts, bolts and similar parts. Lengths of metal rod are fed into these machines, and the parts are automatically manufactured at speeds up to about 3,000 an hour. Some types of screws are manufactured at even greater speeds by the use of three special machines. The first cuts off the required length of metal and stamps up the head of the screw at the rate of 9,000 an hour. The second rolls these pieces between two parallel dies, and forms the threads at the rate of 6,000 an hour. The last machine finishes the job by cutting the slots in 4,000 screws every hour.

After the metal parts are made, they are carried away in baskets suspended from continuously moving conveyors to the plating department to be coated with nickel, chrome, or cadmium. The object of this treatment is to protect them from rust or tarnish, and to impart a pleasing and durable finish. Before being plated the parts have to be cleaned in order to remove the greases and oils that are used in the machinery operations. This cleansing process is carried out by suspending them in the boiling vapour of a chemical called trichlorethylene, which

condenses on the suspended article and runs off as liquid, taking all grease and dirt with it.

Many of the parts in a radio set are made from bakelite. This process is carried out in a department containing hydraulic presses that exert pressures up to about 100 tons. In some cases the cabinets are made of bakelite, and presses capable of giving pressures up to 1,500 tons are used for this purpose.

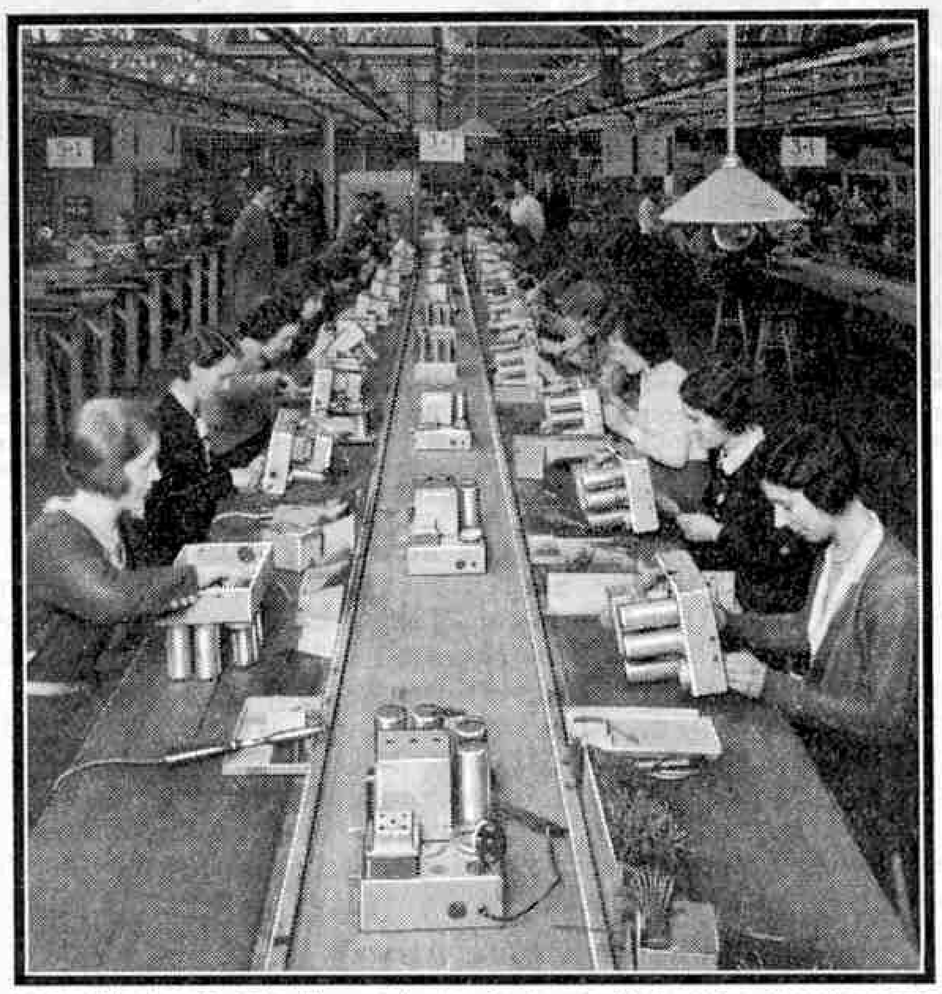
The manufacture of these bakelite parts is a moulding process carried out under heat and pressure. A carefully measured quantity of bakelite powder is placed in a mould, which is closed and inserted in the press. The movement of an electrically operated lever brings down the ram of the press, which forces a die into the mould. After a period which has to be allowed for "baking," the ram is lifted again, and the mould is withdrawn. The parts when taken from the mould are already highly polished and require no further treatment.



A section of the press shop in which machines stamp out various parts from sheets of steel and brass. The photographs on this page are reproduced by courtesy of Kolster Brandes Ltd.

The moulds for making complete radio cabinets weigh from 5 to 15 tons and a special crane running on an overhead track is provided to facilitate their insertion and removal from the press. The presses in most factories are electrically heated and one of the largest bakelite moulding shops in the country consumes 10,000 units of electricity daily.

Before witnessing the actual assembly of the radio sets we must first pay a visit to the coil-winding department, a very important section of the factory. There we find some extremely delicate work being carried out. Transformer coils, tuning coils, chokes, loudspeaker and pickup coils are all being wound at high speed. Some of the machines are capable of winding a dozen coils simultaneously and also interleave a layer of insulation paper or cotton between each layer of wire. The machines stop automatically when the required amount of wire has been wound into the coils.



Assembling radio sets. The parts required are added as the chassis passes along the moving band conveyor.

Some of the wire used in the production of these coils is finer than human hair. The work calls for a high degree of skill and extreme delicacy of touch. For this reason, girls are almost invariably the best operators on this class of work.

The assembly shop, where the thousands of different parts are built up into complete radio sets, is the last word in efficient planning. The methods employed, the speed of the girl operators who assemble the sets, and the perfect organisation of the department are an education in what can be accomplished with human labour and modern conveyor methods.

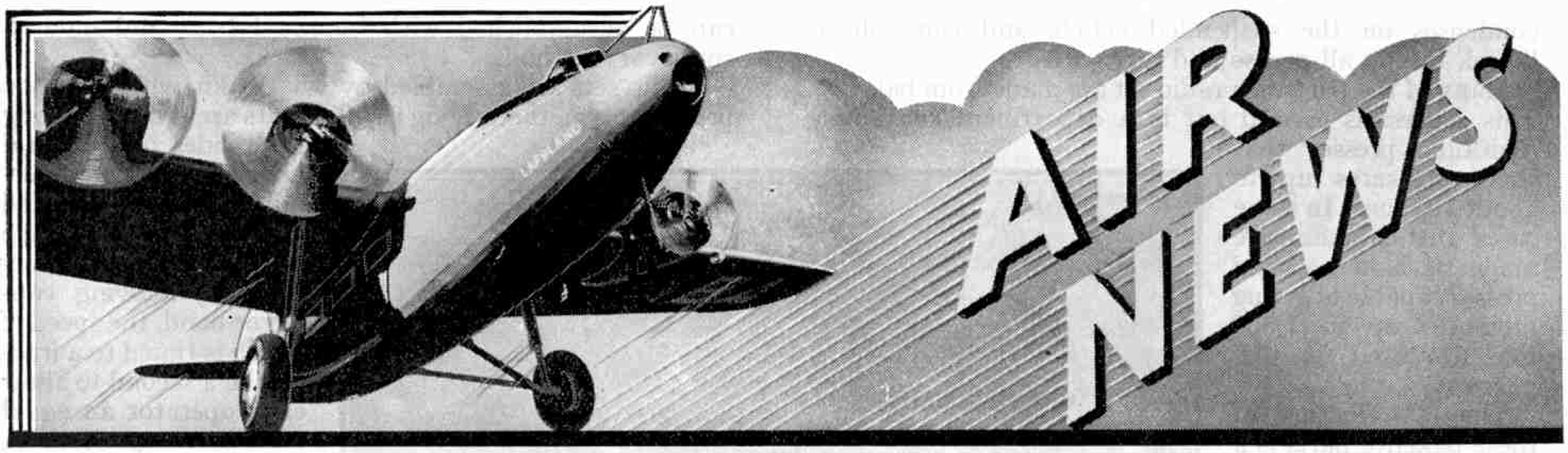
Radio sets are assembled by what is known as the line production method. Long rows of seats are provided along both sides of a central bench for a predetermined number of skilled operators. Along the middle of the bench runs a slowly moving conveyor band, the speed of which is timed to a fraction of a second to allow each operator an equal period to perform a given task. The radio set starts at the beginning of the line as a plain metal chassis, and as it passes from operator to operator the various parts and wires are screwed or soldered into place. A large number of electric soldering irons are provided along the bench for this purpose, together with other tools necessary for the operations to be carried out.

One girl may fix a condenser to the chassis, the next a choke or transformer, and a third solders a couple of wires into position. And so the bare chassis proceeds on its way, part by part being added, until it reaches the end of the conveyor, complete and ready for test. Usually a bell rings each time a set is due off the line, so that it is easy to detect any hold up in the work as soon as it occurs.

During their passage along the line the sets are removed from time to time for various electrical tests to be carried out. When complete they undergo further stringent tests. Operating voltages of all valves are measured, the radio frequency amplification is compared with a given standard and the accuracy of the tuning scale is checked. In all these tests the radio set must match certain definite standards, in order to ensure uniformity of performance; otherwise they are not passed for sale to the public.

When the receiver has passed all its tests it is assembled into its cabinet and taken to a special sound proof cabin where it is tuned in to the various broadcast programmes. The conditions in this testing cabin are similar to those in which the set will be required to operate in the home of the purchaser. The testers are able to detect faults that would pass unnoticed by the average listener. Unless the set gives satisfaction it is returned to the assembly shop for correction.

The final stage is now reached. After the set has been passed for sale it is sent to the packing department, where it is packed ready for despatch. The first models of any new design are sent to various parts of the country for tests in actual local conditions.



Our Air Pilot King

King George VI is the first King to be a qualified air pilot and to have attained this qualification while an officer of the R.A.F. He has not made use of air transport as extensively as the Duke of Windsor, but last year, as Duke of York, he flew to Brussels to visit the great Exhibition there. Queen Elizabeth accompanied him and can therefore claim the distinction of being the first Queen of England to have travelled by air.

The King was a midshipman on H.M.S. *"Collingwood"* when that vessel took part in the Battle of Jutland. Ill health subsequently compelled him to abandon a naval career, and when the R.A.F. was formed he was transferred to it. After a course of training at Cranwell he was appointed to the staff of Sir Hugh, later Lord, Trenchard, who was in command of the Independent Air Force in France. Immediately after the war the King trained for his "wings" and qualified as a pilot. During the years since then he has maintained his close interest in the youngest of the fighting Forces.

American Aircraft for New Zealand

The New Zealand Government have granted Union Airways of New Zealand permission to import three Lockheed "Electras" from America. A condition of the permit is that the machines must comply with British airworthiness certificate requirements.

The "Electra" is a twin-engined low wing monoplane with a top speed of 190 m.p.h. and a cruising speed of 176 m.p.h. It is of all-metal construction, and the passenger cabin contains seating for 10 people. The engines are Pratt and Whitney "Wasp Juniors" of 400 h.p., and controllable-pitch airscrews are fitted.

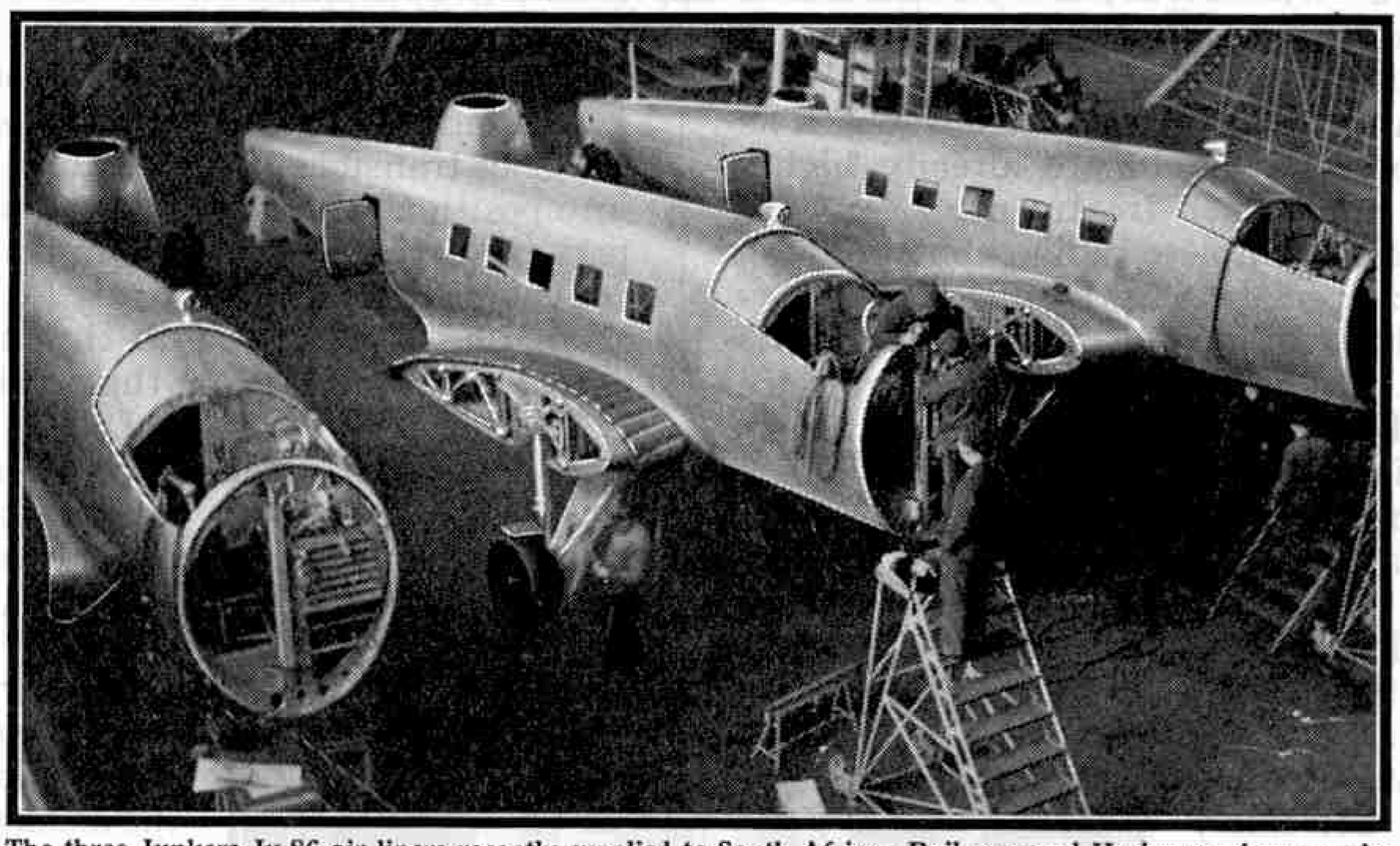
Miles Trainers for the R.A.F.

The Air Ministry continue to add to the now large number of different types of aircraft employed by the R.A.F. and the Fleet Air Arm. The latest order is for Miles "Hawk" Trainers, a two-seater open-cockpit type developed from the well-known "Hawk Major," and for Miles "Nighthawks" which, it is understood, will be used for instruction in blind flying.

New South Atlantic Flying Record

Mlle. M. Bastie, a young French airwoman, has set up a new record for a solo flight across the South Atlantic Ocean. She took off from Dakar, in Senegal, on 30th December, 1936, and landed at Port Natal, Brazil, after a non-stop ocean flight of 1,938 miles in 12 hrs. 5 min. Her machine was a Caudron "Simoun" low wing monoplane fitted with a 220 h.p. engine, and her average speed for the flight was 155 m.p.h. An illustrated description of this type of French light aeroplane was published in the September 1936 *"M.M."*

By this fine flight Mlle. Bastie beat the record created in November 1935 by Miss Jean Batten, the well-known New Zealand airwoman, who was the first woman to fly the South Atlantic. Miss Batten took 13 hrs. 15 min. to accomplish the flight, and later she was awarded the Legion of Honour in recognition of her services to French aviation.



The three Junkers Ju.86 air liners recently supplied to South African Railways and Harbours, shown under construction. They are fitted with Rolls-Royce "Kestrel" engines, instead of the standard Junkers "Jumo 205s," and their top speed of 240 m.p.h. makes them the fastest air liners in service. Photograph by courtesy of Junkers Flugzeug und Motorenwerke A.G., Dessau.

Qantas Empire Airways Notes

A total of about 5,000,000 miles has been flown by nine of the air captains of Qantas Empire Airways, the company operating the Singapore-Brisbane section of the England-Australia Empire air route. One officer, Captain L. J. Brain, recently completed 1,000,000 miles of flying.

D.H. 86, or "Diana" class, air liners are used by the company, and the wonderful service given by these fine machines is shown by the fact that they have now flown a total of 1,277,000 miles without a single forced landing.

Training Flying Boat Pilots at Hamble

In the special article describing Imperial Airways' school at Croydon for training the company's pilots, published in the December 1936 *"M.M.,"* it was mentioned that practical instruction in the handling of flying boats is given to the pilots at Hamble, near Southampton. Further details of this part of their training are now available.

The first stage at Hamble consists in sailing dinghys or cutters, and this part of the course is undertaken because manœuvring a flying boat on the water is very much like handling a sailing boat. Among the things the pilots learn during this phase is the employment of drogues, or boards attached to the end of a line, to act as a form of brake when a craft is approaching a mooring-buoy or raft. After this comes a period of instruction in flying boats. First of all a small flying boat is used, and in this the pilots practise taking-off and landing on smooth or rough water. They also accustom themselves to such things as the lights employed in sea navigation, and the different types of buoys. Then comes a further course in bigger flying boats of a multi-engined type. Pilots are also given an opportunity of studying the actual construction, at the Short company's works, Rochester, of the new *"Canopus,"* or "C" class flying boats, of which they will in due course form the crews.

Fighting Forest Fires by Air

The employment of aircraft in fighting forest fires is not new. In Canada and the United States they have been used for this purpose for several years, and an improved system for carrying out the work is being developed. New ground equipment is being provided, and fresh methods introduced for further increasing the efficiency of the aeroplane as a fire-fighting machine. The Forest Service is to experiment with dropping chemicals on small fires to hold them in check until ground crews can reach the danger zone. Bombs also are to be dropped from the air on small fires, the idea being that the explosives will scatter enough earth on the burning material to check the flames until the arrival of the fire-fighting crews.

Night Flying Equipment on the Indian Air Route

Steady progress is being made with the installation of lighting equipment at important Indian airports to enable regular night flying to be introduced. An official of the Civil Aviation Department of the Government of India recently made a 4,000-mile air tour to inspect the work being carried out.

Lighting installations are now practically completed at Allahabad, Akyab, Calcutta, Gaya and Rangoon aerodromes, and new hangars have been erected at the first three places mentioned. The wireless and meteorological services are also being considerably extended to keep pace with the new developments. The new airport at Karachi has been inspected by the Governor of India, and while there he took the opportunity of inspecting Imperial Airway's westbound air liner *"Horsa."*

Air Photography over Highest U.S. Mountain

An American air expedition, operating from the airport at Fairbanks, has carried out a series of flights over Mt. McKinley, the highest mountain in North America, which towers to a height of 20,300 ft. During these flights some magnificent close-up photographs, of both the still and motion picture type, were taken of the mountain. In a single exposure it was found possible by using infra-red photography to include in the photograph mountains more than 100 miles away. When flying 500 ft. above the mountain, the aerial photographers encountered many violent air eddies.

The steeply-sloping western face of Mt. McKinley has been called the world's highest cliff, as there is an almost sheer drop of over three miles.

New Types of R.A.F. Aircraft Named

The Air Ministry have announced the official names chosen for three of the new types of military aircraft adopted for the R.A.F. The Westland Army Co-operation monoplane will be known as "Lysander," and the new de Havilland trainer, fitted with a D.H. "Gipsy XII" engine, will be called "Don I."

The name chosen for the Handley Page heavy bomber fitted with Bristol "Pegasus X" engines is "Harrow I," and the similar machine fitted with Bristol "Pegasus XX" engines, will be "Harrow II."

Japanese Express Air Service

Next summer the Japan Air Transport Company will put into operation a regular express air service between Tokio and Hsinking, the capital of Manchukuo, with stops at various important places along the route. The full trip will take 8 hrs.

Rapid Growth of Air Traffic

Air passenger and freight traffic is steadily increasing, and people are making greater use of commercial air services than ever before. For instance, the latest figures from Sweden show that air passenger and mail transport in that country has recently increased by nearly 30 per cent. In the Argentine the traffic totals for 1936 in respect of mail and freight on the commercial air routes are nearly double those of the previous year. In the United States the volume of air traffic has doubled in the last two years, and in 1936 was six times that in 1929.

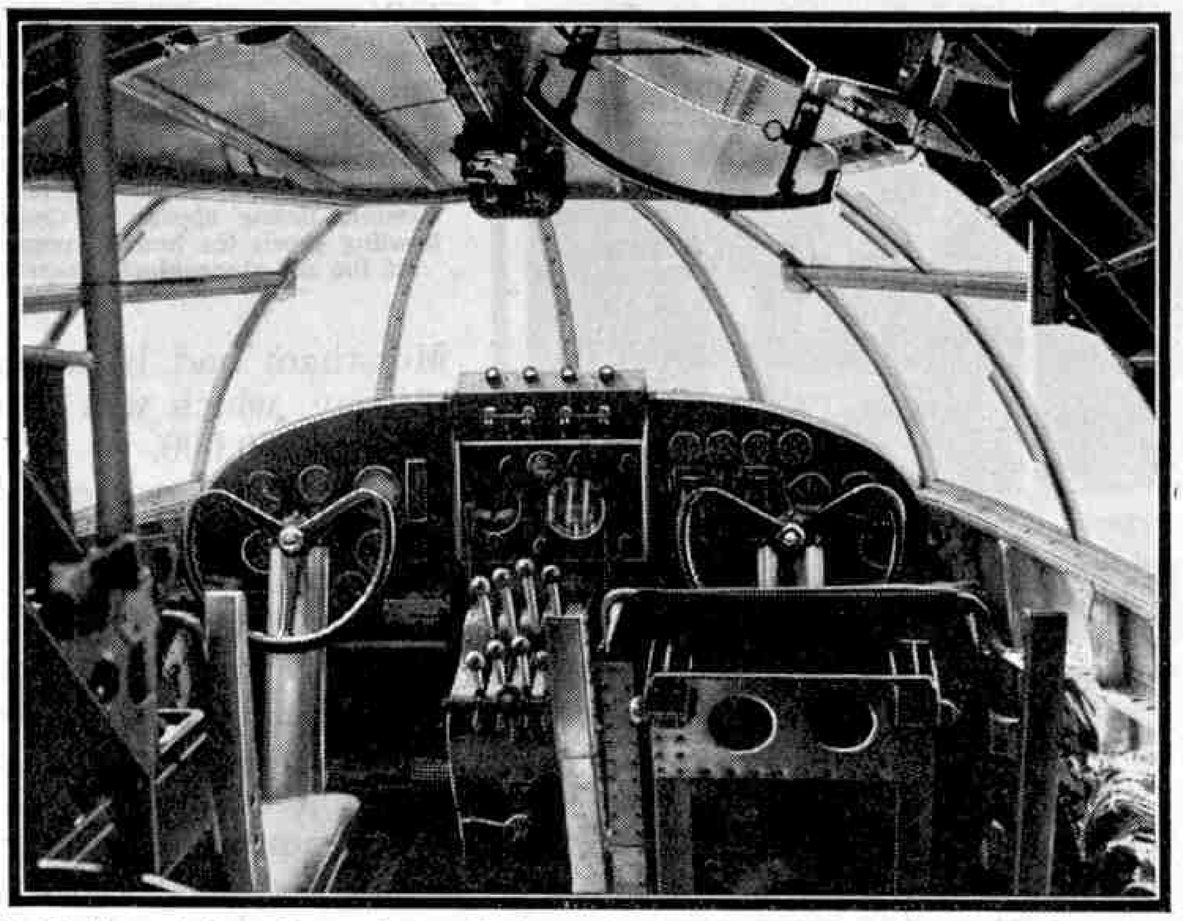
Broadside view of a Caudron "Fregate," a French high wing monoplane with seating for five people, including the pilot. Photograph by courtesy of Société des Avions Caudron.

R.A.S. Retain Mail Contract

Railway Air Services, the principal British internal air line company, have again been awarded the contract for the carriage of mails by air from London to Glasgow. The mails are flown by way of Liverpool and Belfast, over a route that has been operated without interruption since 1934. Passengers are also carried on this route, and there has been a steady increase in the number of people using this important service.

* * * *

The first aerial beacon in New Zealand is being installed at Hamilton. It will be of 3,000,000 c.p., and in clear weather will be visible 25 miles away.



Inside the cockpit, or "control room," of one of the new Empire flying boats. The large and almost hemispherical window in the curved front wall provides an exceptionally fine view for the Captain and the First Officer. Photograph by courtesy of "Flight."

Canadian Airways Increase their Fleet

Canadian Airways have purchased a Noorduyn "Norseman," and this machine is now employed in the MacKenzie River district, being fitted with skis instead of ordinary landing wheels, for winter service conditions.

The "Norseman" is produced by Noorduyn Aircraft Ltd., a Canadian company formed in 1935, at Cartierville Airport, near Montreal. It is a single-engined high wing monoplane of the enclosed cabin type and is suitable for the transport of either passengers or freight. The Canadian Wright engine fitted gives the machine a top speed of 160 m.p.h.

Giant Packing Case for Flying Boat

A packing case claimed to be the largest in the world was used for the shipment to Bermuda of the hull of the Imperial Airways flying boat *"Cavalier."* The case was 90 ft. in length, 12 ft. 4 in. in height and 19 ft. 8 in. in depth. It weighed nearly five tons when empty, and about 13¾ tons with the hull. In addition 20 other cases almost as large were required for the other sections of the machine.

The cases were transported from Rochester to the King George V Dock, London, and shipped on board a liner for Bermuda. On arrival there the various sections of the flying boat were conveyed to the new Marine airport and assembled, after which the flying boat was tested. The *"Cavalier"* is to be employed in conjunction with aircraft of Pan-American Airways in operating a Bermuda–New York air service.

Network of Airways for Burma

Irrawaddy Flotilla and Airways Ltd., of Rangoon, a company operating experimental air services in Burma, plan to establish a network of flying routes throughout that country. A service just begun operates between Mandalay and Rangoon and Yenangyaung and Rangoon, with several intermediate stops. It is proposed to open a service to Tavoy. New landing grounds are being prepared in various localities, in connection with these extensions.

Flying-Boat Harbour at Durban

A technical Commission is investigating various sites for the establishment of a harbour at Durban, South Africa, for the flying-boats of the new Empire air mail service. Suggested sites recently inspected include the Maydon channel at the entrance to the graving dock, the channel near the Island View Oil Sites in the shelter of the bluff and Salisbury Island, and the west side of that island, near the ferry landing-stage. It is understood that Mr. Pirow, the Minister of Railways, will now inspect the sites that have been visited by the Commission.

The World's Oldest Railway

On the Track of London's Ghost Train

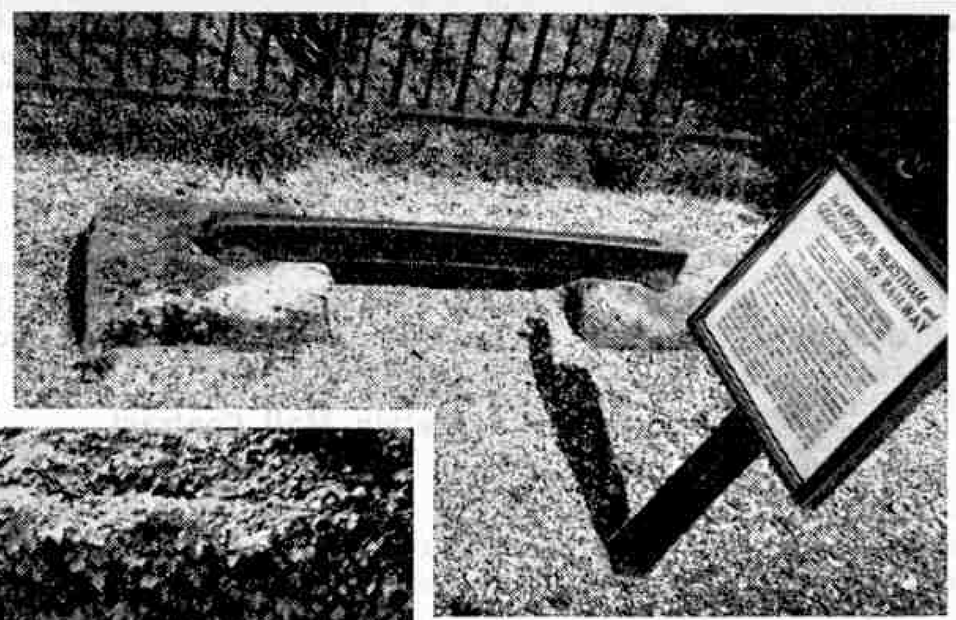
By W. Shepherd, F.G.S.

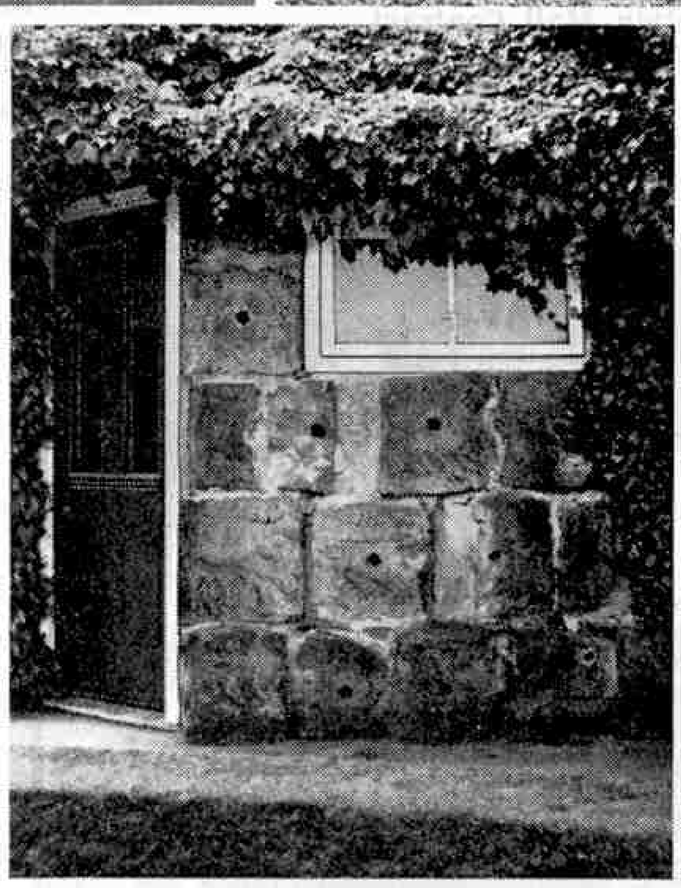
THE world's first public "iron road" was undoubtedly the Grand Surrey Iron Railway, which started its duties of carrying stone and gravel between Croydon and London in 1803.

The River Wandle, which rises at Croydon and flows into the Thames at Wandsworth, was then the busiest river of its size in Europe, and over 3,000 persons were employed in the 40 mills on its banks. But it was not navigable, and the canal to Croydon was becoming inadequate for the increasing traffic. The railway therefore was sanctioned, under the first of all Railway Acts, and was in use a year before Trevithick's experimental steam railway in South Wales, and nearly a quarter of a century before the opening of the Stockton and Darlington line.

For the greater part of its length, the Grand Surrey Iron Railway was a single track, but here and there the track was doubled, and an occasional branch line was run off to serve outlying mills, such as the oil-cake mills at Hackbridge.

Almost all obvious traces of the line have been lost, but ghosts of the old cuttings and embankments can be discerned in a number of places. In the Purley Recreation Ground two of the rails, with their sleepers, have been preserved in their original positions, while the present S.R. electric connection between Mitcham and Croydon runs approximately along the line followed a century ago by the track of this pioneer railway.





Some components of the permanent way of the Surrey Iron Railway, described in this article. A rail and sleepers are shown in the upper illustration, preserved on the site of the old track in Purley Recreation Ground. Below appears a Croydon bowling green tea house, composed of the old stone block sleepers.

The rails were of an unusual fish-bellied type, and rested on square stone sleepers. The flanges were on the inner edges of the rails, instead of on the wheels, and stood three inches high at the centre, tapering away towards the ends. Thus, the "fish-belly" bulged *upwards*, for the rail was L-sectioned, and the bottom limb, on which the wheels rested, was a simple strip of metal an inch in thickness. Later, a second fish-bellied flange was added downwards to the outer edge of the rail, to increase the strength. The gauge was 4 ft. 6 in.

Each rail was about a yard long, and was pinned down at each end to a sleeper of local sandstone, measuring 16 in. square by 9 in. thick. In some of the fields between Croydon and Coulsdon, double rows of depressions mark where the old sleepers rested, the sleepers themselves having been requisitioned by local builders. The Tea-house, and the surrounding walls, of the Croydon Central Bowling Green are built chiefly of old sleepers, where over 200 are in a good state of preservation.

This old line can well be referred to as a "ghost railway," for so obscure have many miles of its track become that a few years ago an archæological society set out to explore it. The one and only contemporary map of the line in existence has proved very untrustworthy, and even now, large sections of the line are conjectural.

The Grand Surrey Iron Railway, as built under the Act of 1801, ran from Frying Pan Creek, Wandsworth, to the dock at the Croydon end of the canal, a distance of 9½ miles. West Croydon Station is built on the site of the old dock, and therefore can lay claim to represent the world's oldest railway station.

In 1803, a further Act was passed allowing the line to be extended through Purley and Merstham to Godstone, but work on it was stopped after the Greystone Lime Works at Merstham had been reached. The total cost of the railway, which was in regular use for 43 years, was about £150,000.

The train consisted usually of 12 wagons, drawn by a single horse, and one of the great accomplishments of the railway was to prove conclusively, by prolonged, practical use, that a smooth metal track reduces wheel friction by a factor of anything up to 10. The Stockton and Darlington line was originally intended to be operated by animal power, as a result of the Grand Surrey demonstration.

The extraordinary feats performed by the single horse employed provoked endless comment at the time, and bets were made on the loads carried, and the speeds attained. On one occasion, the twelve wagons were loaded with three tons of stone each, and the horse drew them a full six miles in 1 hr. 49 min. The record was probably achieved when the horse pulled a load of 55 tons without distress!

Stephenson and others had been busy perfecting the steam engine, however, and in spite of many vain protests that a mechanical horse could never equal the natural animal in pulling power, the Grand Surrey Iron Railway was finally taken over by the London, Brighton and South Coast steam railway.

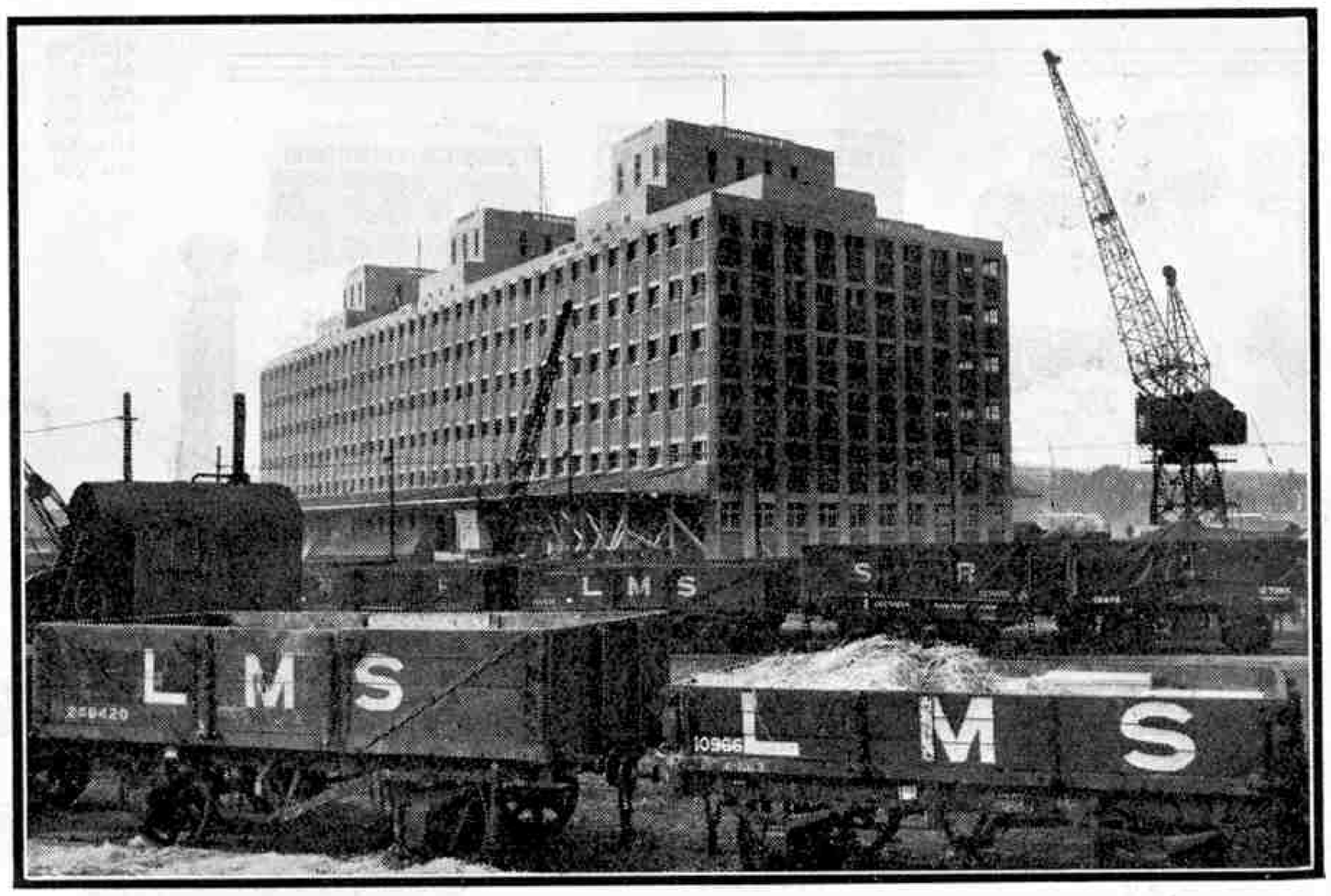
Southern Railway Warehouse at Nine Elms

Marvels of Mechanical Handling Plant

A COLOSSAL granary and warehouse has recently been completed by the Southern Railway at Nine Elms. The new building is of striking appearance and has already become a familiar landmark in the district in which it is placed. It is surmounted by three great towers, each of which rises to a height of 100 ft., and tall cranes on the river front of the building help to make it more impressive.

The warehouse is 310 ft. long and 80 ft. wide. It is constructed of reinforced concrete with brick panelling and has seven floors, including the machinery floor in the towers on the roof. A total storage space of 135,000 sq. ft., or nearly three acres, is provided on the six main floors, and this is sufficient for the accommodation of about 12,000 tons of merchandise. A novel feature is a showroom for the display of goods stored in the building.

The ground floor, which is at platform level, and the first floor are finished in concrete and used for the storage of general merchandise. The upper floors form an immense granary. They are laid with 4-in. planks of Columbian pine, covered with maple wood an inch thick, and there is an ingenious arrangement of electric elevators and gravity chutes by means of which sacks containing grain can be stored in numbered sections on any floor.



A general view of the new S.R. granary at Nine Elms, showing the striking appearance of the building. The three towers on the roof house all the machinery, thus leaving the floor space clear for storage purposes.

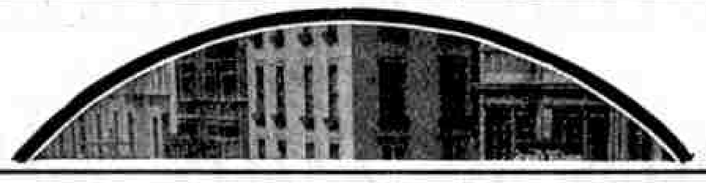
A railway siding for reception purposes runs alongside the river front of the building, which has an external platform, 10 ft. in width, under a canopy. There is a similar platform on the south side of the warehouse for road traffic, and thus the building can easily be reached by road, rail or water. Mechanical plant reduces handling to a minimum. Goods arriving by river are lifted by means of cranes on to the wharf, and are then placed on the ground floor platform, or loaded direct to the upper floors through loophole doors. These doors have been provided in five positions on each floor on the river front. For checking purposes there are platform weighing machines that can easily be reached by the cranes through gaps in the canopy.

Although general merchandise is accommodated in the new warehouse it has been specially designed for grain storage. The bags containing the grain are received on the ground floor and are then taken by means of the electric elevators to any floor above. There are six of these elevators and they can lift the sacks to the grain storage floors at the rate of 380 an hour. Sometimes the sacks have to be taken to a portion of the building that is not immediately above the place at which they enter it. The elevators then take them to the sixth floor. There they are discharged on to a reversible band conveyor, and as they are carried along on this they are diverted by "ploughs," or boards placed diagonally across their paths, into a chute that carries them downward to their appointed destination. Three band conveyors of this kind are installed on the sixth floor. They lead to 12 spiral chutes that carry the sacks of grain to the floors below, so that there is no difficulty in delivering the sacks near to the place in which they are to be stored.

Similar arrangements are made for delivering grain that has been stored in the building. Four of the 12 spiral chutes are twin chutes, placed where the sidings reach the building, and through them the grain can be discharged on both sides of trucks standing on the tracks. These chutes are painted red to distinguish them from those serving the road loading banks. Commodities that are not in sacks are transported up and down by means of three goods lifts that serve all floors. Each of these lifts is capable of carrying a load of two tons at a speed of 100 ft. a minute.

The offices in the building are centrally heated, and the plant has been so arranged that a portion of the granary can be heated if it is being used for the storage of goods that require specially warm conditions and an equable temperature. A system of automatic electric fire alarms has been installed in order to give immediate warning of an undue rise in temperature in any part of the building. Communication from one warehouse to another is ensured by means of an internal telephone system. This gives connections to the wharf and to the operators of the machinery, and also to the Post Office lines.

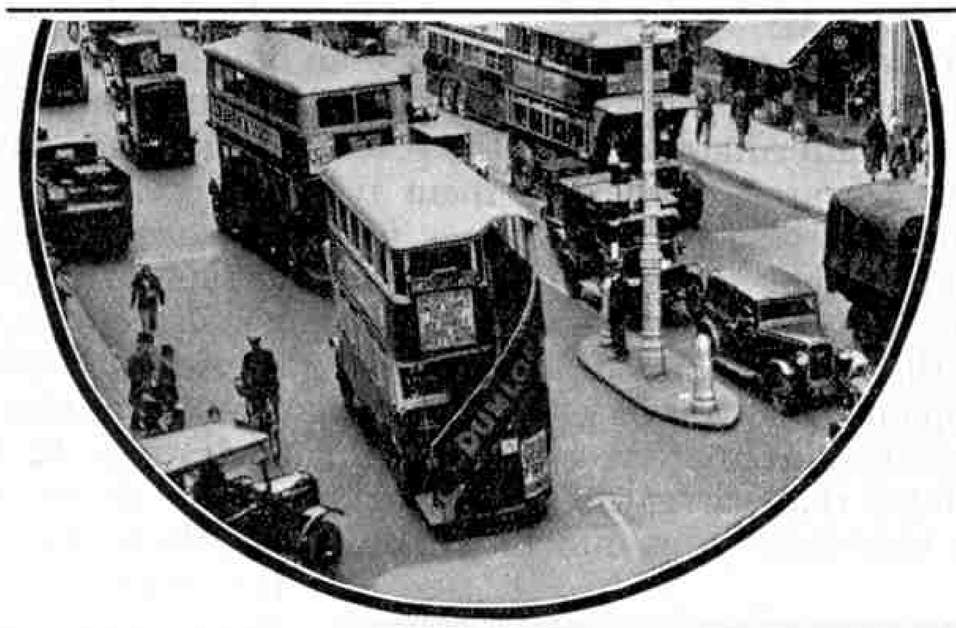
A new wagon and road vehicle shed for 44 railway wagons and 50 road vehicles has been constructed near the warehouse. An additional shed has been set apart for dealing with shipping traffic received in large quantities through Southampton Docks. This shed will accommodate 46 road wagons and 50 road vehicles and has a storage area of 41,000 sq. ft. Two electric 10-ton "Goliath" cranes, which straddle across four sidings and a roadway, deal with 120 wagons in that area.



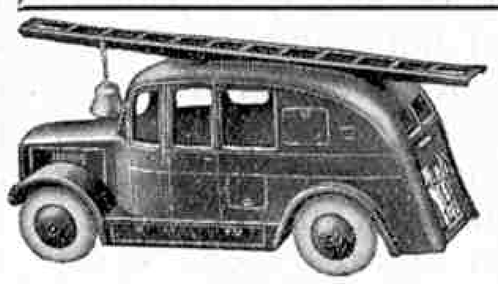
A FASCINATING COLLECTING HOBBY

DINKY

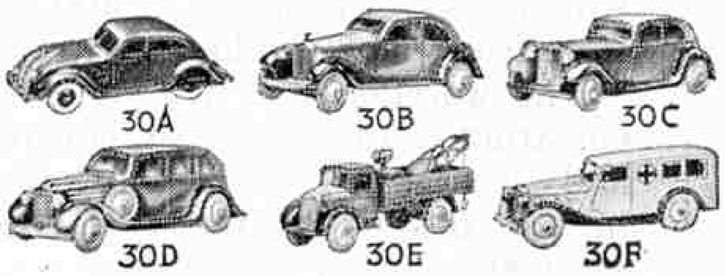
OVER 250 V



Every boy and every girl is collecting Dinky Toys, one of the most delightfu
are now over 250 of these charming miniatures, including Motor Cars, Aeropl
others, each one beautifully finished in rich colours. A section from the range
Dinky Toys can all be purchased separately, or they can be obtained in co
FOLDER, which gives illustrations and prices of the complete range.



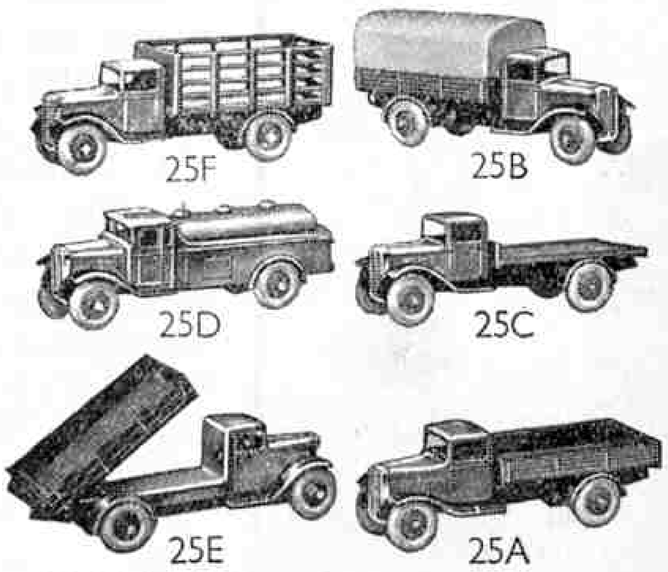
STREAMLINE FIRE ENGINE
Dinky Toys No. 25h
Fitted with detachable rubber tyres Price **9d.** each



MOTOR VEHICLES Dinky Toys No. 30
Fitted with detachable rubber tyres and silver-plated radiators

No. 30a	Chrysler Airflow Saloon	each	**9d.**
No. 30b	Rolls-Royce Car	,,	**9d.**
No. 30c	Daimler Car	,,	**9d.**
No. 30d	Vauxhall Car	,,	**9d.**
No. 30e	Breakdown Car	,,	**9d.**
No. 30f	Ambulance	,,	**9d.**

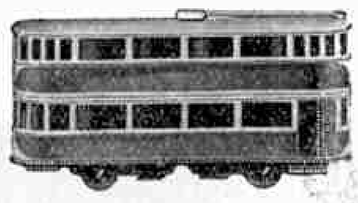
Price of complete set **4/6**



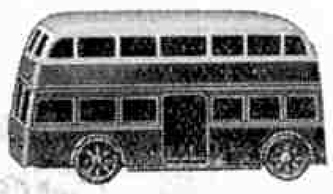
COMMERCIAL MOTOR VEHICLES
Dinky Toys No. 25
Fitted with detachable rubber tyres and silver-plated radiators

No. 25a	Wagon	each	**9d.**
No. 25b	Covered Van ...	,,	**9d.**
No. 25c	Flat Truck	,,	**9d.**
No. 25d	Petrol Tank Wagon	,,	**9d.**
No. 25e	Tipping Wagon ...	,,	**9d.**
No. 25f	Market Gardener's Van	,,	**9d.**

Price of complete set **4/6**



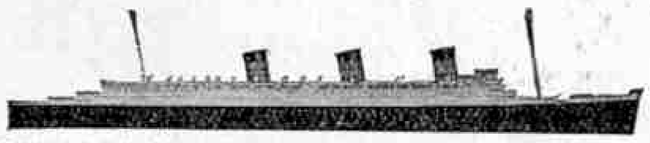
TRAM CAR
Dinky Toys No. 27
Assorted colours
Price **3d.** each



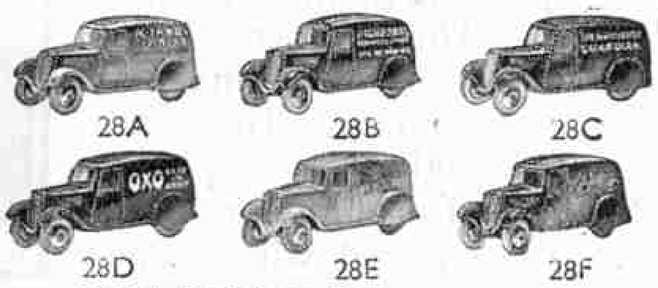
MOTOR BUS
Dinky Toys No. 29a
Assorted colours
Price **4d.** each

PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price **3d.** each

CARAVANTRAILER
Dinky Toys No. 30g
For use with the Saloon Cars in Dinky Toys No. 24 and 30. Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each



CUNARD WHITE STAR LINER "QUEEN MARY"
Dinky Toys No. 52a
Fitted with rollers and supplied in presentation box. Price **1/-** each
Dinky Toys No. 52m
Similar to No. 52a but not fitted with rollers, nor supplied in presentation box. Price **9d.** each

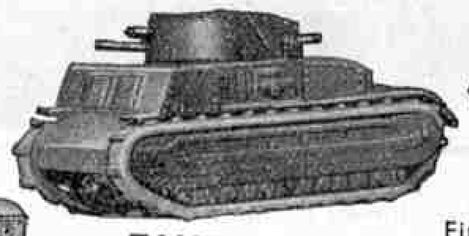


DELIVERY VANS
Dinky Toys No. 28/1
Fitted with detachable rubber tyres

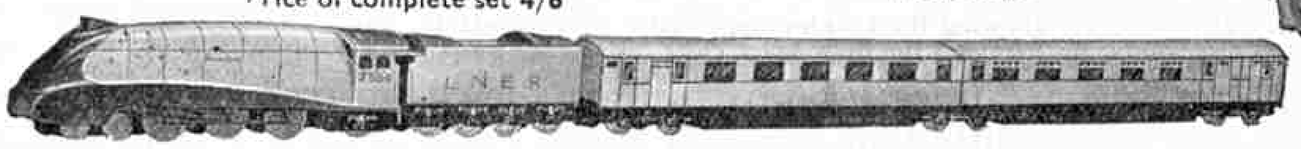
No. 28a	Golden Shred Van ...	each	**6d.**
No. 28b	Seccotine Van	,,	**6d.**
No. 28c	Manchester Guardian Van	,,	**6d.**
No. 28e	Firestone's Tyres Van ...	,,	**6d.**
No. 28f	Palethorpe's Sausage Van	,,	**6d.**
No. 28n	Atco Lawn Mowers Van ...	,,	**6d.**

Price of complete set **3/-**

STRONGLY MADE
UNBREAKABLE
MODELS

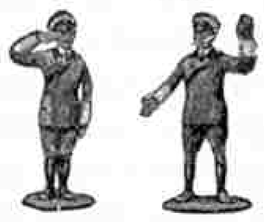


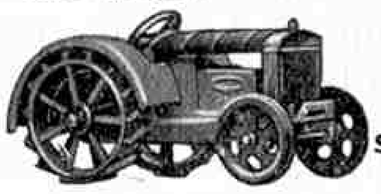
TANK
Dinky Toys No. 22f
Price **9d.** each



A realistic model of the latest type of streamline train

"SILVER JUBILEE" TRAIN SET
Dinky Toys No. 16
Price **1/6** each

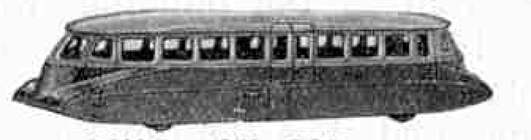




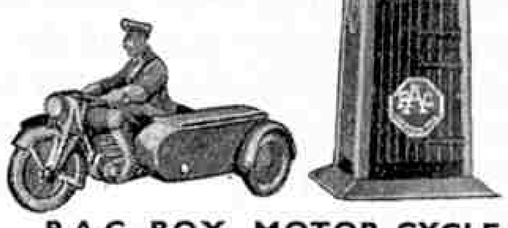
TRACTOR
Dinky Toys No. 22e
Price **9d.** each

STREAMLINE SALOON
Dinky Toys No. 22h
Assorted colours. Fitted with detachable rubber tyres and silver-plated radiator. Price **6d.** each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a (Four face)
Price 3d. each
No. 47b (Three face)
Price 3d. each
No. 47c (Two face)
Price 3d. each



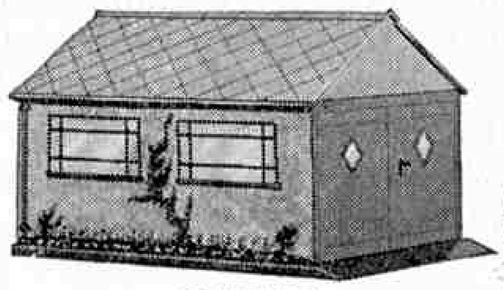
G.W.R. RAIL CAR
Dinky Toys No. 26
Assorted colours Price **4d.** each



R.A.C. BOX, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 43
This set is representative of the familiar road hut and personnel of the R.A.C. Each item is finished in correct colours.

No. 43a	R.A.C. Box	each	**6d.**
No. 43b	R.A.C. Motor Cycle Patrol	,,	**9d.**
No. 43c	R.A.C. Guide directing traffic	,,	**3d.**
No. 43d	R.A.C. Guide at the salute	,,	**3d.**

Price of complete set **1/9**



GARAGE
Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars. Price **1/6** each

POLICE BOX, MOTOR CYCLE PATROL AND POLICEMEN
Dinky Toys No. 42

No. 42a	Police Box	each	**6d.**
No. 42b	Motor Cycle Patrol	,,	**10d.**
No. 42c	Point Duty Policeman (in White Coat)	,,	**3d.**
No. 42d	Point Duty Policeman	,,	**4d.**

Price of complete set **1/11**

MANUFACTURED BY MECCANO LIMITED

TOYS

VARIETIES

htful and absorbing collecting hobbies ever conceived for young people. There roplanes, Road Signals of all kinds, Trains, Farmyard Animals and innumerable ge is illustrated below.
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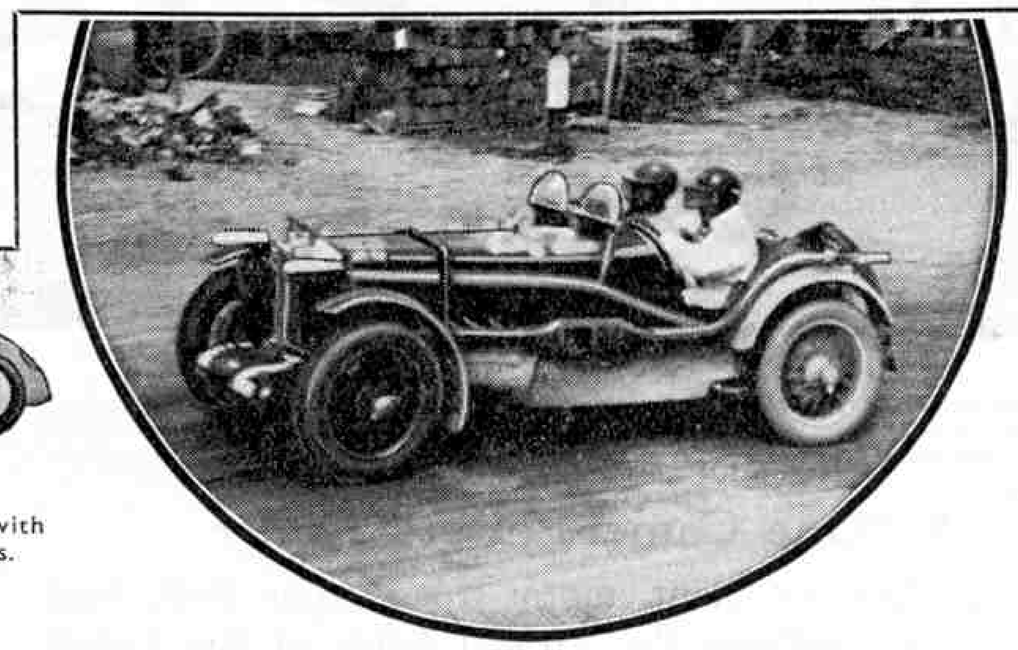
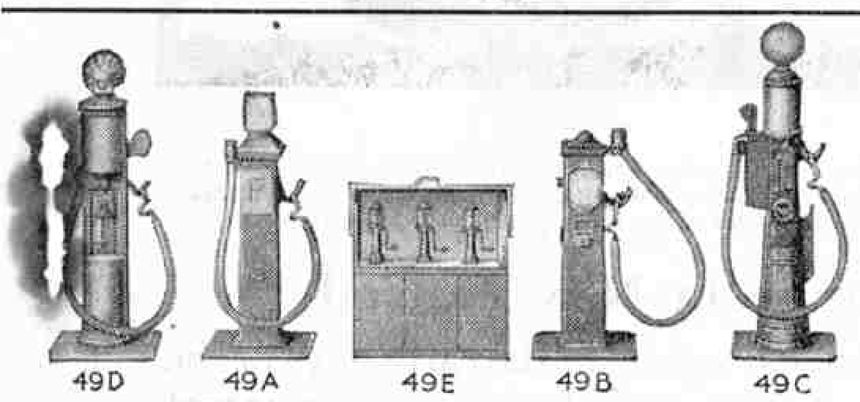


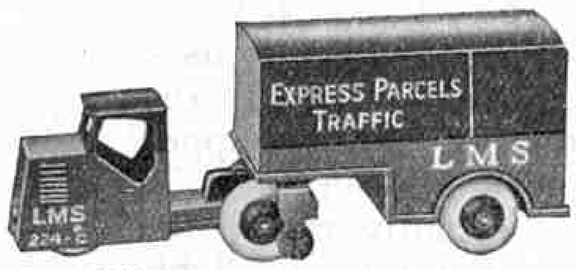


PETROL PUMPS Dinky Toys No. 49
Scale models fitted with rubber hose pipes. Realistically coloured.

No. 49a	Bowser Pump	each	4d.
No. 49b	Wayne Pump	,,	4d.
No. 49c	Theo Pump each 4d. No. 49d Shell Pump	,,	4d.
No. 49e	Oil Bin (Pratts)	,,	3d.

Price of complete set 1/6

RACING CAR
Dinky Toys No. 23a
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each



RAILWAY MECHANICAL HORSE AND TRAILER VAN
Dinky Toys No. 33R
Fitted with detachable rubber tyres

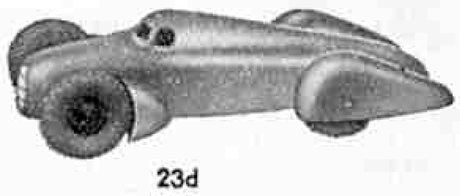
No. 33Ra	Railway Mechanical Horse	each	8d.
No. 33Rd	Trailer Van... ...	,,	10d.

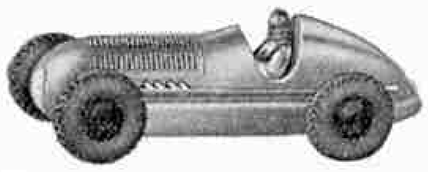
Price, complete, L.M.S.R., L.N.E.R., G.W.R. or S.R., 1/6

PILLAR LETTER BOX G.P.O.
Dinky Toys No. 12a
Price **3d.** each

STREAMLINE TOURER
Dinky Toys No. 22g
Assorted colours. Fitted with detachable rubber tyres.
Price **6d.** each

TRAILER
Dinky Toys No. 25g
For use with Dinky Toys No. 25 (Commercial Motor Vehicles). Fitted with detachable rubber tyres. Price **7d.** each

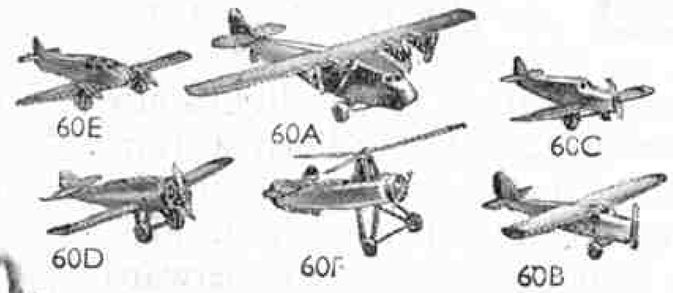




MOTOR CARS
Dinky Toys No. 24
Fitted with detachable rubber tyres and silver-plated radiators

No. 24a	Ambulance	each	9d.
No. 24b	Limousine	,,	9d.
No. 24c	Town Sedan ...	,,	9d.
No. 24d	Vogue Saloon ...	,,	9d.
No. 24e	Super Streamline Saloon	,,	9d.
No. 24f	Sportsman's Coupé	,,	9d.
No. 24g	Sports Tourer (4 seater)	,,	9d.
No. 24h	Sports Tourer (2 seater)	,,	9d.

Price of complete set 6/-



AEROPLANES Dinky Toys No. 60

No. 60a	Imperial Airways Liner	each	9d.
No. 60b	D.H. "Leopard Moth"	,,	6d.
No. 60c	Percival "Gull" ...	,,	6d.
No. 60d	Low Wing Monoplane	,,	6d.
No. 60e	General "Monospar"	,,	6d.
No. 60f	Cierva "Autogiro" ...	,,	6d.

Price of complete set 3/-

ROYAL AIR MAIL SERVICE CAR
Dinky Toys No. 34
n correct colours. Fitted with detachable rubber tyres.
Price **6d.** each

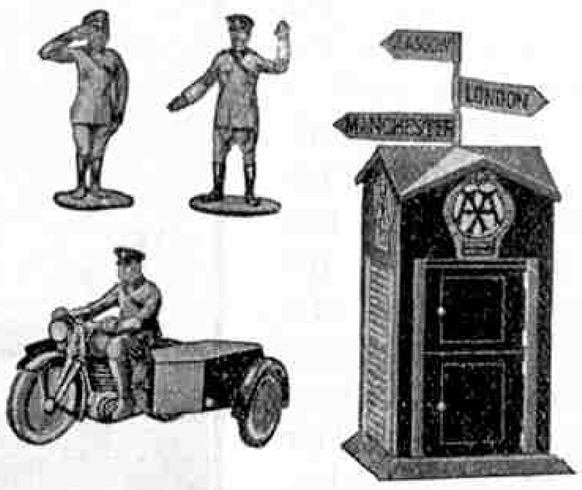
RACING CARS
Dinky Toys No. 23
Fitted with driver and detachable racing tyres. Assorted colours.

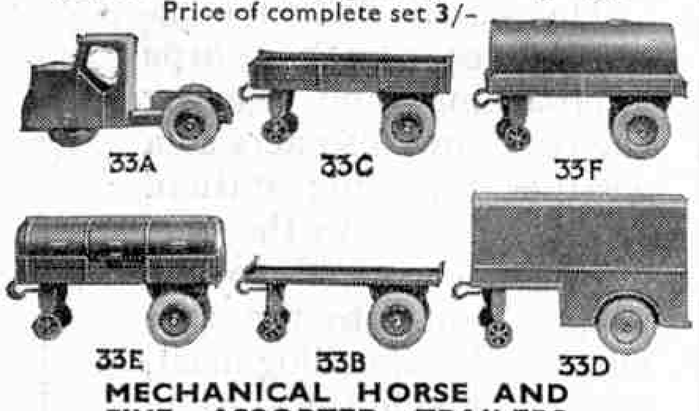
No. 23c	Mercedes-Benz Racing Car	each	8d.
No. 23d	Auto-Union Racing Car	,,	8d.
No. 23e	"Speed of the Wind" Racing Car	,,	8d.

Price of complete set 1/11

MOTOR TRUCK
Dinky Toys No. 22c
Assorted colours. Fitted with detachable rubber tyres. Price **6d.** each

STREAMLINE BUS
Dinky Toys No. 29b
Fitted with rubber tyres
Price **6d.** each





MECHANICAL HORSE AND FIVE ASSORTED TRAILERS
Dinky Toys No. 33
Fitted with detachable rubber tyres

No. 33a	Mechanical Horse ...	each	6d.
No. 33b	Flat Truck	,,	6d.
No. 33c	Open Wagon ...	,,	6d.
No. 33d	Box Van	,,	8d.
No. 33e	Dust Wagon ...	,,	8d.
No. 33f	Petrol Tank	,,	8d.

Price of complete set 3/6

BEACON
Dinky Toys No. 47d
Realistic model of a Belisha Safety Beacon
Price **1d.** each

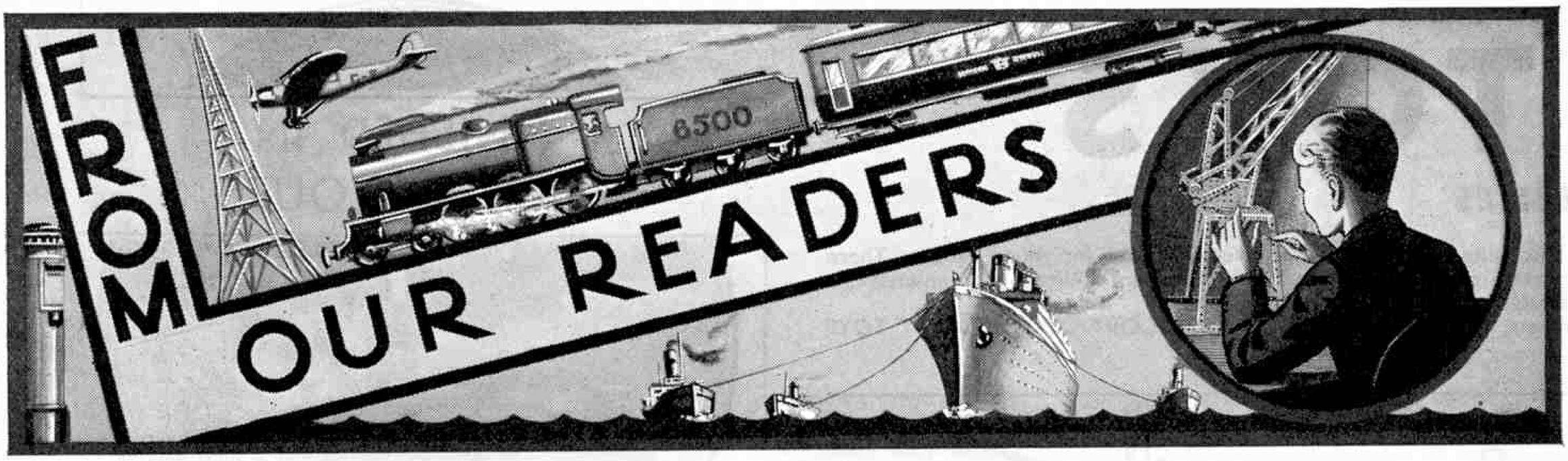
PETROL STATION
Dinky Toys No. 48
Accurate reproduction of a filling station. Printed in appropriate colours.
Price **1/6** each

A.A. BOX, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 44
Collectors of Dinky Toys will find this realistic road set of particular interest. Each item is finished in correct colours

No. 44a	A.A. Box	each	8d.
No. 44b	A.A. Motor Cycle Patrol	,,	9d.
No. 44c	A.A. Guide directing traffic	,,	3d.
No. 44d	A.A. Guide at the salute	,,	3d.

Price of complete set 1/11

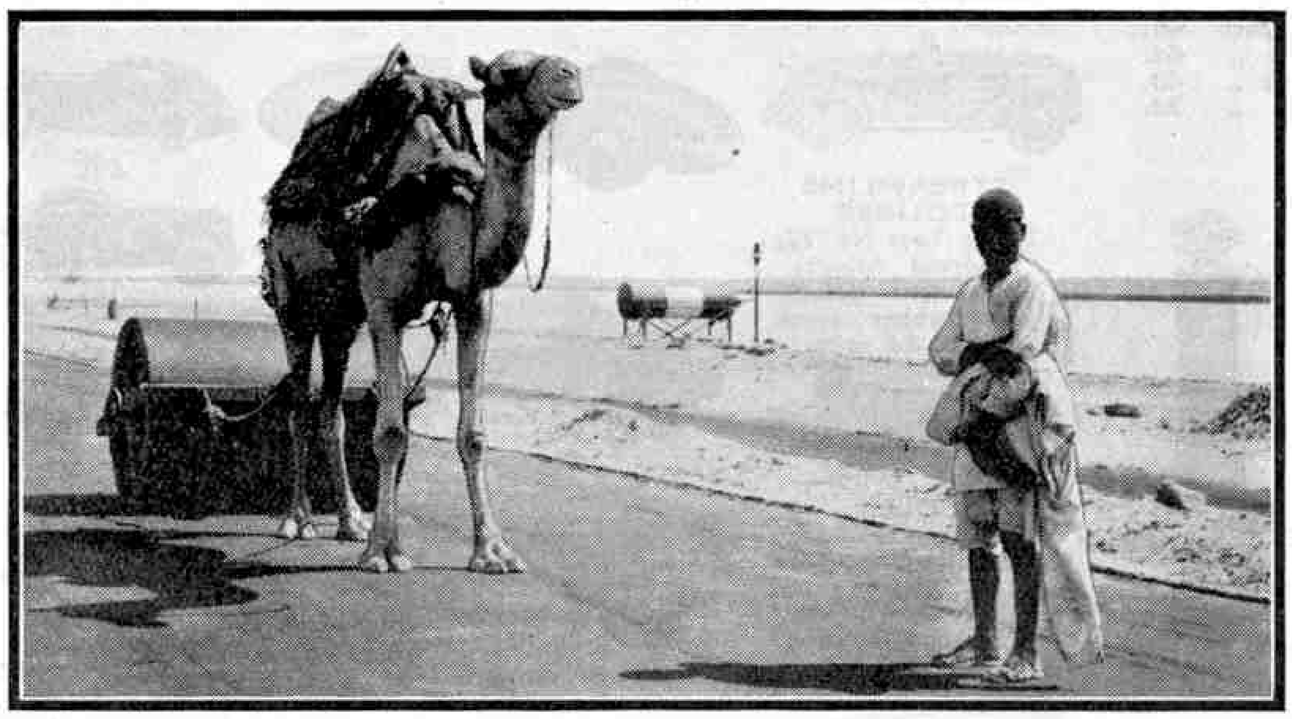
D BINNS ROAD LIVERPOOL 13



These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A "One Camel-Power" Roller

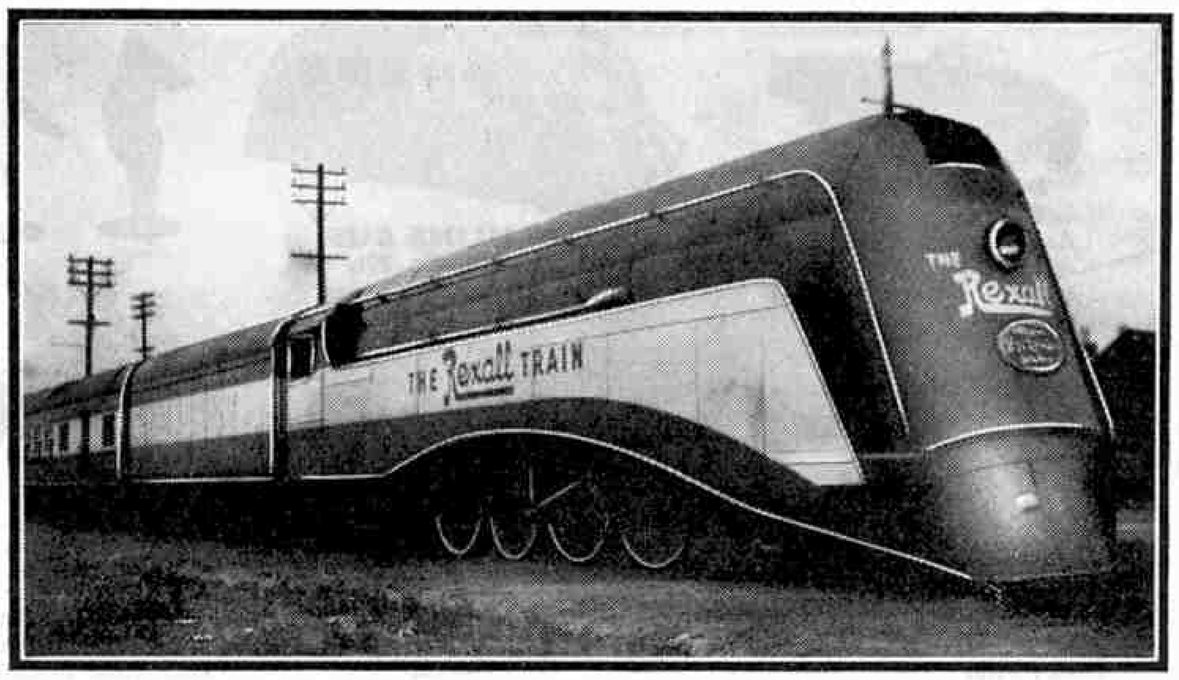
There is an excellent motor road from Port Said to Suez that follows the African bank of the Canal. This road was constructed for the use of light vehicles, and its surface has recently been greatly improved by the "mix-in-place" system. This surfacing is a mixture of sand and tar, and as the name of the system suggests, it is actually mixed on the site and laid directly on the desert sand. The mixture forms a plastic surface that hardens to a certain extent, but can always be levelled if necessary by rolling. Camels are used to draw the rollers, as their soft pads make no indentations on the surface.



A camel drawing a roller during the construction of the motor road from Port Said to Suez. The soft pads of this animal do not mark the surface. Photograph by R. C. Bush, Ismailia, Egypt.

The advantage of the system in this country of deserts is that sand is always available, and it is only necessary to transport the barrels of tar and the mixing machine. Very little skilled labour is required, and as coolies are always available, costs are low. This surfacing is also used extensively in Egypt for landing grounds for aircraft, and for military parade grounds. The surface is suitable for pneumatic-tyred vehicles, but would be torn up quickly by tanks or heavy Army vehicles. It is for this reason that it has been found necessary to construct military roads with stone foundations for the use of the British troops being stationed in the Canal zone in accordance with the recently ratified Anglo-Egyptian Treaty.

R. C. Bush (Ismailia, Egypt).



A special streamlined train used in Canada by The Rexall Drug Co., to tour the country during their annual convention. Photograph by J. W. Griffin, Toronto.

A Lighthouse in New Zealand

Shipping in New Zealand waters in the early days of the Dominion was often a risky undertaking on account of uncharted rocks and dangerous channels. To-day dangerous places round the coast are marked by buoys, beacons and lighthouses, and most harbour mouths are equipped with a fog horn.

I recently visited the signal station and lighthouse reserve at Taiaroa Head, the entrance to Otago Harbour. This is perhaps the best equipped marine post on the East Coast of the South Island, for in addition to the lighthouse and signal station, there is an up-to-date fog horn station. The head of the harbour is in the form of a small peninsula, high in the centre, and sloping down to the sea on all sides. At the top of the head is the signal station, on the seaward slope is the lighthouse, and below it is the fog horn. On the landward side are the three keepers' cottages.

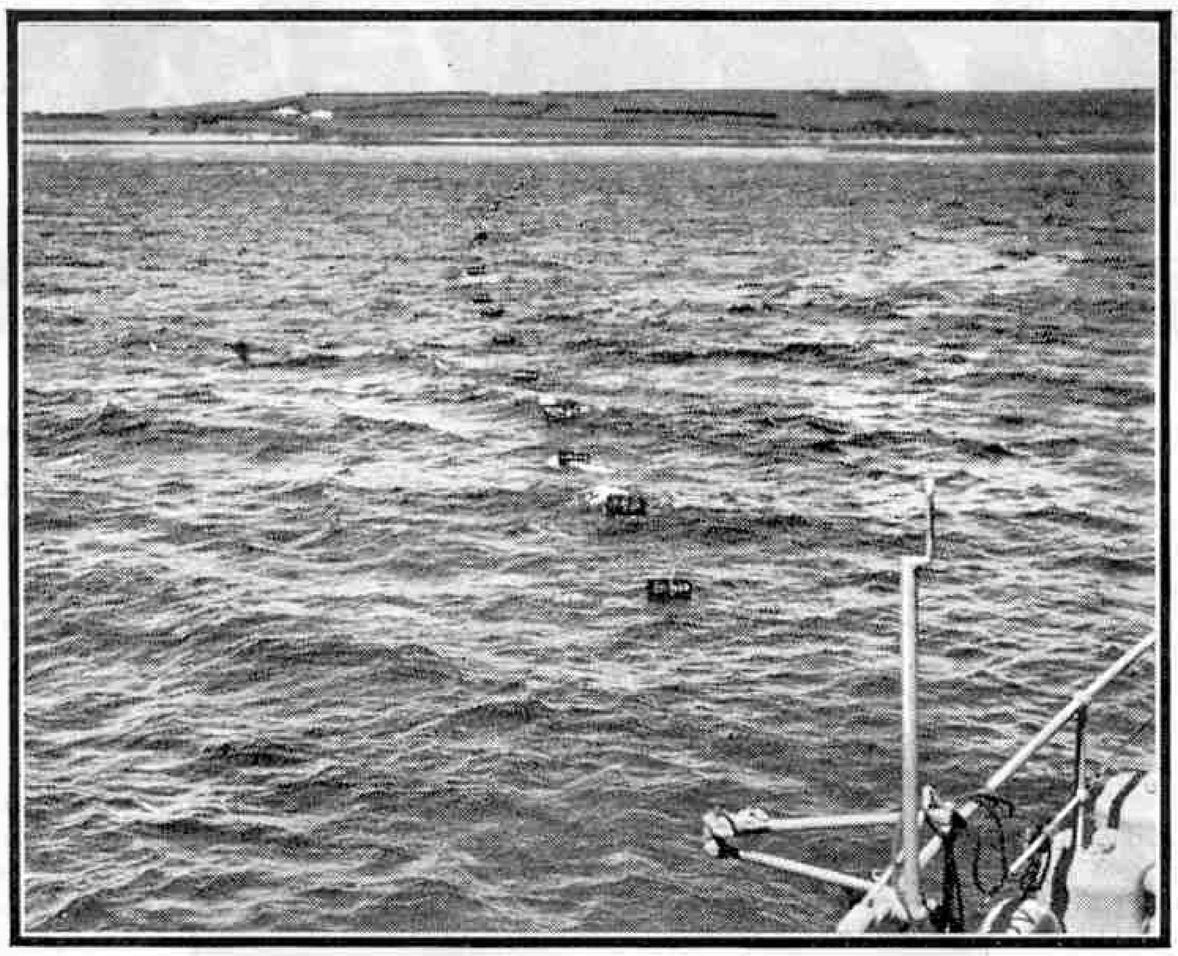
The signal station communicates with ships approaching and leaving the port, and also acts as a weather reporting station. It is connected to the port by telephone, and to the keepers' houses by the same means. The signalling mast, erected outside the station, is the iron foremast of the vessel *"Mokoia,"* once in the colonial trade, and now piled up on the mole opposite the heads. The lighthouse is fitted with an automatic light giving two flashes of a second's duration at an interval of three seconds, followed by a lapse of seven seconds.

D. C. Mooney (Anderson Bay, N.Z.).

Laying the Bass Strait Cable

My father, who is an engineer, was engaged in the great task recently carried out of linking Tasmania, the island state of the Commonwealth of Australia, with the mainland by a submarine telephone cable. The new cable, which was the subject of an article in the October 1936 issue of the *"M.M.,"* has been laid from Apollo Bay, on the Victorian coast, to Stanley in Tasmania, via King Island.

My father took me to see the cable ship *"Faraday"* commence laying the cable at Apollo Bay. The vessel, which had brought the cable from its place of manufacture at Woolwich, near London, sent out a cutter and boats to carry a line to the shore. As the surf is very heavy, attempts were first made to fire rockets to the shore from the boats, which lay just outside the line of breakers. This proved too difficult, so rockets were landed at the jetty some two miles away, brought to the cable station, and then fired out to sea, where the ship's boats picked them up and soon established a line. The shore end of the cable was then attached to this line, and with barrels attached to float it, was hauled ashore by a motor winch and connected to the cable station.



The "Faraday" laying the shore end of the Victoria-Tasmania cable at Stanley, Tasmania. The buoys are attached to the cable, and show where it has been sunk. Photograph by I. Brough, Preston, Victoria.

Slowly the ship steamed away, paying out the cable as she went at the rate of about 8 m.p.h. When about half way to King Island the cable was cut, sealed and buoyed. The ship then proceeded to the island, and laid the cable from there to the half way point, where a single joint was made by a specially trained jointer. The same procedure was adopted between Stanley and King Island.

All the time engineers on ship and shore kept up a constant series of tests to check the behaviour of the cable as it sank to its bed about 300 ft. deep. It consists of two wires arranged one inside the other like a wire in a tube, with a special insulation, called paragutta, between them. The new cable will provide five telephone channels, twelve telegraph channels and one broadcasting relay channel, by means of the carrier wave system.

I. Brough (Preston, Victoria).

In a Canadian Roundhouse

On a recent trip to the roundhouse or engine shed of the Canadian National Railroad in Toronto, I saw locomotive No. 6400, the new radically streamlined 4-8-4, which will eventually be used on the railroad's most important passenger runs. Another engine, No. 5700, is a big, high-wheeled "Hudson," or 4-6-4, that hauls *"The Inter-City Limited"* between Toronto and Montreal. No. 4104, a giant 2-10-2 with a tractive force of 90,000 lbs., and No. 5574, a fine example of the standard Pacifics that bear the brunt of passenger work on North American lines, also were in the shed. All C.N.R. locomotives are painted dead black except No. 6400, which is done in a pleasing green.

This year the Rexall Drug Company of the United States and Canada decided to put their annual convention on wheels and tour the country with it. The result was a completely streamlined train composed of a New York Central oil-burning 4-8-2 and 12 Pullmans painted in the firm's colours, light blue and white. This train recently visited Toronto and I secured the photograph of it reproduced as the lower illustration on the opposite page.

The two principal trains operating between Toronto and Montreal are "pool" or joint trains of the Canadian Pacific and Canadian National Railroads. An interesting feature of this is that each of the two railroads concerned calls it by a different name. No. 6 is known to the C.P.R. as *"The Royal York,"* while the C.N.R. give it the name *"The Inter-City Limited."*

J. W. Griffin (Toronto).

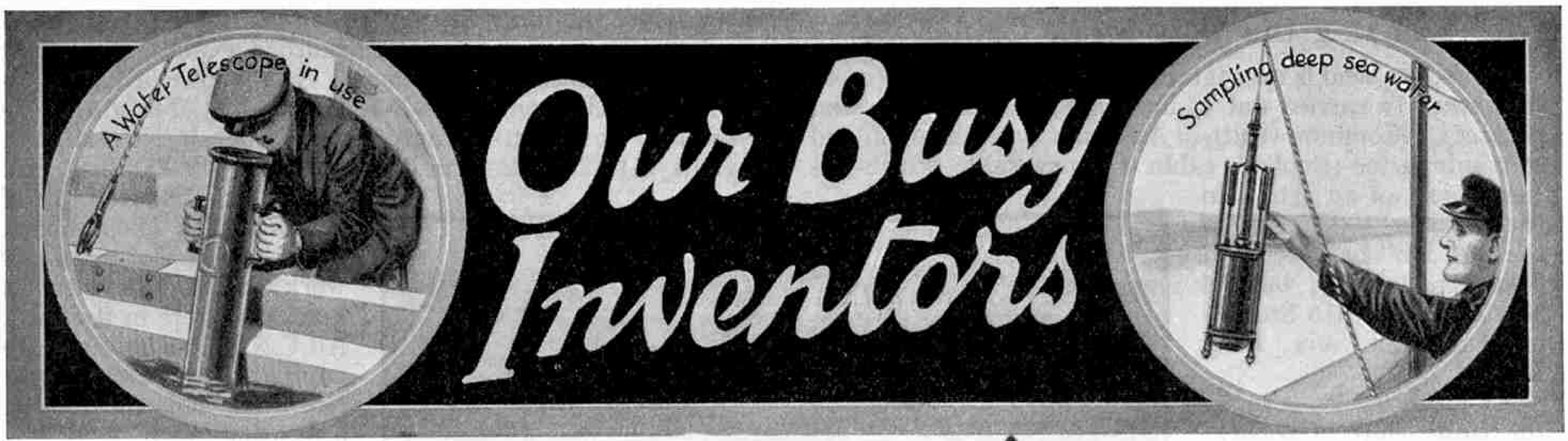
Floods in Burma

In Burma the rainy season or monsoon commences in May and ends in October, and every year at that time floods occur in many parts of the country. The towns most affected include Pegu, Daiku, and Sagaing in Upper Burma. The storms that cause the floods continue for as long as five days, during which time the rain falls unceasingly, never allowing the briefest glimpse of the sun. In consequence, streams, rivers and creeks become swollen and overflow their banks, flooding the countryside and towns. The railways also are flooded and traffic on some lines is often held up because of breaches in the track caused by wash-outs.

A scene in a flooded town in Burma. The water in the streets is from three to four feet deep. Photograph by T. Sike Shu, Thongwa, Burma.

The roads and streets in the towns are often under water to a depth of three or four feet. Young men and boys in small boats or gondolas play gaily in the flooded areas, and some people are even seen going on business, or visiting the bazaars, in gondolas.

T. Sike Shu (Thongwa, Burma).



By P. A. Tent

An Ingenious Extensible Ladder

In many houses, particularly those with one storey, there is valuable space in the loft that is generally wasted. Good use often could be made of it, either for storage or as emergency accommodation, if it could be reached without difficulty. A staircase built for the purpose would take up too much room, and usually it would be a nuisance to use an ordinary ladder to gain access to it through the usual trap-door. The inventor has come to the rescue by providing a safe and convenient collapsible staircase which disappears into the loft when it is not required.

This device is known as the J. B. Gravity Loft Ladder, and is illustrated in use on this page. When the trap-door leading to the loft in which the ladder is installed is closed, the ladder is above it, suspended from a frame about four ft. high, in a position in which it is out of the way. The ladder itself is an extensible one built on the "lazy tongs" principle. A slight pull on a cord raises the trap-door and then releases the ladder, which opens out, the lower end passing through the opening to the floor below, where it may be pulled forward slightly to give a rake or slope that can easily be ascended.

When it is no longer required the ladder is pulled up by means of the cord, and raising this allows the trap-door to fall into its ordinary position.

Rubber pads at the foot of the ladder make firm contact with the ground when it is in use and prevent slip. Another advantage is that the ladder extends well into the loft, so that those who make use of it can climb to the level of the floor and step off comfortably without any scrambling or stretching.

Another use that immediately suggests itself for an extensible ladder so easily fixed and controlled is in providing for easy escape in case of fire, and a fire escape has been constructed on this principle. The ladder is fitted under the sill of an upper window. It is released instantly by a pull at the cord when required, and is so strong that several people can descend at the same time. It is rigid when extended and self-adjusting struts hold it away from the wall so that there is no difficulty in descending it at the high speed desirable when leaving a burning building.

A flexible ladder leading to the loft of a house. When not in use it is folded up above the trapdoor and is released by pulling a cord. Photograph by courtesy of J. B. Gravity Ladder Co. Ltd.

Cutting Ice with Water

A Leningrad engineer, has had the idea of employing water under pressure to cut through ice, and has adapted his invention for use on icebreakers engaged in Arctic seas. His device is intended to be mounted on the prow of the ice-breaker, and from this position it will direct two or three jets of water at a pressure 60 times that of the atmosphere on to the ice.

The water shoots out of the jets at a speed of about 300 ft. per sec. Experiments are said to have shown that it will be effective in breaking up the ice, and the construction of the necessary apparatus was begun in time to allow the device to be thoroughly tested during the winter season in the seas on the north coast of Russia, which are frozen over for months together.

Rival Inventors' Dead Heat

Another remarkable coincidence in the world of invention has recently come to light. The classic example is the invention of the telephone, applications for which were filed on the same day by two inventors, Graham Bell and Elisha Gray. On the morning of 14th February, 1876, Bell's specification was submitted to the United States Patent Office, and only a few hours later Elisha Gray applied for the protection of his design for a similar contrivance. Neither inventor knew that he had a rival in the field, and it is remarkable that the two applications were entered not only on the same day, but at the same office.

The second example of coincidence in invention occurred three years later, when an application for a protection for a device for accumulating electric power reached the London Patent Office on the same day from two different sources. One of these applications was that of Planté, the Frenchman, who is generally regarded as the inventor of the accumulator, and the other came from a Mr. Parker, a British engineer. The two inventors had made the same discovery, practically at the same time, and their specifications were almost identical. The problem of dealing with the applications was solved by granting a double patent, the only one in the history of the British Patent Office.

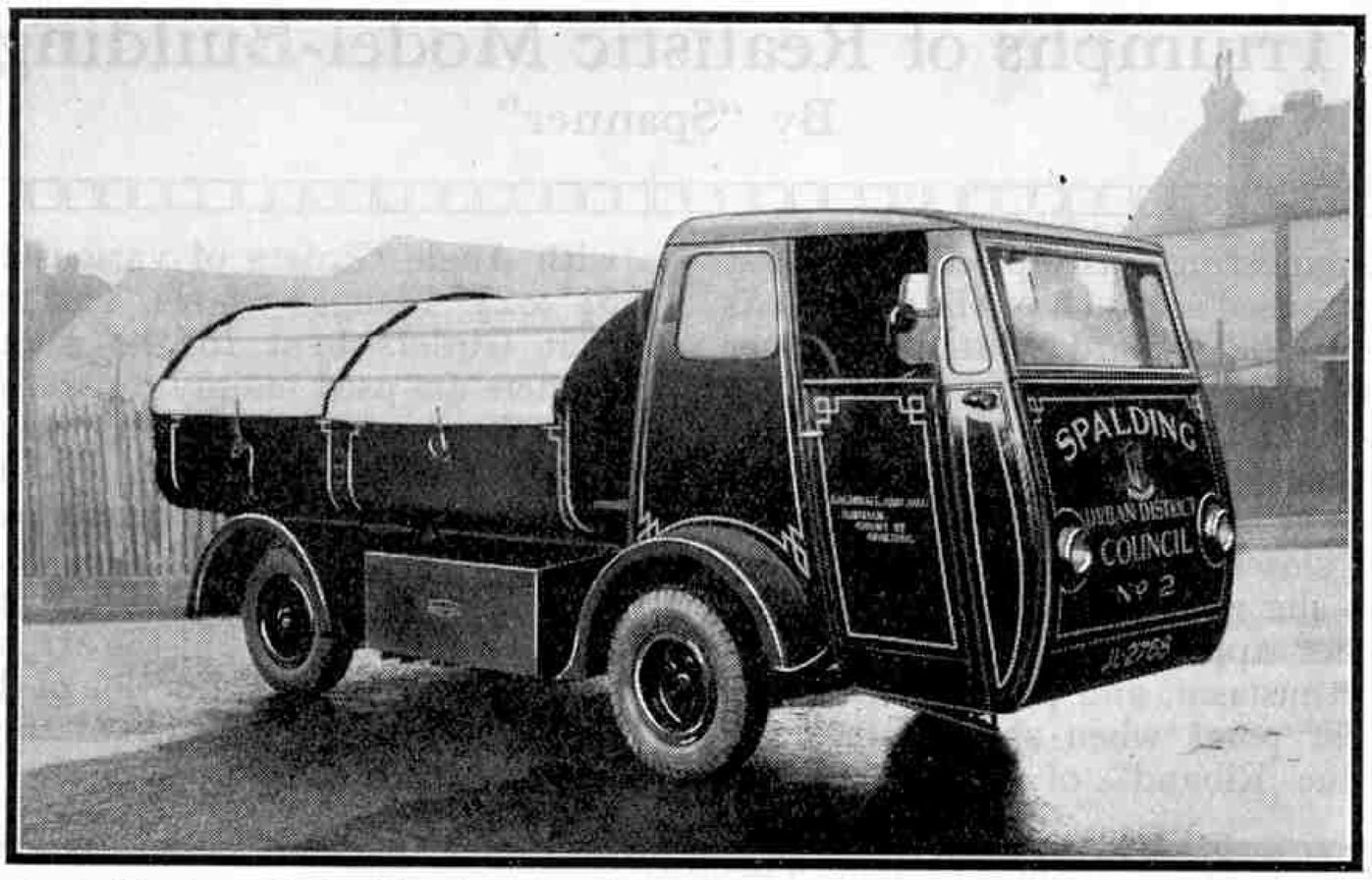
An Early Sparking Plug

Mr. Parker also produced an effective gas engine that has been claimed to be the first invented, and he used this for driving dynamos to supply electric light, chiefly for country mansions and large private houses. In this gas engine the mixture in the cylinder was fired by means of a pipe made red hot by a flame. This was not very satisfactory. The gas engines often misfired, and the lights from the dynamos driven by them were liable to flicker. Mr. Thomas Parker, the inventor's son, set out to prevent this, and after a few years of experiment invented a sparking plug, by means of which the mixture in the cylinder was ignited electrically with greater certainty. This seems to have been an example of an invention that came before its time, for there were then few applications in prospect for the sparking plug, as the gas engine was in its infancy, and was not widely used, and there were no indications of the importance that the petrol engine would attain.

The Parkers seem to have been remarkable engineers and inventors. As early as 1885 they constructed a carriage driven by electricity from the accumulators invented by the elder of the two. This was capable of carrying two people at 7 m.p.h., and had an adventurous career itself, for the ship bringing it home from a demonstration in Paris sank, after which the vehicle was salvaged and made to go again. It is claimed also that Mr. Thomas Parker made the first mechanically-propelled omnibus to be used in London, apart from the early steam carriages of Trevithick, Gurney and other pioneers of the early days of last century, and that he was the first to use four-wheeled brakes on any vehicle. Mr. Parker's brakes were fitted to an electric car as early as 1896 and were operated hydraulically.

Helping American Inventors

The story of the poor inventor who has been unable to persuade anyone to see any merit in his device, or has been prevented from making a fortune, or receiving due recognition, by lack of knowledge or capital, is as well known in the United States as it is in Great Britain. In this country the Institute of Patentees has been formed to encourage inventors and to give them every possible assistance, and my readers are familiar with its excellent work from the accounts I have given of the exhibitions it organises every year in London and Newcastle. Now what seems to be a similar body has been formed to help the American inventor. It is known as the American Bureau of Invention. It is to give technical advice to inventors, and to assist them in developing their ideas. In addition it aims at bringing them into contact with inventors or manufacturers prepared to take up their inventions and carry them to the industrial stage. This Bureau should be of the greatest value, not only to inventors, but to industry in general, for it will provide a clearing house for ideas.



An electric refuse collector, driven by means of a storage battery. An "electric horse" driven in the same manner is described on this page. Photograph by courtesy of A. E. Morrison and Sons Ltd.

Pump to Replace Unsightly Oil Derricks

American inventors are as ingenious as those of other countries, and I have been interested in one or two of their products that are certainly novel and original. For instance, an electrically operated pumping unit for oil wells has been introduced. This is intended to replace the unsightly derrick pumps that are to be seen in oil fields, some of which have been described as forests of derricks. The pump is placed over the mouth of an oil well and is driven by an electric motor. It is said to be as efficient as the more familiar type, and to be quieter in operation.

Another interesting invention of a practical kind is a nail with a lead head for fixing galvanised rods. It is claimed that this nail does not draw out or work loose. In order to help to keep it fast, anchor rings are placed round it. These take a grip of the material through which the nail is driven, and prevent it from being easily pulled out backwards.

Two inventions of a more spectacular character are intended to produce opposite effects. One is a skate for use on land, and the other a motor-cycle to be driven on ice. The skate is a novel production, for it is made like the ordinary ice skate, but on its blade carries a row of tiny roller bearings. It is said to be much superior to a roller skate of the ordinary type, and to make possible motion on land that very closely resembles the gliding action of a skate on ice.

The motor-cycle that runs easily on ice has a wide steel chain belt stretched over its wheels. This motor-cycle is intended for military use and is really a miniature tractor with a sidecar, the wheel of which is replaced by a wide ski. The novel vehicle is steered by twisting the front wheel of the motor-cycle, which simply warps the special steel tread, and it is said that no difficulty is experienced in skimming at high speed over snow or ice.

The clock in this equipment switches on current to boil water, makes tea and rings an alarm. Photograph by courtesy of Teesmade Ltd.

Tea by the Clock

Humorists in the past have often made great play with clever inventions designed to light a fire, make breakfast ready, and carry out many other early morning duties on pulling a string or pressing a button on awakening. In some of these inventions the ringing of an alarm clock or some other automatic device has been supposed to set the train of operation in motion. Now this dream has come true, in part at least, for an ingenious inventor has devised equipment that boils water and makes tea, switches on a reading lamp, and finally rings an alarm bell. The kettle is automatically switched off, and after the tea is made there is enough hot water left for shaving purposes. The reading lamp has a separate switch, so that it can be used at any time, independently of the tea-making apparatus.

The equipment used is shown in the lower illustration on this page. It is simple to prepare, the apparatus being placed on a level surface and connected by means of a plug to the mains supply. The clock is an electric one that starts automatically. Current is switched on at the time set on the clock and as soon as the water boils, the tray carrying the teapot and the kettle tilts, the water is poured into the teapot through a special syphon tube that prevents splashing. The apparatus also can be used to make tea, and to give warning when it is ready, at any specified time during the day.

An "Electric Horse"

Most of my readers will be familiar with the mechanical horse, the powerful little three-wheeled tractor now largely used for hauling purposes. The great advantage of the mechanical horse is that it can be out dealing with one load while a second is being prepared for it, so that standing time for the power unit is greatly reduced in comparison with that of ordinary lorries.

The "electric horse" has now made its appearance. This is a three-wheeled vehicle driven by an electric motor obtaining current from a battery. In many ways the design of this vehicle breaks new ground. Current is derived from a 36-volt battery of 185 ampere-hour capacity, and it is claimed that the electric horse has a range of from 30 to 40 miles, with a maximum speed of 80 m.p.h. An interesting feature of the drive is that violent pressure on the foot pedal that controls the speed does not result in snatch or jerking that may injure the transmission, for there is a suitable time lag on each speed, so that changes must be made smoothly and easily.

The principle of the electric horse has been carried further in the production of large four-wheeled electric vehicles that can be adapted to various purposes. One of these vehicles is shown in the upper illustration on this page. The drive of an electric vehicle of this kind is smooth and silent, and readily controlled. Pressing down the control pedal engages the various speeds automatically in turn, and on releasing the pedal altogether the speed controller is brought straight back to neutral. The delayed action referred to in the case of the electric horse prevents damage through hurried action on the part of the driver, and yet gives rapid acceleration. It is easy to change the battery in order to allow re-charging to be carried out.

A streamline design for bodies to fit on the chassis of these electric vehicles also has been introduced. It has been estimated that the average electric van consumes at least a quarter of its battery current in overcoming air resistance, but by the new design most of this loss is avoided.

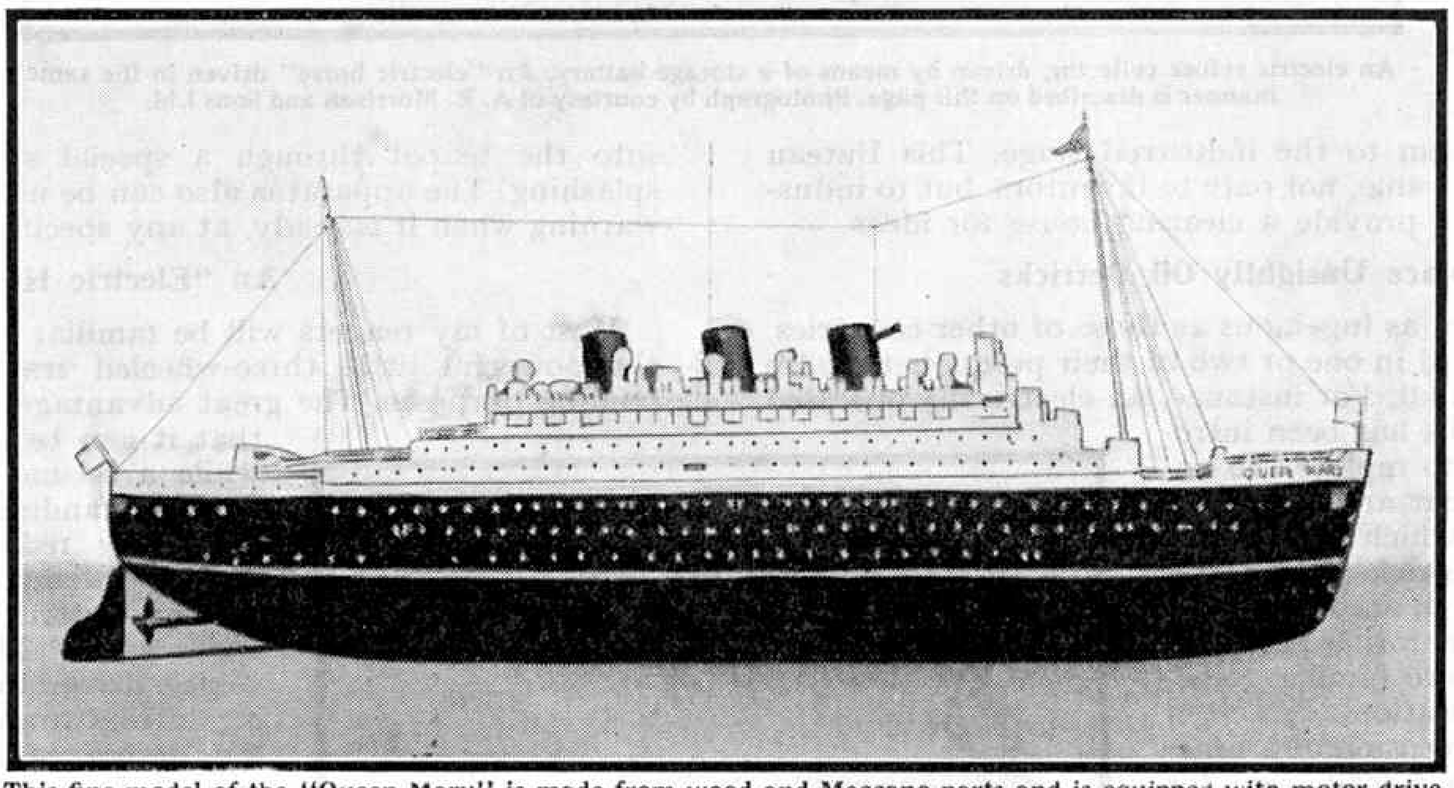
"Queen Mary" in Meccano

Triumphs of Realistic Model-Building

By "Spanner"

AMONG the many engineering masterpieces of the last 25 years, few have aroused so much public interest as Britain's wonder vessel, the Cunard White Star liner *"Queen Mary."* From the time that the keel of this great ship was laid on the stocks at John Brown and Company's Clydebank shipyard to the great day when H.M. Queen Mary named and launched her, the progress of her construction was watched closely throughout this country and the Empire. When she was completed, her passage down the Clyde and her appearance at Southampton aroused the greatest enthusiasm, and pride in the great liner reached its highest point when she regained for Great Britain the "Blue Riband" of the Atlantic.

The *"Queen Mary"* is not merely huge and speedy, for her lines are graceful and she is a magnificent ship from the point of view of appearance, and it is not surprising therefore to find that she is exceptionally popular as a subject for Meccano model-builders. A very large number of splendid reproductions of the ship have been built. These have ranged from small and simple representations that have been remarkably effective to large scale models introducing a wealth of detail. Among them have been models that showed excellent knowledge of the best way to use Meccano parts in reproducing ships, and in this article we describe and illustrate models of special interest from this point of view in order to help Meccano enthusiasts who are planning similar constructional work.



This fine model of the "Queen Mary" is made from wood and Meccano parts and is equipped with motor drive. It was built by Mr. C. W. Page, West Harrow, Middlesex.

The model shown in the upper illustration on the opposite page is a particularly handsome one that has been built by Mr. L. Broadbridge, Twickenham. It is 6 ft. 9 in. in length and about 7 in. in beam, and is made entirely of Meccano. The leisure time of more than seven months was devoted to its construction, and the complete model gives an excellent idea of the size and grace of the original. The builder has been successful in preserving the general outline and contours of the *"Queen Mary,"* and the only criticism that can be made in this respect is that the curve of the bridge, which is a striking feature of the vessel, is not sufficiently pronounced in the model.

The foundation of the hull consists of $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates bolted crosswise. These provide a solid base on which the vessel is built up, and their use gives a very strong and rigid structure. The sides of the hull consist entirely of Strips, the interior bracing being carried out with Angle Girders of various lengths attached to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates. The rounded stern consists of Flat Girders bent to the required shape, and Angle Girders are used mainly for the sides of the upper decks. In order to obtain a close approximation to the appearance of the real *"Queen Mary,"* the three funnels, which are Boilers without Ends, are mounted so that the forward funnel is slightly higher than the second and the second slightly higher than the after funnel. The difference in height is very small, but the arrangement has the effect of emphasising the reproduction of the streamline appearance that is a pleasing feature of the original of the model.

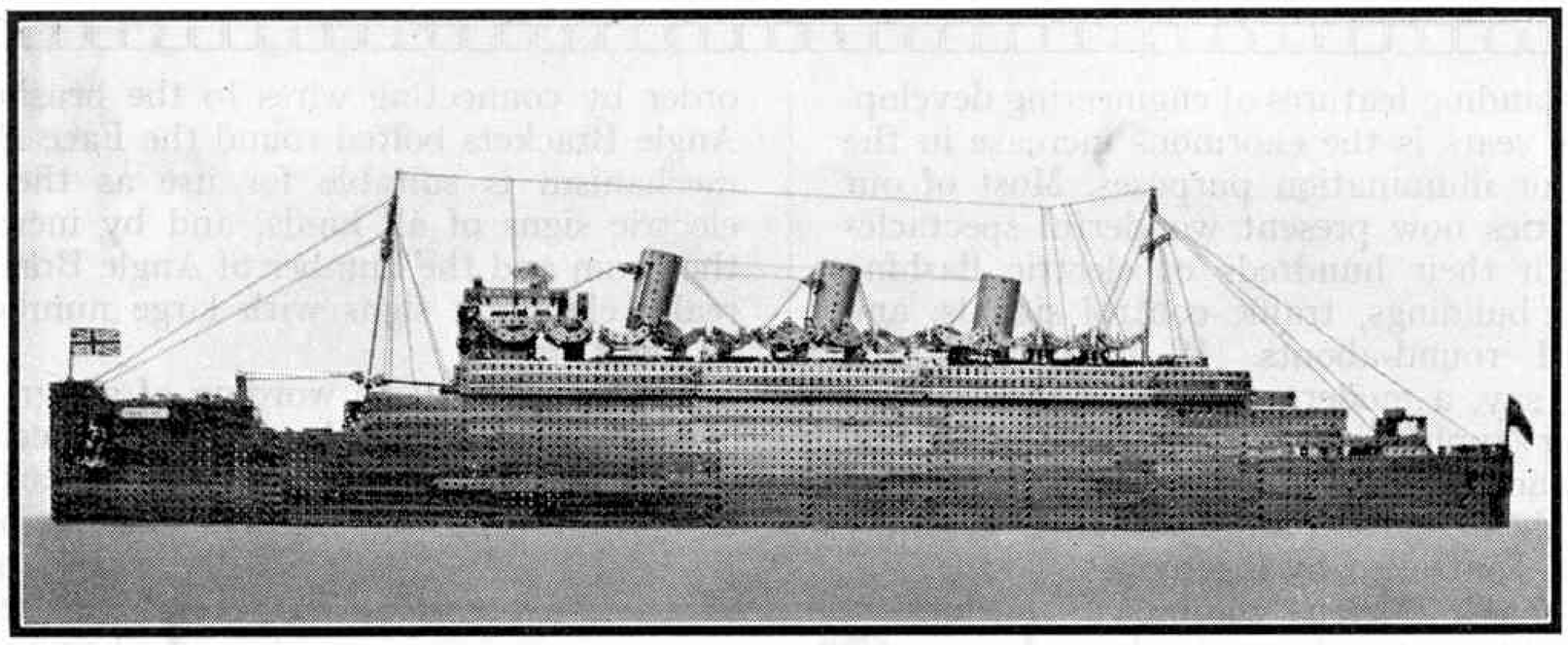
Sirens are represented in the model by Buffers, Part No. 120. These are attached to a siren platform consisting of Double Angle Strips bolted to the first and second funnels, and steam pipes are represented by Rods.

The careful attention given to detail is shown by the fact that in the bridge navigation house is a compass, consisting of a Socket Coupling, together with engine room telegraphs, in the making of which Corner Brackets play an important part. Another feature of the bridge is a searchlight, the lantern of which consists of a Chimney Adaptor, and this part is used also to make the crow's nest on the foremast.

The large number of lifeboats on the *"Queen Mary"* play an important part in determining her outward appearance, and they must be reproduced as accurately as possible if a model is to look realistic. There are several methods of representing lifeboats, all equally easy, but I think the best Meccano parts to use for the purpose are $2\frac{1}{2}''$ Strips. This method of construction is used for the lifeboats of the model shown in the lower illustration on the opposite page and these look much more realistic than the boats in Mr. Broadbridge's model, which are made with Curved Strips. The Curved Strips are quite suitable for representing small lifeboats of the kind used in trawlers or coasting steamers, but the curvature is too pronounced for models of 40 ft. boats such as those of the *"Queen Mary."*

The model shown in the lower illustration on the opposite page was built in the model-building department of Meccano Ltd., and no doubt many of my readers will have seen examples of it in the windows of Meccano and Hornby Train dealers. One of its finest features is its neat and clean lines, and a close examination will reveal a wealth of interesting detail. In some respects

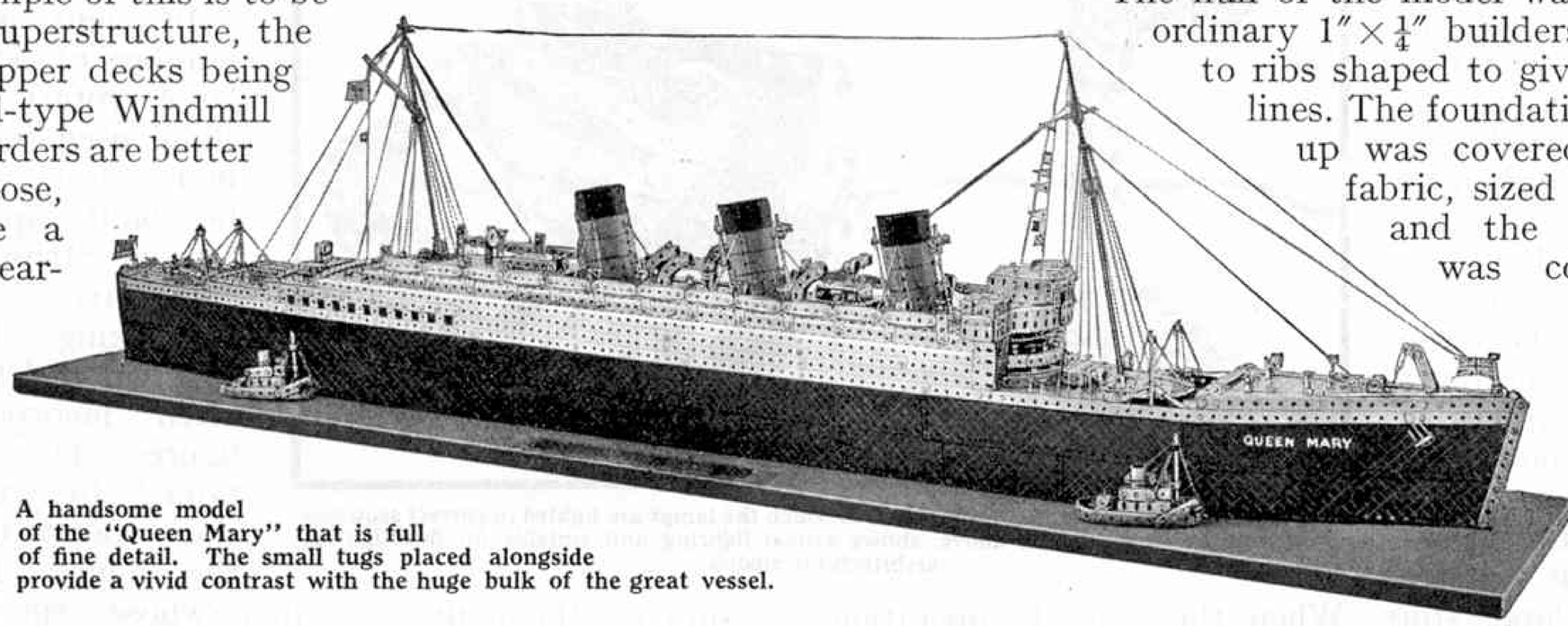
the model resembles that built by Mr. Broadbridge, notably in the use of Curved Strips to represent ventilators and in details of the bridge construction. It will be noticed that Flexible Plates are used for the hull, and it is interesting to compare this method of construction with that adopted in Mr. Broadbridge's model. Electric lamps are fitted inside the hull and they add considerably to the beauty of its appearance. When the model is viewed in a darkened room, the holes in the Flexible Plates look just like portholes and the effect is most fascinating. Another point that is worth mentioning here is the small tugs placed alongside the liner. This simple detail strikes a sharp contrast with the huge bulk of the liner and adds wonderfully to the impression conveyed by the model.



The "Queen Mary" reproduced entirely in Meccano. The model was built by Mr. L. Broadbridge, Twickenham, and forms an interesting comparison with the model shown in the lower illustration on this page.

Among the many items of interest on the decks of the model are sturdy little bollards consisting of Buffers, and ventilators, represented by Couplings and ½″ loose Pulleys in the bows.

Another good model of the *"Queen Mary"* that I saw recently was built by C. Turner, an enthusiastic member of the Exeter Meccano Club, and with it he won a prize in a recent *"M.M."* contest. His model possesses many constructional features quite different from those in any of the models I have described earlier. A notable example of this is to be found in the superstructure, the sides of the upper decks being made with old-type Windmill Sails. Angle Girders are better for this purpose, as they give a more solid appearance to the ship, but the method of construction followed in this model has many points in its favour, particularly as the square holes in the Windmill Sails give the appearance of windows, and is evidence of thought and originality on the part of the builder. The model is built on a much smaller scale than those illustrated on this page and this allowed the use of Raked Funnels instead of Boilers for the smoke stacks, and Strips bent to the required shape to form the front of the bridge.



A handsome model of the "Queen Mary" that is full of fine detail. The small tugs placed alongside provide a vivid contrast with the huge bulk of the great vessel.

Even in far off China model-builders have been at work reproducing the famous vessel in Meccano, and I must refer to one of these, built by Joseph Nie of Shanghai, that has features of special interest. With the exception of two Boilers used for the funnels, and one or two extra parts, the model was made with the contents of a No. 6 Red-Green Outfit. It is 4 ft. 3 in. long, and 5½ in. in beam, and is exceptionally neat. Naturally a large number of parts are necessary to build a model that does full justice to the magnificent proportions of a *"Queen Mary,"* and for this reason many of the deck details had to be excluded. The hull is built mainly with Strips, and the upper portion of the hull and the superstructure are covered with white paper, the holes corresponding to those in the Meccano parts being punched through the paper covering in order to maintain the appearance of the unpapered portions of the model. The white decks and the dark hull create a fine effect, and I think this model has the most realistic general appearance of those I have been able to deal with here, although in some respects its constructional details might be considerably improved.

The models so far dealt with have been built entirely of Meccano. One model brought to my notice that is only partly of Meccano has so many points of interest that I decided to include it along with the others. This model was built by Mr. C. W. Page of West Harrow, Middlesex, and is illustrated on the opposite page. The hull and decks are built of wood, and Meccano parts are used in the construction of portions of the interior and driving mechanism.

The hull of the model was made from ordinary 1″ × ¼″ builders' laths fixed to ribs shaped to give the correct lines. The foundation thus built up was covered with linen fabric, sized and painted, and the wooden keel was covered with thin sheet lead. The lead had the double advantage of giving weight to the hull and covering up the seams in the linen. The decks and superstructure are all built of three-ply wood, and the funnels are mounted on a separate piece of wood that can be removed to give access to the interior of the ship.

The "engine" is an old but powerful gramophone motor, which is mounted in position with the aid of Meccano Screwed Rods, Brackets and other parts. The spindle that formerly carried the turntable of the gramophone was filed down to take a Meccano 57-teeth Gear Wheel, and this Wheel was arranged to mesh with a ½″ Pinion fixed to the propeller shaft. The completed arrangement works very smoothly and silently and when the ship is running in water only a very low hum can be heard. The rudder post consists of an 8″ Screwed Rod.

In Search of New Models

Flashing Signs and Floodlighting Units

ONE of the outstanding features of engineering development in recent years is the enormous increase in the use of electricity for illumination purposes. Most of our large towns and cities now present wonderful spectacles at night time, with their hundreds of electric flashing signs, flood-lighted buildings, traffic control signals, and elaborately lighted round-abouts. If one leaves the streets and enters, say, a modern cinema or theatre, one finds many further applications of electric illumination in the brilliantly and artistically lighted auditorium and the stage colour lighting system and spotlights. In many cases the lighting is controlled by ingenious mechanisms that enable various combinations of light of different colours to be produced at will.

These various forms of electric lighting equipment cover a very extensive range, and up to now few model-builders have given much attention to the subject. With the electrical parts included in the Meccano system, however, it is possible to assemble electrical apparatus of many kinds, and model-builders in search of new ideas certainly should not overlook the possibilities that electric illumination equipment offers.

There should be no difficulty in finding a subject within the scope of any Outfit, however small. For example, a start might be made with one of the smaller types of electric flashing signs seen outside nearly every large store. When these are in operation they are extremely fascinating, and the mechanism by which they are controlled is quite simple. Generally it consists of a rotating metal drum, upon which springy metal brushes press. The drum is connected to one pole of the source of electrical supply, and the brushes, which are insulated from each other, are connected to the various lamps it is desired to light. Gaps are cut in the surface of the drum to break the circuit of each lamp in the required sequence. This arrangement may appear complicated, but really it is quite simple to reproduce in Meccano, and Fig. 3 illustrates one method by which all the essentials of a working flashing sign can be made.

It will be seen that the bulbs mounted behind the letters of the sign can be made to light in any desired order by connecting wires to the brushes that touch the Angle Brackets bolted round the Face Plates. This simple mechanism is suitable for use as the basis of workable electric signs of all kinds, and by increasing the size of the drum and the number of Angle Brackets and brushes, really elaborate signs with large numbers of letters can be built up.

The letters for the wording of a sign could be cut out of a sheet of cardboard, and coloured celluloid substituted for the pieces cut away. The cardboard should be fixed in a frame of Angle Girders and Strips. Lamp Holders are mounted behind each letter, each Holder being separated from its neighbour by a piece of cardboard.

The positions of the Angle Brackets on the Face Plates must be determined before the switches are constructed, and depend entirely on the sequence in which the letters are to be illuminated. The rotary switches may be driven by an Electric Motor, fitted with suitable reduction gear.

In signs where a great number of letters are used larger rotary switches than those used in Fig. 3 would be necessary, and they could be built up either from Curved Strips or from Circular Strips.

Working signs are not confined to letters only, but often incorporate moving figures. This effect is obtained by cutting narrow slots round the outline of the figure. For example, suppose the figure is a man whose arm is required to wave. The required effect can be obtained by marking the position of the arm when raised and cutting it out in outline. Raised cardboard edges can then be fitted round the slot by means of Angle Brackets, and one or two bulbs fixed in position behind the arm. On lighting the lamps behind each arm alternately, the arm appears to move up and down.

The ingenious model-builder will find ample interest in this branch of electric illumination alone to keep him occupied for many winter evenings, and novel and even ghostly effects can easily be obtained.

The electric "news" signs that are becoming popular as a medium for advertising newspapers are very interesting in their construction. The average model-builder

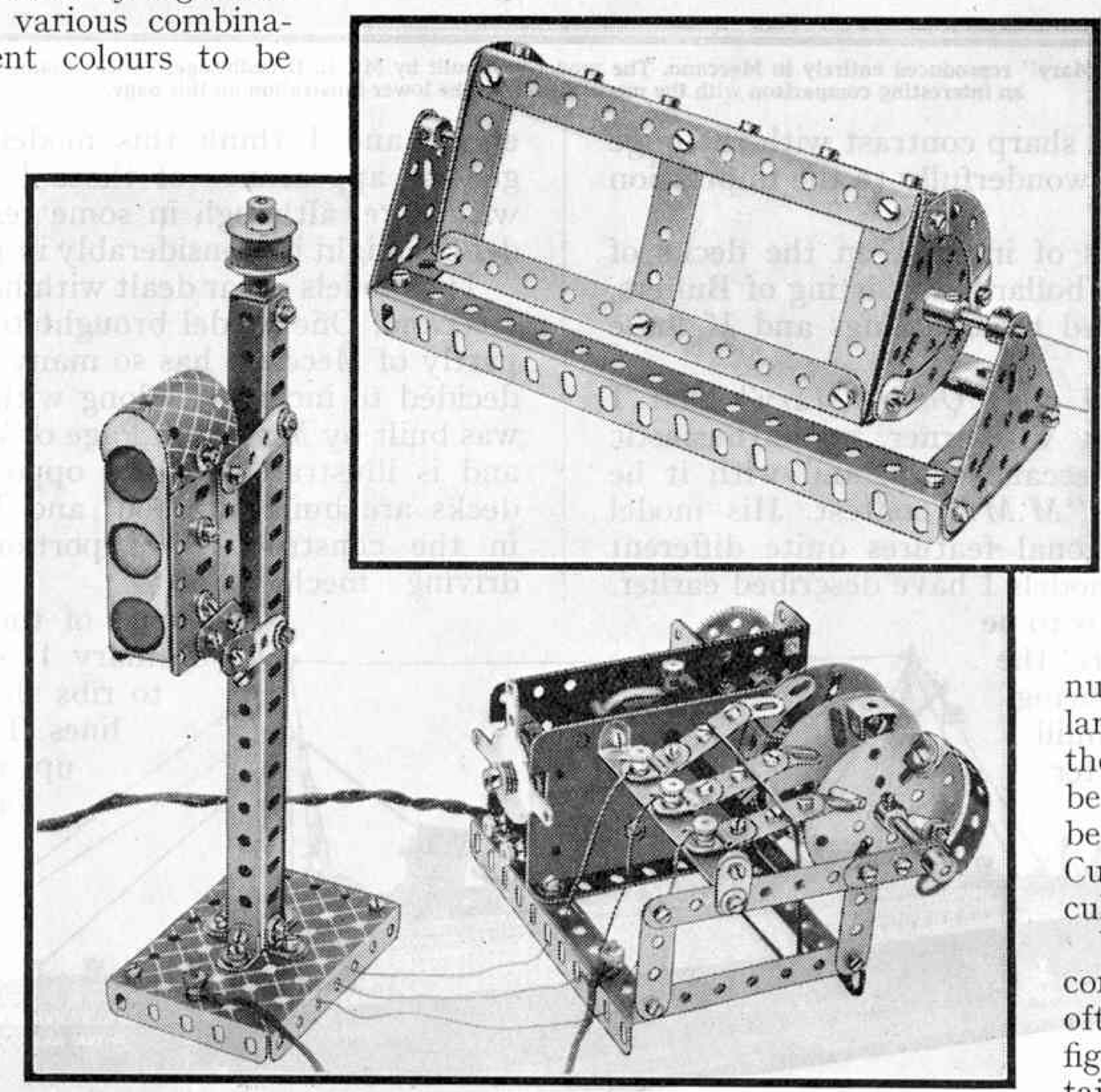


Fig. 1. A Meccano automatic traffic signal in which the lamps are lighted in correct sequence by a rotary switch. Fig. 2, above, shows a neat lighting unit suitable for floodlighting architectural models.

probably would find them too complicated to reproduce in model form, but they offer a challenge to those who like to tackle problems of a more difficult nature.

Automatic traffic signals form another interesting branch of the application of electric illumination. These signals can be made in Meccano, and a good example is shown in Fig. 1. Signals of this kind may be operated either by a 20-volt or a 6-volt Motor. In the example shown in Fig. 1 the bulb Holders are fastened to Chimney Adaptors by means of 6 B.A. bolts, and inserted into Sleeve Pieces held between Flat Girders by Bolts spaced by Washers. A piece of cardboard or metal, with circles cut out in it to register with the Sleeve Piece, and fitted with red, orange, and green celluloid, is fixed in front, and is the only portion of the model that cannot be constructed from Meccano parts.

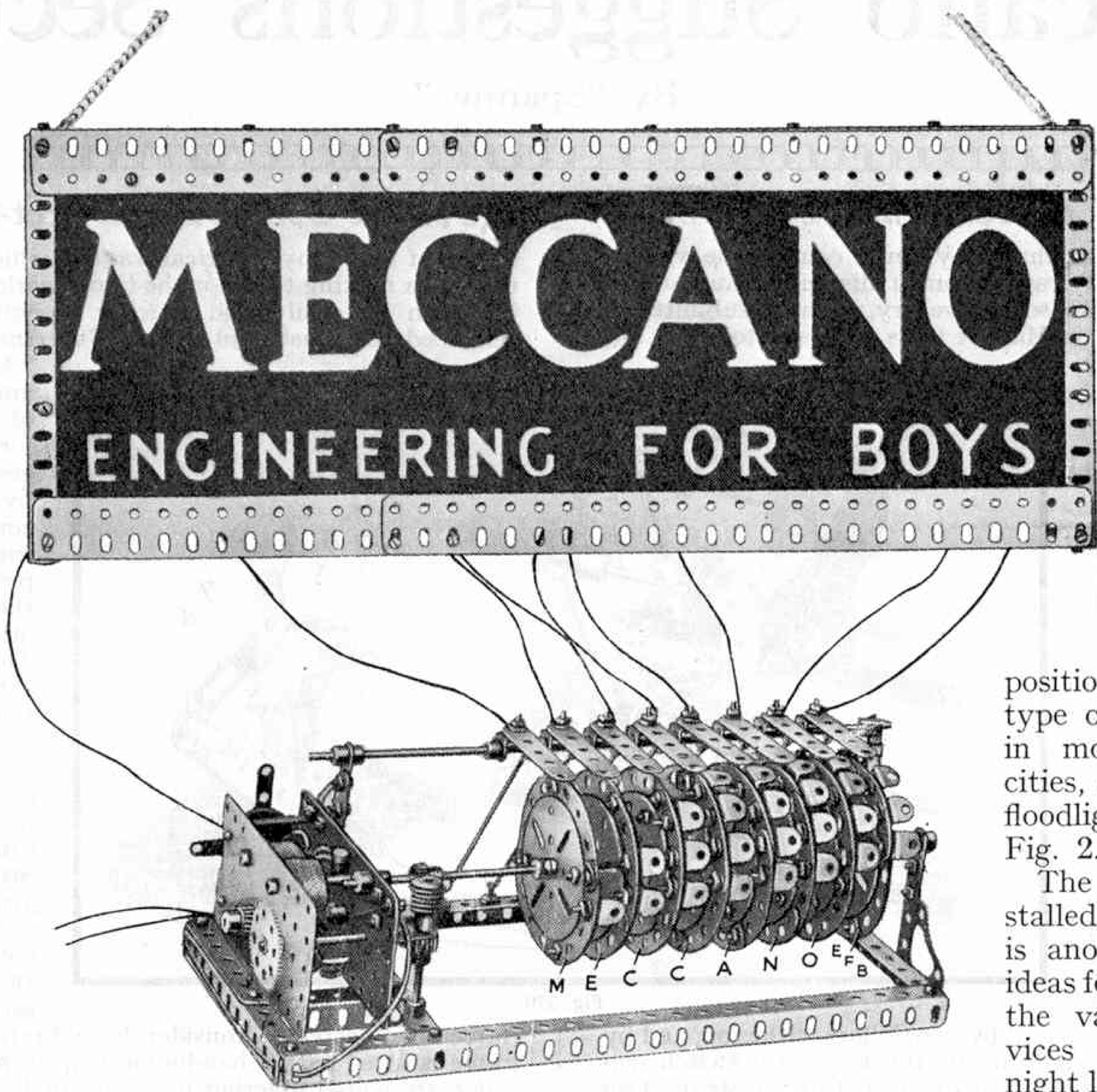


Fig. 3. An example of a working model flashing sign that works in a similar manner to an actual sign.

When wiring up the bulbs, care should be taken to see that the wires to the brushes are rightly connected. From Fig. 1 it will be seen that the brushes are mounted on a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and are insulated from the Strip by means of Insulating Bushes. A Driving Band, stretched round the brushes and two $\frac{3}{4}''$ Bolts, keeps them in proper contact with the rotary switch, and a length of Elektron Ebonite Rod restricts the downward movement.

The construction of a model of this type will provide plenty of interest, but even greater satisfaction would be obtained by constructing a signal that could be operated from the road by the passing of Dinky Toys cars over suitably placed contacts. I have not yet seen a model of this kind, and should be greatly interested to hear of any readers who have made experiments in this direction.

Miniature flexible lamp standards, such as are used for marking dangerous corners in busy streets, form an attractive subject for the model-builder, and are easily represented in Meccano. For small models springy Cord fitted with Pea Lamps can be used to represent the flexible post, but for larger models, Flexible Couplings are more effective for this purpose.

The large entries received in the "Architectural" Competitions announced from time to time in the "*M.M.*" show that there is considerable interest in the making of model buildings, monuments and similar subjects. Models of this kind can be made more attractive by fitting floodlighting units in appropriate positions. Examples of this type of lighting can be seen in most large towns and cities, and a typical Meccano floodlighting unit is shown in Fig. 2.

The lighting equipment installed at a modern airport is another prolific source of ideas for models. For instance, the various illuminated devices installed to facilitate night landings form admirable prototypes for simple but effective working models. A wind direction indicator usually is seen in one corner of an aerodrome. This consists of a T-shaped structure, which is painted with diagonal stripes of contrasting colours, such as black and yellow, in order to make it conspicuous from the air in the day time, and is arranged to swivel on frictionless bearings. At night the "T" is illuminated. A vane at the tail of the "T" is provided to keep it pointing into the wind. A model of such an indicator, which requires only a few parts for its construction, is shown in Fig. 4. Swivelling is effected by allowing a Coupling to move freely in a Socket Coupling.

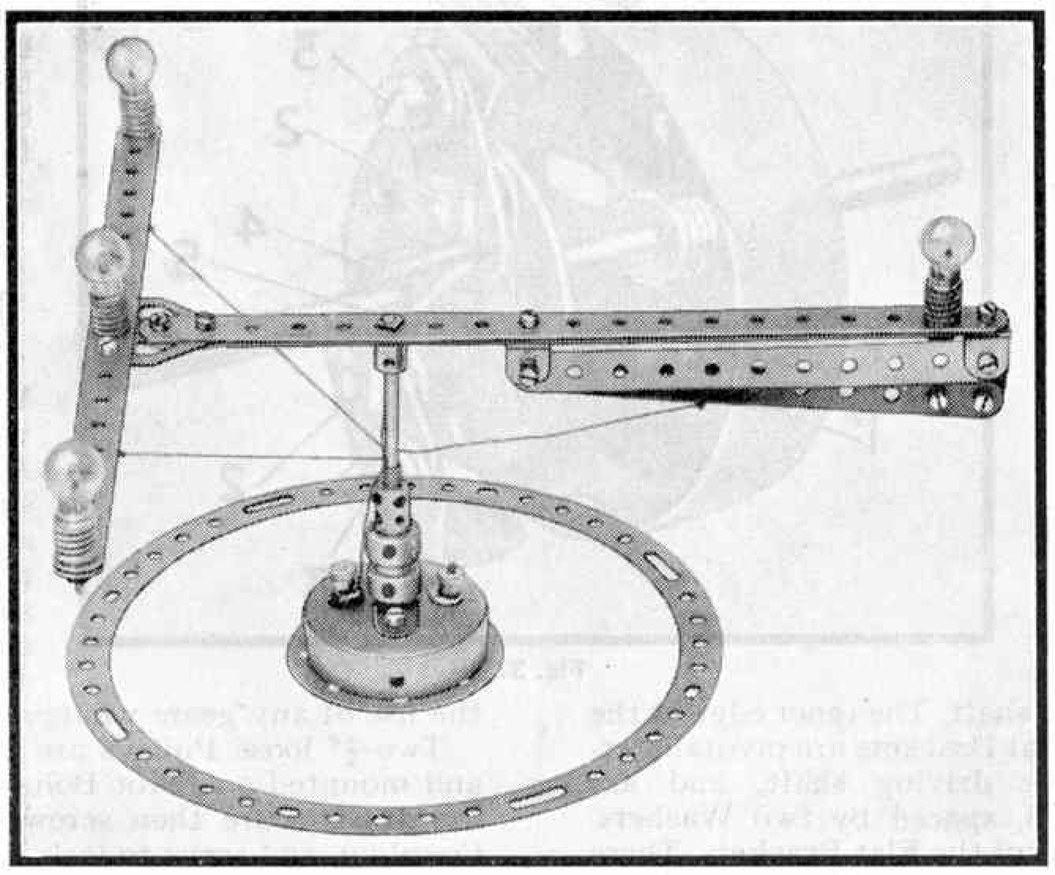


Fig. 4. A simple model of a wind direction indicator, of the type used at aerodromes for giving information to pilots while in the air.

Floodlights in large yellow-painted boxes, situated at various points round the aerodrome also offer an interesting subject for the model-builder. The full-size floodlights consist of nine to twelve high-power lamps arranged in banks of three in front of highly polished curved reflectors, and during the day are protected from damage by a mechanically operated shutter.

Identification beacons are other items of airport equipment that provide interesting subjects for models.

Meccano Suggestions Section

By "Spanner"

(370) Remote Control (R. Jameson, Coventry)

Many model-builders wish that they could control the various movements of their model cranes from a distance, thus adding realism to the model. R. Jameson, Coventry, recently submitted a suggestion in which Elektron Magnet Coils are used to move the various levers. Current is passed through the appropriate coil by means of a distant switch and the corresponding lever is then moved as if it were pulled by hand.

Magnet Coils have the advantage that they can be placed in almost any suitable position in a model. Two levers are shown in Fig. 370, illustrating this suggestion. The Magnet Coils are suitably mounted behind the levers, and in this instance they are clamped between two 3½″ × ½″ Double Angle Strips 1 by means of 1″ Screwed Rods. The 2″ Rods 2 rest in the Magnet Coils and are fitted with Small Fork Pieces 3, and attached to the levers by means of Collars.

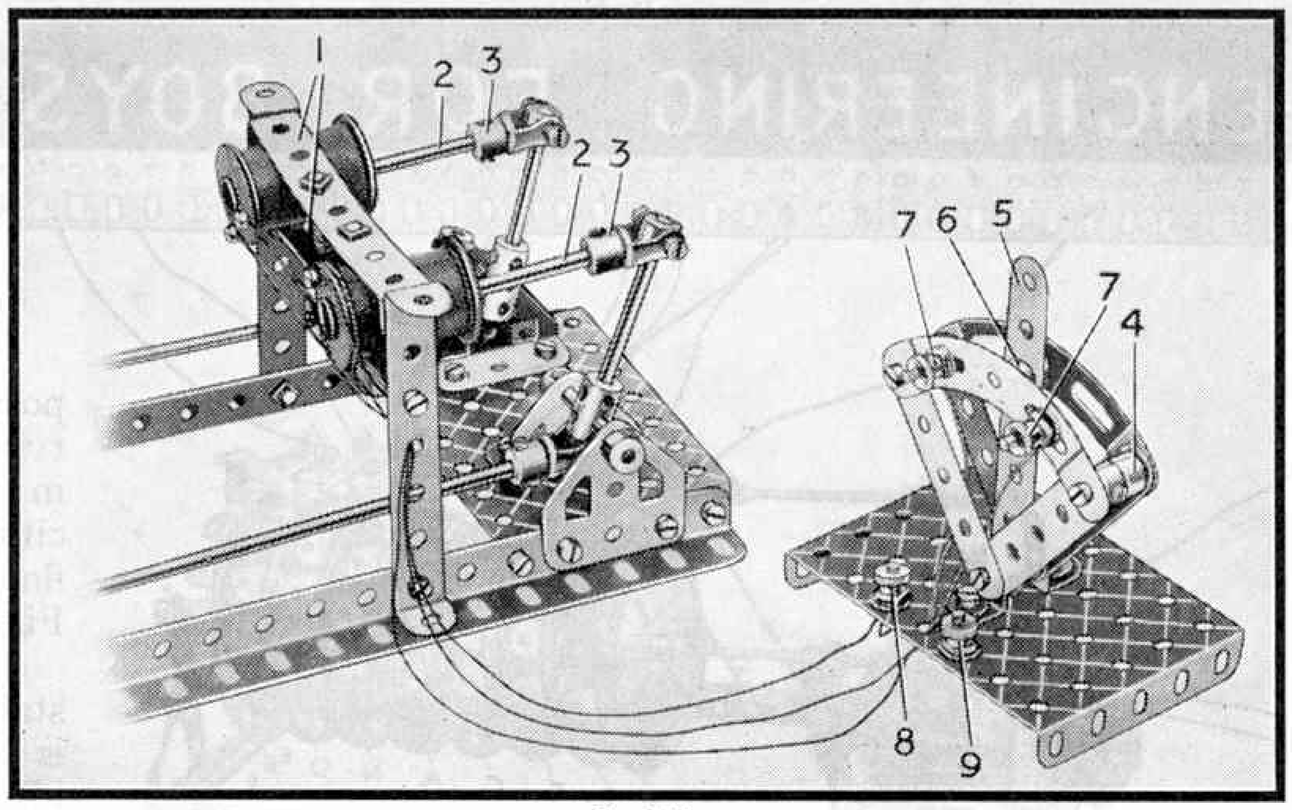


Fig. 370

The switch consists of 2½″ Strips and 4″ Curved Strips, spaced by two Collars at the top, and by Washers and locknuts at the bottom. By this means the switch arm 5, fitted with Washers 6, is held clear of the 4″ Curved Strips. Two insulated terminals 7 are mounted on one of the Curved Strips, and there are two further terminals 8 and 9 on the base. Of these terminals only 8 is insulated.

The wiring is simple. The inner terminals of the Magnet Coils, that is those nearer the openings in the centres of the Coils, are joined together and connected to the insulated terminal 8, and the outer terminals are connected separately to the insulated terminals 7. Current is supplied through the terminals 8 and 9. When the switch is moved to one side to make contact with one of the terminals 7, the circuit of one of the Magnet Coils is completed through the base, and the corresponding lever is pulled. The second lever is operated by moving the switch to the opposite side, and springs return each lever when current in the corresponding Magnet Coil is switched off.

(371) Free-Wheel

(R. Tiylstra, Holland)

A novel friction wheel that can be used in models in which the drive is to be transmitted only in one direction has been submitted by R. Tiylstra, Holland. This is shown in Fig. 371.

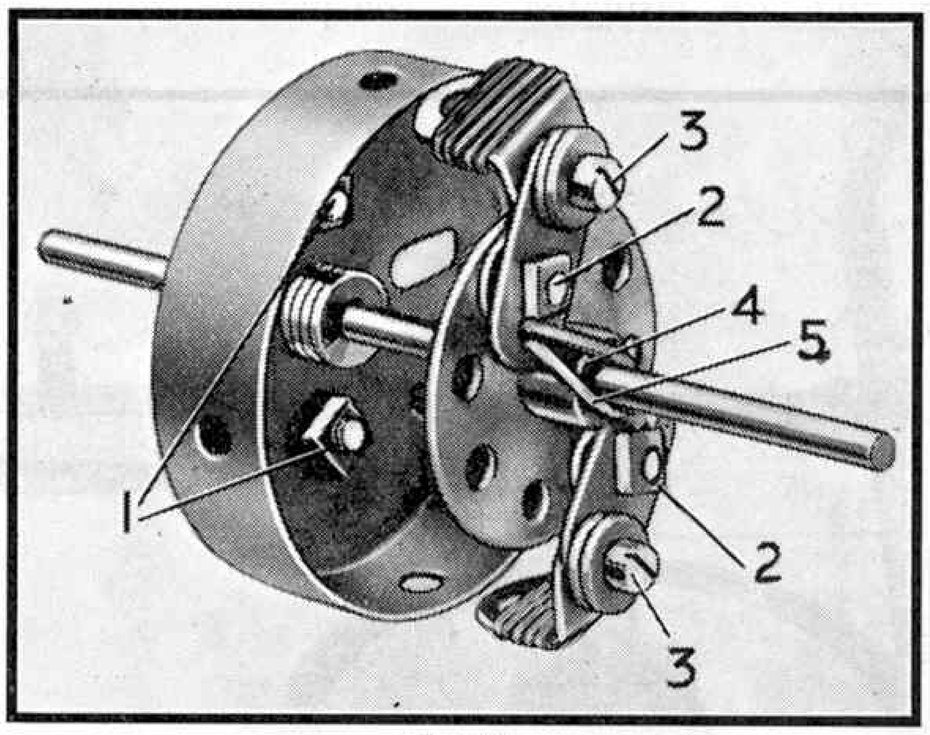


Fig. 371

The mechanism is constructed by fitting a Double Arm Crank to a Boiler End by means of the bolts 1, and mounting this on the Rod forming the driving shaft. The inner edge of the Boiler End forms the friction surface. Flat Brackets are pivotally attached to a Bush Wheel also on the driving shaft, and are lock-nutted by the nut 2. The bolts 3, spaced by two Washers, fasten Angle Brackets on the outer ends of the Flat Brackets. These Angle Brackets serve as brake shoes, and a Collar 4 keeps an elastic band 5 in tension, so that they are held in contact with the Boiler End. Rubber bands are wrapped round the contact surface of the Angle Brackets in order to provide a better grip.

When the shaft rotates in one direction it carries the Boiler End with it. On reversing the direction, the Boiler End remains still.

(372) A Useful Hand Fret-Saw (H. Howes, Stoke)

One of the many practical ways in which Meccano parts may be used is in making tools for the home workshop. Several useful tools that can be easily and quickly assembled have already been described and illustrated in the "*Suggestions Section*" pages of the "*M.M.*," and this month I am including a description of a hand fret-saw, which forms the subject of a suggestion put forward recently by H. Howes, Stoke. Howes constructed this saw some time ago and I think it will prove a useful addition to the workshop equipment of other Meccano enthusiasts. The fret-saw blade is held in a rigid and strong frame, the arms of which consist of several 12½″ Strips bolted together face to face. The ends of the frame are composed of 2½″ large radius Curved Strips and 3½″ Strips, and are joined to the arms with 2½″ Strips.

An important point in the construction of the frame is that all bolts must be tightly secured in place, as the frame is subjected to considerable vibration when in use. The saw frame is fitted with a handle built up from four 5½″ Angle Girders, which are bolted together by means of 1″ × 1″ Angle Brackets so as to form a box girder. This is then attached to the frame with Strips. In order to provide a good gripping surface a length of Cord is wrapped round the handle in a manner similar to that adopted in finishing the handle of a cricket bat.

A simple screw mechanism is incorporated in the handle to control the tension of the blade. The blade is held at each end in Couplings, the lower one of which is attached to the screw tension mechanism, while the upper one is held by 2½″ Strips to the frame. The screw tension mechanism consists of a Screwed Rod fixed at one end in the Coupling that carries the blade. The other end passes through the boss of a 1½″ Pulley, and is fitted with a butterfly nut composed of two Centre Forks held in a Coupling.

(373) A Simple Gearless Differential (A. Shand, Glasgow)

Most differentials built up from Meccano for use in models such as motor vehicles require the use of gears. When A. Shand of Glasgow wished to construct such a mechanism for one of his models and had insufficient gears for the purpose, however, he set to work to devise some other form of differential. He succeeded in producing the following simple device, which can be made up without the use of any gears whatever in the differential proper.

Two ½″ loose Pulleys are fitted with Dinky Toys Rubber Tyres and mounted on Pivot Bolts fitted with Compression Springs. The Pivot Bolts are then screwed into the centre tapped holes of a Coupling, and serve to lock in position a 1½″ Rod that is journalled in the plain hole of the Coupling. Two ½″ fixed Pulleys mounted on the back axles are also fitted with Dinky Toys Rubber Tyres, and are arranged to coincide with the Rubber Rings on the ½″ loose Pulleys.

Collars fitted with 1″ Screwed Rods are fastened to the 1½″ Rod in the Coupling and their remote ends are securely lock-nutted to a 1½″ Contrate Wheel, which also is fastened to the back axle.

(374) Front Wheel Springing

(T. Holmes, Plymouth, and J. Smith, Bristol)

The large number of suggestions for novel mechanisms and refinements for motor car chassis models is striking evidence of the popularity of this type of model. Methods of springing attract many model-builders, and two types of rear wheel springing were described in these pages in the Magazine for December 1936. Several ingenious suggestions for both front and rear wheel springing have since been submitted, and two of these, both for front wheels, are illustrated on this page.

The first of these suggestions was submitted by T. Holmes, Plymouth, and is suitable for use in the Meccano Super Model Motor Chassis or in any large chassis where a robust type of springing is desirable. An underneath view of his device is shown in Fig. 374a. Semi-elliptic springs of the type used in the Meccano Motor Chassis are fitted with Couplings 1, and 2″ Screwed Rods 2 are passed through the tapped holes into other Couplings 3 and 4, where they lock in position the ½″ bolts 4, which are held in Collars by means of Grub Screws and 4½″ Screwed Rods. Two more Couplings are then fitted as before with 4½″ Screwed Rods, and are fastened to the Couplings 4 by means of a ¾″ Bolt, and spaced by a Washer.

The steering mechanism is then fitted. This consists of a Collar 6, fastened to a 1″ Rod and fitted with a 3″ Pulley mounted on a ½″ bolt. The 1″ Rod is pushed through the Coupling 3, and Cranks connected by the track rod 7 are secured in place.

The second suggestion of this kind is an independent springing suspension suitable for a front-wheel drive, and was submitted by J. Smith, Bristol. It is shown in part in Fig. 374. The differential and nearside suspension have been omitted for the sake of clearness.

Two 5½″ Angle Girders bolted across the chassis form the supports for 1″ Triangular Plates 1, and the method of mounting the Hexagonal Couplings 2 can be seen from the illustration. Four 1½″ Strips 3 are pivoted at the outer corners of the Triangular Plate 1 by means of the 1½″ Rod 4, and the 8″ Screwed Rod 5, which acts as a torsion rod. The Couplings 6 and 7 are fastened securely to the Screwed Rod 5 by means of Grub Screws, the Coupling 6 being tightly lock-nutted to the 1½″ Strips.

The Collar 8 is then pivotally mounted between the 1½″ Strips, and the arrangement is duplicated between the lower 1½″ Strips. A Socket Coupling 9, pivotally attached by ½″ bolts lock-nutted between the two Collars, forms a bearing for a 3″ Pulley secured to the end of the Flexible Coupling 10. The usual steering mechanism is then fitted to the Socket Coupling 9 by means of a bolt spaced by Washers.

It should be noted that small Grub Screws should be used for securing the 3″ Pulley to Coupling 10 so that it is able to rotate freely in the Socket Coupling, which should swivel between the Collars.

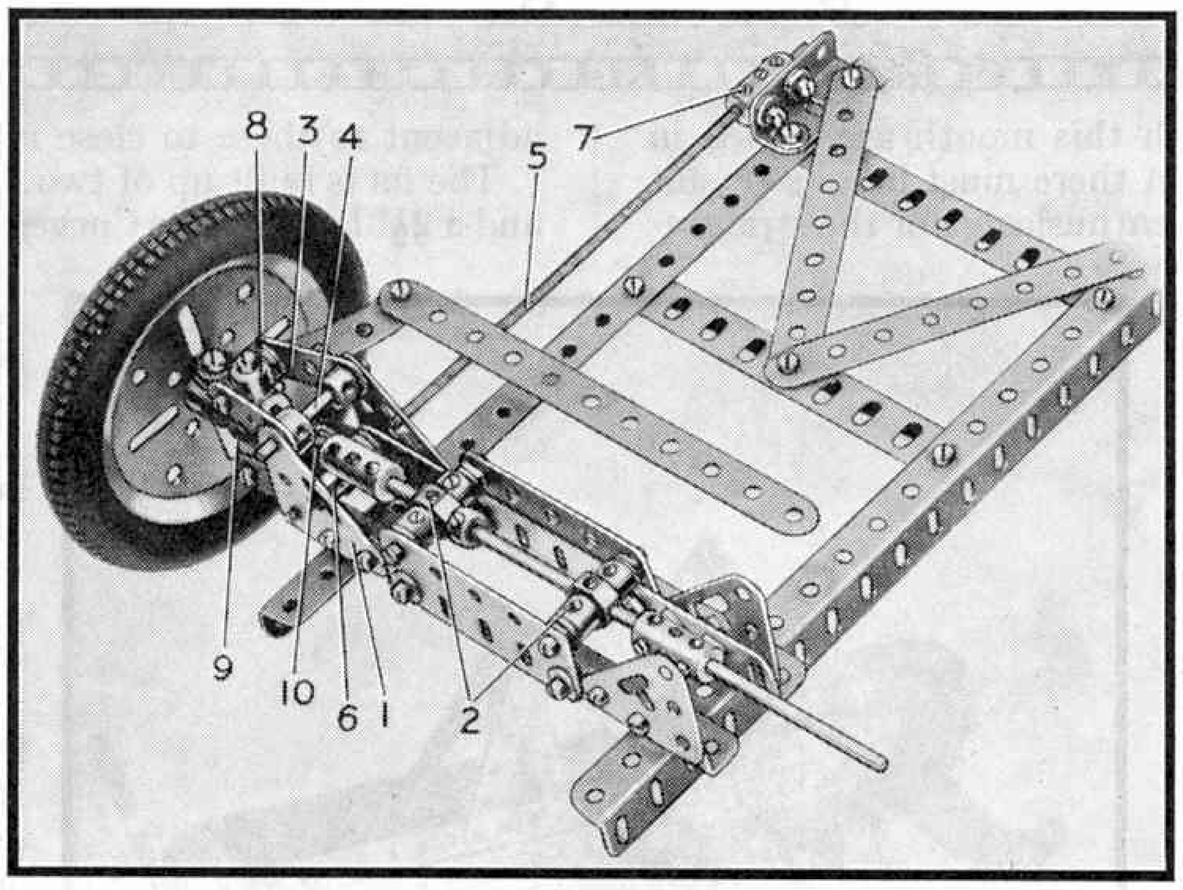


Fig. 374

(375) Double Reciprocating Motion (L. Edwards, Auckland, N.Z.)

From L. Edwards, North Auckland, New Zealand, comes a suggestion for a novel type of double reciprocating motion that can be adjusted to give strokes of different lengths, in a manner unobtainable with Eccentrics. Edwards used the device to drive a pump direct from the connecting rod of a steam engine.

A 3″ Pulley is fastened on a Rod that is journalled in 2½″ Strips bolted to a framework consisting of Angle Girders and two 3½″ × 2½″ Flanged Plates. A 6½″ Rod, fixed at one end in a Handrail Support that is pivotally attached and lock-nutted to the 3″ Pulley, forms the connecting rod. This is then connected to the conventional cross-head and slide bars.

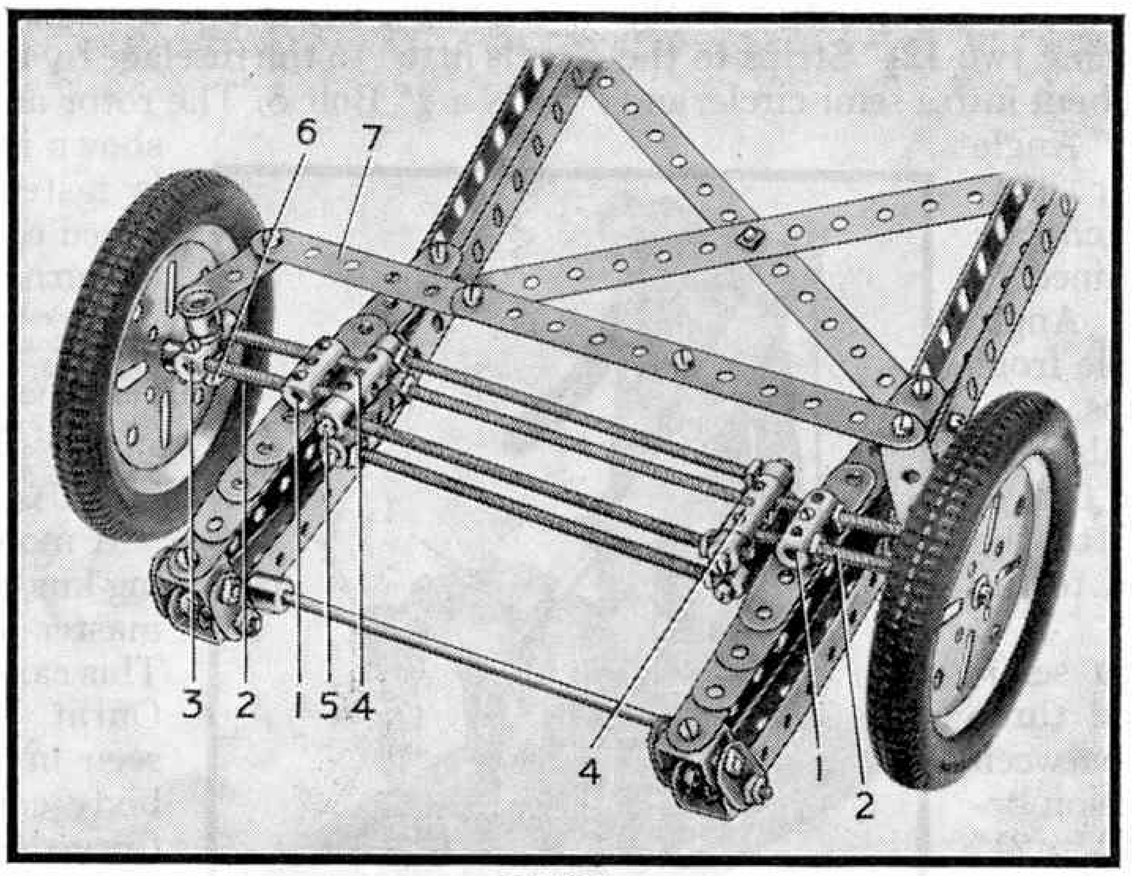


Fig. 374a

A small cylinder constructed from two ¾″ Flanged Wheels and a Sleeve Piece is mounted on a 5½″ × 2½″ Flanged Plate erected on the 12½″ Angle Girders, and is fitted with a connecting rod that carries a small Fork Piece. The latter is pivotally attached to a Collar, on the engine connecting rod by means of Bolts spaced by Washers.

The oscillation of the engine connecting rod actuates the small pumping cylinder through the second connecting rod.

(376) Centrifugal Speed Indicator

(Bristol Grammar School Meccano Club)

An interesting suggestion for a centrifugal speed indicator, which incorporates features that have not appeared in indicating mechanisms previously described in the *"Suggestions Section,"* was submitted recently by members of the Bristol Grammar School Meccano Club. A rhomboid figure, that is one with four equal sides, is made to rotate by means of gears, and as the speed of rotation increases, weights consisting of Flanged Wheels attached to the rhombus tend to move outward. This movement draws a Bush Wheel and Face Plate up the spindle on which the rhombus rotates. The motion of the Face Plate is transmitted to a spindle fitted with a pointer that move over a suitably calibrated dial.

The essential mechanism consists of two rhomboid figures, the sides of which are built up from 5½″ Strips. These are then joined together face to face, and at the upper angle are pivotally attached to a Rod carried in a Coupling fastened to the end of an 11½″ Rod. Four 1⅛″ Flanged Wheels, two fixed on each side of the rhombus, are fastened to 2″ Rods that are held to the 5½″ Strips by Collars. The lower corner of the rhombus is attached by Angle Brackets to a Bush Wheel, which in turn is fixed by means of ¾″ Bolts to a Face Plate. The Bush Wheel and Face Plate are arranged to slide on the 11½″ Rod.

A base consisting of 12½″ and 5½″ Angle Girders and a 5½″ × 2½″ Flanged Plate, supports a box-like structure composed of two 3½″ × 2½″ and one 5½″ × 2½″ Flanged Plates. A reinforced bearing is provided in the upper Flanged Plate for the 11½″ Rod, which is extended by a 4½″ Rod. Movement of the rhombus when the device is in motion is transmitted to an indicating arrangement consisting of a 2½″ × 1″ Double Angle Strip, through the centre hole of which passes the 11½″ Rod. The Double Angle Strip is fitted with Angle Brackets that make contact with the Face Plate.

Two 4½″ Rods are journalled in the bosses of Cranks bolted to the 5½″ × 2½″ Flanged Plate, and are connected by Collars to the 2½″ × 1″ Double Angle Strip. To one of the Rods the spider and fork piece from a Universal Coupling are connected. A Rod, the ends of which are journalled in a Coupling on the pointer spindle and in the Fork Piece, transmits the upward and downward movement of the Face Plate to the pointer.

A spring is not required to return the pointer, as the weight of the various parts of the mechanism is capable of doing this. The dial can be calibrated by working the apparatus from mechanisms such as a gramophone turntable rotating at known speeds, using different ratio gearing between the driving and driven shafts.

New Outfit Models

The "Direct Lifting" Autogiro and a Fret-Machine

THE four models dealt with this month are varied in character, and among them there must be one to suit almost every type of Meccano enthusiast. For the straightforward model-builder, who delights in reproducing fine engineering structures, there is a steam shovel that is remarkable for its clean and well balanced appearance. A neat model of a "Direct Lifting" Autogiro will meet the needs of the aeroplane specialist, and an excellent little working model of a fret-machine is very effective, although it is simple and easily constructed, and will be attractive to the beginner or the model-builder with a small Outfit. Finally there is a humorous scene, the reproduction of which in Meccano may arouse unpleasant memories for a few readers, but the model will provide great fun for all who build it for themselves.

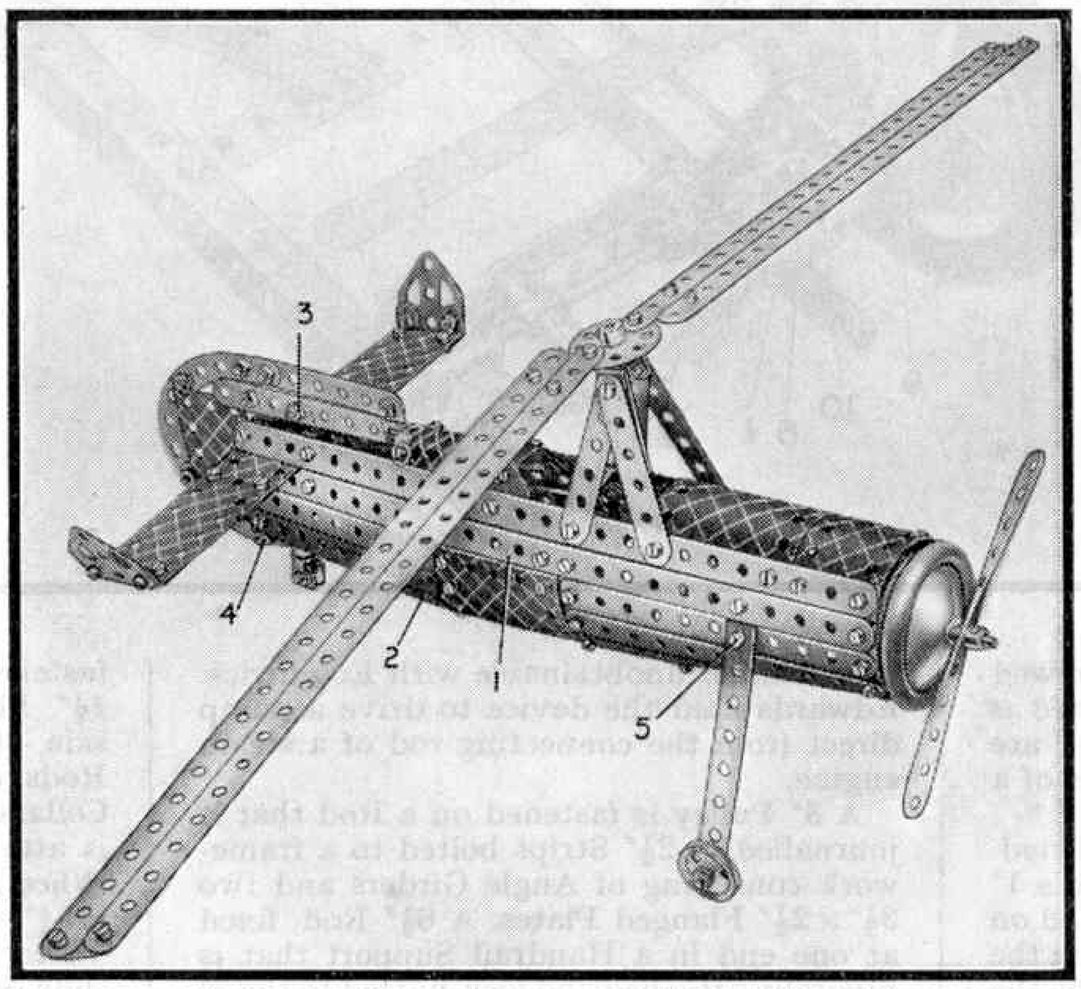


Fig. 1. An excellent reproduction in Meccano of the "Direct Lifting" Autogiro, built with Outfit G. This machine was described in an article on page 558 of the "M.M." for October 1936, and is capable of taking off without a run.

The model Cierva "Direct Lifting" Autogiro is shown in Fig. 1, and is built with Outfit G. The construction of the fuselage is commenced by attaching two $12\frac{1}{2}''$ Strips to the ends of a $5\frac{1}{2}''$ Strip that has been bent into a semi-circle, and bolting the loose ends to a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket. Below these further $12\frac{1}{2}''$ Strips 1 are fastened, one on each side of the fuselage, and these are joined to the first Strips by Obtuse Angle Brackets, bolted in the third hole from the remote end. Two $1\frac{1}{2}''$ Strips, connected by a Double Bracket, also are attached to the Strips 1 at the tail. A fifth $12\frac{1}{2}''$ Strip is then bolted to the centre hole of the $5\frac{1}{2}''$ Strip and to the Double Bracket.

Two $5\frac{1}{2}''$ Strips, curved into semicircles as before, and overlapped three holes at each end, are bolted between the $12\frac{1}{2}''$ Strips to form the division between the two cockpits. A $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate, a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and a U-section Curved Plate are then bolted across the fuselage. Two $2\frac{1}{2}''$ Strips are curved and extended one hole from a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and fastened to the $12\frac{1}{2}''$ Strip 1. The free end of the Flexible Plate is then attached to the $12\frac{1}{2}''$ Strip on the underside of the fuselage. This construction is repeated on the opposite side. The fuselage is completed with $5\frac{1}{2}''$ Strips, and a $3\frac{1}{2}''$ Strip 2 is bolted adjacent to these to close in the fuselage floor.

The fin is built up of two $2\frac{1}{2}''$ small radius Curved Strips and a $2\frac{1}{2}''$ large radius Curved Strip bolted to a 3″ Strip. Below the 3″ Strips is a $5\frac{1}{2}''$ Strip, attached by Flat Brackets, and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is attached as shown. An Obtuse Angle Bracket 3 and an Angle Bracket bolted at 4 secure the fin to the fuselage. An extension piece, consisting of a $2\frac{1}{2}''$ Strip fastened by an Angle Bracket to the fuselage, is attached underneath the fuselage near the tail wheel. This is not shown in the illustration, but its construction and position offer no difficulty. The construction of the tail plane can readily be followed from the illustration.

A 2″ Pulley and a Road Wheel, fastened to a $3\frac{1}{2}''$ Rod and held in the nose by the curved $5\frac{1}{2}''$ Strip, serves as an engine, and the tail wheel is a $\frac{1}{2}''$ loose Pulley held in a small Fork Piece that is attached to the fuselage by a $\frac{3}{8}''$ Bolt. The landing wheels are attached by $\frac{3}{8}''$ Bolts to a $5\frac{1}{2}''$ Strip that is fitted to the fuselage by means of two Bolts, one of which is a $\frac{3}{8}''$ Bolt 5. The rotor and the pylon are constructed as shown in the illustration, and the rotor is fastened to a compound rod composed of a $4\frac{1}{2}''$ Rod and a $1\frac{1}{2}''$ Rod, that is journalled in the floor of the fuselage.

Parts required to build the model Cierva "Direct Lifting" Autogiro: 9 of No. 1; 17 of No. 2; 2 of No. 3; 5 of No. 4; 5 of No. 5; 2 of No. 6a; 9 of No. 10; 2 of No. 11; 7 of No. 12; 3 of No. 12c; 1 of No. 15a; 1 of No. 16; 1 of No. 18a; 1 of No. 20a; 2 of No. 22a; 1 of No. 23; 1 of No. 24; 103 of No. 37; 7 of No. 37a; 4 of No. 59; 1 of No. 63; 1 of No. 90; 2 of No. 90a; 5 of No. 111c; 1 of No. 116a; 2 of No. 126a; 1 of No. 187.

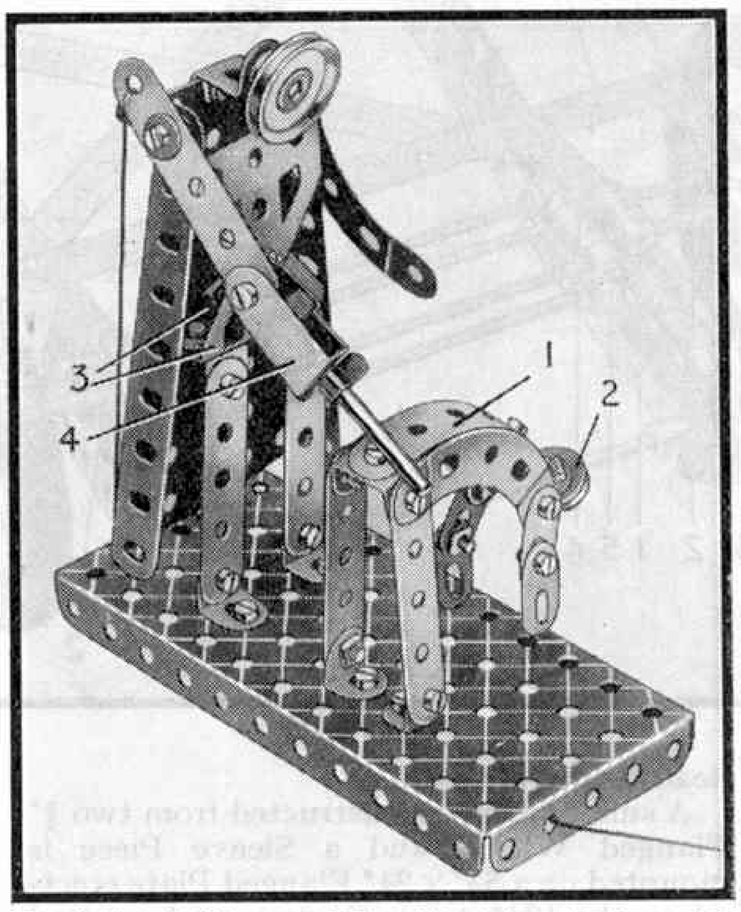


Fig. 2. A painful scene. When the string of this model, built with Outfit B, is pulled and released, the unfortunate schoolboy is heavily punished.

A model of a lighter and more amusing kind is the representation of a schoolmaster and his pupil shown in Fig. 2. This can be built with the contents of B Outfit. The victim of the drastic action seen in progress is first built up. The body consists of two $2\frac{1}{2}''$ small radius Curved Strips joined together by means of Double Angle Brackets, and with a $2\frac{1}{2}''$ Strip 1 curved to represent the back and attached at its loose end by an Angle Bracket to the Curved Strip. Legs and arms are fitted as shown. A $\frac{1}{2}''$ loose Pulley 2 is attached by a $\frac{3}{8}''$ Bolt to an Angle Bracket and bolted to the Double Bracket. This represents his head.

The irate master is next constructed. His body is built up by bolting two Trunnions 3 together by their flanges, and

attaching the $2\frac{1}{2}''$ Strips by Angle Brackets. A Flat Trunnion is then added, and the whole bolted to a $4\frac{1}{2}''$ Flanged Sector Plate. The arm wielding the cane consists of a Cranked Bent Strip 4, in which the cane, a 2″ Rod, is held in place by Spring Clips, and this is secured to the $2\frac{1}{2}''$ Strip by a $\frac{3}{8}''$ Bolt threaded with Washers. The arm is pivoted on a lock-nutted $\frac{3}{8}''$ bolt as shown, and a length of Cord is fastened to it. A 1″ fixed Pulley is mounted on a Reversed Angle Bracket for the head and a $2\frac{1}{2}''$ small radius Curved Strip for the arm.

The two figures are mounted on a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate by means of Angle Brackets. When the string is pulled the master's arm is raised, and on releasing the tension the cane falls heavily on the unfortunate pupil. The effect is ludicrous when the string is pulled and released rapidly.

Parts required to build the model schoolmaster and pupil: 6 of No. 5; 2 of No. 11; 8 of No. 12; 1 of No. 17; 1 of No. 22; 1 of No. 23; 2 of No. 35; 27 of No. 37; 6 of No. 37a; 2 of No. 38; 1 of No. 44; 1 of No. 52; 1 of No. 54a; 3 of No. 90a; 4 of No. 111c; 1 of No. 125; 2 of No. 126; 1 of No. 126a.

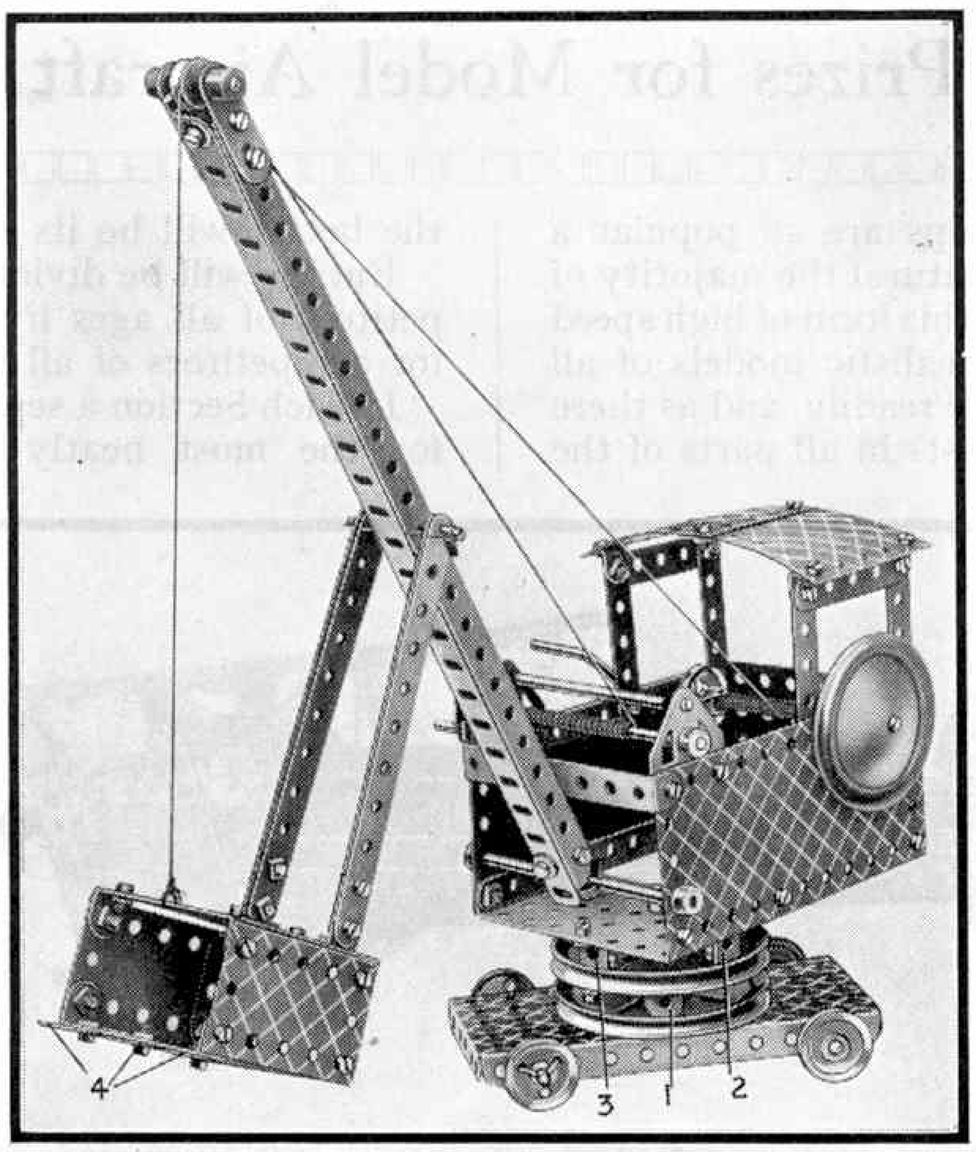


Fig. 3. A fine model of a steam shovel, built with Outfit E. The simplicity of design and straightforward but efficient construction are admirable features of this model.

The fine model of a steam shovel shown in Fig. 3 is built with Outfit E, and owes its appeal to simplicity in construction. Building is commenced by constructing the cab. This is composed of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates strengthened by $5\frac{1}{2}''$ Strips, and joined together by two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates and a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip as shown. The roof supports are then added, and a roof composed of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates is attached by means of Angle Brackets.

The swivelling mechanism consists of a 3″ Pulley to which two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are bolted at right angles, and is attached to the base of the cab by means of two Double Brackets 2, and a Reversed Angle Bracket 3. A second 3″ Pulley is bolted to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, care being taken to align the holes. A 2″ Rod is then pushed through the bosses of the Pulleys, secured in the lower Pulley by a set screw, and a Collar secured to the top end.

The jib is then constructed. Two $12\frac{1}{2}''$ Angle Girders are joined together by means of Angle Brackets to form a box girder, and Cranks spaced by Washers form a bearing for a $1\frac{1}{2}''$ Rod carrying a $\frac{1}{2}''$ loose Pulley at the head of the jib. Spring Clips prevent side play in the Pulley. The shovel is built up from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates that are bolted to two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates at the front by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate forms the back and the tines 4 are represented by three Flat Brackets.

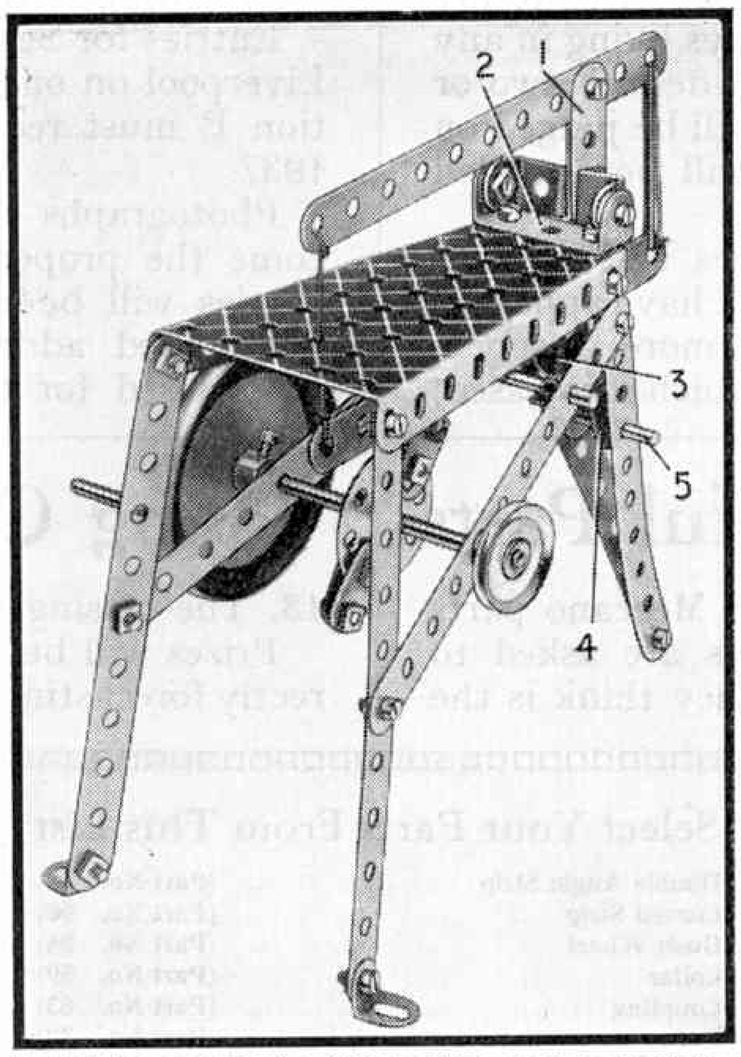
The shovel is attached to the shovel-arm by two $1'' \times 1''$ Angle Brackets, as shown in the illustration, and the arm is pivoted on a 2″ Rod journalled in the jib. The method of mounting the jib can be seen in the illustration. The winding handles are next journalled in the sides of the cab. The forward winding handle consists of a 4″ Rod, fitted with a Bush Wheel and Threaded Pin, journalled in the Flat Trunnions, and controls the bucket movement. The rear shaft, which controls the luffing of the jib, is a $5\frac{1}{2}''$ Crank Handle fitted with a Road Wheel and 1″ Pulley. A $3\frac{1}{2}''$ Rod, also journalled in the Flat Trunnions, prevents the two cords from fouling.

The model is completed by fitting wheels to the two $3\frac{1}{2}''$ Rods journalled in the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, the front wheels being spaced by means of three Washers.

Parts required to build the model steam shovel: 8 of No. 2; 6 of No. 5; 2 of No. 8; 3 of No. 10; 2 of No. 11; 7 of No. 12; 2 of No. 12a; 2 of No. 15b; 3 of No. 16; 2 of No. 17; 1 of No. 18a; 1 of No. 19; 2 of No. 19b; 3 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 24; 13 of No. 35; 66 of No. 37; 14 of No. 38; 4 of No. 48a; 1 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 4 of No. 59; 2 of No. 62; 1 of No. 115; 1 of No. 125; 2 of No. 126a; 1 of No. 176; 1 of No. 187; 2 of No. 188; 4 of No. 190; 2 of No. 195.

The simple but attractive model of a fret-machine shown in Fig. 4 can be worked either by hand or by means of a *Magic* Motor. It is built with Outfit C.

The table of the machine is built from four $5\frac{1}{2}''$ Strips and a $4\frac{1}{2}''$ Flanged Sector Plate, and braced by two $5\frac{1}{2}''$ Strips, as shown in the illustration. The reciprocating arm of the machine is formed of two $5\frac{1}{2}''$ Strips, one above the table and the other underneath it, joined together by two $2\frac{1}{2}''$ Strips 1, bolted on the $5\frac{1}{2}''$ Strips in the manner illustrated. The arm is then pivoted on a lock-nutted bolt that is pushed through the holes of two Reversed Angle Brackets, which are spaced from the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2 by two Washers, and through the middle holes of the $2\frac{1}{2}''$ Strips 1.



A working model of a fret-machine that incorporates a quick return movement. The model can be built with the contents of Outfit C.

The bracing of the table legs carries a $3\frac{1}{2}''$ Crank Handle. On this is a cam built by bolting two Flat Brackets, spaced by a Washer, on each side of a Bush Wheel, together with a Road Wheel and a 1″ fixed Pulley. The positions of these will be clear from the illustration. A piece of wire is stretched from the end hole of the upper $5\frac{1}{2}''$ Strip to that of the $5\frac{1}{2}''$ Strip under the table, and passes through the appropriate hole in a $4\frac{1}{2}''$ Flanged Sector Plate. This represents the blade of the saw.

The movement of the model is fascinatingly accurate, and a quick return stroke is effected by doubling a small Driving Band 3 over the arm, looping it on to a Cranked Bent Strip 4, through which the $1\frac{1}{2}''$ Rod 5 is pushed. If desired, the *Magic* Motor can be bolted to the front leg of the fret-machine, and the Driving Band fitted round the 1″ Pulley.

Parts required to build the model fret-machine: 8 of No. 2; 2 of No. 5; 4 of No. 10; 2 of No. 12; 1 of No. 17; 1 of No. 18a; 1 of No. 19s; 1 of No. 22; 1 of No. 24; 2 of No. 35; 21 of No. 37; 1 of No. 37a; 8 of No. 38; 1 of No. 44; 1 of No. 48; 1 of No. 54a; 1 of No. 111c; 2 of No. 125; 1 of No. 186; 1 of No. 187.

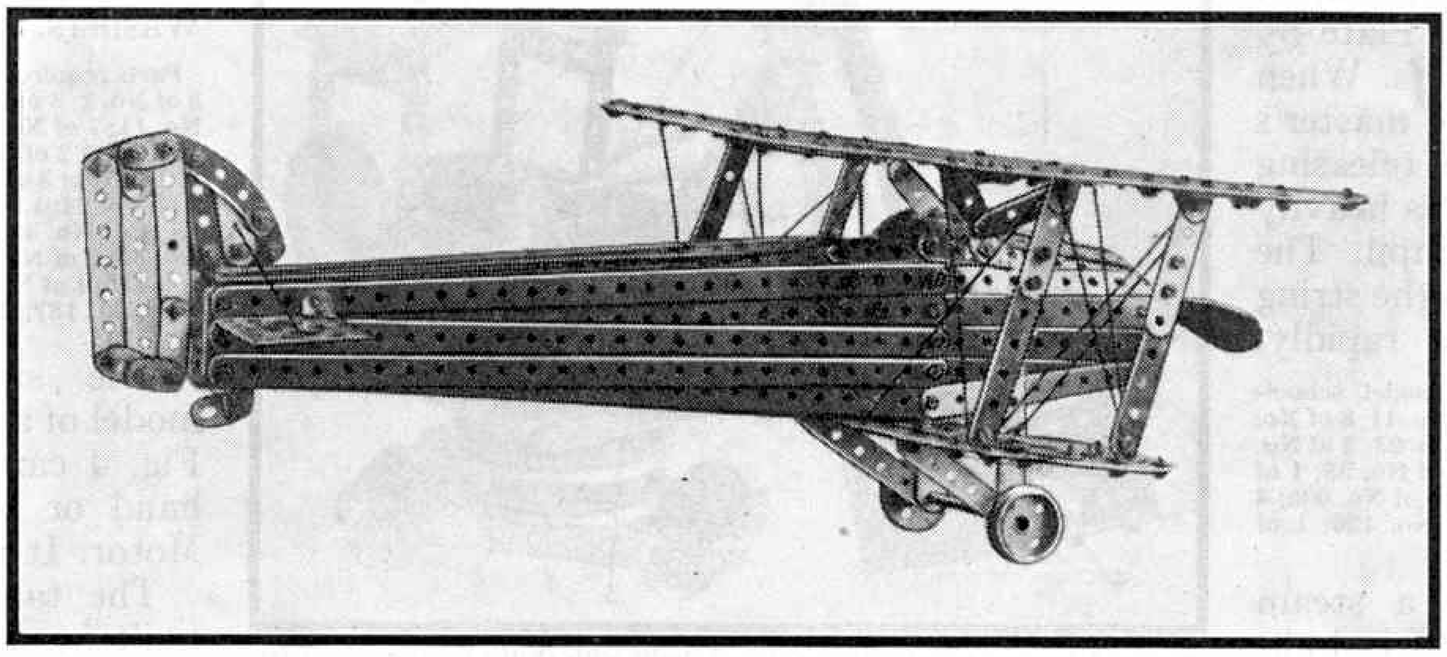
Meccano Competitions Open to all Readers

Prizes for Model Aircraft

Nowadays aeroplanes and airships are so popular a means of transport that it is only natural the majority of boys should be keenly interested in this form of high speed travel. With the aid of Meccano realistic models of all kinds of aeroplanes can be built very readily, and as there are thousands of Meccano enthusiasts in all parts of the world who would like to test their skill in making models of this kind, we are arranging a special aircraft competition, in which fine prizes are offered for the best models received.

To enter the contest a competitor should set to work to build a Meccano model of any kind of aircraft. The model may be a monoplane, biplane, Autogiro, airship, flying boat, or some novel form of aircraft, and the only conditions imposed upon competitors are that all entries must be constructed entirely from standard Meccano parts and must be built by the competitors themselves without any assistance. There are no age limits and boys living in any part of the world may submit entries. If desired two or more models may be entered, and they will be judged on their joint merits, but no competitor will be awarded more than one prize.

Hundreds of illustrations of aeroplanes and airships that will make fine subjects for this contest have appeared from time to time in the "*M.M.*" The more closely a model resembles the actual machine on which it is based, the better will be its chance of winning a prize.



A typical example of the kind of model that will win a prize in the "Aircraft" Competition announced on this page. The biplane shown here was built by K. Lewis, St. Johns, Newfoundland.

Entries will be divided into two sections: (A) for competitors of all ages living in the British Isles, and (B) for competitors of all ages living Overseas.

In each Section a separate set of prizes will be awarded for the most neatly assembled and realistic models received. The prizes will be as follows: First, Meccano or Hornby products value £3/3/–; Second, products value £2/2/–; Third, products value £1/1/–. There also will be consolation prizes in each section.

Competitors must not send the actual models. When the model is completed a photograph should be taken of it, or if this is not possible, a good drawing should be made. The competitor should then write his age, full name and address on the back of the photograph or drawing and enclose it in an envelope addressed "Aeroplane" Competition, Meccano Ltd., Binns Road, Liverpool 13.

Entries for Section A must be posted in time to reach Liverpool on or before 30th April, 1937. Entries for Section B must reach Liverpool not later than 31st May, 1937.

Photographs or drawings of prizewinning models become the property of Meccano Ltd., but unsuccessful entries will be returned to the senders provided that a stamped addressed envelope of the necessary size is enclosed for that purpose.

"Most Useful Parts" Voting Competition

At the foot of this page is a list of 15 Meccano parts taken from the Meccano range. Readers are asked to choose from this list (A) the part that they think is the most useful in model-building, and (B) the six parts that they think will receive the most votes when the "A" votes of all competitors are added together. Competitors should then write on a postcard the name of the part they have chosen, together with those of their selection of six parts in their estimated order of popularity, giving also the Meccano catalogue number in each case. Each postcard also must bear the competitor's name and address and should be addressed "Most Useful Parts Voting Contest," Meccano Ltd., Binns Road, Liverpool 13. The closing date for all entries is 30th April, 1937.

Select Your Parts From This List

Double Angle Strip	(Part No. 48)
Curved Strip	(Part No. 90)
Bush Wheel	(Part No. 24)
Collar	(Part No. 59)
Coupling	(Part No. 63)
Pulley	(Part No. 22)
Double Bracket	(Part No. 11)
Crank Handle (5" shaft)	(Part No. 19)
Trunnion	(Part No. 126)
Hinges	(Part No. 114)
Spring Cord	(Part No. 58)
Flanged Wheel	(Part No. 20)
Face Plate	(Part No. 109)
Hinged Flat Plate	(Part No. 198)
Double Arm Crank	(Part No. 62b)

Prizes will be awarded to readers who succeed in correctly forecasting the six parts that will obtain the highest votes, or if no correct entry is received, to those whose entries are most nearly correct. The prizes are as follows: First, Meccano products value £2/2/–; Second, products value £1/1/–; Third, products value 10/6. A number of consolation prizes will also be awarded.

If several competitors succeed in placing the six most useful parts in the correct order as decided by the total "A" votes of all competitors, First Prize will be awarded to the most neatly prepared all-correct entry, and the other prizes to the remaining entries.

Model-Building Competition Results

By "Spanner"

Fine Work by Home and Overseas Readers

"September" Competition (Home)

1st Prize, Meccano or Hornby products value £3/3/–: F. Higgs, Leicester. 2nd, products value £2/2/–: W. Cook, London, N.W.10. 3rd, products value £1/1/–: P. Ward, Bromley.

Products value 10/6: A. Pope, Bristol; D. Evans, Long Eaton; A. Cole, Broadchalk; F. Coltman, Loughborough; C. Lynch, York.

Products value 5/–: D. Parkyn, Barnet; R. Bauer, Exeter; J. McGowan, Allanton; J. Kennett, Richmond; J. Fenwick, Exeter.

The model that won First Prize in this competition is one of the best of its type that I have seen. It is a very simple wood-turning lathe, constructed by F. Higgs, who originally built it for turning some gun barrels for a 4 ft. scale model cruiser. Its construction is quite simple, yet sufficiently robust to enable it to do really good work, and I understand that it has proved entirely satisfactory for turning small wooden articles.

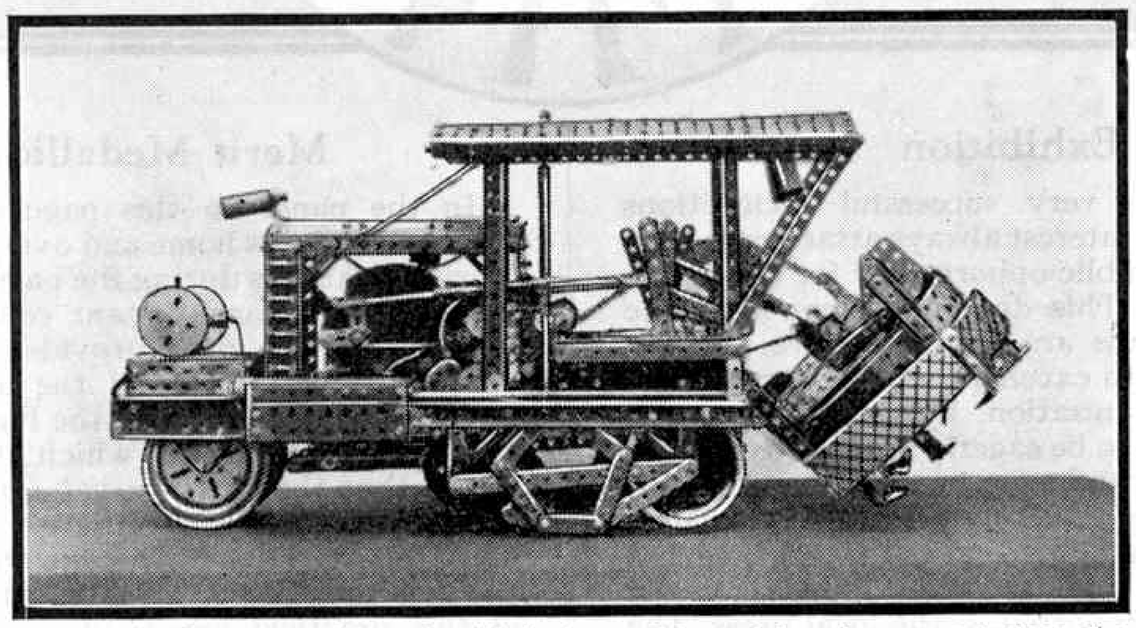
The frame of the model consists of 12½″ Angle Girders bolted together to form a rigid base. The headstock is built up of Flat Plates and Flanged Plates, which are securely braced with Angle Girders, and the main bearing for the headstock shaft consists of a Face Plate and a Double Arm Crank bolted back to back so that their bosses provide a long bearing surface. In addition there is a rear bearing for the shaft, and this also consists of a Double Arm Crank. Mounted directly below the main shaft is a secondary shaft fitted with two 50-tooth Gears. These are mounted on the shaft back to back to make a double-width gear, and they mesh with a ¾″ Pinion on the main shaft. The bearings for the secondary shaft are similar to those for the main shaft and the outer end of the secondary shaft carries a Sprocket, which is driven from an Electric Motor by means of a Chain. An ingenious jockey pulley arrangement is provided to overcome trouble due to stretching of the Chain when the lathe is in action.

Another interesting point in the model is the efficient lubrication system adopted. This consists of oil cups and wicks, and delivers a continuous supply of oil to all the bearings of the machine.

The chuck jaws are built up of Collars, each having four tapped holes. These are bolted to a 3″ Gear Wheel, and through their bores are threaded Screwed Rods, the outer ends of which are slotted to take a screwdriver. There are three sets of these Rods and Collars, spaced equidistantly round the face of the Gear Wheel, and when the Rods are screwed inward they grip firmly the wood to be turned.

The tailstock centre is a Meccano Rod, one end of which is threaded and the other ground to a point with an angle of approximately 60 degrees. The threaded end of the Rod passes through a Threaded Crank and is fitted with a 50-tooth Gear Wheel that serves as a handwheel. Rotation of this Gear moves the centre longitudinally as required. The centre can be locked in position by means of a handle fitted to a Screwed Rod, which in turn is inserted into the set screw hole in the front tailstock bearing. An adjustable tool rest is provided.

The Second Prize model was a Hatfield trailer type fire engine by W. Cook and owes its success mainly to neat construction.



Farming implements make good subjects for models, and here is a reproduction of a gyrotiller that was built by A. V. Butcher, Kaiapoi, S.I., New Zealand.

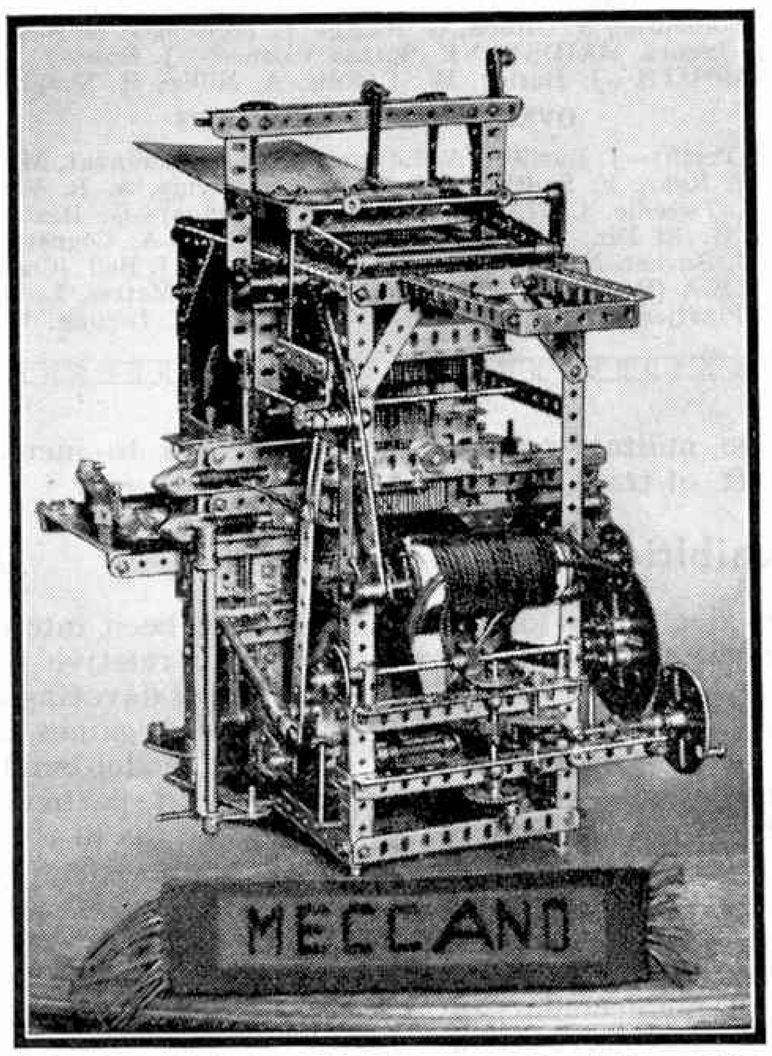
"August" Competition (Overseas)

1st Prize, Meccano or Hornby products value £3/3/–: A. Butcher, Kaiapoi, North Canterbury, New Zealand. 2nd, products value £2/2/–: G. van der Mey, Lisse, Holland. 3rd, products value £1/1/–: C. Taylor, Ashburton, New Zealand.

Products value 10/6: A. Ledent, Rupelmonde, Belgium; N. Soderberg, Falun, Sweden; M. Varhee, Suomi, Finland; J. Malan, Armadale, Melbourne, Australia; W. Legemein, Bloemfontein, S. Africa.

Products value 5/–: W. Dussel, Groningen, Holland; L. Mullick, Calcutta, India; C. Toomath, Petone, New Zealand; A. Mangourie, Zagazig, Egypt; A. De Boeck, Mechelen, Belgium.

A branch of engineering that receives comparatively little attention from model-builders is the design and construction of agricultural machinery. During recent years farm work has become more and more mechanised, especially on very large farms, and many really interesting engine-driven machines have been introduced to do the work formerly done either by manual labour or by simple horse drawn implements. One of these modern introductions is the gyrotiller, and I was pleased to find two very fine models of this type among the prize-winners in the "August" Competition. The better one of these was built by A. V. Butcher of Kaiapoi, New Zealand, and is illustrated on this page. It was awarded First Prize. The other model is the work of C. Taylor, also of New Zealand, and it secured Third Prize. The models are similarly constructed in many respects, but that submitted by Butcher is more neatly put together and better judgment is shown in the choice of parts used in its construction. Unfortunately it is not possible to describe these intricate machines in the small space at my disposal.



A fine loom, built by a blind Meccano enthusiast, on which beautiful patterned material in various colours can be woven. It is the work of G. van der Mey, Holland.

The model that won Second Prize is the fine loom illustrated on this page. It was built by a blind competitor, G. van der Mey of Lisse, Holland, who is an expert on looms and has previously built several splendid models of this kind. I was greatly impressed by the excellent quality and texture of the material that can be made on the model, which has two shuttles and weaves material in two colours and various patterns, according to a special perforated pattern card that is used in conjunction with the machine. The pattern card is fed through the machine and moves over a kind of keyboard containing a number of levers connected to metal hooks. These levers rise and fall according to the disposition of the holes in the pattern card, and in so doing they set or "shed" the threads of the warp to form the required pattern in the material.

The operating mechanism is very complicated, and it is surprising that one so handicapped as van der Mey has been able to master its construction and final adjustment. I congratulate this resourceful model-builder on his great achievement, and hope that he will long continue to find pleasure in the Meccano hobby and to enter "*M.M.*" competitions.

"Dinky Toys Layout" Competition

1st Prize, Meccano or Hornby products value £2/2/–: D. Parker, Brussels, Ontario. 2nd, products value £1/1/–: E. Trillo, Portsmouth. 3rd, products value 10/6: R. Pearson, Richmond, Victoria, Australia.

An Excellent Exhibition

Last month I referred to the very successful Exhibitions organised by two new clubs. Special interest always attaches to such displays, as they provide the first public opportunity for the young clubs to show what they can do. This does not mean that the Exhibitions of long-established clubs are less attractive. On the contrary, a club can build up such an excellent local reputation for constructive activity and good organisation, by means of regular Exhibitions, that these events come to be eagerly anticipated by the parents and friends of the members, and even by the general public.

An instance of this is provided by the Holy Trinity (Barnsbury) M.C. This club was the first to be affiliated to the Guild, and has become so well-known for its splendid annual Exhibitions that they are always well attended and fully reported in the local press. The 17th Annual Exhibition by this club was held recently, and, in the words of the secretary, "proved to be far superior to any other of its kind in the club's history." There was a striking display of Meccano and fretwork models, and outstanding items were a 5-ft. model of H.M.S. *"Revenge,"* a touring car, and a scale model in fretwork of the Cunard White Star liner *"Queen Mary."*

Other features of the Exhibition that proved great attractions to the visitors were models of an aerodrome, military parade ground and a railway layout that included 200 ft. of track.

Merit Medallion Awards in 1936

In the panel on this page appear the names of members of Meccano clubs at home and overseas who have been awarded special Merit Medallions during the past twelve months. It is a considerable list, and the many distant countries that are represented in the overseas section of it provide fresh testimony to the world-wide extent of the Guild and the universality of the Meccano spirit.

The Merit Medallion is the highest award open to Meccano boys, and the keenness with which club members seek to qualify for it shows that they rightly value it very highly. It is for Leaders to recognise loyalty and initiative by nominating deserving members for Merit Medallions. I hope that Leaders of clubs omitted from the list on this page will not hesitate to take greater advantage of this practical means of recognising good work.

For the benefit of new Leaders, I will mention again that in every club two Merit Medallions are available for presentation each session, making a total of eight Merit Medallions per club in a year. They are awarded on the recommendation of Leaders, for energy and foresight in securing recruits, outstanding excellence in model-building, practical ideas for improving the club programmes, or indeed for any activity that has helped to increase the reputation of the Guild and of the club movement.

Merit Medallions Awarded in 1936

BURNLEY (Grammar School)—W. Baker, A. Edmondson, L. Robinson. (Todmorden Road Central School)—J. Collinge, M. Dawe, L. Hinton, T. McGuire, K. Proctor, F. Smith. CHESTERFIELD (Mary Swanwick School)—C. Knopp, K. Leatherday. EDINBURGH (St. Giles' Cathedral)—D. Ashbrook, J. S. Dick, A. A. Matheson, J. R. Ponton, J. E. Smail. (28th Edinburgh)—J. Donald, J. Hay. EXETER—D. Balkwill, K. Brewer, E. Dayman, H. Drury, K. Milton, G. Poore, C. Richards, D. Wills. GLASGOW (Morison Memorial)—R. Fraser, A. Milloy, J. Smith. HEYWOOD (Regent Street Selective School)—C. Stott. KIDDERMINSTER—N. Gale, W. Hudson. LONDON (Holy Trinity, Barnsbury)—A. Baker, E. W. Boys, F. Burg, H. Colbourne, N. Gibson, G. Knight, R. Messenger, D. Norsworthy, F. G. Sims, W. Ware. (Old Charlton)—J. Jaques. MAIDSTONE (Sutton Valence)—J. Bowyer, J. Chandler, J. Hawkes. PLYMOUTH—J. Burley, W. J. Ellis, A. Miller, H. Shapcote.

OVERSEAS CLUB MEMBERS

AUSTRALIA (Maylands, Perth)—J. Bartlett, A. Edwards, R. Le Cheminant, M. Penn, M. Thomson, W. Thomson. (Melbourne)—C. Ryan, F. Smith. (Sydney)—G. I. Devine, A. R. Wade. (Thebarton Junior Technical School)—D. E. Tweedie. CANADA (Rosemount, Regina)—G. Beach, G. Watson. EGYPT (Cairo)—S. F. Awad, A. G. El Din. FRANCE (Bourg-en-Bresse)—A. Cognet, J. Lingot. (Paris)—R. Decouis. (Villefranche)—G. Buchet. NEW ZEALAND (Ashburton)—J. Bell. (Christchurch)—L. W. Best, E. A. Gay. SOUTH AFRICA (Berea)—J. Epstein, P. Epstein, B. Metter, L. Michelow. (Pioneer)—R. George, E. Plaatjes. SWITZERLAND (Neuchatel)—M. Donner, W. Dubler.

Demonstration Models for Exhibitions

The end of the second winter session is an ideal time for an Exhibition, and the attractiveness of such an event can be greatly increased by the loan from Headquarters of one or more of the splendid Demonstration Models available for that purpose. Leaders and secretaries who are making arrangements for such an Exhibition and wish to have models from Headquarters should apply at once, as at least five weeks' notice is necessary to ensure the models being available by the required date. It is important that full details of the electric supply available should be given when ordering models, so that a suitable motor can be fitted to each one. A list of the models available for loan can be obtained on writing to me.

I am always pleased to publish on this page announcements of club Exhibitions, and announcements of this kind have been instrumental not only in attracting visitors but also in recruiting new members. I urge Leaders and secretaries who are planning an Exhibition as the climax of the present winter session, to forward me details of the event, including the address of the hall or club-room in which it is to be held, the date, time of opening and the charges for admission. Notes on any particular striking feature also should be given. The *"M.M."* goes to press well in advance of the date of publication, but announcements of Exhibitions to occur in March can be included in the issue for that month if they reach me within the next few days.

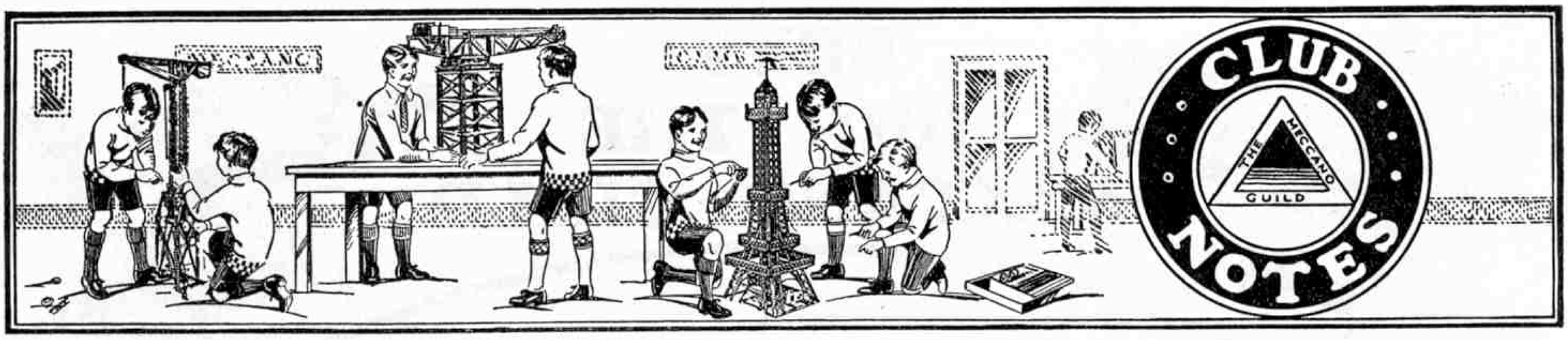
An Ideal Diversion

I have been interested to notice from club reports and correspondence relative to the current winter sessions, the increasing practice of devoting a part of each meeting, or the whole of certain meetings, to games, as a diversion from the more serious pursuits of Meccano model-building and Hornby railway operations. This is all to the good, particularly if the games involve vigorous exercise of some kind, as in the case of table tennis, punch ball or friendly boxing bouts. Such games provide an excellent contrast to the less strenuous tasks that have preceded them. Another point is that games can play an important part in developing a good spirit among the members.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

DONCASTER—F. Blake, 18, Durham Avenue, Thorne, Nr. Doncaster.
LEEDS—P. Walshaw, Greenfield House, 12, Roman Gardens, Roundhay, Leeds, 8.
SWINDON—R. Sweetlove, 102, York Road, Swindon.
STOKE-ON-TRENT—E. N. Challinor, 66, Second Avenue, Kidsgrove, Stoke-on-Trent.



Great Baddow M.C.—Meccano model-building is the chief interest of members, and meetings have been well attended. At one meeting the older members instructed the younger ones in building a fairly difficult model. A Model-building Contest was held on the occasion of the club's first Open Night. The members' parents and friends were invited, and there was an excellent attendance. The secretary of a local club, who were the donors of the prize offered in the Contest, judged the models and presented the award; and he was so delighted with the fine efforts of competitors that a consolation prize was awarded. Afterward a film show was held, and a collection taken in aid of club funds realised just over £1. The Leader has given an interesting Lecture on "*The Motor Magneto.*" A Games Evening during which the club treasurer acted as instructor was greatly enjoyed. Club roll: 33. *Secretary:* K. J. Avis, 5, Crescent Road, Great Baddow.

Hornsea M.C.—A varied programme is being carried out, and includes Hornby Railway Evenings, Cinema Shows, Games and Socials. Further Lectures on "*Electricity*" and "*Chemistry*" have been given. A Lecture by the Leader on "*Testing Wireless Valves*" proved exceptionally interesting. Club roll: 15. *Secretary:* P. Thom, 5, Alexandra Road, Hornsea.

Plymouth M.C.—The membership of the Meccano section has trebled recently. This section has been very busy constructing cardboard warehouses, etc., for use as scenery in the model dockside display arranged for the Exhibition. It is proposed to illuminate the display by means of small batteries housed in a model power station. The Printing Section are to be provided with a new high-speed rotary press. The improved lighting system arranged for the composing sub-section is much appreciated by them. Club roll: 72. *Secretary:* R. G. Symons, 47, Lisson Grove, Mutley, Plymouth.

Burnley Grammar School M.C.—An excellent Lecture on "*Motor Car Engines*" has been given. The lecturer explained in detail the working of an internal combustion engine, and illustrated his remarks with interesting diagrams. A competition has been held in which members had to build a model in a given time from a number of specified parts. Club roll: 22. *Secretary:* J. S. Keighley, Grammar School, Burnley.

St. Stephens (Saltash) M.C.—Considerable model-building has been carried out, and the types of models purchased have included aeroplanes, a two-deck bus, and a church with a spire. At several meetings members have been busy constructing a cardboard house for use as a lineside feature on the club's Hornby Railway. Games are played for a short time during each meeting. Club roll: 10. *Secretary:* B. Braund, 9, Homer Park, Saltash.

St. Oswald's (Thornton Heath) M.C.—Meetings are held at the Leader's house. On the evening of the Crystal Palace fire a meeting devoted to two-minute talks by members on subjects drawn from a hat was in progress when a member who was facing the window noticed the glare in the sky. The meeting was stopped, and the members trooped out in an orderly manner to locate the fire. The members became separated in the great crowd of spectators, but by a previous arrangement all reported back to the club-room afterward. An extensive recruiting campaign is being carried out. Club roll: 18. *Secretary:* R. H. Smart, 14, Kensington Avenue, Thornton Heath.

Fraserburgh M.C.—Meetings have been fewer than usual, owing to many of the members studying for school examinations. There has been considerable activity in the Model Aeroplane Section, however, and some excellent flights have been carried out. Part of the Hornby track has been relaid. Club roll: 27. *Secretary:* W. J. Dawson, Phingask, Fraserburgh.

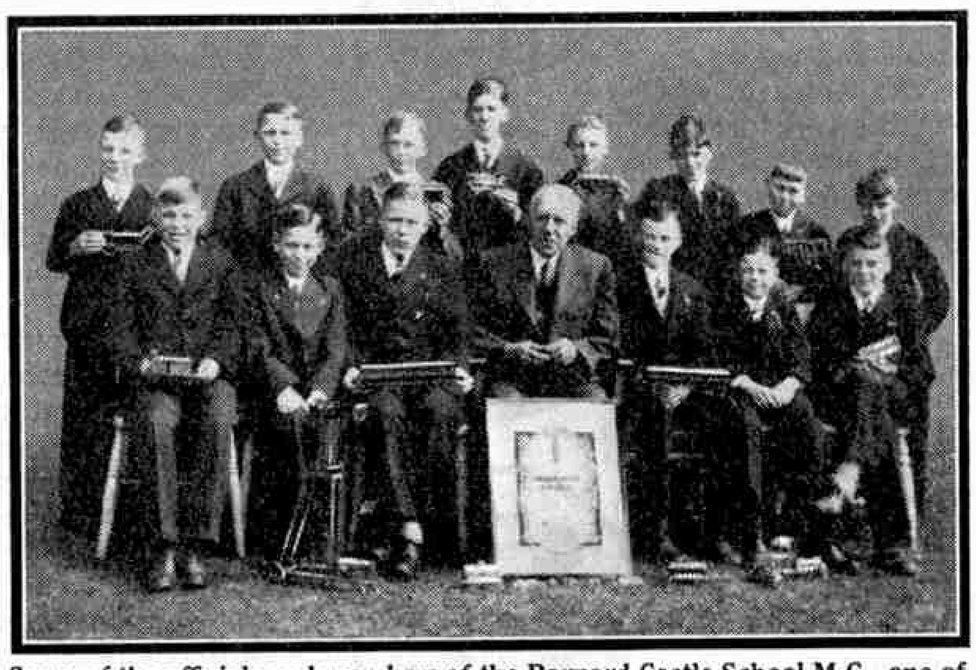
Bryntirion M.C.—It has been necessary to obtain a new club-room, and the members have been busy equipping it with seats and tables. A football team has been formed. Club roll: 14. *Secretary:* P. Parry, Castle Hill House, Carmarthen.

Sutton Valence Council School M.C.—"*Electricity*" has been the subject of several meetings, and keenly-interested members have constructed batteries of the Leclanché type. An interesting model-building competition has been held. The members have been studying the development of transport during the lifetime of King George V. Club roll: 21. *Secretary:* J. Chandler, "Herriard," Chart Sutton, Maidstone, Kent.

Wednesbury M.C.—The President, Mr. A. B. Turner, M.A., B.Sc., has given a Talk entitled "*Reminiscences of a Despatch Rider.*" This was the first of a monthly series. A Lantern Lecture on "*Legendland on the G.W.R.*" has been given jointly by three members, and was much enjoyed. Favourable reports of the club's activities continue to appear in the local press from time to time, and to attract new members and many visitors. Preparations for an Exhibition have taken up much time recently. The Meccano section is constructing a transporter bridge and a model workshop, and these, together with super models loaned from Headquarters, will make a striking display. The Fretwork and Model Railway Sections also will be well represented, and one member is arranging a display of model aeroplanes he has constructed. Club roll: 30. *Secretary:* A. L. Morgan, 17, Cobden Street, Falling's Heath, Wednesbury.

Islington M.C.—An Exhibition has been held, and was a great success. In addition to several excellent mechanical engineering models, the display included a very good railway layout. A visit has been paid to an Exhibition organised by the Holy Trinity (Barnsbury) M.C. Club roll: 17. *Secretary:* K. V. Dines, 70, Thornhill Road, Barnsbury, N.1.

Cold Harbour M.C.—Enthusiasm is high in this recently-affiliated club, the activities of which include Model-building and Chemistry experiments. The junior members have been busy with Dinky Builder Outfits. Some interesting Lantern Lectures have been arranged. Club roll: 11. *Secretary:* R. S. Hill, Anstie Farm, Holmwood, Nr. Dorking, Surrey.



Some of the officials and members of the Barnard Castle School M.C., one of the many school clubs that became affiliated with the Guild last year. The membership is steadily increasing, in spite of losses at intervals due to members leaving the school. A varied programme is followed with keen interest and enthusiasm.

AUSTRALIA

Sydney M.C.—The progress of the club was well maintained throughout the winter. Most of the present activities are of an outdoor character. A cricket team has been formed, and several good matches have been played. A large selection of models has been constructed for display at the Y.M.C.A. Hobbies Exhibition. In addition members will show examples of the work of other sections of the club, including those devoted to Photography and Stamp Collecting. Club roll: 56. *Secretary:* Mr. T. Watson, Box 1749JJ. P.O., Sydney.

Maylands M.C.—A novel feature at a recent meeting was a blindfold model-building competition, and members who did not take part had an amusing time watching the efforts of the competitors. A successful Exhibition has been held at Cottesloe, and the models displayed included a roundabout, meccanograph, dredger, gantry crane and a tractor. The electrically-operated models were especially popular with the many visitors. The club recently joined with the Maylands H.R.C. Branch in a visit to National Park. Club roll: 35. *Secretary:* M. Thomson, 13, Kennedy Street, Maylands, West Australia.

Thebarton Junior School M.C.—The club continues to make very good progress, and many meetings have been held. Two model-building competitions have been held, in each of which the members were invited to build a particular model. Lectures have dealt with "*The Building of the New York Skyscrapers*"; "*The Principles of Aeronautics*"; "*Model Aeroplane Building and Flying*"; and "*Glass Blowing.*" Enjoyable outings have included visits to a sugar refinery, an ice cream factory, the Adelaide Electric Power Plant and the Adelaide Observatory. One afternoon was devoted to showing pictures, and on another occasion a special "liquid air" demonstration was held, the liquid air being supplied by the Western Oxygen Company. The proceeds from these two events have enriched the club funds for the purchase of a film projector. Club roll: 90. *Secretary:* D. C. Tweedie, Thebarton Junior School, Ashley Street, Thebarton, South Australia.

EGYPT

Zagazig M.C.—At the semi-annual meeting the President expressed his pleasure at the continued good progress of the club. The celebrations of the club birthday began with a party, after which talks relative to the development and the working of the club were given by the President, Vice-President, and the Leader. Club roll: 20. *Secretary:* Miss B. Mangourie, 39b, Gannabiet Sikka Hadid Avenue, Zagazig.

HOLLAND

Maastricht M.C.—Several successful meetings have been held, the largest being one organised in conjunction with the Aero Club, when a film kindly loaned by the K.L.M. was shown. There were 200 people present at this show, which was a great success. Club roll: 29. *Secretary:* L. Mulders, Houthemerweg No. 20, Meerssen bij Maastricht.

INDIA

Ranjit (Lahore) M.C.—Membership is increasing steadily, and all are very enthusiastic. A keen interest is being taken in model-building. The club were invited at short notice by the Secretary of the D. A. V. College Jubilee Exhibition to stage a model display at that event. A letter of thanks was afterward received from the organisers, and a silver medal awarded to the club, who were also invited to a Dinner. Club roll: 45. *Secretary:* S. Harbhajan, 689, Krishna Bazar, Gowalmandi, Lahore.

ITALY

Milan M.C.—A very varied programme is being carried out, in which Games Evenings are a very popular feature. The President recently gave a very interesting lecture on "*Technicalities of Naval Construction.*" The Scientific Section is also very busy. Several Film Shows have been held. Club roll: 14. *Secretary:* E. Vigo, Corso Genova 19, Milan.

NEW ZEALAND

Ashburton M.C.—More new members have been enrolled, and an interesting programme is being enthusiastically carried out. A good display of models and an excellent Hornby layout were arranged for a Parents' Night, and other attractions were a Concert and Games. Club roll: 25. *Secretary:* Miss P. Kruse, 82, Eton Street, Ashburton.

Christchurch M.C.—At one meeting the juniors took charge, as most of the senior officials were absent, and organised a Meccano Competition in which members were called upon to identify the parts of a Meccano Outfit. The remainder of the evening was spent in playing games. A very enjoyable Lantern Lecture on "*The Story of Rubber*" has been given by Mr. Morrison, a good friend of the club, who has previously given illustrated talks on interesting topics. One evening Mr. S. George, a city solicitor, gave a talk on early Christchurch. He brought many pictures, and these were passed round for members to inspect. The invitation of the Ashburton M.C. to attend their Parents' Night was accepted, and an enjoyable time spent there. A welcome visitor at one meeting was Mr. Speers, formerly the secretary of the Boys' Institute (Wellington) M.C. He is now on a farm near Christchurch, and has invited the Christchurch M.C. to spend a day there. Club roll: 23. *Secretary:* L. W. Best, 28, Circuit Street, Strowan, Christchurch, N.W.1.

Clubs Not Yet Affiliated

AUSTRALIA

Charters Towers M.C.—Model-building and Hornby Train operations have been the chief activities. Models completed have included a Gantry Crane and a Horizontal Steam Engine. *Secretary:* R. McLean, Marion Street, Charters Towers, Queensland.

INDIA

Excelsior (Lahore) M.C.—Some excellent models of windmills and aeroplanes have been constructed. Visits have been paid to the Mela Ram Cotton Mills and the Shahdura Match Factory. The latter part of each indoor meeting is devoted to reading an instalment of a scientific story. Other outdoor activities have included a boating excursion and a very enjoyable picnic. *Secretary:* N. S. Narang, Shish Mahal Road, Lahore, India.

BOYS ! JOIN THE MECCANO GUILD

President:
MR. ROLAND G. HORNBY

The Meccano Guild is an organisation for boys started at the request of boys and conducted as far as possible by boys. At its head—guiding and controlling, and taking a personal interest in it—is the President, Mr. Roland G. Hornby, son of the inventor of Meccano, and it is ready to be of service to each individual member, and to help or give advice whenever requested. Membership of the Guild enables Meccano boys to get the best out of life.

The three great objects of the Guild are to make every boy's life brighter and happier; to foster clean-mindedness, truthfulness, ambition and initiative; and to encourage boys in the pursuit of their studies and hobbies, and especially in the development of their knowledge of mechanical and engineering principles. Every boy undertakes to promote these objects.

A Meccano boy who joins the Guild becomes a member of a great brotherhood of world-wide extent, every member of which has promised to observe its great objects; wherever he happens to be, even in strange countries he will know that he has met a friend whenever he sees the little triangular badge. Thus the Guild brings together Meccano boys all over the world.

THE GUILD BADGE

Membership of the Guild is open to every boy possessing a Meccano Outfit or Hornby Train Set who satisfactorily fills in the application form. The only conditions are that members shall promise to observe the objects of the Guild and to wear their badges on all possible occasions.

The Meccano Guild badge is beautifully enamelled in blue and white. The ordinary form is made for wearing in the lapel of the coat, but brooch badges are issued to members who prefer to pin them in position, and applicants who wish to have this form of badge should indicate this when sending in their forms. In addition to the badge, each member receives a handsome Membership Certificate printed in orange and black.

HOW TO BECOME A MEMBER

In order to join the Guild all that is necessary is to fill up the form of application, and to forward it to the Secretary of the Meccano Guild, Binns Road, Liverpool 13, from whom an application form may be obtained if desired. A remittance to pay for the membership badge should be sent along with the completed form of application. The price of the badge is 7d. post free in the United Kingdom and 1/- post free overseas (25 cents Canada). The applicant is then duly enrolled as a member of the Guild and his badge of membership is sent to him. Each member has the personal interest of the President and is entitled to the friendly advice and assistance of the Secretary.

Boys living overseas should write to one of the Meccano agents at the following addresses: CANADA: Meccano Ltd., 187-189, Church St., Toronto. AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W. NEW ZEALAND: Models Ltd., Third Floor, Paykel's Buildings, 9, Anzac Avenue (P.O. Box 129), Auckland, C.1. SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.

MECCANO CLUBS

Meccano Clubs are founded and established by enthusiastic Meccano boys under the guidance of the Guild Secretary at Headquarters. At the present time there are over 150 affiliated clubs in various towns and villages in this country and overseas, together with many others not yet affiliated. Each club has its Leader, Secretary, Treasurer and other Officials, all of whom, with the exception of the Leader, are boys.

Every Guild member should join a club if possible, for only in association with other Meccano boys is he able to obtain the greatest fun from his hobby. If the nearest club is too far away for him to join, or if he is unable to join it for any other reason, he should consider the possibility of forming a new club in his own district. A special booklet entitled "How to run a Meccano Club" is now ready, and will be sent to any reader (post free) on receipt of 2d. in stamps.

When a Meccano Club has been successfully launched and good progress is being made, affiliation with the Guild is granted. A beautiful club certificate, suitable for framing and hanging in the club-room, is presented, and the club becomes entitled to such privileges as the loan of interesting lectures and large models built at Headquarters.

THE CORRESPONDENCE CLUB

Members of the Guild are eligible to join the Correspondence Club, by which they are placed in communication with other Guild members in some other part of the country or abroad. To those boys who are interested in foreign languages the Correspondence Club presents a splendid opportunity of obtaining a correspondent in the particular country in the language of which they are interested. Stamp collectors also find the club of value. Full particulars and enrolment form will be sent on application to the Guild Headquarters.

THE SUN NEVER SETS ON THE MECCANO GUILD

Developing a Small 2 ft. Radius Layout

Hornby Track and its Uses

READERS and Hornby Railway Company members who are beginning the great hobby of Hornby Trains will want to know how the simple layouts they are now using can be developed into really interesting model railway systems. Most model railways commence from a circle, such as that illustrated in Fig. 1, or a small oval. If each addition is planned with care and with some definite object in view, increasingly interesting working can be obtained, and the full fascination of Hornby Trains realised without difficulty.

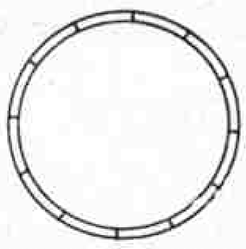


Fig. 1. A circular track consisting of 12 Curved Rails of 2 ft. radius.

The circular track shown in Fig. 1 is formed of 12 A2 Curved Rails. The layout can therefore be easily separated into two semicircles of six rails each, in order to allow of the first step in the expansion of the system—the introduction of B1 Straight Rails. Any number of pairs of Straight Rails may be added according to the space that is available, for of course the addition of a Straight Rail on one side of the layout involves a corresponding addition on the other. Otherwise the lines would not finally join up in a satisfactory manner.

Layouts of this kind are very useful in enabling beginners to become accustomed to the management of their locomotives and rolling stock. When proficiency in this direction has been attained, a longing is again felt for an extended layout that will allow more scope for skill and for the powers of the locomotives used.

One of the first considerations to be taken into account in the development of a miniature railway is the amount of space that can be allotted to it. A circle of 2 ft. radius Curved Rails, including the overhang of the engine, requires a space of at least 4 ft. 6 in. square. The addition of Straight Rails will increase the length or width as the case may be. The length of a Hornby B1 Straight Rail is $10\frac{1}{4}$ in., so that if a circle of A2 Curved Rails is converted into an oval by the addition of one Straight Rail in each side, the size of the layout will be increased from 4 ft. 6 in. square to 5 ft. 4 in. by 4 ft. 6 in.

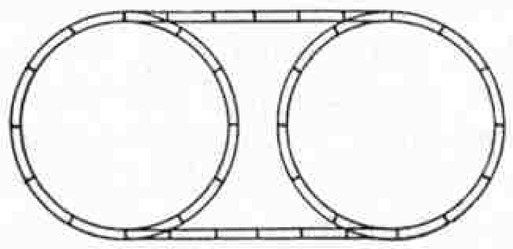


Fig. 3. This layout is ideal for two operators.

The addition of Points to the layout is one of the first steps to be taken. Beginners rarely obtain as much satisfaction from Points as they might, because the actual effect of their addition is not fully appreciated, a feature that is by no means confined to beginners. The standard Right-hand and Left-hand Points are so arranged that their straight portions correspond exactly in length with the ordinary Straight Rails, and their curved branches in a similar manner agree in length and radius with corresponding A2 Curved Rails. This relation is shown in Fig. 2, which consists of a combination of two oval layouts. The small oval is obtained by adding Right-hand and Left-hand Points as shown. As the curved branches of these Points correspond in length with a standard Curved Rail, only four more curves are required to complete the semicircle. The result of the addition is a track that is more interesting than a plain circle or oval, for the addition of Points gives a choice of routes that may be taken by the train, according to the fancy of the operator. Fig. 3 shows how the layout just described can be developed a stage further by the addition of another set of Right-hand and Left-hand Points and four more Curved Rails.

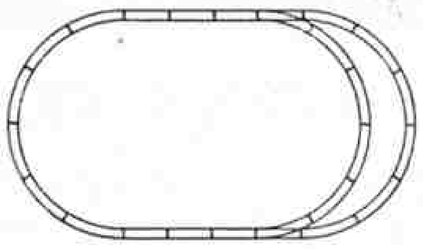
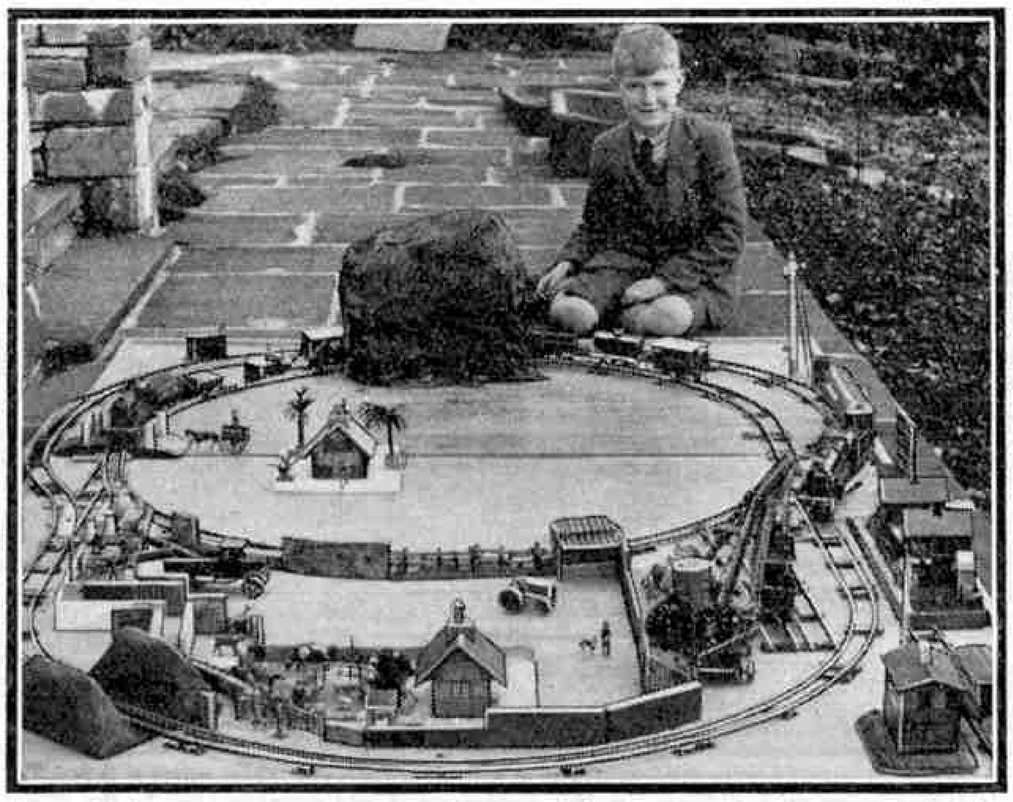


Fig. 2. The addition of right-hand and left-hand points make a great improvement.



A reader's layout that has been developed from a small circle or oval. The doubling of the track at the far side is a decided advantage.

The curved branches of Double Symmetrical Points are each identical with one Curved Rail so that they can be used for a variety of purposes. Parallel Points, which can be used with either 2 ft. or 1 ft. radius layouts, are practically equal in length to one Straight Rail and one Quarter Straight Rail. The branches of these Points join up with Hornby Double Track, and with No. 2 Level Crossings and the large and small Engine Sheds. Crossover Points provide a connection between the up and down tracks of Hornby Double Track and they are equal in length to two Straight Rails, that is, 1 ft. $8\frac{1}{2}$ in.

The addition of Acute-Angle or Right-Angle Crossings is another interesting method of improving a small layout. Fig. 4 illustrates how an Acute-Angle Crossing can be used in conjunction with R.H. and L.H. Points.

Sidings are an important part of a model railway layout and they are usually among the first items to be added. In order to make them parallel to the main line Right-hand or Left-hand Points are required, together with one Curved Rail, which is necessary to reverse the direction of the track from the curved arm of the Points. Several interesting schemes for sidings will be found in *"Hornby Layouts—One Hundred Suggestions,"* which can be obtained from any Hornby Train dealer or direct from Meccano Ltd.

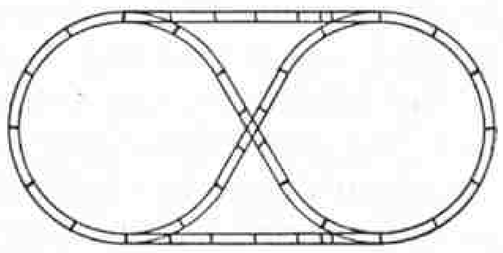
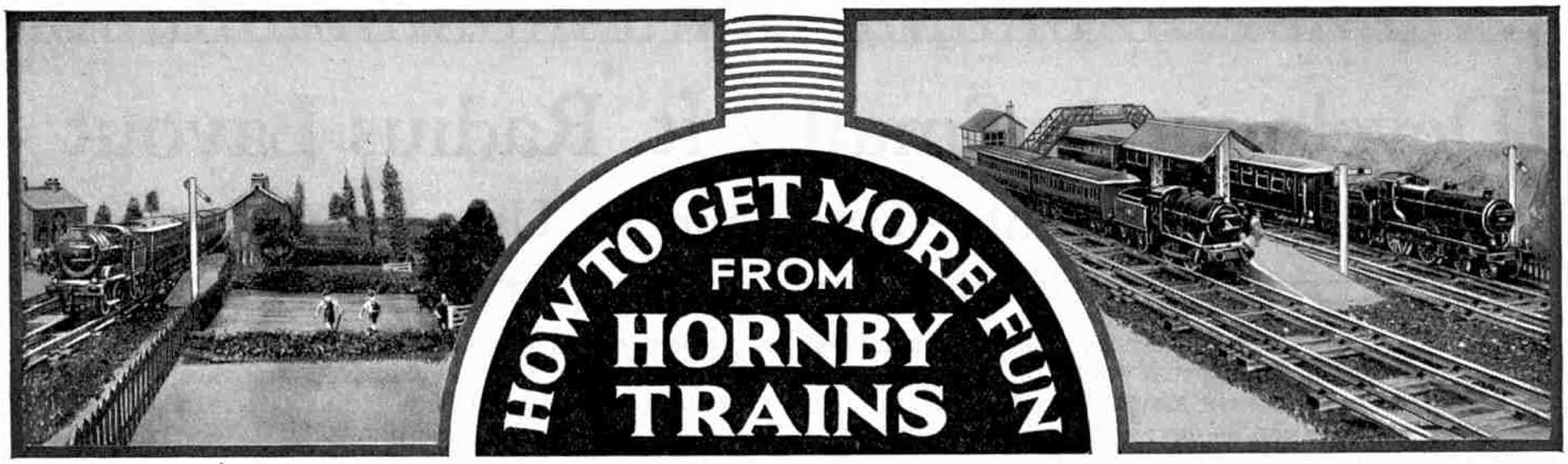


Fig. 4. A layout in which an Acute Angle Crossing is used.



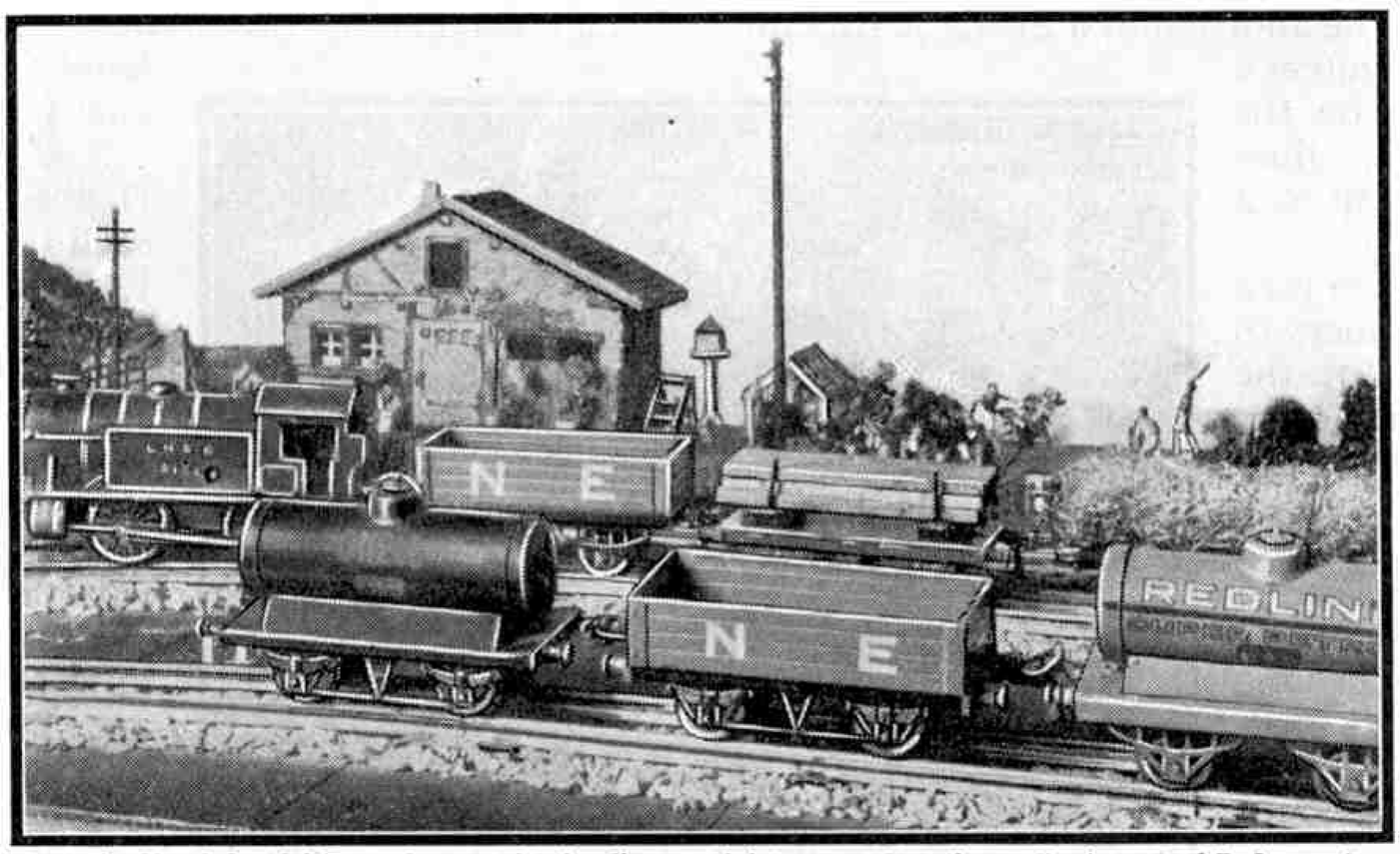
GOODS TRAINS AND THEIR REPRODUCTION ON HORNBY LAYOUTS

THE freight services run on British railways are of an extremely varied nature, and this gives special interest to their reproduction in miniature working. There is no difficulty in providing for goods traffic of all kinds on Hornby layouts, for the range of wagons and vans now available in the Hornby Series is very comprehensive, and meets the needs of every H.R.C. member attracted by the conveyance of goods in miniature, no matter what kind of freight he is particularly interested in. The traffic to be carried should be provided for by appropriate wagons or vans as far as possible, but unlikely or unrealistic collections of vehicles should be avoided as this would spoil the good effect of the trains being operated.

The first loads that suggest themselves are probably any odd items that can be collected, such as old matchboxes. Later, the matter is taken more seriously, and the conveyance of coal or small stones suggests itself. There is something particularly appropriate about this use of coal, and it is interesting to remember that the necessity of providing for its carriage started the British railway system years ago. The main objection to using coal as a load in a miniature train is that it is dirty, and if a wagon is accidently derailed there are likely to be unpleasant consequences. If the coal is washed before it is used, however, it is dustless and clean to handle. The coal should be specially picked, and fairly small pieces will be found most suitable. These should be left to soak in water over night, so that the dust settles at the bottom of the vessel holding the coal. The water with the accompanying dust is then poured away and the clean pieces of coal are dried by being spread out on an old newspaper in front of the fire or stove. They are then quite fit to handle and may be loaded in the wagons as necessary before the train is assembled.

The hauling of long trains complete with loads is likely to prove difficult for the locomotive, owing to the increased weight. Some Hornby Train owners fit their open wagons with dummy floors consisting of a cardboard shape made up for each wagon, like the lid of a box. This should fit easily into the wagon, with its sides just below the top of the wagon body. The dummy floor should be painted black and when dry, glue or Seccotine should be used for setting the coal in position. This should be heaped up by degrees, so that a realistic load is the result.

This scheme can be applied to other substances, such as the small granite chippings that are often used for ballasting purposes on miniature railways. Indeed a variety of loads of this kind can be provided, so that a complete coal train, a stone ballast train, or a mixed train carrying several mineral products can be assembled.



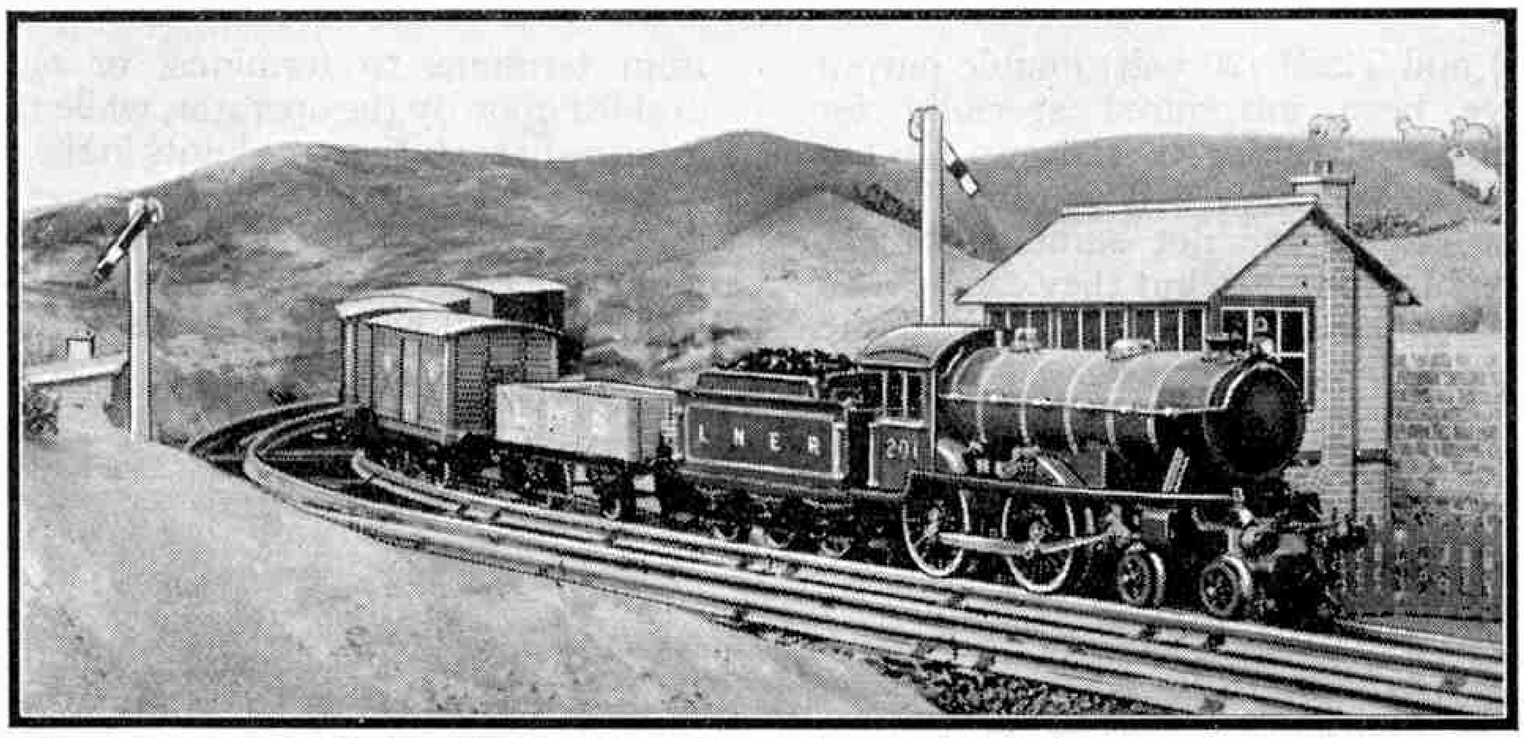
A Hornby No. 1 Special Tank Locomotive hauling a miniature goods train on the layout of P. Lancaster, Hull. The building and miniature figures in the background add considerably to the effect of the layout.

Of the three new High Capacity Wagons which have been introduced recently into the Hornby system, two are intended for the conveyance of coal and the third for carrying bricks in large quantities. The High Capacity Coal Wagons are eight-wheeled vehicles, and are representative of G.W.R. and L.M.S.R. practice. The G.W.R. vehicle is modelled after the all-steel 40-ton wagon used for the conveyance of locomotive coal, while the L.M.S.R. model is intended for a similar purpose, but has a carrying capacity of only 30 tons. The L.N.E.R. High Capacity Wagon, which also has eight wheels, represents the well-known timber-bodied 50-ton brick wagon used solely for the conveyance of bricks. A suitable load for this Wagon may be made from a piece of wood coloured to represent bricks. Alternatively, a sheet of cardboard on which is painted a miniature load of bricks could be used.

For enthusiasts who do not wish to make special loads of coal for their four-wheeled vehicles, there is the new "Hornby Railway Company" Coal Wagon that is supplied with an embossed representation of coal. This wagon is representative of many thousands of wagons belonging to industrial concerns, collieries and coal merchants. They are known generally as private owners' wagons. There are other items of goods

rolling stock in the Hornby system that are supplied complete with the appropriate loads. These include the Timber Wagons Nos. 1 and 2, each of which is loaded with miniature lengths of sawn timber. The Lumber Wagons, fitted with appropriate bolsters and stanchions, are well adapted for conveying a variety of lengthy loads in addition to the round wooden poles with which the No. 2 pattern is supplied.

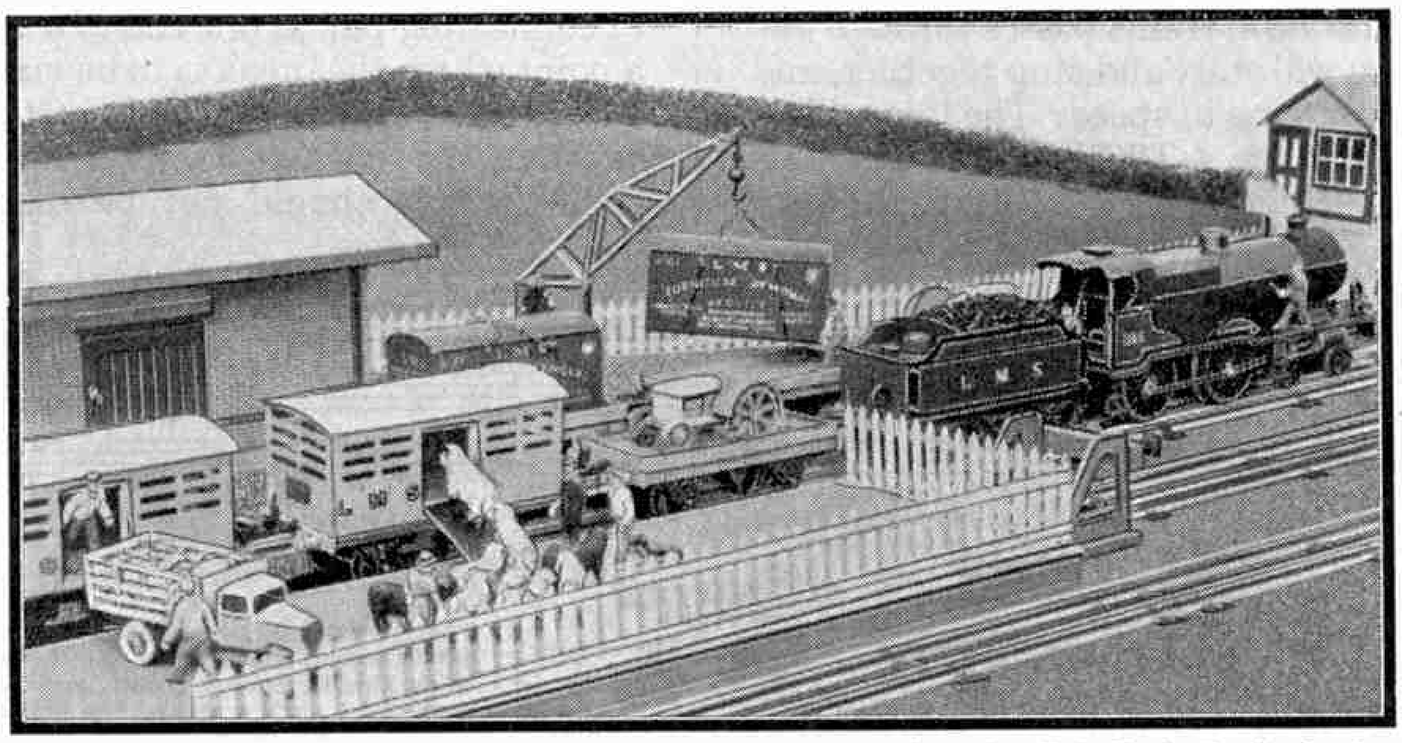
Other items in the Hornby Series that are supplied with realistic loads are the Flat Trucks with Cable Drums and Flat Trucks and Containers. The Cable Drums are perfect replicas in miniature of the drums used by the British Insulated Cables Ltd., and when they are secured to the Flat Truck in the correct manner the effect is very pleasing. The Containers are a more recent introduction and they are completely detailed in accordance with the latest actual practice.



A Hornby perishable freight train. The No. 2 Special Locomotives are particularly suited for hauling express freight trains and the L.N.E.R. model No. 201 "The Bramham Moor" can be seen in this picture.

The barrels supplied with the Hornby Barrel Wagon are useful items. They are carried in sets on the special wagons provided for them, but odd barrels look well mixed up with other articles of miscellaneous freight loaded on suitable wagons.

The Trolley Wagon is particularly well adapted for the conveyance of bulky items, as it is of the well type commonly used in actual practice. Meccano Parts, such as large girders, can be used for making up suitable loads for this Wagon. These are favourite forms of loads with miniature railway owners, and the wagons just mentioned are particularly useful for out-of-gauge traffic, for which special arrangements have to be made.


A miniature L.M.S.R. goods train on a Hornby layout. Excellent use is made of the Cattle Trucks for the transport of the live stock. Flat Trucks are used for Containers and one of these Trucks carries the farm Tractor.

Enthusiasts who are ballasting their tracks should not just place the ballast in a haphazard manner, but they should convey it to the required site in open wagons, or better still in the Hornby Hopper or Side-Tipping Wagons, which are ideal for jobs of this nature.

The Milk Van No. 1 and its load of Milk Cans should not be forgotten. Although milk tank wagons are now largely used in actual practice, of which a fine example in miniature is available in the Hornby Series, the familiar can or churn does not seem likely to disappear altogether for some time. The Hornby Milk Cans also are available in the No. 2 Set of Hornby Railway Accessories. They may be loaded into special trains consisting of milk vans, or alternatively they may be conveyed as convenient with other luggage carried by ordinary passenger trains. The No. 1 set of Railway Accessories has extremely realistic contents in the shape of articles of passengers' luggage, which are particularly suitable for conveyance by passenger or special parcels train.

Some of the miniature animals in the Dinky Toy Series form splendid consignments for the No. 1 Cattle Truck which is manufactured with sliding doors. In connection with the conveyance of cattle, a cattle pen is necessary if actual practice is to be followed closely. The construction of a suitable pen was described in the August 1932 issue of the "*M.M.*"

Some of the items of rolling stock in the Hornby range are not suitable for the conveyance of loads, but nevertheless their presence on a model railway layout is most desirable. For instance, the Petrol Tank Wagons are not designed for carrying loads, because this would serve no useful purpose, but they should be included on a layout, as wagons of this type are common features in actual practice. Some H.R.C. members go so far as to include miniature refineries on their layouts, in which petrol tank wagons are used almost exclusively.

Other Tank Wagons in the Hornby Series are the Bitumen Tank Wagons "Colas" and the Milk Tank Wagons previously mentioned. None of these vehicles is manufactured for loading for the reasons stated above, but their inclusion on a model railway system is essential.

Although it is not intended for the actual carriage of freight, the Crane Truck is a most useful item and should not be omitted from the equipment of any model railway. The crane portion revolves on the chassis, and a winding handle is provided for raising and lowering the loads.

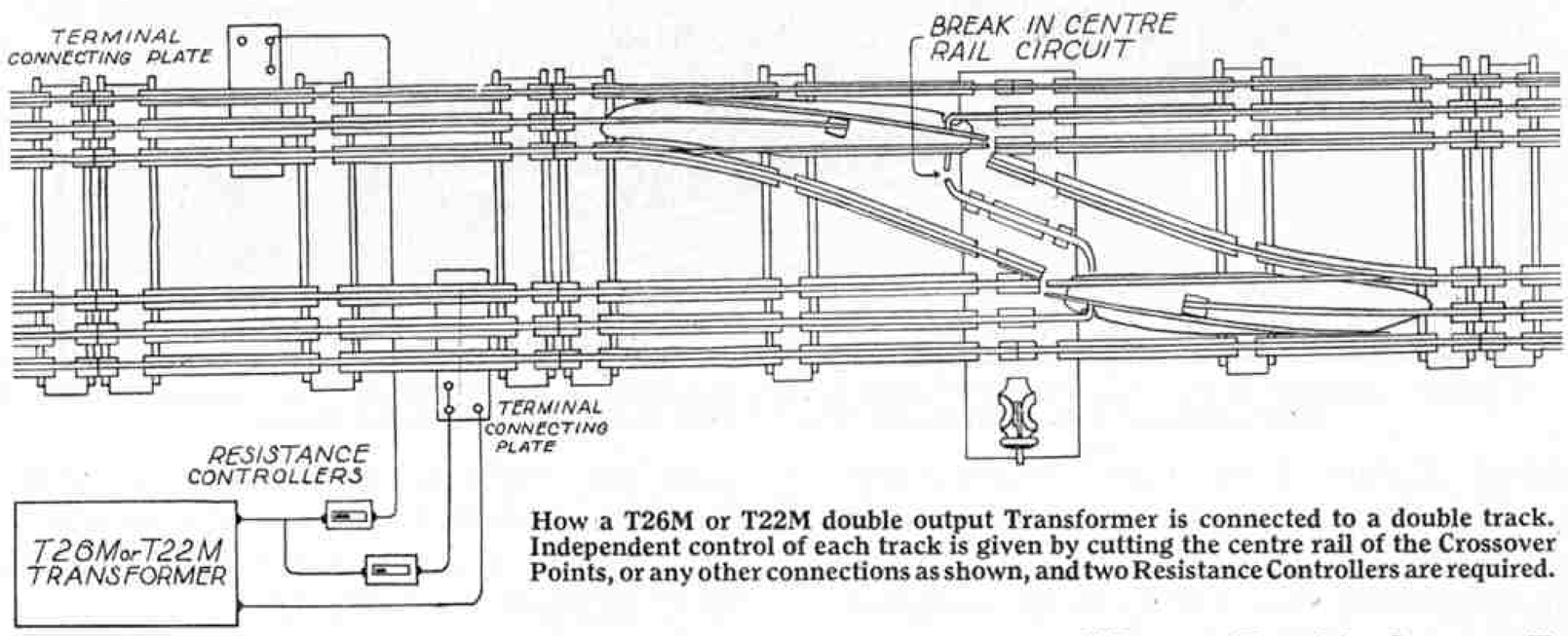
Lastly we come to "dummy" loads that can be arranged to be covered with tarpaulin sheets. For lightness, screwed up paper is most suitable for the "load," which should be covered by a Hornby Tarpaulin Sheet. The paper should be arranged in an irregular fashion, so that the Tarpaulin Sheets do not appear too "neat and tidy."

How to Use the Double Output Transformers

By "Tommy Dodd"

THE T26M (6-volt) and T22M (20-volt) double output Transformers have been introduced specially for Hornby railway enthusiasts wishing to run two electric trains simultaneously. The ordinary T6M, T6, T6A, T20M, T20 and T20A Transformers are not suitable for the simultaneous operation of two trains, but they can be used for running two trains separately if the track is divided into separate electrical sections, as described later in this article.

The double output Transformers are similar in operation to the other Meccano Transformers, except that the current output is sufficient to drive two trains at the same time either on the same track or on two separate tracks. The high-voltage A.C. mains supply is led to the Transformer in the usual way, through which it passes and emerges as 6-volt or 20-volt current, as the case may be. A suitable Resistance Controller must be used and the current from the Transformer must be led through this to the track by means of a Terminal Connecting Plate. With this arrangement two trains can be run on the one track, but as the current for both trains passes through one Resistance Controller they will start and stop together, and be subject to the same variations in speed. The lower illustration on this page shows how a T26M or T22M Transformer is connected to a single track for the running of either one or two trains as desired.



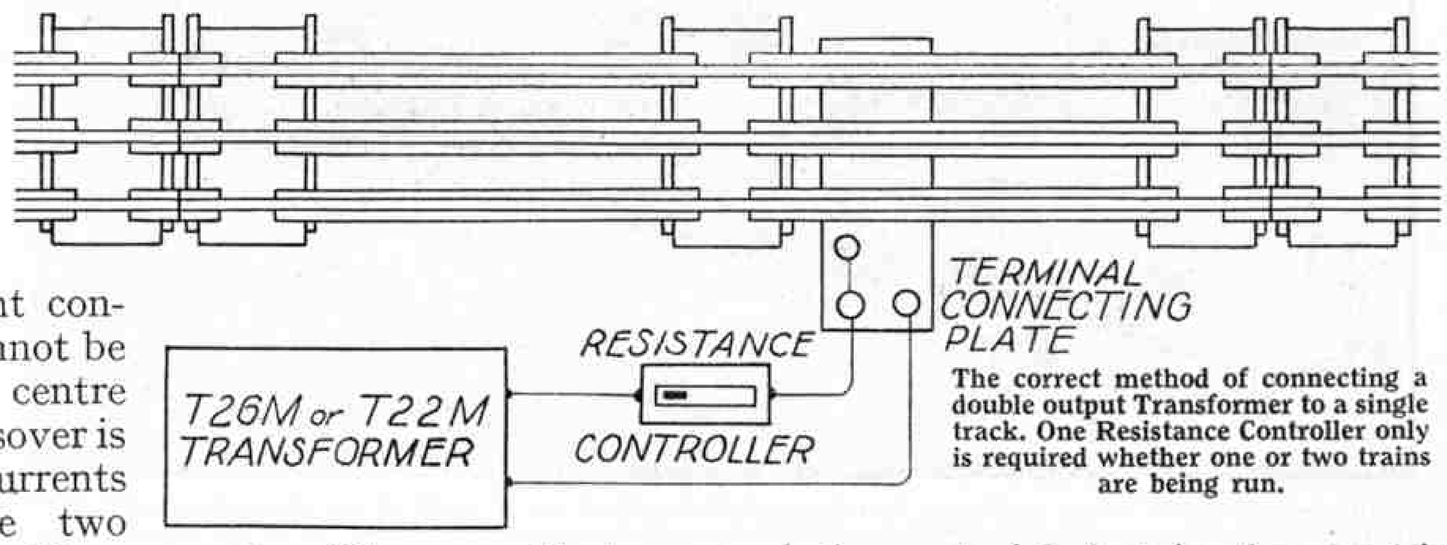
How a T26M or T22M double output Transformer is connected to a double track. Independent control of each track is given by cutting the centre rail of the Crossover Points, or any other connections as shown, and two Resistance Controllers are required.

When two tracks are being used, such as Hornby Double Track, with Crossover Points connecting them, independent control for each track cannot be afforded unless the centre rail circuit of the Crossover is broken, so that the currents flowing through the two tracks do not connect with one another. The upper illustration on this page illustrates how a double output Transformer is used to run two trains on Hornby Double Track connected by Crossover Points, the centre rail circuit of which has been broken. This is an important point that should be remembered if independent control is to be afforded to the two trains being operated. It will be noticed that each track has its own Terminal Connecting Plate, with a Resistance Controller inserted in the circuit. By means of the two Resistance Controllers, two trains, one on each track, can be operated entirely independently of one another as regards starting, stopping, and speed control. For instance, one train can be kept going at full speed from terminus to terminus, or on any other journey decided upon by the operator, while the other train stops at intermediate stations or shunts in the goods yard if required.

If one of the two trains being operated is transferred to the other track by way of the Crossover Points, it will come under the control of the Resistance Controller on the new track, and will behave in exactly the same manner as the train already being operated from this Controller.

The dividing up of the track into several electrically separate sections provides a means by which any reasonable number of trains can be controlled independently of one another. When a Double Output Transformer is being used two trains can be run simultaneously according to the requirements of the operator, while others remain standing on previously arranged "dead" sections of the track.

In order to isolate sections of the track, all that is necessary is to arrange gaps in the centre rail circuit at the desired points, so that the continuity of the electric supply is broken. The best method to adopt is to withdraw the spike, or connecting pin, at one end of a length of the centre rail at a point where the break is to be made. As the result of this a gap is left between the ends of the adjacent centre rails, so that the current is interrupted. The spikes in the running rails should not be disturbed.



The correct method of connecting a double output Transformer to a single track. One Resistance Controller only is required whether one or two trains are being run.

When the track is connected up by means of the Rail Connecting Plates, the gap between the centre rails is so small that there is a danger of the ends touching, and thus defeating the object in view. To prevent this possibility the gap should be filled in with insulating material. A strip of paper 1 in. long and one-quarter inch wide will fulfil this purpose admirably. It should be folded in two and then inserted between the adjacent centre rails before fitting the Connecting Plates in position. Then, when everything is connected up, the piece of paper is gripped tightly in position, so that complete isolation of the desired section is assured.

The power supply is connected to the main track at any convenient point in the usual manner by means of a Terminal Connecting Plate. The centre rails on each side of the gap must be wired up to a simple switch, such as that listed in the Meccano Elektron Parts (Part No. 1572), so that when necessary, the gap can be bridged electrically.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

MISSING WORDS CONTEST

There is continual keen interest among railway enthusiasts in locomotive types of all kinds, and for our competition this month we are turning to one that is perhaps not familiar to all H.R.C. members, but is nevertheless of great importance and value. This is the fireless locomotive. The first engine of this type was *"Fowler's Ghost,"* built as long ago as 1861 for use on the Metropolitan Railway in order to avoid introducing smoke and fumes into the long tunnels. This was not very successful, but efficient fireless locomotives are now used in chemical works, petrol refineries and other places where fires cannot be allowed for different reasons.

The panel on this page contains a short account of the manner in which a modern fireless locomotive works and of some of its advantages. In this account certain words are represented by dots and competitors are asked to discover the missing words.

All the words missed out are simple and straightforward, and there is nothing unusual in the manner in which they are used. It should be noted also that the number of dots has no relation to the number of letters in the words. When these have been discovered they should be written down on a sheet of paper in the order in which they appear in the complete account, and it is not necessary to write out the full story.

Can You Find the Missing Words?

Many . . . . have . . . . laid down on their own premises for shunting purposes. These . . . . are usually laid in confined spaces with sharp . . . . necessitating the use of short . . . . shunting engines and sometimes the nature of the work carried out at the . . . . necessitates the use of a fireless engine, owing to the risk of . . . . through flying . . . .. The . . . . that have available an ample supply of high pressure . . . . steam, the fireless type of locomotive has proved to be very successful. This is provided with a reservoir which is kept about two-thirds full of . . . .. This reservoir is charged from time to time with . . . . high . . . . . steam from stationary . . . . ., which is passed through a . . . . valve on the locomotive. The . . . . continue to draw on the reservoir until the pressure has fallen to the working pressure of the locomotive, after which . . . . is necessary.

In service the fireless types of . . . . engines have proved themselves capable of hauling exceptionally heavy loads. It has been known for one of them to . . . . up to nearly 700 tons on the level.

The competition will be divided as usual into two sections, Home and Overseas, and prizes consisting of any products manufactured by Meccano Ltd., to the respective values of 21/–, 15/–, and 10/6 will be awarded to the three competitors in each section who submit the most correct and complete lists. In the event of a tie for any prize, general neatness and novelty in presentation will be taken into consideration by the judges.

Competitors should write their names, H.R.C. membership numbers and full addresses on the back of their entries, which should then be placed in an envelope marked *"H.R.C. February Missing Words Contest"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, not later than 27th February. The Overseas closing date is 31st May.

Locomotive Drawing Contest

The attractions of a locomotive are not always due to its size or power, or even to its appearance. Many who are interested in railways have a special liking for engines that are not particularly notable in these respects, but are favourites because of some personal association or familiarity with them and their work. Age, too, is of no importance, for many cherish memories of locomotives of by-gone days, now broken up or relegated to humble duties in the shunting yard or elsewhere. We are giving members an opportunity of revealing their choice in this respect in a Drawing Contest, the subject of which is *"My Favourite Locomotive."*

To the three competitors in each section, Home and Overseas, who submit the best drawings, prizes consisting of any products manufactured by Meccano Ltd. to the respective values of 21/–, 15/–, and 10/6 will be awarded. On the back of each entry must be clearly written the competitor's name, H.R.C. membership number and full address. Unsuccessful entries will be returned if they are accompanied by a stamped addressed envelope of suitable size. Prizewinning entries will not be returned.

Envelopes containing drawings should be marked *"H.R.C. February Locomotive Drawing Contest"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, not later than 27th February. The closing date for competitors in the Overseas section is 31st May.

COMPETITION SOLUTIONS

"October Sharp Eyes Contest"

(1) No. 1 Special Mainspring Guard. (2) Sleeper for 2 ft. radius L.H. Point. (3) R.H. M.1 Piston Connecting Rod. (4) B.1 Rail. (5) Reverse lever for No. 1 Special. (6) No. 3 R.H. Slidebar. (7) Coupling Strip (Buttress) for Engine Shed. (8) Weighted Point lever. (9) Fibre Switch base for Electric Crossover Point. (10) Coach End for Riviera "Blue" and Saloon Coaches. (11) Solebar for all No. 1 Goods Rolling Stock. (12) M.O. Loco base. (13) M.3 Tank Smokebox door. (14) Automatic Coupling Hook. (15) Locking lever for Control System and T.C.P. (16) No. 2 Special Pullman Coach Roof. (17) No. 1 Passenger Coach Roof. (18) Signal Lever. (19) Bolster for Lumber or Trolley Wagons. (20) Base for Platform Crane or Goods Platform Crane. (21) Handrail for No. 1 Special Loco. (22) R.H. Switch Sleeper 9 in. radius point. (23) Automatic Coupling Link. (24) Buffer (No. 1). (25) Motor bracket for No. 1 Loco. (26) End beam for Nestles, Colas and United Dairies Wagons. (27) Bogie for No. 2 Special Loco. (28) Engine Shed Chimney. (29) Special Coach bogie side. (30) No. 1 Piston Connecting Rod. (31) L.H. Switch rail for 2 ft. radius point. (32) No. 3 Loco Piston, Crosshead and Connecting Rod. (33) Coupling Rod for No. 2 Special Loco. (34) Cab back for M.1 Loco (Electric).

"October Questions Contest"

(1) Southern, L.M.S., L.N.E., Met., and G.S.R. (Ireland). (2) Brakepipes painted red do not operate brake blocks, but are only through pipes. (3) This indicates to train men that the line is track-circuited. (4) The wagon is an end door type. (5) An extra pair of lines fitted parallel to the running lines and covered with sand to a depth of about 3 in., into which vehicles can be diverted and brought to a stand. (6) White—dummy levers, Red—stop signal levers, Yellow—distant signal levers, Black—points, Blue—locking bars. (7) The Aberdeen-Penzance coach, 792¼ miles. (8) 1888. (9) To derail trains running away backward. (10) Small Signal. (11) G.W.R., L.N.E.R. (G.E.). (12) Forth Bridge Co.

COMPETITION RESULTS

HOME

December "Mystery Loco Contest." The clever concealment of the different locomotive parts set competitors a difficult task to perform, but most competitors succeeded in discovering the majority of the hidden parts. The prizes were allocated as follows: First: C. E. Wrayford (6039), Moretonhampstead, Devon. Second: R. Burrows (6144), Sudbury, Wembley, Middx. Third: R. H. Mann (18111), Aspley Guise, Bletchley, Bucks. Consolation Prizes: F. E. Sykes (47721), Newsome, Huddersfield; E. Hill (38742), New Eltham, London, S.E.9; D. Tebbs (49585), Bexleyheath, Kent; P. A. Norton (49994), Coventry; P. D. Smith (43252), St. Albans, Herts.; R. O. Lyon (39292), Redland, Bristol, 6.

December "Railway Jokes Contest."—First: D. Fear (18477), Taunton, Somerset. Second: J. L. Makin (30933), Penwortham, Preston. Third: R. Garner (43574), Peterborough. Consolation Prizes: A. F. Milburn (16322), Chingford, London, E.4; H. Walkiden (40759), Kenton, Harrow, Middx.

OVERSEAS

September "Voting Contest."—The votes of the competitors placed the illustrations in the following order: 2, 9, 5, 6, 4, 3, 11, 1, 12, 7, 8, 10. The prize winners were as follows: First: A. McIntyre (30925), Winnipeg, Canada. Second: A. R. Bacon (38242), Camp Deolali, India. Third: D. Murison (37642), Buenos Aires, South America. Consolation Prizes: I. Brough (9112), Preston, N.18, Victoria, Australia; D. Parker (38595), Brussels, Ontario, Canada; J. A. Mallia (43679), Vittoriosa, Malta; G. F. Emmerson (48076), Greymouth, New Zealand; H. C. Key (24764), Calcutta, India.

September "Photo Contest."—First: H. Bennett (10615), Auckland, S.W.2, New Zealand. Second: E. A. Hamilton (42512), Southland, New Zealand. Third: T. A. McGavin (17018), Wellington, N.1, New Zealand. Consolation Prizes: I. Brough (9112), Preston, N.18, Victoria, Australia; G. E. Schulz (15425), Coromby, Victoria, Australia.

Summer "Puzzle Contest."—Three competitors sent in all-correct entries and the cash prize therefore has been divided between: T. Watson (18065), Leichhardt, N.S.W., Australia; E. A. Hamilton (42512), Gore-Te Tipua R.D., Southland, New Zealand; E. C. Heath (29104), West Pennant Hills, N.S.W., Australia.

HORNBY RAILWAY COMPANY

A REAL RAILWAY COMPANY WITH BOY DIRECTORS AND OFFICIALS

How to Become a Member of the Hornby Railway Company

Every boy who possesses a Hornby Train Set should join the H.R.C. and thus become entitled to wear the badge of membership, which is beautifully enamelled in colours and has as its central feature a tiny representation of a train. All that he has to do is to fill in the application form—a copy of which is enclosed in every Train Set, or may be obtained from the Secretary of the H.R.C., Liverpool—and to return this together with a remittance of 6d. (overseas 10d.) to pay for the badge. Immediately on receipt of the completed form the applicant is enrolled as a member of this great organisation, and a handsome certificate to that effect is forwarded to him along with his badge.

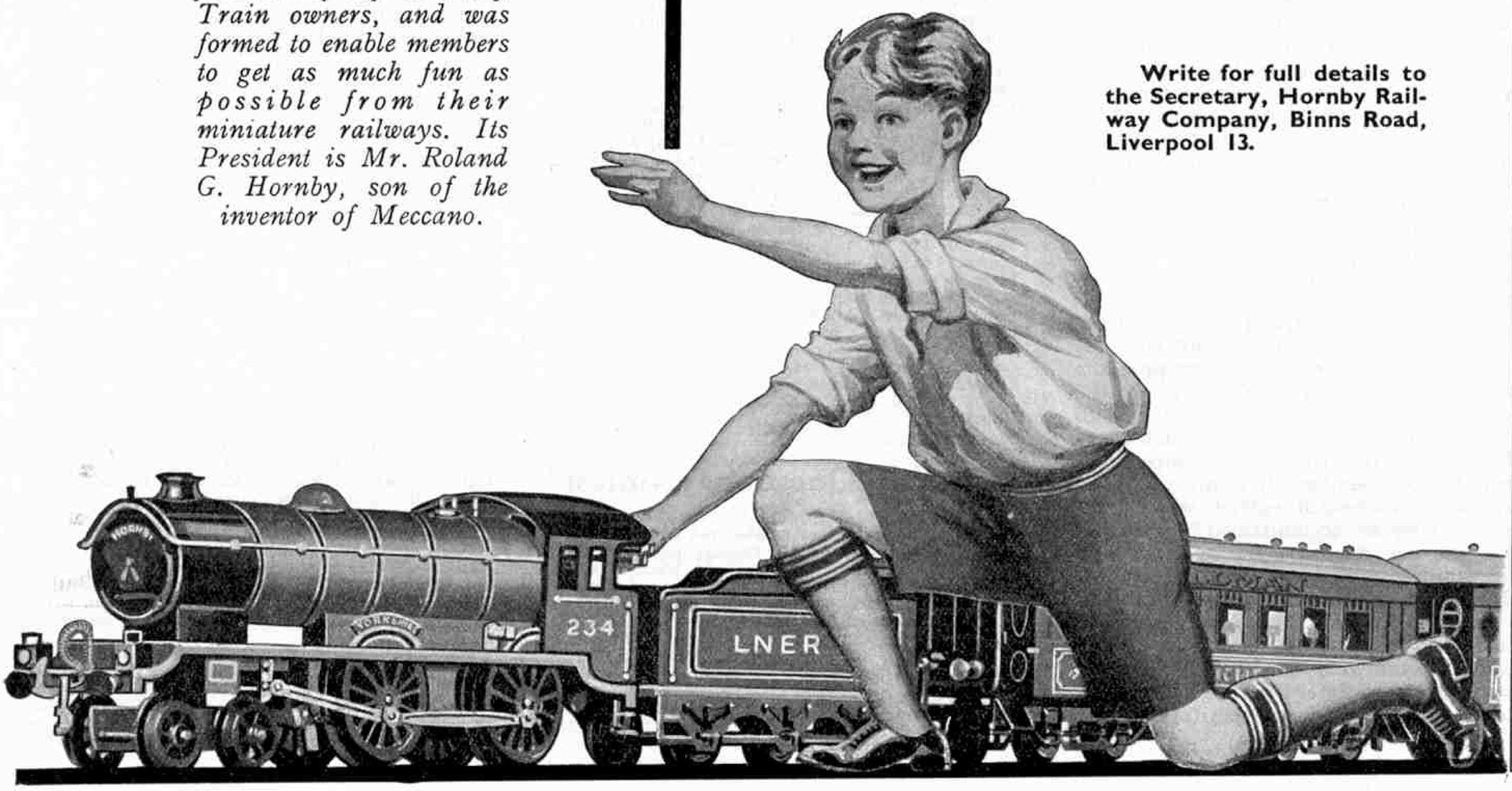
Members of the H.R.C. are entitled to many privileges. The chief aim of the Company is to enable its members to get as much fun as possible from their miniature railways. This can best be done by helping them to make their layouts and operations as realistic as possible, and competent railway experts on the staff at Headquarters therefore are continuously engaged in advising members how to make the best use of the material at their disposal.

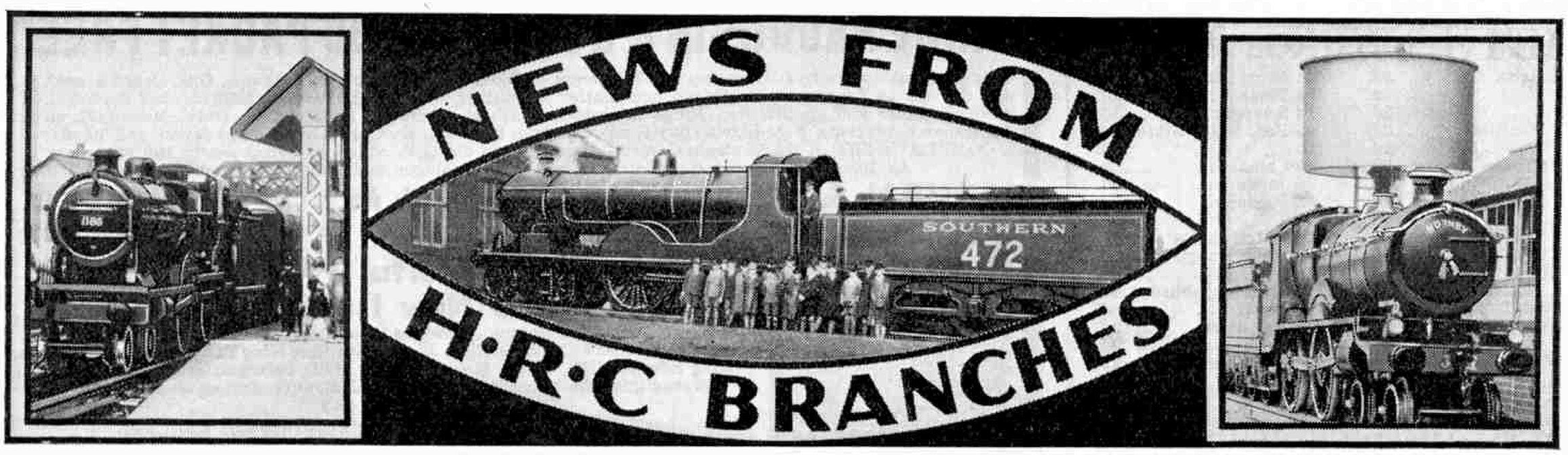
Join a Local Branch

The greatest fun is obtained from Hornby Trains by joining one of the many local Branches that have been formed in various parts of this and other countries. These Branches are composed of Hornby Train owners who meet together in order to carry out railway operations on a more extensive scale than is possible for a single individual. Every member should join a Branch immediately, or if one does not exist in his neighbourhood, he should try to induce other enthusiasts to help him to found one.

The Hornby Railway Company is a world-wide fellowship of Hornby Train owners, and was formed to enable members to get as much fun as possible from their miniature railways. Its President is Mr. Roland G. Hornby, son of the inventor of Meccano.

Write for full details to the Secretary, Hornby Railway Company, Binns Road, Liverpool 13.





Branch News

ISLINGTON.—The Branch scale track is being converted into double line track and this, together with the Hornby rails, will be used to make a new layout. A discussion held to decide on the best plan for this layout resulted in several interesting proposals. Visits have been paid to the Holy Trinity (Barnsbury) M.C., where members picked up several useful hints, and the L.M.S.R. Motive Power Depot at Camden, where members boarded *"Turbomotive," "Princess Helena Victoria,"* and were fortunate enough to see *"The Royal Scot"* and other well-known locomotives. Members recently organised a display at the annual Bazaar of a local church. Secretary: S. H. Gardener, 3, Tiverton House, Pleasant Place, Islington, N.1.

GLENGORSE (BATTLE).—A Fancy Dress Dance has been organised by the Branch, those attending having to make their own costumes. The evening was voted a great success by all. Train operation at meetings continues to be enthusiastically carried out. Secretary: P. Ballard, Glengorse, Battle, Sussex.

ELMSIDE (EXETER).—Following the completion of the relaying of the track, train operation on both open and timetable services has reached a high standard. Floodlighting and illuminations have added a realistic effect to the layout. The Branch locomotives and rolling stock are frequently overhauled to ensure the smoothest possible running. Several miniature railway containers have been made by members, and suitably painted and lettered. New sections of road and river, and several bridges have been added to the layout. Road services with Dinky Toys have increased considerably, and so much interest is displayed in this new venture, that keen rivalry between road and rail has arisen. An amusing diversion is the weekly reading of a "William" book in serial form. Secretary: K. W. Brewer, 18, Commins Road, Exeter.

ACTON.—A new track has been laid, and train operation on this has been successful. A Lecture in two parts on *"Local Railway Features"* has been given by D. Grant, a hand-drawn map being used to illustrate it. A Social Evening has been held to celebrate the first birthday of the Branch. Secretary: S. Simmons, 7, Alfred Road, Acton, W.3.

WATERLOO (DUBLIN).—Members have been very busy making improvements to the Branch layout. The track in the Headcorn area has been relaid, necessitating the special working of trains. Several new stations have also been installed in the layout, members carrying out the work in groups. Secretary: S. B. Carse, 38, Oakley Road, Ranelagh.

LOSTOCK GRALAM.—Weekly meetings are being held during the winter session. Interesting trains run on the layout have included the *"Scottish Braked Goods Express"* and an "Oil Special." Timetable services have also been run. An aerodrome and flying-ground made and painted in the Branch workshops have been added to the layout, and supplied with suitable Dinky Toys. Railway competitions similar to those announced on the H.R.C. Competition Page in the *"M.M."* are frequently held. A further interesting issue of the Club Magazine has been produced. Secretary: A. Milligan, Wincham Hall, Northwich.

NORTHAMPTON.—The running of trains to timetable has been the feature at meetings. A complete Pullman train was run for the first time, with great success. A shunting competition has provided an interesting diversion from timetable work. Games Nights are held regularly. The much discussed question of *"Electricity or Clockwork for Model Train Propulsion"* has been the subject of a Debate, members being equally divided in their opinions. Secretary: D. K. Adams, 8, Cedar Road, Northampton.

FOLKESTONE.—New points, rails, buffers and signals have been added to the Branch layout, and the track also has been extended. Two new stations, "Dover Marine" and "Folkestone Junction," have been built and installed in the layout, and "Victoria" Station has been provided with a coaling plant. High speed trains have been run to timetable on the much improved layout. These include local passenger, express, goods and boat trains. The latter run to "Folkestone Harbour" station in connection with a regular boat service. Meccano cranes handle goods at this station. Secretary: F. E. Saunders, 79, Dover Road, Folkestone.

AUSTRALIA

PERTH.—The Branch railway has been completely electrified, and much work is at present being put in on the signalling system. The secretary has designed a novel lever frame that can be easily extended to hold more levers. The largest signal cabin fitted with this type of frame has 42 levers installed. The Branch locomotives have been fitted with Hornby electric mechanisms to enable them to operate on the new track. Visits have been exchanged with the Maylands M.C., and a combined outing to the Darling Range was enjoyed. Special permission was obtained from the Western Australia Government Railways to walk along a certain section of the track, and to inspect the equipment on the line. Interesting visits have also been paid to a signal box and control room at Perth. Secretary: J. Stanbridge, 285, Lord Street, Perth, W. Australia.

Our 50,000th Member

Ian Knox, age 4, of Wakefield, H.R.C. No. 50,000. Master Knox was enrolled in December 1936, and then became one of the youngest of the 50,000 miniature railway enthusiasts in the Hornby Railway Company.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below.

BLACKPOOL—S. J. Chambers, General Holiday Camp, Stanley Road, Marton Moss.

CHALFONT ST. GILES—G. A. Rodway, "Walmley," Cokes Lane.

CIRENCESTER—G. W. Pollard, 119, Cricklade Street.

MALVERN—J. R. Hebden, Burford House, Worcester Road.

STOCKPORT—J. Greenland, 9, Clifton Road, Davenport Park.

YEADON—J. Speight, 8, Quarry Mount.

CANADA—E. K. Shorrock, 3565, Marshall Street, Vancouver, B.C.

Branches Recently Incorporated

316. GREENOCK—J. Agnew, 122, Dunlop Street.
317. FERRYHILL (ABERDEEN)—A. McKenzie, 27, Crathie Terrace.

SETS (POSTAGE EXTRA)

5	Malta	2d.	4	Negri Sembelan	3d.
10	„	5d.	4	Perak	3d.
1	„ Jubilee ...	2d.	4	Selangor ...	3d.
5	Mauritius ...	3d.	5	Fed. Malay State	2d.
1	„ Jubilee	4d.	10	„ „	5d.
5	Nigeria ...	3d.	10	China	2d.
1	„ Jubilee	2d.	35	Japan	6d.
5	Newfoundland	2d.	5	Philippine ...	2d.
1	„ Jubilee	3d.	10	„ ...	5d.
5	Straits Settlemts.	2d.	10	Dutch Indies ...	3d.
10	„ „	5d.	5	Hong Kong ...	2d.
1	„ Jubilee	4d.	10	„ ...	5d.
5	Trinidad ...	2d.	1	„ Jubilee	3d.
1	„ Jubilee	2d.	15	Persia	6d.
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15	„ ...	4d.	5	Syria	2d.
20	„ ...	6d.	4	Lebanon ...	2d.
1	„ Jubilee	2d.			

J. RUSSELL
23, Shanklin Drive, Westcliff-on-Sea

ABYSSINIA

A timely offer, which should not be missed, of a superb **MINT** set of 30 diff. stamps from this mysterious country, mostly 1917-31 issues (cat. over £1), with scarce **AIR STAMPS, COMMEMORATIVES, PICTORIALS, ETC.** Price 5/- only, secure them while you can. We offer superb collections of any country at bargain prices. Full lists FREE.

NORRIS & CO. (Dept.M), NORWOOD, LONDON, S.E.19

PRINCE BAUDOUIN & QUEEN ASTRID PACKET FREE!

This excellent and unrivalled packet of 33 different includes two beautiful large stamps. One, issued a week ago, depicts the Belgium Crown Prince, and another his mother, whose tragic death in 1935 shocked the world. Also his father and grandfather, Kings Leopold and Albert. There are stamps from Italy (Mussolini), an Australian Cable issue, Jugo-Slavia (Boy King), sets from Bohemia, Hungary, Canada, and Japan, and, finally, a COMPLETE SET of the Olympic Games stamps and an old Q.V. emission, issued nearly 100 years ago. All free. Just request approvals and free 1937 catalogue and send 2d. postage.

LISBURN & TOWNSEND (Dept. M.M.), LIVERPOOL 3

FREE Wonderful 1937 offer 20 New Issues and Novelties

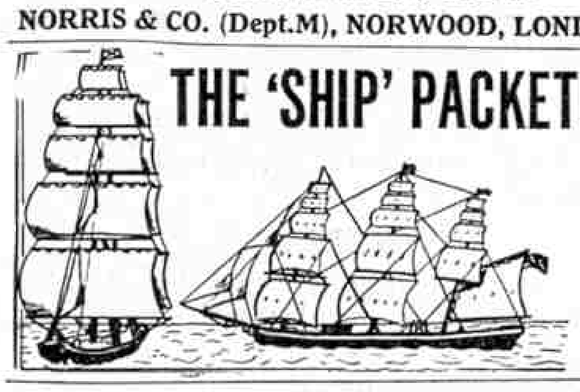
Including **Algeria** (centenary), **Bermuda** (Hamilton Harbour), France (new colour), Ivory Coast (head of Native Girl), Jugo-Slavia (**Boy King Peter**), Morocco Agencies (**King Edward VIII**), **Perak**, Roumania (**Air Mail**), **Selangor**, Senegal (bridge), etc. I will send this collection absolutely free to all stamp collectors sending 2d. postage. (Abroad 4d.)

G. P. KEEF, WILLINGDON, EASTBOURNE, ENGLAND.

THE "DIAMOND" PACKET IS THE ONLY PACKET

OF UNSORTED STAMPS ON THE MARKET with 15 years' reputation behind it. It contains approx. 1,000 UNSORTED STAMPS from Convents abroad. MANY RARE STAMPS have been found in it. 1 pkt., 1/6; 3 pkts., 3/9; 5 pkts., 6/-. All post free inland. Postage to Colonies 3d. per pkt. extra. Foreign, 6d. extra.
Ask your stationer for the "Diamond" packet.
SPECIAL TURKS ISLANDS JUBILEES complete set, used or unused, 5/6.

O. NERUSH (Dept. A), 68, TURNPIKE LANE, HORNSEY, LONDON, N.8.



THE 'SHIP' PACKET

This marvellous packet is offered under cost as an advertisement, **45 different stamps each with a ship on it.** A regular armada. **GABOON**, New Issue **SENEGAL** (Canoe), wonderful flotilla of caravels from **DENMARK** (complete set), **NEW CALEDONIA, IVORY COAST, COSTA RICA**, a fleet of **7 CHINESE** junks usually sold at 10d., **TRINIDAD & TOBAGO, MAURITIUS, KENYA-TANGANYIKA, NEWFOUNDLAND, U.S.A., B. GUIANA**, set of **S. AFRICA, GREECE, POLAND, INDO-CHINA, FRENCH OCEANIA WALLIS & FUTUNA ISLANDS.** etc. Price **4½d.**, postage 1½d. (abroad 3d. extra). Purchasers of this packet asking for approvals receive **FREE** set of **3 SPAIN** (Columbus, each with his ship on it). Senders of addresses of stamp collectors receive **FREE** set of **6 VENEZUELA or 6 PERSIA, 100 BRITISH COLONIALS 1/-, 20 AIRPOST 6d., 6 TRIANGULARS 6d., 50 PERSIA 4/-, 2 ASTRID** (mourning stamps) **2½d., VOLUMES OF B.O.P. CHEAP.**

H. C. WATKINS (M. Dept.), Granville Road, BARNET

ONE THOUSAND STAMPS ON APPROVAL

From which you may select any 100 for 3/-.
This selection is not made up of the very commonest varieties, but contains stamps catalogued at 1/- each or more. (I do not sell less than 100.)

H. HARDY, "Hoyland," Potter Heigham, Norfolk.

Air Mail • King Edward VIII • Pictorials—Another BUMPER Gift

For every stamp collecting reader of the "MeccanoMagazine"—a luxurious feast of stamps—**FREE.** Beautiful mint 1d. **New Zealand Airmail, King Edward VIII** Colonial, just issued, **Roumanian** Airmail, and, **in addition,** a surprise selection of magnificent **Pictorials, Novelties and Commemoratives.** A free packet sparkling with interest for your collection. **ACT NOW**—send 2d. postage and ask for a selection of **Globe-Trotter** approvals, famous for sensational value. Ask for particulars of **FREE** stamps every 14 days!!!

GLOBE-TROTTER, 17, WINCHESTER RD., BIRCHFIELD, B'HAM.

HAVE YOU SEEN OUR APPROVAL SHEETS?

FREE. For 30 days (abroad 60 days) we offer our special GIFT PACKET, including BELGIUM PRINCE BAUDOUIN, DARWIN CENTENARY, MONGOLIA and many other attractive stamps FREE to applicants for our APPROVAL SHEETS.
Department 258
ERRINGTON & MARTIN, South Hackney, London, E.9
Established 1880.

FREE TRIANGULARS • JUBILEES • AIR MAILS FREE

We consider this to be the **finest Free Offer** we have yet made, as this unique collection includes: Switzerland (Dove of peace), beautiful Mozambique **Triangular (Air Mail)**, Canada Jubilee (King George and Queen Mary in State Robes), 2 fine **Mint Air Mails** and a fine collection of **25** different superb British Colonials), all of which will soon be obsolete. This wonderful packet will be given **FREE** to all who send 2d. postage and request approvals. No approvals sent abroad. Price of packet alone **9d.**

MICHAEL HERBERT (M.M.), 8, Woodstock Rd., Walthamstow, London

GET THESE MINT SETS NOW!!

11 Morocco A., K.E. VIII, complete		... ...	1/9
4 Zanzibar "Silver Jubilee"		... ...	2/-
5 New Zealand "Commerce," scarce		... ...	5/6
3 Egypt "Treaty"		... ...	2/-
6 Liberia "Airs" ...	1/6	10 Mozambique "Airs"	1/6
4 Nauru "Jubilee" ...	3/6	4 Newfoundland "Jubilee" ...	4/-

CASH WITH ORDER—POSTAGE EXTRA.
H. L. GOMM,
41, Upper Cranbrook Road, Redland, Bristol 6.

ARMAGEDDON PACKET FREE!!

This interesting packet contains stamps showing naval and military subjects and stamps for whose issue war has been responsible. Included are **TURKEY** (cruiser "Hamidie"), four-coloured **AZERBAIJAN** (standard-bearer), **BOSNIA-HERZEGOVINA** (Archduke whose murder started Great War), **GREECE** (Battle of Navarino), set of 3 mint **AUSTRIA** (infantry, cavalry, artillery), mint **BELGIUM** (famous "tin hat" issue), **GREECE** (cruiser "Averoff"), mint **TURKEY** (soldiers off to the front), **AUSTRALIA** "Anzac" commem. (the Cenotaph, Whitehall) **CANADA** (war tax), etc. The packet will be sent free only to genuine approval applicants sending 2d. postage and packing. (Overseas 1/-.)

HELY. HUTCHINSON (M.4), Hurrock Wood, Kents Bank, Grange-over-Sands.

The NEW "TRANSPORT" Packet

Contains a wonderful assortment of 44 foreign and colonial stamps including the following, which depict various means of transportation, **Tunis** (water carrier), **Senegal** (bridge and boats), **Mauritania** (crossing desert), **Mid. Congo** (train and bridge), **Sth. Africa** (ship), **Germany** (aeroplane), **Austria** (horseman), **Indo China** (boat), **Mozambique** (aeroplane), **Gaboon** (raft), **Greece** (bridge and liner), **St. Pierre and M.** (trawler), **Fr. Guinea** (native carriers), **Dutch Indies** (Steamboat), **Madagascar** (native transport), **Brazil** (aeroplane), **Belgium** (train), **Roumania** (aeroplane), **Newfoundland** (steamship), **Fr. Morocco** (camels). Price **6d.** Purchasers asking for approvals will receive **Ceylon** Silver Jubilee and Pictorials free.

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4, MARLBOROUGH ROAD, LONDON, S.W.19.

"WORTH WHILE"

Free 25 BRITISH COLONIALS 25 Free

Jubilees, Commemoratives, Pictorials, etc.
Send 1½d. stamp for postage, and ask to see a selection of my **"WORTH WHILE"** approval sheets and receive this excellent **FREE GIFT.**
The best packet you have ever had.
"WORTH WHILE" sheets for stamps Worth While.
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FREE STAMP WALLET

(Size 3¾ by 5½ inches) fitted with Perforation Gauge, etc., and containing
MINT SET OF BRITISH COLONIALS
(1d.-1/-) to approval applicants enclosing 3d. (in stamps) for postage and packing.

A. B. LEWIS (Dept. B8),
16, Cricklewood Lane, London, N.W.2

CHEAP APPROVALS

My beautiful Approval Selections are ideal for filling those vacant spaces. Pictorials, Colonials, and hard to get items. Selections from 4 a 1d. Free Gift Bi-coloured Persia all applicants.
A. V. TAPP, 26, WINDSOR ROAD, BRISTOL, 6.

4 Belgium, Prince Baudouin, Mint	... ...	5d.
8 Belgium, Prince Baudouin, Complete, Mint		2/-

Mix up 100 stamps with Dutch Triangle, Jubilees, War Pictorials, Commems., Colonials, **6d.** All post 1½d. extra. Selections sent if desired.
J. R. MORRIS, 9, Audley Road, Folkestone, Kent.

ALL BRITISH COLONIAL APPROVALS

Fine BRITISH COLONIAL PICTORIAL SETS OF CAYMAN ISLANDS and GAMBIA FREE to all Collectors sending 2d. in stamps and requesting ALL BRITISH COLONIAL APPROVALS. BRITISH COLONIALS ONLY on approval at bargain prices, including JUBILEE and NEW PICTORIAL ISSUES, West Indies, East and West Africa, Cyprus, Iraq, Newfoundland, Papua, and many other fine Colonials. (No stamps sent Abroad.) C. H. SHAW (Dept. M.2), 95, CHRISTCHURCH AVENUE, KENTON, HARROW.

See also other stamp advertisements on pages 124 and xv

Stamp Gossip

and Notes on New Issues

One-Colour Collections

Readers who are seeking a novel line to take in stamp collecting might well consider the making of special colour collections.

Recently we saw an album in which each page was devoted to stamps in one special colour, or combination of colours, and it looked amazingly attractive. One page contained nothing but blue stamps, another was devoted to red stamps, a third green stamps, a fourth purple stamps, and yet a fifth black stamps. Other pages showed only stamps in particular colour combinations such as red and blue, green and red, purple and green, and so on. The collection had been formed largely as a novelty, but also to show the colour ranges employed in modern stamp printing.

The majority of the stamps were commemoratives, picked up at very small cost, and, of course, they were in mint condition, since postmarks would have spoiled the effect of the colours.

Stamps Used Abroad

A young collector showed us a cover that had been posted in Sweden but which was franked with a Dutch Peace stamp. He wished to know whether the cover was valuable.

Occasionally it does happen that a wrongly-stamped letter slips through the post and such covers have an attractiveness. They are postal freaks, however, and their philatelic value is very small, although a specialist collector might be prepared to give a good price for a particularly desirable item.

It is a different matter entirely when the stamps of one country are authorised for use in another country, as, for example, the stamps of Great Britain used in Jamaica, and those of India used in the Straits Settlements. Such stamps in effect have become the official issues of a second country and they rightly possess philatelic importance and value.

The Christmas Charity Issues

This month we are able to illustrate more of the Christmas Charity issues to which we referred in our December and January issues, notably the Belgian design showing the heir to the Belgian throne, Prince Baudouin, the Luxemburg issues showing Wenceslas I, Duke of Luxemburg (1353-1383), and two of the Swiss Pro Juventute stamps, showing respectively Hans Georg Nageli (1773-1836), a popular composer of light music, and a typical girl from the Neuchatel Province.

The Dutch charity issue consisted of four stamps each bearing the allegorical design of a child and post horn as illustrated here. The values range from 1½c. to 12½c., each stamp bearing a charity premium.

The Dutch Colonial issue, also illustrated here, is strikingly interesting. This series bore premiums in aid of Salvation Army funds, and in the background there is a representation of the Salvation Army badge. The main motif of the design is the feeding of a young child.

The Danzig Winter Relief series contained five stamps, each of them showing one of the ancient gates of the Free City. We illustrate the 15p. value showing the Milchkannenturm.

Esthonia's winter charity series appeared on 2nd January and consisted of four stamps, bearing designs showing the arms of various Esthonian cities, as follows: 10 senti + 10s., arms of Paisk; 15s. + 15s., arms of Pakware; 25s. + 25s., arms of Valga; 50s. + 50s., arms of Viljandi.

This series was limited to 50,000 sets with 30,000 additional copies of the lowest value.

Stamps of Three Reigns

It is probable that stamps bearing the portrait of King George VI will be available to celebrate the Coronation in May next. In that eventuality there will arise the unique position of the stamps of three British reigns being on sale simultaneously, for certain King George V values must do duty for several months to come, and it is yet too early to demonetize the King Edward VIII stamps.

Readers who collect cover novelties no doubt will take the opportunity of posting themselves a letter on Coronation Day franked with stamps of the three reigns.

An Interesting Discovery

Shortly there is to be put up for auction an early envelope postmarked in Hull 27th March 1841, which is franked by one of the famous 2d. blue stamps bisected vertically and used as a 1d. stamp.

"Antigua Penny Puce"

By Robert Graves. Constable and Co., 7/6 net.

Our older readers who divide their interest between stamp collecting and good light literature will enjoy this latest novel from Mr. Robert Grave's pen.

The story hinges around a stamp collection formed by a brother and sister in their childhood days, in which collection there is housed a unique stamp described as "Antigua, Penny, Puce." The stamp was one of a consignment of new issues en route to Antigua for use in that Colony. The ship bearing the stamps was wrecked, and the captain used one to frank a farewell message that he put into a bottle and cast to the mercy of the waves.

The story relates a comedy of vindictive competition between brother and sister for possession of the stamp in later years. Twice it was put up for auction and once it figured in litigation, and the auction and court scenes are among the most interesting chapters of a novel that will appeal to a wide public.

* * * *

A new 1f.50 French stamp has been issued to commemorate the recent Universal Peace Assembly at Brussels, which movement was started in France. The design shows a crowd of people saluting the figure of Peace.

New Zealand Health Stamp

The 1936 New Zealand Health stamp, illustrated on this page, maintains the charm and novelty of design that has characterised the previous issues in this series. The design this year shows the head of a young girl peeping through a lifebelt, superimposed upon a view of the grounds of a sanatorium.

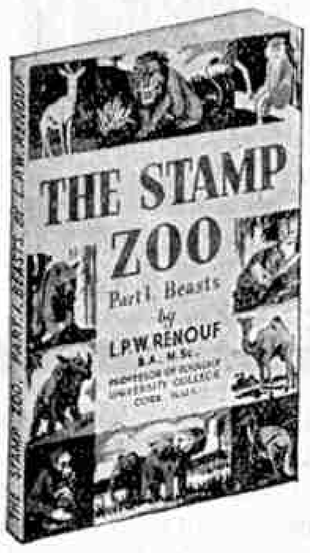
The issue, as usual, consists of just one stamp, 1d. value bearing 1d. premium for charitable work among children.

For 100% Enjoyment from Stamp Collecting

READ THE "STANPHIL" STAMP BOOKS

Half the interest of collecting is to know as many as possible of the fascinating—often really thrilling—stories that the designs of your stamps tell. But how can you find them out? The answer is: With the aid of the "STANPHIL" STAMP BOOKS, each one of which deals in expert manner with a popular subject well represented among the world's stamp designs.

The Following are Now Ready—Get Them All



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2. **NATIVE RACES OF THE STAMP ALBUM** By A. E. Gould, L.L.A.
3. **LAND TRANSPORT in the STAMP ALBUM** By A. E. Gould, L.L.A.
4. **THE STAMP ZOO. Part I. Beasts** By Professor L. P. W. Renouf, B.A.
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ALL 1/- EACH (Postage extra, 2d. each)

STANLEY GIBBONS LTD.
Dept. S.15, 391 Strand, London, W.C.2

PROPHETIC NEWS

Any "M.M." Reader in Any Part of The World.

I told all readers that the Morocco Agencies were going to be good, before even their date of issue was announced.

NOW LISTEN

There may still appear further stamps of King Edward from the Colonies. **The first stamps of the new reign** will be posted direct to you from every part of the empire. If your order is too late for posting on first day, you will receive covers posted as soon as possible after.

PRICES:

½d., 1d., 1½d. (and where issued ¼d.) from each of 64 Colonies	£1 10 0
As above, but to 3d. value	£4 0 0
Complete set to £1 value	£100 0 0

¼d. stamps in most colonies will be released after first issue. THESE WILL BE SENT ON SEPARATE COVERS.

6d. ANOTHER UNUSUAL OFFER 6d.

Those not ordering complete sets may have the new stamps posted direct to them from any country in the Empire from 6d. each (½d., 1d. and 1½d.). These will *NOT necessarily* be posted on date of issue.

Place your orders now for MINT King George VI Colonials at 2d. in the 1/- over face value. These will be in enormous demand.

Have you read "Antigua Penny Puce," by Robert Graves? The book of the year. 7/6, postage 6d. extra.

INVESTORS' STAMP CLUB

Here are some of the stamps sent out in our 6d. monthly packets:
½d. to 2d. mint Nigeria ½d. to 2d. mint Bermuda 2c to 9c used Ceylon
½d. to 2d. mint St. Lucia 12 Jubilees 5c to 20c used Kenya
WHY NOT JOIN. 6d. PER MONTH. 5/- PER YEAR.

Tel: Temple Bar 8642. ARCHIBALD F. McQUARRIE
161a, Strand, London, W.C.2, England

NEW ZEALAND JUBILEE PACKET FREE!

This **Marvellous** Packet contains a **Large** and **SCARCE NEW ZEALAND JUBILEE Pictorial**; Large **Paraguay AIR MAIL** Pict.; Old **NATAL** (Q.V.); Fine set 8 **Canada**; Fr. Peace; **Hindenburg Mourning**; China **Sun Yat Sen**; Old **Cape of Good Hope**; **NEW Polish** Pictorial; **Transvaal** (K.E.); Set U.S.A. **Chicago Exposition Picts.**; New Caledonia Pict., etc. **ALL FREE** to those enclosing 1½d. postage and requesting our **BARGAIN** appros. of **Large** Pictorials, etc. **THE PUKKA STAMP CO., 27, Normandy Avenue, BARNET.**

Special Offers. Mint Sets

(Postage extra.)

Zanzibar, Sultan's Jubilee, complete	1/4
Belgium, Prince Baudouin, set of 6, 1/-, set of 3	4d.
Egypt Airs, set of 5	7d.
Kenya, set of 3, 5d., set of 6	1/7
40 British Cols., 6d. Pictorial Packet	2/6

A. LUCAS, 60, PARK STREET, BRISTOL.

GRAND FREE GIFT

FINE COLLECTION of 20 old SPANISH STAMPS, including several scarce Queen Isabella and Alfonso XII issues; also old Spanish Morocco, to applicants for approvals enclosing 2d. postage; to every tenth applicant a beautiful Queen Astrid Mourning Stamp is added; many other fine gifts.

R. WILKINSON, 18, ST. PETERS ROAD, CROYDON.

QUEEN ASTRID PACKET FREE!

This huge gift parcel contains **507 FOREIGN** stamps, many scarce, with **QUEEN ASTRID MOURNING STAMP, FINLAND, EGYPT, RUSSIA, HUNGARY, SPAIN, S. AFRICA,** etc., etc. Just send 2d. stamp and request my **FAMOUS EXTRA-LARGE-DISCOUNT APPROVAL SHEETS.** (Abroad 6d. P.O.) Price of parcel without approvals, 1/-.

E. EASTICK, 22, BANKSIDE RD., BOURNEMOUTH.

THE MURDER PACKET FREE

This unique packet contains stamps bearing the heads of **Murdered persons only. RUSSIA** (Czar), murdered in a cellar. **ITALY,** Romulus and Remus (one killed the other); Cæsar (stabbed). **JUGO-SLAVIA,** special mourning stamp for King Alexander (who was shot). **4 CHINA,** Martyrs issue—Teng-Keng and his three compatriots (all were assassinated). **GREECE,** Rigas Feros (poet, killed by the Turks). **U.S.A.,** President Lincoln (shot in a theatre). Absolutely **FREE.** All you have to do is to send 1½d. postage and ask for approvals. Senders of collectors' addresses receive 6 Persia or 6 Venezuela free. 100 British Cols., 1/-; 20 Airpost, 6d.; 6 Triangular, 6d.; 20 Brazil, 8d.; 1,000 different, 3/11, 10 newly issued Pictorials, 6d. **H. C. WATKINS (M. Dept.), GRANVILLE ROAD, BARNET.**

50 BRITISH COLONIALS ABSOLUTELY FREE to all applicants for my cheap "Super Value" approvals.—Wm. G. Lucas, 32, Monks Road, Coventry.

FREE! Pictorials from Bechuanaland, Bermuda and Nigeria, to all applicants for my approvals. Post. 1½d. —The Hillside Stamp Co., 7, Hillside Gardens, Barnet.

FREE. 100 diff. Stamps, Perf. Gauge and Watermark Detector, request approvals.–Lymbery, Brunton-Joyce, Nottingham.

FRENCH COLONIES

18 scarce short-lived colour changes, cat. 5/2, mostly 20c. and 30c. values, from Martinique, Sudan, Cameroons, etc. Superior lot 2/-
100 diff. various F.C.'s 1/6

KING EDWARD VIII

The set of 4 values King Edward G.B. overprinted for use in Morocco, unused, sent free to all genuine applicants for approvals enclosing 2d. postage. Bound to be a short-lived set.

CANADA

A fine used set of 50, various issues, including Ottawa Conference, Jubilees, 1932 Provisional, Cartier, coil stamps, King George VI, etc., a splendid lot 2/-

R. D. HARRISON - ROYDON - WARE

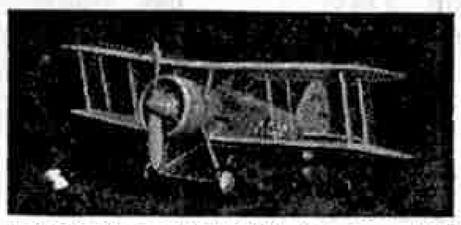
AEROMODELS 1/24th Full Size (Non-Flying) Scale Model Construction Kits

AEROMODEL KITS ARE REALLY WONDERFUL

YOU WILL BE AMAZED AT THE WEALTH OF DETAIL IN THE COMPLETED MODELS

WHY NOT BUILD ONE YOURSELF?

Postage Abroad Extra



"GLOSTER GAUNTLET." Wing Span 16⅜"

ILLUSTRATION IS AN UNTOUCHED PHOTOGRAPH OF A MODEL BUILT FROM ONE OF OUR STOCK KITS

LOOK AT THIS FOR VALUE!

Comper "Swift" ...	Price 3/6
De Havilland "Fox Moth"	,, 4/-
S.E. 5a 3/6. Hawker "Hart"	,, 5/-
Sopwith "Camel" ...	,, 4/-
Bristol "Bulldog" ...	,, 6/-
Gloster "Gauntlet" ...	,, 5/-
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FREE Please send me Illustrated Literature containing full details of all Aeromodel Kits

Name .....

Address .....

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AEROMODELS LTD., Dpt.D, 1st Floor, Wellington Bldgs., STRAND, LIVERPOOL

Post Coupon To-day. ½d. Stamp if envelope is unsealed

See also other stamp advertisements on pages 122 and xv

The Last Edwardian Stamps

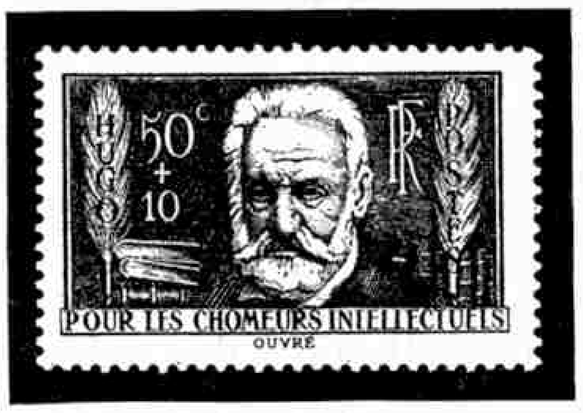
The last issue of British Colonial stamps to appear during King Edward's reign was the Zanzibar set commemorating the Silver Jubilee of the Sultan Kalif ben Harub, that appeared on 9th December last.

There were four stamps in the series, each bearing the design illustrated on this page, showing a portrait of H.H. the Sultan set in a scroll bearing the commemorative dates 1911-1936 in English and Arabic numerals. In the background there is an elaborately carved Arab door.

Stamp Glossary

In a recent issue of the "*M.M.*" we gave a brief glossary of terms commonly used in stamp collecting and we give below a number of helpful additions to that list.

"Back Stamp." This is an arrival postmark applied usually on the back of the envelope. It is particularly valuable when it is desired to prove that a letter has made a journey between two given points in a given time, as for example, by air mail, for in conjunction with the despatch postmark it proves the time occupied on the journey. Most countries make a practice of back stamping correspondence carried by air, but the British post office have steadfastly refused to afford this facility to collectors of air mail covers.



"Face Value." This expression means the actual sum paid to the post office for the stamp. In the case of charity issues, in which the stamp has a postal value plus a premium to be devoted to charitable purposes, the face value is the total of both charges.

"Tied." This expression is encountered when dealing with stamps on cover or on piece, as fragments of covers are termed. The stamp is said to be tied to the envelope when the postmark overlaps the stamp and the cover, thus proving the authenticity of the stamp. If the postmark is entirely on the stamp, or entirely off it, there is no proof that the stamp was actually used on the envelope to which it is now attached.

* * *

For more than 10 years the postal charges in force in the Union of South Africa have rendered a 1½d. stamp unnecessary, but it has been decided now to add this value to the range of pictorial stamps. The design chosen shows a view on the surface of a gold mine. This is the first design issued by South Africa and the stamp should prove very popular.

The inscriptions appear alternately in English and Afrikaans throughout the sheet.

Origin of King Edward VIII Stamp Design

In September, when the King Edward stamps first appeared, there was much speculation as to who was responsible for the design. It was variously attributed to certain highly placed officials at the G.P.O., and to Mr. Guy Harrison, a director of Harrison and Sons Ltd., who are printing the stamps.

The truth is revealed in the January issue of *Gibbons Stamp Monthly*, which shows that the originator of the basic plan of our new stamps was not a famous artist, nor a great printing expert, but an eighteen-year-old British youth, Mr. H. J. Brown of Torquay.

Early last year, anticipating that a design for the new stamps would be required, Mr. Brown thought he would like to try his hand at the job. After considerable thought and experiment, he evolved a design that had in it all the essentials of the one actually used. He sent his design to the Postal Authorities in April and they, in their turn, sent it to Messrs. Harrison and Sons to see if it would be helpful to them.

Thus the most-discussed stamp design of the century originated in the brain of a stamp collector who had only recently left school, for it was only in 1935 that Mr. H. J. Brown left Monkton Combe School to take up an actuarial career.

New Issue Services

From time to time we receive enquiries from readers concerning New Issue Services, and the following explanation of what these services are, and how they work, probably will be of interest to all those readers who have recently taken up stamp collecting.

It goes without saying that novelty is the lifeblood of modern stamp collecting, and collectors naturally are anxious to obtain new issues as quickly as possible. The New Issue Service meets this demand, and most of the leading stamp firms, Stanley Gibbons Ltd., for example, provide such services, under which books of new issues are sent out to the subscribers month by month as they appear.

The subscriber takes from these books just those new issues that he desires to add to his collection, and returns those that he does not want. Most of the firms offering the service stipulate that the subscriber must take stamps to a minimum value each month, say 5/- worth, and in the case of collectors who are not already known to them, they insist upon provision of references.

* * * *

The opening of the new Houses of the Imperial Diet (Parliament) at Tokyo on 7th November last has been commemorated in Japan by the issue of four stamps. We illustrate the 1½s. value, which shows a view of the facade of the buildings. This design is used also on the 10s. value.

Egyptian Treaty Commemorative

This month we are able to illustrate the design of the stamps issued by Egypt to commemorate the signing of the treaty with Britain on 26th August last. The view is of the scene in the Locarno Hall of the British Foreign Office during the ceremony of the signing of the treaty. Mr. Anthony Eden, the British Foreign Minister, can be seen in the chair at the further end of the table.

There were three stamps in the series, the values being 5m., 15m., and 20m.

A Greek Mourning Stamp

We are indebted to Mr. A. F. McQuarrie for a first-day cover bearing the mourning stamps recently issued by Greece on the occasion of the re-interment of the remains of King Constantine and Queen Sophia in the royal mausoleum at Tatoi. Thus, 14 years after his death in exile in Italy, King Constantine's portrait appears on a Greek stamp for the first time.

King Constantine was probably the most unfortunate monarch of modern days. In 1897 he was at the head of the Greek troops in the ill-starred campaign in Thessaly and he had to take all the blame for its failure. In 1909 he quarrelled so severely with the leaders of the Greek army that he was forced to resign his commission, and no sooner had he mounted the throne in 1913 than the Great War broke out.

Although Greece nominally was neutral in that war, King Constantine's pro-German sympathies were so active that the Allies intervened and compelled him to abdicate. His son, Alexander, assumed the throne but on his death in 1920 Constantine came back. Neither Britain nor France would recognise him, however, and two years later he was forced to abdicate again. He retired to Italy in September 1922 and died there four months later.

* * *

Portraits of Jacques Callot, the artist, Hector Berlioz, the composer, Victor Hugo, the author, and Louis Pasteur, the scientist, thus typifying art, music, literature and science, have been used by France as the designs for the recently issued charity stamp series to aid the relief of unemployed French intellectuals.

We illustrate the 50c. value on which the portrait of Victor Hugo appears. The other three values were 20c., 40c., and 1fr. 50, the portraits used being in the order indicated above.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

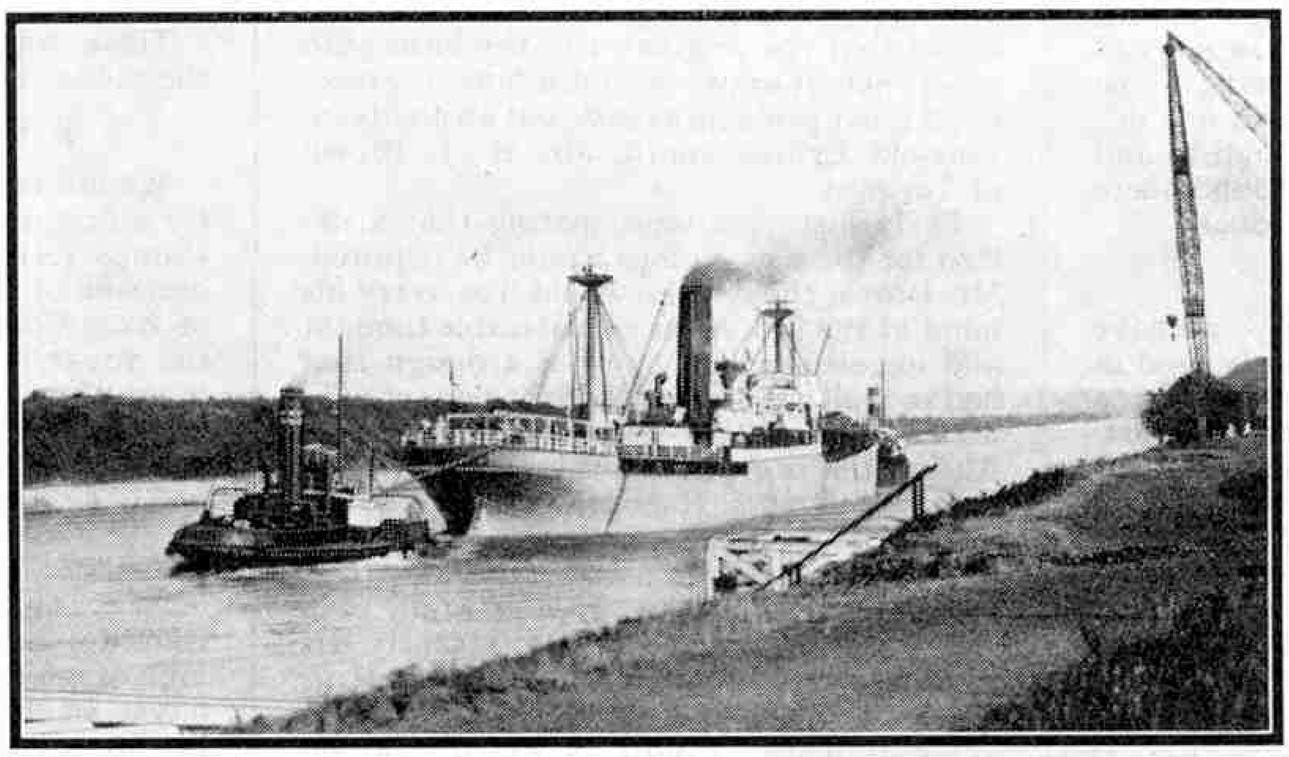
A Novel Engineering Practice

Crane that Lifts Ships' Masts and Funnels

By H. A. Robinson, B.Eng., M.R.S.T.

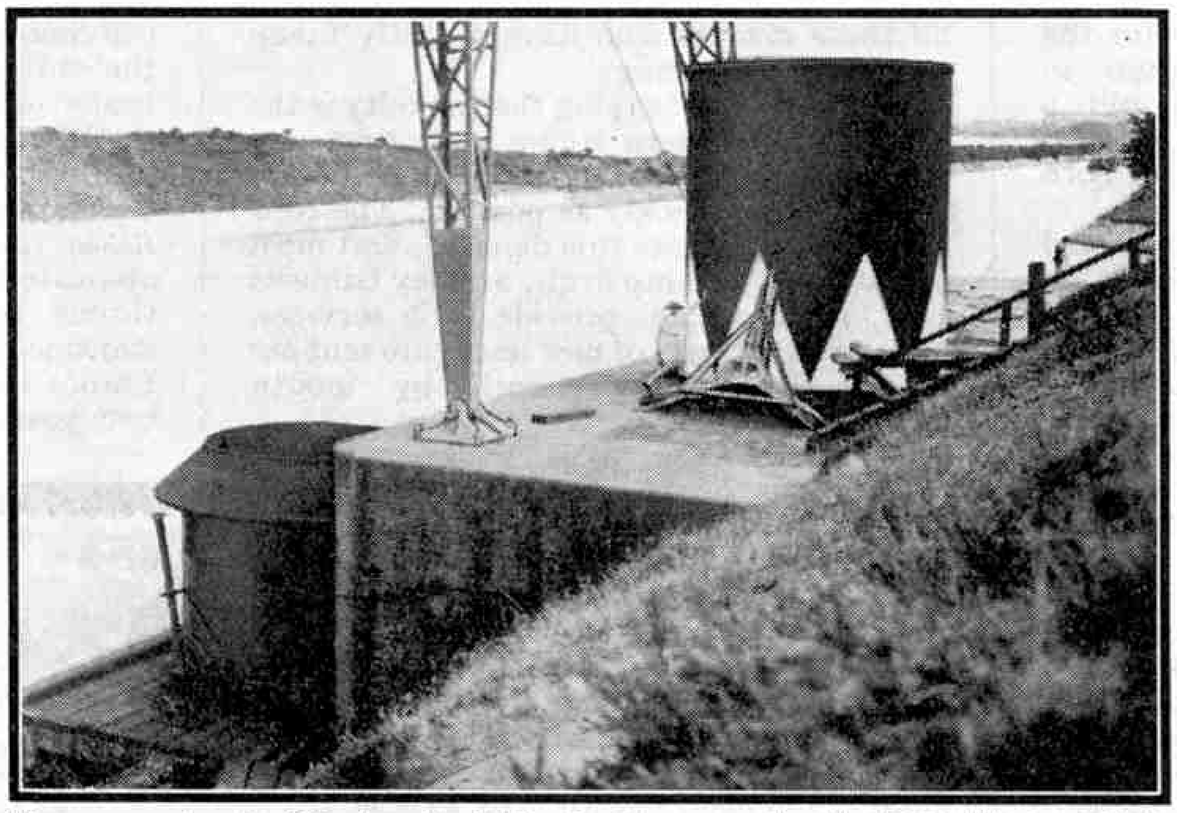
TAKING a vessel from the River Mersey into the Manchester Ship Canal and preparing her for the 35-mile trip inland to the port of Manchester is by no means as straightforward as might first appear. The precautions and measures that have to be taken to ensure a safe passage of course depend to a great extent on the size of the vessel. The smaller craft are able to move in the canal with as little restriction as if they were out in the open river, and proceed under their own steam. With larger craft things are different, however, for their excessive height and length prevent this easy manipulation.

All vessels over a certain size are attended by two tugs. One is at the bow and the other in the rear, where it can prevent any sideways drift of the stern, which would soon cause collision with the canal banks. The tug usually keeps a grip on the situation by going slowly in reverse. There are several paddle canal tugs still in service, and when one of these is employed astern there may be seen the curious sight of a tugboat going steadily ahead with the paddles turning backwards.



A scene in the Manchester Ship Canal. The upper sections of the masts of the vessel shown have been lowered to enable low bridges to be negotiated.

For a vessel escorted in this manner the passage of the narrow waterway is a matter of good navigation. Taking the vessel under comparatively low bridges along the course of the canal is quite another matter, and one that comes into the province of the engineer rather than that of the navigator. With many of the larger ships that now use the canal, it is necessary to take off the top segments of their funnels. These are left on the bank, and are picked up and replaced on the return passage to the River Mersey.



The upper segments of the funnels of ships that have passed up the Canal. The crane that lifts the funnels is seen on the right in our upper illustration.

This remarkable piece of engineering jugglery takes place a few hundred yards up the canal from the entrance locks at Eastham, where a large three girder crane has been erected for the purpose. The crane is shown in the upper illustration on this page. It is electrically driven, current being supplied from the power house at the locks, and has a lifting capacity of 15 tons at an outreach of 50 ft. from the foot pins of the jib girders.

Preparations for the shortening process usually begin as a vessel is proceeding up the River Mersey. A scaffolding is often rigged round the upper part of the smoke stack, or men are slung aloft to take out most of the bolts that hold the top section and steam escape pipe. The joint normally is of a flanged type. The only effect of the bolts is to prevent lateral movement, and most of them can be removed in calm water without danger. If necessary the funnel of a vessel can be cut by local firms of engineers specially equipped for the task in order to enable her to pass up the canal.

The engineers whose duty it is to manipulate the crane are notified by telephone of the approach of a vessel that needs attention, and proceed in good time to their posts, where they unship the large hook from its mooring guys and in general prepare for a "lift."

The vessel on arrival is tied up under the hook. The longest girder of the three that go to make the crane is then run forward. This has the effect of projecting the lifting gear out over the vessel until the desired position is reached. The hook is next lowered and the cables, usually four in number, are made fast to the shackles by the men on the funnel scaffolding. The remaining bolts are taken out and the top is lifted. A backward motion of the main girder brings the load inshore, where it is slowly lowered on to a special platform near the edge of the water. Finally the vessel casts off and proceeds on its way up the canal, often looking strangely shorn with its shortened funnel and its masts also cut down.

Masts usually can be dealt with in a simpler manner than funnels. Most of the vessels intended for service on the canal have their masts built telescopically, so that the upper half can be drawn down into the lower portion. If this is impossible the masts can be "cut and unshipped" at the big crane.

Competition Corner

PRICE CODES

No doubt most of our readers, when walking round a busy departmental store, will have noticed little price tickets attached to the articles displayed for sale, and will have observed that frequently the prices marked on the tickets are in letters instead of plain figures.

These letters are taken from a price code consisting of some easily memorised word or phrase, consisting of 10 different letters which represent the numbers one to nine and the cipher 0. The store assistants of course are familiar with the code, and can quickly decode the letters into figures when a customer desires to know the price. As an example of a suitable code word, the word "Buckingham" might be taken. In this the letter B would represent the figure 1; U would represent 2; C, 3; K, 4; and so on to the final letter M representing the cipher 0.

A member of our staff who has a weakness for transcribing ciphers and secret codes, has made a hobby of discovering the codes used in shops, and he suggests that many of our readers would find much fun in endeavouring to discover for themselves the code-word used in a music store that he visited recently. Certainly the idea has all the possibilities of an interesting competition.

In the panel in the centre of this page we give a list of articles that were on sale in this shop, and their code prices. Careful study of the articles and a knowledge of their approximate values will enable readers to identify some of the code letters quite easily. The numerical values of other letters can then be found by detective methods, and so, step by step, the code word will be revealed.

Grand Piano	**OSS/–/–**
Piano-accordion	**OC/CS/–**
Double Bass	**NF/–/–**
Mouth Organ	**C/I**
Saxophone	**E/CS/–**
Harmonica...	**N/D**
Banjo	**CF/I**
Radiogramophone...	**OE/CE/I**
5-valve Superhet	**CC/CC/–**
Portable Gramophone	**R/CR/I**
Clappers	**–/I**
3-valve Wireless (batteries extra)	**R/CL/I**

Prizes of Meccano products value 21/–, 15/–, 10/6 and 5/– respectively are offered to the senders of the nearest solutions in order of merit, and in addition there will be a number of consolation prizes for the next best entries. In the event of a tie for any of the prizes, the judges will give preference to those entries displaying the neatest or most novel presentation.

Entries should be sent to reach this office not later than Saturday, 27th February, and should be addressed "Price Codes, Meccano Magazine, Binns Road, Liverpool 13."

Similar prizes will be reserved for entries from Overseas readers, whose entries must arrive not later than Monday, 31st May.

February Drawing Contest

Each month throughout the winter we are featuring a drawing and painting competition to afford our artist readers an opportunity to display their skill.

Competitors may submit drawings of any subjects they prefer and the prizes will be awarded to the best drawings or paintings submitted.

Each month's entries will be divided into two sections, A for those from readers aged 16 and over, B for those from readers under 16, and prizes of Meccano products, to be chosen by the winners, to the value of 21/– and 10/6 respectively, will be awarded to the best and second-best entry in each section. In addition there will be a number of consolation prizes.

Entries should be addressed "February Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13," and must reach this office not later than Saturday, 27th February.

A duplicate set of prizes is offered for competition among Overseas readers which description covers readers living outside Great Britain, Ireland and the Channel Islands in precisely similar age groupings. Entries from Overseas readers must arrive not later than Monday, 31st May.

Prize-winning entries will be retained by the Editor, who reserves the right to reproduce any entry. Unsuccessful drawings will be returned if a stamped addressed envelope is provided. This must be sent with the entries, for it is rarely possible to trace a particular entry after the judging has commenced.

We give herewith the solution to the October Crossword Puzzle, the Overseas section now having closed.

Competition Closing Dates

HOME

Price Codes	27th February
February Drawing Contest ...	27th February

OVERSEAS

"Modern Inventions" Voting Contest	27th February
"School Story" Contest	27th February
November Drawing Contest ...	27th February
Advertisement Jig-Saw Contest...	31st March
Christmas Shopping List Contest	31st March
December Drawing Contest ...	31st March
"Animalesques" Contest ...	30th April
Broken Resolutions Contest ...	30th April
January Drawing Contest ...	30th April
Price Codes	31st May
February Drawing Contest ...	31st May

Watch the Closing Dates

COMPETITION RESULTS

HOME

Advertisement Jig-Saw Contest.—A very big number of readers succeeded in finding all the fragments set in this competition and the judges found it necessary to award the prizes on the basis of neatness and novelty. Each of the prizewinners deserves hearty congratulations upon his success.

It is not possible to give the solution of the puzzle yet as the Overseas Section does not close until 31st March. It will be published in the April issue.

The prizes in the Home Section have been awarded to the following competitors: 1. R. J. Biggs (Bristol, 6). 2. D. Morley Davies (Maesteg, Glam.). 3. R. P. and J. C. Walford (Newton Abbot). 4. J. Maguire (Belfast). Consolation Prizes: D. H. Graham (Rugby); J. M. Gibson (Glasgow C5); W. Hewson (Troon); K. B. Jones (Liverpool 4); G. E. Robinson (Scissett); C. P. Ricketts (Bristol, 7); A. H. B. Lee (Leeds, 6); T. D. S. Nichols (London, N.W.3).

December Drawing Contest.—First Prizes: Section A, A. Marsh (Coventry); Section B, J. S. Taylor (Burnley). Second Prizes: Section A, F. E. Sykes (Huddersfield); Section B, C. Bowles (Grimsby). Consolation Prizes: D. Foster (Leeds); R. A. S. Musker (Liverpool); A. Sunderland (Stockport); D. Bain (Penicuik, Midlothian); G. Cooper (Jordans).

Christmas Shopping List Contest.—1. F. R. Harrison (Sandyford). 2. W. Scott-Cross (Northampton). 3. E. Johnson (Northwich). 4. W. L. Whytock (High Craigie, Scotland). Consolation Prizes: J. L. McArthur (Southampton); R. Garner (Peterborough).

OVERSEAS

September Photo Contest.—With this contest the Overseas Photo Contests finish for the season but we hope to announce a further series in the April issue. The prizewinners in the present series are to be congratulated for the standard of the entries has been high throughout. This month's awards are as follows: First Prizes: Section A, A. R. Bacon (Camp Deolali, India); Section B, T. Sike Shu (Thongwa, Burma). Second Prizes: Section A, A. A. Olowu (Ibadan); Section B, E. Philp (Port Elizabeth, S. Africa). Consolation Prizes: E. A. Hamilton (Southland, N.Z.); F. van Bulck (Brussels).

Point Words Contest.—1. G. R. Churches (Heilbron, S. Africa). 2. C. Keekok (Singapore). 3. J. A. Churches (Heilbron, S. Africa). 4. T. Huckaing (Singapore).

STATION-ARY!

Passenger (after sitting patiently in Welsh train for 20 minutes): "Hey, porter, when does the train start?"
Porter: "Where are you going, sir?"
Passenger: "Bangor."
Porter: "It's gone."

* * * *

Sergeant: "What's the first thing you do when you clean your rifle?"
Recruit: "Look at the number, sergeant."
Sergeant: "What the blazes has the number to do with it?"
Recruit: "Stops you cleaning another bloke's."

* * * *

After buying a railway ticket a woman was asked by the booking clerk whether she would take an insurance ticket.
"No thanks," she replied, "we are always taking tickets for this and that, and we never have any luck."

* * * *

Customer: "That chicken I bought yesterday had no wishbone."
Butcher (smoothly): "It was a happy and contented chicken, madam, and had nothing to wish for."

* * * *

"There's one thing I like about that boy of yours, Thompson," said Brown, after he had patiently listened to the latest achievement of the child.
"What's that?" said the fond father.
"He isn't a twin."

* * * *

Scotch Gent.: "Are you to be my caddie?"
Caddie: "Yes, sir."
Scotch Gent.: "Are you good at finding lost balls?"
Caddie: "Very good, sir."
Scotch Gent.: "Well, look around and find one so we can start the game."

* * * *

Manager (sarcastically): "I notice there were 35,000 people present on the afternoon that your grandmother was buried."
Office Boy (rising to the occasion): "I couldn't swear to that, sir, but grandma was always very popular!"

* * * *

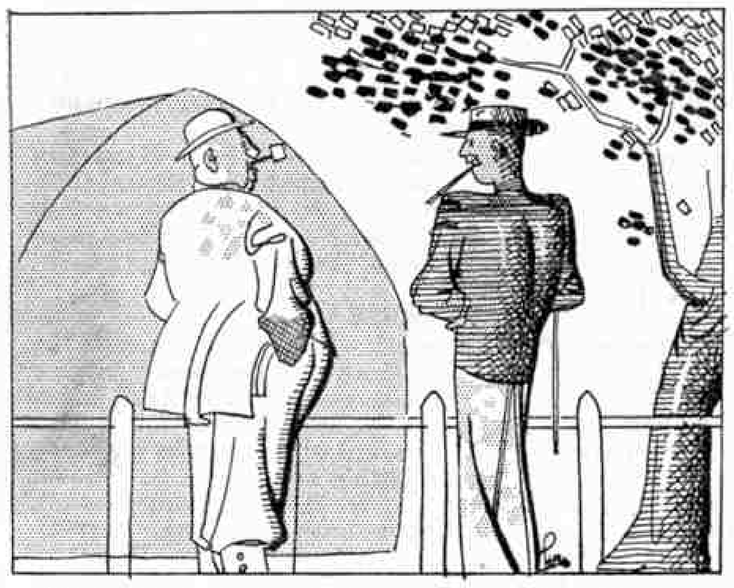
"Maggie," said Angus to his wife, "here's a wee ticket for to-night's conjuring show, and when he comes to that part where he takes a teaspoon o' flour and one egg and makes twenty omelettes, watch verra verra close."

* * * *

Customer: "How long will it take to fix up my car?"
Mechanic: "Rather a long time, I'm afraid, sir; it's the only job we've got at present."

* * * *

HAY-SY!



City man (pointing to haystack): "What kind of a house is that?"
Farmer: "That ain't a house, that's a haystack."
City man: "Say, you can't fool me. Hay doesn't grow in a lump like that."

THE FIRST LESSON

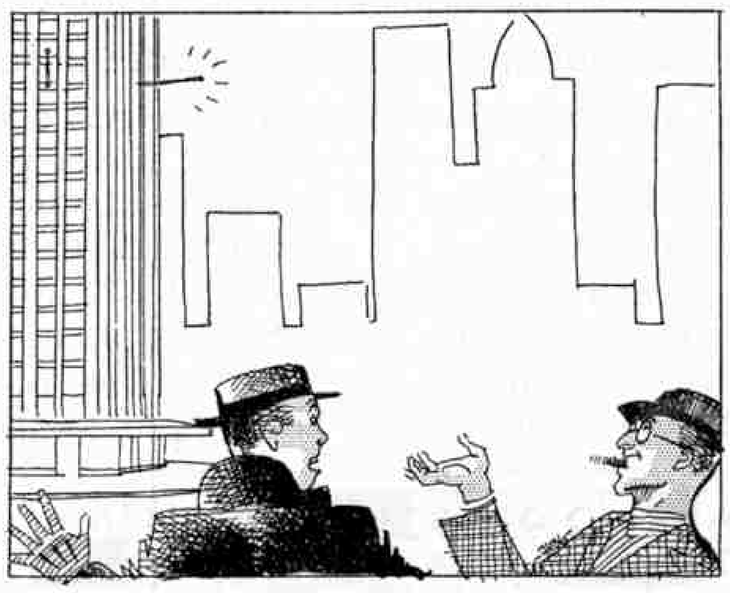
"Son," wrote a busy father, "emulate Benjamin Franklin, who said: 'To learn the value of money, borrow some.' "
In due course the boy at college replied: "Dear dad, I did as you suggested. Borrowed £5 from my roommate. What do I do next?"

* * * *

Johnny: "What does an 'L' on a car mean, dad?"
Father: "Why, that means that the driver is only a learner."
Johnny: "And I suppose that 'G.B.' means getting better."

* * * *

TALL STORIES!



Visitor to New York (pointing to flag poles): "What are those things sticking out from the sides of that sky-scraper?"
American: "Oh those are mile posts."

* * * *

"Here boy," said the wealthy motorist, "I want some petrol, and please get a move on. You'll never get anywhere in the world unless you push. Push is essential. When I was young I pushed, and that got me where I am."
"Well, gov'nor," replied the boy. "There is not a drop of petrol in the place so I reckon you'll have to push again."

* * * *

An officer in a native district in South Africa presented to the Kaffir boy who acted as his servant a pair of strong, heavily-nailed boots. The boy was delighted with the gift and at once put them on.
A few days afterwards, however, he appeared with bare feet, and the boots tied round his neck.
"Hullo!" said the officer. "Why don't you wear your boots? Are they too small for you?"
"Oh, no, sah," replied the boy, "they berry nice boots, sah, but no good for walking or running. Make fellah too much slow, sah. Keep boots now for wear in bed."

* * * *

"What time does the half past five train go?"
"Five thirty, sir."
"Well, the Church clock says 5.28, the Post Office 5.25 and your Station clock 5.32, which am I to go by?"
"Well, sir, you can go by which clock you like, but you can't go by the train 'cos it's gone."

* * * *

"He's been sitting there all day, doing nothing but wasting time."
"How do you know?"
"Because I have been sitting watching him."

* * * *

"Now boys," said the teacher, " I want you to bear in mind that the affix 'stan' means 'the place of.' Thus we have Afghanistan. Can anyone give me another example?"
Nobody seemed anxious to do so until little Jimmy said, proudly: "Yes, sir, I can: Umbrellastan, the place for umbrellas!"

THE RIGHT PLACE

Stoneybroke was not feeling in the jolliest of moods. "Just look at that notice," he said, indicating the words, "Post No Bills," on a blank wall. "What is the use of sticking that up there? Why don't they put these things in the right place?"
"Where would you put it?" asked his friend.
"Over every letter box in the country," was the reply.

* * * *

Applicant: "And if I take the job am I to get a rise in salary every year?"
Employer: "Yes, if your work is satisfactory."
Applicant: "Ah, I thought there was a catch in it somewhere."

* * * *

HIS TURN NOW

Son: "Do you remember telling me about the time you were expelled from school?"
Father: "Yes, my boy, I do."
Son: "Well, I'm telling you."

* * * *

A teacher asked for sentences containing the word "beans."
"My father grows beans," said the first boy. "My mother cooks beans," said a second. Then a third boy piped out: "We are all human beans."

* * * *

Tom: "I have an uncle who is making big money from his pen."
Jack: "He's fortunate! There aren't many writers who can make big money from their pens."
Tom: "But he isn't a writer, he raises pigs."

* * * *

Nine little sausages
Sittin' on a plate,
In came the diners
Then they were ate.

* * * *

Shopkeeper: "And what can I oblige you with?"
Pat: "I've come for some of that twisted paint for barbers' poles."

* * * *

Minister: "I do wish I could think of some way of making my congregation keep their eyes on me when I am preaching."
Son: "Daddy, you should put the clock right behind the pulpit."

* * * *

The 'flu is both affirmative and negative. Sometimes the eyes have it and sometimes the nose.

* * * *

First Camper: "You woke me out of a sound sleep."
Second ditto: "I had to. The sound was too loud."

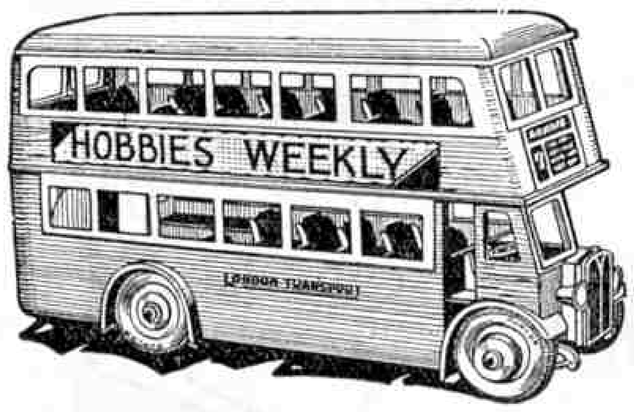
* * * *

THE ORDEAL

(Man having photograph taken): "Have I got the expression you want?"
Photographer: "Yes, that's fine, hold it."
"Well shoot quickly, it hurts my face."

Make them all with a HOBBIES FRETWORK SET

Making all sorts of things in wood with a Hobbies Fretwork Outfit is good fun, and often brings in pocket money. You can turn out models, boxes, toys, furniture, radio speakers and everyday things for the home with little expense or trouble. Free designs with Hobbies Weekly of things to make and do.



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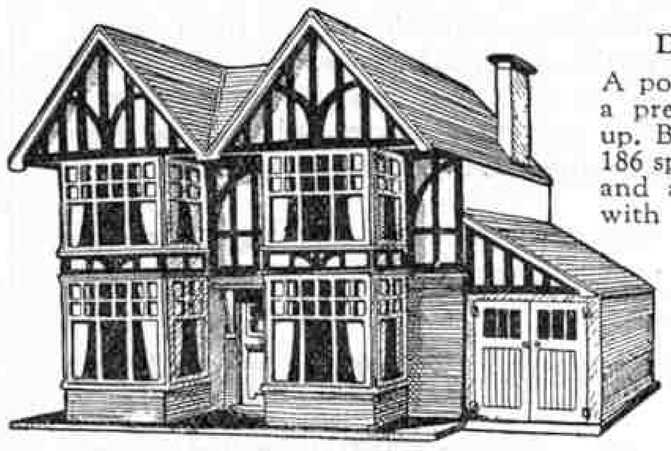

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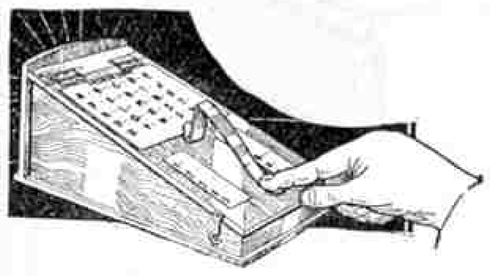

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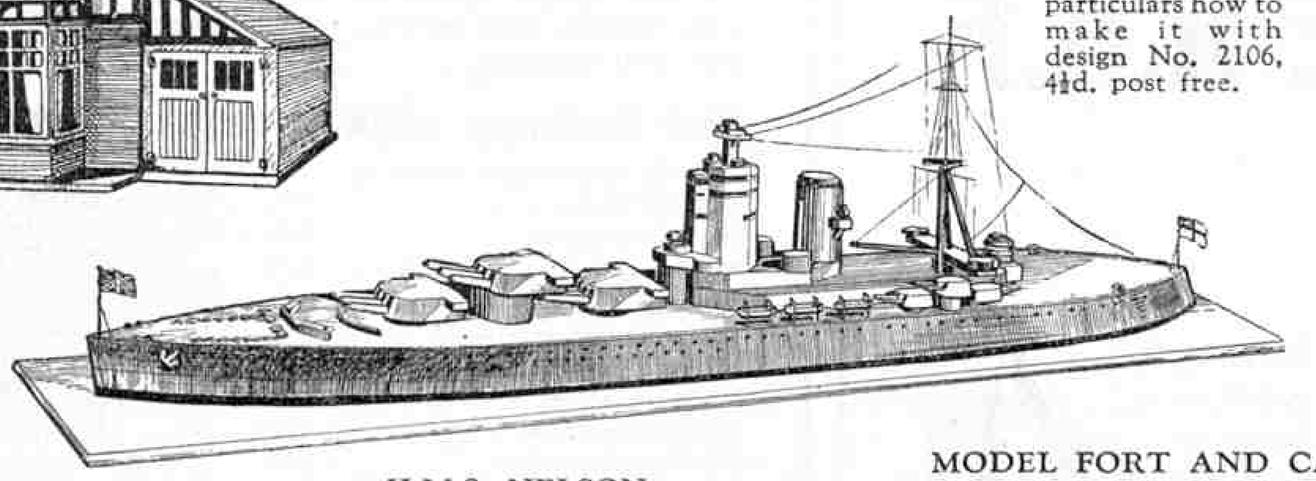

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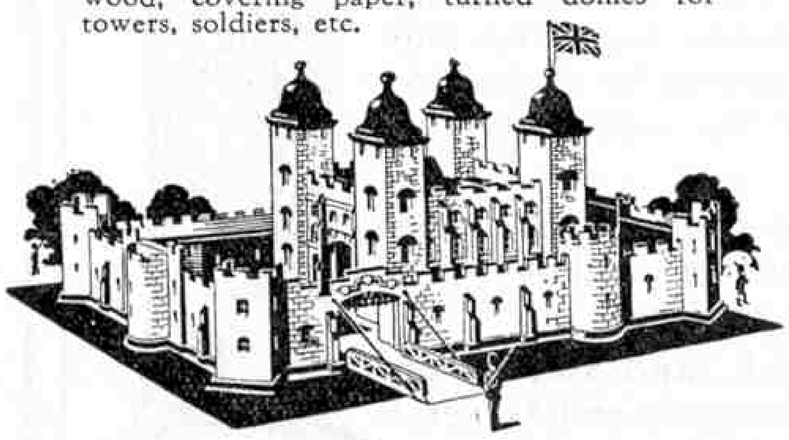

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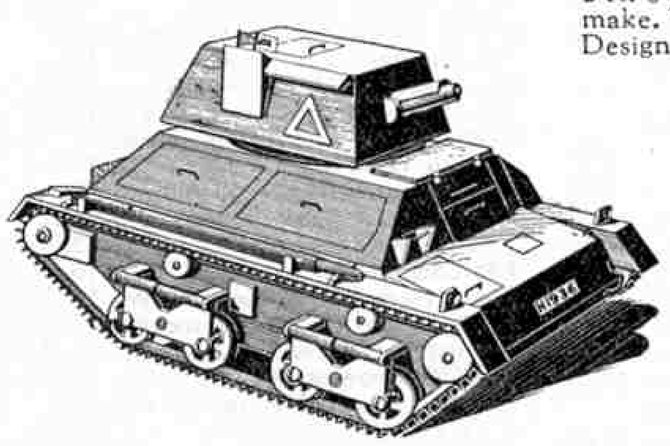

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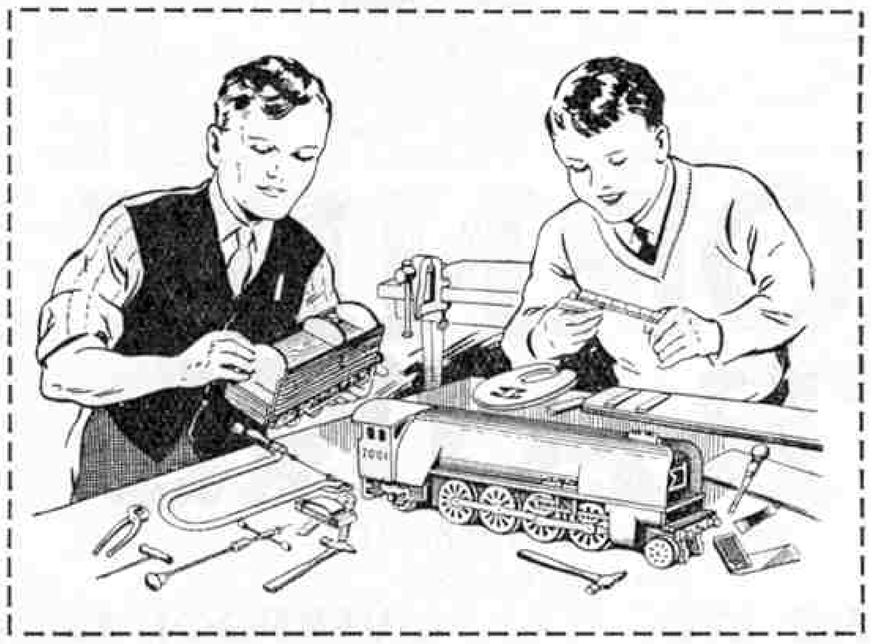

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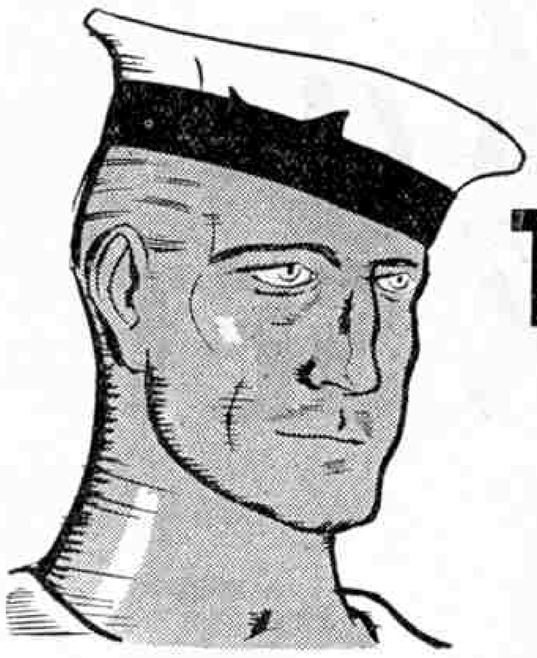
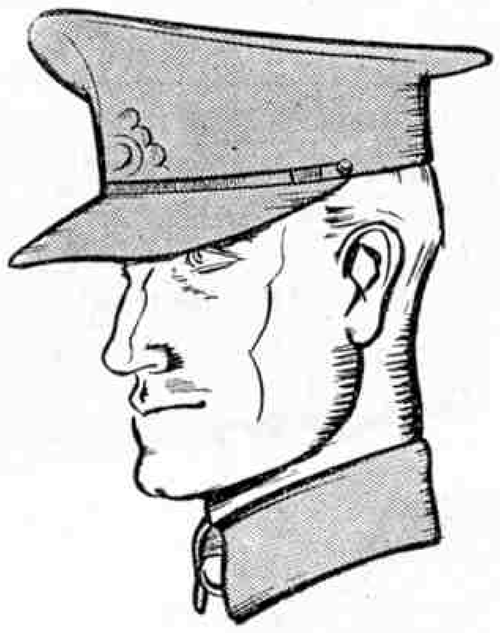


THE NAVY



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M1/2 Locomotive	2/3
*George V Locomotive ...	3/3
*No. OO Locomotive	3/3
M3 Tank Locomotive	3/9
M3 Locomotive	4/3
Zulu Locomotive	5/3
No. O Locomotive	5/3
LEC 1 Locomotive (Swiss Type)	5/3
Zulu Tank Locomotive... ...	6/3
No. 1 Tank Locomotive ...	6/3
No. 1 Locomotive	6/3
No. 1 Locomotive, fitted for Hornby Control	7/6
No. 1 Tank Locomotive, fitted for Hornby Control	7/6
No. 1 Special Locomotive ...	8/3
No. 1 Special Tank Locomotive	8/3
No. 2 Locomotive	10/–
No. 2 Tank Locomotive ...	10/6
No. 2 Special Tank Locomotive	10/6
Metropolitan C Locomotive ...	10/6
No. 2 Special Locomotive ...	11/3
No. 2 Locomotive, fitted for Hornby Control	11/3
No. 2 Tank Locomotive, fitted for Hornby Control	11/9
No. 3C Locomotive	12/–
No. 3C Riviera "Blue" Locomotive	12/–

*These models were identical.

ELECTRIC MODELS	
EM16 or EM120 Locomotive ...	4/3
No. 1 Electric Tank Locomotive, Permanent Magnet	7/6
EM36 or EM320 Tank Locomotive	8/3
LST M3/20 Tank Loco (20-volt)	8/3
LE 120 Locomotive	10/–
LE1/20 Loco (Swiss Type) 20-volt	10/–
E06 or E020 Locomotive ...	11/–
E16 or E120 Locomotive ...	12/–
E16 or E120 Tank Locomotive	12/–
LST 1/20 Tank Locomotive (20-volt)	12/–
LST 2/20 Tank Locomotive ...	12/6
E3/20 Locomotive	12/6
E3/20 Riviera Locomotive ...	12/6
EPM16 Special Tank Locomotive	13/9
Metropolitan L.V. Locomotive	15/–
E26 Special Tank Locomotive ...	15/–
E36 Metropolitan Locomotive...	15/–
E120 Special Locomotive (automatic reverse)	15/–
No. 2 Electric Tank Locomotive	15/–
E120 Special Tank Locomotive (automatic reverse)	15/–
E36 Locomotive	16/3
E36 Riviera "Blue" Locomotive	16/3
E220 Special Tank Locomotive (automatic reverse)	16/3
LE2/20 Locomotive	16/6
LE220 Locomotive (automatic reverse)	16/6
E320 Locomotive (automatic reverse)	17/6
E320 Riviera Locomotive (automatic reverse)	17/6
E220 Special Locomotive (automatic reverse)	18/9
Metropolitan H.V. Locomotive	18/9

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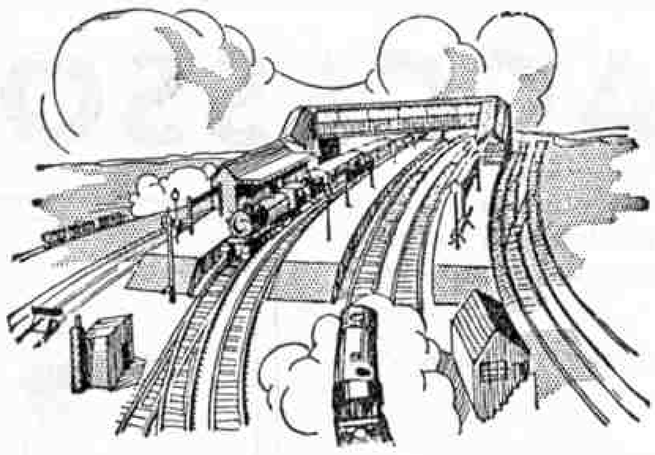

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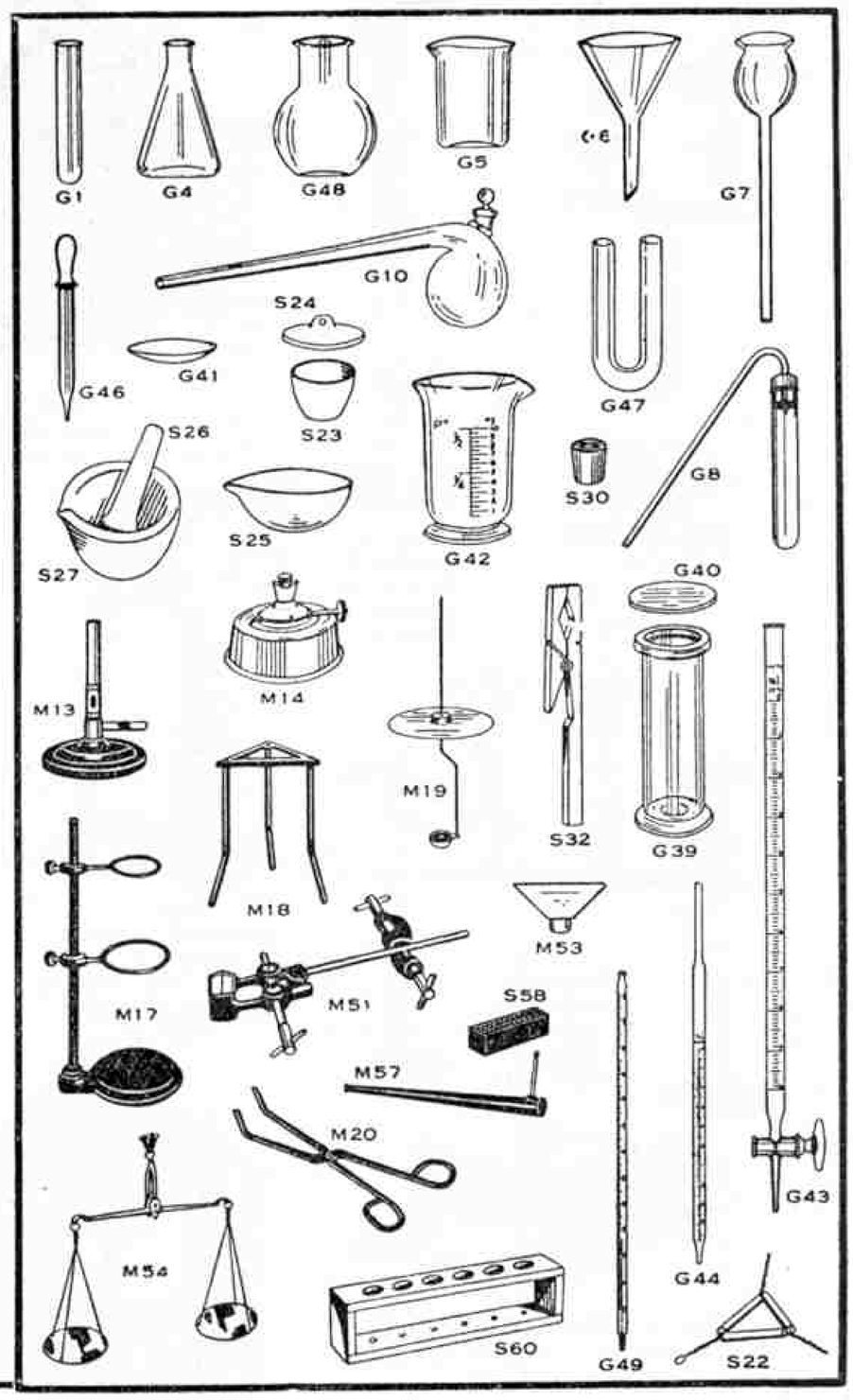

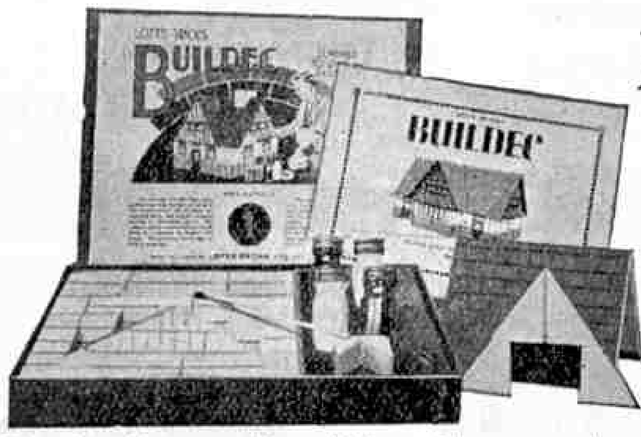

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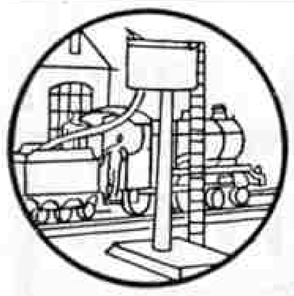
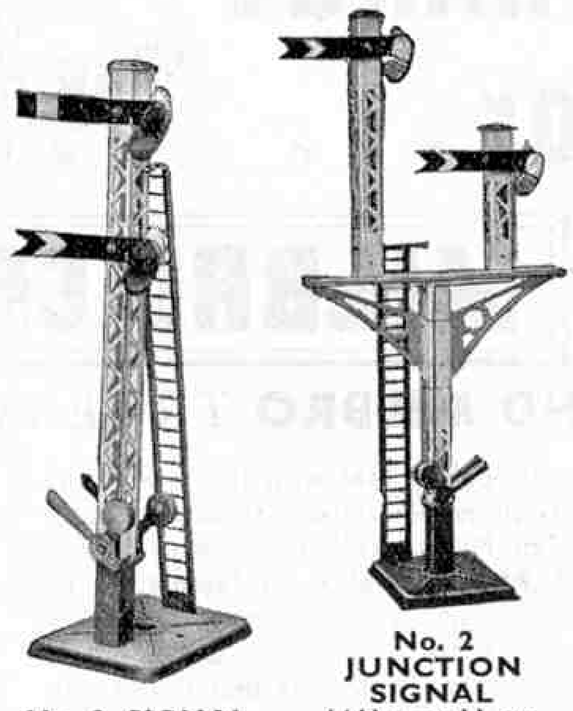


HORNBY ACCESSORIES

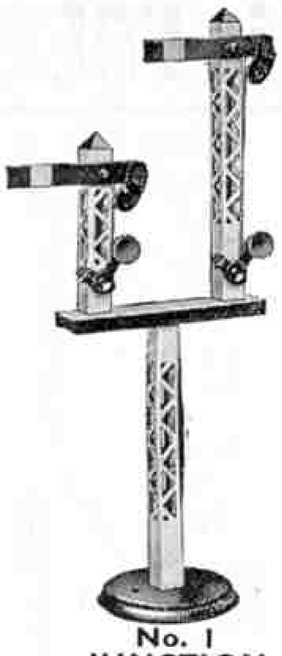
There is a splendid range of Railway Accessories in the Hornby Series, each one built in perfect proportion and beautifully finished. With these realistic accessories the most elaborate model railway may be constructed and operated in exactly the same manner as a real railway.

A selection of Hornby Accessories is shown on this page. Ask your dealer to show you the full range.

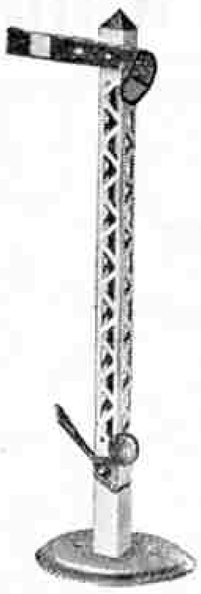


No. 2 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price **2/6**

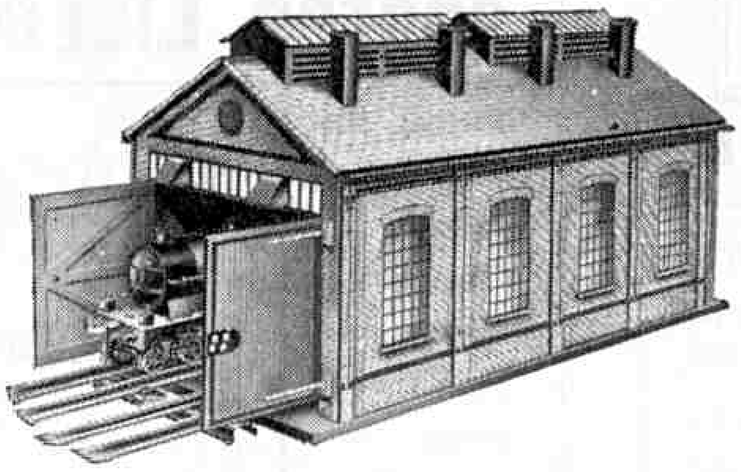
No. 2 JUNCTION SIGNAL
"Home" or "Distant." Signal arms operated by levers at base. A very realistic model. Price **4/9**



No. 1 JUNCTION SIGNAL
"Home" or "Distant."
Price **2/9**

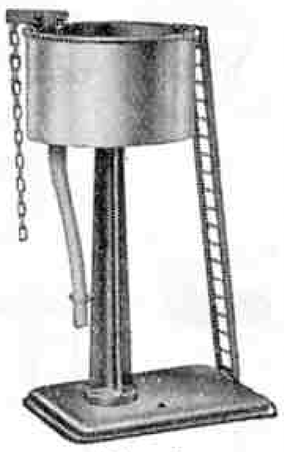


No. 1 SIGNAL
"Home" or "Distant."
Price **1/-**



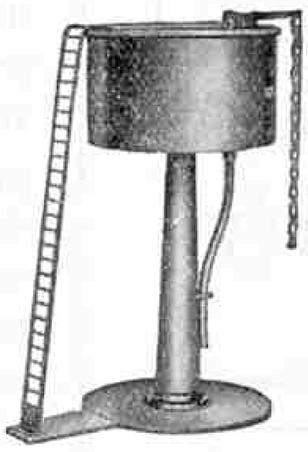
No. 2 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 17½ in.
Price **22/6**

No. 1 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price **1/6**

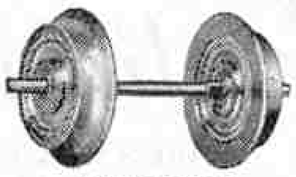


No. 1 WATER TANK
Height 7 in.
Fitted with flexible tube and valve lever.
Price **3/-**

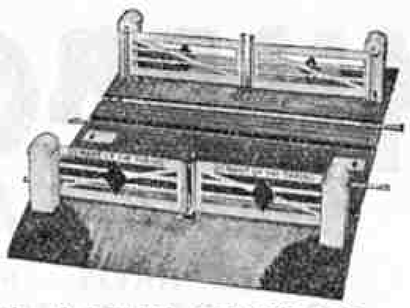
TELEGRAPH POLES
Price per pair **3/6**



No. 2 WATER TANK
Height 9 in.
Fitted with flexible tube and valve lever.
Price **5/9**



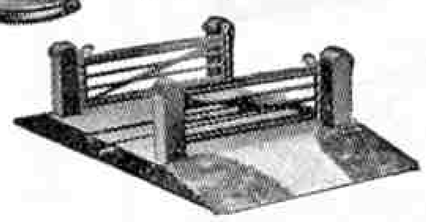
MANSELL WHEELS
These solid die-cast Wheels can be fitted to Hornby Coaches, Vans, etc.
Price per pair **3d.**



No. 2 LEVEL CROSSING
Measures 13½ x 10½ in., with two tracks of gauge O rails in position.
Price **5/6**

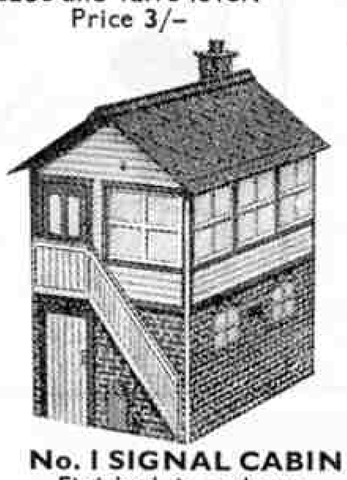
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks.
Price **7/6**

No. 1 SIGNAL GANTRY
"Home" or "Distant."
Price **4/11**

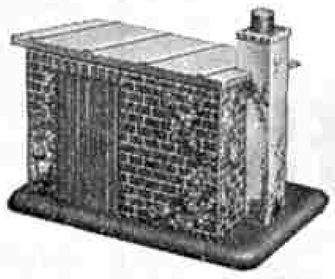


No. 1 LEVEL CROSSING
Suitable for a single track only.
Price **2/11**

No. E1 LEVEL CROSSING (Electrical)
Similar to No. 1 Level Crossing, but fitted with electrical track.
Price **4/-**

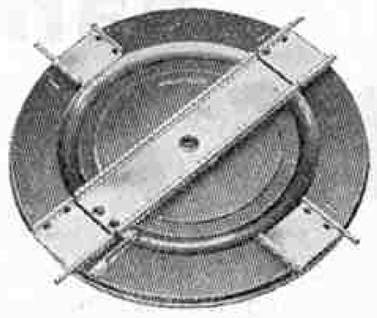


No. 1 SIGNAL CABIN
Finished in colours.
Price **2/6**

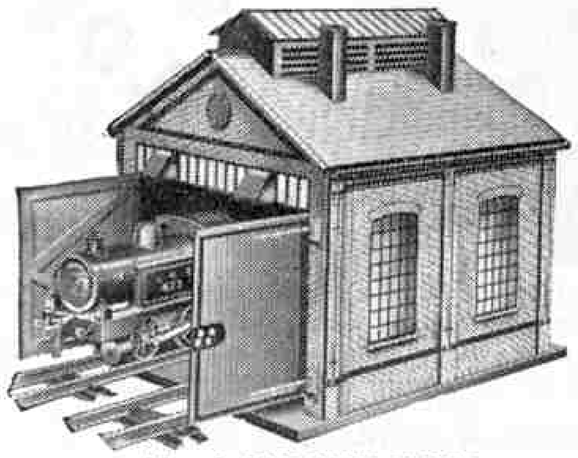


PLATELAYER'S HUT
Price **1/-**

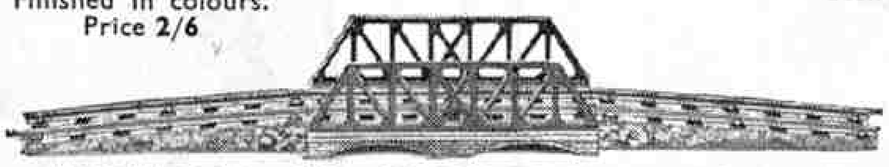
No. 2 SIGNAL CABIN
Dimensions: Height 6½ in., width 3½ in., length 6½ in. Roof and back open to allow Lever Frame to be fitted inside cabin if desired. Price **3/9**



No. 1 TURNTABLE
Price **2/6**

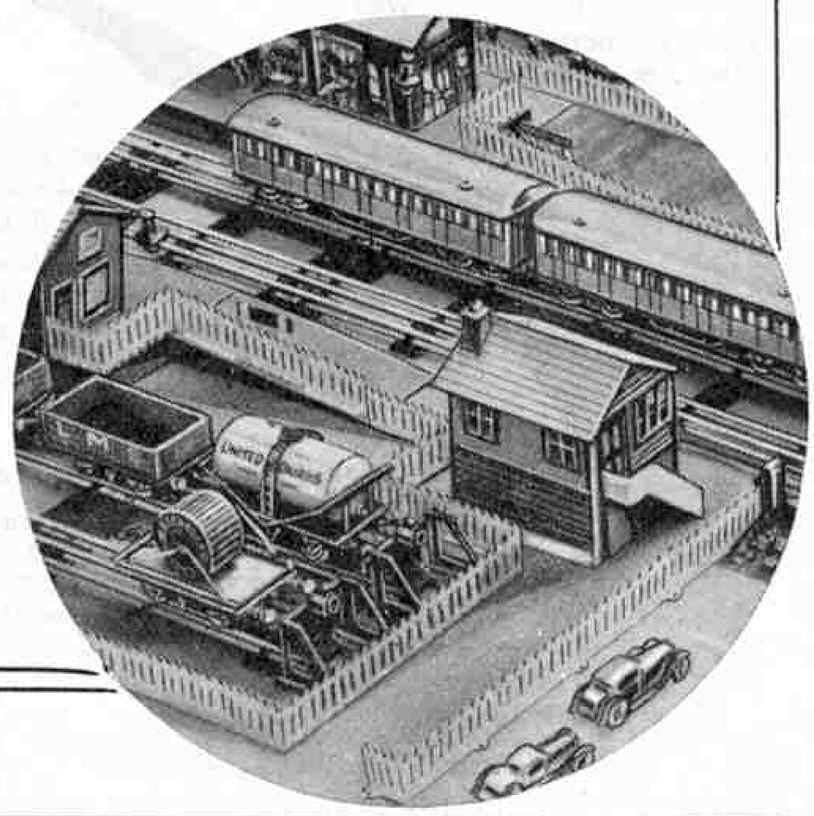


No. 1 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. Price **15/-**



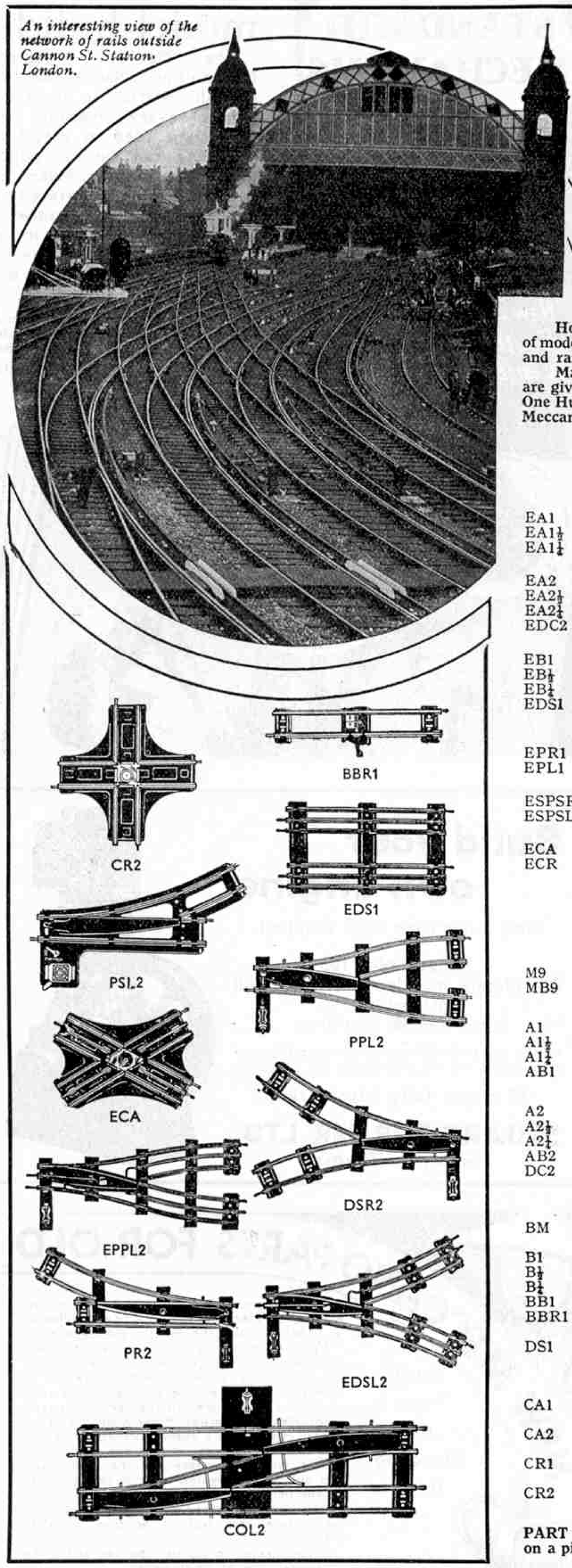
VIADUCT Price **6/6** **VIADUCT (Electrical)** Price **7/6**
VIADUCT Centre Section only ... ... Price **4/-**
VIADUCT (Electrical) Centre Section only ... Price **4/6**

No. 1 STATION
Length 16¾ in., width 6 in., height 6 in. Price **4/6**



MECCANO LTD., LIVERPOOL 13

Hornby Rails, Points and Crossings



An interesting view of the network of rails outside Cannon St. Station, London.

Hornby Rails, Points and Crossings are designed to meet the most exacting requirements of model railway enthusiasts. They make it possible to construct an almost endless variety of attractive and railwaylike layouts, for both Electric and Clockwork trains.

Many interesting illustrations and much useful information regarding Hornby Railway layouts are given in the booklets entitled "How to plan your Hornby Railway," and "Hornby Layouts—One Hundred Suggestions." Each of these booklets is obtainable from any dealer, price 3d., or from Meccano Ltd., Binns Road, Liverpool 13, price 4d. post free.

Rails for Electric Trains, Gauge 0, 1¼″

CURVED RAILS

1-ft. Radius

EA1	Curved Rails ...	... per doz.	5/-
EA1½	Curved half rails	... „	4/6
EA1¼	Curved quarter rails ...	„	4/-

2-ft. Radius

EA2	Curved rails ...	... per doz.	5/-
EA2½	Curved half rails	... „	4/6
EA2¼	Curved quarter rails ...	„	4/-
EDC2	Curved rails, double track,	½ doz.	9/-

STRAIGHT RAILS

EB1	Straight rails ...	... per doz.	5/-
EB½	Straight half rails	... „	4/6
EB¼	Straight quarter rails ...	„	4/-
EDS1	Straight rails, double track,	½ doz.	8/6

POINTS

For 1-ft. Radius Curves

EPR1	Right-hand points	... per pair	5/9
EPL1	Left-hand points		

For 2-ft. Radius Curves

ESPSR2	Right-hand points	per pair	7/6
ESPSL2	Left-hand points		

CROSSINGS

ECA	Acute-angle crossings ...	each	2/9
ECR	Right-angle crossings ...	„	2/9

DOUBLE SYMMETRICAL POINTS

1-ft. Radius

EDSR1	Double symmetrical points, right-hand	... per pair	6/-
EDSL1	Double symmetrical points, left-hand		

2-ft. Radius

EDSR2	Double symmetrical points, right-hand	... per pair	7/-
EDSL2	Double symmetrical points, left-hand		

PARALLEL POINTS

EPPR2	Parallel points, right-hand	per pair	7/-
EPPL2	Parallel points, left-hand		

CROSSOVER POINTS

ECOR2	Crossover points, right-hand	per pair	24/-
ECOL2	Crossover points, left-hand		

EMC20	Switch rails (20-volt) ...	each	1/3
EMC6	Switch rails (6-volt) ...	„	1/3
TCP20	Terminal Connecting Plates (20-volt)	„	1/3
TCP6	Terminal Connecting Plates (6-volt)	„	1/3

Rails for Clockwork and Steam Trains, Gauge 0, 1¼″

CURVED RAILS

9-in. Radius (for MO Trains)

M9	Curved rails ...	... per doz.	2/6
MB9	Curved brake rails	... each	3d.

1-ft. Radius

A1	Curved rails ...	... per doz.	3/6
A1½	Curved half rails	... „	3/-
A1¼	Curved quarter rails	... „	2/6
AB1	Curved brake rails	... each	4d.

2-ft. Radius

A2	Curved rails ...	... per doz.	3/6
A2½	Curved half-rails	... „	3/-
A2¼	Curved quarter rails	... „	2/6
AB2	Curved brake rails	... each	5d.
DC2	Curved rails, double track,	½ doz.	6/-

STRAIGHT RAILS

BM	Straight rails (for MO Trains),	per doz.	2/6
B1	Straight rails ...	... „	3/6
B½	Straight half rails	... „	3/-
B¼	Straight quarter rails	... „	2/6
BB1	Straight brake rails	... each	4d.
BBR1	Straight brake and reverse rails,	each	1/6
DS1	Straight rails, double track,	½ doz.	5/3

CROSSINGS

CA1	Acute-angle crossings (for 1-ft. radius tracks)	each	1/9
CA2	Acute-angle crossings (for 2-ft. radius tracks)	„	1/6
CR1	Right-angle crossings (for 1-ft. radius tracks)	„	1/9
CR2	Right-angle crossings (for 2-ft. radius tracks)	„	1/6

POINTS

9-in. Radius (for MO Trains)

MR9	Right-hand points	... per pair	3/-
ML9	Left-hand points		

1-ft. Radius

PR1	Right-hand points	... per pair	3/-
PL1	Left-hand points		

2-ft. Radius

PR2	Right-hand points	... per pair	3/-
PL2	Left-hand points		
PSR2	Points on solid base, right-hand	per pair	8/6
PSL2	Points on solid base, left-hand ... ... (Fitted for Hornby Control)		
SPSR2	Points on solid base, right-hand	per pair	5/-
SPSL2	Points on solid base, left-hand		

These points are similar to Points PSR2 and PSL2 but they are not fitted with ground disc or for Hornby Control.

PARALLEL POINTS

PPR2	Parallel points, right-hand	per pair	3/6
PPL2	Parallel points, left-hand		

The above Parallel Points can be used with either 1 ft. or 2 ft. radius track.

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

DSR1	Double symmetrical points, right-hand		
DSL1	Double symmetrical points, left-hand	per pair	3/6

For 2-ft. Radius Curves

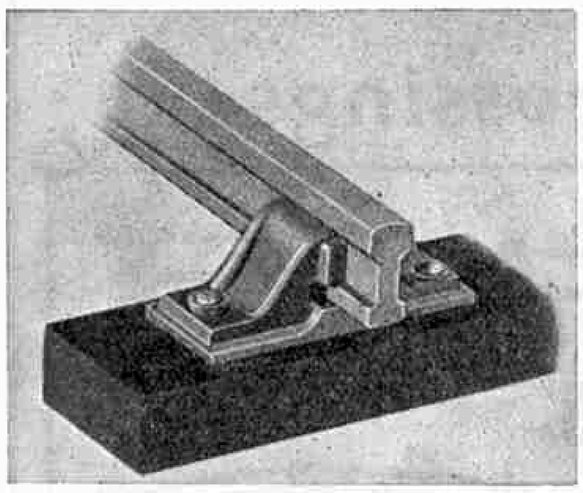
DSR2	Double symmetrical points, right-hand		
DSL2	Double symmetrical points, left-hand	per pair	3/6

CROSSOVER POINTS

COR2	Crossover points, right-hand	per pair	12/-
COL2	Crossover points, left-hand		
RCP	Rail Connecting Plates	... ½ doz.	2d.

PART EXCHANGE. You can exchange Hornby Clockwork Rails, Points and Crossings for Electric on a piece-for-piece basis, the allowance being half the current price of Clockwork Rails returned.

Manufactured by MECCANO LTD., BINNS ROAD, LIVERPOOL 13



Actual Photograph of Bond's British Permanent Way.

THE CHEAPEST SUPER DETAIL PERMANENT WAY . . . .

IN ALL GAUGES FROM "OO" TO ¾" SCALE.

We illustrate above an ACTUAL PHOTOGRAPH of Bond's Super Detail Permanent Way; this is not an Artist's Impression, but a Photograph of the Model Rail and Chairs which Bond's supply. The Rail Sections faithfully reproduce the outline of the Full Size Rails, also the Model Chair—that of the Latest Standard Chair as standardised by the British Railway Companies.

If you want Super Detail for your Model Permanent Way, you can only get this with Bond's Super Detail Permanent Way Parts.

PRICES

STANDARD GAUGE "O" PARTS

Steel Rail, sheradised	per yd. **2d., 1/6** doz. yds.
Brass Rail	per yd. **4d., 3/9** doz. yds.
Cast Chairs, slide-on fit	per 100 **1/2.**
Cast Chairs, for wooden keys	per 100 **1/2.**
Keys	per 100 **6d.**
Fishplates	per doz. **3d.**
Sleepers, stained correct colour	per 100 **2/–.**
Battens, ½ × ¼" section	per yd. **2d., 1/9** doz. yds.
Pins, approx. 1,000	**6d.** packet.
Track Gauge, special, with elec. chair jig ...	**9d.** each.

All Prices Plus Postage. For Prices of Gauge "OO," "1," ½" Scale and ¾" Scale, see **General Catalogue,** Price 6d. It contains 200 pages, which illustrate all the requirements of the Model-maker, including a complete list of Tools and Materials.

BOND'S O' EUSTON RD. LTD.

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Telephone: Museum 7137 **Established 1887**

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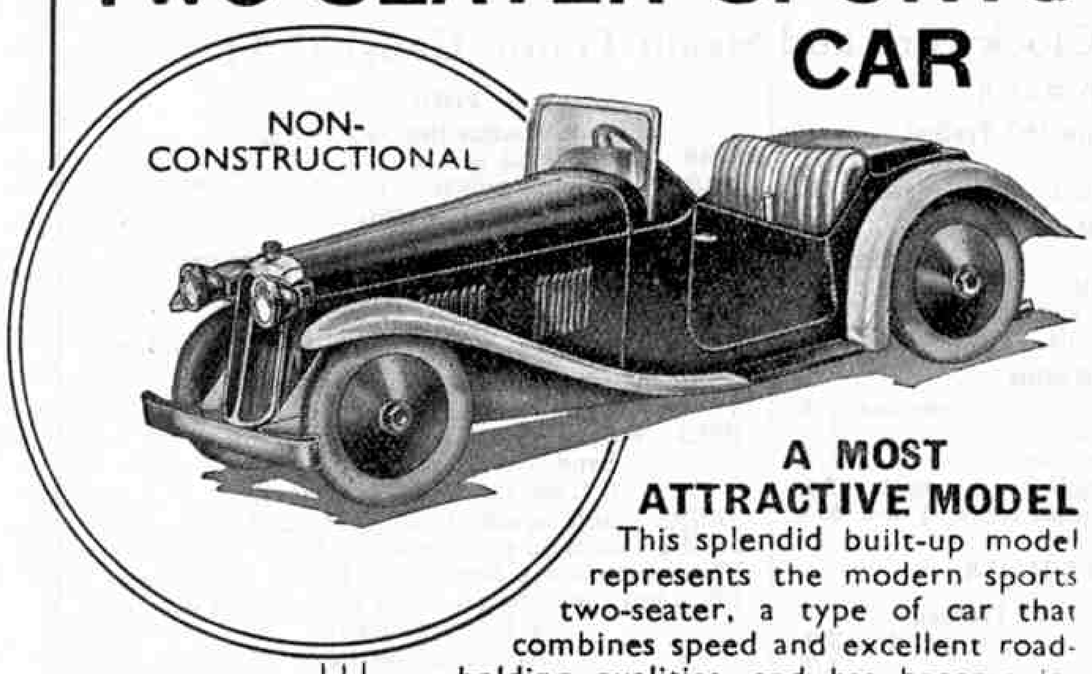
The Meccano "Standard Mechanisms" Manual has been specially written to show how almost every machine and movement used in actual engineering can be reproduced with Meccano parts. Nearly 200 mechanisms are illustrated and described in a simple manner, so that you can include them in your own models, making them real engineering structures in miniature.

The Manual can be obtained from any Meccano dealer, price 1/– (New Zealand and South Africa, 1/6, Canada 30 cents).

YOU **MUST** HAVE THIS MANUAL.

A REALISTIC

TWO-SEATER SPORTS CAR



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This splendid built-up model represents the modern sports two-seater, a type of car that combines speed and excellent road-holding qualities, and has become increasingly popular during recent years. Speed is suggested by the sweeping lines of the bodywork and mudguards, together with the sloping radiator and wind-screen.

The model faithfully resembles its prototype in all important respects. It is complete in itself, no constructional or assembly work being required. It steers from the wheel and is fitted with a strong clockwork motor that gives a long and steady run.

Overall dimensions: Length, 8¼ in.; Width, 3¾ in.; Depth 2¼ in.

Price **6/6**

The model is beautifully made and finished, and is richly enamelled in Blue and Cream

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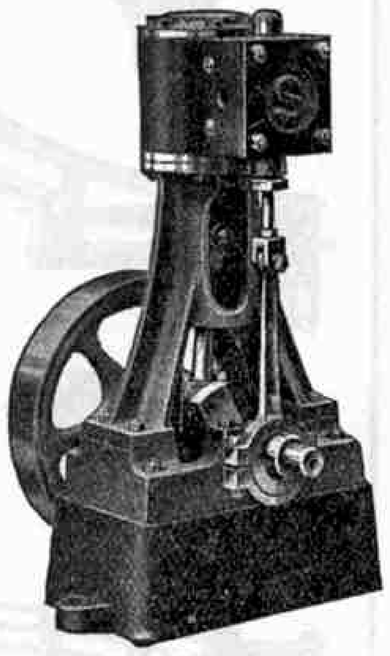
72 pages fully illustrated.

STUART TURNER LTD.
Henley-on-Thames



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Every Meccano boy should know of the wonderful Meccano Part Exchange Scheme, in order to take the fullest advantage of it.

We undertake to exchange any damaged Meccano parts for similar new parts at half the current list price, no matter how old or how much damaged the parts are. Just send them to us, addressed to the Service Department, Meccano Limited, Binns Road, Liverpool 13, together with a remittance covering half the cost of the new parts. The remittance should include postage on the new parts and will be exactly the same as that you pay on the parcel of old parts you send us.

It is very important that you enclose your own name and address written in plain characters.

If you prefer to do so, you can effect the exchange through your dealer.

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10 Straits Settlements	3d.
15 Canada	3d.
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Postage 1½d., or to approval applicants any one free, state which. Postage Free.

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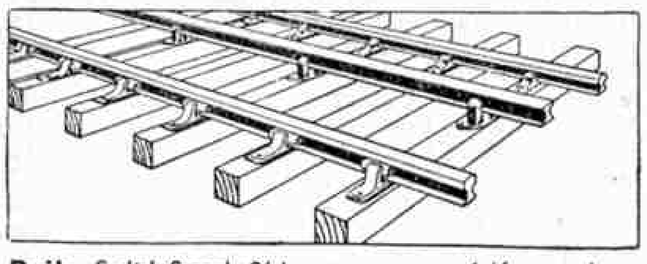
THE "PERMANENT" WAY!

GET ON THE RIGHT TRACK

Add to the realism of your railway by making your own permanent way of solid steel rails on wooden sleepers.



Rails, Solid Steel, 3′ long ...	1/6 per doz.
,, ,, Brass, 3′ ,, ...	4/6 ,, ,,
Battens, Wood, 3′ ,, ...	1/9 ,, ,,
Fishplates, Brass or Steel ...	4d. ,, ,,
Chairs, Spring Steel	1/1 ,, 100
,, Die Cast ...	1/2 and 1/6 ,, 100
,, for Centre Rail	2/– ,, 100
Spikes, Brass or Steel	3d. per pkt.
Track Gauge	3d. each

(Postage 6d. extra on rails and battens.)

Write for free illustrated list showing all components with prices.

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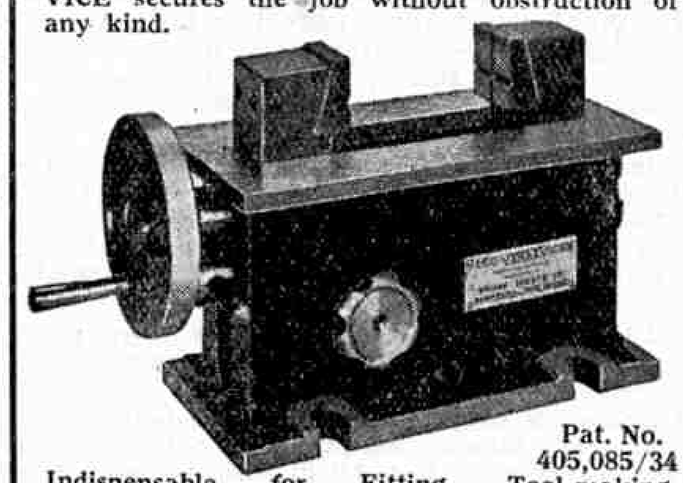

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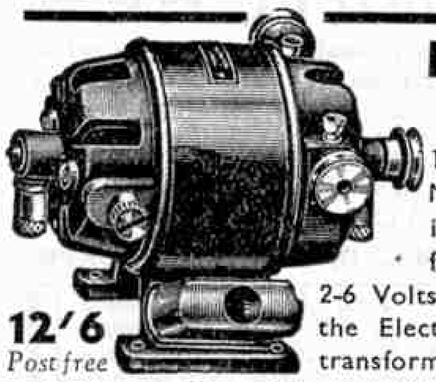

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READERS' SALES

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

Various Models. Locomotive, Stationary Engines, Speed Boats (Hobbies), Rails, etc. Send ½d. for list.—A. Mold, 2, Eastmont Road, Esher.

"Boy's Own Paper," January 1925–October 1932 complete. Excellent condition. Offers?—Hunt, Fremington House, Barnstaple, Devon.

Surplus Pathe 9.5 Films—30's, 1/9; 60's, 3/6; Supers from 8/–. Send for list.—85, Killinghall Road, Bradford.

Wanted. Unbound "Railway Wonders of the World."—Brown, St. John's Avenue, Brentwood, Essex.

Meccano Red-Green Outfit, 30/–; Jig-Saw Puzzles, 2/6; No. 1 Lott's Bricks, 2/6; Toy Farmyard, 7/–. Lot 40/–. Sell singly.—Prescott, 38, Robingoodfellows Lane, March, Cambs.

Sale. "M.M.'s," 1933-1935 (1934 bound), 9/–; Toboggan, 2/6; 1,850 Cigarette Cards, many sets, 6/–.—Layman, Hillside, Drum Hill, Walmer, Kent.

Sale. Eelex M2 Super Shortwave Converter AC 200-250 volts, £3. Particulars from—Bickmore, 2a, Uxbridge Road, Stanmore, Middlesex.

"M.M.'s," Jan. 1924–May 1934. Less covers ready for binding, 15/–.—Drumm, 217a, Latchmere Road, Battersea, London.

For Sale. "M.M.'s," 2/6 doz.; 1,016 different Stamps, mounted in "Strand" Album, 10/–; Set of Boxing Gloves, never used, 5/–. All in perfect condition.—"Brusty House," Burton-Joyce, Nottingham.

Sale. No. 5 (Red/Green) Meccano Outfit with many additions, in oak cabinet. Excellent condition, hardly used. Total cost about £10, would accept £6, or near offer. List of actual parts on application.—Rodway, Cokes Lane, Chalfont Street, Giles, Bucks.

Meccano Mags. 1928-1933. Five missing. Offers?—Rose, Cowley, Copthorne Road, Wolverhampton.

Stamps. Breaking up collection, 125 different 1/–, catalogued over 10/–.—J. Wood, 7, Redbourne Avenue, Church End, Finchley.

Sale. 10/– Meths. Bunsen Burner. Complete. Cost 25/–.—Haward, 9, Moorfield Road, West Didsbury, Manchester.

Wanted. People to swap Cigarette Cards. Particulars from—Fenwick, 28, Alleyn Park, Dulwich, London, S.E.21.

Bassett-Lowke and Hornby Rails, 4/–. List.—Trillo, 46, Stubbington Avenue, Portsmouth.

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This Month's Special Articles

	Page
Air News	92
City Airports of the Future	70
Competition Page	127
Crane that Lifts Ships' Funnels	126
Engineering News	78
Fireside Fun	128
French Air Liners	80
From Our Readers	98
Guild Pages	112–114
Hornby Railway Company Pages	115–121
Hydraulic Cranes on Thames Jetty	71
In Search of New Models	104
Kincardine-on-Forth Bridge	68
Making Electric Cables	66
Model-Building Contests	110
Model-Building Contest Results	111
Motor Yacht "Aclo"	87
Mysteries of the Ocean Floor	88
New Outfit Models	108
Our Busy Inventors	100
Our Wonderful World	82
"Queen Mary" in Meccano	102
Railway News	84
Romance of Radio Manufacture	90
Shipping News	72
Singapore Airport	86
S.R. Warehouse and Granary	95
Stamp Pages	123, 125
Streamlined London Tube Trains	77
Suggestions Section	106
"The Silver Jubilee," Run on	74
World's Oldest Railway	94

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EDITORIAL AND ADVERTISING OFFICE:—
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/– for six issues and 8/– for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/–. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/6 per line (average seven words to the line), or 16/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 8d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

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Readers Overseas and in foreign countries may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in the cases of Australia, where the price is 1/2 per copy (postage extra), and the subscription rates 8/– for six months and 16/– for 12 months (post free); Canada, where the price is 10c. per copy, and the subscription rates 65c. for six months, and $1.25 for 12 months (post paid).

The U.S.A. price is 15c. per copy, and the subscription rates $1 and $2 for 6 and 12 months respectively (post free).

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the United Kingdom and Northern Ireland. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned

CANADA: Meccano Ltd., 187-189, Church St., Toronto.

UNITED STATES: Meccano Co. of America Inc., New Haven, Conn., Meccano Co. of America Inc., 200, Fifth Av., New York.

AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.

NEW ZEALAND: Models Limited, Third Floor, Paykel's Buildings, 9, Anzac Avenue (P.O. Box 129), Auckland, C.1.

SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.

INDIA: Karachi: Daryanamal and Bros., Elphinstone Street. Bombay: Bombay Sports Depot, Dhobi Talao. Calcutta: Bombay Sports Depot, 2, Lindsay Street. Madras: Bombay Sports Depot, 162, Mount Road.

The Editor wishes to make known the fact that it is not necessary for any reader to pay more than the published price. Anyone who is being overcharged should lodge a complaint with the Meccano agent in his country or write direct to the Editor.

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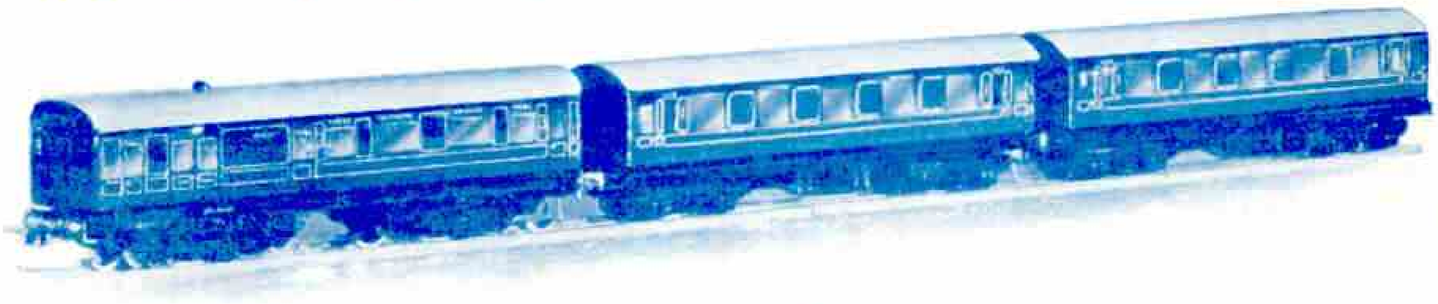
A "SCALE MODEL" in "OO" Gauge of the SOUTHERN ELECTRIC



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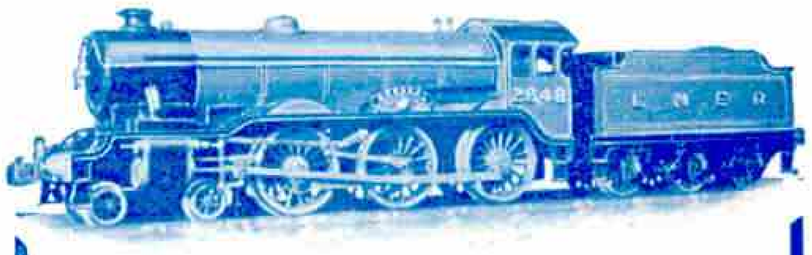

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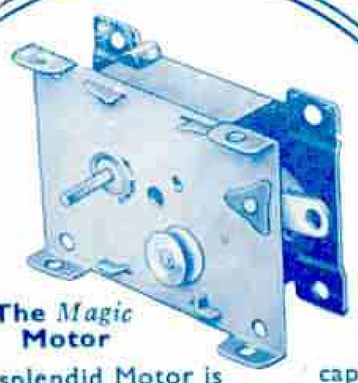

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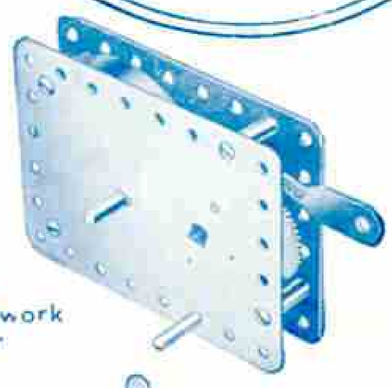
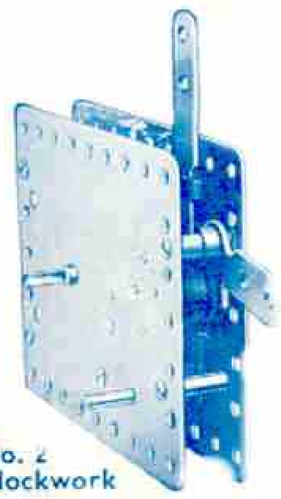
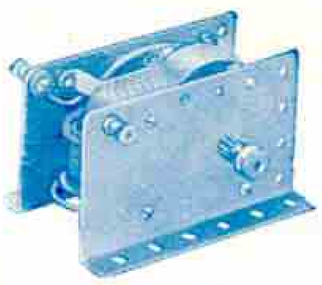


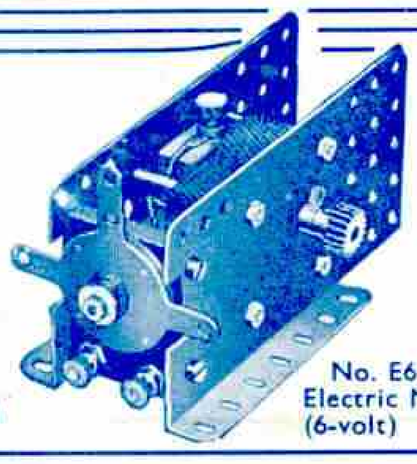
No. 1 Clockwork Motor



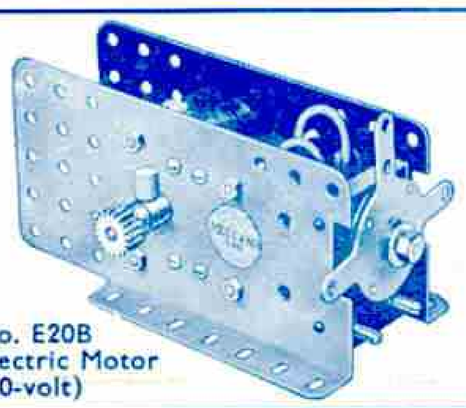
No. 2 Clockwork Motor



No. E1 Electric Motor (6-volt)



No. E6 Electric Motor (6-volt)



No. E20B Electric Motor (20-volt)

No. T20 Transformer

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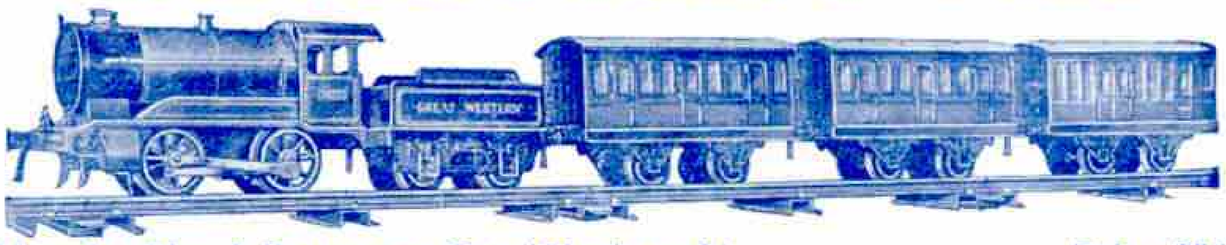
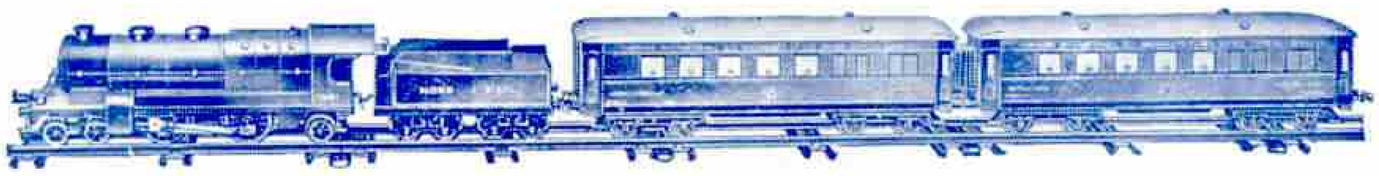


Hornby No. 1 Passenger Set (Clockwork) ... ... Price 25/–

Hornby E220 Mixed Goods Set (20-Volt Electric) ... ... Price 47/6



Hornby No. 3C Riviera "Blue" Passenger Train Set (Clockwork) Price 57/6

Hornby No. E220 Special Pullman Set (20-Volt Electric) ... Price 75/–

A selection from the range of

HORNBY LOCOMOTIVES

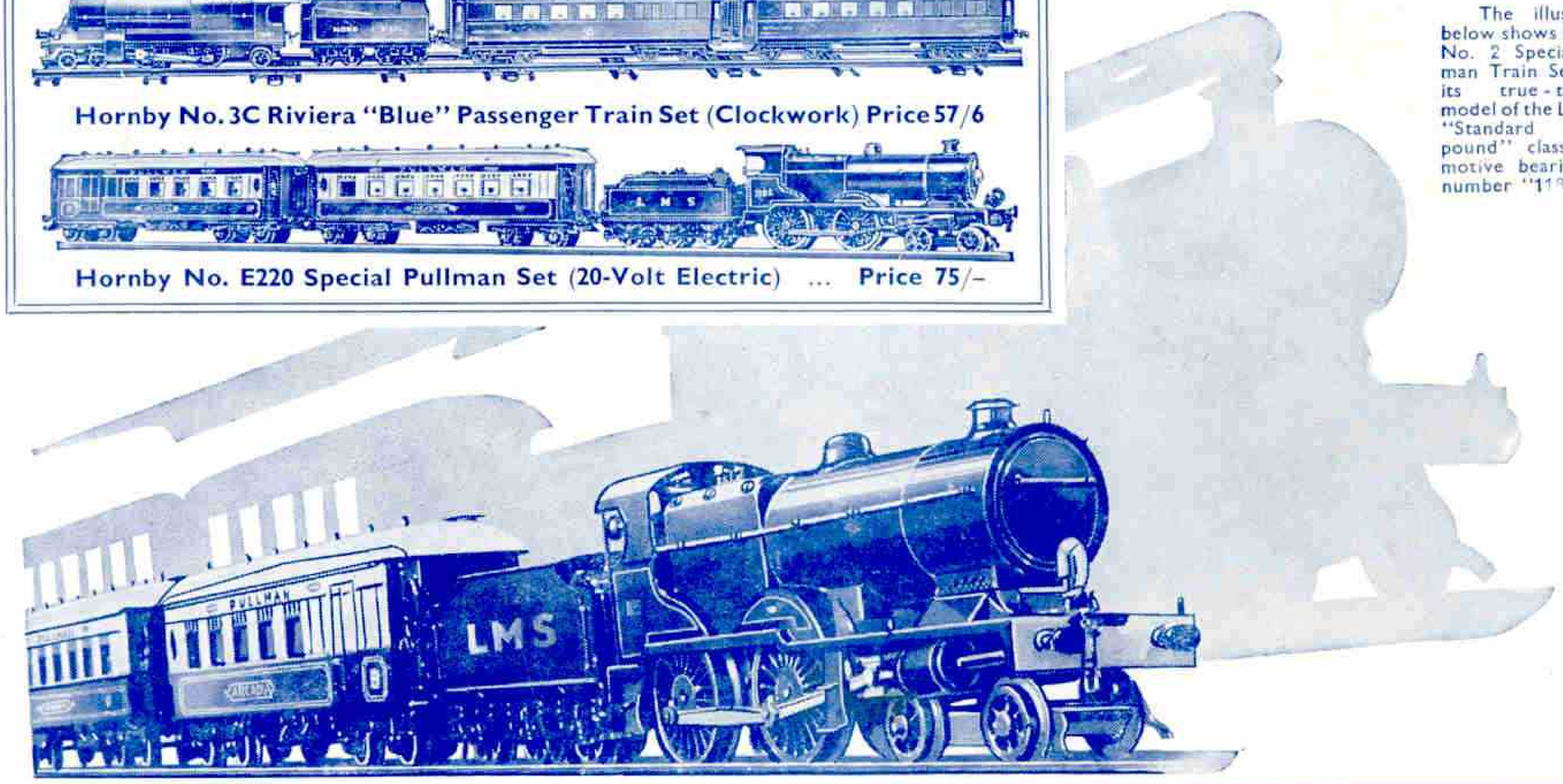
ELECTRIC MODELS

EM120 (20-volt) or EM16 (6-volt) Locomotive (non-reversing) Price **8/6**
EO20 (20-volt) Locomotive (reversing) Price **22/–**
E120 (20-volt) Tank Locomotive (reversing) Price **24/–**
E120 (20-volt) Special Tank Locomotive (automatic reversing) Price **30/–**
E220 (20-volt) Special Tank Locomotive (automatic reversing) Price **32/6**
E220 (20-volt) Special Locomotive (automatic reversing) Price **37/6**

CLOCKWORK MODELS

M1/2 Locomotive (reversing) Price **4/6**
M3 Tank Locomotive (reversing) Price **7/6**
No. O Locomotive (reversing) Price **10/6**
No. 1 Special Locomotive (reversing) Price **17/6**
No. 2 Special Locomotive (reversing) Price **27/6**

The illustration below shows Hornby No. 2 Special Pullman Train Set with its true-to-type model of the L.M.S.R. "Standard Compound" class Locomotive bearing the number "1185."



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