VOL. XXVI. Nº 1

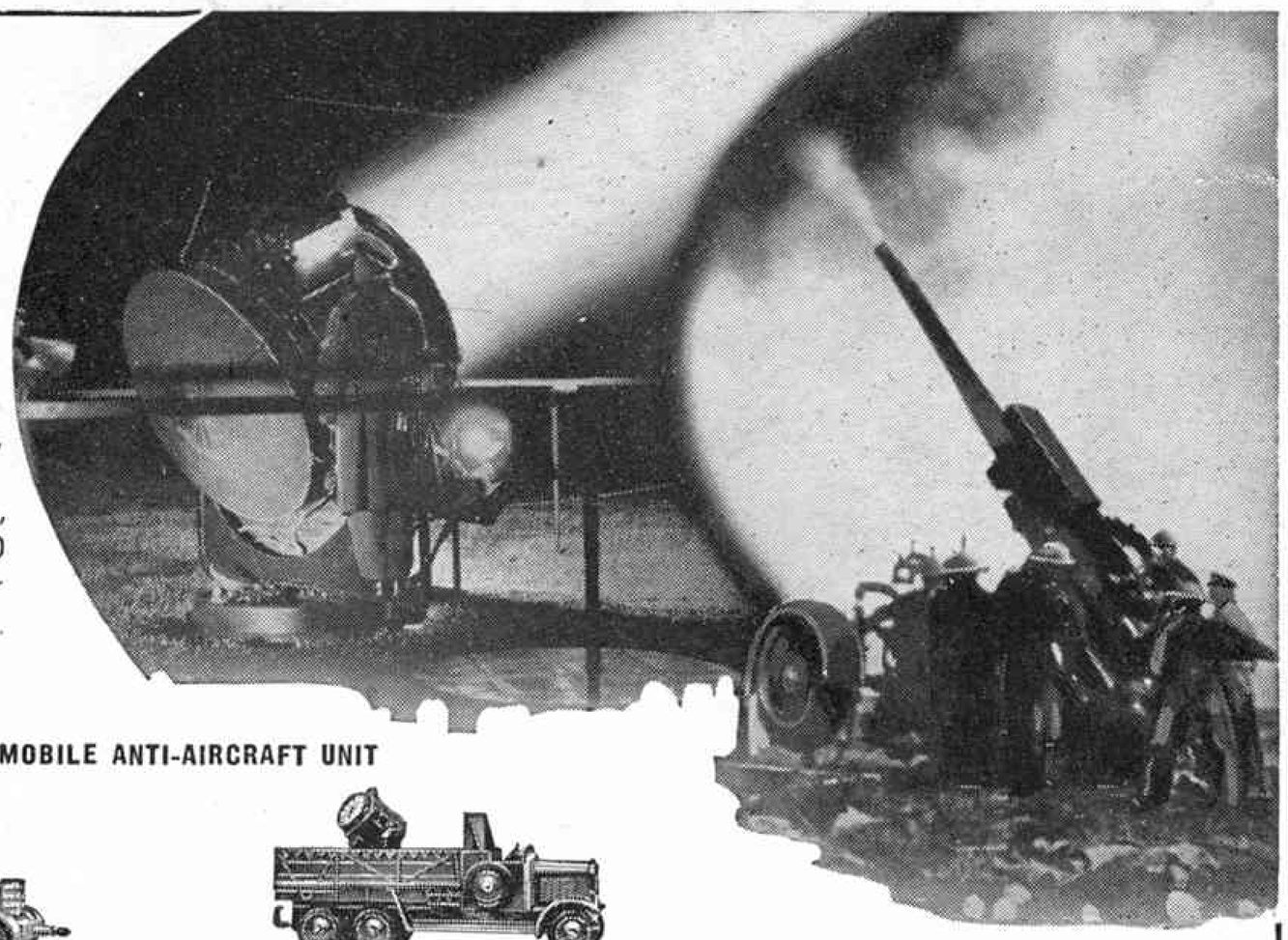
JANUARY 1941

MECCANO MAGAZINE

IN ACTION!

6D.

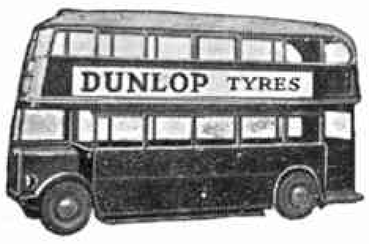
DINKY TOYS



THE FASCINATING COLLECTING HOBBY

Dinky Toys owe their popularity to their scale proportions, wealth of detail, and attractive finish. There are over 300 subjects now in the range. Here is a selection. Ask your Dealer for a copy of the latest illustrated price list of Dinky Toys.

DOUBLE DECKER BUS

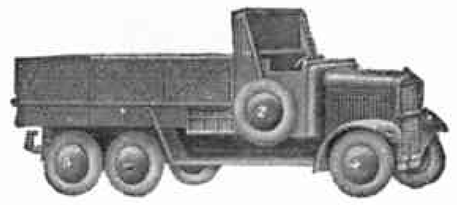


Dinky Toys No. 29c
Assorted colours.
Fitted with detachable rubber tyres.

MOBILE ANTI-AIRCRAFT UNIT

Dinky Toys No. 161
Comprises scale models of a Quick-Firing Anti-Aircraft Gun mounted on a mobile platform and a Searchlight mounted on a lorry. Both Gun and Searchlight have elevating and traversing movements.

SIX-WHEELED WAGON



Dinky Toys No. 25s
An interesting model of a modern three-ton wagon. In assorted colours.

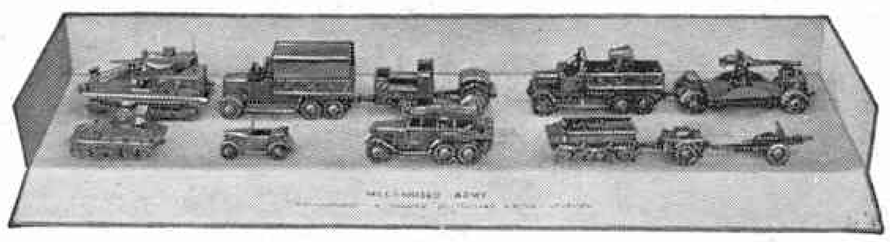
VICKERS-SUPERMARINE "SPITFIRE" FIGHTER (Camouflaged)

Dinky Toys No. 62e
Scale model of the Vickers-Supermarine "Spitfire," one of the fastest fighter aircraft used by the Royal Air Force.
No. 62e Camouflaged
No. 62a Aluminium Finish

18-POUNDER QUICK-FIRING FIELD GUN UNIT

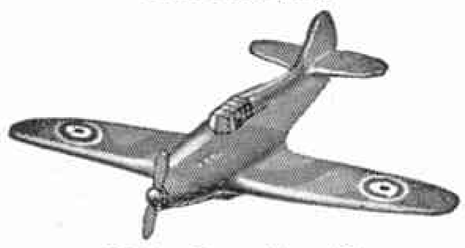
Dinky Toys No. 162
Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor.

MECHANISED ARMY



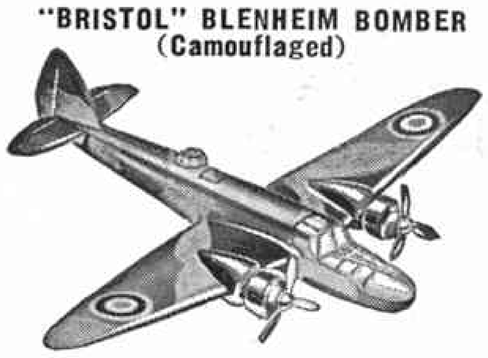
Dinky Toys No. 156
This fine set contains the principal units of a modern mechanised army. It includes the following items:
Royal Tank Corps Medium Tank Set (Dinky Toys No. 151) without driver.
Royal Tank Corps Light Tank Set (Dinky Toys No. 152) without driver.
Mobile Anti-Aircraft Unit (Dinky Toys No. 161).
18-Pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162).

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER (Camouflaged)



Dinky Toys No. 62h
Scale model of the Hawker "Hurricane" single-seater Fighter extensively used by the R.A.F.

"BRISTOL" BLENHEIM BOMBER (Camouflaged)



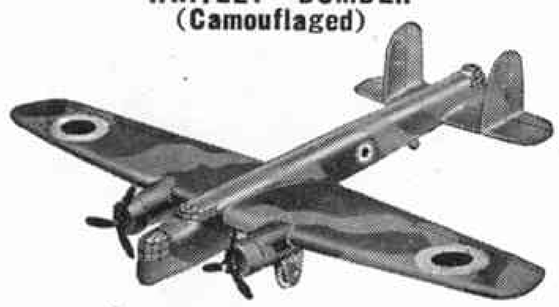
Dinky Toys No. 62d
Realistic model of the latest "Bristol" Blenheim Bomber extensively used by the Royal Air Force.
No. 62d Camouflaged
No. 62b Aluminium Finish

SHIPS OF THE BRITISH NAVY

50c 50e

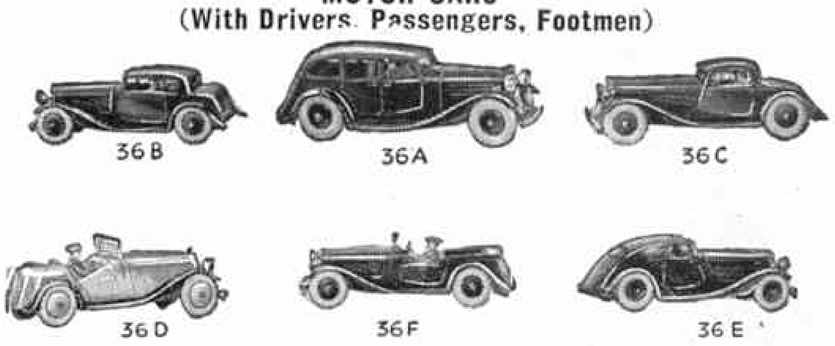
Dinky Toys No. 50
No. 50a Battle Cruiser "Hood" ; No. 50b Battleships, "Nelson" Class (2) ;
No. 50c Cruiser ; No. 50d Cruiser "York" ; No. 50e Cruiser "Delhi" ;
No. 50f Destroyers, "Broke" Class (3) ; No. 50g Submarine, "K" Class ;
No. 50h Destroyers "Amazon" Class (3) ; No. 50k Submarine, "X" Class.

ARMSTRONG WHITWORTH "WHITLEY" BOMBER (Camouflaged)



Dinky Toys No. 60v
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.

MOTOR CARS (With Drivers, Passengers, Footmen)



36B 36A 36C 36D 36F 36E

Dinky Toys No. 36
Fitted with detachable rubber tyres. Silver-plated true-to-type radiators.
No. 36a Armstrong-Siddeley (Limousine) with driver and footman
No. 36b Bentley (Two-seater Sports Coupé) with driver and passenger
No. 36c Humber (Vogue Saloon) with driver and footman
No. 36d Rover (Streamlined Saloon) with driver and passenger
No. 36e British Salmson (Two-seater Sports) with driver
No. 36f British Salmson (Four-seater Sports) with driver

BOEING "FLYING FORTRESS"

Dinky Toys No. 62g
Scale model of Boeing B-17 "Flying Fortress," one of the fastest bombers in the world, and extensively used by the United States Army Air Corps.

FAIREY "BATTLE" BOMBER (Camouflaged)

Dinky Toys No. 60s
Scale model of the well-known medium bomber used in large numbers by the R.A.F.

DINKY TOYS ARE MANUFACTURED BY MECCANO LTD., LIVERPOOL

Prices of all Dinky Toys are subject to change without notice. Ask for the latest price list.

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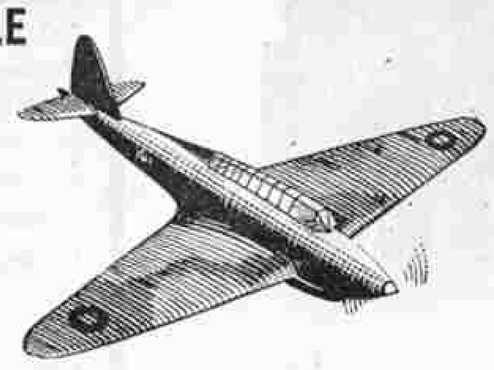
FAIREY BATTLE

A super kit and champion flyer. All parts ready to assemble ; dope, celluloid cabin, instrument panel, three-bladed propeller, two full size plans. Wing span 25 inches.

Price 13/9
Despatch 9d.



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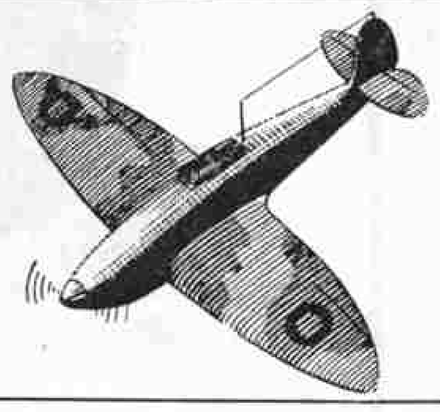
THE EASIEST WAY TO LEARN ABOUT FLYING IS TO MAKE YOUR OWN PLANE - and FLY IT!



SPITFIRE CONSTRUCTIONAL KIT

All parts partly cut out, cement, plans, etc. Wing span 12 inches.

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Despatch 4d.

Hurricane also, 3/3. Wellesley — wing span 18 inches, 3/11.

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The Yellow Carvel

Scottish warship of the days of Bruce. Size of finished model 14½ inches high by 14 inches long. Kit contains assembled hull, masts, spars, vellum, paints, blocks and plans.

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Size of finished model 32½ inches long, 25 inches high. Full kit with guns, lanterns, etc.

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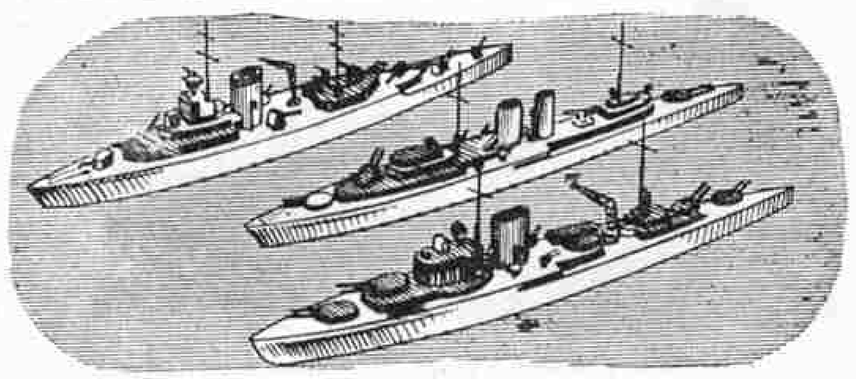

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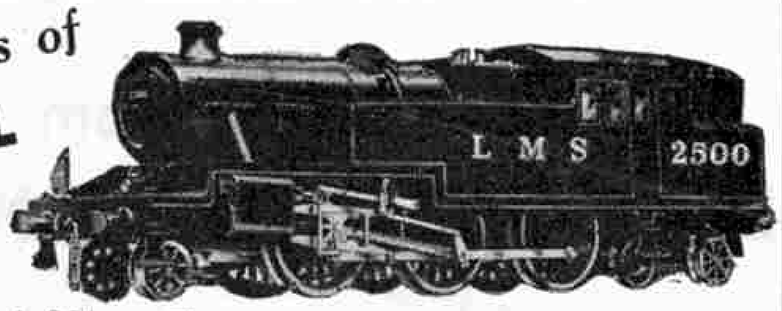

This MILBRO L.M.S. Tank Loco is complete in every detail.

Precision-built to limits of .001 of an inch, MILBRO model locos are perfect reproductions in miniature of the real thing. Their true-to-scale accuracy, first class workmanship and finish ensure 'crack' track performance.

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MODELS OF PERFECTION

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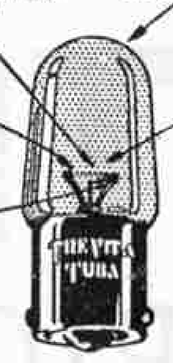
THE FINEST CYCLE DYNAMO HEAD BULBS PROCURABLE

THIS SPECIAL form of the MOUNTING of the FILAMENT known as "CATCH BACK" SECURES EFFECTIVE LIGHT from the WHOLE FILAMENT, as against the minute hot-spot of Light, at the focal point only, of other Filaments.

THIS WIDER STRETCH of the longer FILAMENT secures LIGHT IMMEDIATELY IN FRONT, stretching FAR AHEAD, and ILLUMINATING BOTH SIDES of the road.

THIS THIRD SUPPORT secures EXTRA RESISTANCE against ROAD JARS and any other SHOCKS



THIS SPECIAL SHAPE of TUBA secures 30% GREATER VOLUME WITHIN the BALLOON, so greatly INCREASING the LIFE that VACUUM instead of Gas can be used.

THIS STRONGER FILAMENT for Vacuum enables Lower Amperage, with Higher Voltage—EVEN MORE THAN 13 VOLTS FROM 6V 3W DYNAMOS—securing much HIGHER BRILLIANCY of LIGHT. This output of over 13 Volts has been certified by the N.P.L.

THIS LOWER AMPERAGE Filament used secures INSTANTANEOUS LIGHT, even at WALKING SPEED, which containing Infra-Red Rays, PENETRATES THE FOG.

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THE SUMMARISED ADVANTAGES

A Brighter and Better Light at All Speeds.

A Light at Walking Speed, when with other Bulbs there is no light.

A Voltage of over 13 Volts from 6V 3W Dynamos, giving much more Brilliant Light—the Voltage upon N.P.L. tests having been Certified at over 13 Volts.

A Stronger and Brighter Light, giving Longer Life in actual Usage.

A Light which Penetrates Fog.

BAYONET CAPPED BULBS (i.e. push-in) For LUCAS, MILLER, etc.

Description	Ref. No.	Frosted or Clear	Price
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For use with Miller 6V 3W Dynamo Outfits	MSC MSF	Clear Frosted	1/- 1/1½
For use with 6V 6W Dynamo Outfits	M9C M9F	Clear Frosted	1/- 1/1½

Ref. LSF

M.E.S. CAPPED (i.e. screw-in) For BEMO, STARLITE, LUCIFER, etc.

For use with 6V.3A 1.8W Dynamo Outfits	852 851	Clear Frosted	7½d. 9d.
Specially for Bemo and Starlite	862 861	Clear Frosted	7½d. 9d.
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Ref. 871

With all types use 6V.04A Rear Bulbs (price 7½d.) excluding Bemo, with which use Ref. 202 2.5V.25A.

Send for Price List. Individual Bulbs Supplied. No Charge for Postage, All Prices exclusive of Purchase Tax.
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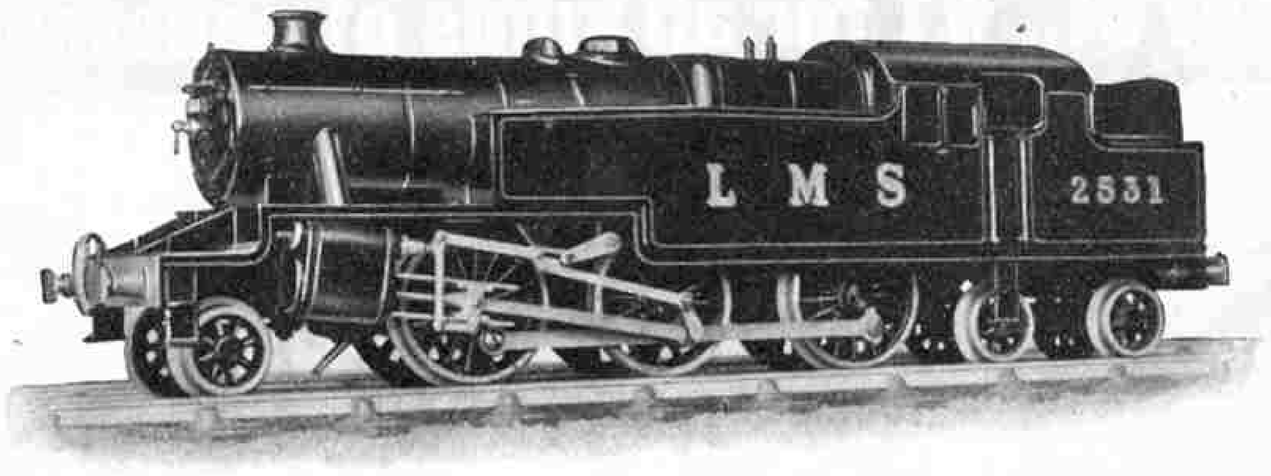
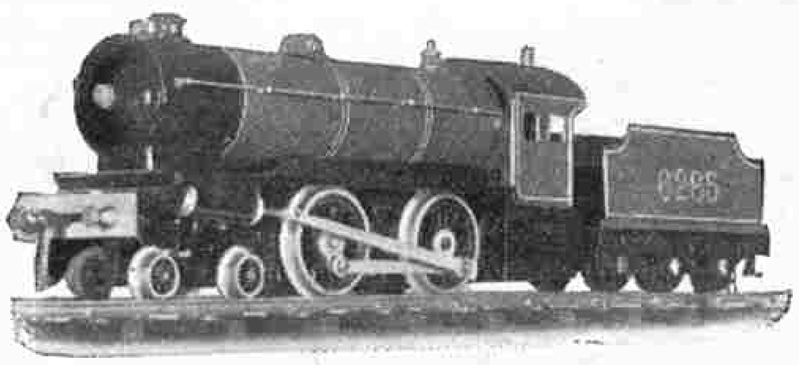
THE THREE WINNERS!

This month we illustrate three of our most attractive gauge "0" models—our "three winners"—and if you have not seen NEW GR. 17, our smart 1941 Gauge "0" Railways Catalogue—send for it RIGHT NOW! It describes all these models in detail and scores of others, as well as wagons, signals, track, stations, power units and accessories—all for gauge "0"—and the price **6d. post free.**



The new 2-6-4 Tank Locomotive described on page 12 of our new GR.17. (6d. post free).

Have you seen the new edition MODEL RAILWAY HANDBOOK by W. J. Bassett-Lowke, M.I.Loco.E.? 150 pages, 200 illustrations. Price 3/6. Postage 4d. Model Shipbuilders should get our S.17 catalogue, which describes a wide range of true to scale models of vessels of all types. Details of these, together with fittings, blue prints, sets of parts, etc., are given in the latest catalogue S.17. Price 6d. post free.



"Enterprise" our wonderful gauge "0" steam locomotive still as popular and useful as ever. Price £3 . 0 . 0.

AND NOW THE TWINS!
Come and see them at Holborn—we have a splendid layout there—or if this is impossible send for catalogue NEW TT.17, price 3d. post free. If you are not already a Twin Train owner and would like details of this fascinating "00" gauge Table Railway—send us your name and address and we will put you on our mailing list of gauge "00" owners!

Constructional Booklet.
Building a gauge "0" steam Mogul in 30 hours.
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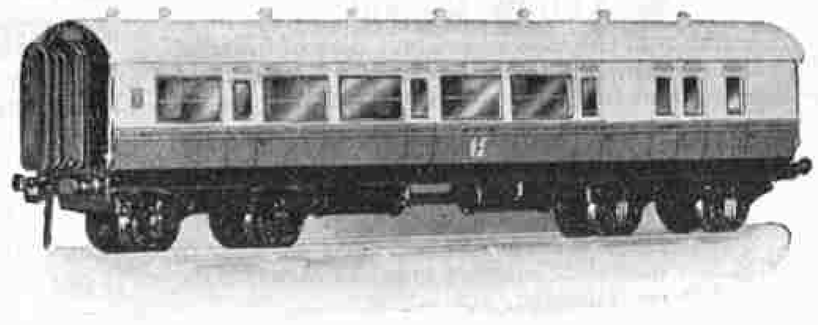

Standard gauge "0" Passenger Rolling Stock, (length 13") in L.M.S., L.N.E.R. and S.R. colours. Price 14/6d. each.

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ASTRA
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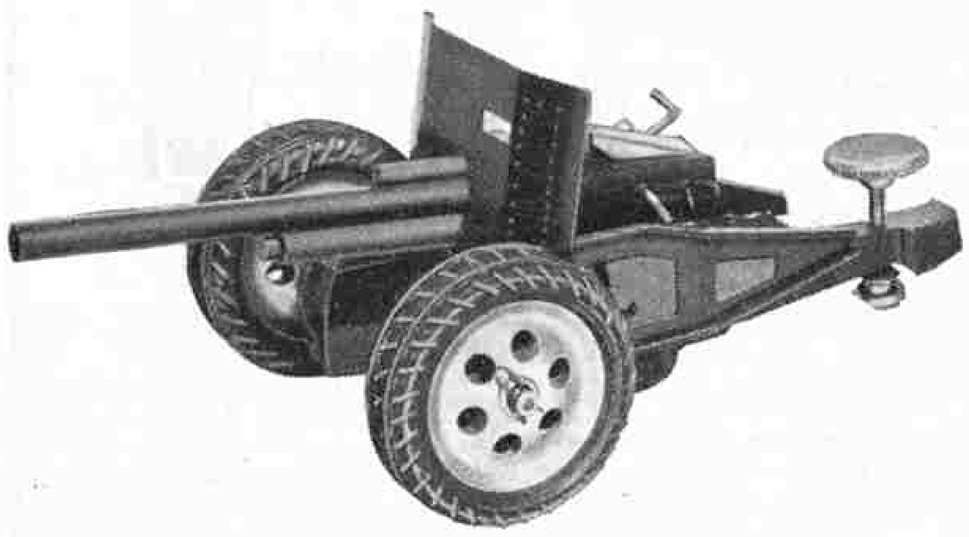

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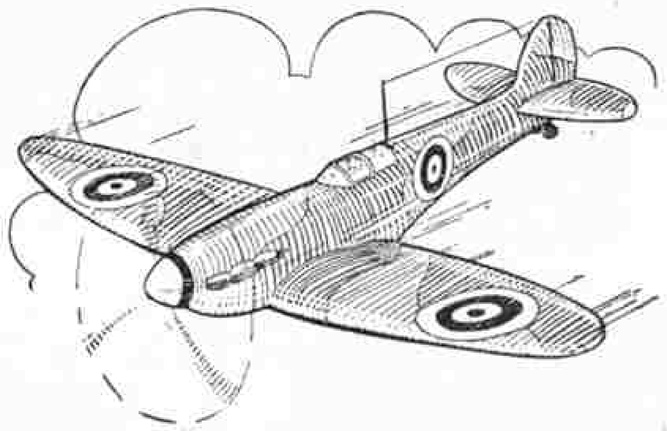
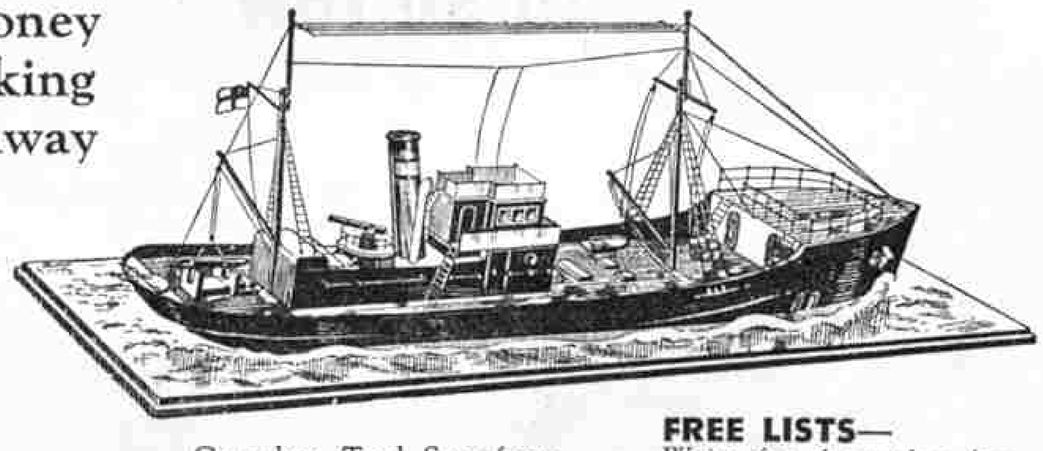
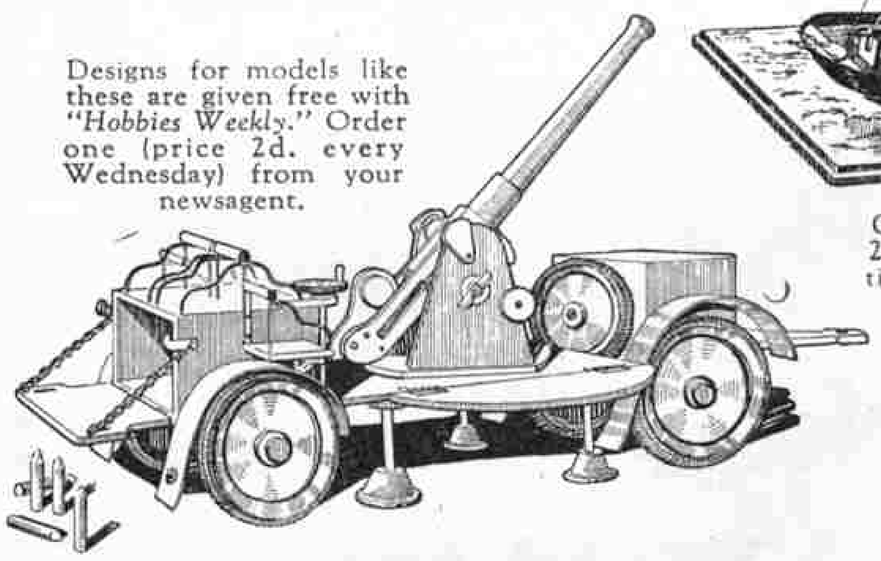
MODELS TO MAKE WITH A FRETSAW



There is an endless range of things to make if you have a few Hobbies Tools, some wood and a pattern sheet. You can make models like those shown, or articles to use in the home, or even suitable presents for your friends. A real money saving as well as money making hobby. You can begin right away with any Hobbies Outfit.



Designs for models like these are given free with "*Hobbies Weekly*." Order one (price 2d. every Wednesday) from your newsagent.



Complete Tool Sets from 2/3 to 28/6. With full instructions and simple design.

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HOBBIES HANDBOOK

A 200-page book with over 500 things to make and complete instructions on all kinds of models in the 1941 Hobbies Handbook. Large free charts for models in wood of H.M.S. Exeter and a "Spitfire" fighter. Get a copy (price 6d.) at any newsagent or post free 9d. as below.

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GALLEONS – TOYS – MODELS
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PUZZLES – TRAYS – BOXES

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BRITISH FRETWORK OUTFITS

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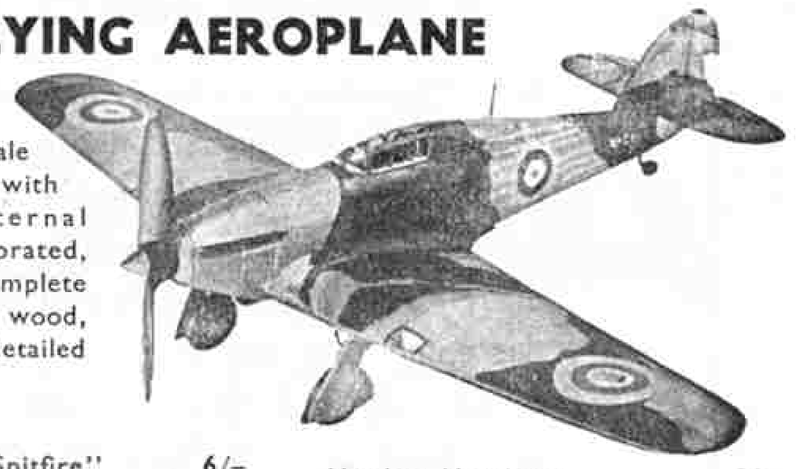
NEW FLYING AEROPLANE KITS



To build ½" scale flying models with all main external details incorporated, Each kit is complete with all Balsa wood, glue, etc., and detailed drawing.

Supermarine "Spitfire"	...	6/–
Miles "Magister"	...	4/3
Foster Wikner "Wicko"	...	3/6
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Hawker Hind	...	7/–
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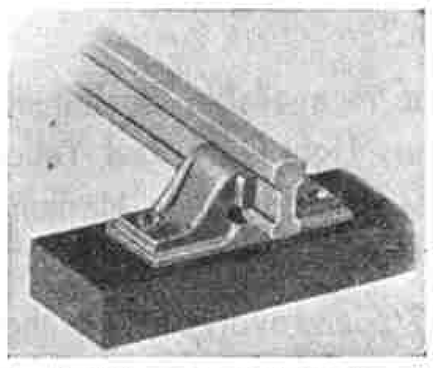
Postage 6d. extra per kit.



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PRICES. Standard Gauge "OO" and "O" Parts suitable for Hornby Models.

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All Track Prices plus 20% and carriage.

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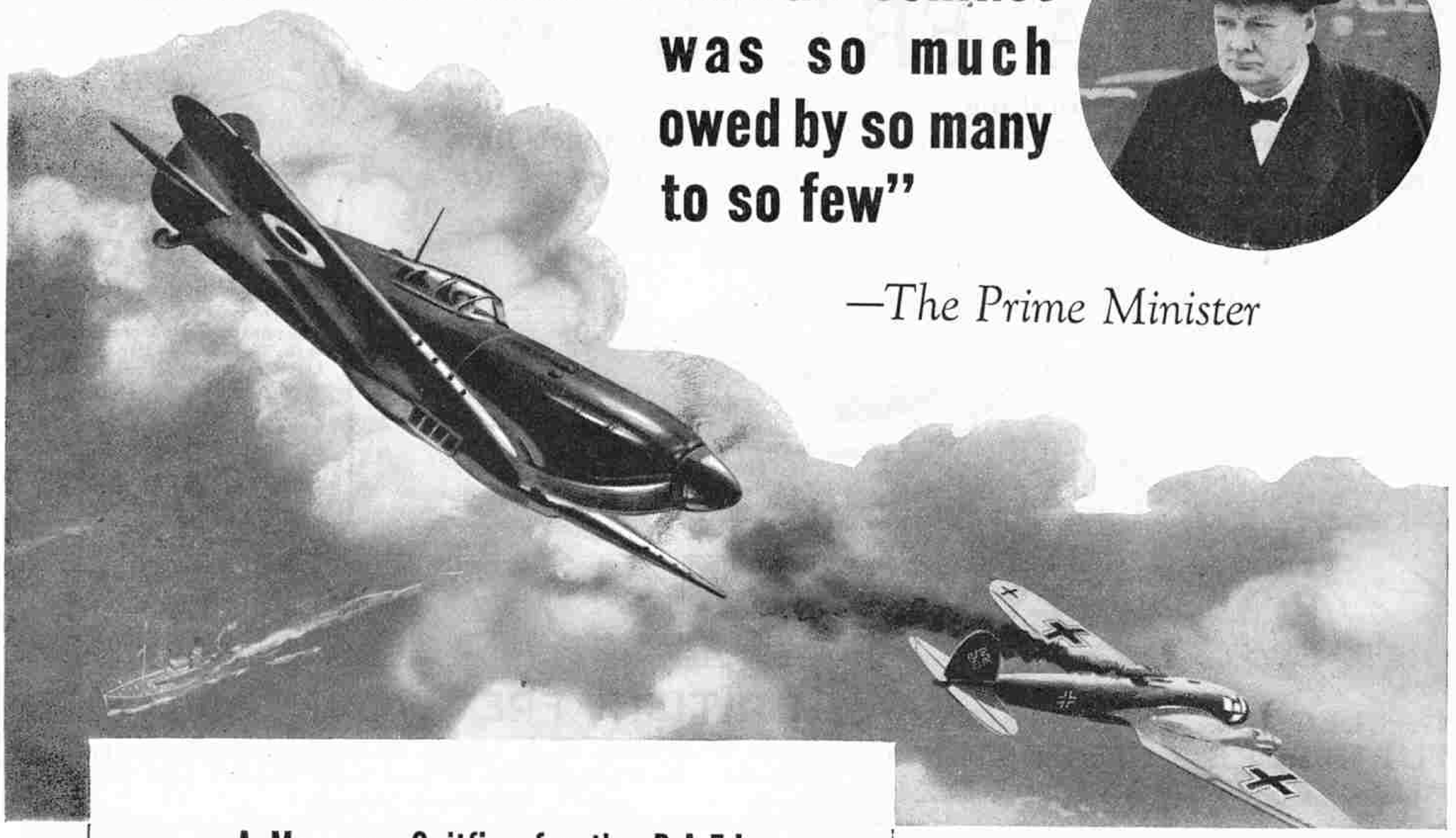
"Never in the field of human conflict was so much owed by so many to so few"

—The Prime Minister



A Meccano Spitfire for the R.A.F.!

Every Meccano boy is full of enthusiasm for the splendid work of our Fighter Command—the magnificent pilots who have fought and beaten, and continue to beat, the most powerful bombers the Germans can put into the air. THE MECCANO SPITFIRE FUND provides a glorious opportunity to express this enthusiasm, and to show these pilots that their heroic exploits are watched with ever-growing excitement and admiration in every British home.

Have you told your father and mother, and all your relatives and friends, about the Fund, and persuaded each of them to buy a Spitfire Pendant?

This special Pendant is available beautifully enamelled in the following colours: Light Grey, Red, Yellow, Magenta, Dark Blue, Light Blue, Emerald Green, Medium Green, and also in specially finished Camouflage.

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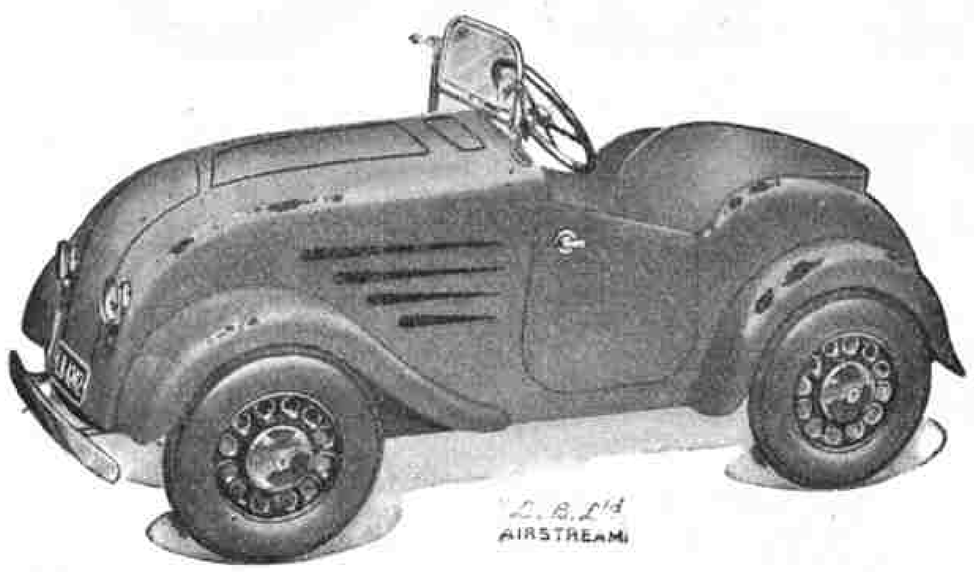

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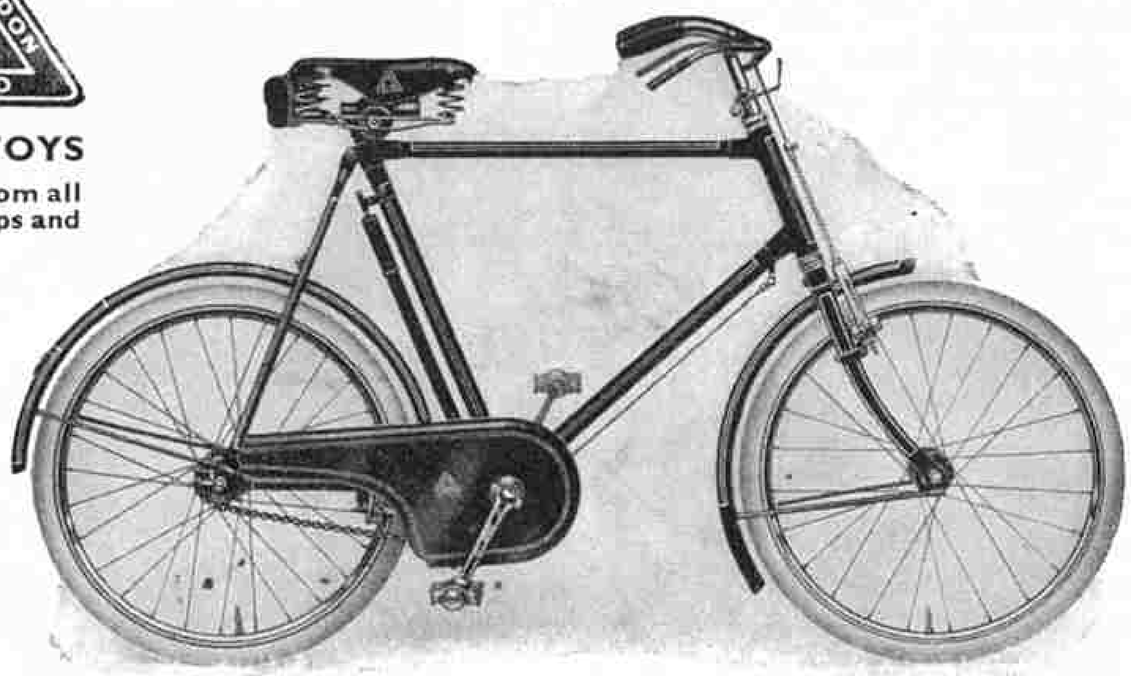

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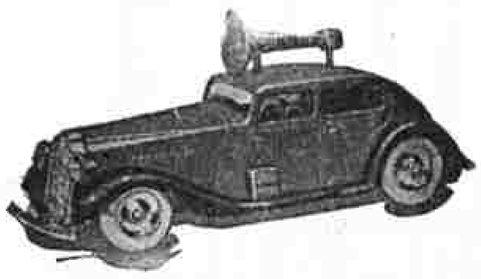

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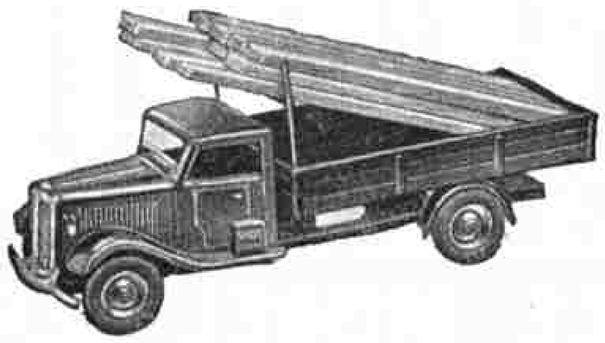

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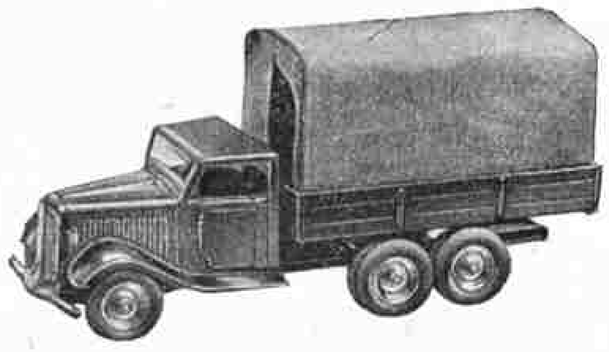
MINIC Breakdown Lorry. Also obtainable in camouflage colours. LENGTH 5½ ins.



MINIC Canvas Tilt Lorry. Also obtainable in camouflage colours. LENGTH 5⅛ ins.

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Next Month: "THE FLEET AIR ARM" Publishing Date: 1st February

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With the Editor

Looking Forward

What a year 1940 has been! Norway, Denmark, Holland and Belgium over-run by the Nazi gangsters; and then, most unexpected calamity of all, the collapse of France, leaving Britain and the Empire to face the storm. Then the British Bulldog shook himself wide awake, got his teeth into the enemy and held on; and he will hold on to the end!

Months of ferocious bombing of our towns and villages have done nothing to help Hitler; they have only strengthened our determination to smash him and all he stands for. Our fighting power grows day by day. Already we have hit back hard, and we shall hit harder. We still have a grim struggle to face, but the result is certain—victory over the wicked Nazi bullies, and the return of peace to the world.

My mailbag during the past few months has been extraordinarily interesting. Many of my readers have been bombed out of house and home; some have lost fathers or mothers, sisters or brothers. Yet in all their letters there is never a word of fear or faltering. They tell the story of their ordeal vividly but quietly. They are sad, but they face the future undaunted; they are true British boys. Then there are those who have been evacuated to safer places. For a while their whole world seemed to be turned upside down; but presently their grit and their sense of humour came out on top, and they tackled their new life manfully.

It is my firm conviction that the coming months, whatever stern trials they may hold, will bring a lightening of the clouds. And in this spirit I wish with all my heart: A Happy New Year to Every Reader!

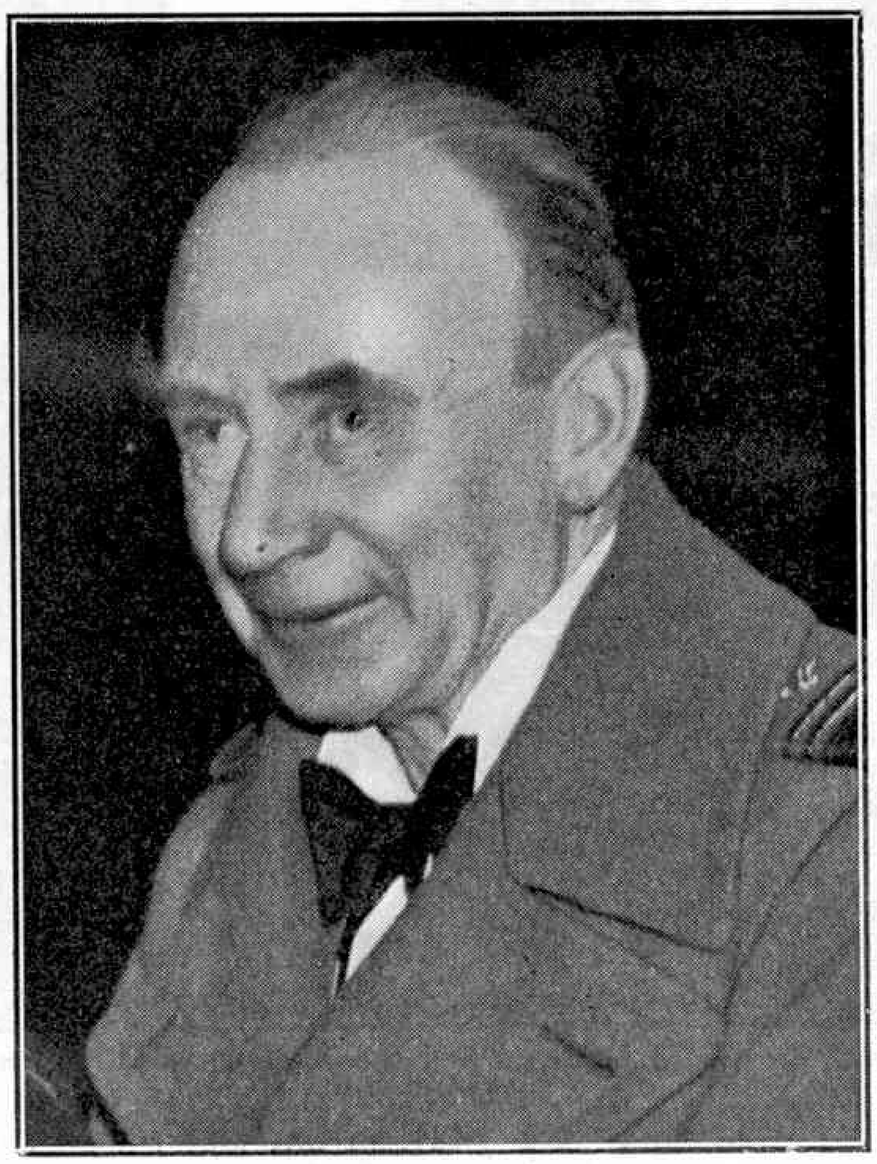
Our R.A.F. Radio Fund

Readers will be interested to know that through our R.A.F. Radio Fund, which still goes steadily forward, the R.A.F. Comforts Committee have sent 26 battery wireless sets to isolated stations of the R.A.F. where the personnel are working under very lonely conditions, and a wireless set is a great boon to them.

Leaders in the War

XIV—Sir Frederick Bowhill

Air Chief Marshal Sir Frederick William Bowhill was born in September 1880, in India, where his father, a Colonel in the 1st Wiltshire Regiment, was stationed. He was educated at Blackheath School and in the old training ship H.M.S. "*Worcester*." He began his sea career in the Merchant Service, and at 19 was third mate of the "*Almora*," a square-rigged ship. After 16 years in this Service he entered the Royal Navy.



Air Chief Marshal Sir Frederick William Bowhill, K.C.B., C.M.G., C.B., D.S.O. Air Officer Commanding-in-Chief, Coastal Command, R.A.F.

During 1912-13 he learned to fly, and later was appointed a Flying Officer in the Royal Naval Air Service. He was aboard the carrier "*Empress*" when her seaplanes took part in the raid on Cuxhaven on Christmas Day 1914, and he was Commander of No. 8 (Naval) Squadron when this was sent, in August 1916, from Mesopotamia to East Africa to assist General Smuts' force. In February 1918 he was awarded the D.S.O. for his services in connection with military operations in East Africa. During the war he was mentioned altogether seven times in dispatches, and was awarded the C.M.G. and a Bar to the D.S.O.

In 1919, as Wing Commander, he was appointed Chief Staff Officer to a secret expedition to Somaliland, in which aircraft were employed to locate and rout the "mad Mullah" who had been a nuisance to the British Army there for many years. Later he served in Egypt and Iraq, and from 1929 he has held a series of important home appointments. He was Director of Organisation and Staff Duties at the Air Ministry from 1929 to 1931, and followed this with two years as Air Officer Commanding, Fighting Area, R.A.F.

When the Royal Air Force was re-organised in 1937, Sir Frederick was made Air Officer Commanding-in-Chief, Coastal Command, a position he has held with the greatest distinction. The Coastal Command is responsible for patrolling the seas around Britain on the lookout for enemy aircraft, ships, and submarines, and co-operates with the Royal Navy in protecting shipping convoys.

The Empire's Strongest Natural Fortress

By Harold J. Shepstone, F.R.G.S.

IN the Rock of Gibraltar the British Empire possesses the strongest natural fortress in the world. Its value to Great Britain lies in the fact that it guards the entrance to the Mediterranean. With Malta and Aden in our possession it means that we are enabled to offer protection to our shipping passing to and from India and the East by way of the Mediterranean.

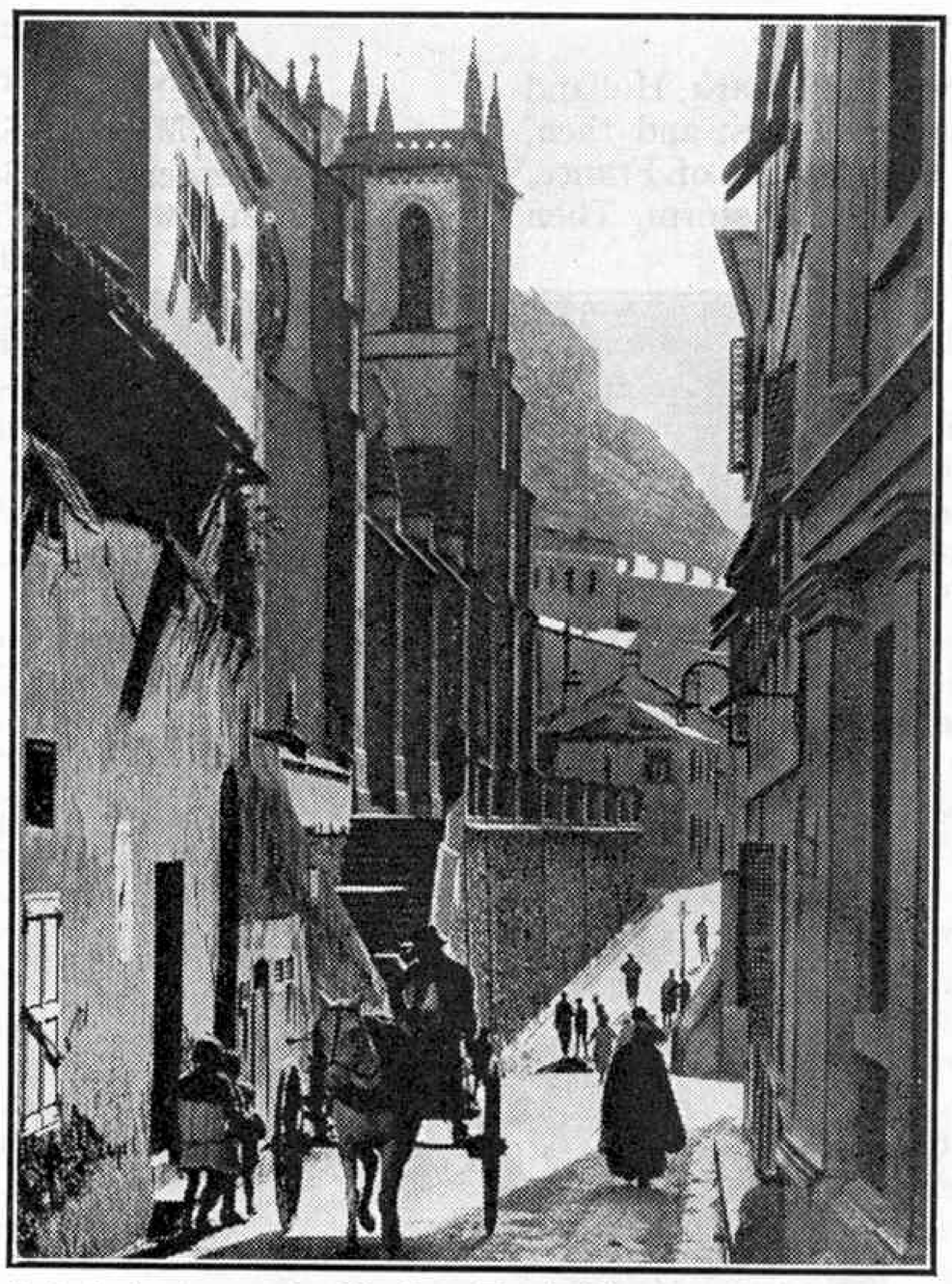
The question many are asking to-day is whether this fortress of ours is still as impregnable as it has been considered to be. Do the guns in its galleries really control the Straits? We can answer the question better by first noting Gibraltar's unique geographical and strategical position.

It consists of a huge towering mass of limestone rock, somewhat resembling in shape a crouching lion. This rock, which rises to a height of nearly 1,400 ft., forms a peninsula $2\frac{3}{4}$ miles long and less than a mile in breadth, having a total area of but $1\frac{3}{4}$ square miles. The peninsula is joined to the southern extremity of Spain by a low, narrow, sandy isthmus. Were it not for this isthmus Gibraltar would be an island. That part of the isthmus which is regarded as British is heavily mined and also capable of being instantly flooded. The remainder of the isthmus, for it is 1,500 yds. long, is "neutral ground," neither British nor Spanish. Both countries often use it for exercising troops. At its northern end, where it joins the mainland, is the Spanish town of La Linea.

The Rock dominates both sea and land as if challenging attack from either. Its northern face, which looks across the isthmus towards Spain, rises almost vertically to a height of 1,396 ft., its highest point. From here the great ridge of rock, which forms the backbone of the peninsula, runs almost due south, rising and sinking to form two other well-defined peaks—Upper Signal Station, 1,294 ft. high, and Sugar Loaf Hill, which rises to 1,361 ft. Southward of the latter point the Rock declines gradually to Europa Point where is situated the lighthouse.

The town and harbour lie on the western side of the Rock, in Gibraltar Bay. On the other side of this bay, eight miles away, facing the town and harbour, is Algeciras, where Spain is known to have stationed heavy guns. Directly opposite the Rock, across the Straits on the African coast, 15 miles distant, is Ceuta, in Spanish Morocco, which also has been heavily fortified.

Briefly then the position is this. Just as the guns of Gibraltar can cover the straits by their fire, so no doubt could the Spanish guns at Ceuta. The German guns at Calais can fire across the Straits of Dover, but this does not give the Germans control of that waterway. Protected by aeroplanes, smoke-screens and destroyers, our convoys successfully make the passage. The same holds good at Gibraltar. The straits here can only be effectively closed to shipping by patrolling warships operating from the harbour. If the latter is under heavy gunfire it could not be used; but this would not prevent our warships dealing with enemy ships the moment they left the narrow waterway. While it may be possible, therefore, to put town and harbour out of commission by gunfire, it would mean very little to an enemy unless he had command of the sea. Then, as long as the fortress remained, it would be a continual menace to passing ships.



Typical street scene in Gibraltar. The building on the left is Holy Trinity Cathedral.

Gibraltar is a great fortress and it is run as such. At sunset the gates are locked, to be opened again at sunrise. No one—not even a British subject—has any legal right to live in Gibraltar. Before he can do so he must obtain permission from the Governor. No alien is allowed in the town without a special ticket, but these are readily granted in normal times. But he must leave at sunset unless he can find a resident of standing to vouch for his good behaviour. If a resident, without a pass signed by the garrison adjutant, is outside after the gates are closed, he must remain there until they are re-opened in the morning.

For centuries Gibraltar was regarded by the races inhabiting the neighbouring shores as the edge of the world. Together with the promontory of Apes' Hill, at Ceuta, it formed the renowned Pillars of Hercules, beyond which no sailor, however bold, dared steer his ship.

It was not till the eighth century that the Moors discovered its strategic importance, a fact that seems to have escaped the rest of Europe. Crossing from Africa to Spain, and taking advantage of its unrivalled defensive qualities, they converted it into a great fortress and held it off and on till 1462 when they were finally driven out of Spain. It fell into British hands in 1704, when a mixed English and Dutch squadron under Admiral Sir George Rooke subdued the Rock after a siege lasting only three days. Curiously enough, Rooke had been sent to capture Barcelona, and having failed to do so and not wishing to return empty-handed took Gibraltar instead.

All attempts since to drive Britain from the Rock have so far failed. The last attempt, and the greatest of Gibraltar's fourteen sieges, was that made by 17,000 Spanish and French troops in 1779. The British garrison at that time totalled 3,000. Britain was occupied with the American War of Independence and her fleet and Army were far away. The siege lasted three years and seven months.

As month succeeded month, the situation in the little town at the foot of the Rock grew more and more desperate. Food became so scarce that fowls were sold at two guineas each and mutton cost 4/- per lb., an incredible price considering the value of money in those days. Roots, weeds and thistles were grubbed up greedily from the earth and used as food. For some weeks the Governor of the fortress, General Sir George Eliott, lived on four ounces of rice a day, so that it should not be said that he had plenty to eat while his people starved. A dreadful outbreak of scurvy followed, and only the almost miraculous capture of a Dutch ship laden with lemons and oranges enabled the garrison to hold out.

At first the enemy contented themselves with their blockade and the building of siege works; but later, when a relief squadron managed to break through the lines and carry food and ammunition to the starving garrison, they opened fire and began a heavy bombardment. Day after day and night after night the men and women of Gibraltar listened fearfully to the sound of bursting shells as they lay terrified in their shelters.

Failing to reduce the garrison by starvation and bombardment, a new weapon was tried. This consisted of a fleet of floating batteries designed by a French engineer and held to be bomb-proof. In broad daylight, and only half a gunshot from the walls, they took up their position and began to bombard the Rock. The shots from the garrison could not find a vulnerable spot in the thick wooden armour. Volley after volley rolled harmlessly off the sloping sides and fell with a splash into the sea. The position looked desperate when an idea flashed across the mind of the commander. He changed the solid shot to red hot shells, and an improvement was soon evident. One by one

the "invincible" ships caught fire and went up in flames, and the besiegers were forced to retire, beaten.

It was during this siege that the galleries for which Gibraltar is famous were commenced. They are among the engineering wonders of the world. Huge tunnels were hewn out of the solid limestone, occasional chambers formed with gun embrasures pointing towards Spain, the Bay of Gibraltar, and across the Straits to the African coast. Only the lower gallery is shown to visitors, the position of the modern guns and batteries being a jealously guarded secret.

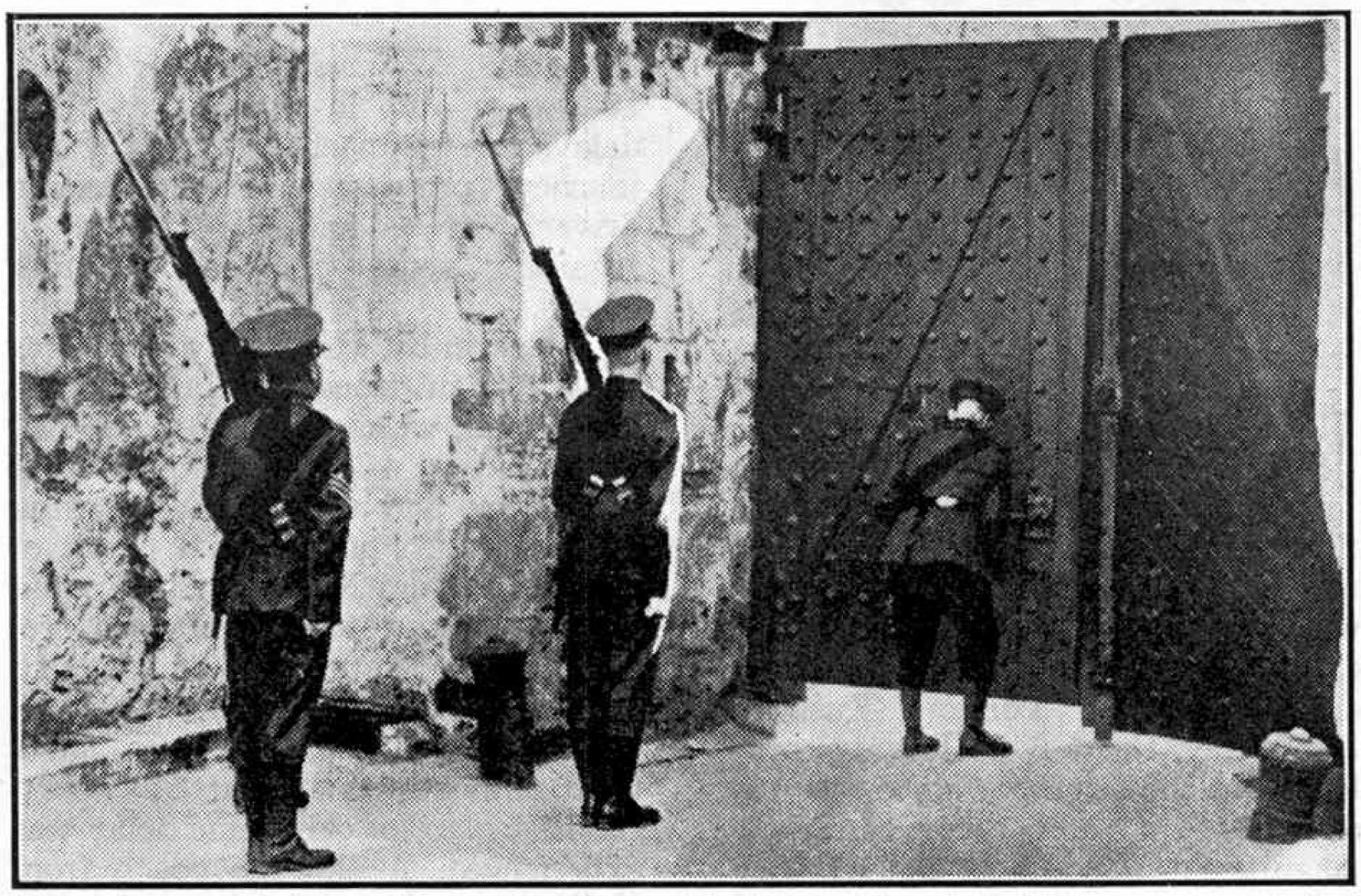
Another engineering wonder is the water supply. Gibraltar has a total population in normal times of about 20,000 including a garrison of some 3,000 troops. There are no fresh-water springs, and the people have to depend upon the rain that falls during the winter months. On the eastern side of the Rock there is a cement-covered slope 38½ acres in extent. The rain that falls on this collecting area runs off through channels into huge reservoirs excavated in the heart of the rock, and capable of storing 9,000,000 gallons of water. One inch of rain falling on the catchment area will collect 600,000 gallons of water. It is said to be among the purest drinking water in the world.

It can be said of Gibraltar that it is our nearest colony. In normal times it is only two days from England by rail and three-and-a-half by sea. Of recent years it has come to the fore as a travel centre. It has an excellent climate, sport of every variety, and places of beauty and interest within reach in every direction. Then Gibraltar is not a barren rock as many are apt to believe, but a veritable flower garden. Practically all the year round there are blooms of every colour, shape and size.

The town, straddling the lower slopes of the rock, consists of one long, winding thoroughfare with ramps and alleyways leading off from it. The houses, which are of the Spanish type, are painted pink, pale blue or yellow, colours that tone well together in the sun-drenched atmosphere. In the main thoroughfare are the shops and stores, and Moorish and Indian bazaars crowded with the merchandise of the East. In the streets and cafes you encounter people of many races and colour—Moors, Spaniards, French, Arabs and Negroes. Gibraltar is a free port and in the course of a year over 5,000 vessels call there.

The town boasts a fine old cathedral, a museum, and a public library, a recent attraction being a magnificent masonry arch commemorating the United States naval activities in Gibraltar waters during the World War of 1914-18. Just outside Southport Gate, the southern limit of the town, is Trafalgar Cemetery, where lie buried the heroes of Nelson's famous battle fought near by. It is well kept, and the graves are covered in a riot of flowers all the year round. It is not generally known that Nelson's body was landed in the dockyard at Gibraltar and pickled in rum before being sent back for a hero's funeral in London. A little further on is the Almeda Gardens, Gibraltar's only public park.

Gibraltar has one sight that is unique—a tribe of Barbary apes that roam wild about the Rock. They have inhabited it for centuries and are believed to have originally come from Africa. They are regularly fed by order of the Governor, and food to the value of threepence per ape per day is left by a soldier in a lonely spot. The apes are seldom seen by passing tourists as they inhabit the higher portions of the Rock where visitors are not allowed. Once hundreds strong, the apes are now believed to number about a score. There is a saying in Spain that when the apes leave the Rock the English will leave also. At present, however, they show not the slightest inclination to do so.



Gibraltar is run as a fortress and at sunset its gates are locked. Our photograph depicts the ceremony of locking the Landport Gate, closing the link with Spain.

"Tail-End Charlie" runs into Bad Weather

By an Air Gunner

"A SLICE of cake," said my pilot. I knew what he meant. This time we were not off to Berlin or Milan, or any of those far-flung places, sections of which have been flung even farther. We were to make a quick, sudden smash at Hitler's invasion bases, and be back in bed by three.

No trouble at all, so long as—it being full moon—old Tail-end Charlie* kept a good look-out behind. Only the watchful tail gunner, alone and alert in his little glazed house far out on the great bomber's tail, can see and deal with trouble when it comes streaking out of the sky in the shape of a Heinkel or a Messerschmitt.

The night was bright, with a huge golden moon climbing up, but we had not covered more than two-thirds of the way when we sailed slap into cloud. Soon we plunged into absolute darkness, as the clouds engulfed us, and rain beat down on the turret.

"We'll take her up out of this," I heard the pilot say, through the intercommunicating telephone. Up we climbed through thrashing rain which suddenly turned into hail. I heard *'whack! whack! whack!'* as ice flew off the airscrew and rattled down on the fuselage. On the leading edges of the wings de-icers dispersed the ice before it could form thick and heavy. Something flickered, close to us, again and again. "I don't like that lightning" I heard someone say, in front.

Then a strange thing happened. From the barrels of my four guns, little sparks began to shoot backwards, with a thin, dry crackling noise. Lightning shimmered in front and behind us, and thunder bellowed all around. Our flying became very 'bumpy.' We suddenly rose or fell at incredible speeds. I lurched about my turret, holding on tightly, wondering if the next bump would K.O. me on the roof. All the time those little flickering sparks shot out of my guns.

There came one enormous bump when we must have dropped 500 ft., then a pause. Then a purple flash filled the whole of my turret and there was a deafening report. I found myself completely blind. The aircraft rocked crazily. Not a sound came from those in front.

"Hello, Captain! Hello, Captain!" I called.

Nobody answered.

After a bit, light filtered back to my eyes. I was not blind, after all. What was more, we were out of the clouds, and my guns had stopped firing off sparks. I could see that their several thousand cartridges had not gone off in my face as I had suspected.

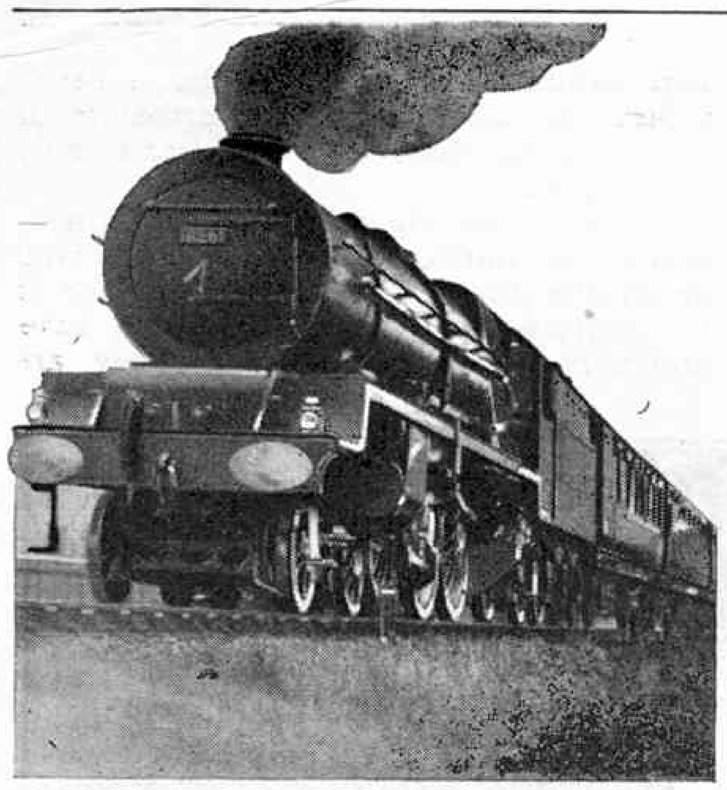
"Hello, Captain!"

At last his voice came back to me, bringing me but little comfort. "The 'plane has been struck by lightning" he said. "Have your parachute ready."

I took one glance at the cold sea, gleaming below, opened the turret doors, and reached for my parachute . . .

Well, we got back all right, and without having to jump. The lightning blast had done no harm to our "kite"; but if ever "Met" matters go wrong with me again, I only hope I have as steady a captain and as stout an aircraft to bear me.

*"*Tail-End Charlie" *is the nickname for an air gunner who lives in the turret at the tail of a heavy bomber.*



"Princess Elizabeth," L.M.S. 4-6-2 No. 6201, at speed.

Overtaking the "*Coronation Scot*"

Brilliant Run by Manchester-London Express

By "Observer"

JUST before the War began, two L.M.S. 4–6–2 locomotives of the original "Princess" type were stationed at Longsight (Manchester) motive power depôt, to share in the working of the fast and heavy expresses between Manchester (London Road) and London (Euston). Previously, the 4–6–0 "Royal Scots" had been the largest engines shedded at Longsight, and these had done magnificent service, as indeed they still continue to do. But a need had been felt increasingly for yet greater locomotive power to enable time to be kept with maximum loads on the fastest schedules. It was arranged, therefore, as new "Pacifics" were completed at Crewe and put into service, that some of the older ones should go to Longsight; and the first two to be sent were No. 6201 "*Princess Elizabeth*," which made the remarkably-successful trial runs from London to Glasgow and back in November 1936, and No. 6206 "*Princess Marie Louise.*"

These engines were getting splendidly into their stride on the Manchester-London services when war broke out, with such lamentable results to railway working and especially to express services. The "Pacifics" were soon taken away from Longsight, and the expresses—reduced in number and slower in timing—were committed to the charge of the "Royal Scot" and less powerful locomotives. Only occasionally, on the trains that travel via Crewe, are "Pacifics" still to be found, but the slower bookings now in force and the restrictions placed upon speed do not permit them to extend their powers and show their paces.

It was my good fortune, however, just before the war came and wrought such drastic changes, to secure a run of exceptional merit behind "Pacific" No. 6206 "*Princess Marie Louise.*" It was a run in which vexatious delays in the earlier stages of the journey provided an enterprising driver with a fine opportunity of regaining some time in the later stages.

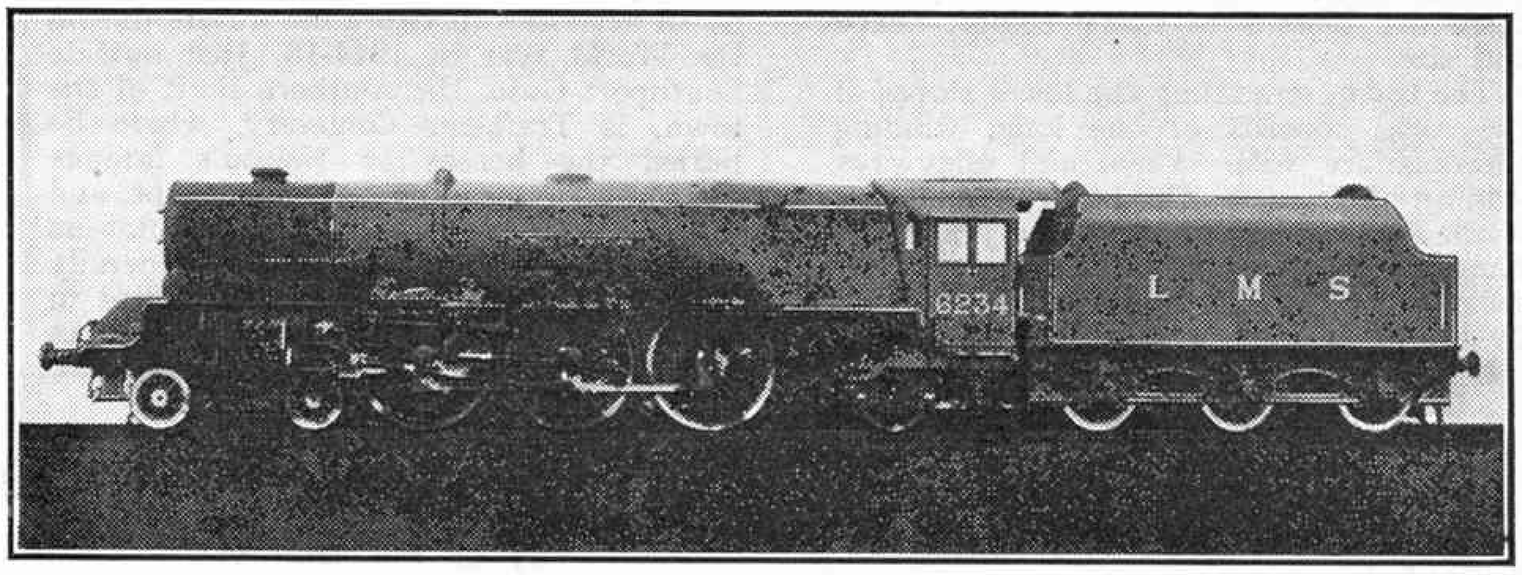
The train by which I travelled was the 4.10 p.m. from Manchester (London Road), which was booked to call at Stockport, Crewe, Stafford and Nuneaton, and to arrive at Euston at 7.47 p.m. For the final break of 97.1 miles from Nuneaton to Euston only 92 minutes were allowed, requiring an average speed of 63.3 m.p.h., start to stop.

A punctual departure was made from Manchester, but at Stockport, the first place of call, some delay was experienced. A through coach from Halifax was there joined to the train, but so numerous were the passengers—including many soldiers—that a further coach had to be added. At Crewe, again, prolonged station duties further delayed us, so that on leaving we were 10 minutes late. Onward to Stafford the engine recouped a little time, and made the run of 24.5 miles in 28 min. 15 sec. instead of the 30 min. allowed. This was sound work in view of the 10 miles of adverse gradients to Whitmore.

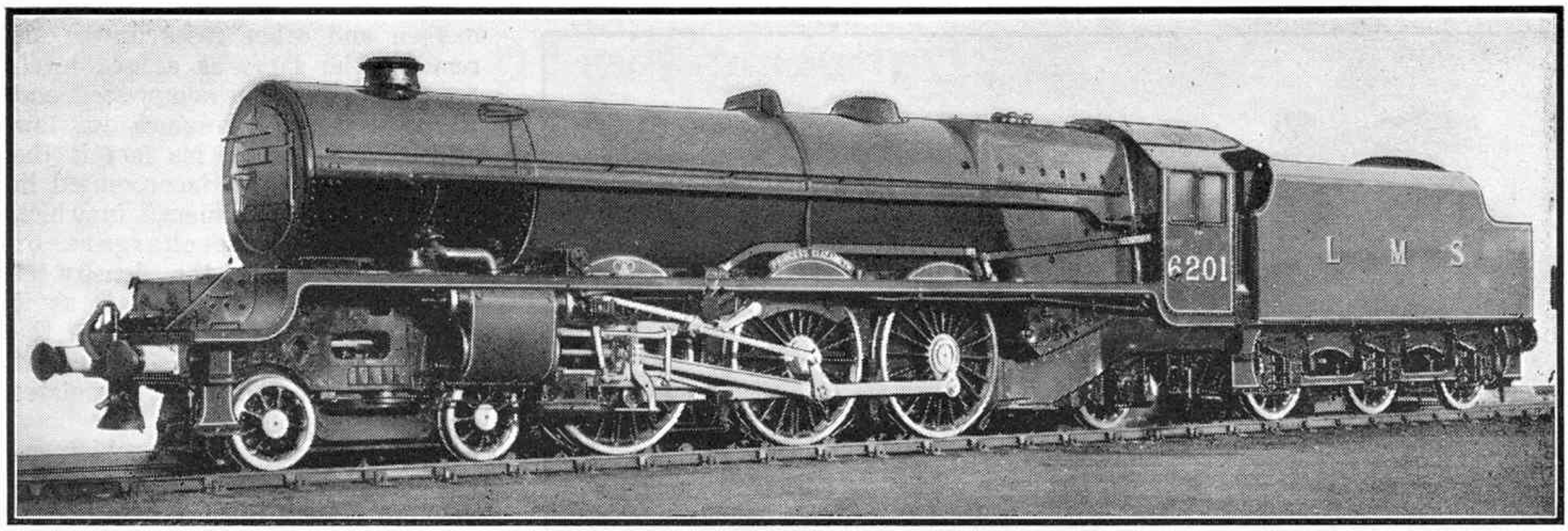
Having cleared Stafford we made good running until, approaching Tamworth, we found signals "on," and were brought to a dead stand for almost half a minute. So it was that we were 13 min. late on reaching Nuneaton. This made me fear that the "*Coronation Scot*," which was due at Euston at 8.0 p.m., 13 min. behind our arrival time, might now be allowed to get ahead of us. My fears proved to be only too well grounded, and surely enough, as we stood waiting at the platform, the famous streamlined flier swept swiftly through, three minutes ahead of her booked time. She was drawn by No. 6234 "*Duchess of Abercorn*," the non-streamlined "Pacific" with a double chimney—a red and gold engine at the head of a blue and silver train.

When at last we got the right-away signal we were late to the extent of 16 min. 40 sec. Up the rising grades to Bulkington No. 6206 rapidly gathered speed, her tremendous pulling powers being clearly evidenced. Brinklow (9.0 miles from Nuneaton) was passed in 11 min. 5 sec., and Rugby (14.5 miles) in 16 min., exactly on scheduled time. Here speed was reduced to about 40 m.p.h., and the next 7.3 miles on to Welton, including the climb to Kilsby tunnel, took 8 min. 10 sec. And now our "Princess" began to show her turn for speed in a most convincing manner. On the falling gradient to Weedon a rate exceeding 80 was attained, nor did the slight rise to Roade later affect our progress; the 15.4 miles from Welton to Roade were covered in 11 min. 55 sec., showing an average of 77½ m.p.h. From Roade to Bletchley (13.2 miles in 9 min. 55 sec.) an average of 80 m.p.h. was sustained, and between Rugby and Bletchley exactly 2 min. were gained on the tight schedule timing.

On the 15 miles of rising grades from Bletchley to Tring, No. 6206, most ably handled by the men on the footplate, put up a truly astounding



L.M.S. No. 6234, "Duchess of Abercorn." The illustrations to this article are by courtesy of the L.M.S.R.



Another view of "Princess Elizabeth," the L.M.S. record-breaking 4-6-2 locomotive.

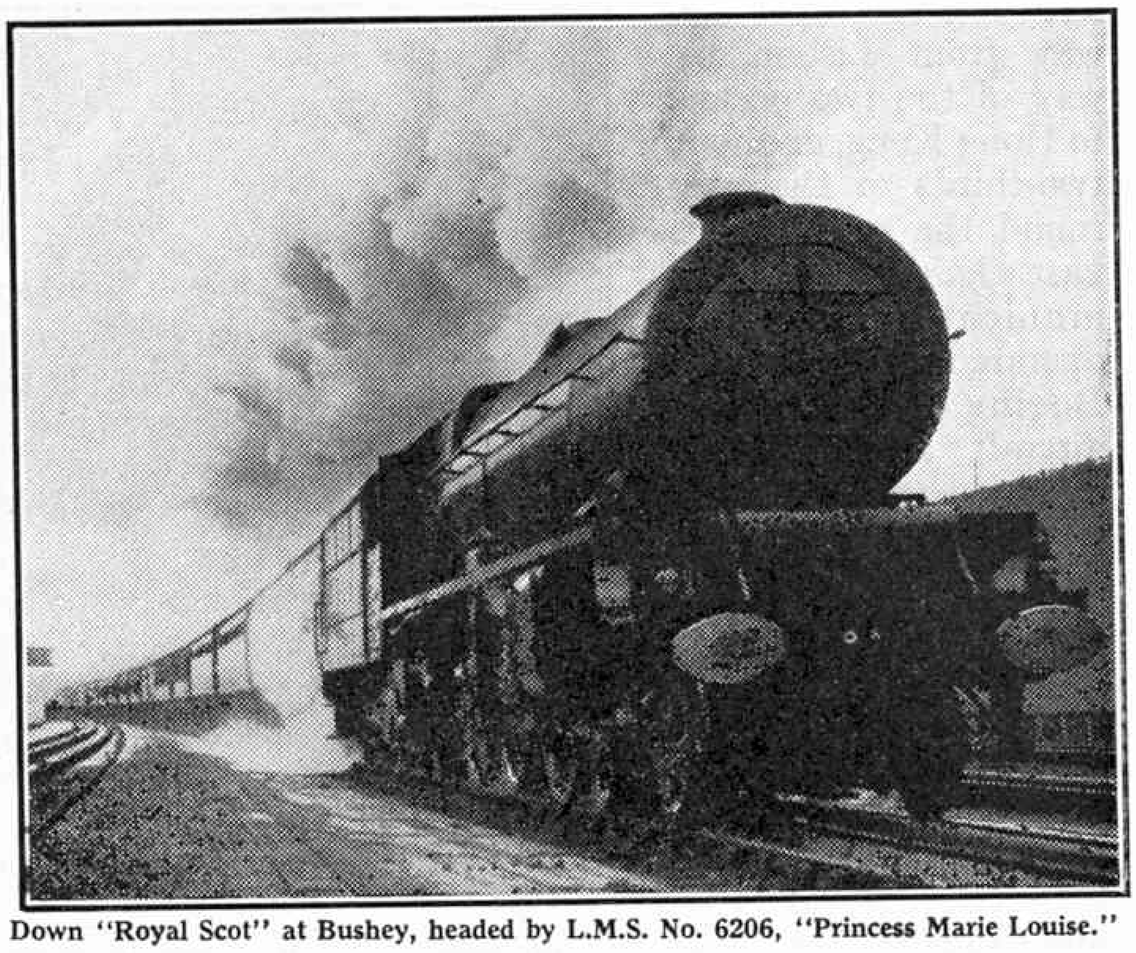
performance. The 6.5 miles from Bletchley to Leighton Buzzard were reeled off in 5 min. precisely, at an average of 78 m.p.h.; and the following 8.5 miles thence to Tring were done in 6 min. 40 sec., at 76.5 m.p.h. Thus the 15 miles from Bletchley to Tring were covered in the remarkable time of 11 min. 40 sec., at an average of 77 m.p.h., and in 2 min. 20 sec. less than the scheduled allowance! This compares most favourably with the achievement of No. 6201 "*Princess Elizabeth*" in the course of the trial run on 17th November, 1936, when this stretch of 15 miles was done in 11 min. 3 sec., but with a load of only 8 coaches, weighing 260 tons, as against our train of 13 coaches, weighing, with a maximum complement of passengers and luggage, 420 tons. And whereas the one was a special test, the other was done in ordinary working, and the driver had no idea that he was being timed. It should be added that for the last few miles—from Cheddington onward—our climb up the slopes of the Chilterns was made in a torrential rain-storm, but on the well-washed rails the wheels of our engine seemed to grip the better, and, defying the elements, No. 6206 breasted the summit at Tring at 75 m.p.h.

In the succeeding descent towards London speed rose into the eighties well before Berkhamsted was passed. From there to Hemel Hempsted an average of 85.7 m.p.h. was realised, and the following 3.6 miles to King's Langley were done at an average of 89 m.p.h. Then, just as our speed was soaring into the nineties, there was a sudden application of the brakes for signals were against us. *We had overtaken the "Coronation Scot"!* That flier had sped past us as we stood belated at Nuneaton, but such had been the capabilities of No. 6206 and her crew that, in spite of our much heavier load, we had steadily overhauled it until now at length we were so close upon its track that signals had to protect it and retard our progress!

Through the mile or more of Watford tunnel we were braking very hard, and at much reduced speed we rolled past Watford Junction. But with signals once more in our favour, our driver, nothing daunted, was soon speeding again. Over the 7.9 miles from Hatch End to Willesden an average of 79 m.p.h. was registered, with a maximum of 85 at Wembley. At Willesden we experienced another signal check, for we were again close on the heels of the streamliner; while for the concluding stages from Kilburn to Euston there was nothing but checks, so that for the last 3 miles no less than 9 min. were demanded. Yet, inclusive of all delays, the 97.1 miles from Nuneaton to Euston had been covered in 90 min. 5 sec., at an average speed of 64.7 m.p.h. From Welton to King's Langley, including the ascents to Roade and Tring, the average speed for the 54.4 miles, accomplished in 41 min. 8 sec., was 79 m.p.h.

Such figures surely sustain the claim that this was a run of exceptional merit, and one that reflects great credit on the enginemen in charge, Driver G. W. Hulme and Fireman J. Penn, both of Longsight motive power depôt. Longsight men have won for themselves an enviable reputation for their skill and efficiency in locomotive management, and such a run as the one just described is a sure proof that, with the bigger engines again available, they will be capable of achieving new triumphs of speed when the fastest bookings again come into force. Given the opportunity, they could readily observe a time of 3 hours between Manchester and London, instead of the 3¼ hours given to the best expresses in the pre-War timetables.

But that can only be when the War is ended and victory won. Meanwhile, as "the lines behind the lines," our railways are taking a great part in the national effort, and for the present speed must be sacrificed in the interests of economy and safety.



Down "Royal Scot" at Bushey, headed by L.M.S. No. 6206, "Princess Marie Louise."

"Flying Cloud," one of three Boeing "Stratoliners" built for Pan American Airways, flying over the snow-clad summit of Mt. Rainer, 14,408 ft. high, during the final test flight.

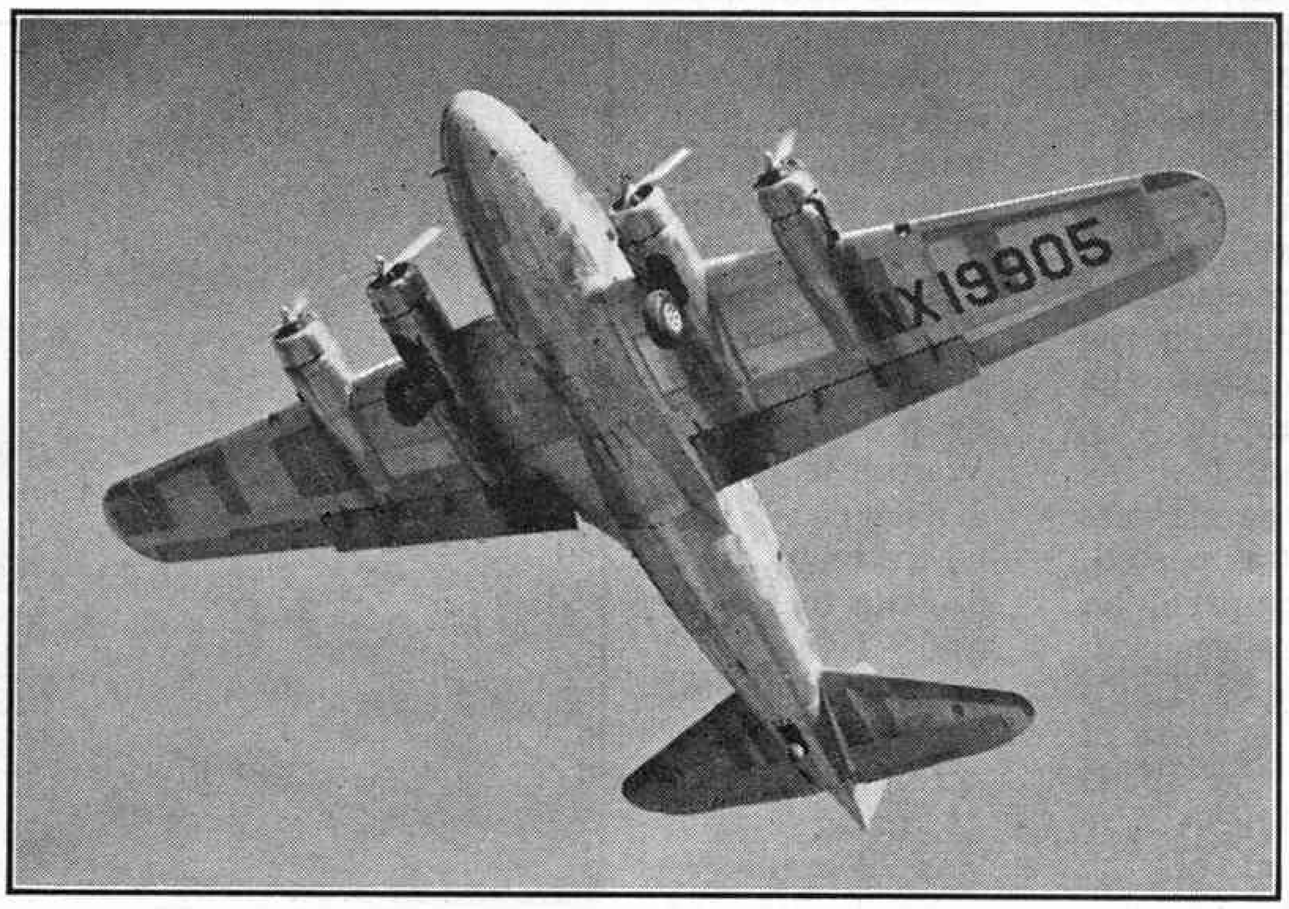
The Boeing "Stratoliner"

Air Travel at "Above the Weather" Heights

THE fleet of five Boeing 307-B "Stratoliners" delivered recently to Transcontinental and Western Air, Inc., are now employed on that company's great air route across the United States. This service links Pan American Airways' transatlantic and transpacific "Clipper" flying boat services, and the three form a great super airway from Lisbon by way of the two oceans to Hong Kong, or about two-thirds of the way round the world. This vast chain of air communication is thus operated throughout by Boeing four-engined aircraft, a fine tribute to their efficiency and reliability.

The new transports of T.W.A. were the first four-engined landplanes to be put into service on an American air line. Pan American Airways have taken delivery of three "Stratoliners," almost identical with the T.W.A. machines, and have classed them as "Strato-Clippers." The photograph at the head of this article shows *"Flying Cloud,"* the first of these three aircraft, in flight.

The Boeing "Stratoliners" are of special interest as the first large air liners to be equipped with an automatic pressure regulating or altitude conditioning system for comfortable flight at "above the weather" heights.



This underside view reveals the graceful lines of the "Stratoliner" and the large area of wing. The illustrations to this article are by courtesy of the Boeing Aircraft Company, U.S.A.

At 18,000 ft. the atmospheric pressure is only half as great as at sea level. At this height the percentage of oxygen and other gases in the air remains the same as at sea level, however, and when compressed and warmed the air resumes its low altitude condition. This fact is the basis of the system incorporated in the Boeing "Stratoliners," in which mechanical superchargers or "blowers" increase the density of the rarified high-altitude air as it enters the ventilating system of the aircraft, so that it is the equivalent of low-altitude air as it circulates through the sealed cabin.

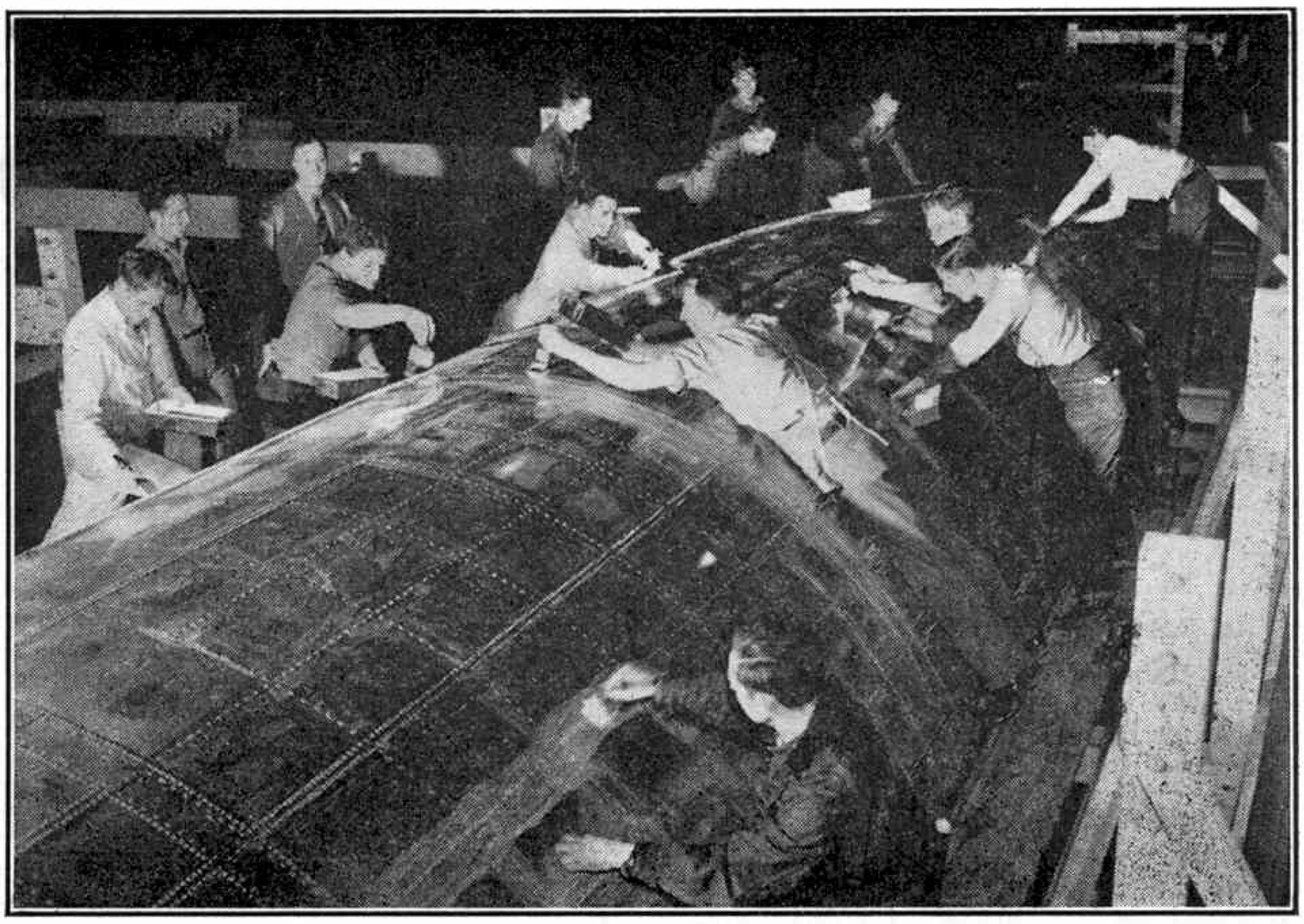
Flight research by the chief engineer of Transcontinental and Western Air, Inc., before these aircraft were built, led to the conclusion that more than 95 per cent. of all "bad weather" is avoided by flying at heights of 18,000 ft. to 20,000 ft. During flight at these levels the atmospheric pressure inside the "Stratoliner" exceeds that outside by 2½ lb. per sq. in., less than half of the 6 lb. per sq. in. difference in pressure which the fuselage is designed to withstand. With this moderate degree of cabin supercharging the machine is able to operate at heights ranging from 14,000 ft. to 20,000 ft. with complete comfort for the passengers and crew, who enjoy conditions comparable to those at the normal flight levels of 8,000 ft. to 12,000 ft. The altitude conditioning system is in duplicate, and either set is capable of handling the cabin pressure requirements alone.

As the "Stratoliner" climbs to its normal operating height fresh air enters an intake valve far out along the leading edge of each wing, and is drawn through water separators into two mechanical superchargers each driven by one of the inboard engines. In these "blowers" the air is rotated at high speed and its density increased. It is then pumped through freeze-proof condenser type steam radiators in the engine nacelles, and down to automatic flow control valves in a chamber below the cabin floor. Finally it passes through a distribution valve there that directs it uniformly into the cabin by way of grilles in the floor and ceiling, and through individually controlled ventilators at

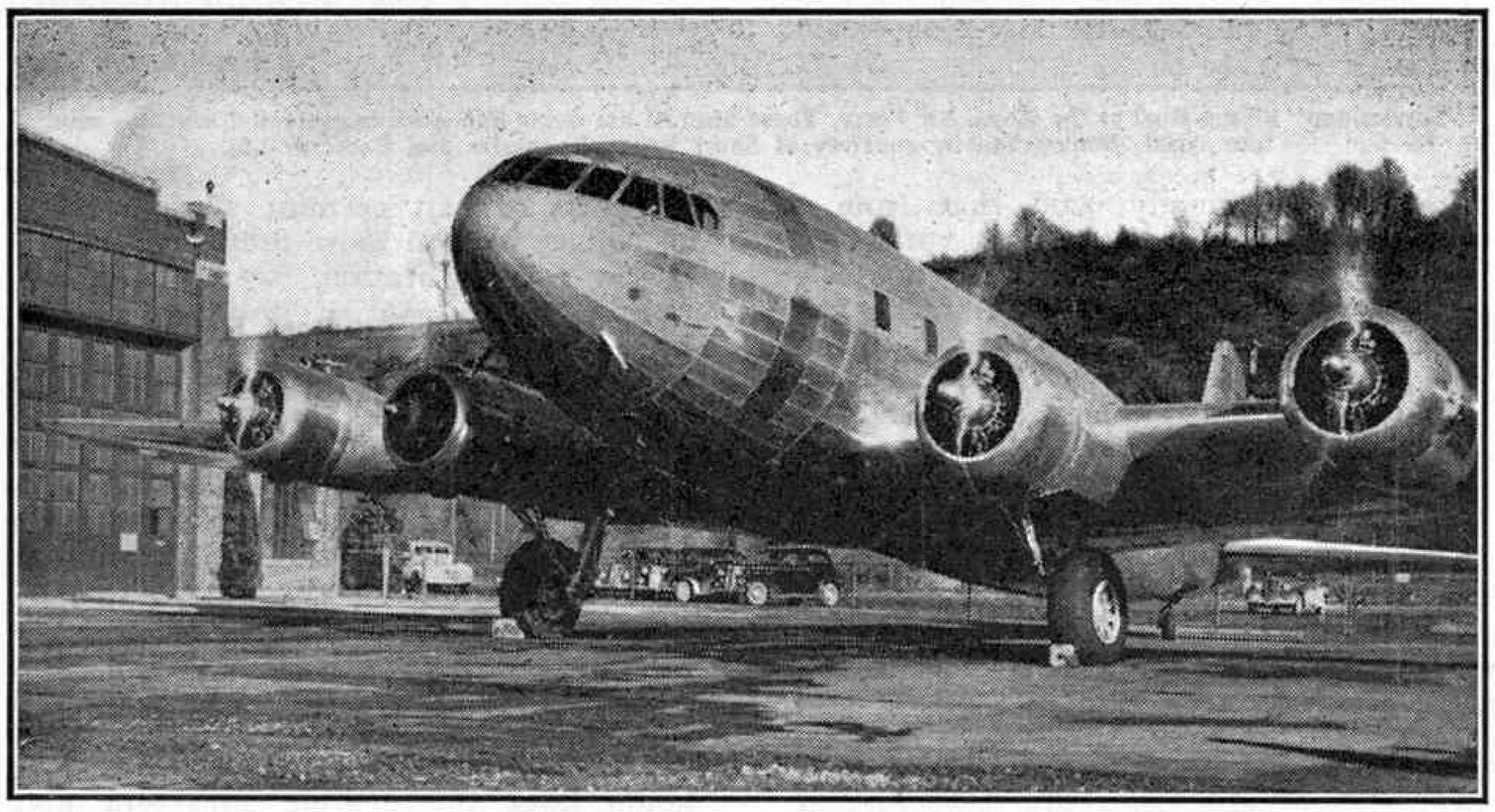
the passenger seats and berths. After the air has circulated through the cabin it is drawn away through ventilators in the floor into an accessory compartment below deck, where automatic exhaust valves discharge it into the atmosphere.

At its "upper level" operation the "Stratoliner" flies at about 250 m.p.h. By merely arranging the proper setting of the air pressure regulating controls the crew can bring the machine down from a height of 15,000 ft. to sea level at the rate of 565 ft. per min. without any discomfort to the occupants, because the cabin pressure will change only at the rate of 300 ft. per min. Such a swift descent ensures a substantial saving in time.

Research on the "Stratoliner" design and equipment included extensive wind tunnel tests with a scale model air liner one-tenth the size of the actual machine and so complete mechanically that it could do almost everything except fly. The wings of this miniature liner were of laminated mahogany, the tail and control surfaces of maple, and the fuselage of sheet duralumin. Each of the four metal engine nacelles contained a 5 h.p. electric motor that drove a 13.8 in. 3-bladed airscrew and was capable of speeds up to



Workmen covering the seams of the huge fuselage with a soap film while air pressure built up inside the cabin shows them if every joint is properly sealed, as soap bubbles reveal the faintest leaks.



"Warming up" the 1,100 h.p. Wright "Cyclone" engines of a "Stratoliner" for a test flight at Boeing Field.

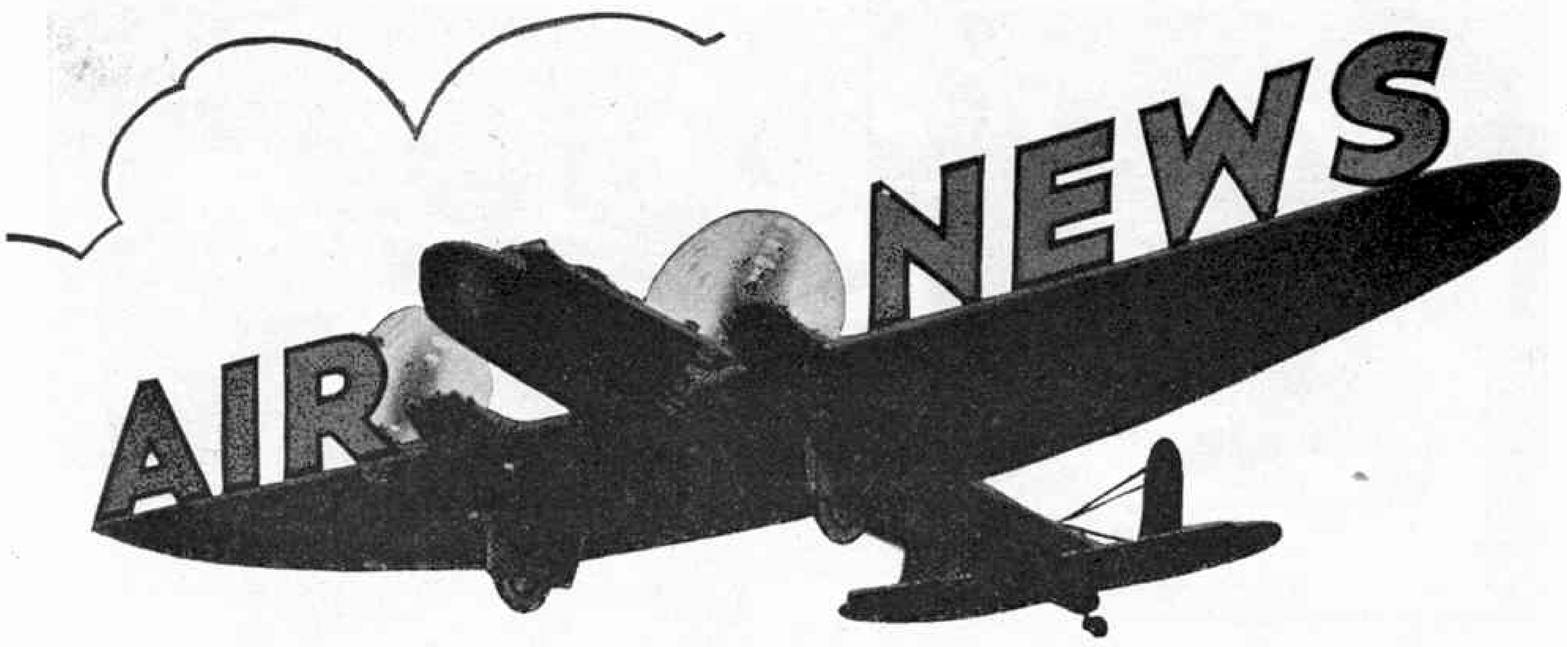
20,000 revs. per min. Inside the fuselage were two more small motors which operated the ailerons and wing flaps, rudder and elevators. During tests in the wind tunnel the research engineers could move any of these surfaces by remote control.

The first of the Boeing "Stratoliners" to be completed, *"Flying Cloud,"* was subjected to a long series of tests even greater in scope than those carried out with the first of the giant Boeing 314 "Clipper" flying boats as described in the August 1939 *"M.M."* The "Stratoliner" trials included the testing of all equipment involved in the operation of the machine, and of all flying qualities in both normal and abnormal flight attitude and conditions, and of the novel altitude conditioning equipment.

In the course of these prolonged trials various modifications to the machine were decided upon and carried out to improve still further its general efficiency. The landing flaps were lengthened and leading edge slots installed near to the wing tips, to permit lower landing speeds, and the streamlining of the fairing between the wings and fuselage was improved. A low vane fitted experimentally as a forward extension to the tail fin proved to have marked stabilising qualities when the aeroplane was in extreme attitudes of flight, and therefore it was incorporated as a permanent feature and its design rounded-out to form an integral part of the tail.

The accompanying illustrations show the "Stratoliner" to be a low wing monoplane. The huge wing is of 107 ft. 3 in. span, and is built in six sections, two outer and two inner sections, and two wing tips. It is mainly of aluminium alloy, with stressed-skin covering. The fuselage is 74 ft. 4 in. long and entirely cylindrical, and tapers toward the tail. At the deepest part it is 11 ft. 6 in. in diam., which gives a cabin width greater than that of a modern streamlined railway coach. By day there is seating for 33 passengers, arranged in four compartments with wide facing seats, along the starboard half of the cabin, and nine single chairs in line along the port side. At night there is sleeping accommodation for 25 persons, 16 in berths and 9 in the separate reclining chairs just mentioned. The wide seats in each compartment make up into two sets of upper and lower berths arranged transversely.

The four 1,100 h.p. supercharged Wright "Cyclone" engines of the "Stratoliner" give it a top speed of 250 m.p.h. at 16,200 ft. It has a range of 800 miles when carring a full load, or a maximum range of 2,340 miles with 17 passengers.



An R.A.F. Bomber Crew's First Raid

The training of Royal Air Force bomber crews is so thorough that they can go into action for the first time with the complete confidence that they are technically ready for any task.

A recent example was a bomber with an entirely new crew who were detailed to attack the aerodrome at Haamstede. Although the A.A. fire over the target area was so close and accurate that the observation panels of the bomber were smashed the crew persisted in their attack, and successfully dropped a stick of heavy bombs across the landing ground, one bomb bursting alongside a hangar. Six "Messerschmitt Me. 109s" were seen on the ground, and the British bomber circled for a second time and attacked them with machine gun fire to such purpose that one of them burst into flames and was destroyed.

Transatlantic Air Rivalry

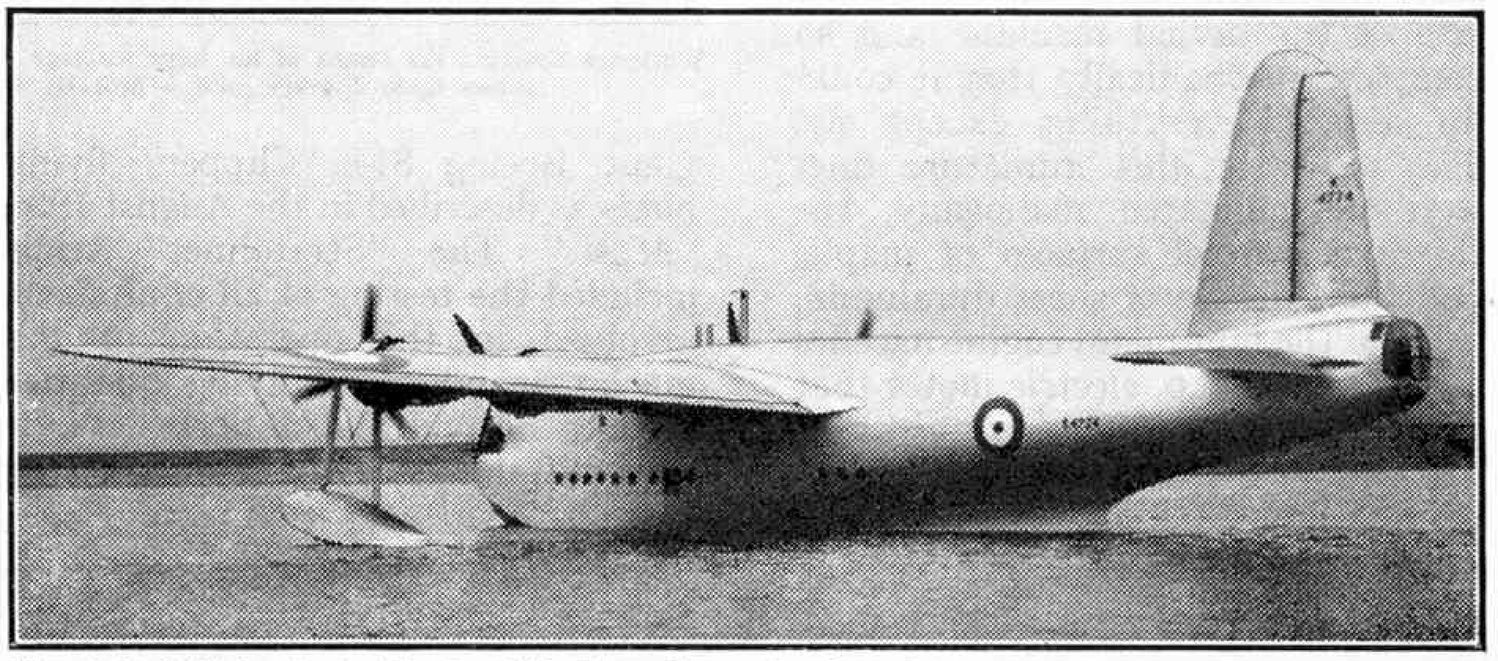
American Export Airlines have been granted permission by the Civil Aeronautics Board, U.S.A., to operate two air services across the North Atlantic, in competition with Pan American Airways. The first service will be one for air mail and freight between the United States and Lisbon by way of the Azores, and the company will begin it with a Consolidated type flying boat appropriately named "*Transatlantic.*" The second permit granted to the company is in respect of a proposed passenger service to Lisbon, which must be started before September 1941. A fleet of three Vought-Sikorsky S-44 flying boats is being built for this service. The boats will be equipped with sleeper accommodation for 16 passengers for night flying, and will have a range of 3,600 miles.

"This company recently took over the extensive Central American air services of Transportes Aereos Centro Americanos. These air lines extend over seven countries in Central America and link up 235 towns, and they are operated by a fleet of 52 aircraft.

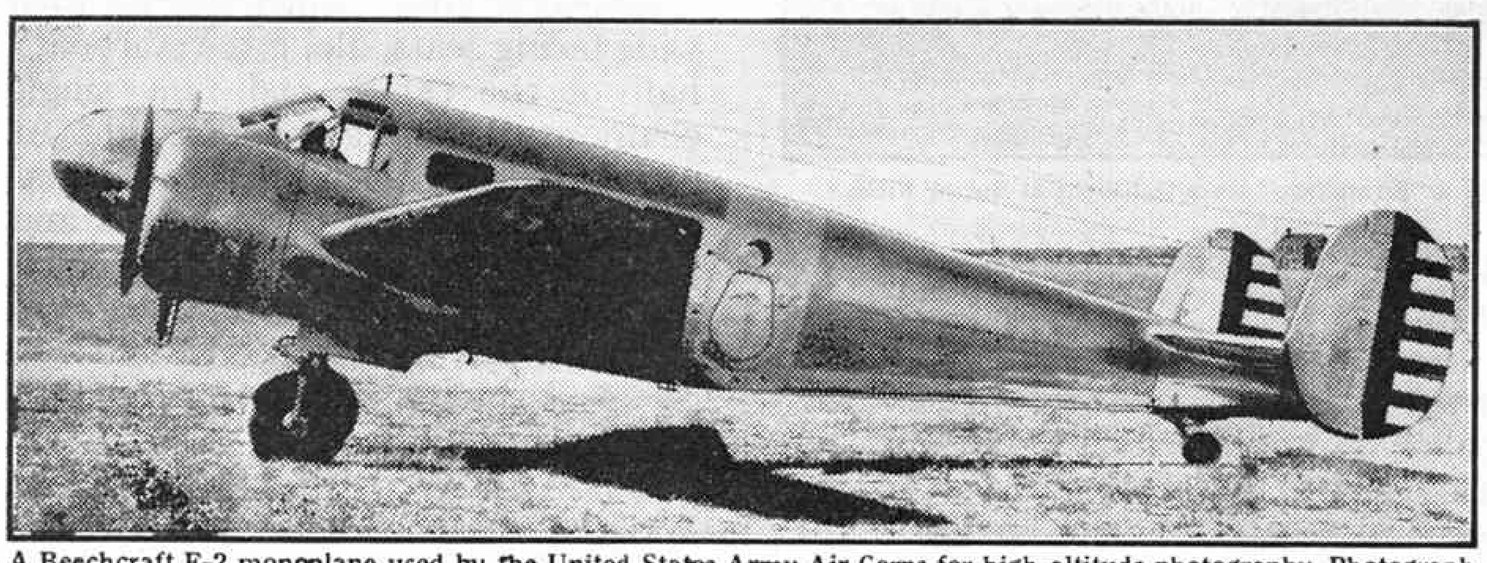
"Daddy-long-legs Hamm"

The Captain of an R.A.F. aircraft recently operating against much-bombed Hamm, in Germany, said that from a good height those great railway yards look "like a Daddy-long-legs." The 'body' is composed of about 12 railway tracks, and single tracks placed more or less where the wings or legs would be jut out in various directions. "These single tracks," he said, "feed the body of Hamm, which is usually choc-a-bloc with supply trains. As soon as we have hit it the repair gangs, who have probably taken up permanent residence, come on the scene. It must be heartbreaking for them to see all their good work blown to pieces."

R.A.F. machines attacking the yard have to defy intense anti-aircraft fire.



"Sunderland" Flying Boat of the Royal Air Force. These aircraft are doing fine work in protecting convoys around our coast. Photograph by courtesy of Short Bros. (Rochester and Bedford) Ltd.



A Beechcraft F-2 monoplane used by the United States Army Air Corps for high-altitude photography. Photograph by courtesy of Beech Aircraft Corporation, U.S.A.

Lockheed "Lodestar's" Fast Flight

A fine high-speed flight across the United States has been accomplished by a Lockheed "Lodestar" of National Airlines, one of the big American air transport firms. It left Burbank, California, and flew to La Guardia Field, New York, a distance of 2,357 miles, in 9 hrs. 29 min. 39½ sec., averaging 248.2 m.p.h. The only call made during this long trip was at Dallas, in Texas, for refuelling. The air liner was piloted by Mr. G. T. Baker, President of National Airlines, and carried five passengers. Most of the way it flew at a height of 15,000 ft.

Railway Air Services Winter Timetable

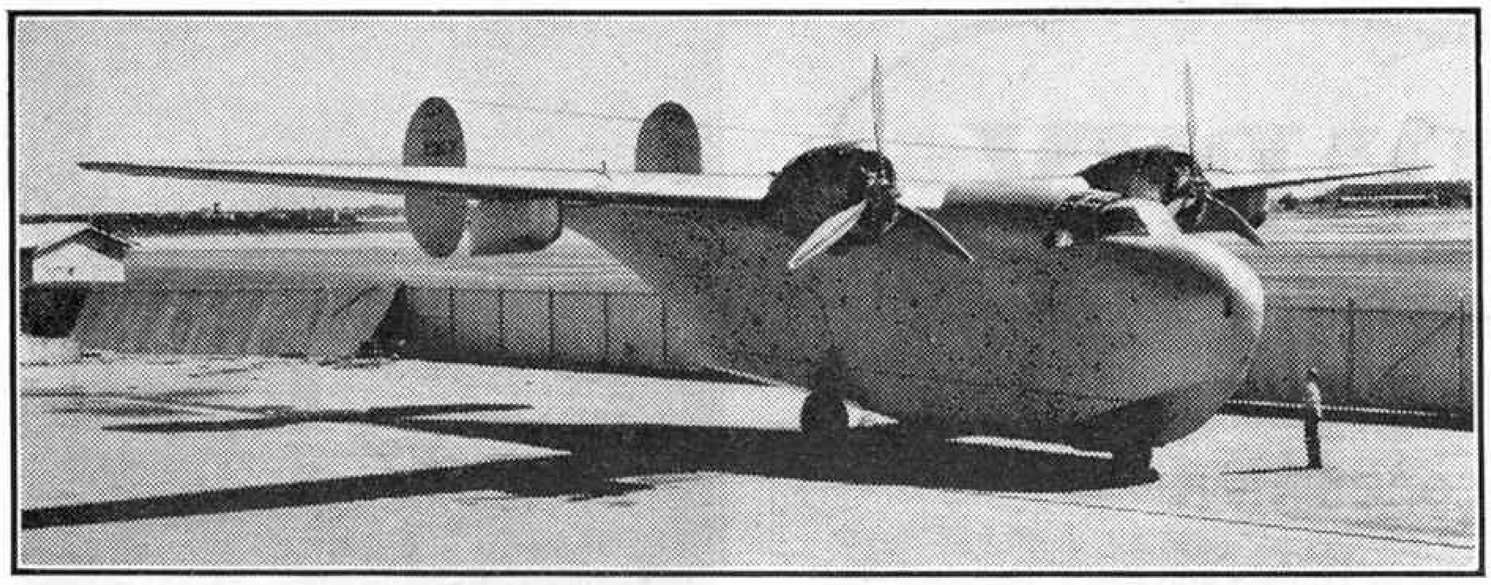
The winter timetable of Railway Air Services includes a weekday service each way between Glasgow and Belfast, leaving Glasgow Airport at 9.30 a.m. and returning from Belfast Airport at 3.5 p.m. The service between Liverpool and Belfast leaves Liverpool at 1.15 p.m. and departs from Belfast at 10.45 a.m.

Passengers on these cross-channel air services must be in possession of valid passports or exit permits. Freight traffic for conveyance on these routes is accepted at any railway station.

R.A.F. Flying Boat Rescues

Seamen drifting 200 miles from land and out of the track of shipping figured in yet another rescue by a "Sunderland" flying boat of the R.A.F. Coastal Command. The "Sunderland" was escorting a convoy of merchant ships in the Atlantic, and while searching the sea for enemy submarines or mines the Captain saw two small boats and a raft. One of the boats was so low in the water that its gunwale was awash. The aircraft flew back to the convoy and signalled "Follow me." Three hours later the drifting survivors were safely on board the vessel, and the "Sunderland" went on with its patrol around the convoy.

Survivors from a wrecked ship were found by another flying boat off the Irish coast. The Captain of the aircraft dropped them a message: "Going for help—Good luck." While a warship was steaming to the rescue the weather thickened, and it became extremely difficult to find the lifeboat again. The flying boat had to return to its base, but another aircraft from the same squadron took up the search and eventually located the boat by flying only a few feet above the sea. The warship was informed. It steamed to the position given and rescued 19 sailors.



Consolidated Model 31 flying boat. As a civil transport it can be equipped to carry 52 passengers by day and to have sleeping accommodation for 28 at night. Photograph by courtesy of Consolidated Aircraft Corporation, U.S.A.

British Transatlantic Flights in 1940

The British transatlantic flights last year made a great impression in the United States. The British Airways flying boats *"Clare"* and *"Clyde"* made a total of 10 crossings, and about 36,430 miles were flown in a total flying time of 264 hrs. 20 min. Nearly 50 passengers and more than 3,200 lb. of important diplomatic documents, mail, and freight were carried in safety through the air and across the ocean, which the Germans have so often boasted were under their control.

The unheralded arrival in New York of the *"Clare,"* commanded by Capt. J. C. Kelly Rogers, in the evening of 4th August, 34 hrs. 44 min. after she had left England, created world-wide interest. The imagination of the people of New York in particular was stirred by the sight of this unarmed aircraft which had come from the very heart of the air war, showing them clearly the truth of Great Britain's strength and superiority in the air and the falsity of Germany's "blockade" claims.

During the period of these British transatlantic flights the trust of the United States in the German news bulletins appreciably waned and there is no doubt that the ocean crossings of the *"Clare"* and *"Clyde"* contributed to this, as on each westward flight the boats carried to the New World the latest editions of the English daily newspapers. These papers told of the brilliant work being done by the Royal Air Force, of the courage and determination of the Londoners in carrying on their daily work, and of the new hope brought to our war effort by the sympathy and practical help of the United States and the British Commonwealth. No less important was the opportunity which these flights gave for men at the heart of the war effort in Great Britain, Canada, and the United States, to see for themselves the progress that was being made on the other side of the Atlantic.

The flying boat *"Clare"* paid four visits to the United States and *"Clyde"* one visit. The aircraft were commanded alternatively by Captains J. C. Kelly Rogers and J. Kirton. Special police arrangements were made for the care of the boats at La Guardia Field, New York, and so diligent were the officers on duty that on one occasion even some members of the crew had great difficulty in getting near the aircraft.

During one of *"Clare's"* visits she narrowly escaped damage when the wing tip of the Pan American *"Yankee Clipper,"* lying near her in the hangar, caught fire. The fire was put out and both aircraft saved by the prompt action of an American engineer.

Scale Model Douglas Air Liner for Tests

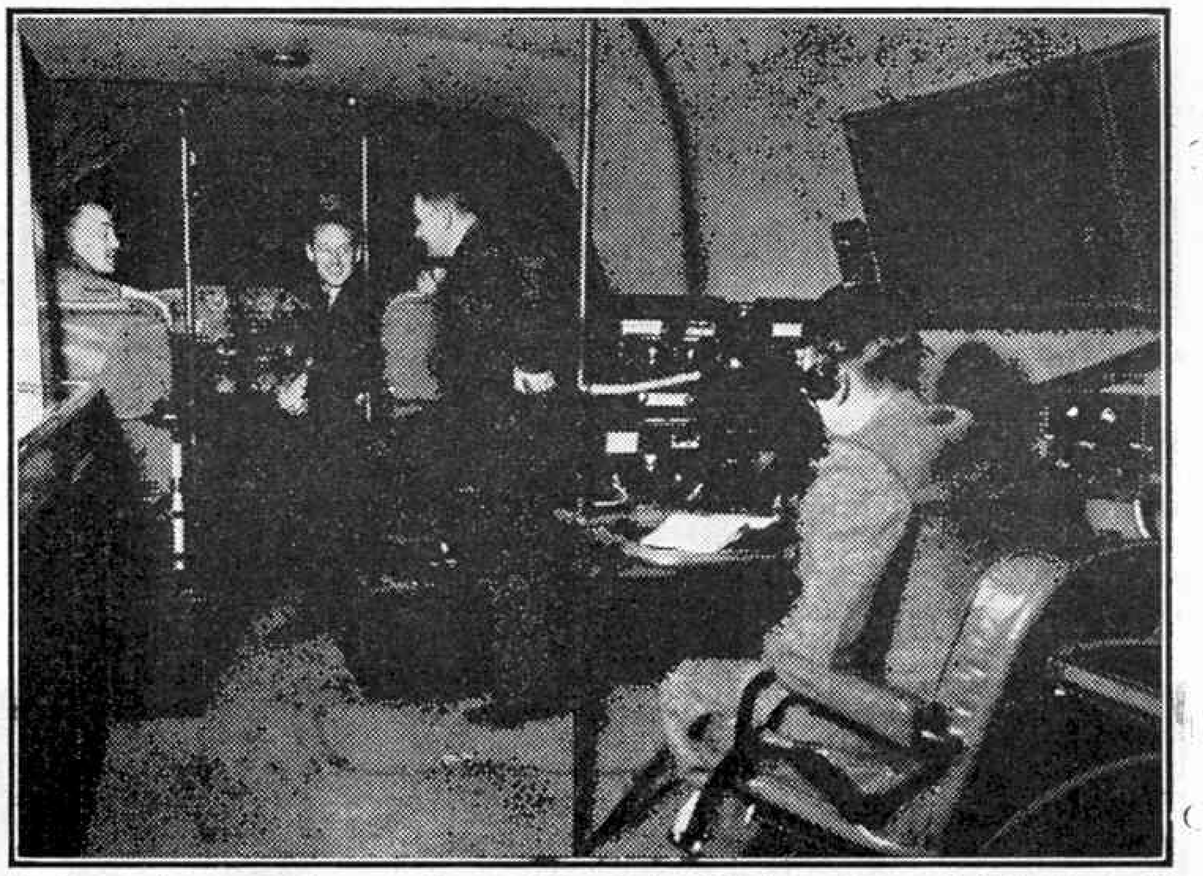
A fine scale model of the "Douglas DC-4" air liner has been constructed by the Douglas Aircraft Company, U.S.A., and is being used for wind tunnel research at the California Institute of Technology. The model took three months to make, has a wing span of 7 ft. 7 in., and is nearly 6 ft. long. Each of its four water-cooled, electric engines develops almost 15 h.p. They are claimed to be the most powerful engines ever installed in a wind tunnel model aircraft, and they drive controllable-pitch airscrews.

Lockheed Build Four-Engined Aircraft

Two types of 4-engined aircraft now being developed by the Lockheed Aircraft Corporation, U.S.A., are a good indication of the current trend of civil air liner development in that country. They are the L.44 and L.49, and are of special interest as hitherto the Company's transport aircraft have been twin-engined types. One of them, the Lockheed 14, has gained fame with the R. A. F. Coastal Command, in the modified form known as the "Hudson." The first order for "Hudsons" was placed just before the war.

The Lockheed L.44, provisionally known as "Excalibur," is a low wing monoplane, with an all-up weight of about 17 tons, about twice the weight of the Lockheed 14, and approximately ½ ton more than that of the D.H. "Albatross," a British 4-engined mail carrier. A tricycle type undercarriage is provided, a growing practice with American types, and there is provision for 32 passengers by day, or 16 by night, and a crew of four. The cruising speed at a height of two miles is around 230 m.p.h. The L.44 has a ceiling of about five miles, on four 750 h.p. "Hornet" engines, and the maximum range is 2,000 miles.

Details of the design and performance of the L.49 have not been released.



In the spacious control room of one of the Boeing 314 type "Clipper" flying boats of Pan American Airways. Photograph by courtesy of Boeing Aircraft Company, U.S.A.

Smoke Without Fire

"Where there's smoke there's fire," states the proverb. But a "Hurricane" pilot—a British Flight Lieutenant who leads Polish fighters into battle—has reason to doubt it.

Attacking a formation of enemy bombers, he shot down a "Heinkel III." He broke away, and glancing in his mirror, saw a trail of white smoke apparently coming from his machine. "Thinking I might be on fire, I prepared to bale out," he reported on landing, "but as no flames appeared, I did a tight turn and found that the smoke had ceased. I found afterwards that an explosive bullet had opened up my port wing about a foot from the tip, leaving a jagged piece of metal sticking up. I assume that the white smoke was due to condensation caused by the jagged metal in the dive."

R.A.F. Bomber Destroys Enemy Fighter

The sergeant air-gunner of a R.A.F. bomber has described how the crew shot down an enemy fighter by night, an unusual feat.

"We were on our way back from bombing Hamburg," he said. "Two anti-aircraft shells had hit us, but the aircraft was still in good shape. Over Bremerhaven the searchlights caught us, but there was no attempt to renew the anti-aircraft fire. Very soon we saw why they were letting us alone. An 'Me. 109' was coming for us from behind the searchlight beam, and when I saw it there was only a hundred yards between us. There was a burst of machine gun fire and quite a number of bullets hit us.

"I fired both guns and caught the 'Me. 109' just as it did a steep bank right over our wing—my pilot told me afterwards that he saw it flash past our nose with flames pouring from it. A few seconds later I saw the Me. again; it was plunging straight down. Hitting the ground it exploded at once."

* * * *

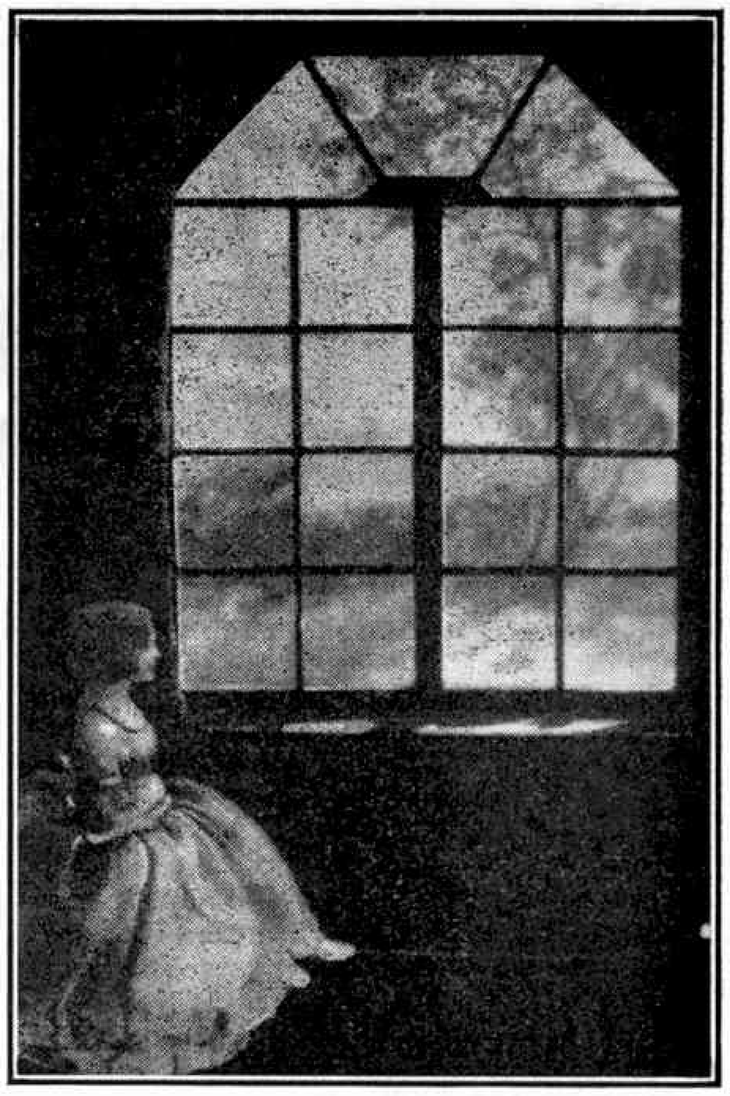
The 17th December is the anniversary of the first heavier-than-air flight, made by the Wright brothers at Kitty Hawk, North Carolina, in 1903. In future it is to be observed as Pan-American Aviation Day, according to a proclamation by President Roosevelt.

PHOTOGRAPHY

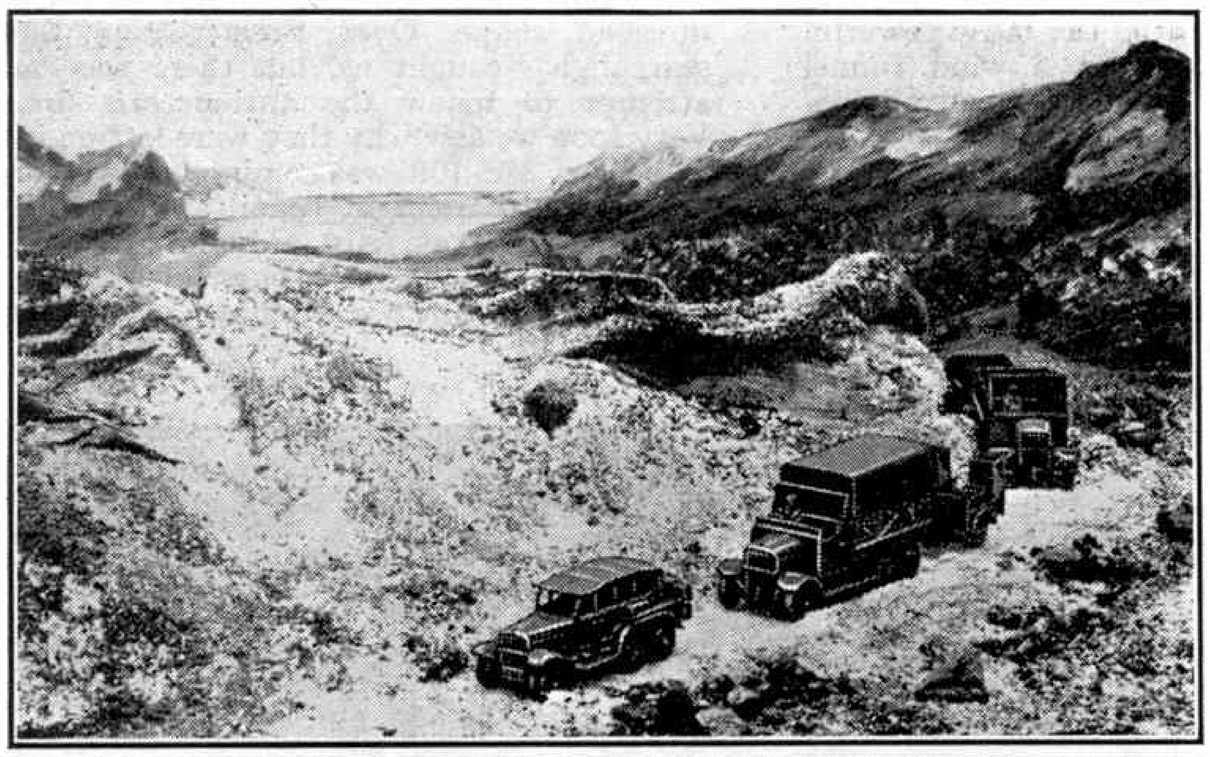
Table-Top Scenes

LAST month I referred to the possibilities of table-top photography as a pastime for winter evenings, and I mentioned how simple it is to make up realistic scenes from odds and ends that can be found in any home. For example, a heap of alum or salt, carefully arranged and lighted, looks remarkably like a snow-covered mountain peak shining in the sunlight. A lump of coal sprinkled with flour can be used for a similar purpose, while bits of brick laid in sand will make a realistic rocky path. The three pictures on this page show methods of obtaining various other effects. The hilly countryside in the military convoy picture consists of a few pieces of broken rock, sawdust, some ashes from the kitchen grate and a few pieces of rag! The rocks were first arranged more or less at random and the cloth was spread over them and crumpled. Finally a few handfuls of ashes and sawdust sprinkled here and there completed the setting. The background is a piece of paper on which is drawn a simple sketch of coastline. The vehicles are items from the Dinky Toys Mechanised Army Sets.

Quite different ingredients were used in arranging the picture of a crinolined lady sitting near a window, which is reproduced at the top of this page. The window was cut with a sharp penknife from a sheet of cardboard. The countryside seen through the window is the illustrated cover of a magazine, which was placed about 6 in. from the window at the rear. Down one side of the window frame a piece of velvet was hung to represent a heavy draw curtain, and the "lady" was one of the popular "pincushions" built round a small china figure! A scene of this type depends for its effect on correct lighting, and in order to obtain an idea of daylight streaming through the window a 60-watt lamp was suspended between the window and the background, a little above and to one side of the top of the window.



"In an Eighteenth Century Drawing Room." A novel table-top photograph by N. Tudor, Birkenhead. A small dressed china doll was used for the crinolined lady.

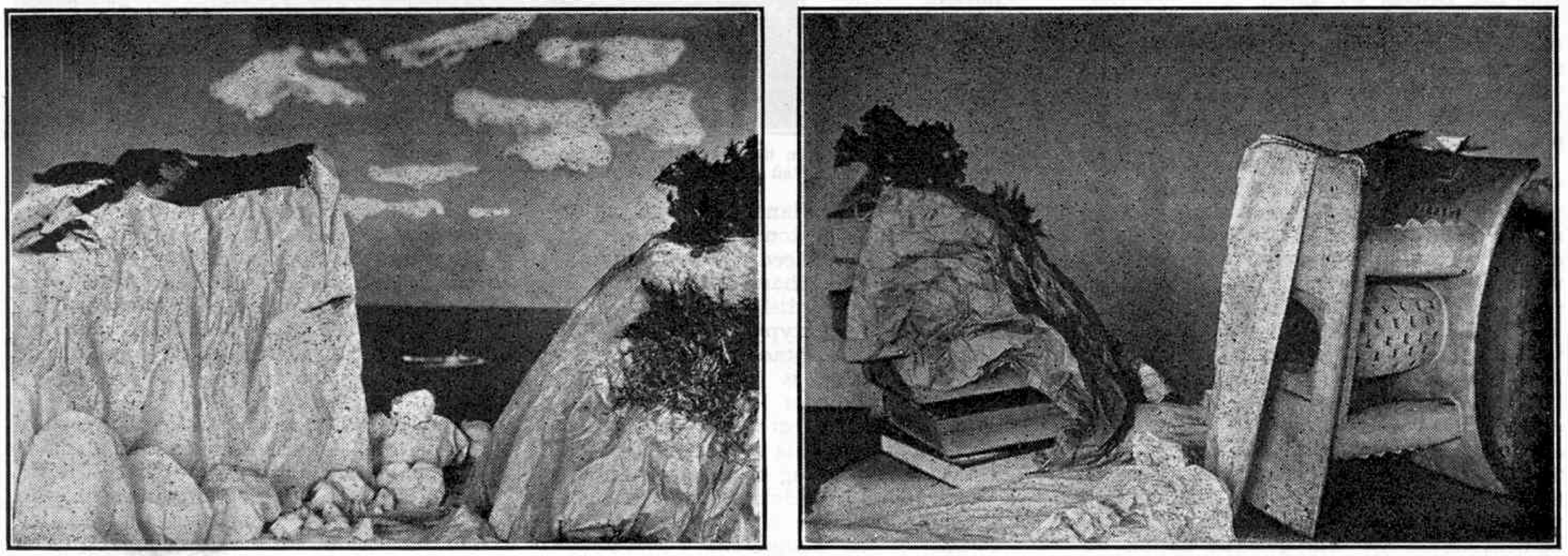


Dinky Toys are ideal for use in table-top photographs. The vehicles seen in this picture are items from the range of mechanised army vehicles.

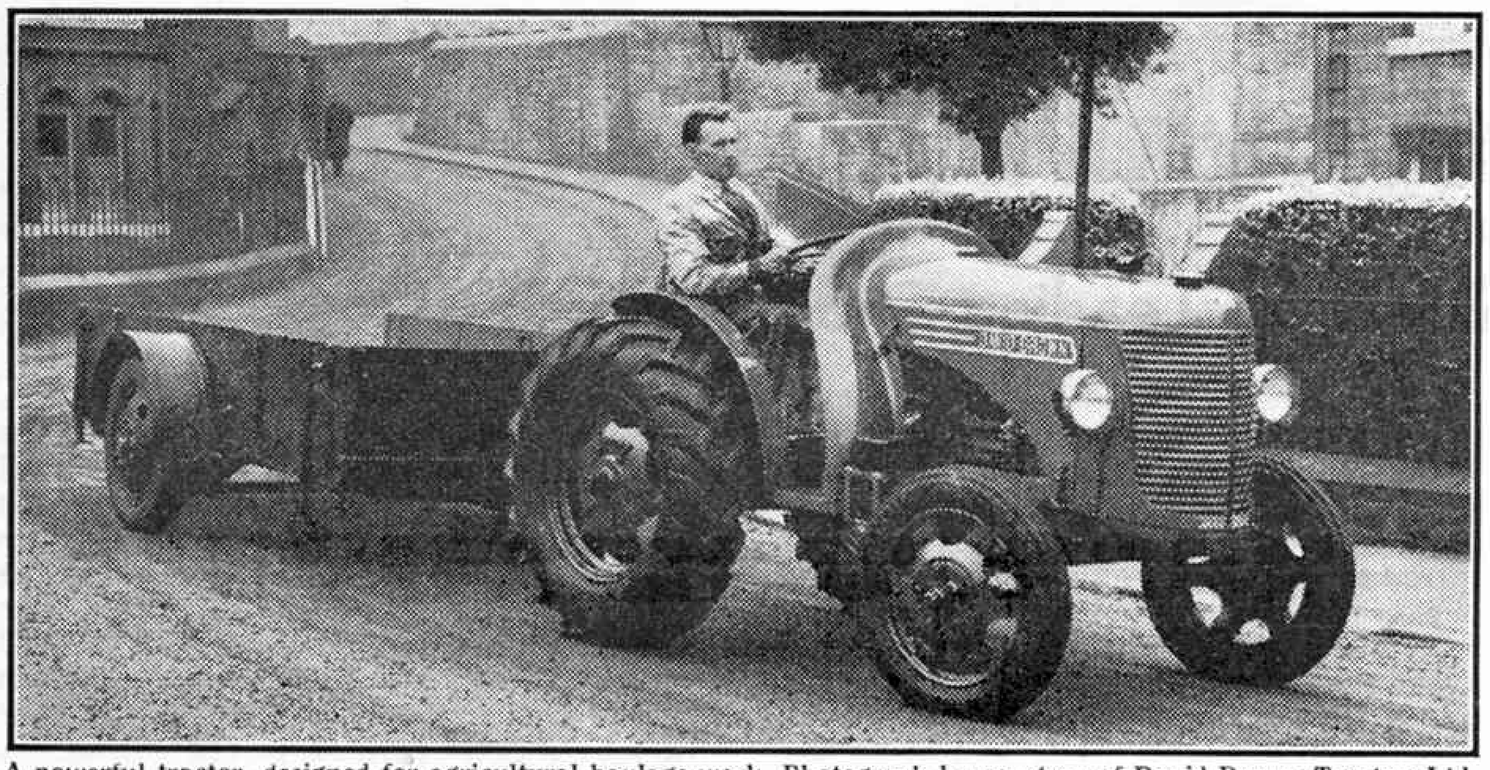
A great deal can be done with sheets of paper, cotton-wool, twigs and a few handfuls of soil, and the reader's attention is drawn to the good effect obtained with these materials in the illustration in the lower left-hand corner of this page. The picture in the right-hand corner shows the reverse of the scene and reveals the secrets of its make-up. The great cliffs are only sheets of blue paper, and the summery clouds are represented by cotton wool. The background is a picture cut from an advertisement.

The best table-top photographs are taken by artificial light. It is best to place the stage or table almost directly under a top light, such as a 60-watt globe, and to have a second and rather more powerful light to one side and slightly in front of the scene, in order to avoid flat lighting. A table lamp is suitable for side illumination.

Harsh lighting can be avoided by moving the light further from the scene or by placing a piece of white muslin between the light and the scene.



Left, a table-top coastal scene by H. Bastin, Reading. Right, the same scene, photographed from the rear to reveal the secrets of its make-up.



A powerful tractor, designed for agricultural haulage work. Photograph by courtesy of David Brown Tractors Ltd., Meltham.

ENGINEERING NEWS

A Fine Agricultural Tractor

One of the many types of agricultural machines that are now helping farmers to increase Britain's output of home-produced foodstuffs is the fine tractor shown in the upper illustration on this page. Although it was introduced after the outbreak of war this machine was not developed as a wartime emergency measure, but is the result of many years of research work and experiment. The chief aims of the designers of the machine were to produce a tractor capable of working for long periods without a breakdown and possessing sufficient ground clearance to allow it to be used for work with various crops. The tractor has also a very small turning circle and a high road speed for haulage work; and the track widths of both front and rear wheels are adjustable.

The bed or chassis is designed so that all the power and transmission components can be fitted into it, and in case of accident any component can be easily removed and replaced by a service unit while the faulty component is being reconditioned in the maker's factory. This feature ensures that the machine is never likely to be out of commission for more than a few hours. The engine is of the overhead valve wet sleeve type, and is very compact and neat in design. It is fitted with renewable cylinder liners that can be replaced when worn in much less time than would be required for re-boring. The machine is designed to haul any type of implement and is manufactured by David Brown Tractors Ltd., Meltham.

Vessels for Use on Shallow Rivers

The Russians have commenced work on a scheme to build a large number of shallow-draught flat-bottomed vessels for use on the small rivers of the Soviet Union. Those now being constructed have a draught of from 10 in. to 14 in., and construction of the remainder of the fleet will be started after these have been tested in actual working conditions.

There are about 100,000 rivers in Russia, and about nine-tenths of these are less than 3 ft. 4 in. deep and therefore unnavigable to ordinary vessels. The use of the new shallow-draught vessels will allow the transport of millions of tons of freight on them, however, and so will provide a cheap and extensive internal system of communications to supplement the roads and railways. The vessels resemble flat-bottomed pontoons, and are 26 ft. 3 in. long with a beam of 9 ft. 10 in. They are propelled by a 21 h.p. gas generator motor, and each hauls three 10-ton barges.

New Power Stations for the Grid

In order to provide a margin of reserve electric power for emergency use during the war period, the Electricity Commissioners intend to add to the generating plant resources in the South-East England area and in the area covered by the South-West England and South Wales scheme. In the first-named area a station will be erected having an installation capable of an output of not exceeding 50,000 kw, while in the second area the installation at the new station will not exceed 30,000 kw. When completed the new plants will form part of the Central Electricity Board's Grid system. At the end of 1939 the Grid comprised 4,430 miles of transmission lines and 307 switching and transformer stations, which were fed from 137 generating plants.

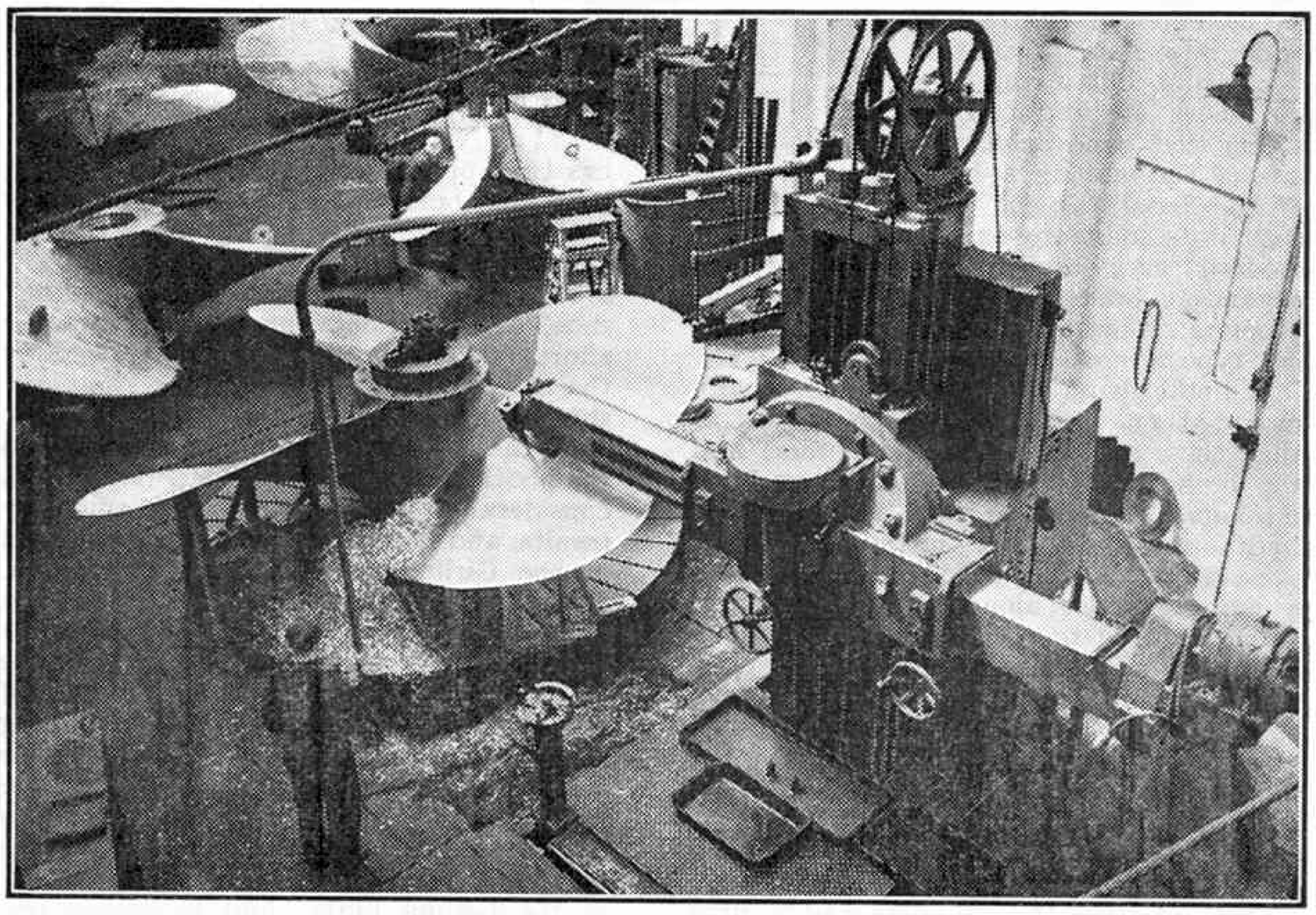
More Great Dams in the United States

One of the most important power schemes now being carried out in the United States necessitates the diversion of the Santee River, in South Carolina, into a reservoir formed in the Cooper River mountains, from which the water will fall 70 ft. down into the Cooper River to operate turbine generators. The Santee will be turned from its course by a great dam 8 miles long. Across the Cooper River will be another dam just over two miles long, and in the highest section of this dam a power plant and a navigation lock will be constructed. The lock chamber will be 184 ft. long.

Machine for Planing Marine Propellers

The lower illustration on this page shows a machine specially designed for planing ships' propellers. It was manufactured by the Morton Manufacturing Co. Ltd., Michigan, U.S.A., to the specifications of the Manganese Bronze and Brass Co. Ltd., London, and is capable of carrying out radial planing, rotary planing, milling and drilling operations.

The machine has a solid base plate on which is mounted a large diameter rotatable work-table, and a vertical column fitted with guides to carry a tool saddle that moves up and down in a vertical plane. The work-table can be linked by gearing to operate in conjunction with the vertical movement of the saddle, power for both these motions being obtained from a single motor. Mounted on the saddle is a large rectangular forged steel ram, which is reciprocated by means of a reversing motor, driving through gears engaging a toothed rack on the ram. The ram is hollow, and in it is mounted a forged steel spindle that is driven by a variable speed motor and rotates in roller bearings. The spindle is bored with a tapered end for receiving the cutting tools or drills, and it serves also as a drive for a right-angle milling head, which can be mounted on the end of the ram and operated with its spindle at any angle.



The special planing machine described on this page, machining the blades of a large marine propeller. Photograph by courtesy of The Manganese Bronze and Brass Co. Ltd., London.

A Powerful Brake for High Speed Vehicles

The Girling Two Leading Shoe System

ONE of the essential parts of any power driven vehicle is a reliable brake system, for on this depends its safety and efficiency. Consequently, this part of a motor vehicle's equipment has received considerable attention from designers and manufacturers, and efforts are continually being made to obtain the greatest possible braking power combined with smooth and easy operation. The braking gear must not only be powerful in case of emergencies, but also it must be thoroughly robust and reliable over long periods of service, and must be capable of application with the minimum of physical effort. Brakes fitted to motor vehicles may be divided into two classes—"internal expanding" and "external contracting." The internal expanding type has two or more metal shoes fixed to a stationary part of the car, and a steel drum fixed to the rotating axle. The shoes are surfaced with a tough heat-resisting fabric such as "Ferodo," and normally they are held from the rotating drum by springs. When it is desired to apply the brake, a simple expander mechanism, consisting usually of a cam or wedge, forces the shoes apart, so that they make contact with the inner surface of the drum.

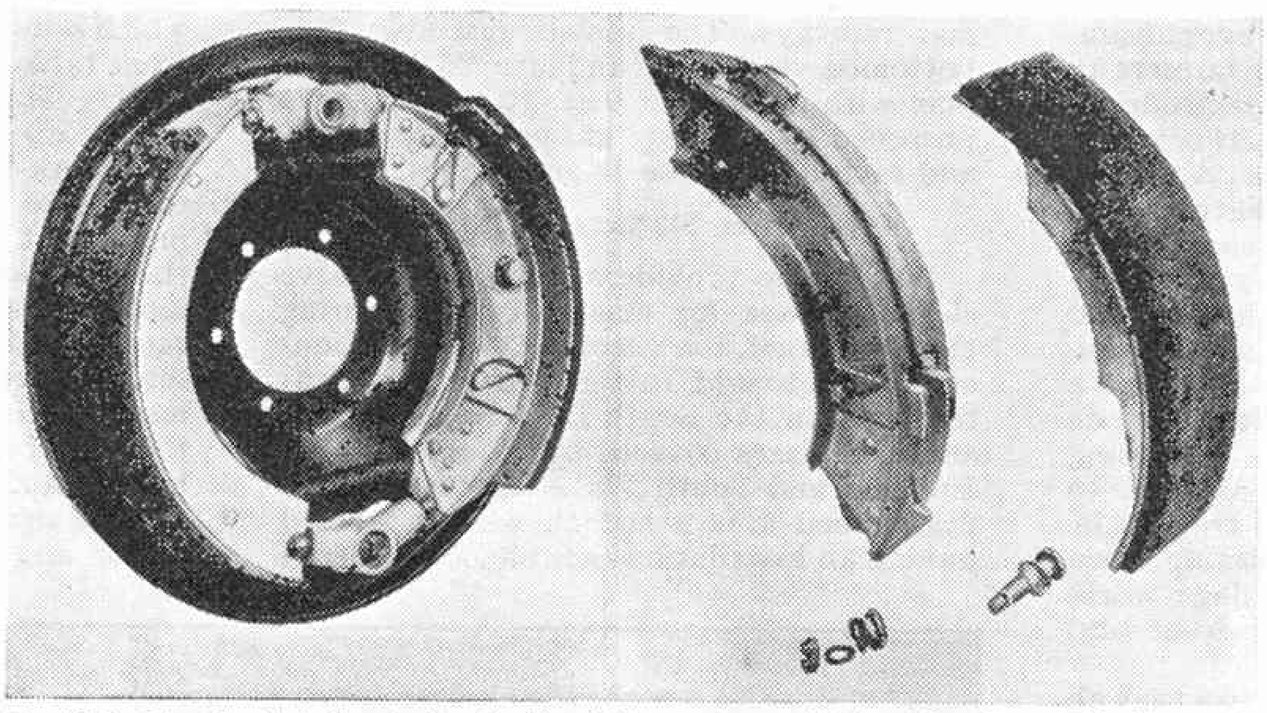
The external contracting brake also has a rotating steel drum, but in this case the shoes are replaced by a thin steel band lined with fabric. By moving a lever the two ends of the band can be drawn together so that it is made to grip the drum. Most modern cars are fitted with internal expanding brakes, and owing to weather-proofing difficulties the external contracting type is now almost extinct.

A brake drum with its shoes is usually mounted on the hub of each wheel so that they are all retarded together; and the brakes can be controlled either by a mechanical system of rods and levers or hydraulically. In the latter case light pressure on a foot pedal forces oil from a main cylinder along pipes to a small cylinder fitted to each brake drum. Each of these cylinders carries two pistons, which in turn are connected to the brake shoes. When these pistons are forced outward and away from each other by the incoming oil, they move the brake shoes and force them against the drum. The brakes are released simply by removing pressure from the pedal, when the oil passes out from the cylinders and returns to the storage cylinder. The hydraulic system is simple and very effective, and has the great advantage that it applies all the shoes equally hard against the drums.

The mechanical system of operation consists of a series of link rods and levers connected between the foot pedal or hand lever and the cams.

One of the best internal-expanding brakes is the well-known Girling system produced by New Hudson Ltd., Birmingham. The original Girling brake was introduced some years ago and has become one of the most popular in use on cars. Recently a new form of this brake, having even greater braking power and longer life than the original Girling brake, has been made available. It is known as the Girling "two leading shoe" brake.

In the normal type of internal-expanding brake there is a tendency for one shoe to produce a self-wrapping or servo effect, similar to that produced when the tail end of a rope wrapped round the drum of a revolving winch is pulled. The other shoe has the opposite tendency, with the result that the brake effort is not distributed evenly, the lining develops an excessive amount of heat, and wear is rapid. The first-mentioned shoe is termed the "leading" shoe, and it endeavours to multiply the effort on the lever or pedal applied by the driver; while the second, or "trailing" shoe as it is known, inclines to minimise it.



The Girling two leading shoe brake. On the right are shown details of the shoes. This illustration is reproduced by courtesy of "Motor Transport."

If the two shoes can be arranged so that both act as leading shoes, however, a considerable increase in brake efficiency results, and it is this effect that is obtained in the Girling two leading shoe system. The arrangement of this brake and its method of operation are simple, and the illustration on this page shows how the design is carried out. On the left side of the assembly can be seen the plain leading shoe of a normal Girling brake. In this the shoes are pivoted at the top, and are forced against the drum surface by a special wedge and roller expander at the bottom. This expander is a special feature of the Girling brake, and is largely responsible for the smooth and powerful application of the shoes.

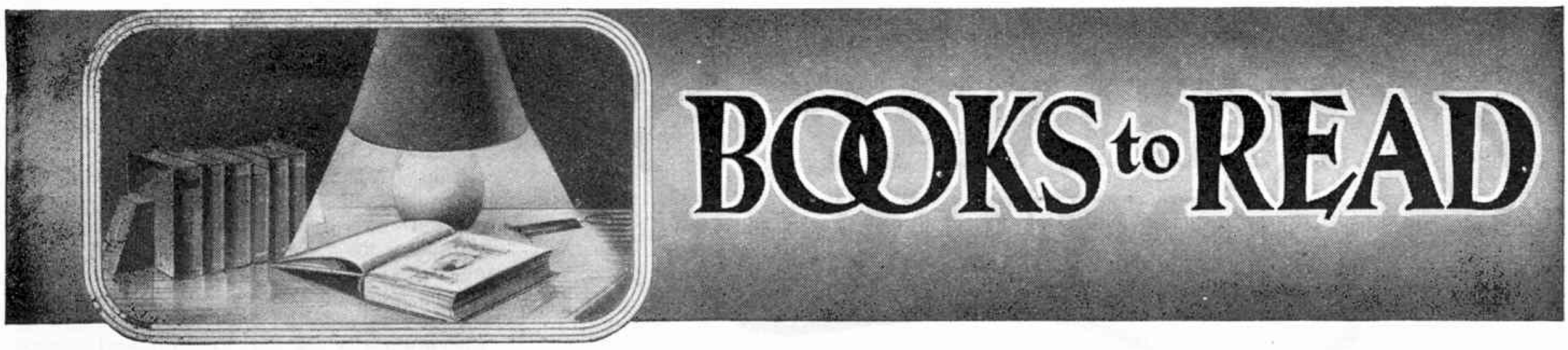
On the right-hand side of this assembly is seen what normally would be the trailing shoe, but in the new brake is a specially arranged device that becomes a second leading shoe. It is made in two parts, one of which is a steel carrier, while the other forms the shoe and is surfaced with brake lining. The carrier is built up of two steel channel sections, which are riveted back to back to end plates. One of these plates makes contact with the expander and the other with the adjuster. The web of the shoe fits in a gap between the two channel members, and its inner surface, which carries the lining, bears against the ends of four rockers pivoted to the carrier. At the expander end the shoe bears against an abutment fixed to the brake back plate, and is held to the carrier by a central screw which, through the influence of two small cones, pulls it down on to the rockers, but does not restrict the relatively free movement of the web of the shoe within the two halves of the carrier.

When the brake is applied the carrier is pressed outward by the brake expander, and the frictional drag of the drum carries the shoe into close contact with the fixed abutment. Further drag tends, therefore, to apply the brake with greater force, and the effect of two leading shoes is obtained.

This brake is now fitted as standard equipment on many of the most popular private cars and commercial vehicles manufactured in this country, two of the reasons for its success being its simplicity and reliability.

In addition to the brake already described, New Hudson Ltd. also produce a specially powerful type for use on heavy commercial vehicles. It is known as the four-shoe brake, and is designed so that the fullest possible use is made of the drum surface. In the two-shoe brake only just over half of the drum surface is in contact with the brake lining, while in the four-shoe type nearly 360 degrees of surface are brought into use. This is made possible by the use of four similar shoes, which are forced into absolutely equal contact with the drum by a simple arrangement of compensated levers. This allows four maximum points of pressure as compared with two in the normal two shoe brake or one in the usual self-servo brake. This ensures a substantial reduction of the average pressure on the brake lining, which thus gives a greater length of service.

An interesting application for this type of Girling brake has been found in connection with military tanks. These vehicles are steered by retarding or stopping either of the creepers as necessary to make a turn to right or left, and the four-shoe Girling brake is ideal for this purpose. The tracks are of course independently driven and each is fitted with its own brake gear. A tank controlled in this way is shown on our cover this month, which is based on an illustration kindly provided by New Hudson Ltd.



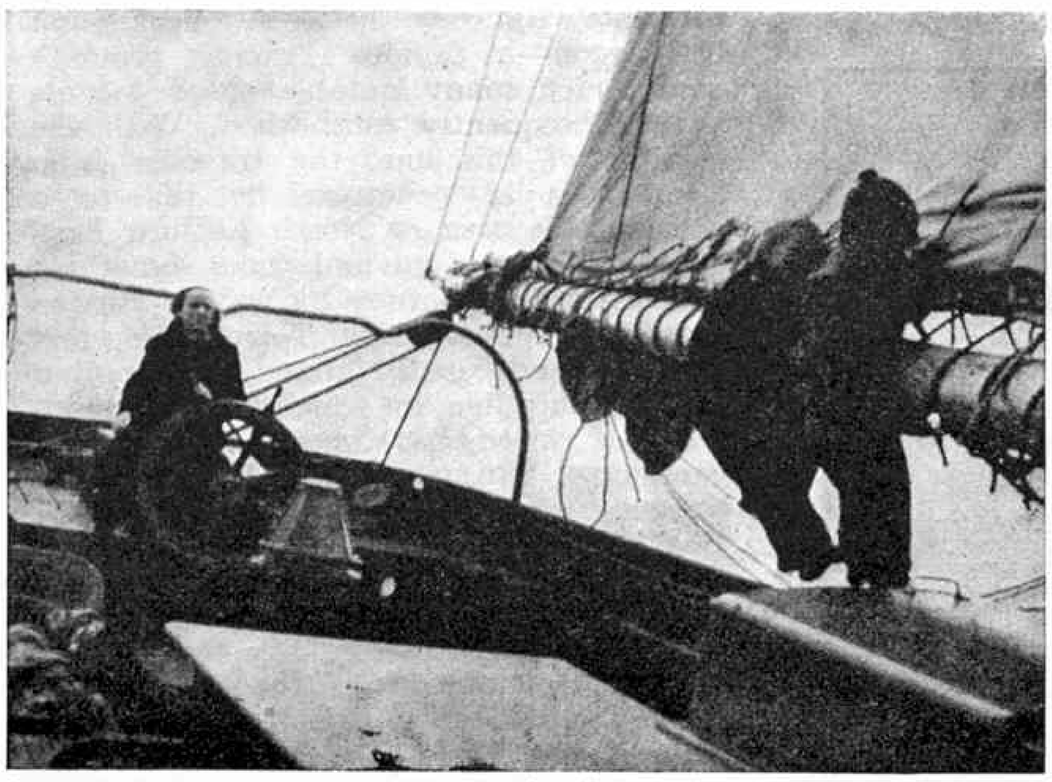
Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/– for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"Two Sailors"

By WARWICK M. TOMPKINS (Routledge. 6/– net)

The Cape Horner can do anything he wishes, with nobody to say as much as "boo" to him. He can coil a line left-handed, and even spit to windward, both of them serious crimes for ordinary seamen. The two sailors who give the name to this fine book reach the distinguished position after a month of battle with the storms that rage round Cape Horn, and how they and their shipmates fared during this exciting struggle makes a magnificent story.

The sailors themselves are Commodore and Ann, a boy and girl who have spent the few years of their lives in the schooner "*Wander Bird*," and speak of cabins and companionways instead of rooms and stairs. Their father is the Skipper, and they themselves are at home in their sea-life, vastly interested in the fitting out for the voyage from Boston to San Francisco and in every detail of sailing throughout the voyage. The result is that the reader has an authentic story of sea-life, full of the fine yarns that sailors themselves tell. The two sailors take their share in the work. They can find every line on the ship in the dark, and Commodore even goes aloft to help to set topsails in spite of being only eight years old.



Commodore and Ann shake out the mainsail reef of the "Wander Bird." This illustration and the one above are from "Two Sailors," reviewed on this page.

Neptune comes aboard as the schooner crosses the Equator on its way southward; sharks and whales are seen, and there is good fun with the ardent fishermen of the crew. Then comes great excitement as the dominions of the Cape Horner are entered. Storms bar the way, but little by little the schooner fights her way round, on one occasion making only 15 miles in one day and 90 miles in five days of the hardest sailing. At the last moment a terrific gale for a time threatens to drive the "*Wander Bird*" on a lee shore, crippled by a torn mainsail, but hard work and first-class seamanship bring her safely through this crisis, and she sails northward through the Pacific in triumph.

Every boy will revel in this splendid book. The illustrations too are excellent, including many splendid sea photographs, interesting drawings and sketches.

"Lloyd George"

By R. H. KIERNAN (Harrap. 4/– net)

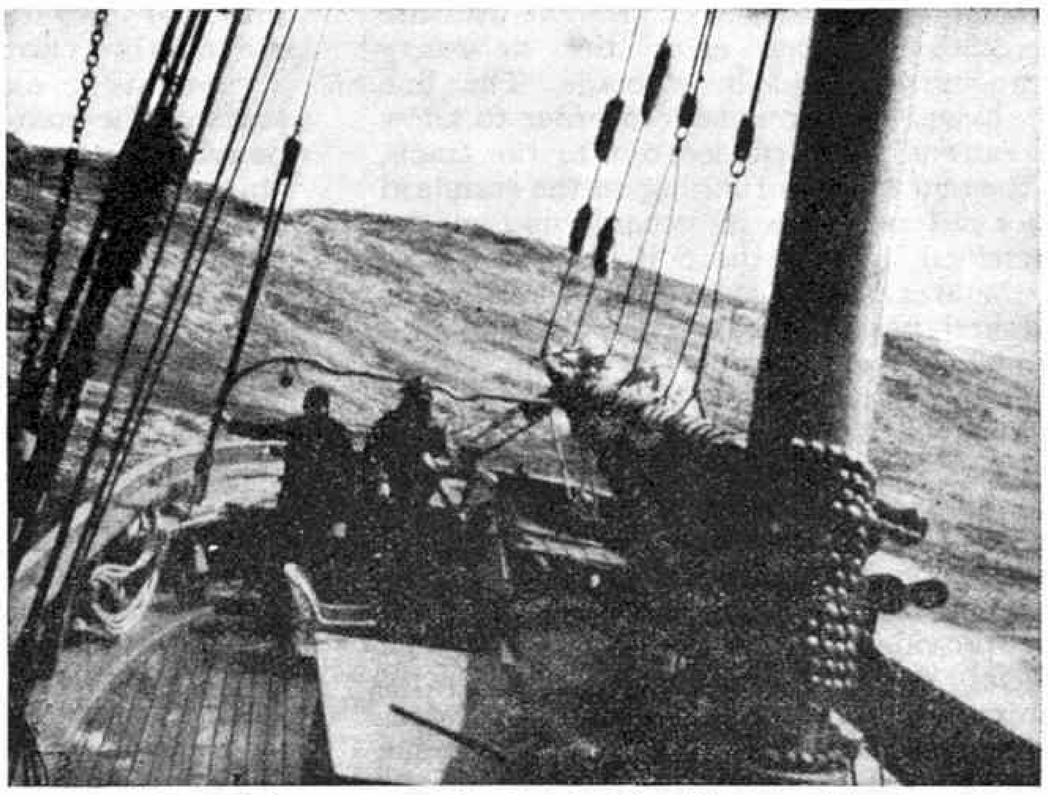
Older readers of the "*M.M.*" will find inspiration in this story of a poor boy who rose by his own efforts and perseverance to one of the greatest positions in the world, that of leader of a victorious nation in a long and exhausting struggle. We see Mr. Lloyd George first as a boy in a small Welsh home, then as a young lawyer and county councillor, and finally as Member of Parliament in the time of the Boer War, when he chose the unpopular side without hesitation because he believed it to be right. Then came office as Cabinet Minister, the beginning of an amazing career of public service.

In telling his story the author has concentrated on the man himself, and we see how he contributed to great events by his spirit, enterprise and acumen. His battles were fought in London, but they were no less exhausting than those of the actual battle zone and equally decisive. The book gives us a real insight into the mind of a great man. It is illustrated by eight interesting photographs.

"The New Carthaginians"

By DORIS TWINN (Lutterworth Press. 5/– net)

The New Carthaginians are a cycling club, the four members of which are transformed into amateur detectives when they become involved in the problem of recovering stolen tapestry. Their detective work daily becomes more complicated, and they have astonishing adventures in a south coast town and on the Downs, with international relations and family affairs to make up an exciting jig-saw. The amateur detectives themselves are real boys and girls, full of life and interest, and their story and their solution of the mystery make up an unusual and attractive book.



The 60-ft. seas towered astern looking like mountains.

"The Shabby Cavalier"

By DORA JONES (Lutterworth Press. 5/– net)

This is a pleasant and romantic story, the scene of which is set in Holland and Belgium in the days when Charles II and his cavaliers were exiles in those countries. The story concerns a Captain in the Duke of York's Horse and a wilful heiress, and great political issues and small personal matters are intertwined in the story of their lives. Their are sparkling festivals, poetry and wit in the book, and the people in it, old and young, are full of life.

"Further Adventures of the Hazelbys"

By NORA ST. JOHN BEALE (Harrap. 4/– net)

The Hazelbys enjoy the best kind of fun on their farm in Kenya. They are spirited and adventurous, and their East African home provides them with surprises and excitement of all kinds. We begin by joining them in a drive to get rid of zebra that eat up the grazing on the farm. Then they get lost out on the hills, fish and otherwise enjoy themselves on Lake Victoria, and one of them has some rather astonishing night adventures centering around a gun-trap laid for a marauding leopard. The story is bright and attractive and its setting is very pleasant and interesting. There is a fine coloured frontispiece, with four other full page illustrations.

RAILWAY NEWS

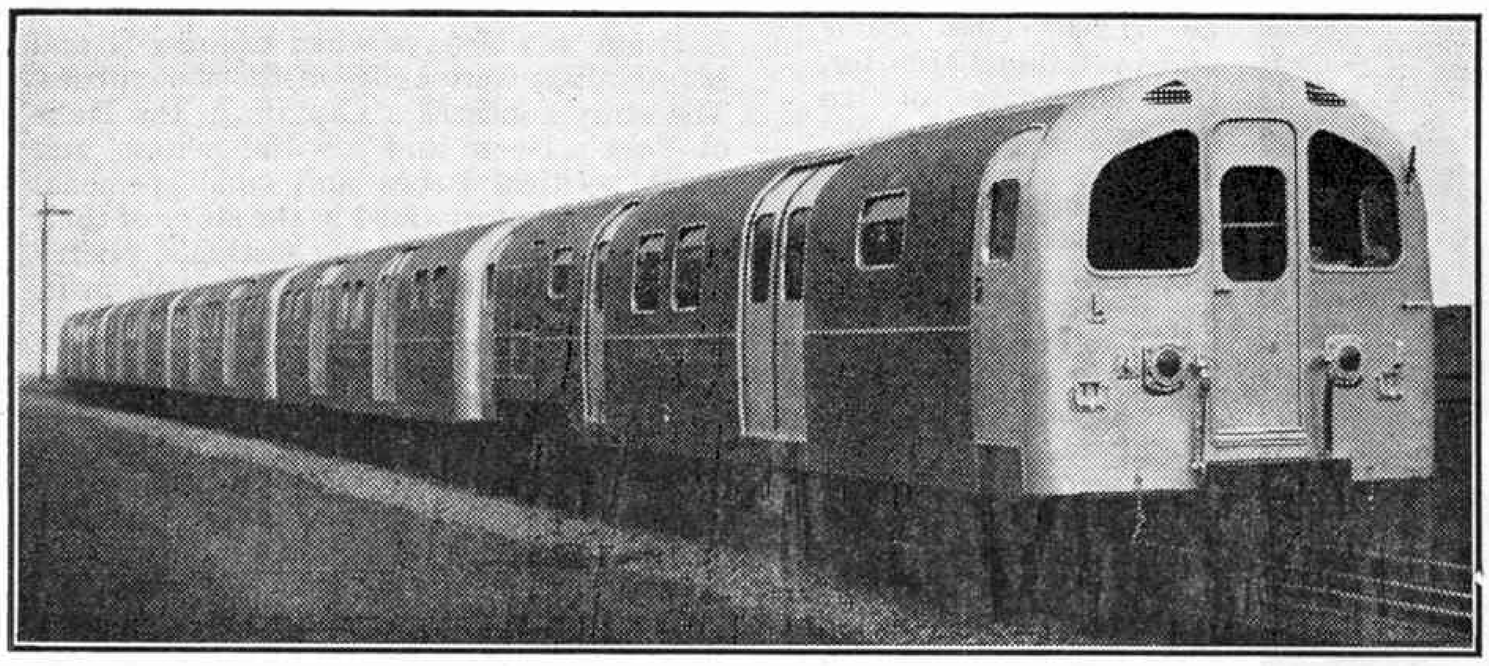
Modernisation of London's Shortest Tube Railway

The Waterloo and City Railway, London's shortest tube railway, is being modernised, and the first stage was completed recently. The line belongs to the S.R., and new stock was brought into use on 28th October after the necessary arrangements had been made. The line was closed for three days in order to allow alterations to be carried out to the track, as the new stock is running on the standard three-rail principle in general use on the electrified lines of the S.R. In the course of the work 6,445 yds. of new conductor rail and nearly 4,000 yds. of cables and wires have been laid.

The new rolling stock is illustrated on this page. Altogether there are 28 new coaches, comprising 12 motor coaches and 16 trailers. Each train will consist of five coaches, with carrying capacity for 600 passengers during peak periods. Electrically-controlled and air-operated doors are provided. Lighting has been given special consideration, and the control equipment is of the most modern design. Telephone communication, between the motorman and guard is provided by means of Loudaphones fitted in each driving cab, and hand telephone sets for use in emergency allow the motorman to communicate with the electric supply sub-station.

In order to reduce noise to a minimum the running rails have been welded into lengths of 315 ft., and experiments will be made with shields to absorb noise after the new rolling stock has been brought into use. The shields will be fitted between the lower portions of the coaches and the tunnel walls. New lighting on a semi-automatic system has been installed in the tunnels, and colour-light signalling also has been introduced.

A journey over the line, which is 1 mile 46 chains long, takes only five minutes.



New rolling stock for the Waterloo and City Railway. The modernisation of this line is described on this page. Photograph by courtesy of the S.R.

Salvage on the G.W.R.

Methods of recovering scrap in the large engineering departments of the G.W.R. are already well defined, and now the discovery and collection are being undertaken of the odd bits of waste materials that accumulate in all parts of the company's system. Many of these formerly were regarded as rubbish, but now have definite value. Dumping grounds are being provided at suitable points on the system for iron, steel and brass etc., sacking and rags, tins and miscellaneous scrap, and special salvage vans are being provided to make regular calls to pick up the waste material collected. The first of these vans to be put into service is illustrated on this page. Each van contains four separate bins for receiving the different kinds of salvage collected, and when loaded will be taken to one of the five stores depots that have been brought into use. There the contents will be sorted again prior to being disposed of in the most suitable manner.

The first special salvage van of the G.W.R. Similar vans now call regularly at all principal stations to collect waste materials. Photograph by courtesy of the G.W.R.

This Year's Centenaries

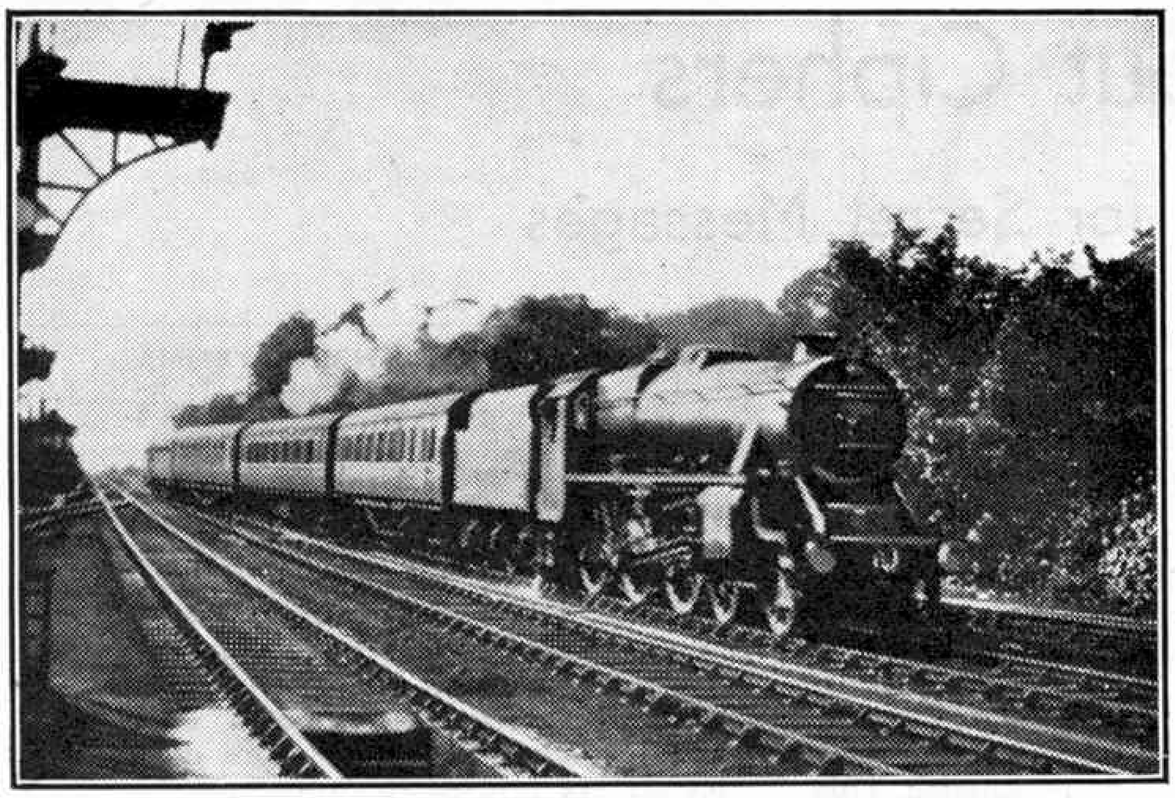
Once again we enter upon a year prolific in railway centenaries, but while 1841 was responsible for the addition of about 275 miles to the British railway system, it also witnessed the introduction of several developments that were to lead to great advances in safety and efficiency. On the North Midland Railway, for instance, there was perfected the first example of the absolute block telegraph, electrical instruments (working independently of the ordinary telegraph) being used to show, by means of needles moving on dials, whether the lines through Clay Cross Tunnel were "clear" or "blocked." In achieving this notable step forward, the famous pioneers Cooke and Wheatstone, who had introduced the electric telegraph experimentally on the London and Birmingham Railway in 1837, and on the Great Western two years later, were considerably encouraged by George Stephenson who, among his many other activities, was Engineer of the North Midland Railway. Another important innovation in 1841 was the first use for railway purposes at New Cross on the London and Croydon Railway, of the semaphore type of signal, which was already in extensive use for naval signalling.

A Famous "Racing Ground"

Turning to the new railways opened in 1841, one of the most interesting was the 44 miles of practically level track brought into use by the Great North of England Railway between York and Darlington—a famous "racing ground" over which many notable speed records were subsequently established. With the opening of this line, the traveller from London could penetrate by rail to a considerable area of North Eastern England, if prepared to undertake something of a marathon journey by way of Euston Square, Rugby, Derby, Normanton, and the York and North Midland line. Another famous main line, on which also numerous feats of speed have been set up, was completed throughout in 1841 by the finishing, after vexatious delays, of Brunel's Box Tunnel between Chippenham and Bath. This permitted through trains to be run between Paddington and Bristol, while beyond the latter city the opening of the first section of the Bristol and Exeter Railway from Bristol to Bridgwater allowed the Broad Gauge banner to be carried a further 34 miles westward.

Curiously enough, the Great Western was not the only company enabled to complete its main line in 1841 by the overcoming of protracted tunnelling difficulties; for in that year Stephenson in the North completed his mighty Summit Tunnel through the Pennines.

D. S. Barrie.



"The Pines Express" of the L.M.S. entering Bournemouth West over S.R. metals. The engine is a Stanier "5P5F" 4-6-0. Photograph by C. Davis, Wimborne.

A Wayside Yorkshire Station

Several features of interest, particularly to model railway enthusiasts, are included in the illustration on this page of a Carlisle to Leeds express freight train passing the typical Yorkshire wayside station of Long Preston, between Hellifield and Settle Junction. The old station-house on the right affords an effective contrast with the small wooden waiting-room on the left, while an interesting feature in the right background is the distinctive type of Midland Railway station name-board, with the name displayed in large raised letters at an angle towards the line, so as to be clearly visible from trains in either direction. (This photograph was taken in happier days, before war conditions led to the "obscuration" of station names!).

Long Preston is the last intermediate station before the Midland main line from Leeds and Bradford divides, at Settle Junction, to pursue separate ways over the fells to Carlisle, and westward to Lancaster and Morecambe. It is situated on the original main line of the North Western Railway, which used to be called the "Little" North Western, to distinguish it from the L.N.W.R., and which comprised a series of lines extending from Skipton to Morecambe and from Clapham Junction (Yorkshire!) to Ingleton, all opened in 1848-50. Although the North Western promoters envisaged that their line would afford an outlet for the Midland Railway's Scottish traffic via the Lancaster and Carlisle Railway, they probably never imagined that the Skipton-Settle Junction section would afterwards become a link in the Midland's bold and costly Settle and Carlisle scheme.

The train shown in the photograph is hauled by one of the ubiquitous and invaluable "Class 4" 0–6–0s of M.R. origin, more than 700 of which have been constructed, and which are still being brought out by the L.M.S. Despite their 5 ft. 3 in. driving-wheels they have a good turn of speed, and can attain 60 m.p.h. or more with quite considerable loads.

D. S. BARRIE.

Bulgarian State Railways

Bulgaria is a partially mountainous country having an area four-fifths the size of England and a population of six million. The first railway in the country was British built and operated until about 1887. There are now 2,131 miles of track, of which 2,093 miles are owned and worked by the State, 1,820 miles, being of standard gauge and 273 miles of narrow gauge. The locomotives are mostly of the small-wheeled heavy haulage types with long coupled wheel bases. For the narrow gauge lines tank engines are provided. Some remarkable 2–12–4 tank engines are reputed to be capable of hauling a 410-ton train at a speed of 12½ m.p.h. up a continuous grade of 1 in 40, with curves of 900 ft. radius, extending over a mountain course for 10½ miles. In this region there are spiral loops with tunnels in order to avoid extremely sudden ascents and changes of gradient. About three miles of ascending travel are necessary in order to cover about 700 yds. as the crow flies, the rise in this length being 300 ft.

Rapid Acceleration

Some idea of the rapid acceleration featured by the new 6-car articulated multiple unit electric trains of the L.N.E.R. operating the Tyneside services is given in a letter from a Gateshead reader. On one run on the south side of the river, after starting from Pelaw up a grade of 1 in 145, the speed in approximately 0.37 miles was 42 m.p.h. The next two quarter-mile readings showed the speed to be 48 m.p.h., and 49 m.p.h. respectively before power was shut off. From another start on the level, 39 m.p.h. was attained in less than a quarter of a mile. The quarter mile immediately succeeding is on a down grade of 1 in 92, and a rate of 48 m.p.h. was very rapidly reached.

* * * *

A train travelling at 60 m.p.h. would require 292 days to run the full length of the railway tracks of the United States.

Up express freight train, hauled by Class 4 0-6-0 No. 4208, passing Long Preston, L.M.S. Photograph by D. S. Barrie.

HINTS ON LOCOMOTIVE NAMING

The naming of locomotives is an old British custom, which after lapsing entirely on some lines has been extensively revived in recent years and has proved popular with the public. Many of the classes are familiar and the names carried easy to differentiate. Quite justifiably, however, confusion arises in some readers' minds from time to time as to the identity of some of these titled machines. Has a "Scott" anything to do with a "Royal Scot"? How many different types of engine are named "Castle"? These are typical points that the following notes may help to clear up.

The "Royal Scots" are all L.M.S. 4–6–0 engines named after famous regiments or national organisations; the "Scotts" are former North British, now L.N.E.R. 4–4–0 locomotives, carrying names of Sir Walter Scott's novels, or of people or places introduced in them. One or two of these titles also appear on G.W. "Saints," while years ago they were also familiar on London and North Western engines.

"Castles" are usually understood to indicate the G.W. express class, which also contains batches otherwise named. On the L.M.S. however there are still at work some of the once famous Highland Railway class of 4–6–0s named after Scottish Castles. In addition there is a 4–4–0 series of "Castles" in Northern Ireland, as well as one of the erstwhile Great North of Scotland engines of the same wheel arrangement, now L.N.E.R. No. 6850 "*Hatton Castle.*" Further, among the "Sandringham" 4–6–0 class carrying names of large houses or estates in the eastern counties are to be found a number of "Castles" and "Halls"; the latter suggesting an otherwise exclusive G.W. naming style. The "Football Club" series of the "Sandringhams" is quite distinctive, as are such complete classes as the L.N.E.R. "Shires" and "Hunts," the S.R. "Schools" and "King Arthurs," and the G.W. "Kings," "Manors" and "Granges." The "Glens" are ex-North British 4–4–0s on the L.N.E.R.; the "Bens" are of a similar Highland L.M.S. type and each is appropriately named. Not unnaturally the names of lochs are popular for engines north of the Border. They are found on the L.N.E.R. 2–6–0s allocated to the West Highland route, classes K2 and 4; on the remaining Highland Railway 4–4–0s, class 2P. Nos. 14379 etc. of the L.M.S.

Years ago all the small tank engines of the London, Tilbury and Southend and the London, Brighton and South Coast lines were named after stations or districts served by the systems concerned, or by their connections. This interesting old custom caused some amusing confusion among uninformed passengers, who on seeing say "*Southend*" on the side of a Tilbury line engine sometimes jumped to the conclusion that it indicated the destination of the train! The practice survives in two self-contained coastal areas of the S.R. to-day upon elderly diminutive locomotives. The outside cylinder 0–4–0Ts that have spent many years shunting in Southampton Docks bear names of ports normally served by the Company's cross-channel steamers. Pleasant local island names also appear on the sides of the former L.B.S.C., and London and South Western tanks that operate the Isle of Wight train services, and have numbers prefixed by the letter W.

In these stirring days the naming of engines after Military or other Service units is rightly popular, and among classes so honoured we find some of the L.M.S. "Patriots" and mixed traffic 4–6–0s, L.N.E.R. "Green Arrows" and "Sandringhams," and G.W. "Castles." The grand old Naval and British Empire names carried by the L.M.S. "Jubilees" are now familiar. In certain recent cases naming has been carried a stage further by reproducing crests, sometimes in colour.

More About Ciphers

How to Make Keys for Secret Messages

LAST month we gave three puzzles for readers to amuse themselves with, and the first thing to do this month is to work these out so that readers can compare the results with their own. In the first of the problems the message was hidden by the trick of splitting it into parts of four letters each and placing these in alternate lines. The last two lines of the working are

M A K E G Z X V **H I L E** S G D R **U N S H** H M D R
N B L F **H A Y W** I J M F **T H E S** V O T I **I N E S**

(a)

K Y C K D W R M V Z T F K C V A V M B M D C O
L Z D L E X S N W A U G L D W B W N C N E D P
M A E M F Y T O X B V H M E X C X O D O F E Q
N B F N G Z U P Y C W I N F Y D Y P E P G F R
O C G O H A V Q Z D X J O G Z E Z Q F Q H G S
P D H P I B W R **A E Y** K P H **A F A** R G R **I H T**
Q E I Q J **C** X **S** B F Z **L** Q **I** B G B **S** H **S** J I U
R F J R K D **Y** T C G A M **R** J C H C T **I** T K J V

(b)

Fig. 1.

reproduced here as Fig. 1a, in which the letters making up the message conveyed in cipher are printed in bold type. The second puzzle is worked out in Fig. 1b on this page. The message is distributed over three lines, and has to be read backward, that is from right to left instead of from left to right.

Both these puzzles were ciphers. The third was a code message for which the key was given in Fig. 5 last month. This would readily be understood by most readers, each letter of the alphabet being denoted by its position in the framework of the key and by the number shown above it. Thus A is represented by $\underline{1}$, H by $\underline{2}$, X by $\overline{3}$, and so on. Simple substitution then shows that the code message is: THE DEVELOPMENT OF STAINLESS STEEL IS PERHAPS THE GREATEST METALLURGICAL ACHIEVEMENT OF THE PRESENT CENTURY.

Now we come to the cipher message given at the end of last month's article, with hints as to how this could be read. For convenience we reprint the cipher message itself, and in what follows the letters of the solution are given in capitals.

"Dt kuelg e buevv pej tw e outla ty mlg ewq ktzj mw xtudgw vdggu vggxv dsg jmbsd ner dt ojgea md. Ozd dsmv sev oggw qtwg ewq dsg pej mdvguy ltzuq og xeqg jgd std ewq qjtkkgq mw ltuq nedgj nmdstzd ojgeamwb dsg buevv. Dsg buevv ty ltzjvg nev or wt xgewv ew tjqmwejr amwq."

The first thing to do is to make a count of the letters. We then find that g, e, d, t, w and v occur most often. Of these six letters g is present 24 times, followed by e 21 times, and d and t 17 times each. The two remaining letters, w and v, occur 15 times each. It seems therefore that g must represent E, and e apparently is the cipher for T and d that for A. In a short message it does not necessarily follow that the frequency of the letters will be exactly that given in last month's article, however, and on examining the three-letter words in the message we find that the combination dsg occurs more often than any other of the same length. We have already decided that g is E, so that it is a safe assumption that dsg represent THE. Thus d represents T, and clearly s stands for H. As for e, this occurs alone twice. It must therefore be I, A or O, and for a start it would be well to assume that it is A, the single-letter word that is most often met in ordinary English. This is roughly in agreement with the frequency of the letter.

Continuing with our six most frequent letters, t apparently represents O, but it is impossible yet to say whether v or w is to be deciphered as N. The next step is to make use of the two-letter words in the message. There are nine of these. One is dt, which we already know to be TO. Then we have tw and wt. We can take it that w represents N, the two words tw and wt being ON and NO. Then ew must be AN, and mw and md must be IN and IT respectively.

The combination ty can be guessed as OF, since other possible two-letter words beginning with O are used much less often. The remaining two words of this length are og and or. Since g is E, og must be BE, HE, WE or ME. This can be settled later.

TIITEALECTPOCPEHSSHRIFNEYEFIHR
T I I T E A L E C T P O C P E
H S S H R I F N E Y E F I H R

Fig. 2.

know d to be T. This would give z as U, and make og to be BE, a guess that would fit in with BY for or.

With the 13 letters we have now collected to give us a working solution we can write out the paragraph with the correct letters substituted for the ciphered ones. The result is shown below, where deciphered letters are printed in capitals.

TO kuAlE A buASS pAj ON A BuOla OF IlE AND kOuj IN xOuTEN STEEu SEExS THE jIbHT nAY TO BjEAa IT. BUT THIS HAS BEEN DONE AND THE pAj ITSEuF lOUuD BE xADE jED HOT AND DjOkkED IN lOuD nATEj nITHOUT BjEAaINb THE buASS. THE buASS OF lOzjSE nAS BY NO xEANS AN OjDINAjY aIND.

The rest is fairly easy, for all that is necessary is to pick out words that are almost complete and decide what they must be. From the word IlE the L appears to be either C or R, and of the two C appears the more likely from the accompanying words as far as we have deciphered them. Two words a little farther on in the paragraph also are helpful. They are STEEu and SEExS. The second of these may represent several words, but a little consideration will suggest that SEEMS is the most likely, and also that the other word is STEEL, the interpretation of u as L being confirmed by the word ITSEuF, which clearly is ITSELF. Another pointer to the second of these conclusions is the word xOuTEN, which distinctly suggests the word MOLTEN. Returning now to the fourth word, this becomes bLASS, which leads us to the solution GLASS.

AHOAN SSSEP TOCUS LLSLC MILLC ERAED YMEOR MGONI TDFAE EBCCO AHZEI RADNI TDNA

Fig. 3.

Take up now the three-letter words. We have already decided that dsg represents THE. The next most frequent three-letter word is ewq. Since e is the cipher letter for A and w represents N, this word must be AND, a conclusion that agrees with its frequency. This gives us q as D. Further progress is quickly made when we write down the deciphered three-letter words as far as we know the letters, putting dashes for those still unknown. Two of these are sev and nev, both of which we write as —A—. Now v is as frequent as w, which we have decided to be N. This suggests that it stands for one of the letters immediately following the ETAON group in the order of frequency. The first two of these letters are I and S, and as the v occurs three times at the end of a word, and there is doubled, it almost certainly stands for S.

ALLMECCA
HSSYOBON
OULDREAD
ACCEMEHT
NOMAGAZI
STIROFEN
SPLENDID
SELCITRA

Fig. 4.

Now we have deciphered 10 letters, so that we are making excellent progress. To help us on our way we next take the two words og and or, in which we know g. Farther on in the message we have ozd at the beginning of a sentence. From its position we can interpret this as BUT, since we

Proceeding further, an interesting combination of words is jIGHT nAY. At first glance this may be LIGHT RAY or RIGHT WAY, but if we read the words in conjunction with those immediately preceding and following, "RIGHT WAY" seems correct, so that we now have the two further letters j and n, which represent R and W. Then from what we have already learned ktzj is kOUR. As we are writing of molten steel this word probably is POUR, whence we see that k is P. The only letters not now identified are a and p, for c, f, h and i do not occur at all, and there is no difficulty in seeing that in order to make sense a must be K and p must be J. Thus we get the final message:

TO PLACE A GLASS JAR ON A BLOCK OF ICE AND POUR IN MOLTEN STEEL SEEMS THE RIGHT WAY TO BREAK IT. BUT THIS HAS BEEN DONE AND THE JAR ITSELF COULD BE MADE RED HOT AND DROPPED IN COLD WATER WITHOUT BREAKING THE GLASS. THE GLASS OF COURSE WAS BY NO MEANS AN ORDINARY KIND.

Readers who wish to make use of simple

substitution ciphers for their own purposes need not go through lines of working every time a message has to be put into

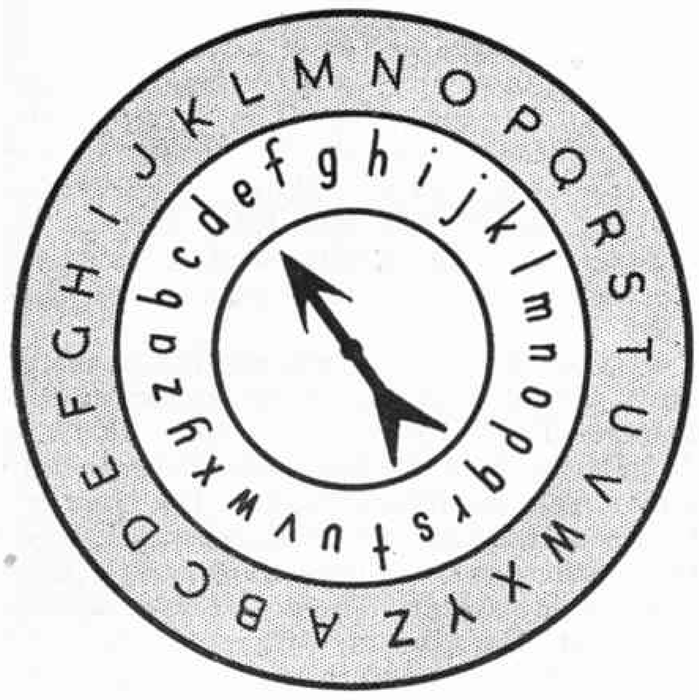


Fig. 5.

cipher or decoded. The method that is used depends upon the fact that they know how many spaces backward or forward in the alphabet it is necessary to go in order to effect the necessary change. Two strips of card are all that is necessary. On one of these the alphabet is written out twice while on the other it is written once, the spacing of the letters on both pieces being similar, as shown in Fig. 7. The short strip is slid along until the A on it is immediately under the corresponding cipher letter on the long strip. Every letter on it will then be under its cipher equivalent, so that a message can be put into cipher or decoded easily and quickly.

A more convenient device for the same purpose is shown in Fig. 5. There are two discs of card, one a little smaller than the other, and the two are pinned together at their centres so that the smaller one can be turned round over the other. The letters of the alphabet are printed round the circumferences, one circle for letters of the cipher and the other for those of the real message, and the smaller disc is turned so as to bring the two alphabets in the right place relative to each other. A good plan to make it easy to remember the right position is to mark an arrow on the smaller disc. It can then be arranged by those who use the scheme that the arrow shall point to a certain letter on the larger disc, and this letter can be varied when it becomes advisable or necessary to change the code.

In Fig. 2 is an entirely different form of cipher from any so far dealt with, and none of the methods described would be of any use in trying to solve it. The reason for this becomes plain when we count up the letters, for then it appears that E is the one most often used, and that the other letters of the ETAON group are abundant. This tells us that there has been no substitution of other letters. In fact, this is an example of cipher by transposition, that is by re-arranging the letters in accordance with some known plan.

There are many possible routes or ways of rearranging the letters in a transposition cipher, and it may take considerable time and much hard work to hit upon the right one. Fig. 2 is an example of a special trick that is baffling to those who are unacquainted with it. It illustrates a form of cipher that was largely used during the American Civil War, when it was described as a rail fence cipher. In the example given there are 30 letters. In order to decode the message it gives, write down the first 15 of these, leaving room for another letter between those of each pair, and then write the remaining 15 letters in order in the vacant spaces. The result is the solution, which will be found to read : THIS IS THE RAIL FENCE TYPE OF CIPHER.

How the message was put into cipher is shown in Fig. 2. The letters are simply written down in zig-zag fashion, and then read off as if they formed two lines, with really astonishing results as far as appearance goes!

Fig. 3 is an example of a different kind of transposition. In dealing with ciphers of this kind the first step is to rewrite the message in the form of a square or rectangle. There are 64 letters and we might start with a square having 8 letters on each side. Starting at the top left-hand corner we write the first column downward, the second upward, and so on, alternately upward and downward, to get the result shown in Fig. 4. Now this can be read along various other routes, and it will be found that sense is made by reading horizontally instead of vertically, beginning with the same corner and moving alternately from left to right and from right to left. Thus we get the inspiring message. "ALL MECCANO BOYS SHOULD READ THE MECCANO MAGAZINE FOR ITS SPLENDID ARTICLES."

It will be seen that rectangular arrangement of this kind offers a very large number of possible routes for the necessary rearrangement. The letters may be made to follow each other across, up and down, or even diagonally, and a start may be made at any corner.

There is another very interesting trick that makes these transposition ciphers even more difficult. This is to rearrange the columns before writing-off the message in cipher. The columns must be rearranged in accordance with a definite scheme, and the usual plan is to make use of a key word. The message to be conveyed is written out in a rectangle, above which the key word is written. The next step is to label each of the letters of the key word with its relative position in the alphabet. This numbers the columns for us and they are then placed in that order, after which all that remains is to re-write, following some definite route.

When the key word is known this form of cipher is no more difficult to solve than the ordinary transposition type. Those making use of ciphers are seldom obliging enough to supply the key word, but even then experts, using various ingenious tricks, usually can read the hidden message.

To show how this is done, in Fig. 6 is a sentence that has been set out in cipher by the method just explained, with a key word that is unknown. There are 42 letters in the sentence, which suggests a rectangle of seven columns and six rows, or six columns and seven rows. Suppose we write the letters in columns, alternately down and up, as at (a) in Fig. 6. It is impossible to read any intelligible message in this jumble of letters, but if we have adopted the right way of routeing then what is wanted is rearrangement of the columns. This is a matter of commonsense, combined with some knowledge of words.

The first thing to do is to try to spot combinations of familiar letters. A good plan is to pick out the columns in which there are a good number of the letters that occur most frequently, that is those of the ETAON group, and to try to fit columns in front and behind so as to make up words of two or three letters. Here the fourth column seems the most suitable for this plan. The third letter down is O, and elsewhere in the third row are I and L, which suggest OIL. This appears to be the only word that can be made in the third row at this stage, so we put the first and fifth columns after the fourth, as in (b) in Fig. 6. This seems promising, for in the second row we get MUD and in the first there is WIT, which with the H of the second column makes WITH, so we add that. Then we notice that the remaining letters of the first row are T, O and U. These suggest that WITH should be completed as WITHOUT. On trying this we get the rectangle at (c) in Fig. 6, from which we can read off the solution as WITHOUT MUD DEEP OIL WELLS COULD NOT BE DRILLED CBA. The three letters at the end have been added to make a full rectangle, a common device in transposition ciphers. They have nothing to do with the message itself, but do not give rise to any confusion as they work out to the end of the message when this is deciphered.

IUICT LDEUW DHTPI NIALO SOMWT DLOBE BRDLE UOEEL DC

(a)	(b)	(c)
IHTWTUO	WIT	WITHOUT
UDPMDEE	MUD	MUDDEEP
IWLOLLE	OIL	OILWELL
CUNSODL	SCO	SCOULDN
TEIOBRD	OTB	OTBEDRI
LDALEBC	LLE	LLEDCBA

Fig. 6.

Solving a puzzle of this kind is very fascinating, and here is another one for readers themselves to work out. The sentence when ciphered is: EMRTT EESLS IYPON FKOCA YAMMA SOVTE XCHMA SDEOD SLBEO ETAMO ESNT.

The solution will be given next month, when a further article dealing with interesting examples of ciphers will appear. The example is not a very difficult one, and those who try it should find a rearrangement that will make sense if they make use of one or other of the methods that we have explained.

ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ

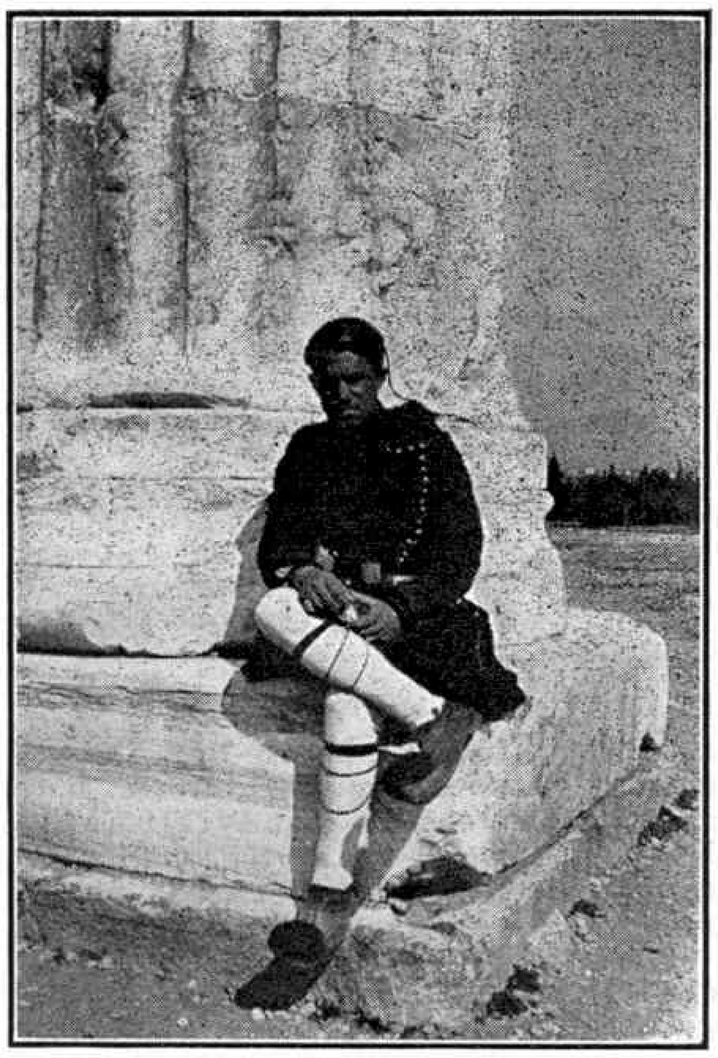
abcdefghijklmnopqrstuvwxyz

Fig. 7.

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

An Evzone in Athens

The historic monuments and temples of Greece, the most famous of which stand on the Acropolis at Athens, are likely to have many interested visitors from among the British sailors, soldiers and airmen now serving in Greek waters.



An Evzone at the base of a Greek temple in Athens. Photograph by P. Lawrie, London.

When I visited Athens, shortly before the outbreak of war, our ship anchored in Phaleron Bay, a few miles from the capital and not far from the ancient harbour of Piraeus, which can now only be used for smaller vessels. From the anchorage we had a fine view of three famous mountains. These were Hymettus, which is noted for its bees and honey, Pentelicus, the source of the marble used in the buildings on the Acropolis, and Lycabettus, near the city.

From Phaleron Bay, an electric railway leads to the city and a short walk enabled us to reach the Temple of Jupiter. This famous edifice was commenced in 530 B.C., but now only 15 of its original 104 lofty columns remain. Soldiers of the Greek National Guard, the famous Evzones, were visiting the ruins when I was there. I persuaded one of them to have his photograph taken as he sat at the base of one of the columns. The result is shown in the accompanying illustration. The recent achievements of these fine soldiers in the Albanian campaign against the Italians have added greatly to their reputation for courage, skill and determination.

From the Temple of Jupiter one may see the Acropolis, and we visited this on our way back to the landing stage.

P. Lawrie (London S.W.19).

A Holiday in Castleblayney

Castleblayney, where I once spent a fine holiday, is a market town in Eire. There are two market days in the week, one for cattle and the other for farm produce, when stalls are put up in the street from which eggs, chickens, pickles and other foodstuffs are sold. I was interested to find that many of the farmers still made use of the jaunting car.

Near by is a huge estate belonging to the Duke of Newcastle. This consists of a Castle standing in lovely grounds, with dense woods containing almost every variety of tree and shrub. We were allowed to wander through the woods and by the side of a lake, although the Castle was then being used as a hospital. There are two large islands in the lake, as well as a number of smaller ones. Black Island is thick with trees and very hilly; White Island is larger, and is flat with only a few trees on it. Swans and wild duck nest on the islands, and while I was there I saw a fisherman get a perch, only to have it seized by a huge pike as he was trying to land it. The only way to Black Island was by a self-propelled bridge, a flat wooden structure fixed to thick chains and drawn across by turning a wheel.

J. M. Howe (Blackpool).

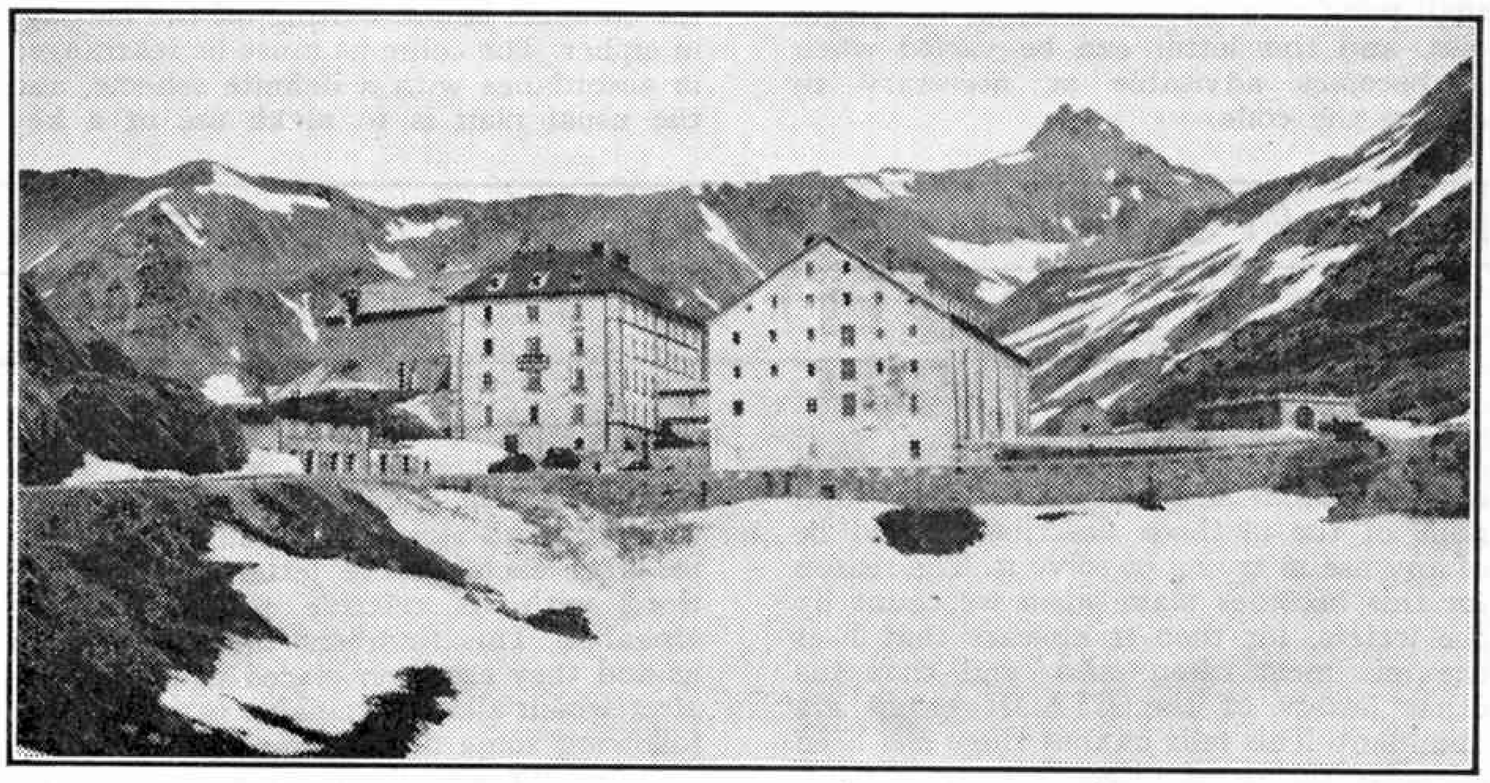
Across the Great St. Bernard Pass

The picture at the foot of this page shows the hospice at the summit of the Great St. Bernard Pass, famous for its monks and dogs, who have helped travellers so much, and one of the oldest known crossings of the Alps. The hospice, the thick walls of which were built three centuries ago, is the building on the right; the building on the left is the hotel, constructed when the hospice could not accommodate all the travellers who passed that way.

The kennels that house the famous dogs are low buildings hardly to be seen in the picture. These fine animals have little to do in these days, for the railways tunnelling under the mountains make the journey between Italy and Switzerland much easier than in former times, and the pass is seldom crossed in winter. There is snow on the Great St. Bernard in July, and when we were there we joined in a snowfight.

Most people visit the hospice and return the same way to avoid frontier formalities. We climbed, with our bicycles, from Italy to Switzerland. This was shortly before the outbreak of war. It was early evening when we left the smoky town of Aosta, deep in its valley, and after travelling many hilly miles we found a bed at Etroubles, about half way. In the morning practice guns were being fired by Italians, who were mining the very road on which we walked. When we were almost past the tree line a monk came striding down the pass, and he gave us a friendly nod. Then, by an old bridge across the stream, we scanned the ancient path, the road the Romans knew, climbing up the sheer hillside to the skyline. Our road, making its way upwards by amazing bends, was much longer. We thought we had reached the summit when we came to the Italian Custom House, but the frontier was still two miles away and much higher, its lofty cross high up against the skyline. It took us a long time to crawl up the final stretch, with snowdrifts on all sides.

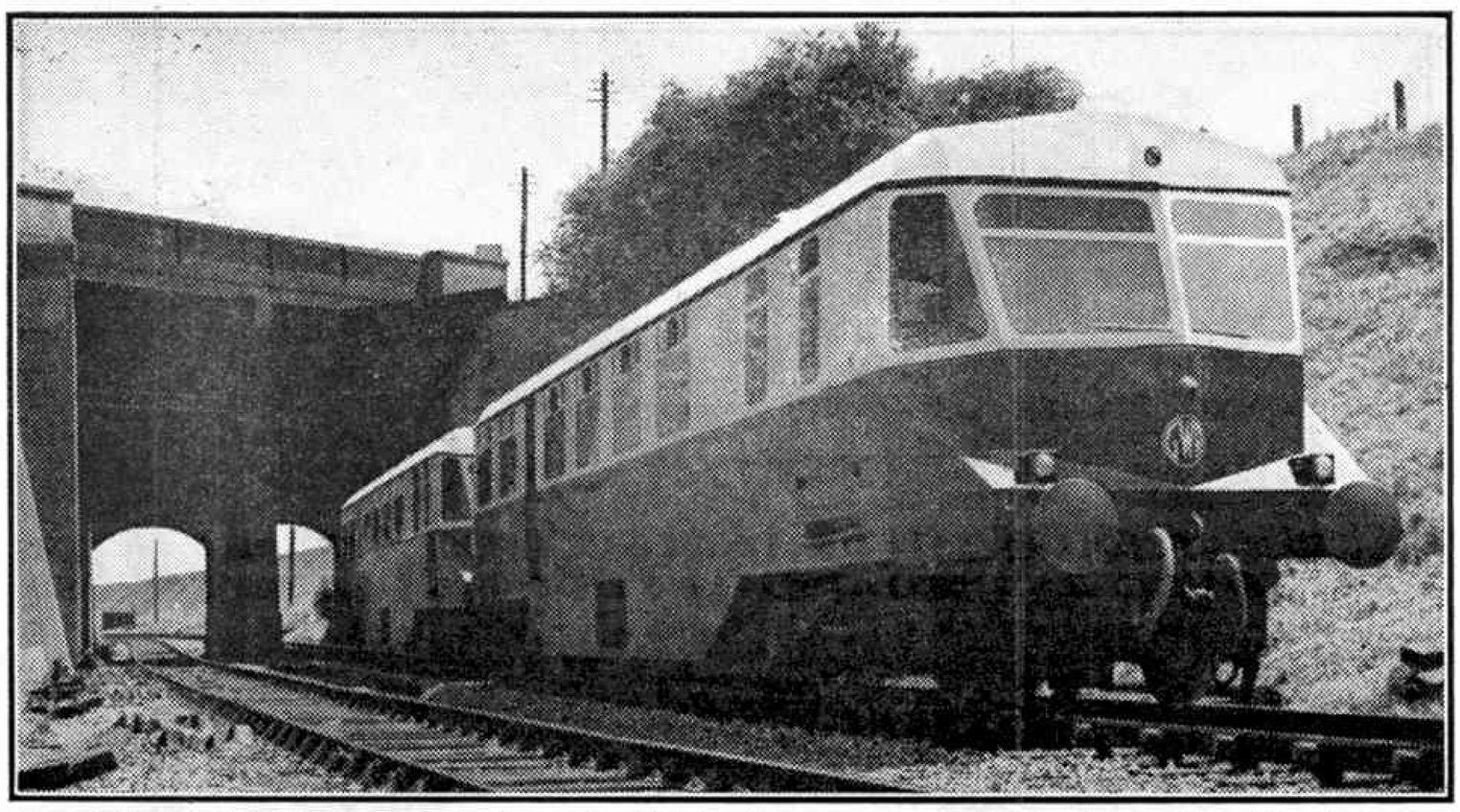
The summit is 8,100 ft. above sea level, and we lingered around for more than an hour, talking with the monks and walking through the museum in the hospice. By 4 p.m. it became too cold to stay longer, and we continued our journey down the winding road to Martigny and Lake Geneva.



The summit of the Great St. Bernard Pass through the Alps. The famous St. Bernard hospice is the building seen on the right. Photograph by F. Marriott, Birkenhead.

We did not hurry but the 28 miles to Martigny were ridden in 1½ hrs.

F. Marriott (Birkenhead).



Two of the new A.E.C. railcars in service on the G.W.R. They are seen coupled together on trial. The illustrations to this article are reproduced by courtesy of the Associated Equipment Co. Ltd.

The New G.W.R. Railcar Fleet

Diesel-Engined Vehicles of Improved Design

By T. R. Robinson

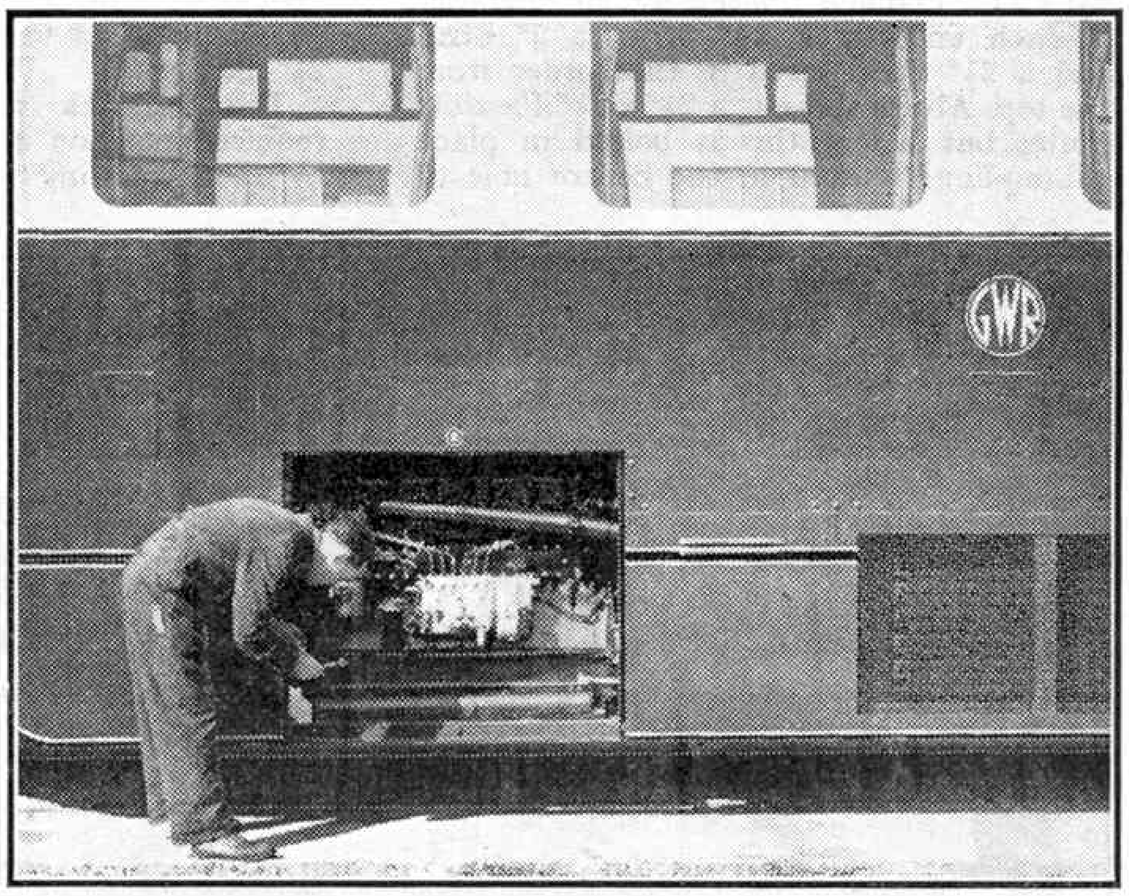
ONE of the most successful of recent innovations on British railways has been the fleet of Diesel-engined railcars put into service on the G.W.R. The first of these efficient vehicles was the single-engined experimental car, built in 1934, that ran between Southall, Reading and Didcot, and effectively demonstrated the possibilities of service improvement by such means. Further cars of a more ambitious type followed, three twin-engined vehicles being put in service soon afterwards on the Birmingham-Cardiff main line, and the total eventually became 18.

The all-round efficiency and mobility of the railcars enabled services to be run that could not economically be operated with steam traction, and encouraged the G.W.R. to extend their use to additional areas. As a result 20 additional cars were ordered. The design of the new cars has been slightly modified, and improvements in detail suggested by experience with previous cars have been embodied wherever possible.

The chief alteration in external appearance has been the replacement of the streamlining employed for the earlier cars by straight lines and flat panels. Scientific streamlining has only proved effective at high speeds, and as the new cars are intended for branch-line working, at relatively low speeds, the curves and rounded surfaces have been replaced by something more utilitarian. For instance, the downswept rounded front is a framing that in its lower part is almost vertical, and this has allowed the body-length of the cars to be increased by 2 ft. Still another foot has been gained by continuing the bodywork for 6 in. over the headstocks at each end, and thus the total of 3 ft. has been added to the space available for passengers and luggage.

The engines, which are "staggered," are of a new type, and have more efficient cooling arrangements. In many ways, they resemble those used for omnibus work. They are six-cylinder direct-injection power units, with a bore of 120 mm. and a stroke of 142 mm., and their combined output at 1,650 r.p.m. is 210 b.h.p. Their design embodies an ingenious oil-cooling system consisting of water-cooled grids located in the main sump, and arranged to maintain the lubricating oil at a moderate temperature. As the cooling of the oil has an important effect on its lubricating value, the system should effect a marked improvement in the life of both the oil and the engine components. The grids are so arranged that they can be easily removed for cleaning.

The transmission consists of a fluid flywheel, a five-speed epicyclic gearbox, a bevel-type final drive with reversing gears in the inner axle-box of each bogie, and a cardan shaft and bevel drive on the outer axle box.



The six-cylinder direct injection oil engines used to drive the new G.W.R. Railcars are easily accessible, as this illustration shows.

The engines are very accessible, being behind large removable panels that can be swiftly removed. The fuel injector pumps, sump oil fillers and similar details are then within easy reach of anyone standing at rail level. The radiators are behind similar panels, which are provided with wire-mesh insertions to admit air.

One change in connection with the braking system is the adoption of two-tread brake shoes of railway type for all wheels in place of the internally-expanding form previously used. This change brings the new cars more in line with railway practice, internally expanding brakes being characteristically an "automobile" feature. Another feature of the bogie construction is the use of S.K.F. roller bearings for the axle boxes.

The body space is divided into five main sections, the driver's cabs, a luggage compartment, and two saloons, which are separated by a vestibule having entrance and exit by doors of the usual rail-car type. The larger saloon carries 32 and the smaller 16 passengers, and the luggage compartment is fifteen feet long. Steel panelling is used throughout, the panels being mounted on a teak framing, which is reinforced by steel members. The flooring is fire-proofed boards, covered with a sound-proofing composition.

Four of the cars are designed to operate as twin-coupled sets, able to carry a total of 104 passengers, and are provided with a buffet and a lavatory. The maximum speed of these twin-coupled cars will be about 70 m.p.h. Still another car is to be designed for parcel carrying only, but except for the bodywork details, there is little difference in the general form of the cars.

Heating for the cars is provided by an oil fired automatic steam generator. Oil is supplied from a tank mounted on the underframe, and water from a container mounted near the generator. Sufficient steam can be produced to heat the car and also any trailer cars that may be attached, and is available within a few seconds of the starting of the generator.

Some of the smaller details are novel and interesting. For instance, the horn is located in the buffer-beam itself, the mouths of the horns being covered with a special mesh-guard. Windscreen wipers are fitted to the cab windows, and as the cars are arranged for operation from either end, both the necessary "head code" and red tail lamps are permanently fitted at each end of the vehicle.

One of the cars has already been employed over the 86½-mile run between Southall and Westbury on a number of test runs. The vehicle was used both as a single car and with various trailer loads, and some very good performances were put up.

A Meccano Model Lathe

THE model lathe shown in Fig. 1 on this page is an excellent subject for those who like building model machine tools. It is not suitable for working in metals, but it can be used to produce miniature articles in wax, which can be obtained from a candle.

The base consists of two 12½″ Angle Girders and two 4½″ Angle Girders bolted together, and the bed is built up of two 12½″ and two 3½″ Angle Girders. The bearings for the 4″ Rod on which the Cone Pulley 4 is mounted consist of two 5½″ Strips 1. The Rod carries also a Face Plate and a Flywheel. A 6½″ Rack Strip 7 is bolted to the front of the bed in the position shown in Fig. 1.

The sides of the headstock consist of two 2½″×1½″ Flanged Plates 2, held together at one end by a 2½″×1½″ Flanged Plate, and at the other end by 2½″ Strips. A 3″ Rod journalled in the centre holes in the end plates carries a Cone Pulley inside the headstock, and a 1″ Pulley outside, and a Bush Wheel is fixed on the forward end of the Rod to represent the face plate. The two Cone Pulleys are mounted on their Rods facing in opposite directions and are joined by a Driving Band. The headstock framework is completed by bolting on a 2½″ Semi-Circular Plate at each end, and two 2½″×2½″ Flexible Plates to form the curved top.

The sides of the tailstock consist of 2½″×1½″ Flanged Plates joined together at each end by a 1½″ Strip, a 2″ Strip and a 2½″ Strip, used in that order from the top. Above these is a 2½″×2½″ Flexible Plate, but before this is bolted in place a Coupling is fitted in the centre hole of

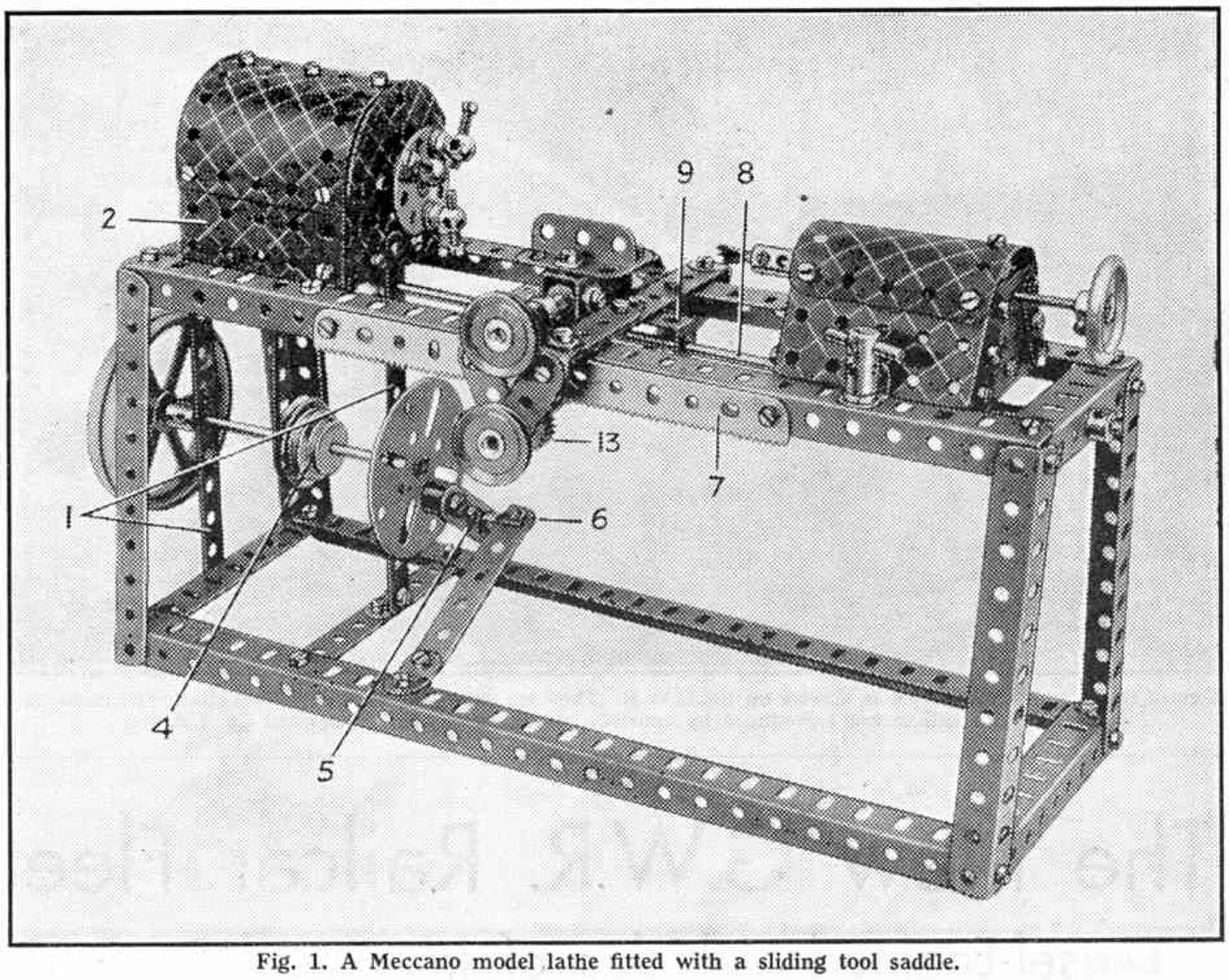


Fig. 1. A Meccano model lathe fitted with a sliding tool saddle.

centre hole of the other 1½″ Strip. This Rod carries outside the tailstock a Coupling holding a Centre Fork. At its other end is a 1″ Pulley Wheel fitted with a 1″ Rubber Ring to represent a handwheel, and when this is turned the Centre Fork moves forward or backward. Slides for the tailstock are provided by two 3½″ Strips bolted to its ends. The Strips are under the flanges of the Angle Girders of the bed, and are fitted to the tailstock by Angle Brackets bolted in the centre holes of the 2½″ Strips.

The tailstock may be fixed in any required position on the bed of the lathe by means of wing nuts, which hold Obtuse

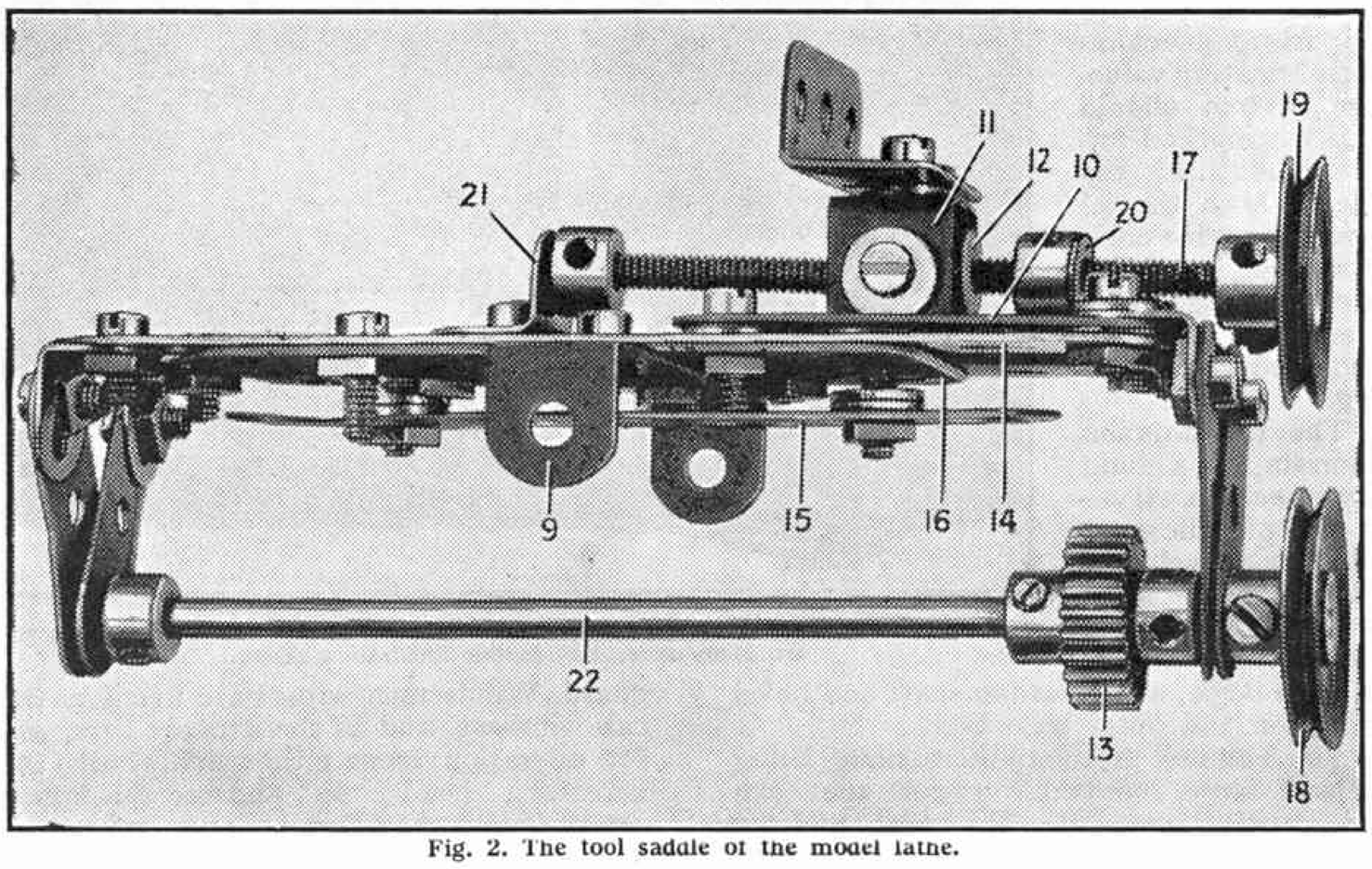


Fig. 2. The tool saddle of the model lathe.

one side by a bolt passed through its bore and gripped by the grub screw. A 2″ Screwed Rod journalled in the centre hole of the 1½″ Strip and the centre threaded hole of the Coupling, is joined by a second Coupling to a 2″ Rod passed through the Angle Brackets bolted to the sides of the tailstock. Each wing nut consists of a Threaded Coupling fixed by a bolt and nut to the Girders forming the sides of the lathe bed. A 1″ Rod is passed through the top tapped hole in the Coupling.

The frame of the tool saddle, which is shown in Fig. 2, consists of two 4½″ Strips 14 bolted to the long sides of a 3″×1½″ Flat Plate 16 so that one hole of the Strips projects at one end and two holes at the other end. Two 2″ Strips 10 are bolted at the latter end with a Washer between them to serve as guides for the Double Bent Strip 11. A 1½″ Strip carrying two Angle Brackets is also bolted across this end. An Angle Bracket 21 is bolted to the middle hole of the 1½″ Strip. The Double Bent Strip 11 forms the cross slide and is secured to a Threaded Coupling 12 by Bolts. A 1½″ Angle Girder is fixed to the top of the Double Bent Strip to form the tool rest as shown. The Strips 14 rest on the side Angle Girders of the lathe bed and the 3½″ Strip 15 serves to hold the saddle in place. The tool saddle moves to and fro along the bed on a Rod 8 consisting of a 2″ Rod and an 8″ Rod joined by a Rod Connector.

The 1½″ Strips that form bearings for the Rod 22 are now bolted in place, and the Rod, Collars, a ¾″ Pinion 13 and a 1″ Pulley 12, are arranged so that the Pinion 13 meshes with the Rack Strip 7.

A 3″ Screwed Rod is inserted in the bore of the Threaded Coupling 12, and Collars 20 are put in position. These prevent the Rod from sliding, so that when it is turned by means of 1″ Pulley 19 the tool holder represented by the 1½″ Angle Girder is moved towards or away from the work.

The crank 5 is built up of two Cranks bolted back to back. One end is attached to the Face Plate by a lock-nutted Pivot Bolt, and the other to an Angle Bracket bolted to 3″ Strip 6. A Hinge joins the Strip to the frame.

Parts required to build model lathe: 2 of No. 2; 3 of No. 2a; 4 of No. 3; 1 of No. 4; 5 of No. 5; 2 of No. 6; 3 of No. 6a; 4 of No. 8; 4 of No. 9; 2 of No. 9a; 2 of No. 9b; 1 of No. 9f; 14 of No. 12; 2 of No. 12c; 1 of No. 13a; 1 of No. 15b; 1 of No. 16b; 2 of No. 17; 2 of No. 18b; 2 of No. 22; 86 of No. 37a; 87 of No. 37b; 19 of No. 38; 1 of No. 48a; 5 of No. 51; 6 of No. 59; 2 of No. 62; 3 of No. 63; 2 of No. 63c; 1 of No. 65; 1 of No. 73; 1 of No. 81; 1 of No. 109; 1 of No. 110a; 2 of No. 111; 2 of No. 111a; 2 of No. 111d; 1 of No. 114; 2 of No. 123; 1 of No. 32; 3 of No. 136; 2 of No. 147; 9 of No. 155k; 3 of No. 190; 1 of No. 213; 2 of No. 214.

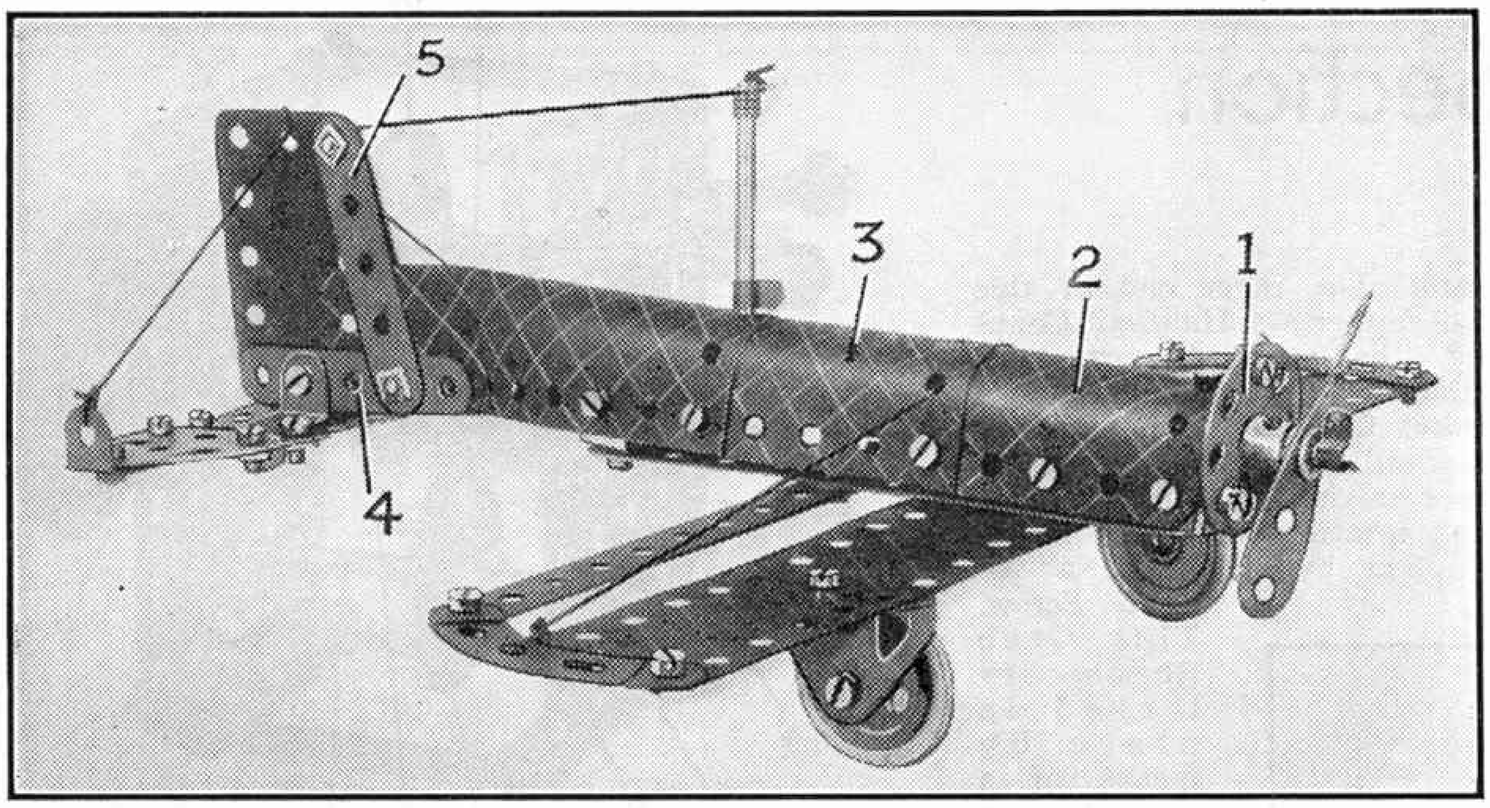


Fig. 1. A model monoplane designed for Outfit No. 2.

New Meccano Models

THE model low wing monoplane shown in Fig. 1 is assembled from parts contained in Meccano Outfit No. 2. Construction of this model is commenced by building the front of the fuselage. A Bush Wheel 1 is secured to a U-section Curved Plate 2 by three $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets, and the Curved Plate is then bolted to two $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets joined to two $5\frac{1}{2}''$ Strips.

The wings consist of two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates joined at their narrow ends to the $5\frac{1}{2}''$ Strips, their other ends being bolted to $2\frac{1}{2}''$ Cranked Curved Strips attached to the fuselage by two $5\frac{1}{2}''$ Strips. A Curved Plate 3 is bent as shown in the illustration, and is then bolted to the U-section Curved Plate 2.

The rudder and fin unit consists of a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate strengthened by $2\frac{1}{2}''$ Strips 4 and 5. The tailplane and elevators are made up of a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate. To one end of this a Flat Trunnion is fixed, and a similar Trunnion spaced by two Flat Brackets, is bolted to its other end. The tailskid is a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket bolted to the tailplane.

Parts required to build model Aeroplane: 4 of No. 2; 5 of No. 5; 3 of No. 10; 8 of No. 12; 2 of No. 17; 2 of No. 22; 1 of No. 24; 3 of No. 35; 40 of No. 37af; 40 of No. 37bf; 2 of No. 38; 1 of No. 40; 2 of No. 48a; 2 of No. 90a; 2 of No. 111c; 2 of No. 126; 2 of No. 126a; 2 of No. 155a; 1 of No. 176; 2 of No. 188; 2 of No. 189; 1 of No. 191; 1 of No. 199; 1 of No. 200.

Owners of Outfit No. 3 will be interested in the ingenious model of an invalid chair illustrated in Fig. 2. In building this model two $2\frac{1}{2}''$ Cranked Curved Strips are attached to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate 1 by means of two $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets 2. The other ends of the Curved Strips are secured to the ends of a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that is attached to the Flexible Plate. Two $2\frac{1}{2}''$ Strips 3 are also bolted to each end of the Double Angle Strip, and one of the Strips is attached at its other end to a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket secured to the seat. Two $3\frac{1}{2}''$ compound strips, each consisting of two $2\frac{1}{2}''$ Strips overlapped, are bolted to the $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. These Strips provide bearings for the $3\frac{1}{2}''$ Rod, and at their upper ends they carry the operating handles 6.

The rear wheel axle carries a 1″ Pulley and a Road Wheel at each end. These Pulleys are connected by means of Driving Bands to the Pulleys on the operating handles, each of which is fixed on a $\frac{3}{8}''$ Bolt by a set-screw, the bolt being journalled in the upper end hole of the $3\frac{1}{2}''$ compound strip. A Flat Bracket is secured to each of the $\frac{3}{8}''$ Bolts and similar bolts are fixed to the Flat Brackets to form handles. Two $2\frac{1}{2}''$ Cranked Curved Strips are joined to the $2\frac{1}{2}''$ Strips 3, and their lower ends are bolted to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that is secured to the back of the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. Two 3″ Formed Slotted Strips 7 also are joined to the Double Angle Strip and are bolted to a $\frac{1}{2}''$ Reversed Angle Bracket 8.

The front wheel is steered by means of a handle consisting of a 2″ Rod fixed by a Rod-Strip Connector to a Double Bracket, which is fixed to a second Double Bracket that in turn is mounted on a $\frac{3}{8}''$ Bolt passed through a hole in the Flat Trunnion 9. The lower Double Bracket is lock-nutted to a Cranked Bent Strip 10, in the arm of which the axle of the front wheel is journalled.

Parts required to build model Invalid Chair: 8 of No. 5; 2 of No. 10; 2 of No. 11; 4 of No. 12; 1 of No. 16; 1 of No. 17; 1 of No. 18a; 4 of No. 22; 1 of No. 24; 37 of No. 37af; 28 of No. 37bf; 3 of No. 38; 1 of No. 40; 1 of No. 44; 2 of No. 48a; 4 of No. 90a; 5 of No. 111c; 1 of No. 125; 1 of No. 126a; 2 of No. 187; 1 of No. 190; 1 of No. 192; 1 of No. 212; 1 of No. 214; 2 of No. 215.

The construction of the mobile crane shown in Fig. 3 is commenced by bolting two Angle Brackets to the front flange of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the chassis. Two $2\frac{1}{2}''$ Curved Cranked Strips are bolted to these Angle Brackets to form the supports for the front wheel. A $\frac{3}{8}''$ Bolt is passed through the end holes in the $2\frac{1}{2}''$ Curved Cranked Strips and is then lock-nutted in the end hole of the flanges of two Trunnions.

The sides of the jib are held together by a 2″ Axle Rod fitted with two Spring Clips, and by a $\frac{3}{8}''$ Bolt 3. A nut is placed on this bolt to space the sides apart.

The Crank Handle journalled in the sides of the cab carries a Cord Anchoring Spring. A 3″ Rod with a 1″ Pulley at one end, and a Bush Wheel in the centre, also is journalled in the sides of the cab, where it is held in place by Spring Clips.

The Cord for raising and lowering the jib is tied to the Bush Wheel, and is then passed round the 2″ Rod and tied to the 3″ Axle Rod. The pulley block consists of two Flat Brackets bolted together with a small Loaded Hook between them. The operating cord is tied to the Cord Anchoring Spring on the Crank Handle and is then passed over the end of the jib and round the two Washers in the pulley block before it is tied to the end of the jib.

Parts required to build Mobile Crane: 4 of No. 2; 6 of No. 8; 2 of No. 10; 8 of No. 12; 2 of No. 16; 2 of No. 17; 1 of No. 19g; 4 of No. 22; 1 of No. 24; 4 of No. 35; 43 of No. 37a; 34 of No. 37b; 4 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 1 of No. 57c; 2 of No. 90a; 3 of No. 111; 2 of No. 126a; 2 of No. 176; 2 of No. 188; 1 of No. 189; 2 of No. 190; 1 of No. 191; 1 of No. 200.

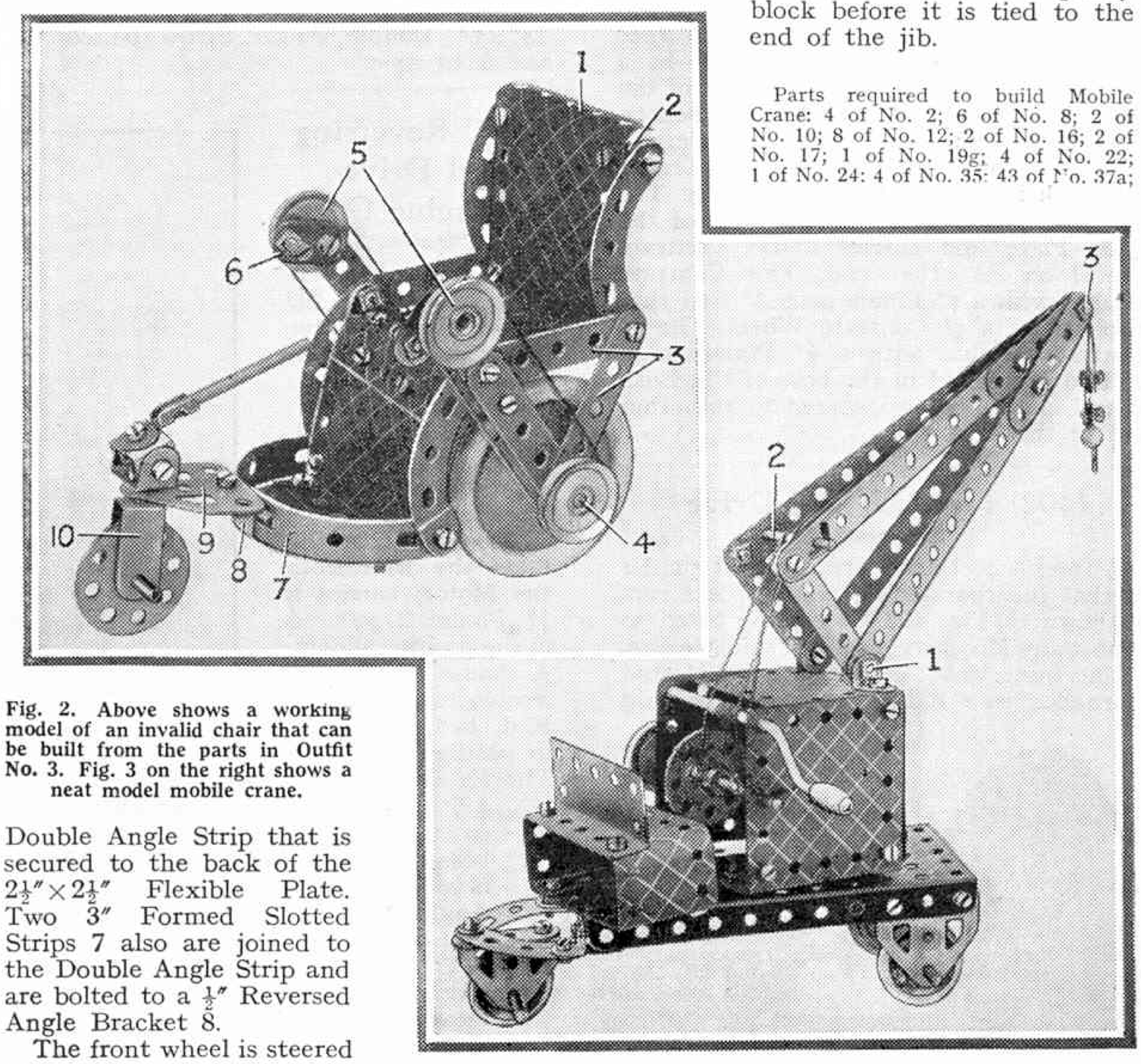


Fig. 2. Above shows a working model of an invalid chair that can be built from the parts in Outfit No. 3. Fig. 3 on the right shows a neat model mobile crane.

Suggestions Section

By "Spanner"

(491) A Model Egg Whisk

(B. T. Gillyatt, Chesterfield)

The model egg whisk shown in Fig. 491 is designed so that it may be clamped on the rim of a basin. The framework consists of a Face Plate 1 and a Bush Wheel 2, spaced apart by four $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bent as shown. Four $3\frac{1}{2}''$ Strips are

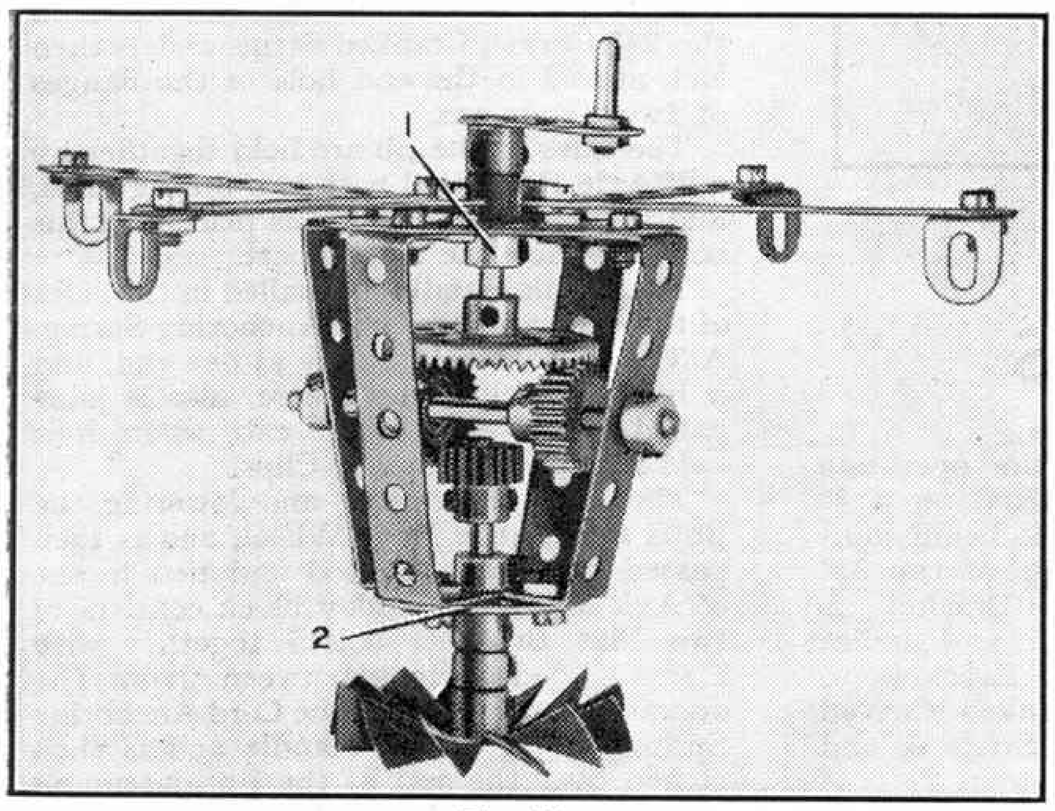


Fig. 491.

lock-nutted to the inner holes of the Face Plate, but they are spaced from it by a Washer and a Nut. The other ends of the Strips are bolted to $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets.

The handle is constructed by inserting a $1\frac{1}{2}''$ Rod firmly in the boss of a Crank, to which is secured a Threaded Pin. The $1\frac{1}{2}''$ Rod is journalled in the boss of the Face Plate and carries a $1\frac{1}{2}''$ Contrate Wheel on its other end. This Contrate meshes with a $\frac{3}{4}''$ Pinion on a 3" Rod that also carries a $\frac{3}{4}''$ Contrate Wheel. The $\frac{3}{4}''$ Contrate meshes with a $\frac{1}{2}''$ Pinion on a 2" Rod journalled in the boss of the Bush Wheel, and a Fan is secured to the other end of this Rod.

(492) Front Wheel Drive

("Spanner")

A front wheel drive arrangement similar to that incorporated in many sports cars is shown in Fig. 492. It can be fitted to almost any Meccano chassis of suitable size.

The front wheel is carried on a 1" Rod journalled in the boss of a Double Arm Crank. The inner end of this Rod supports a Handrail Coupling, the rounded portion of which fits into one end of a Socket Coupling. Although the Handrail Coupling is free to move universally, it is prevented from rotating from the Socket Coupling by means of a $\frac{7}{32}''$ Grub Screw. This Grub Screw is locked in place by means of a $\frac{5}{32}''$ Grub Screw screwed into the opposite hole of the Handrail Support, and the portion of the long Grub Screw that projects engages with the slot in the Socket Coupling.

The opposite end of the Socket Coupling carries a Coupling by means of which the drive from the differential is transmitted through a Rod of suitable length to this part of the movement. The Rod is journalled in $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bolted to the front axle.

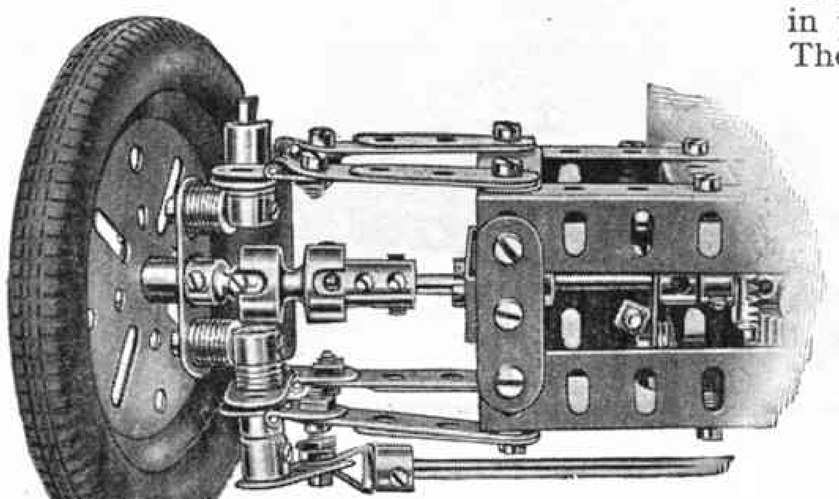


Fig. 492.

(493) Reversing and Drive-Changing Gear

("Spanner")

The mechanism shown in Fig. 493 allows two or three different operations to be controlled from a single driving shaft separately or simultaneously, and in the forward or reverse direction.

The Rod 1, which takes the drive from the Motor, carries a $\frac{3}{4}''$ Pinion 2 secured in the position shown. A similar Pinion 3 is free to rotate on the Rod, but is retained in position by a Collar and Set Screw 4. The Pinions engage with opposite sides of a $\frac{3}{4}''$ Contrate Wheel 5, which is free to turn on a short Rod fixed in the boss of a Bush Wheel 6. This wheel is bolted rigidly to the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that connects the side Plates of the gear box.

The secondary Rods 7 and 8 are slideable in their bearings and their movements may be controlled by levers 9. Each Rod carries a 50-teeth Gear Wheel 10, and on operation of its respective lever this Gear may be made to engage with one or other of the Pinions 2 or 3 or it may be placed

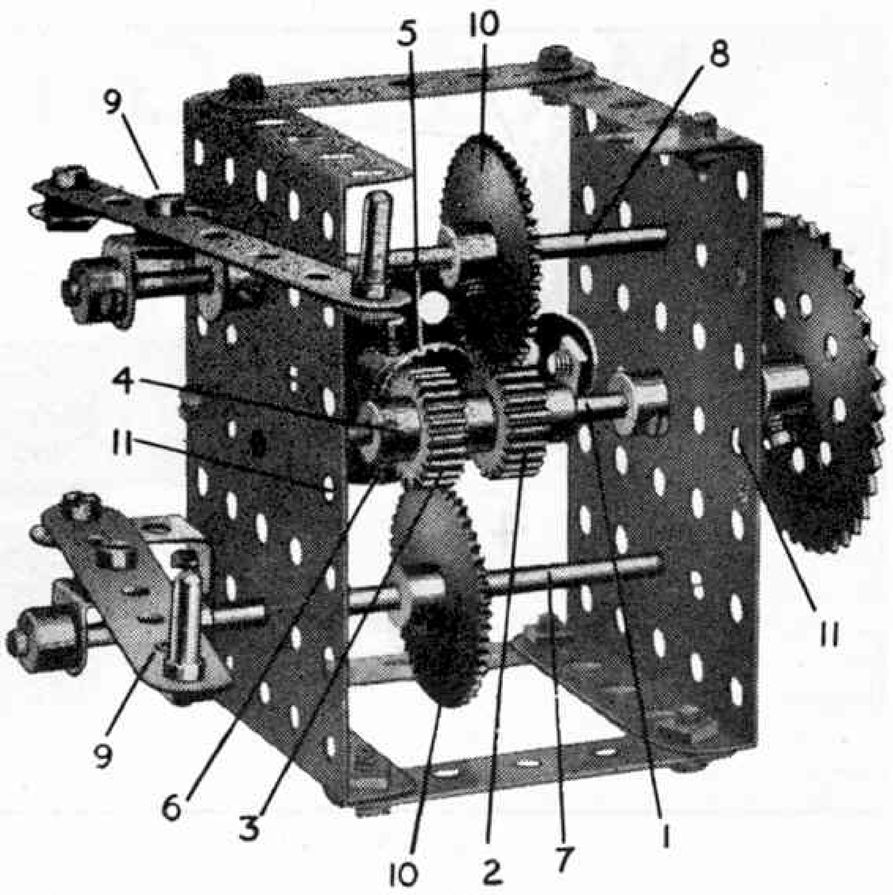


Fig. 493.

in neutral, that is, in a central position.

A third shaft can be journalled in the holes 11 of the side Plates and controlled from the driving shaft 1 in exactly the same way. The gear-box, therefore, enables the shafts 7 and 8 and the shaft journalled in the holes 11 to be driven simultaneously or separately from the single driving Rod 1.

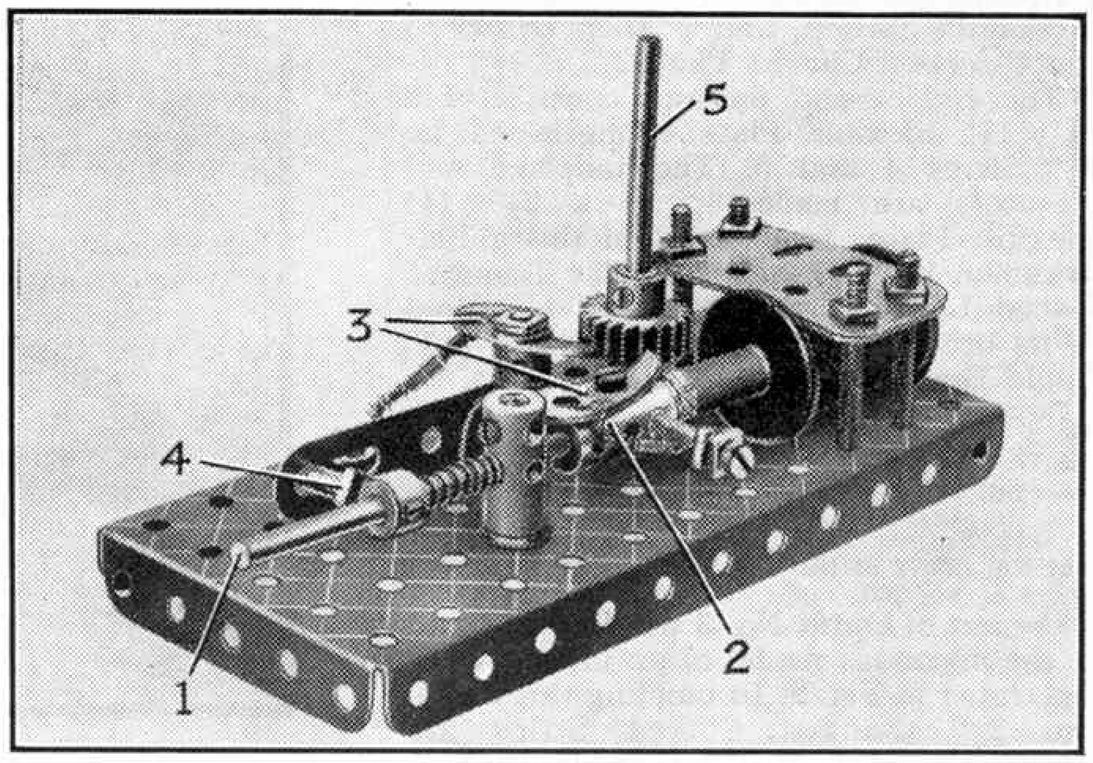


Fig. 494.

(494) Electro-Magnetic Ratchet Feed

(J. Blacklin, Liverpool)

Electro-magnetic ratchet feed mechanisms fulfil an important part in the working of automatic traffic lights, and are also used extensively in automatic telephones for operating rotary switching devices. Fig. 494 shows an electro-magnetic ratchet feed built in Meccano.

The base of the mechanism is a Flanged Plate, to one end of which an Elektron Solenoid is clamped by Flat Girders and $1\frac{1}{2}''$ Screwed Rods. A 3" Axle Rod 1 is connected to the Solenoid core by a Coupling 2, the other end of the Rod being journalled in a Threaded Coupling. A Compression Spring is placed on the Rod and is locked in position by a Collar, on one side of which is screwed a Threaded Pin 4 that slides in the slot of a 2" Slotted Strip mounted on the base. One of the Pawls is mounted on a 1" Threaded Rod, and the other on the Coupling 2.

Meccano Competitions

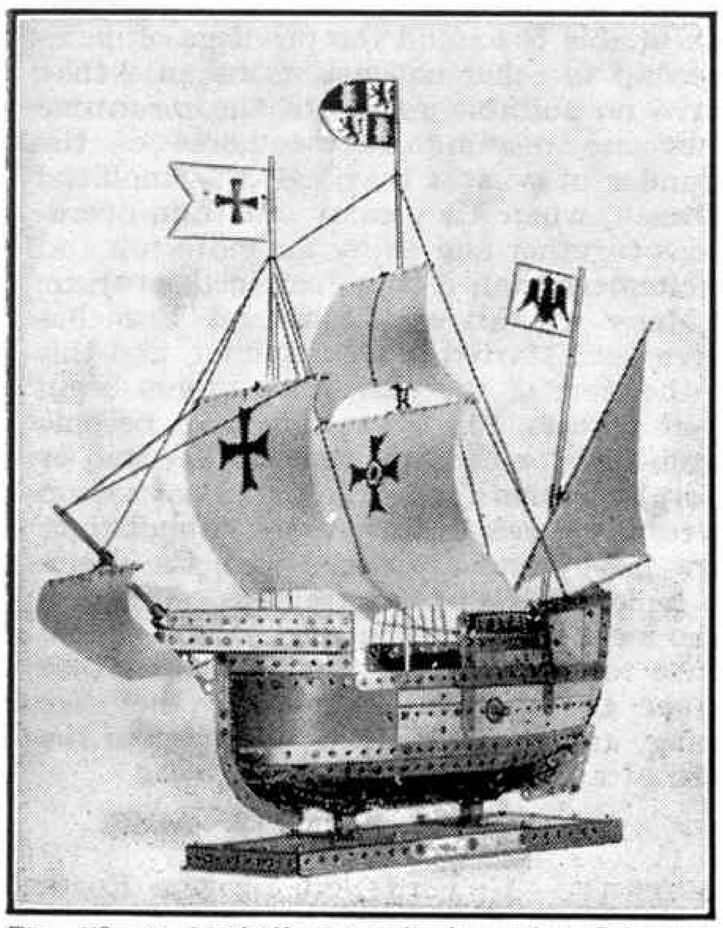
By "Spanner"

Prizes for Model-Builders

I wish to remind readers that there is still time to send in entries for the Grand *"Christmas Model-building Competition"* that was announced last month. This Contest closes on 31st January for entries from readers living in the British Isles, but entries in the Overseas Section will be accepted up to 31st March. The competition is open to model-builders of all ages, and any kind of Meccano model is eligible for entry.

The rules of the contest are few and simple. There are no entrance fees to pay or forms to fill in. Models may represent any desired subject, and may be constructed from any size of Outfit or number of parts.

I advise intending competitors to try and incorporate in their models some ingenious use for a Meccano part, or a new Meccano movement. Models displaying originality of this kind, no matter how simple they may be, will stand the best chances of winning the prizes. When the model is completed a photograph of it should be prepared, but if this is not possible a good sketch will do. The competitor's age, name and address should then be written on the back of the illustration, and this should be sent, together with a brief description of the model, to "Christmas Model-building Competition," Meccano Ltd., Binns Road, Liverpool 13."



The "Santa Maria," the ship in which Columbus discovered America, modelled in Meccano by P. Wickham, Leicester.

The competition will be divided into two Sections, A, for readers living in the British Isles; and B, for readers living Overseas, and the following prizes will be awarded in each Section. The First Prize is a cheque for £3/3/–. The Second and Third Prizes will consist respectively of Meccano or Hornby products to the value of £2/2/– and £1/1/–, and there will be 20 further prizes, 10 consisting of Meccano or Hornby products to the value of 10/6, and 10 of similar products to the value of 5/–. Every winner of a prize consisting of Meccano or Hornby products will be allowed to make his own choice from current price-lists.

Competitors who would like to have their photographs or drawings returned to them after the entries have been judged should enclose a stamped addressed envelope for the purpose. Photographs or drawings of prize-winning entries will not be returned.

Prize-Winners in the "September" Model-Building Competition

The complete list of prize-winners in the "September" Model-Building Competition is as follows:

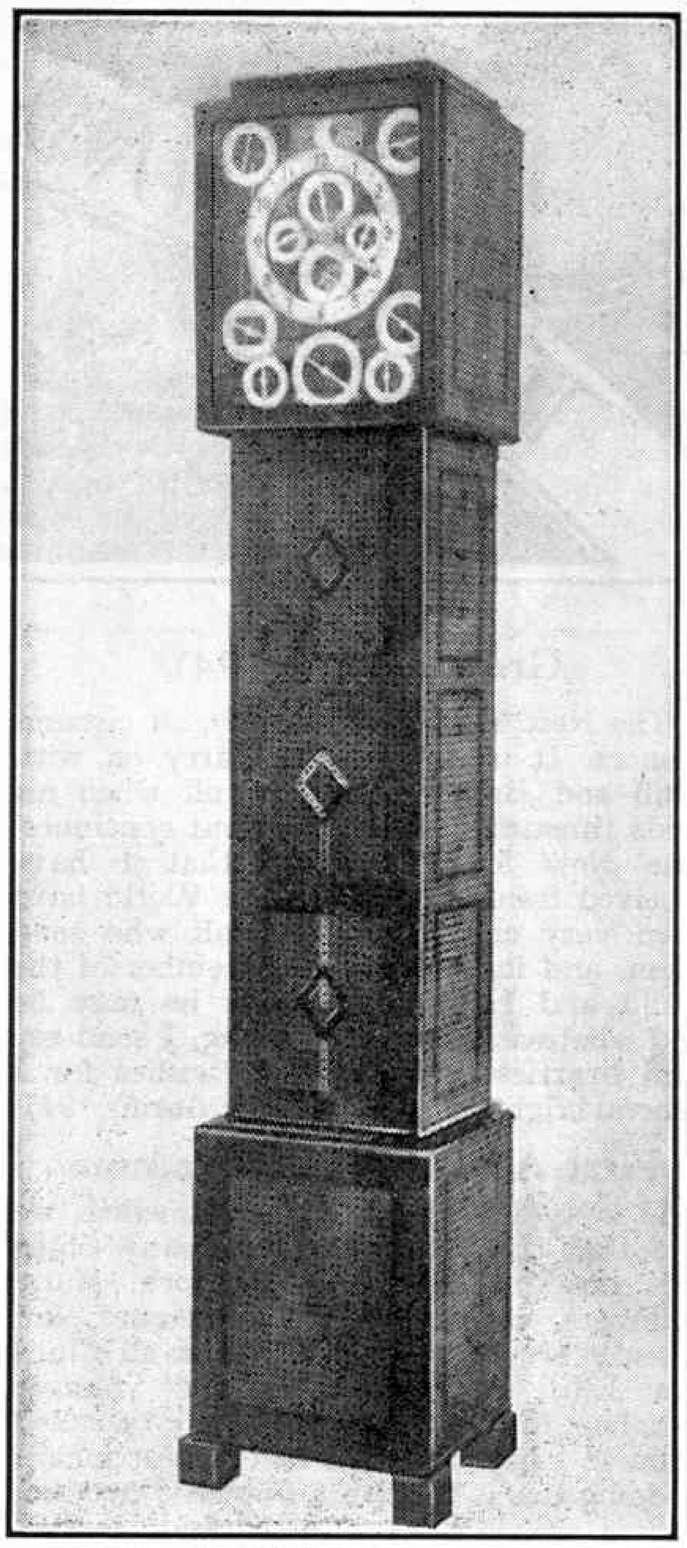
First Prize, Meccano or Hornby products value £3/3/–: J. Nowlan, Dagenham; 2nd, products value £2/2/–: A. Matthews, Birmingham 22; 3rd, products value £1/1/–: P. Wickham, Leicester.

Products value 10/6: C. Snow, Windsor; N. Ferry, Timperley; E. Clements, Orpington; H. Gibbs, Liverpool 19; S. Lippiatt, Dunkerton.

Products value 5/–: B. Colby, Dunstable; M. Shenton, Littleover; J. Smith, Teddington; P. Walters, Billericay; T. Jones, Sheffield 11; C. Readshaw, Redcar; J. Lorimer, Bradford; D. Freeman, Canterbury; J. Hawthorne, Mapledurham; M. Gainsborough-Waring, Shepperton.

In almost every Meccano competition there are to be found one or more models that stand out prominently from the majority of the entries on account of some feature such as superlative construction, originality and realism. One such entry in the September Contest is a remarkable electric clock built by J. Nowlan, Dagenham, who was awarded First Prize. It is illustrated on this page, and it is much more than a mere time-teller of the usual kind. In addition to indicating the time of day, the clock shows also the Golden Number for the year, phases and age of the Moon, the approximate times of high and low tide at London Bridge, the days of the week, the date, month and year. As though this were not sufficient activities for any mechanism to undertake the clock also chimes the quarters and strikes the hour!

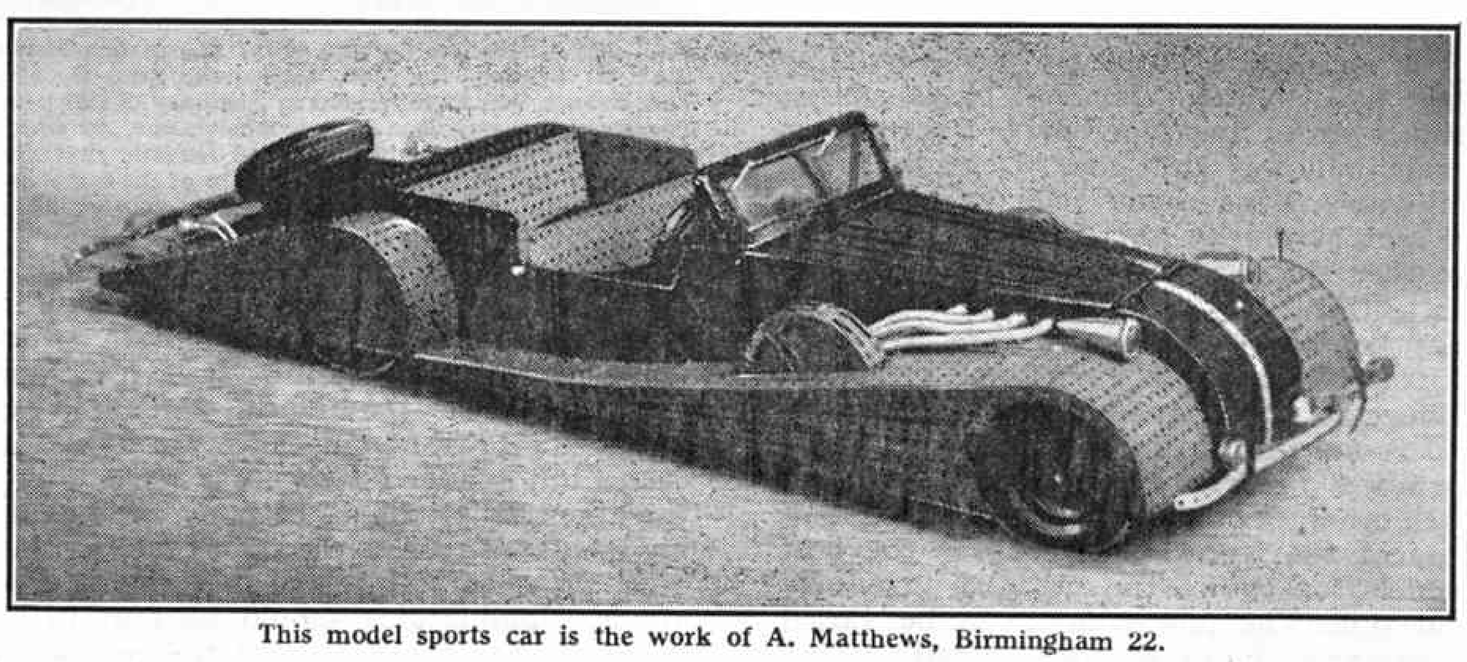
Nowlan started to build the clock about three years ago. To begin with it was operated by a 32 lb. weight, with the usual escapement and pendulum, but later it was redesigned and now has 1½ lb. weights to operate the chiming and striking movements, while the time-keeping gears are driven by a synchronous motor. A further 2 lb. weight operates the calendar mechanism, the weights being automatically wound up by electric motors at prearranged intervals.



A remarkable clock built by J. Nowlan, Dagenham, who was awarded First Prize in the "September" Model-Building Competition.

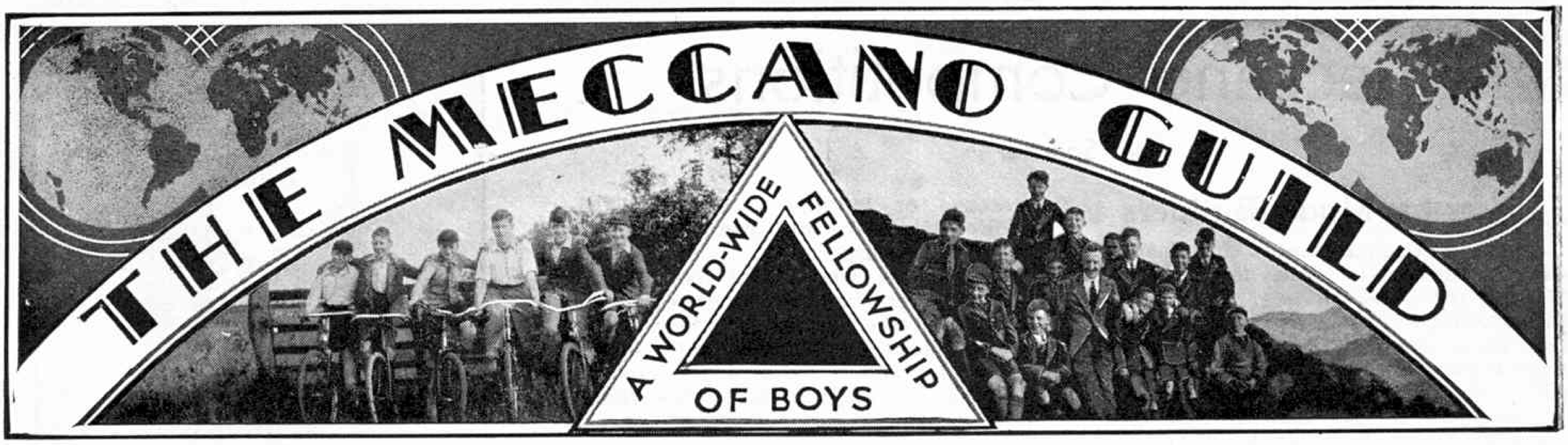
The clock has been operating in its present form for over 12 months and except for minor adjustments to the chiming mechanism has given no trouble.

Second Prize was awarded to A. Matthews, Birmingham, for the fine model sports car shown at the foot of this page. Model-builders will find much to interest them in its novel design and construction.



This model sports car is the work of A. Matthews, Birmingham 22.

P. R. Wickham, Leicester, won the Third Prize with a model of Columbus' *"Santa Maria,"* which is illustrated on the left.



Greetings for 1941

The New Year opens in difficult circumstances. It is not easy to carry on with Club and Branch work in full when air raids threaten and the blackout continues. The New Year greetings that I have received from all parts of the World have been very encouraging. To all who send them, and indeed to every member of the Guild and H.R.C., wherever he may be and whatever he may be doing, I send my own heartiest greetings and wishes for a general brightening of prospects during 1941.

First Aid in the Programme

It is typical of the times in which we live that the programmes of many Clubs are concerned with A.R.P. work. Many members, especially the older ones, are already very active in this, and all Clubs can help by preparing their younger members for tasks that they may be called upon to carry out. One of the best means of doing this is to form a First Aid Section. It is a simple matter to set aside certain meetings for instructions in the beginnings of work of this kind, and most Clubs have connected with them an official or member who is already trained and can easily set beginners on the right path by giving them some simple instruction. As their share in the National effort Meccano Clubs and H.R.C. Branches could well devote some of their time to this subject, and to talks on the general precautions that should be observed when air raids threaten.

Special Model-Building Sessions

The central feature of every good Club programme must be Meccano model-building. In some Clubs this forms a part of the proceedings at every meeting, and in others special nights are set apart, either for the construction of Club models or for the building of entries in competitions. Special intensive model-building sessions also are arranged. These consist of a series of meetings devoted entirely to model-building and can be made really enjoyable. Thus in one such session models of motor vehicles may be constructed; in another ships may be the subject, while at a third mechanised army equipment may be reproduced in miniature. A special display of the models built forms a splendid climax to these proceedings.

Excitement is introduced by forming members into teams to compete against each other, giving small prizes to the members of the team that produces the best models, or shows the greatest ingenuity and skill. The proceedings can be varied by giving each of the teams a small number of parts with which to build some simple model, the winners being the members who do this in the shortest time.

Merit Medallions

Now is the time for Leaders to forward nominations for the Merit Medallion for the Session that has just been completed. Next month I hope to publish the list of winners of this Medallion during 1940, and I wish to make sure that this list is complete. Leaders who have not sent in their nominations therefore should do so at once. In every Club there must be members who have shown merit in Club work of some kind, whether it be in model-building, Hornby Train operation or some other programme feature, or in bringing in recruits and assisting in the smooth working generally of the Club. It is for these members that the Merit Medallion is intended. Two nominations are open to each Club Leader for the past session, and the opportunity should be taken of rewarding members keen to see their Club making good progress and active in bringing this about. Nominations should be sent in at once, so that the names of the recipients and of their clubs can be included in my list. I want as many Clubs as possible to be represented in this on its appearance.

P. J. McNamara is secretary of the Blackfriars School (Laxton) Branch, No. 388, Chairman, Rev. D. Sire. This Branch was incorporated in February of last year. The Branch layout is a very extensive one, on which operations of a very interesting and realistic character are carried out regularly. A description of the track and of the running of trains on it is given on page 33 of this issue.

Start New Clubs and Branches Now

Recently I referred to small Clubs and Branches that have not reached the stage at which they can apply for formal recognition, and expressed my deep interest in them. A very good example of what I have in mind came to my notice only a day or two after writing. This concerns a group of friends in Birmingham who at present are unable to extend the privilege of membership to other enthusiasts because they have no suitable room. In the meantime they are meeting at the home of the founder of what I may call the unofficial Branch, where they carry out train operations together and enjoy far more fun and excitement than if they remained separate.

Many well-known Clubs and Branches have been started in this manner, and this is the time of the year when others begin their careers, for boys who have become interested for the first time in Meccano or Hornby Trains during the Christmas season naturally speak to their friends about their new hobby and are seized with the desire to build models or run trains together. All who meet informally in this manner should write to me about it. They will find that I am as eager to learn what they are doing, and to help them, as I am in the case of an established Club.

Proposed Clubs

DAGENHAM—R. Ferris, 83, Grafton Road, Dagenham, Essex.
LOCHGELLY—G. Gray, 83, South Street, Lochgelly, Fifeshire.
PRESTWICH—B. Chadwick, 55, Park Street, Heaton Park, Prestwich, Lancs.
SOUTH ELMSALL—R. Mozley, "Roxburgh," High Street, South Elmsall, Nr. Pontefract.
THORNER—H. A. Deighton, 17, Kirkfield Lane, Thorner, Leeds.
TIPTON—D. Lloyd, 14, Keelinge Street, Tipton, Staffs.

Proposed Branches

BOURNEMOUTH—T. Priest, 41, Sedgley Road, Bournemouth.
BRISTOL—K. Rogers, 15, Windsor Road, St. Andrews Park, Bristol 6.
CHATHAM—R. Jewell, 156, Glencoe Road, Chatham, Kent.
EDINBURGH—Mr. J. D. McPhee, 88, Craigentinny Avenue, Edinburgh 7.
NOTTINGHAM—B. Boyden, 2, Premier Road, Gregory Boulevard, Nottingham.
PONTYPRIDD—G. Gwilym, School House, Hawthorn, Pontypridd, Glam.

Branch Recently Incorporated

400, BELVEDERE—Mr. F. E. C. Wood, 67, Picardy Road, Belvedere, Kent.

Club and Branch News

Branch News

Rosedale (Kidderminster).—The Branch is making such good progress that it has been found necessary to hold meetings on three nights each week. The Branch rooms have been re-decorated, and the Branch Layout rebuilt. This provides very interesting experimental work, and it will be enlarged by degrees. Mr. C. P. Harris gave an interesting talk on "*The Model Railway Club in Wartime.*" An invitation is given to all interested to join the Branch. *Secretary:* A. D. Hamblin, 19, Katherine Road, Bearwood, Birmingham.

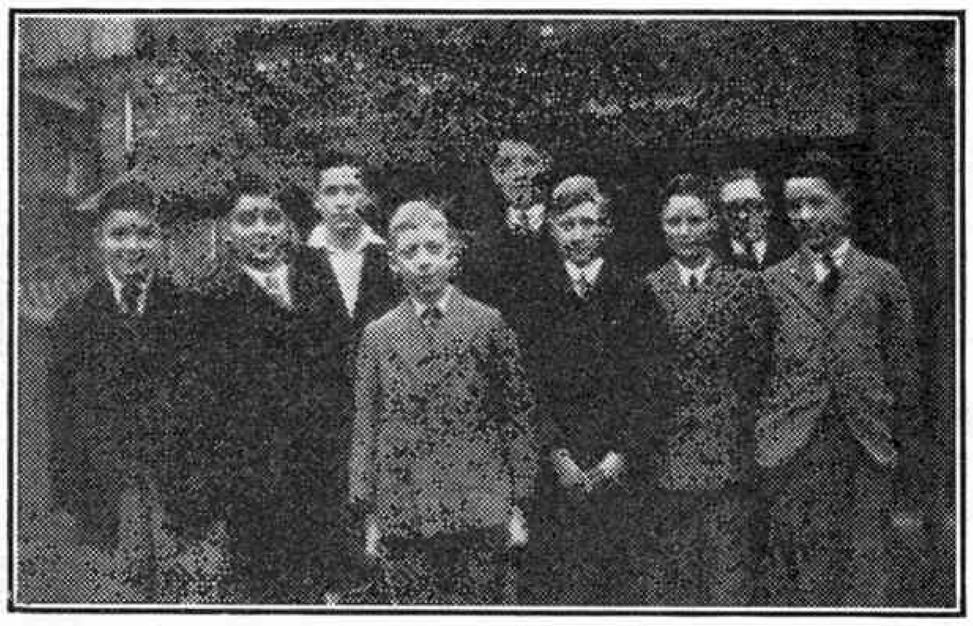
Hornsea.—Enjoyable meetings have been held. At one of these Mr. Shooter, Chairman, who was in charge, introduced junior members to the pleasures of railway operations, and it was found that they quickly became capable of running trains to timetable. Air raid warnings have limited attendances at some meetings. At one of these only one member was present, and he declared that he enjoyed the proceedings better than a full meeting! This is understandable, for he had the entire Branch railway to himself. *Secretary:* D. E. Parker, 8, Burton Road, Hornsea.

Dumpton House School.—The Branch room has been put thoroughly in order, and excellent layouts are planned and built up for track meetings. Special plans have been made for a layout for use at the Branch Exhibition, Rails and other parts being carefully tested in advance. Railway Accessories constructed include cranes. Besides the Exhibition a play is to be produced. *Secretary:* J. P. Oboussier, Crichel House, Nr. Wimborne, Dorset.

Selly Oak.—War conditions have restricted meetings to some extent, but the Branch is carrying on well, members meeting in smaller groups on Saturdays. The Branch layout has been greatly improved, and now has three levels, two for the G.W.R. and one for the L.M.S. Scenery also has been constructed and painted. The operations carried out have included interesting piloting. An electrical signalling system has been installed, with control boards at important stations. The Club Library is proving very useful. *Secretary:* G. O. Jones, 12, Blackthorn Road, Bournville, Birmingham 30.

Rockport School (Co. Down).—The Branch has been very active, and several new members have been enrolled. A telegraphic service has been installed on the layout. Pullman coaches have been introduced for passenger work, and four complete trains of these coaches can now be run. Meccano parts have been used in constructing useful accessories for the goods yard of the Branch layout, to which they give a realistic appearance. *Secretary:* P. C. L. Cosgrave, Rockport, Craigavad, Co. Down.

Kinglassie.—Meetings are now started early because of war conditions. A new track has been laid down. This is more than 100 ft. in length, and represents the line between Dunfermline and Thornton Junction. A realistic touch that has been introduced is the use of miniature Junkers, on the appearance of which trains are brought to a standstill. A member who possesses a cinematograph projector is giving a show every month, and some excellent travel and railway films have already been shown. A special Exhibition of Branch work in the Parish Church Hall produced 13/- for the "*M.M.*" Radio Fund. *Secretary:* W. Duncan, "Helen Dhu," Kinglassie, Cardenden, Fife.



Members of the Northampton Branch No. 284, Chairman, Mr. G. L. D. Hodges, secretary, P. W. Samwell. This well known Branch has an excellent record extending over years, and continues its good work although Mr. Hodges is now serving in H.M. Forces. Mr. P. W. Samwell has taken charge, and is training younger members in the conduct of Branch affairs.

Loughton.—The wise plan of arranging meetings for Saturday evenings has been adopted. Extensive alterations have been made to the layout in order to improve the running. These alterations took some time, but they can be appreciated now that running has been resumed. A collection is being made on behalf of the "*M.M.*" Radio Fund. *Secretary:* G. W. Ruffell, 10, Elmhurst Way, Loughton.

Picardy (Belvedere).—The Branch makes use of Hornby-Dublo material, and special layouts are devised from time to time in order to introduce new operational schemes. Both passenger and goods trains are run, and each member is given a definite post, such as stationmaster, signalman, etc. Timetables are carefully followed. More Isolating Rails and Points are to be acquired in order to extend the interest of the layout. New layouts are now being planned and it is hoped to introduce a signalling system. Games are played regularly, chiefly Darts, Billiards and Monopoly. *Secretary:* L. J. M. Wood, 67, Picardy Road, Belvedere, Kent.

Carmarthen.—Meettings have been devoted generally to track operations and to the monthly cinematograph display. At one meeting chemical experiments were carried out by the members themselves, Mr. R. Lewis, Chairman, presenting a box of chocolates to the pair who were most successful. The secretary explained the interesting chemical actions involved in the experiments. A conjuring display was given by a visitor at one meeting, and at others Table Tennis, Monopoly and other games have been played. *Secretary:* J. D. Lewis, 7, Spilman Street, Carmarthen.

Waterloo (Dublin).—Train services are now worked in complete blackout, only signal lights showing and these being dimmed. A bell rings on the switch board when a train passes a halt. Electric track circuiting arrangements work well during train operations, in the course of which many "specials" are run. *Secretary:* S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

Rudheath (Northwich).—The Branch is in need of a new Club room and more members are urgently required. Those interested should apply by post to the *Secretary:* R. Owen, 6a, Gadbrook Rd., Rudheath, Northwich, Ches.

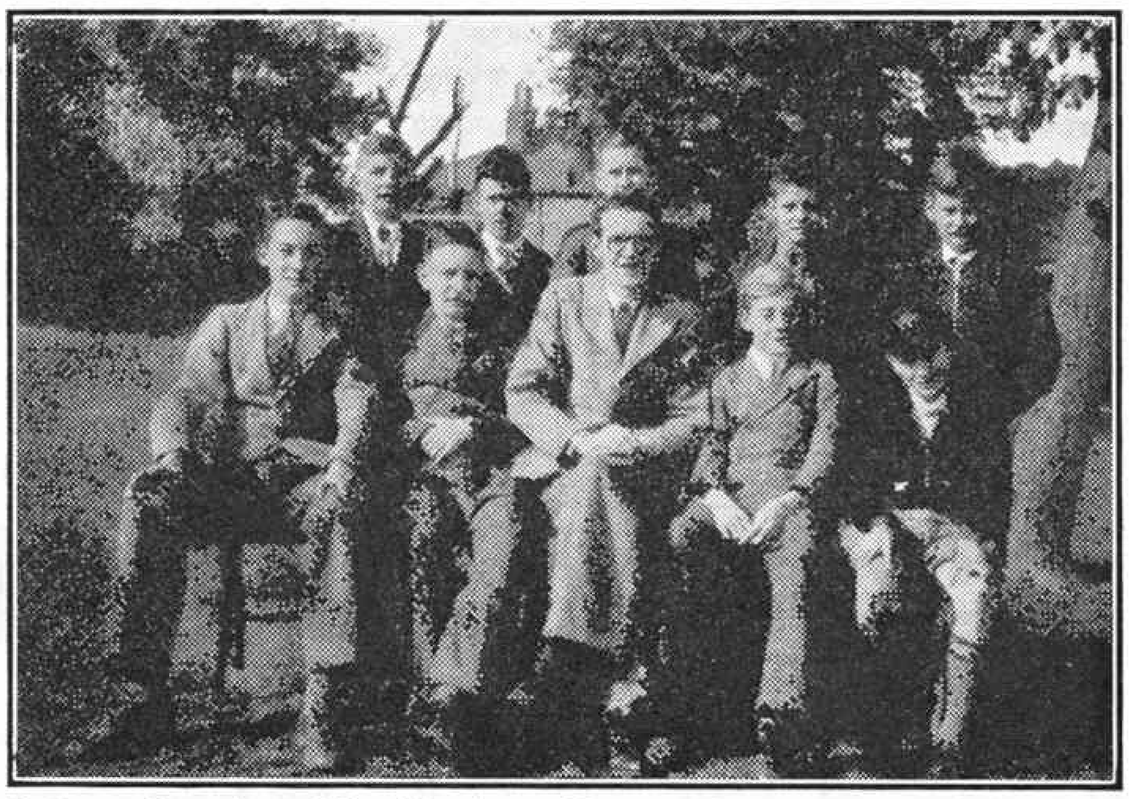
Club Notes

Praze School (Camborne) M.C.—Considerable progress has been made. Models completed include two Meccanographs, several cranes and lorries, and a steam engine. An excellent Library has been formed. Each member has contributed a book, and the stock is being expanded by gifts from friends of the Club. Club roll: 10. *Secretary:* D. James, Carnowall Farm, Praze, Camborne, Cornwall.

Hornsea M.C.—The Programme has included a variety of attractions. Excellent film displays, Talks on electricity, aeroplanes and Hitler, and a new game. All have been enjoyed. The talks on electricity are part of a series in which the methods used in laying electric cables, the construction of joints and the working of telephones and bells are demonstrated. Table Tennis and other games also have been played. The Club's Social Nights are very popular. Club roll: 20. *Secretary:* P. Richardson, 14, Grosvenor Terrace, Hornsea.

Exeter M.C.—One of the most productive periods in the Club's history is now being enjoyed. Many new members are being enrolled and model-building activity is intense. Two prizes were gained in a Hobbies Exhibition held recently, and members are now completing models for a further Exhibition in which the Club was invited to take part as a result of the excellent special display it gave at the previous one. Hornby Railway operations continue, although model-building activities leave little time for this pursuit. The football teams are showing their usual energy. There are three regular teams, with two additional teams for Juniors. The Club includes among its members a clever cartoonist, whose amusing drawings of Club incidents are displayed on the notice board every week. Club roll: 117: *Secretary:* M. F. Golesworthy, 122, Old Tiverton Road, Exeter.

Acton M.C.—Meetings are held on Saturday afternoons. Active work proceeds in spite of air raid warnings and gunfire, which sends members to shelter until things become quiet once more. Model-building sessions are arranged, and other features of the programme include regular film displays, at which travel films, comedies and more serious screen plays are presented. A thorough stock taking of Meccano Parts has been carried out, and the Club's finances are in good shape. Club roll: 13. *Secretary:* S. W. Simmons, 37, Derwentwater Road, Acton, London W.3.



A group of members of the Kingston-on-Thames M.C. Mr. T. J. Howells, Leader, is seated in the centre, with W. Purcell, acting secretary on his left, and G. Taylor, treasurer, on his right. This club was affiliated in April 1940. Members enjoy the construction of large models and have just completed a well-planned model dock.

Hornsea Evacuee M.C.—Both Engineers and Apprentices have been busy. The former have enjoyed Talks on wireless by Mr. R. W. Shooter, Leader, who explained direction finding and the beam system, and a demonstration by a member of the Hornsea M.C. of the building of a Meccano submarine. Submarines built at the second of these meetings were used in games. The Apprentices have been concerned with aeroplanes, learning how they are constructed and how they fly from the Leader, and constructing models for themselves. Club roll: 15. *Secretary:* D. Parker, 8, Burton Road, Hornsea, Yorks.

Islington M.C.—Officials and members are struggling on in spite of difficulties due to enemy action. The Club's losses have been considerable, but new quarters are being sought, and any suggestions for helping the Club in this respect would be welcomed. In the meantime the Leader is keeping in close touch with as many members as possible. Club roll: 12. *Leader:* Mr. V. Miller, 541, Liverpool Road, London N.7.

AUSTRALIA

Maylands (Perth) M.C.—A special Model-building Session is being enjoyed by members, who have completed such models as an electric mobile crane, a lathe, an ambulance and a twin-cylinder steam engine. The Club's projector is put to good use, and Darts and Table Tennis Tournaments give opportunities for keen but friendly rivalry between the Factions. A special meeting arranged by the Leader was very successful, singing, dramatic sketches and short lectures forming the chief items. Organ recitals form a novel feature of the present programmes. Club roll: 34. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

Thebarton Technical School M.C.—At the opening meeting of the present session Mr. E. S. H. Gibson, Leader, gave a brief outline of the Club's activities, and an electric clock, Meccanograph and other models made in previous years were displayed. Excellent Model-building Contests have attracted many good entries, and other competitions are now being arranged together with excursions to places of interest. A Lantern Lecture has been given by Mr. Gordon on "*Aeroplane Crashes in the Great War.*" At this meeting the sum of 18/- was raised for the School's Patriotic Fund. Mr. Gibson has given interesting demonstrations on glass blowing and the construction of home-made scientific apparatus, and one of the Club members has given a film display. Club roll: 55. *Secretary:* R. Hale, Thebarton Technical School, Ashley Street, Thebarton, S. Australia.

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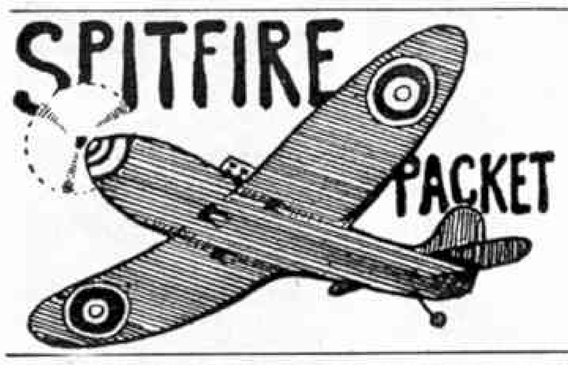

PACKET contains 36 air, triangular, and stamps with aeroplanes on, etc.—2 LIBERIA triangular (with aeroplane), usually sold at 7d.; NIGERIA (Geo. VI); COSTA-RICA triangular (fish); URUGUAY INDIA (mail train); ROUMANIA (Carol); 8 CANADA (a fine set including large Royal Visit pictorial); 2 TANGANYIKA; 3 PALESTINE (pictorials); 6 BRAZIL (including airpost and aeroplane design); 5 U.S.A. (obsolete); 2 JAVA; COSTA-RICA (Exhibition triangle) **and MOROCCO**, LARGE PICTORIAL; Peru New Issue; GERMANY (airpost); COCHIN (large) and IRAQ.—Price 5½d., postage 2½d. extra, abroad 3½d. extra. Money back if you are not satisfied. Applicants for approvals receive 8 Peru FREE (catalogued at 9d.) and in addition, those sending addresses of stamp collecting friends get an additional set of 4 GEORGIA. FOR EVERY PACKET SOLD I AM GIVING THE PROFIT TO THE "SPITFIRE FUND," SO YOU WILL BE HELPING TO WIN THE WAR.

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For other Stamp Advertisements see page xii

STAMP COLLECTING

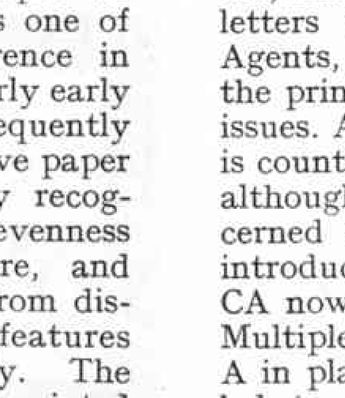
How to Distinguish Stamps that Look Alike

WE have often remarked in these pages that the stamp collector who tries to carry on his hobby without a catalogue to guide him is like a sailor attempting to navigate without a compass. The possession of a catalogue is not enough in itself, however. Unless the collector knows how to identify his stamps from the catalogue

descriptions, he may cast aside as mere duplicates stamps that in fact are different, and possibly valuable. This month therefore we propose to deal briefly with the more important features of stamps and simple means of identification.

First of all let us take the paper on which stamps are printed. This is one of the commonest sources of difference in apparently similar issues, particularly early ones. The types of paper most frequently encountered are *wove* and *laid*. Wove paper can be easily recognised by the evenness of its texture, and its freedom from distinguishing features in its body. The "*M.M.*" is printed on wove, which is used for the great majority of modern stamp issues. Laid paper can be identified by parallel watermark lines running vertically or horizontally across the paper.

Another common paper, of which Switzerland makes great use, is *granite*, which derives its name from minute coloured fibres in its texture. *Pelure* is a hard thin semi-transparent paper. The term is rather loosely applied nowadays to all thin papers, but strictly it should be used only for papers of great strength and toughness. Another paper that is encountered frequently is known as *quadrille*, the name being derived from its network of vertical and horizontal watermark lines forming a pattern of squares or rectangles.



The distinguishing watermarks of these various types of papers are, of course, quite distinct from the watermark devices impressed in most stamp printing papers as a guard against forgery. These usually become visible when the stamps are held up to the light, but if the mark cannot be seen in this way it will show up readily when the stamp is placed face downward on the black surface of a watermark detector and wetted with a drop or two of benzine. It should be remembered that the mark is correctly read from left to right, and when examined from the back of a stamp it is seen in reverse.

The modern issues of Great Britain employ a watermark device consisting of a Crown over the Royal Cipher, G vi R. The device is smaller in size than a single stamp, and one complete watermark and several parts of others appear in each stamp.

The British Colonies use another device known as Multiple Script CA, illustrated on this page The letters CA represent the Crown Agents, who are responsible for the printing of all British Colonial issues. A change in the watermark is counted as an entirely new issue although the designs of the stamps concerned may not be changed. Before the introduction in 1921 of the Multiple Script CA now used for the British Colonies, the Multiple Crown CA, with the letters C and A in plain type, was used, and the change led to a whole series of new catalogue listings for the same series of stamp designs.

In earlier days single devices that appeared only once in each stamp were employed. A typical instance was the Spray, a simple flower design, illustrated here, used by Great Britain on issues from 1867 to 1880.

Before finishing with papers we must touch briefly on surfaced papers, adopted by many countries to secure a good printing surface, and to prevent the illegal removal of postmarks. The two commonest surfaced papers are chalky and enamelled. They are similar in appearance, but the difference may be detected easily by rubbing their surfaces with the edge of a silver coin. On a chalky paper a fine pencil-like line will appear, but no such mark appears with an enamelled surface. A word of caution is necessary. The lightest of touches is sufficient for the test; heavy pressure will produce an ugly black mark that cannot be removed.

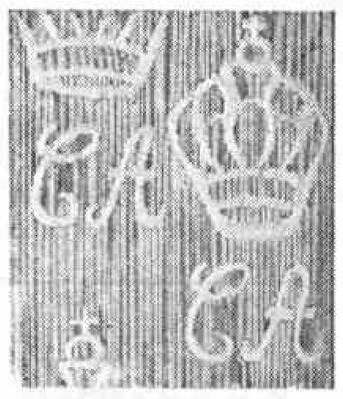
The next common difference between apparently similar stamps is in the perforation, that is the series of small holes punched around the stamp to allow it to be separated easily from the sheet. The method of measuring perforations is to count the number of holes appearing in a length of two centimetres, and, in cases where the number is different at the top and bottom as compared with the sides, the top measurement is quoted first. Thus a perforation may be stated to be $14\frac{3}{4} \times 14$, as in the current stamps of Great Britain. This means that there are $14\frac{3}{4}$ holes in two centimetres along the top and bottom, and 14 in the same length down the sides.

In the early days of stamps the idea of perforations had not been conceived, and stamps had to be cut from the sheet with scissors. Such stamps are known as imperforate, typical specimens being the French stamps shown here. This strip of three 1 fr. stamps is from France's first issue in 1849. The absence of perforations will be noted, as will the tête bêche stamp at the left.

Another system of separating stamps is the roulette, in which tiny cuts, instead of holes, are made between the stamps. It is not commonly employed to-day, and it is particularly interesting to note that Greece is one of the few countries where it is employed exclusively. The 5 penni Finnish issue of 1866 illustrated on this page is an example of rouletting.

One hears the terms "surcharge" and "overprint" used very loosely by some collectors, but really they present no difficulty. A surcharge alters the value of a stamp; an overprint alters its purpose. Thus both overprint and surcharge may appear together on a stamp.

On this page is an illustration of a vertical pair of the 1887 2d. issue of Great Britain overprinted and surcharged for use in the Niger Coast Protectorate in 1893. The name "Oil Rivers Protectorate," which appears on the overprint, had ceased to be used six months before the issue of these stamps! Another example illustrated here is the 2½d. Australian stamp overprinted for use in New Guinea in 1915, shortly after that territory had been captured from the Germans.



A difficulty that young collectors will encounter in determining differences between similar stamps will arise when the variation is one of shade of printing colour. When an issue is long in use, and therefore has to be reprinted, there may be difficulty in exactly matching the printing inks. As these variations often tell an important story in fixing the date of a new printing, a knowledge of colour shades is valuable. Those who become interested in this point would be well advised to make use of the Stanley Gibbons Colour Guide, price 2/6.

Stamp Gossip

and Notes on New Issues

The 1940 New Zealand Health Stamps

New Zealand's annual issue for health charities appeared on 1st October, and as usual consisted of two values. The designs and values are as last year, 1d. and 2d. with a premium of ½d. and 1d. respectively for the charity funds.

Originally it had been intended to use orange for the 2d. value, but when proofs were submitted it was found that the design showed up only poorly and a red-brown shade has been finally adopted. Entirely new printing plates have been used, and readers who have specimens of last year's issue may find it interesting to compare the two stamps to discover any slight differences of engraving that exist.

Manchukuo Census Commemorative

It is not surprising that a young country like Manchukuo should have felt that its first effort at counting its population should be worthy of a special commemorative issue of stamps. Two values, 2 and 4 fen., have been issued, the latter of which is illustrated here. The design shows a census form being handed from a citizen to an official, while the lower half of the stamps bears in Chinese the instruction: *"Give straightforward information. The census is the cornerstone of the State."*

The design of the 2 fen value has a map of the country for its background, and a census official is shown holding aloft the form.

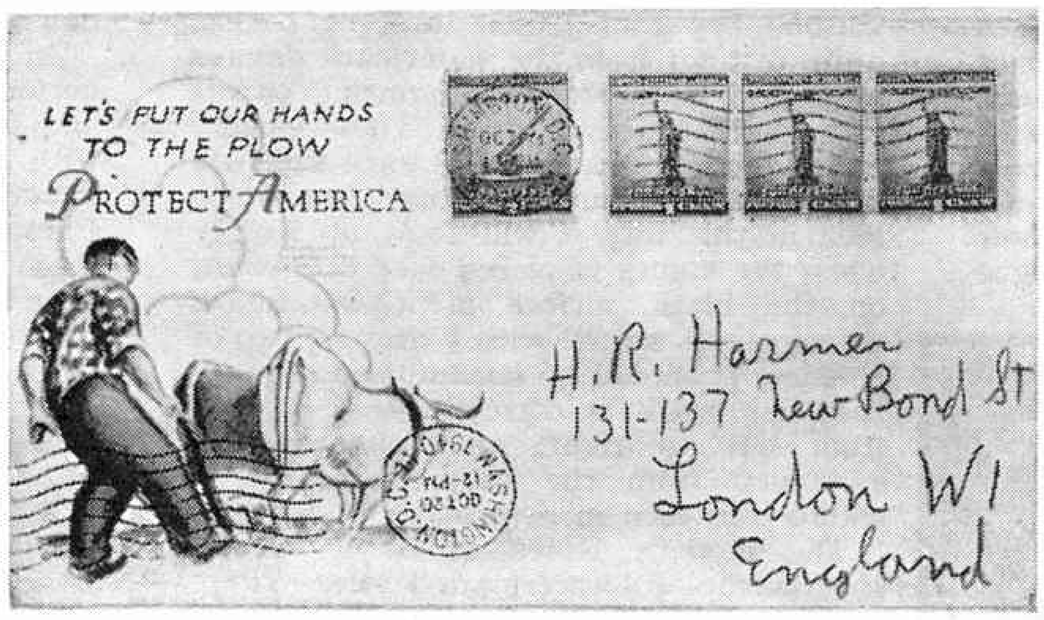
Oceania Provisionals

This month the New Zealand Dependencies, Cook Islands, Niue, and Western Samoa, provide us with an interesting case of an overprinted new issue on stamps that never appeared in their original form. The explanation is that some months ago there was need in these Dependencies for a 1½d. stamp for use on mail to be carried in the "all-up" Empire Air Mail scheme. Supplies were ordered, but before they could be released pressure of war conditions compelled the raising of the postage rate to 3d. Therefore the 1½d. stamps have been issued with the original value blacked out and the new value printed at the sides.

The same design is used for Cook Islands and Niue and, as our illustration of the former shows, it depicts an island scene. The Western Samoa issue, also illustrated on this page, shows a native chief with ceremonial headdress seated outside his hut.

Lundy Red Cross Issue

In our article on page 26 we refer to instances of stamps being both overprinted and surcharged, and as we go to press an interesting new example of this has come to hand from Lundy, the island in the Bristol Channel. The owner of this island maintains his own postal service on it and requires all letters carried by this service to bear one of the island's own stamp issues. A complete series of eight stamps, with values from ½ to 9 puffin, has been issued with an overprint and surcharge for Red Cross Funds. In each case the surcharge is the same as the original face value, as shown in our illustration of the 2 puffin value.



The curious bird illustrated on the stamp is the puffin, from which the Lundy Island currency derives its name. Each of the other stamps in the series bears a puffin design, either identical with our illustration or showing the birds in colonies at their nesting places.

Novelty Pieces

Collectors of stamp novelties will be interested in the unusual postmark from the Faroe Islands illustrated on this page, as it is one of the very rare examples of the actual cancellation incorporating a piece of national propaganda. The inscription in the lower half of the postmark means "Eat Faroes Codfish." Incidentally the stamp and cover are of further interest, the former being a provisional 20 ore on 15 ore, issued by a provisional government.

The Faroes are a Danish possession, now in the temtemporary occupation of British Forces.

A second novelty illustrated on this page is a striking patriotic cover from the United States, bearing stamps of the U.S. defence issue, the 3c. value of which is illustrated here.

"How to Arrange and Write Up a Stamp Collection"

By Stanley Phillips and C. P. Rang (Stanley Gibbons Ltd. 3/6 net)

A hobby such as stamp collecting should be pursued heartily if the highest value and the greatest amount of pleasure are to be obtained from it. It is not sufficient simply to accumulate stamps; they must be arranged and written up so that the collection is attractive to all who see it. "Writing up" may have a formidable sound, but in reality it is good fun to hunt out details of the stamps concerned, or of the people or places associated with them. Once the practice has been begun it will be kept up because of the interest that it adds, and it is not difficult, with the authors of this book as guides. Their work is in its second edition and there have been three large reprints since its first appearance in 1933, when we reviewed it in our Stamp pages. This alone is evidence of the importance and practical value of its contents.

The entire subject is splendidly covered, from the choice of an album and the correct way to use hinges to the arrangement of collections and of special displays and exhibits. How to make each page effective and the writing up of labels are fully dealt with, and there is a special section on lettering in the album, with examples from which every collector will find some style that will meet his needs. New topics dealt with in this Second Edition are the writing up of the now popular black leaf albums and how to make the best use of the new Stanley Gibbons write-up labels.

The book is attractively printed and well illustrated, with many practical examples to support the authors' suggestions and recommendations.

Snails, Past and Present

By Pentland Hick

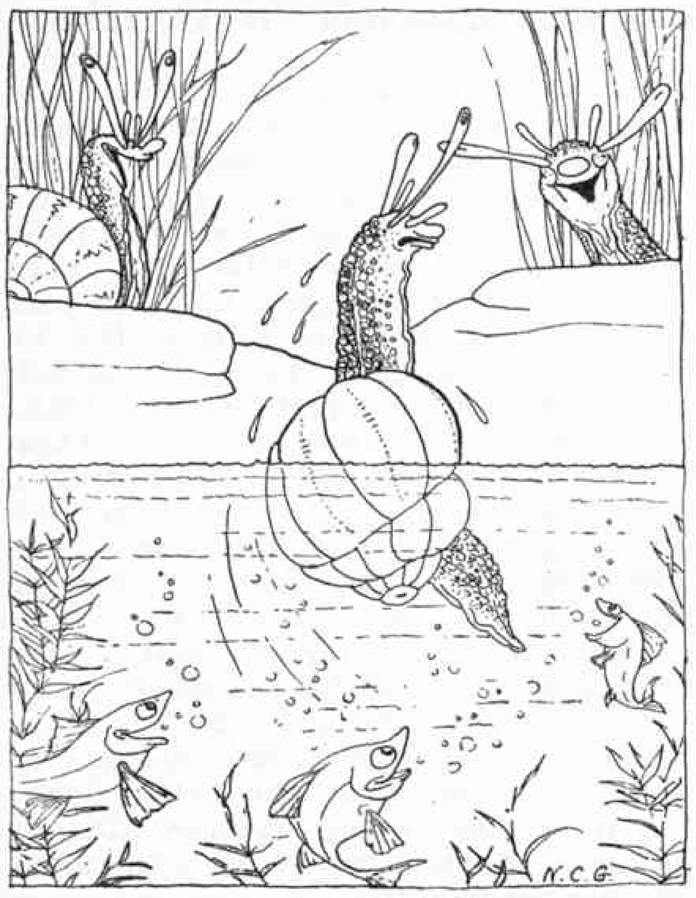
BEFORE history began, all the snails that ever were lived in the sea because they were born there, and if some of them were pink that is none of our business. They were fitted with up-to-date gills and breathed much as fishes do, and they liked plenty of salt with their seaweed.

All the best snails dwelt by the sea-side in little rock pools, and were not at all bright, even for snails. Sometimes the tide would go out when they thought it was coming in, and then they would be left high and dry, though they did not always notice this.

After many thousands of years they began to get quite used to this sort of thing, and by and by some discovered that they were out of the sea altogether, and they were most upset. But as they knew how to breathe air by now, it didn't seem to matter much. In fact they became land snails, and were quite proud of it in a vague sort of way.

They quite forgot how to breathe under water, and if they were pink they were eaten by birds, and if they were not pink they were eaten by birds, and if birds did not eat them plenty of other things did.

In spite of these and other little worries there were soon snails all over the place—even in marshes and swamps, and by ponds and streams. And by and by they began to fall in or get caught by floods, which was rather a bother, because they always had their houses on.



"... climbing out of ponds and things."

Well, after many more thousands of years some of the more brainy snails decided that it really wasn't worth while spending so much of their time climbing out of ponds and things, and so they stayed where they were. It seemed rather a clever thing to do.

But they still have to come up to breathe. And they discovered that some cousins of theirs had come up the rivers from the sea, and they had gills, of course, and were inclined to be superior, which was frightfully annoying.

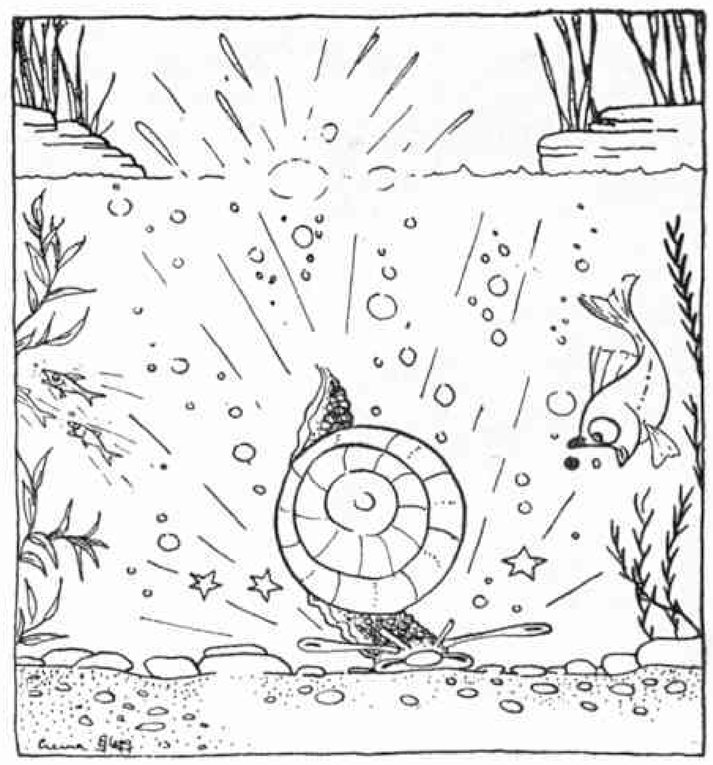
Well, after that little tale of snailish progress, let us see if we can manage to be serious for a while, and glance at some facts.

Life, then, began in sub-tropic seas, and it was a long time later that certain creatures began to leave, or be left by, the water, for gradually increasing periods. These bold animals had still to breathe oxygen dissolved in water—they were, in fact, gilled. An interesting example of this state of affairs being carried to its limit is shown by the wood-louse, which has become completely terrestrial, though still having gills that must be kept moist!

More sensible creatures began to develop lungs alongside their gills—the lung-fish of to-day are in this stage, and every tadpole passes through it. In time this led naturally to life on land, the greatest difficulty—which the frog has yet to face—being to reach a stage in which the young could be born ashore.

Thus were land animals evolved, and in them all trace of water life was lost—except in the developing babies, which have useless gills for a time before they are born. And then, as we have seen in the case of the snails, some land animals began to go back to water.

This process is beginning in the otter, and more developed in the seal, which, however, has to come ashore to breed—the old trouble in reverse. Next we come to the whale and the water snails, which, though completely aquatic, must breathe air to obtain their oxygen. Certain insect larvæ have even managed to grow gills again, but then insects never did have much of a breathing system, and they break all the rules anyway. Other creatures cannot go back on Nature without taking the consequences.



"... began to fall in."

"... always gets the snivels."

This makes it seem all the stranger that any animal should return to sea or river after all the trouble of leaving, but actually it is a good idea, especially in the case of the sea, where there is much more food, a less variable climate, and plenty of water.

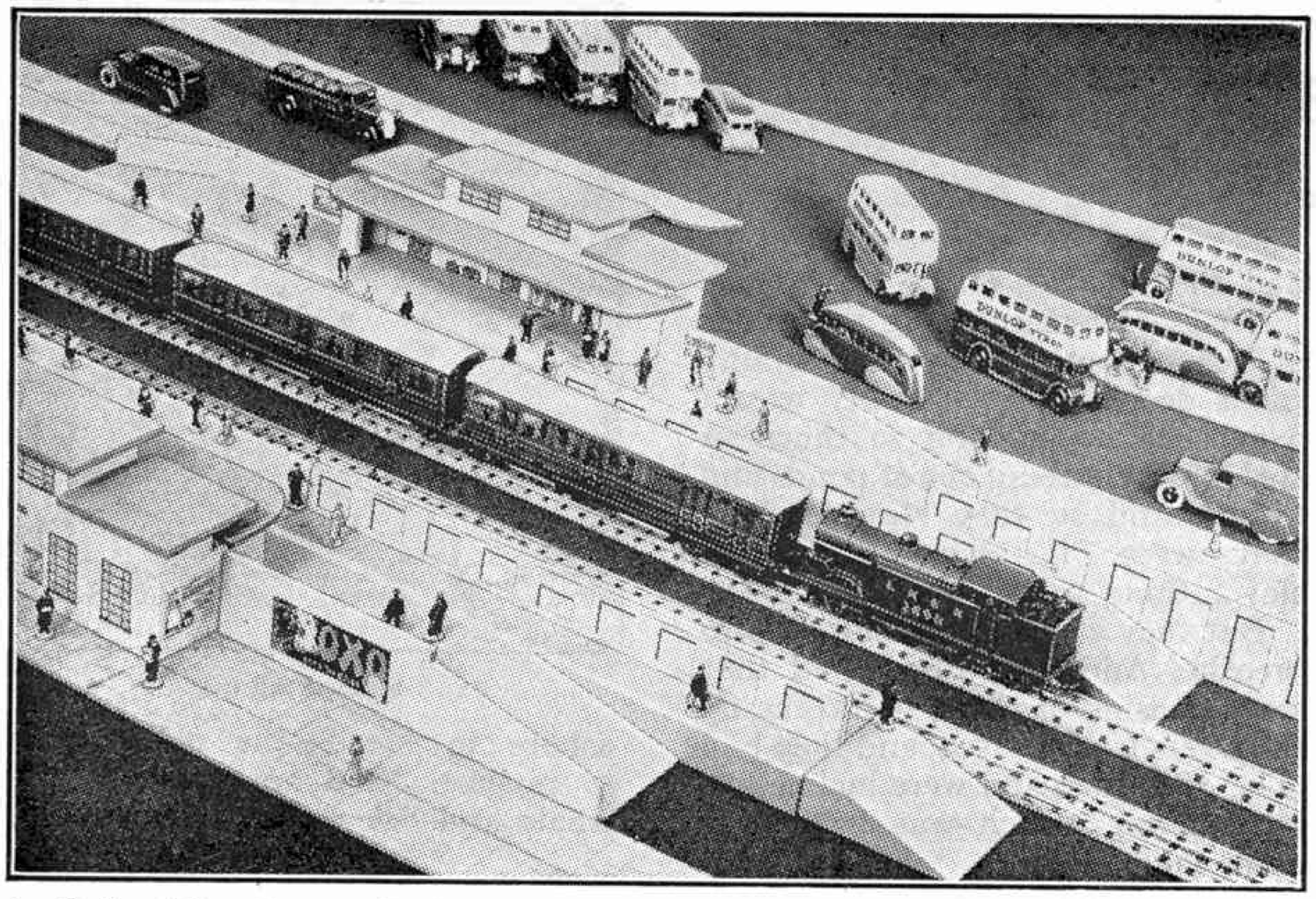
Also one could, if one wished, grow to about 120 tons, as the whale does, if he is that sort of a whale. The water supports a lot of this weight, but it would never do on land.

Why, then, you may ask, did our fishy ancestors ever leave the sea at all? And that, my friend, is some question!

Let us end this story by clearing up a mystery, quoting a verse of the pathetic "*Ballad of the Bad Snail*"

A snail, no matter how it tries,
Always gets the snivels,
And that is why it has its eyes
On telescopic swivels.

This remarkable piece of natural history is graphically illustrated for us by Creina Glegg.



An effective station scene on a Hornby-Dublo railway. Several of the Dinky Toys components mentioned in this article appear in the illustration where they add considerably to its realism.

Dinky Toys and Hornby-Dublo Railways

WE have often spoken of the use of suitable items of the Dinky Toys range in connection with Hornby Trains. So far, however, we have not dealt very fully with their uses on Hornby-Dublo layouts, although the illustrations to the Dublo articles invariably show several "Dinkies," as boys often call them. In this article we deal with a selection of Dinky Toys material that can be used with good effect on Hornby-Dublo systems.

Having laid down our Dublo railway, let us see what we can first add to it to improve the realism. The "street" side of the main line station looks rather bare, so we get a Pavement Set (Dinky Toys No. 46) and arrange realistic paving that greatly improves the look of the station approach. Perhaps we "play about" with various pieces of pavement and find that it can be used to make quite good "concrete block" walls near the Station and perhaps the goods yard and so on. These "walls" are nicely in keeping with the general style of the Hornby-Dublo railway buildings. They can have miniature Posters attached to them too, and these help to brighten the blank effect of the plain walls.

Incidentally the Poster Boards of the Hornby Series can be placed along the lineside and elsewhere on a Dublo railway. Their scale is such that they do not look too big for this purpose.

Another possible use for the Pavement Set components is as paving in goods yards and railway premises generally. Ordinarily the Hornby-Dublo track base gives the effect of a raised ballasted "road bed." The Dinky Toys Pavements have the effect of bringing up the "ground level" nearer to that of the rails, a common feature in yards, sheds and so on. Sometimes certain pieces may have to be cut to fit in where required. For this a sharp knife is the best thing to use, a steel rule being employed as a guide; but be careful not to slice a piece off your finger!

While speaking of the lineside generally we must not overlook Dinky Toys No. 13, the well-known Hall's Distemper advertisement. One of these placed in the fields along the line is most effective. It can be used in conjunction with the Poster Boards previously mentioned to form an imposing advertising "layout."

One of the most striking features of modern travel is the working of road passenger services in connection with the railway trains and this calls for motor buses. There are two different types of buses in the Dinky Toys range that can be employed in this way. For ordinary short-distance "suburban" work, based perhaps on the Main Line Station itself, or the City Station, the Double-Decker Bus (Dinky Toys No. 29c) is ideal. Several of these can form a bus line associated with the railway. Then it is advisable for all the vehicles to be obtained finished in the same colours, adopted as the line's standard. In any case the appearance of several buses alongside the Pavement outside the Station gives the premises a busy and realistic look. As a rule "road services" of this kind can be well run by younger members of the railway "staff," even sisters!

The Streamlined Bus (Dinky Toys No. 29b) makes a good vehicle for longer-distance travel and for such combined "Rail and Road Excursions" as the system may run. These vehicles can be all different in finish, if preferred, and they will then be supposed to belong to several different operators or road concerns.

Coming now to private motor traffic, the various Small Cars (Dinky Toys Set No. 35) are splendid for Dublo layouts. These midgets are just the thing for parking alongside the Pavement outside the Station. In addition to these a topical note will be struck if an Austin Seven (Dinky Toys No. 152c) can be included. This actually belongs to the Royal Tank Corps Set and therefore can have a "sitting down" Gunlayer of the Royal Artillery Set as driver, or else a black-clad Royal Tank Corps Private. Civilian traffic can be carried on with the standard Austin Seven (Dinky Toys No. 35d).

Mail traffic in connection with the railway services can be dealt with by means of the smart Royal Mail Van (Dinky Toys No. 34c). This is a little on the big side perhaps, but can be considered to represent one of the larger vehicles used for mails and parcels rather than the medium-sized vans employed for local collection and delivery services.

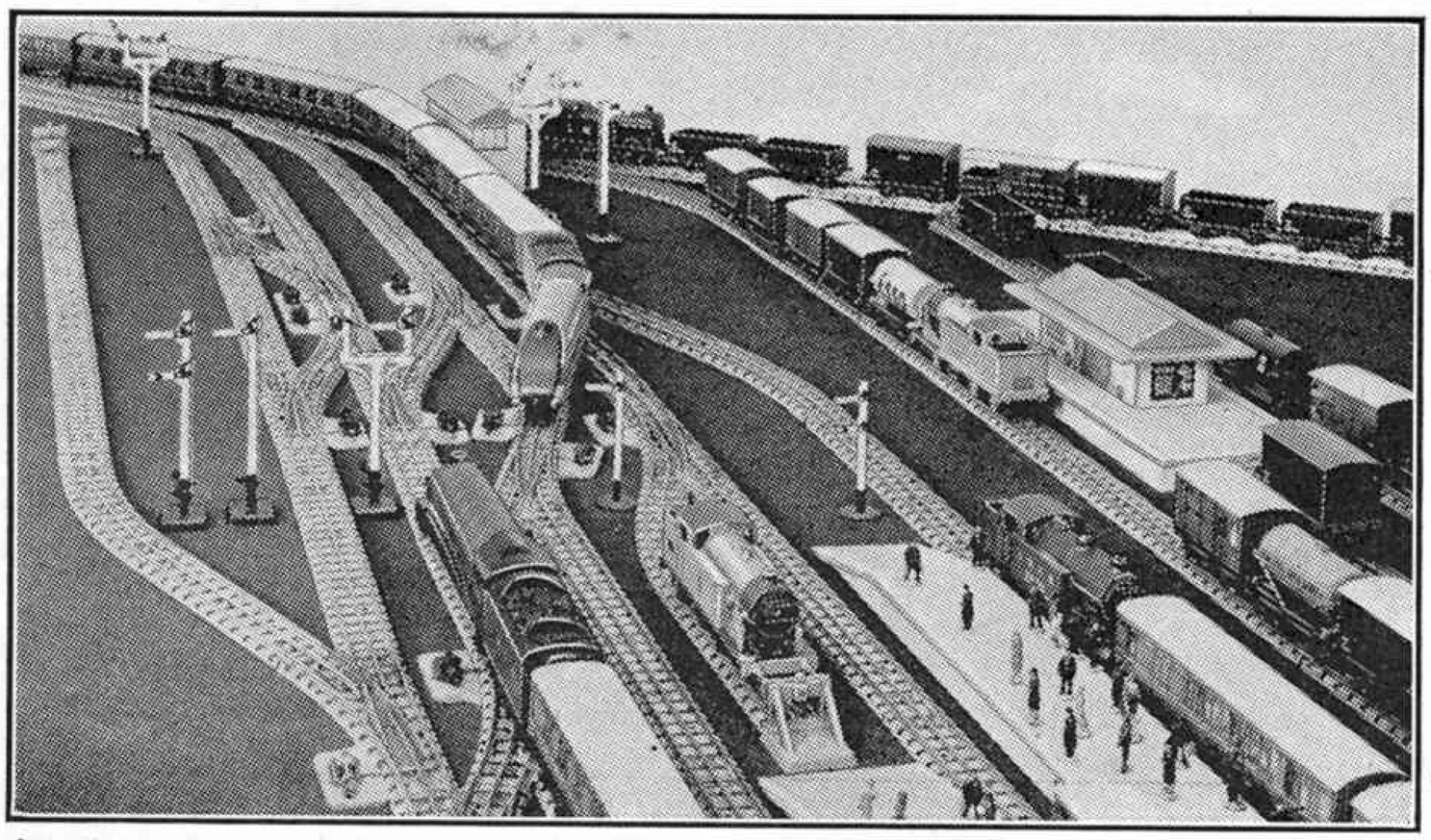
Ordinary delivery services can be run by any of the numerous Delivery Vans of Dinky Toys Set No. 28/1, 28/2 and 28/3. Here a splendid choice is afforded, and the various colours in which the different Vans are used will add a pleasing variety to the general scene. These Vans all represent "private owners" as opposed to "Company's vehicles"; for the latter, however, it only requires a little skill in painting to finish a Van or two in the livery of the "Railway Company."

For heavier work, more especially in connection with the Goods Department, there is the Motor Truck No. 22c, a vehicle of pleasing modern appearance. This can be used as a haulier's wagon in general use on the road or as a "Company's vehicle." For coal traffic and for any of the materials normally carried in open wagons on the railway it is exactly what is required.

A specially attractive motor vehicle is the Market Gardener's Van (Dinky Toys No. 25f). This has a body that somewhat resembles a large crate, and so it can be used for such things as bulky parcels, vegetable traffic, or as a lifestock float. The latter are widely used by the railways to-day, and on a Hornby-Dublo system the Cattle Truck D1 gives sufficient reason for the employment of a road vehicle for livestock traffic.

All our Motor Vehicles will require petrol, and for the haulage of this fuel there is the bulky Petrol Tank Wagon (Dinky Toys No. 25d). This can be placed anywhere "on the road." It looks specially effective if at or near the Garage (Dinky Toys No. 45), which is a useful little building, ideal for stabling motor vehicles and for representing a workshop or shed on a layout. However, having reached the Garage with our vehicles, we will finish with road transport for the time being.

It is frequently possible to make good use of the Dinky Toys Signals (No. 15) on a Dublo system. They are slightly smaller than the standard Hornby-Dublo Signals of corresponding type, and so they can be used when a small signal, such as is sometimes found actually on the platform at a station, is required. Used in this way they add to the variety of the scene and so improve the realistic effect. Another purpose for which the single-arm home type of Signal (No. 15a) is specially useful is as a shunting signal controlling movements in sidings, yards, and so on. Here its smaller size than the actual Dublo Signal D1 will be in keeping with the difference that may be seen in actual practice between the less important signals and those used on main lines.



A well-signalled station on a Hornby-Dublo layout. Note the use of Dinky Toys Signals for platform and shunting purposes.

How to Use Hornby-Dublo Signals

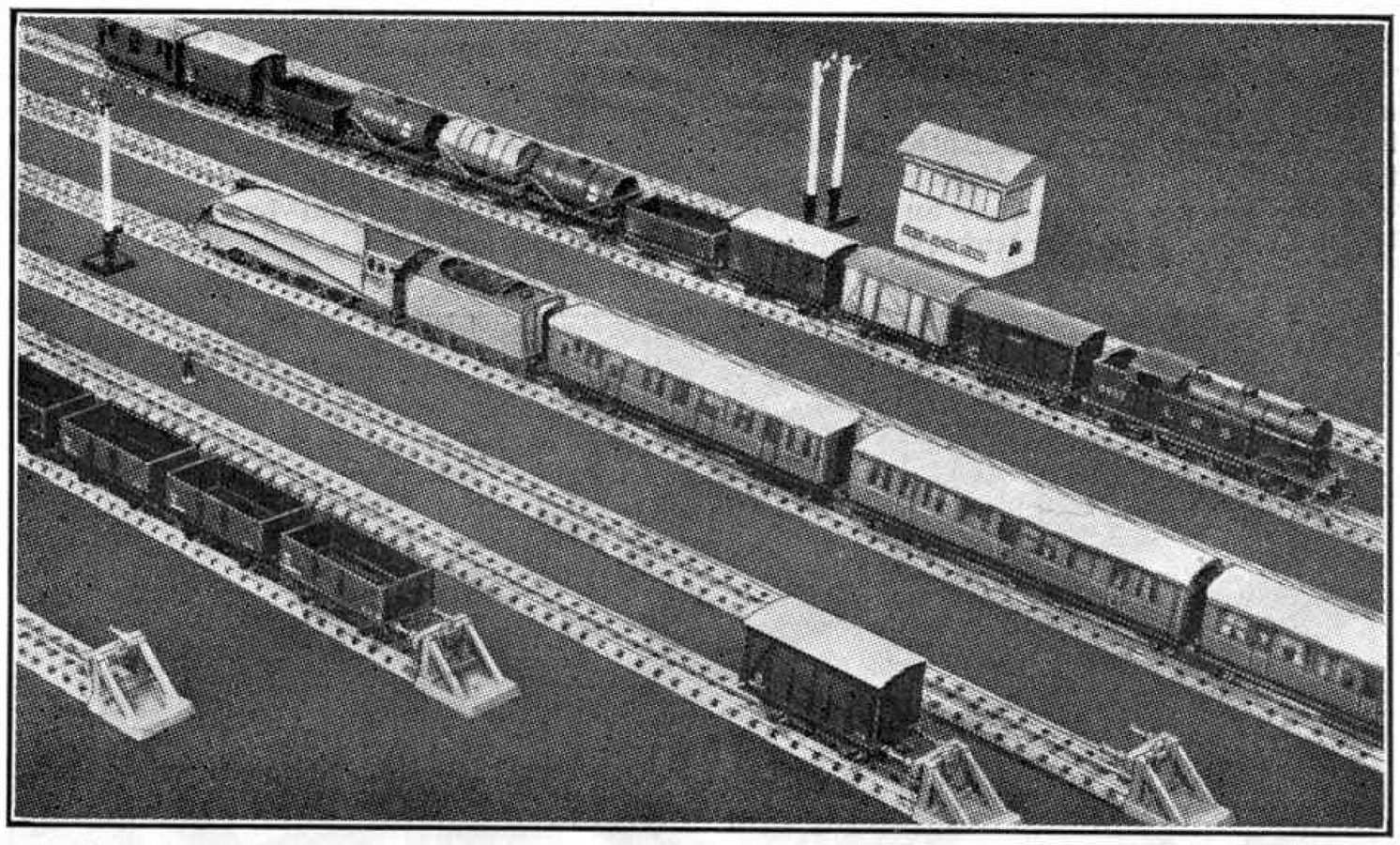
AMONG the earliest accessories to be added to any railway, whatever its scale, are signals, and it is probably safe to say that no other items alone add so much to the attractive appearance of a layout as they do. Much of their spectacular value however is lost if they are used incorrectly, or without due thought being given to their real purpose.

All the Hornby-Dublo Signals are of the standard modern upper-quadrant semaphore pattern; that is to say their semaphores, or arms, move upward to "line clear" from the horizontal "danger" position. As in actual practice, so on miniature railways it is necessary to have several different patterns of signals. Hornby-Dublo Signals are of three main types, and with these, either singly or in combination, it is possible to signal correctly almost any track arrangement that can be made up.

The simplest type of signal is the single arm Signal D1. This is available with arms of either the "home" or "distant" pattern. Let us see exactly what these are used for, and what is the difference between them. The arm or semaphore of the home type of signal is red in colour on the side that faces the driver, and its outer end is square. The distant signal is the one that we have all seen, with a yellow arm and a V-shaped notch at its outer end. Each type therefore is easily distinguishable from the other by its colour and form in the daytime. At night the home type when in the "danger" position shows a red light, but the distant pattern in the same position shows an orange light. When at "line clear" both types show a green light.

The home signal when its arm is in the "danger" position is a positive "stop" signal that must on no account be passed by a driver. The distant signal, however, which is placed in advance of the home signal, can be passed by a train when its arm is horizontal. Its indication then is "caution," for the distant signal gives advance information to the driver of the state of the home signal ahead, and this gives him time to slow down and stop at the home signal should this be at "danger" when he reaches it. When the distant signal shows "line clear" the driver knows that he can go ahead in perfect confidence that the "home" signal also will show this indication when he comes to it.

The home type of signal is therefore used for starting trains from the station platform, for admitting them to stations, for controlling the entrance and exit of trains at loops and sidings, and for controlling the passage of trains at junctions and from the supervision of one signalman to another along the line. The true home signal is the one governing the entrance to the next section; the others have the same pattern of semaphore, but their different names indicate their exact purpose, such as the "starting" signal at a station and so on.



A familiar scene; Hornby-Dublo passenger and goods trains. The two Signals placed together control movements on parallel tracks.

An interesting combination of the two types of semaphore on the same post is seen in the Double-Arm "Home" and "Distant" Signal D2. This is used in actual practice where the distance between successive home signals is so short that it would not be possible to place a separate distant signal in the normal position. The distant arm applying to the second home signal therefore is placed on the same post as the first home arm. This home arm may show "line clear" and the distant arm may show "Caution," or both may be at "line clear." The distant however is never at "line clear" when the home is at danger; in practice they are controlled from different cabins and special mechanism prevents their being used incorrectly. On a Hornby-Dublo railway, as on most miniature systems, distances are short so that the double-arm Signal is a most useful one.

The "Signal Engineer" of a Hornby-Dublo railway should give special attention to the placing of his Signals. They should never be placed where they cannot easily be seen by the imaginary driver of a locomotive on the track. It is quite a good scheme to take a "sight" along the line when the exact position of Signals is being determined; frequently the smallest movement to one side or another, or the slightest twist is sufficient to make all the difference to the sighting of a particular Signal. Ordinary signals are placed to the left hand side of the tracks to which they apply, but for better sighting they are sometimes found on the right hand side.

Movements over points approached in the facing direction are governed by junction signals. The Hornby-Dublo Junction Signal has a similar style of construction to the Signals so far dealt with. The main post however supports a cross member, at the outer ends of which there are short posts, or "dolls" as they are often called; on these posts semaphores are mounted in the ordinary way. The Junction Signal is made with both home and distant semaphores. The home type is used to protect the actual points or turnout; for preference it should not be placed immediately by the points, but slightly in advance of them. The distant type of Junction Signal allows an advance indication of the approach of the actual junction to be given to the driver.

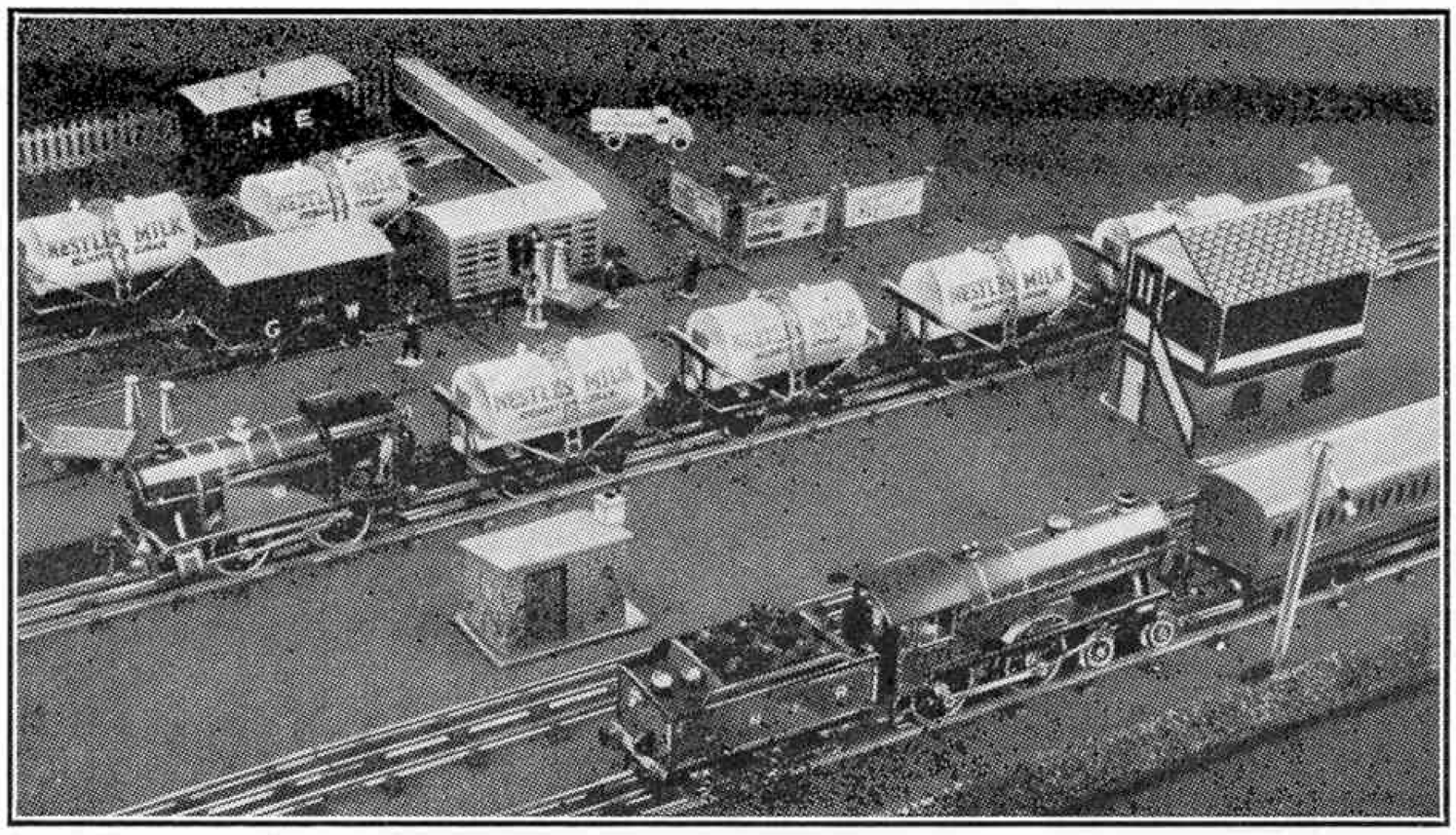
Hornby-Dublo Signals work so perfectly that they are most fascinating to operate, quite apart from their neat and realistic appearance. The movement is positive and the arms are held at "line clear" or "danger" until they are altered again, without any interference from the vibration of passing trains.

Hornby Goods Rolling Stock (1)

THE fastest and most important goods trains, or "freight" trains as they are sometimes called, are those that convey food supplies from point to point. It is great fun to arrange the running of trains of this kind on a miniature railway system; the trains themselves are much more interesting and seem far more important when their purpose is understood, and when they are made up of vehicles of the correct types.

Take for instance meat trains, or at all events the vans used for meat traffic. This is usually conveyed "in bulk," and meat trains may carry a frozen cargo, a load of fresh meat, or possibly some of both. On a Hornby railway it is possible to provide suitable vans for either purpose. Frozen meat requires to be kept chilled while on a journey from the port to the market, and it is for this purpose that refrigerator vans are used. These are specially constructed so that their loads are kept cold by means of ice bunkers built into the vans, and they are usually, but not always, painted white.

Refrigerator Vans in the Hornby Series are of two kinds, the No. 1 type with sliding doors and enamelled finish, and the No. 0 without actual doors, but with detailed tinprinted finish. The No. 1 type can thus be made to carry actual loads, although the representation in miniature of the carcases conveyed in real practice is something of a problem! We do know however of some Hornby railway owners who have carved miniature carcases from wood and painted them, but Plasticine or modelling wax will appeal more to those who are not skilled in wood carving. The No. 1 type have a smart and suitably "cool" appearance in their white paint, although the S.R. vehicle is not white, but that peculiar pinkish-buff shade favoured by that line for refrigerator vehicles. The No. 0 type have an attractive look too, as most of the planking, strapping



A local "dock" for milk traffic with Hornby Milk Vans alongside the platform. The Tank Locomotive is shunting a train of Hornby Milk Tank Wagons.

and lettering details of the real thing are reproduced clearly. Among the details that will appeal to many boys are the ladders printed on the ends of the N.E. and S.R. No. 0 Refrigerator Vans. On the real vans these enable the railway staff to climb to the roof for the purpose of filling the bunkers with ice.

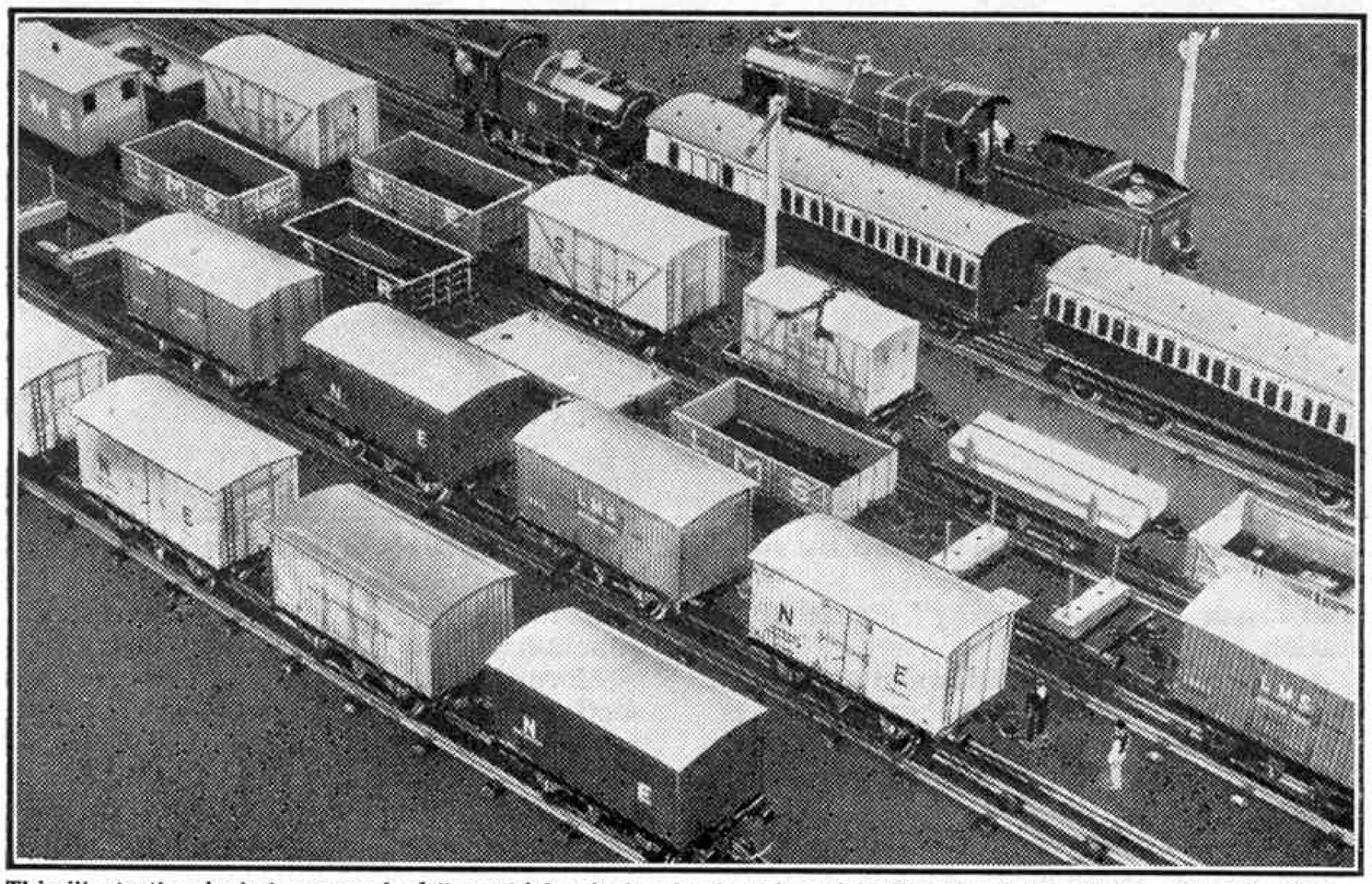
The range of Meat Vans as used for ordinary fresh meat traffic is not so extensive, but the L.M.S., G.W.R. and L.N.E.R. vehicles are represented. These are similar in style to the No. 0 Refrigerators in being tinprinted, but they are not distinguished by special colouring. Thus the L.M.S. and G.W.R. Vans are grey, and the L.N.E.R. one is finished in the characteristic red-brown used for goods vehicles fitted with automatic brakes and adapted for running in express goods trains or even attached to a passenger train. Ventilation is the important feature of a meat van, and on each of the Hornby vehicles the details of the vents seen on the real vans are well reproduced. The L.N.E.R. Meat Van has louvred or "venetian blind" type vents along the sides; the L.M.S. Van has them at the ends; and on the G.W.R. Meat Van the special construction of the upper parts of each end to represent ventilating "bonnets" is a feature.

A point of interest on the G.W.R. Meat Van is that the word "Mica" appears prominently on each side, while similarly the G.W.R. No. 0 Refrigerator Van bears the equally mysterious title "Mica B." These are the code designations used on the G.W.R. to distinguish the types.

Milk traffic is interesting in that it is conveyed by two quite different types of vehicles. There is the ordinary type of milk van in which the load is carried in churns, and there is the modern milk tank. For local traffic or for small loads the milk van is still largely used; but for large consignments conveyed over long distances the milk tank wagon is favoured. In the Hornby Series each of these types of vehicles is represented by effective models. There is the No. 1 Milk Traffic Van, which has correct openings in its sides for the ventilation of the supposed contents of the four miniature milk cans or churns with which the vehicle is provided. Sliding doors allow these cans to be loaded and unloaded as required. The regular picking up and setting down of the cans at stations along the railway is a realistic and quite entertaining practice. The Milk Van can be conveyed by a local passenger train, or a train of Milk Vans can be assembled.

To supplement the No. 1 Milk Van, or where actual loads are not required, the Hornby No. 0 Milk Van is ideal. It is not fitted with doors, but the detail of the bodywork is all reproduced by the tinprinting process. The van represents the open-boarded G.W.R. "*Siphon*" type of van, "*Siphon*" being the general code name for milk vans on that system. The model is coloured brown and lettered in yellow and is thus specially effective.

The Milk Tank Wagon is a splendid model. It follows standard tank wagon practice, but the tank itself is painted white and in addition there are several fittings peculiar to milk tanks. A train of them has a very fine "clean" look about it and would represent perfectly any of the more important milk trains that run on real systems. Bulk consignments of milk are run in tank wagons from dairy farming areas to town depots where bottling and distribution are carried out. A suitable depot, or at least a milk "dock," can be provided on miniature systems where milk traffic is a feature.



This illustration includes several of the vehicles dealt with in this article. The tinprinted details of the No. 0 Vans give them a realistic appearance.

H.R.C. Branch Layout at Blackfriars School

ON several occasions in these pages we have described the layouts operated by various Branches of the Hornby Railway Company. It is always interesting to read of the development of such systems and this month we deal with the railway of the Blackfriars School H.R.C. Branch No. 388 at Laxton, Kettering, Northants. The growth of the railway and the success attained by the Branch have been due largely to the keenness and energy of the Headmaster, the Rev. D. J. Sire, President of the Branch, to whom we are indebted for the details and photograph reproduced on this page. Mr. Sire has been a railway and model railway enthusiast for many years so that the H.R.C. members at Blackfriars School are fortunate in having a keen and experienced President.

Although the Blackfriars School Branch was incorporated in February last year, model railway activities had been in progress for several years previously. Actually operations were originally commenced about 1936 with some Gauge 1 material. This was old but still serviceable, and was very useful in giving experience in layout planning, train running and so on to the budding model railwaymen of that time. After a while, however, the advantages of Gauge 0 in regard to space and the range of equipment available led to the abandonment of Gauge 1 and the adoption of Gauge 0.

At first the system was laid down on the floor of an attic or loft over a carpenter's shop at the School. Tinplate rails were used, but the floor did not prove an ideal site and for greater convenience in operation and to avoid damage to the system it was decided to arrange the railway on a raised foundation. This was done and in relaying the line special attention was given to obtaining smooth running in addition to realistic effects. The final stage of track development was reached when the tinplate rails were replaced by miniature permanent way consisting of steel track.

The space occupied by the system is some 30 ft. long by 12 ft. wide, and in this generous area a double track main line oval in form is arranged. There are three stations on the main line, one being situated at one end of the oval and the other two one on each of the long sides of the layout. From the outer track a branch line is thrown off at one corner to serve a terminal station. In addition a diagonal track connects opposite sides of the inner track and adds to the operating possibilities of the system. From this diagonal track work is at present in progress on an extension serving an additional station. It is planned to carry the extension up a rising gradient and to run it over one end of the main track by means of an overbridge. Another scheme, that is only in the proposal stage as yet, is to extend a dead-end road connected with the diagonal track until it makes a third road almost three-quarters of the way round the main line. At the moment this dead end track terminates as a bay line at the back of the inner platform at one of the main line stations.

An interesting point in connection with the track is that the baseboard is not arranged to be level all the way round, but gradients are incorporated just as on a real railway. This gives the engines—all clockwork, by the way, except one which is steam driven—some hard work to do and adds considerably to the entertainment of train operations. Naturally the space available is a great help in arranging a feature of this kind; in anything like a restricted space where the layout is largely curves, gradients are not to be recommended.

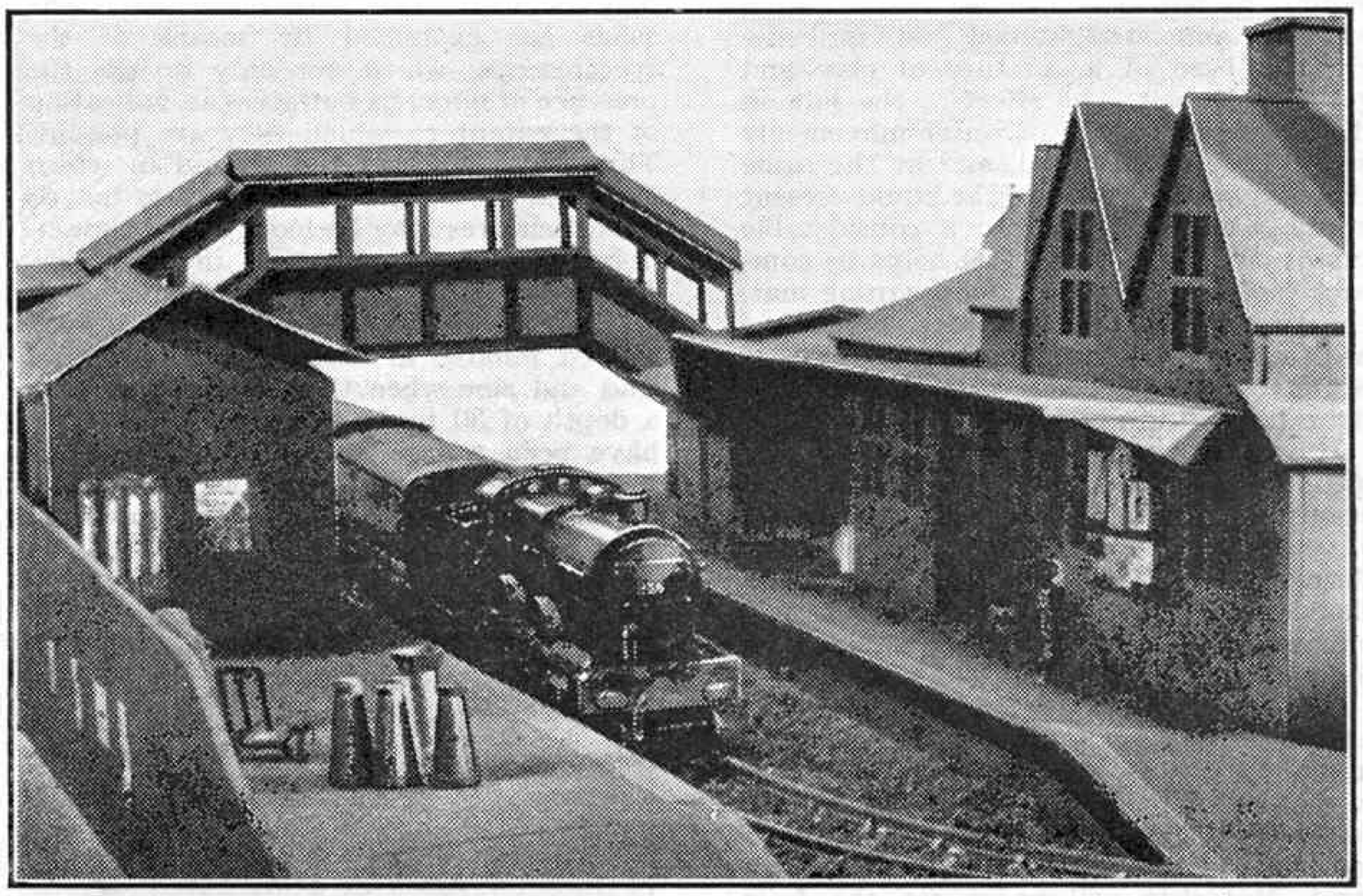
These gradients have led to some interesting episodes being arranged in the course of working. At the moment, as a great deal of constructional work is still going on, regularly-organised services are not yet the rule. However on one occasion a heavy passenger train in charge of a Hornby L.M.S. No. 2 Special "Standard Compound" had to be started on a rising gradient; to assist the train engine a banking engine in the shape of a Hornby No. 1 Tank was brought up in the rear and the two engines together got the train under way successfully. The banking engine was not coupled to the train but was dropped off at the top of the gradient in exactly the same way as is often seen in actual practice.

Attention is now being paid to the erection of buildings and the arrangement of lineside effects. Actually the station buildings that appear in the illustration on this page are "under construction" and work is in progress elsewhere. Roads are being made on which Dinky Toys Traffic is increasing. Houses, shops, churches and in fact whole towns are springing up in several places. These buildings are largely carried out in cardboard coloured to represent different kinds of building material and the results are a credit to the Branch members.

Owing to the situation of the Branch near the main line of the L.M.S. (Midland Division) it is natural perhaps that the practice of this section represents the aim of the Branch. This has had its effect in the selection of the locomotive stock. Actually a certain amount of "weeding out" has been necessary in order to represent mainly the standard L.M.S. classes of locomotives. This process has been a gradual one. Among the miscellaneous types that have been "withdrawn from service" were an "Experiment" 4–6–0 of former L.N.W.R. design, also a 4–4–2 "Precursor" tank of the same railway, neither of which were suitable for a "Midland" line. Naturally the Standard Compound class is represented, there being actually three models of this type. There is another Hornby No. 2 Special that has been rebuilt to represent another Derby product, the Class "2P" 4–4–0. Actually this model is the one the rebuilding of which was described, with illustrations, in the *"M.M."* some years ago. As in actual practice a favourite method of operation with very heavy trains is to use a Compound as the train engine and the "2P" 4–4–0 as the pilot engine. Other engines include a Hornby No. 2 Special Tank and there is a steam driven 4–4–0; also a clockwork 0–6–0 goods engine that closely resembles the Class 4 Standard Freight type so common on the Midland and on other sections of the L.M.S.

Rolling stock in use includes Hornby No. 2 Corridor Coaches which make up into a fine-looking train. There are various miscellaneous vehicles for passenger traffic and, true to "Midland" traditions there were once several bogie vehicles with "clerestory" roofs but these have now been replaced. Goods rolling stock numbers about 20 vehicles, all of the Hornby Series, so that quite a variety of traffic can be dealt with.

Signalling has not yet had much attention paid to it, but it is hoped to develop an effective system when the constructional work now in progress has finished. Even so, visitors to the line as it is at present are impressed by the extent of the system and with the way in which realistic conditions have been reproduced.



One of the stations on the layout of Blackfriars School H.R.C. Branch No. 388 described on this page. The train entering the platform is hauled by a Hornby No. 2 Special "Standard Compound" Locomotive.

Scene at an Army School of Artillery. A gunner catches the ramrod thrown to him after firing.

Fighting Frost with Salt

Frost is the greatest enemy of roads in Canada, and common salt is now being used there to overcome its ravages. A great road from Montreal to the Laurentian Mountains region in Quebec that is being widened and straightened out is being given a base of a mixture of clay and gravel with salt. The effect of the salt on the clay is to get rid of water movements in the base of the road, and at the same time the freezing point of the liquid present in the base is lowered to a considerable extent. In addition the salt helps to compact the mixture into a dense strong mat. Construction of the highway, which has been fittingly described as Canada's "Great North Road," is being pushed ahead at the rate of a mile a day.

It is interesting to realise that in this new plan the road engineer is following the example of the potters of Egypt thousands of years ago. They used salt to control the shrinking of the clay they used, the chemical binding the clay together and preventing the pottery from cracking as the clay dried out.

The new method was only brought into use on a large scale after prolonged tests in the laboratory and on special stretches of road. Experience has shown that a base built up in this manner on well drained foundations gives a strong and durable road. Motorists will never see the frost resisting base, which is hidden by the asphalt covering, but its presence beneath the surface ensures safe and comfortable riding for them at all times of the year.

Prospecting in the New Style

The old style prospector spent weary days tramping over undeveloped country, digging holes and making laborious trials in order to find valuable minerals. He has been followed by men who create miniature earthquakes in the ground by exploding dynamite in it and then track the sound waves, and by others who pass electric currents through it or measure its magnetic properties. Now the work is done very easily by simply pulling leaves off trees and analysing them. Three men can collect the required material from a square mile in a single day, and the analyses can be made at the rate of 700 a day.

Examining leaves to discover minerals is not quite so absurd as it may seem at first glance, for living trees and plants take up mineral salts from the ground and these are accumulated in certain parts of them, notably in the leaves. Live or dead growths may be used. They are burned and the ashes are examined by means of the spectroscope, which not only reveals the presence of minerals but gives an indication of the extent to which they are present. This shows whether the ground in which the trees grow is so rich in certain metals that their ores may be looked for below it.

In practice prospecting in this new style has been found very successful where ore deposits are not deep, and it has even proved reliable in finding such metals as lead and zinc when these were covered to a depth of 30 to 50 ft. Other metals that have been traced in this manner include nickel, silver, copper, and gold, in addition to rarer elements such as tungsten and vanadium.

A Steam *"Flying Scotsman"* Model

Our advertisers Bassett-Lowke Ltd., Northampton, have introduced a new steam model locomotive for the advanced constructor, who from the parts provided can build it with the aid of only a few simple workshop tools. The model is a ½ in. scale reproduction, for 2½ in. gauge track, of the famous L.N.E.R. Locomotive *"Flying Scotsman,"* and all working details of the original are followed, as well as the characteristics of external design.

A full set of castings and finished parts for the model are available, together with full size working drawings. The actual construction is explained and illustrated in a booklet, reprinted from *"Practical Mechanics,"* that is issued by Bassett-Lowke, Northampton, at 8d. post free, or 6d. if purchased at a Bassett-Lowke Ltd. establishment in London, Manchester or Northampton.

COMPETITION RESULTS

HOME

"October Feature Voting Contest."—1. D. Stevens, Dagenham; 2. A. M. Fleming, Milngavie; 3. R. Storm, Hexham; 4. D. F. T. Arnold, Combe Florey.

"November Crossword Puzzle Contest."—1. W. Nagington (Liverpool 6); 2. R. A. Wood (Middlesbrough); 3. J. H. White (Keighley); 4. A. Elvey (London S.E.9).

OVERSEAS

"July Doublets Contest."—1. D. Dundee, Regina, Canada; 2. D. Murison, San Andres, Argentina; 3. A. C. Crawshaw, Jamaica, B.W.I.; 4. V. Garcia, Trinidad, B.W.I.

"July Photographic Contest."—1st Prizes: Section A, J. R. Hurst, Olivos, Argentina; Section B, I. Rowlands, Durban, South Africa. 2nd Prizes: Section A, L. S. Osborne, Victoria, Australia; Section B, W. H. Eastman, Sea Point, South Africa.

H.R.C. COMPETITION RESULTS

HOME

"Locomotive Pie Contest."—1. E. S. Hill, Sheffield 11. 2. R. J. Tredwell, Wolverhampton. 3. L/Cpl. H. G. Johnston, Chepstow, Mon. Consolation Prizes of 2/6: D. Blackburn, Minehead; A. M. Tompsett, Lewes; K. Oldham, Hyde, Cheshire; K. Weston, London S.W.17; R. P. Walford, Lustleigh.

OVERSEAS

August "Engine Name Building Contest."—Senior Section—1st: F. J. Harrison, Bulawayo, S.A.; 2nd: D. King, Montreal, Canada; 3rd: A. Jenkins, Melbourne, Australia. Junior Section—1st: P. Kelly, Wellington, N.Z.; 2nd: T. Davies, Johannesburg, S.A.; 3rd: J. White, Toronto, Canada.

August "H.R.C. Names Contest."—1st: G. Myburgh, Claremont, S.A.; 2nd: D. Woods, Auckland, N.Z.; 3rd: P. Cook, Sydney, Australia.

Ready to fire. The gun crew standing by. A heavy gun in action at an Army School of Artillery.

COMPETITIONS! OPEN TO ALL READERS

Which Were the Most Popular Covers in 1940?

This month we give readers an opportunity of taking part in an annual voting contest that has always been a great favourite. Above we illustrate the covers of the 12 issues of the "*M.M.*" for 1940, the upper row showing in order those appearing from January to June, and the lower one those from July to December. The reproductions do not give any idea of the brilliancy of the colour of the originals, but new readers will find them of great assistance and it will be useful to readers of longer standing to have them set out for easy comparison. What each competitor is asked to do is to tell us on a postcard:

A. The 1940 cover that he likes best of all;

B. What he thinks will be the order of popularity of the covers as this will be decided by the votes of competitors.

The lists submitted must cover the whole year, including each of the 12 issues. Each cover must be referred to by the name of the month in which it appeared and its number in the volume. It is not essential that the competitor should place his own favourite at the head of the list B, and indeed he should not do this unless he believes that it will be the popular choice of the majority of competitors.

Competitors must write their names and addresses on their entries, which should be addressed to "1940 *Cover Voting Competition*, Meccano Magazine, Binns Road, Liverpool 13."

There will be two sections, one for Home readers, the closing date for which will be 31st January, and the other for Overseas readers, closing date 30th April. In each section there will be prizes of products of Meccano Ltd., to the value of 21/–, 15/–, 10/6 and 5/– respectively for the four competitors whose lists are nearest the final result, and in addition there will be a number of consolation prizes.

HORNBY RAILWAY CONTESTS

Can You Find These Missing Railway Words?

For our chief railway competition this month we invite all readers to complete the railway story given below. It will be seen that certain words have been omitted. Their places are taken by dashes, each dash representing a word, and competitors are asked simply to put the correct words into the spaces.

"The — are worked by Walschaerts valve gear, and the reversing rod is carried on the left-hand side of the boiler, but is mostly hidden by the wheel — . The coupled wheels are each 6 ft. 9 ins. in — , and the total — of the engine and — is 54 ft., so that it will just go on to a 60 ft. — , the largest in general use in this country at present. There is a standard L.M.S. tender, carried on six — , and the total weight of the — and — in — — is practically 120 tons. Of this, 60 tons rests on the — — , giving what is called the ' — weight.'

"The — is a modification of the ordinary steam horizontal engine, in which the single — with large — is replaced by one or more short shafts or — , carrying — at each end. By means of — rods the sliding of the — causes the cranks, and therefore the — , to rotate. To enable the locomotive to start from rest, and move in either direction, there must be at least two — . The cylinders may be — or — the frames. Cylinders are fitted with drain — operated from the — , so that when starting up after standing for some time the — may be opened and — blown out."

The 30 missing words are of railway significance and should be known to every "*M.M.*" reader, and all that is necessary is to write them out in order on a postcard. The name and address of the competitor must then be added. Home section entries must be sent to "*Missing Words Contest*, Meccano Magazine, Binns Road, Liverpool 13" on or before 31st January. In the Overseas section the closing date is 30th April. There will be three prizes in each section, consisting of products of Meccano Ltd. to the value of 21/–, 15/– and 10/6 respectively, in addition to consolation prizes. If there is a tie for any of the prizes, this will be awarded to the competitor whose entry shows the greatest novelty or neatness.

This contest should appeal to every reader, for it is open to all and there are no special rules or restrictions. All that is wanted in order to arrive at the solution is a pencil and a piece of paper, and only the list of missing words is to be written out on the post card to be submitted, not the entire story.

A Railway Voting Contest

Here is a contest open to all readers of the "*M.M.*", and in which everyone can join. The list that follows shows a typical selection of 10 recent railway competitions, and we ask readers to tell us which they like best and to place all 10 in what they think will be the order of popularity.

1. **Drawing Errors Contests.**
2. **Locomotive Designing Contests.**
3. **Drawing Contests.**
4. **Word Building Contests.**
5. **Route Finding Contests.**
6. **Layout Planning Contests.**
7. **Railway Questions Contests.**
8. **Mystery Railway Photograph Contests.**
9. **Locomotive Silhouettes Contests.**
10. **Engine and Train Names Contests.**

Just make a list on a postcard of the numbers of the contests, and add your name and address before sending the card to "*Railway Voting Contest*, Meccano Magazine, Binns Road, Liverpool 13."

There will be the usual two sections, for Home and Overseas readers respectively, and in each there will be three prizes of products of Meccano Ltd. to the value of 21/–, 15/– and 10/6. The closing dates are 31st January and 30th April.

FIRESIDE FUN

FORLORN HOPE!

A Parliamentary candidate was canvassing votes. He explained his opinions to one housewife and ended by saying: "Well, madam, those are my views, and I am hoping this constituency will return me."

"Some hopes you've got, mister," she said, sadly. "I can tell you the people 'ere never return anything."

* * * *

A Scottish coal merchant was always being worried by his friends to supply them with coal at a lower rate than his other customers. So, because he was a friend of theirs, he reduced the price by two shillings; and, as they were friends of his, he knocked two cwt. off the ton.

* * * *

Cuthbert: "Father, I want to be a musician."

Father: "All right, but don't let me catch you playing outside this house."

* * * *

With a grinding of brakes the officer pulled up his motor-car and shouted to a little boy playing in a field: "I say, sonny, have you seen an aeroplane come down anywhere near here?"

"No sir!" replied the boy, trying to hide his catapult, "I've only been shooting at a bottle."

* * * *

"Think of something very nice," said the dentist as he started to drill, then you won't notice the pain."

The patient did not move.

"Splendid! What did you think about?"

"Well, I thought my boss was here in my place."

* * * *

FIRST TIME SUFFICIENT

Nervous Old Lady: "Do these big ships sink very often, sailor?"

Breezy A.B.: "Only once, lady; only once."

* * * *

"What are you doing now?"

"I have found a new circus turn—the friendship of a lion and a goat."

"But aren't there quarrels between them?"

"Oh, yes, they have their little quarrels, but then we buy a new goat."

* * * *

"Do you say your prayers at night, little boy?"

"Yes, sir."

"And do you always say them in the morning, too?"

"No, sir. I ain't scared in the daytime."

* * * *

Yokel: "I'll get the sack for upsetting this hay."

Friend: "Cheer up, Bert, the farmer'll never find out."

Yokel: "Won't he? He's underneath the hay."

* * * *

"You cough more easily this morning," said the doctor, as he sat down by the patient's bedside.

"I should," said the sick man, dryly: "I practised all night."

* * * *

Father: "Now, be careful with that money I gave you son. Remember the saying, 'A fool and his money are soon parted'."

Son: "Yes, Dad, but I want to thank you for parting with it, just the same."

MRS. MALAPROP AGAIN

Mrs. Malaprop was speaking to her neighbour over the fence. "What do you think!" she said. "They've promoted our Joe for 'ittin' Corporal. They've made 'im a Court Martial."

* * * *

Stationmaster: "That pig cannot go in the carriage with you. It must have a special compartment."

Rustic: "Thank you kindly, sir, but there is no need for all that ceremony about my poor pig."

* * * *

Sandy (being shaved at the village hairdresser's): "Just ance o'er the face, Rab."

Rab: "But, why, Sandy? Ye ken I aye put the razor o'er twice."

Sandy: "Ay, ay, Rab—that's aricht. I'll come back an' get ye tae dae it the second time at the end of the week."

* * * *

"Catching any?" the bystander asked the fisherman.

"Caught 40 bass outta here yesterday."

"Say, do you know who I am?"

"No," said the fisherman, "can't say as I do."

"Well, I'm the county fish and game warden."

The fisherman thought for a moment, and then said: "Say, do you know who I am?"

"No," said the officer.

"Well, I'm the biggest liar in Western Europe."

* * * *

"So you left your job, Pat?"

"Yes."

"Was the boss surprised when he knew you were leaving?"

"No, he knew before I did."

* * * *

The ticket inspector, during his tour of the train, came across an old lady who had made a mistake. "I'm sorry, madam," he said, "your ticket is for Bristol. This train is going to Margate."

"My goodness!" she exclaimed. "Does the driver know he's going in the wrong direction?"

* * * *

TONGUE TWISTER

No prizes are offered for saying the following sentence correctly three times in succession:

"Frank threw Fred three free throws."

* * * *

Moody: "Say, Doc, do you remember last year when you cured my rheumatism? You told me to avoid dampness."

M.D.: "That's right. What's wrong?"

Moody: "Well, can I take a bath now?"

* * * *

Before becoming a hotel clerk he had worked in a grocery store.

"Is Judge David Gasbagges stopping here?" asked an impressive-looking stranger, approaching the desk.

"No," replied the clerk, with his most winning manner, "but—er—we have something else just as good."

* * * *

To avoid his little son being laughed at if he expressed belief in Santa Claus, the father decided to tell him there was no such person.

"But there is a Santa Claus," said the boy. "I saw him at the big shop and he spoke to me."

"Spoke to you!" exclaimed the father. "What did he say?"

"Put that blinkin' engine down!"

* * * *

A lawyer made his way to some scaffolding where a gang was working, and called for Michael O'Neill.

"Who's wanting me?" inquired a voice from above.

"It is my duty to inform you," said the lawyer, "that your Aunt Mary has died and left you a fortune."

There was a short silence, and then a commotion from above.

"Are you coming, Mr. O'Neill?" called the lawyer.

"In wan minute," was the answer. "I'm just stopping to wallop the foreman."

* * * *

THIS MONTH'S HOWLER

Savages are people who don't know what wrong is until missionaries show them.

A WARNING

Two big coloured caddies had a quarrel, and warnings of intended violence were exchanged whenever the two passed each other.

"You jest keep on pesterin' around wid me," declared one of the lads, "an' you is gwine to be able to settle a mighty big question for the sciumtific folks!"

"What question dat?" asked the other.

"Kin the dead speak!"

* * * *

Charles: "I started out on the theory that the world had an opening for me."

Henry: "And you found it?"

Charles: "Well, I'm in an awful hole at present."

* * * *

The chief had sent the new messenger boy with a bill to old Mrs. Jiggs, just hoping that she would pay off her old account.

Chief: "Well, did Mrs. Jiggs pay off that account of 11 shillings?"

Boy: "Yes, I gave her the nine shillings change and she will bring the pound herself next week."

* * * *

LOST PROPERTY

Host: "This is my great grandfather; he lost a leg at Waterloo."

Guest: "Shocking place for losing things, I lost a suit-case there last week."

* * * *

Parent (concluding a recital of his exploits): "And that, my boy, is what I did in the Great War."

Son: "But, daddy, why did they want so many men besides you?"

* * * *

Two men entered Westminster Abbey, and one of them listened enraptured to the strains of the organ.

"That's Handel," he murmured.

"He plays very well," returned the other.

* * * *

"I am a son of the soil!" shouted the grimy park orator.

"Yes, and I'm sorry for you," exclaimed one in the audience, "for I see you have your father on your hands."

* * * *

Sailor (telling story of his adventures on a desert island): "Hungry? Lumme, I should say so! Why, for three days the only bite I had was the one a mosquito gave me."

* * * *

Keeper: "Fishing on private grounds, eh? Well, come along—hand over all you've got."

Angler: "Well, I've caught a cold and rheumatism—you're welcome to them both."

* * * *

PEACE

Motor Salesman: "Can I show you something, sir?"

Pedestrian: "No, I'm not here to buy. But it's such a wonderful change to be in the midst of all these cars without having to dodge them."

* * * *

Bricklayers were just completing the foundations of a new building when a man carrying a ladder on his shoulder stopped to watch them at work.

One of the bricklayers suddenly looked up, glanced at the man, then turned to his mates. "Get a move on, boys," he cried, "there's a bloke here waiting to clean the windows."

What a wealth of

JUNEERO

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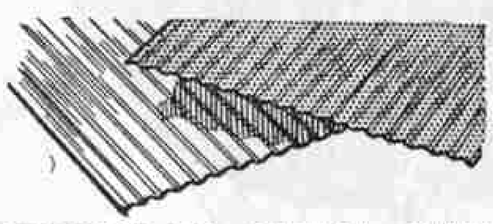
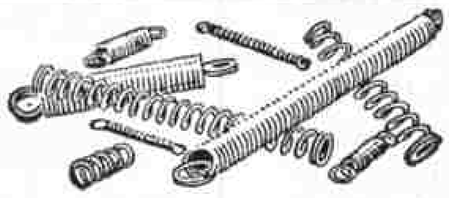
FROM YOUR JUNEERO DEALER AND ALL IN 1′- PACKETS

JUNEERO DEALER



CORRUGATED METAL SHEETS

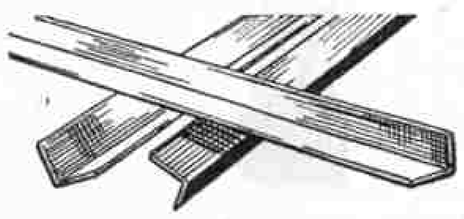
Plain or in attractive colours. Ideal for roofing models of buildings, etc. Easily worked with the Juneero Tools.



SPRINGS ASSORTED

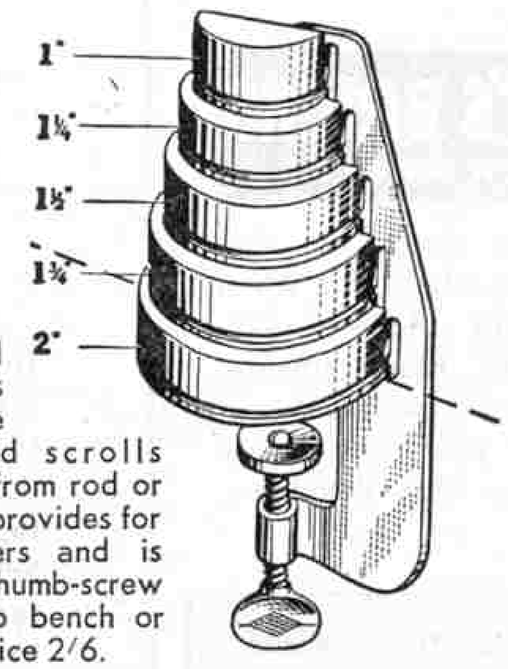
Assorted sizes and strengths, invaluable for all kinds of working models.

ANGLE IRON



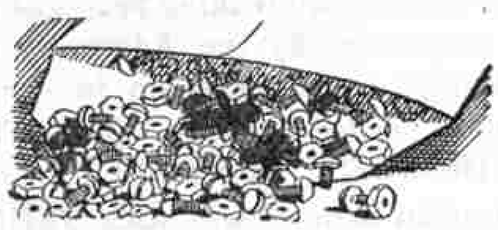
Similar to the Juneero strip in gauge, etc. It can be worked with the Multi-Purpose Tool. Ideal for girders, steel joists, etc.

JUNEERO SCROLL TOOL

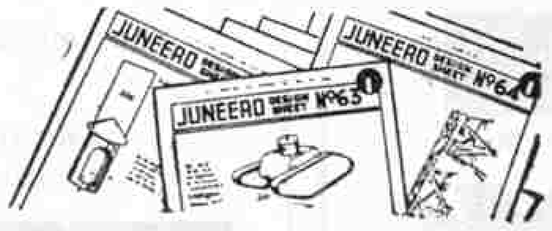


This useful tool enables accurate curves and scrolls to be bent from rod or flat strip. It provides for five diameters and is fitted with thumb-screw for fitting to bench or table. Price 2/6.

BOLTS & NUTS



Supplied in two sizes, "Standard" and "Long." The nuts are all of a standard thread.



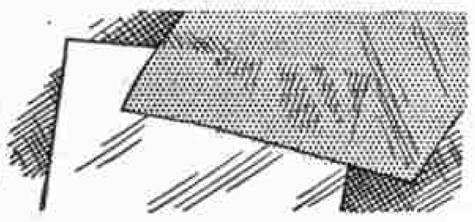
JUNEERO DESIGN SHEETS

Show how to make hundreds of interesting articles or models in Juneero. Price 1d. each.

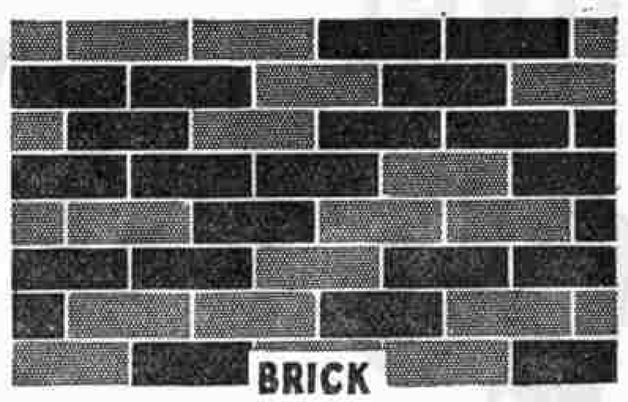
DISCS Assorted

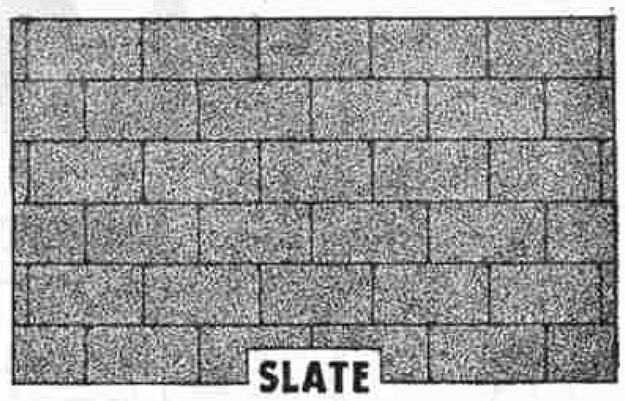
Metal discs of assorted diameters will be found very useful for all kinds of purposes.

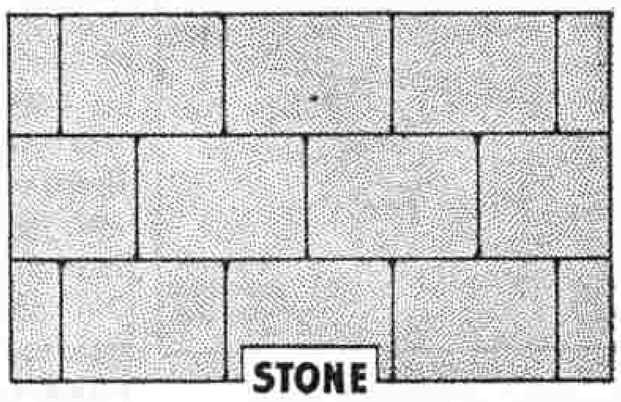
GLASS Substitute



Safe and easy to use with the Juneero Tools. Supplied plain and in various colours.







JUNEERO TRANSFERS

for realistic finish to model buildings, etc.

A NEW YEAR'S MESSAGE

If you are one of the many owners of Juneero sets who have made first acquaintance with this fascinating tool at Christmas, you will already have discovered the enormous possibilities of your Juneero tool and will be looking for increasingly ambitious things to make. Why not send the coupon for a comprehensive list of Juneero design sheets which give full instructions for making a hundred-and-one worth while models, utility articles, repairs, etc?

NOTE: Juneero sets are available at **15′-; 30′-** and **60′-** from your Juneero dealer. If, owing to war conditions, you have any difficulty in obtaining, send remittance to us, adding **1′-** for packing and postage. Abroad **5′6** extra.

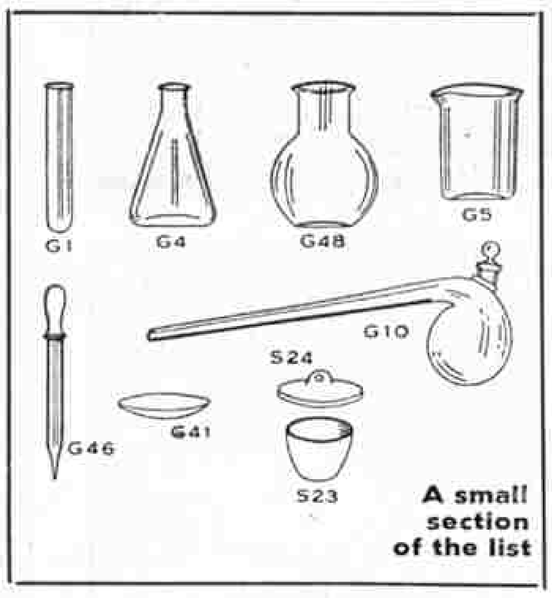
SPECIAL ASSORTMENT
of some of the most popular lines as illustrated.
See complete range at your dealers. **Price 2′6**

COUPON: Write Name and Address in Margin BLOCK LETTERS

To JUNEERO LTD., Stirling Corner, Boreham Wood, Barnet By-Pass, Herts.

Please send list of Juneero design sheets and name of nearest dealer.

BOYS! GO TO IT! with LOTT'S



A small section of the list

WRITE TO-DAY FOR LOTT'S CHEMISTRY SPARES LIST which will be sent Free. You will get much more fun out of your hobby and be able to conduct more absorbing experiments from the extra apparatus contained in this list. There will never be a dull evening with your Lott's Chemistry Outfit and you will banish "Black Out Blues" completely. All articles in the list are

FREE OF PURCHASE TAX

LOTT'S BRICKS new series

are really great fun and give added satisfaction when constructing Railway layouts, Gun Emplacements, Forts and Tank Traps. In addition you can build Modern Houses, Garages, etc., all with new Sun Trap Windows.

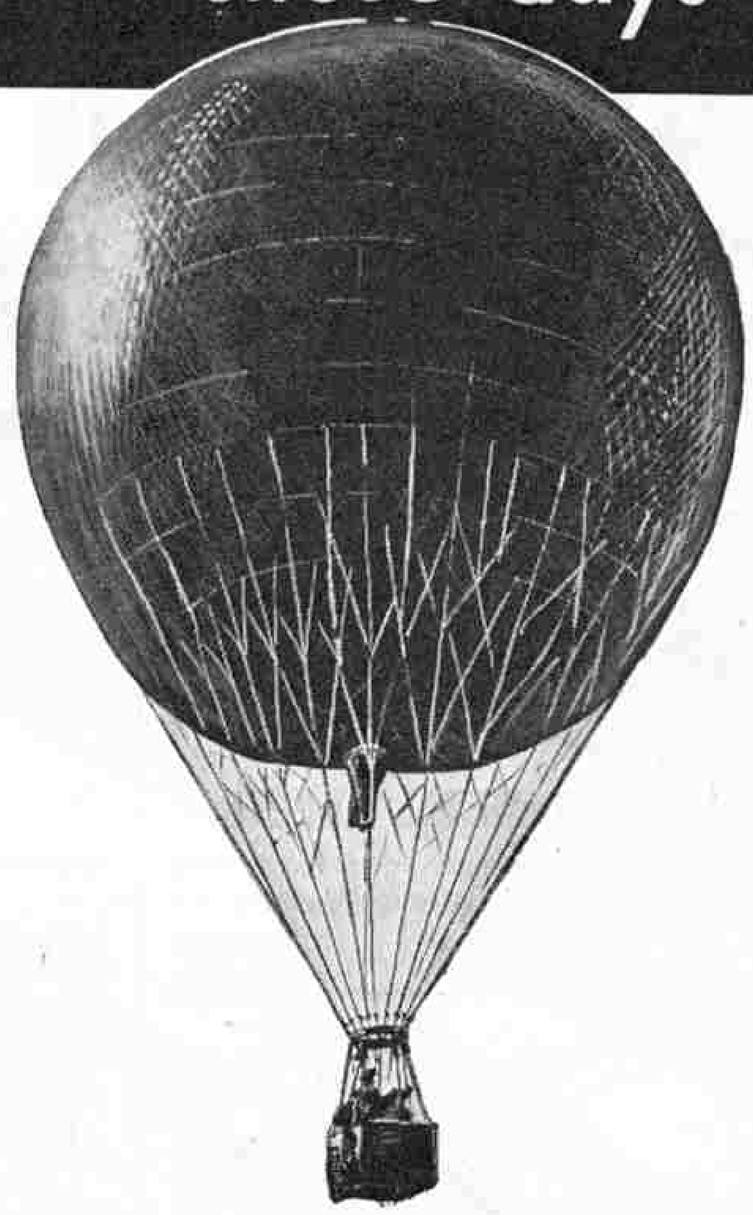
LOTT'S PUZZLES

made of special red stone, will lighten the dark evenings and form a thrilling pastime for the whole family. And here's an idea for a party game: Everybody has a puzzle and one of the 105 problems is chosen. Then whoever solves it first is the winner. It's great fun and exciting! Price 1/- (plus purchase tax) at all good toy shops.

★ **Ask your toy dealer for full particulars, or write to the manufacturers (Dept. M.M.) for name of nearest agent and illustrated lists of all products, including Chemistry Spares. 2d. stamp on p.c. or 2½d. stamp on letters, please.**

LOTT'S BRICKS LTD., WATFORD HERTS.

Flying meant BALLOONS in those days



In 1884 (20 years before the first aeroplane) Seccotine was discovered. Flying meant ballooning in those days. Yet though the world has since seen immense development in Air travel, Seccotine is still the standby for making and mending. It has been used on record-breaking long-distance 'planes, Schneider Trophy Seaplanes, by the Admiralty and leading factories and workshops everywhere, on jobs where failure to stick might mean disaster. The WORLD'S PROVED STRONGEST ADHESIVE.

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1. "Torbay Express" (G.W.R.) No. 1 Special Clockwork Passenger Train Set.
2. No. 2 Clockwork Tank Mixed Goods Train Set (L.M.S.)
3. "Eton" (S.R.) 20-volt Electric Locomotive and Tender.

Prices of Hornby Trains are subject to change without notice. Ask your dealer for a copy of the latest Hornby Trains Price List, or write direct to Meccano Ltd., Dept. HF, Binns Road, Liverpool 13.

Perfect Model Railways

Hornby Trains not only look like actual trains, but work like them. The Hornby Railway system includes everything that is required to reproduce in miniature almost all the operations that are carried out day by day on the real railways. You can operate long-distance expresses with fast passenger locomotives, or local trains with splendid little tank engines; and for freight working there are vans and wagons of almost every kind.

Look at the above magnificent models from the wide Hornby range. Note the wealth of detail and the perfect lines that characterise each one.

Get to know more about Hornby Trains. Ask your dealer about them to-day.

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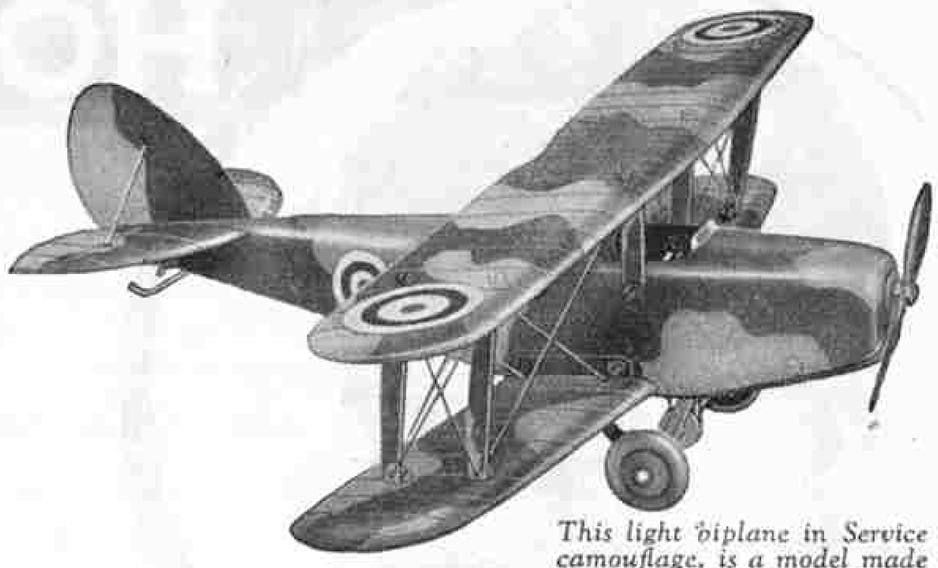
MECCANO AEROPLANE CONSTRUCTOR OUTFITS

The parts in these Outfits are all interchangeable on the famous Meccano principle, and splendid miniature aircraft (non-flying) can be built with them. The instruction manuals included in the Outfits show clearly how to construct a number of interesting models.

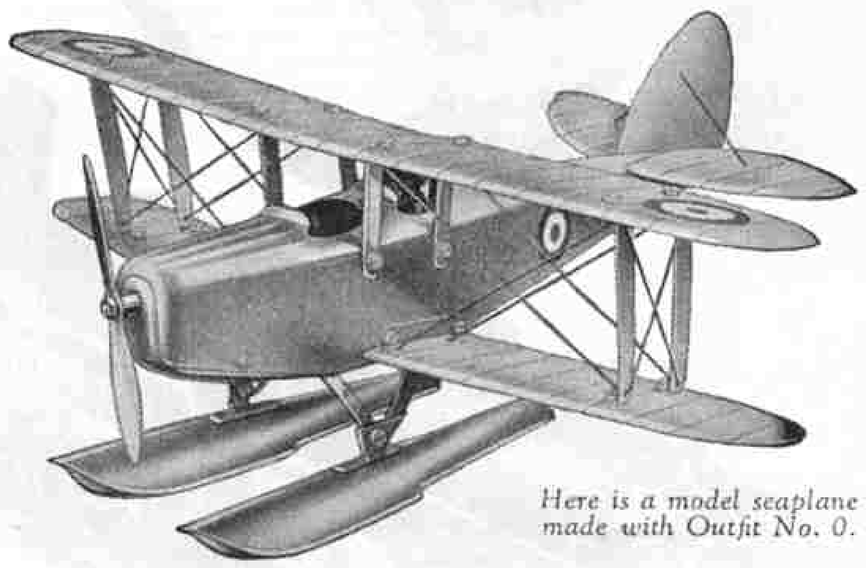


This light 'biplane in Service camouflage, is a model made with Outfit No. 00.

SPECIAL NOTICE

The No. 00 Outfit is now available in Camouflage as well as in Blue and White. The No. 0 Outfit is supplied in Service Grey as well as in Red and Cream.

No. 0 Aeroplane Outfit

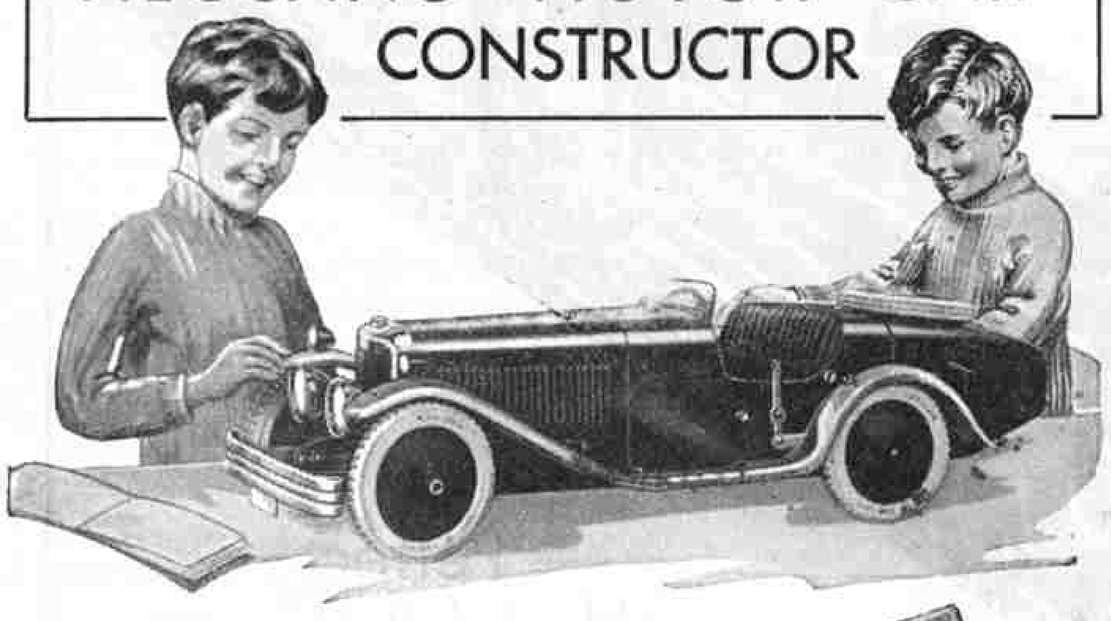


Here is a model seaplane made with Outfit No. 0.

Prices of Meccano Aeroplane Constructor Outfits are subject to change without notice. Ask for the latest list.

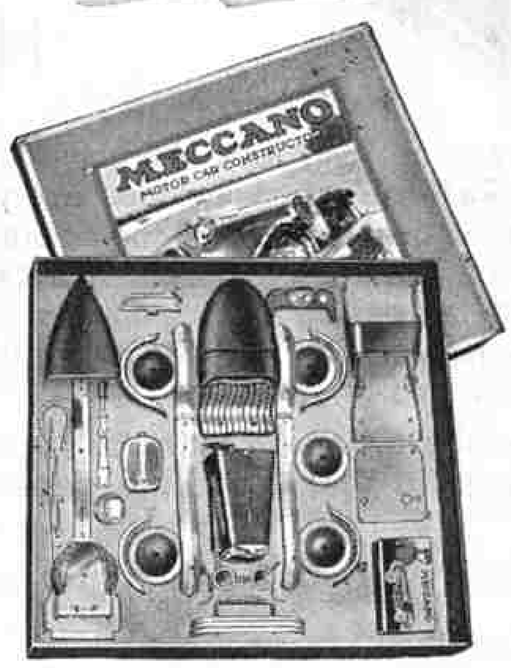
MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

MECCANO MOTOR CAR CONSTRUCTOR



MECCANO MOTOR CAR CONSTRUCTOR OUTFITS

Perfect miniature reproductions of many different types of car can be built with these Outfits. All the models are driven by means of a powerful Clockwork Motor (included in the Outfit).



MECCANO LIMITED
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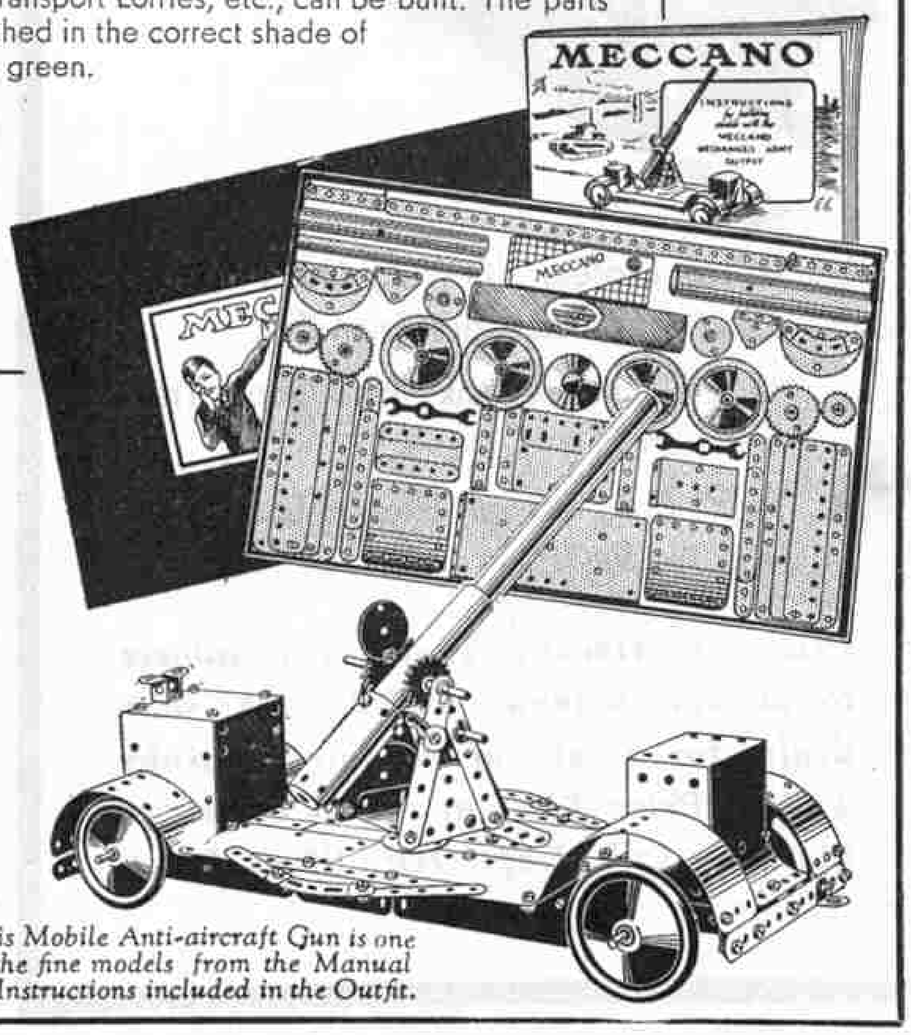
Owing to war conditions, prices of all Meccano products are subject to change without notice. Ask your dealer for the latest price list.

MECCANO

MECHANISED ARMY OUTFIT

This special Meccano Outfit makes possible the building of models of a variety of Mechanised Army prototypes.

It contains a big assortment of specially designed Meccano Parts, including gun barrels, with which realistic models of Tanks, Anti-Aircraft Guns, Field Guns, Transport Lorries, etc., can be built. The parts are finished in the correct shade of Service green.



This Mobile Anti-aircraft Gun is one of the fine models from the Manual of Instructions included in the Outfit.

SKYBIRDS

The **PIONEERS**
of 1/72 scale model aircraft construction, introduced in 1932
and still the most popular and most modern of all HOBBIES.

AEROPLANES: **"SPITFIRE" 3/-, "DEFIANT" 3/-, "HURRICANE" 3/-, "SKUA" 5/6, "BLENHEIM" 8/-, "HAMPDEN" 10/6.** 36 different types including enemy machines. Also full range of Aeronautical Accessories, Figures, etc.

SKYBIRDS EIGHTH ANNUAL MODEL RALLY
Now is the time for Modellers to prepare their models for the 1941 Rally which, all being well, will take place next March. Models should be ready early in March.
The following Skybird models are eligible :
Messerschmitt Me. 109, Hampden, Dornier Do. 17, Henley, Defiant, and any subsequent model introduced in the series.
Further particulars will be available by Jan. 1st, on application to:
"SKYBIRDS," 3, Aldermanbury Avenue, London, E.C.2.

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BRITAIN'S LAND FORCES A.A. Guns, Searchlights, Sandbags, Tanks, Armoured Cars, Motor Cyclists, Figures, etc. Latest additions : **6" Field Howitzer 1/-** and **Scammell Gun Tender 1/6,** complete set, price **2/6.**

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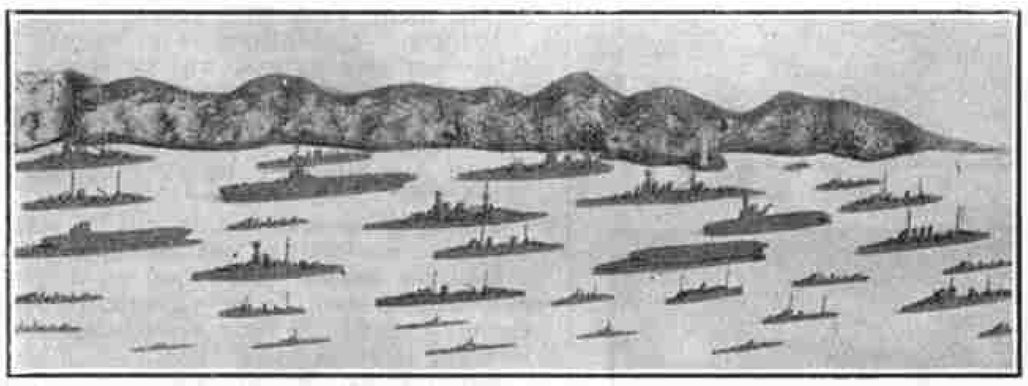

"SHIPSERIES" Waterline models. Portraying every type from **Destroyers 6½d.** each to **Battleships 3/-** each. 32 different types.
List prices above must be increased by 25% to cover Government Purchase Tax.
These topical models may be obtained from all the leading Stores or send stamps 1½d. for free Price List direct to:
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Send stamp for free 52-page Games and Model List.
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Before commencing to operate a Meccano model, or to run a Hornby Train, all gears and bearings should be oiled thoroughly with Meccano Lubricating Oil. This oil is specially prepared and is of the right consistency for the purpose.

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How to obtain the "M.M."

The "*M.M.*" may be ordered from all Meccano dealers, or from any newsagent or bookstall. Price 6d. per copy. As a rule, back numbers cannot be supplied, because we print only sufficient copies to fill our standing orders. To prevent disappointment, therefore, place a regular order either with your dealer, newsagent, or direct with this office.

MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13

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If You're Lazy you won't read far in this talk. If you're not—if you have the courage to face facts—you will want to know what special effort on your part will enable you to get on.

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But, if You're a Fighter you *will* set about doing something. You'll get the special *necessary* training that fits you for a good position and good pay.

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I.C.S.

READERS' SALES AND WANTS

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.

Over 2,000 good Stamps in Album. Worth over £10. Will take £4 or nearest offer.—J. Crickmere, 37, Granby Street, Newmarket, Suffolk.

Wanted. Regimental Badges. Send lists to H. J. Nicholson, 17, Pemberley Avenue, Bedford.

Sale. Complete gauge 0 and 00 Railway; as new, £6/10/-. Diana Air-rifle, powerful and accurate, £2/5/-. The lot £8/12/- or separate. Write—Mantle, The Yews, Langham, Oakham.

Wanted. Daisy Double Barrel Repeater, or Daisy Pump Gun. State Price.—Brown, 88, Armitage Road, Milnsbridge, Huddersfield.

Wanted. Super reel attachment for Pathéscope "Home Movie" projector, what offers.—Worcester, "Tal-y-llyn," Davenport Crescent, Stockport.

Sale. Gauge 0 steel and tinplate electric track, locomotives, coaches, trucks, model cars, platforms, signals, accessories. "Shipping Wonders of the World," 1-50, "Meccano Magazines," 1935-1938 (various) "Railway Magazines," 1923-1934 (various). Apply—P. Clay, The Manor House, Thornton-in-Craven, Skipton, Yorkshire.

Sale. Bowman M135 Steam Engine. 7/6.—G. Bird, 23, Chiltern Crescent, Earley, Reading.

Sale. Gauge 0 railway stock: 2 locomotives, Pullmans, wagons, lines etc. Cost £6. 40/- or offers.—D. P. Young, 3 Essendon Rd., Sanderstead, Surrey.

Sale. Red-Green Meccano £2, cost over £4. Lott's Chemistry set. Railway accessories, Soldiers. Stamp for list.—Gale, Jervis, Lyndhurst, Hants.

Sale. "Meccano Magazines," January 1938/40.—Gore, 31, Berwick Drive, Crosby, Liverpool.

Sale. 2,000 Stamps, 50/- or offer. Many rare issues.—Roberts, 88a Coombe Road, New Malden, Surrey.

Wanted. Trix locomotives, body condition immaterial. Motors must be reasonably good.—Fry, Churchtown, Dundrum, Dublin.

Sale. Large quantity Gauge 0 clockwork track, locomotives, rolling stock, accessories. Moderate prices to clear. Single items, small or large lots. Write for list (stamped addressed envelope).—Forrest, 32, Cowley Road, Ilford, Essex.

Wanted. 110 volt Meccano Motor. Pay good price.—Baker, Shirleycote, Papplewick, Notts.

Quick Sale. 25 Sets Cigarette Cards in Albums, also Loose Cards. Send for list.—Dixon, Brooklands, Dawlish, Devon.

Sale. Three-Valve Wireless, 7/6; Phones, 2/6.—Lennard, Cressing Vicarage, Braintree, Essex.

"Our Air Force," 3/-; "Featuring the Saint," 2/-; Two Bulldog Drummond Books, 2/- each.—Kelly, 165, Humberstone Road, London E.13.

STAMP ADVERTISEMENTS

See also page 26

FOR SERIOUS COLLECTORS

Our Bargain "Discount" Approvals contain a fine range of picked Modern and New Issues, Pictorials and Commemoratives, etc., from 1d.–6d. each, less a generous discount. Send to-day with confidence. Approvals or details are post free, and we do NOT send again unless requested. State whether you want British Colonials, Foreign or both. You'll be delighted with our PERSONAL service.

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BARGAIN. Packets of stamps 6d. & 1/-, plus postage. D. May, 44, Vegal Crescent, Englefield Green, Surrey.

This Month's Special Articles

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British, German and Italian

Supplementary List No. 10/5M is now available and will be sent with specimen photograph post free 4d.

OUR NEW LIST (No. 11M)

Our new consolidated list (incorporating all titles in our five recent supplementary lists) will be available later this month. Order your copy now for delivery as soon as ready—price 2d. post free (or 4d. with specimen photograph).

We also list photographs of Railways and of Ships. Either list and specimen photograph 4d.

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MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

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.

Ordering the "M.M." Overseas

Readers Overseas may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in Australia, where the price is 1/- per copy (postage extra), and the subscription rates 7/- for six months and 14/- for 12 months (post free), and 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.

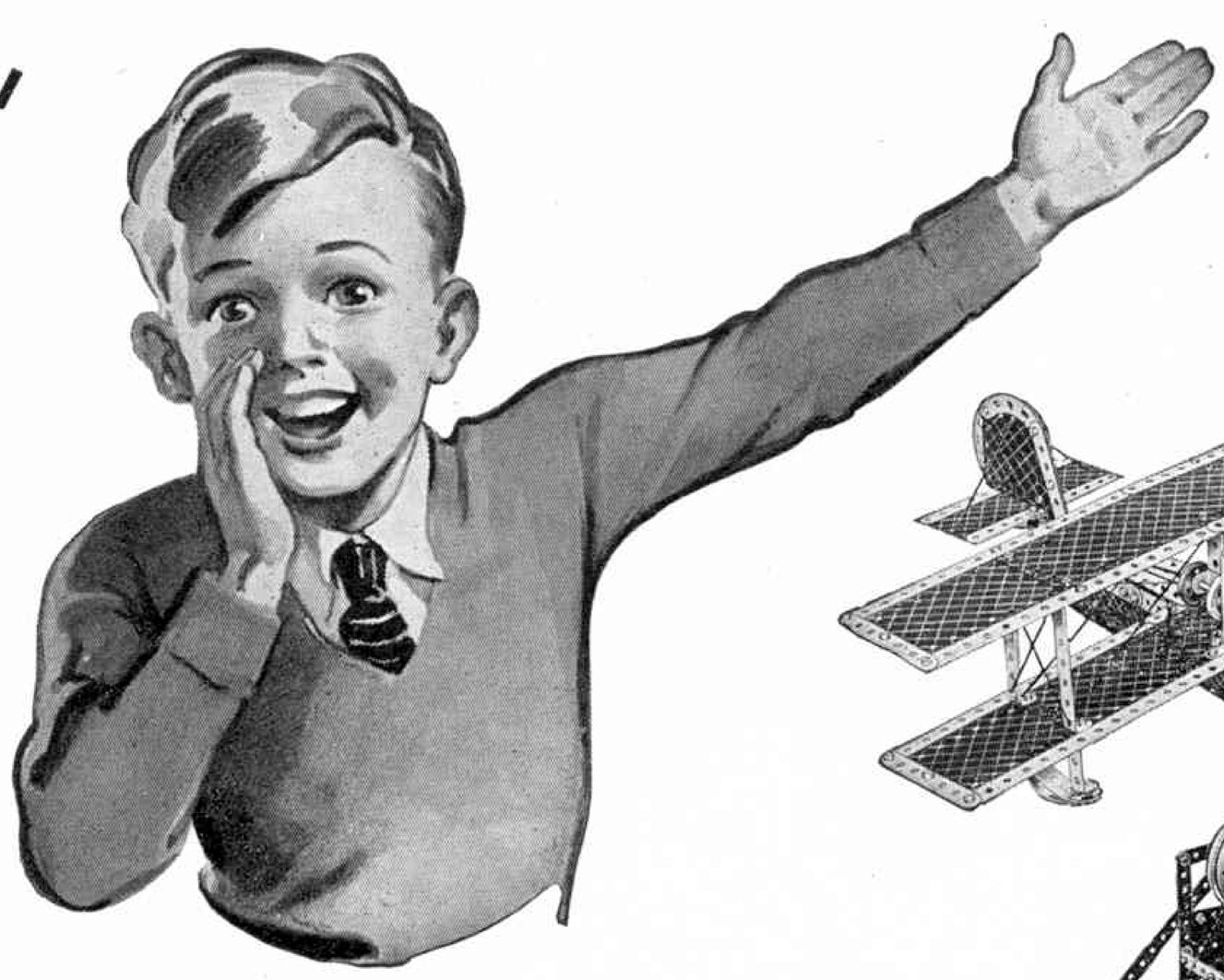
CANADA: Meccano Ltd., 187-189, Church St., Toronto.
UNITED STATES: Meccano Co. of America Inc., New Haven, Conn., Meccano Co. of America Inc., 200, Fifth Av., New York.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Models Limited, Third Floor, Paykel's Buildings, 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 & Bros., Elphinstone Street. Bombay: Bombay Sports Depot, Dhobi Talao. Calcutta: Bombay Sports Depot, 2, Lindsay Street. Madras: Bombay Sports Depot, 162, Mount Road.

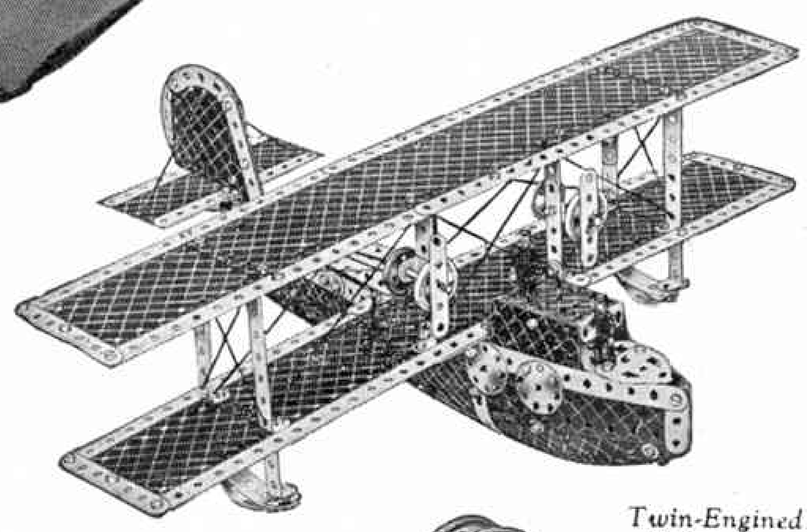
SPECIAL NOTICE

THE HORNBY & MECCANO PART-EXCHANGE SCHEMES HAVE BEEN TEMPORARILY SUSPENDED

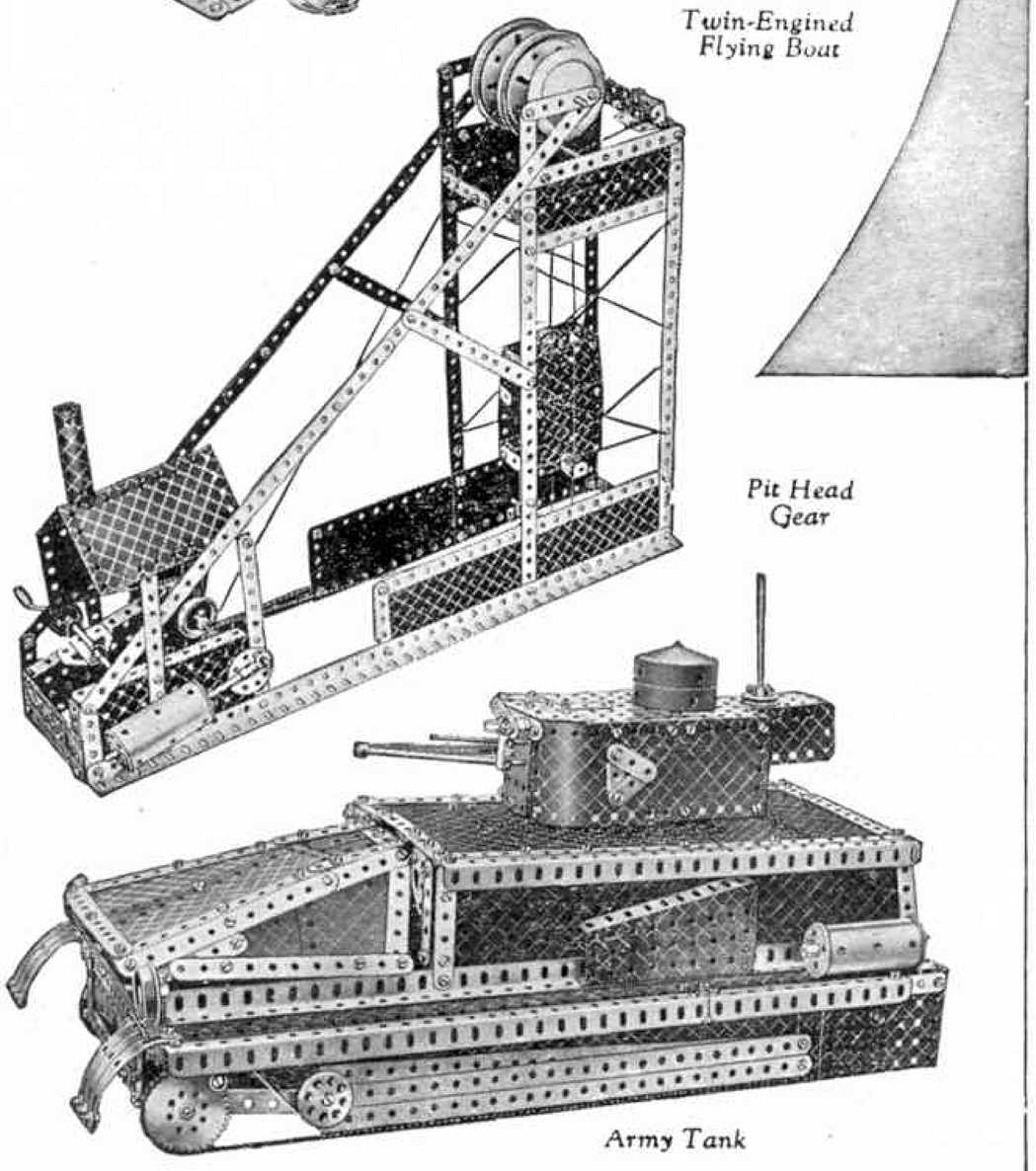
MECCANO LTD. — BINNS ROAD — LIVERPOOL 13

THE KING OF INDOOR HOBBIES





Twin-Engined Flying Boat



Pit Head Gear

Army Tank

No other hobby touches Meccano for fun, interest and entertainment. It's thrilling to build grand working models of cranes, bridges, engines and hundreds of other engineering marvels in miniature. It's better still to make the finished models work just like the real thing! There's simply no end to the things you can make and invent with Meccano!

Certain Meccano parts are not at present available. Ask your dealer for a copy of the latest price list.

MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13

MECCANO

Prices are subject to change without notice.

HORNBY DUBLO

The Perfect Table Railway

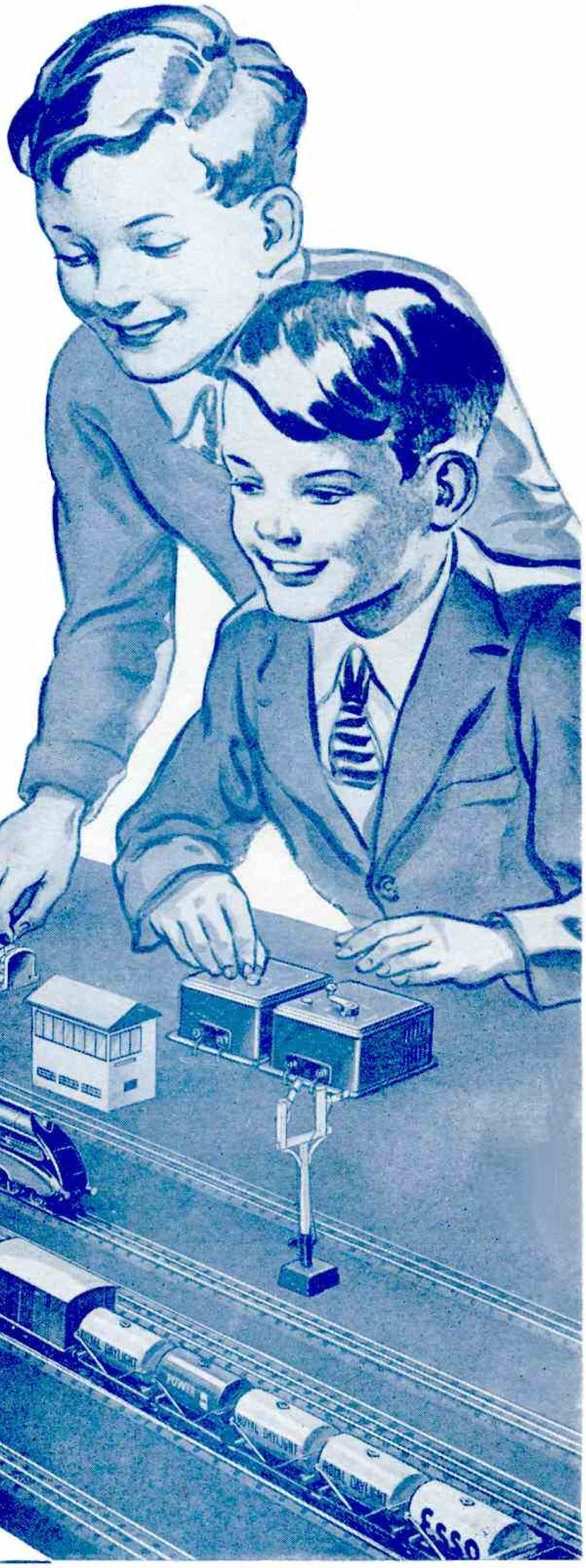
LOOK! A MAGIC TABLE!

A Hornby-Dublo Railway, Gauge 00, turns any table into a source of endless entertainment. The perfectly scaled locomotives and rolling stock—the wonderful railway buildings—the track, the signals, the accessories—all are miracles of realism in miniature.

How fascinating it is to take charge, to operate everything by remote control from one point! Stopping, starting, reversing—coupling rolling stock at any part of the track—controlling switches and signals—a real railway coming to life before your eyes, doing what you want it to do—without being touched. You don't know the fun you've been missing until you start a home railway with these trains!

The current required by a Hornby-Dublo Electric Railway is very small. A Train can be run for 100 hours for the cost of one unit!

Write to-day for a free copy of the special folder giving details of the Hornby-Dublo Railway System.



★ *This is how your Hornby-Dublo Railway will look!*

MECCANO LTD., DEPT. DF, BINNS ROAD, LIVERPOOL 13

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