VOL XI No. 11 NOVEMBER 1926.

MECCANO MAGAZINE

HUGE FLOATING CRANE (See page 658)

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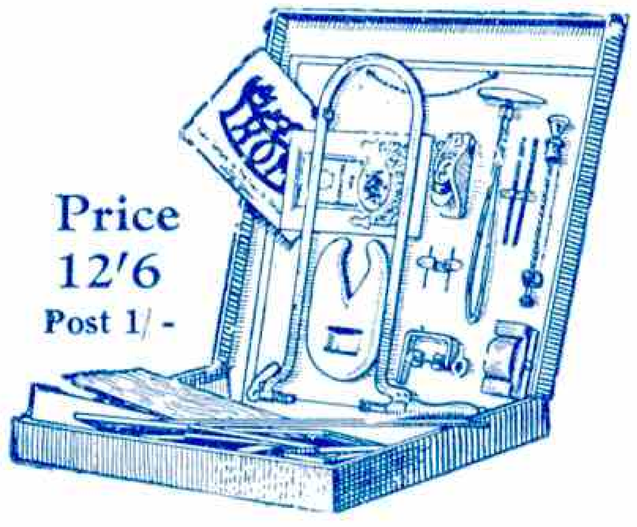

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NEXT MONTH: SPECIAL CHRISTMAS NUMBER. PUBLISHING DAY: 4th DEC. PRICE 6d.

MECCANO MAGAZINE

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Liverpool

Vol. XI. No. 11
November, 1926

With the Editor

Our Special Christmas Issue

The special Christmas number of the *"M.M."* (96 pages) will include splendid articles on the World's Largest Bridge, now being built at Sydney; "Some Famous Express Trains;" "Illuminating the Niagara Falls;" "The *Carnarvon Castle*," the second largest motor liner in the world; "All About Railway Sleepers;" an article on Noah's Ark; the "Story of Zinc," and many other interesting articles. In addition, of course, there will be our regular features, dealing with Aeroplanes, Engineering, and Railway subjects, several of which articles will be enlarged.

Altogether the Christmas number will be one of the best we have ever issued and I expect there will be a greatly increased demand for it, as was the case with last year's. Although we are printing at least 80,000 copies, readers will be well advised to place an order at once for a copy with their Meccano dealer or newsagent. *So great will be the demand that unless readers order their copies well in advance, there certainly will be many disappointments.*

The price of the special Christmas number will be 6d., and owing to the increased number of pages and the consequent extra time required for printing, it will not be published until Saturday the 4th December. I hope my readers will bear this in mind and not cause a disturbance at their dealers or newsagents on the 1st of the month, because the Magazine is not to hand on the usual publication date!

The Lesson of the Dolgarrog Disaster

During next session a Bill is to be introduced to Parliament to make compulsory the official inspection of big dams. This proposed legislation arises out of the terrible disaster that occurred last year in North Wales, where a huge dam burst and the waters rushed down the mountain-side, sweeping away the village of Dolgarrog with terrible loss of life. The scene of desolation now presented by the ruins gives one some little idea of the terrible havoc that can be wrought by the force of pent-up water, which—as the old saying has it—is "a good servant but a bad master."

There are other big dams in North Wales, and in many other parts of the country, and if any were to burst the results would be disastrous as far as the inhabitants of the surrounding country are concerned. Only recently it was mentioned that the dam in the mountains above Bettws-y-coed, Capel Curig and Bethesda is showing signs of weakness, and if it fails there will be tragic consequences to the inhabitants of these three villages. It should be one of the duties of the Government inspector to assure himself that all dams are built with sufficient strength to withstand excessive strain, such as might be experienced during a prolonged rainfall in specially bad weather.

No doubt the future will see a considerably greater use of water power, and engineers will be called upon to harness all falling water for industrial purposes, instead of allowing it to run to waste as at present. As the construction of big dams in various parts of the country becomes more frequent, the necessity for official inspection will become more acute. I look forward with interest to the result of the introduction of this Bill—which is being undertaken by Major Owen, the Member of Parliament for Carnarvonshire—and feel sure that our wise lawmakers will realise the necessity of protecting the lives and property of those who live within the possible danger zone.

A Dream that may be Realised

The largest liner in the world is the White Star liner "*Majestic*," 915 ft. in length, although the "*Leviathan*," 907 ft. in length, runs it a close second. Both these ships were built at Hamburg, as was also the third largest liner the "*Berengaria*," 901 ft., whilst the largest liner to be built in Britain is the "*Aquitania*," 902 ft., which was built on the Clyde. These figures are of particular interest at the present time, in view of the fact that the problem of constructing a 1,000 ft. liner is now being discussed in ship-building circles.

A 1,000 ft. liner has long been the dream of ship-builders and there seems some possibility that the dream may be realised in the not distant future, for enquiries have been addressed to the Clyde Navigation Trustees as to whether a ship of this length could be launched with safety on the Clyde. There seems little doubt that all the obstacles in the way of launching and taking to sea a 1,000 ft. liner will be overcome, as far as the Clyde is concerned. The facilities at Clydebank are particularly good, the slipways being so placed that large vessels can be launched into the mouth of the River Cart, which joins the Clyde at this point.

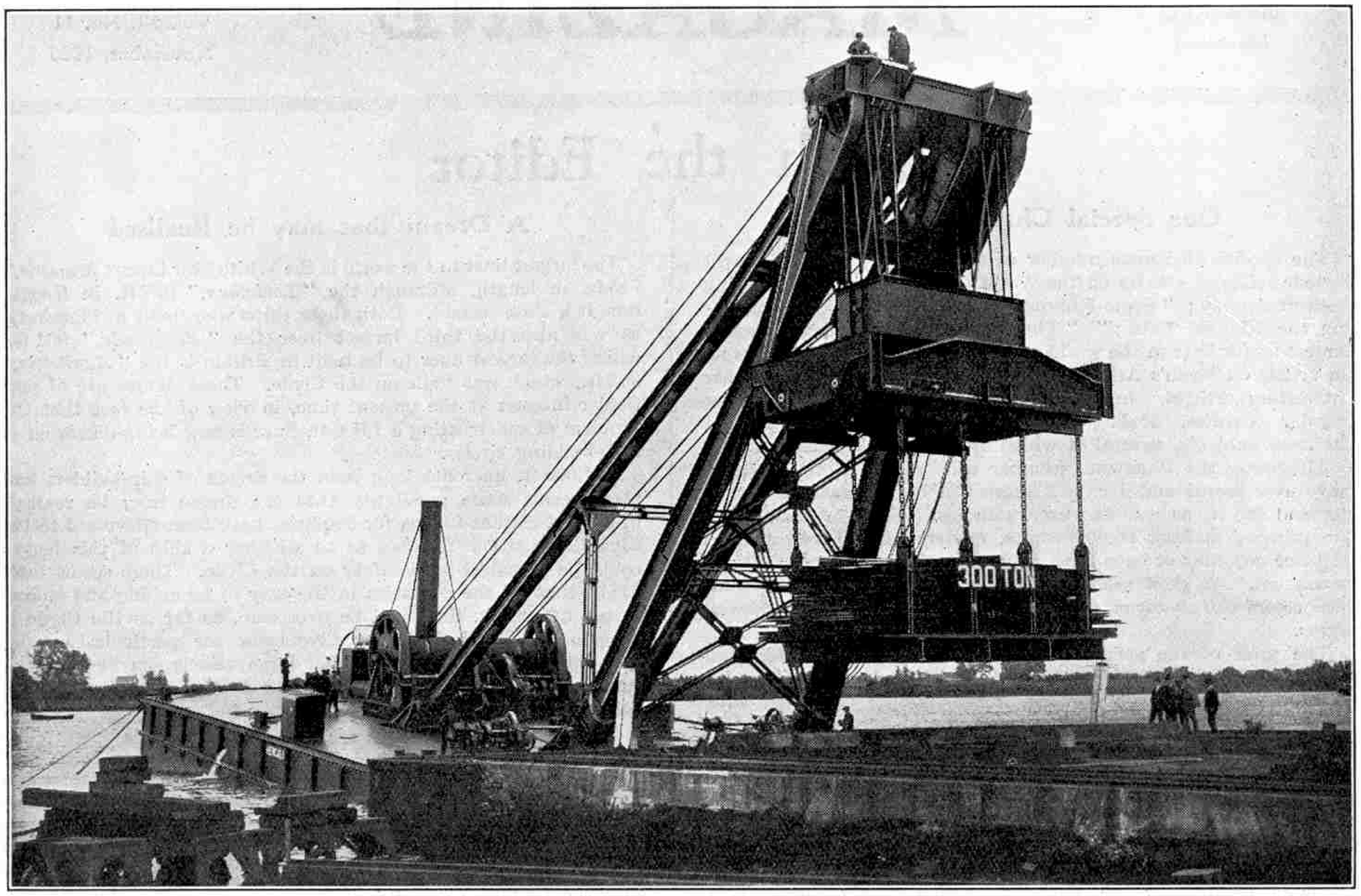
Disadvantages of Large Ships

There has naturally been considerable speculation as to which company has caused this enquiry to be made. Some people have supposed that there may be some connection between it and the recent announcement that the White Star Line is planning to build a 62,000 ton ship. On the other hand, others point out that the Cunard Company have announced that they are also contemplating the question of larger ships, so that really we are not much wiser! However, I expect shortly to be in a position to tell my readers something definite about the project, and hope to publish in an early issue an article on the world's large liners.

Although it would be fine for a Britisn company to be the first to build a 1,000 ft. ship, the useful purposes of such a vessel are not very clear. There are many considerations against the use of large ships, chiefly that they become unwieldy in heavy weather—for they present a very large surface to the wind—and that they are not nearly as economical as smaller vessels. There is also the question of docking and harbour accommodation to consider, for just as Alice in Wonderland could not grow any more because she filled the room and bumped her head against the ceiling, so, too, is the size of large ships limited by the available accommodation for them. In England, France and America it is not possible to deal with ships larger than the "*Majestic*," and if a 1,000 ft. liner is built, special provision will have to be made in these three countries by deepening channels and by increasing the size of landing stages, harbours and docks. No doubt this could, and will be done if it is decided to proceed with the scheme, and in this connection it may be mentioned that there is now being constructed at Liverpool the largest dock in the world—the Gladstone Dock—which will have an entrance lock of 1,070 ft. We clearly see, however, that the working of a 1,000 ft. liner is not as simple a matter as might at first appear. Indeed, such a craft might easily turn out to be as large a "white elephant" as was the "*Great Eastern*"—a name that will long be remembered by shipping companies and engineers alike!

Lifting 300-ton Concrete Blocks at Sea

Huge Floating Crane for Spanish Harbour Works



THE giant block-setting cranes already described in our pages were all of the shore type, mounted on wheels and movable on rails. Despite the extreme mobility of this type, however, our readers can easily imagine that a floating block-setting crane must have a large number of advantages over a crane operating on land.

The crane depicted on this page is known as the "*Hercule*" and has a total lifting capacity of 300 tons. It was designed and built in Holland to meet the requirements of a Spanish engineering firm, who are at present engaged on a large contract for extensive harbour works for the Spanish Government.

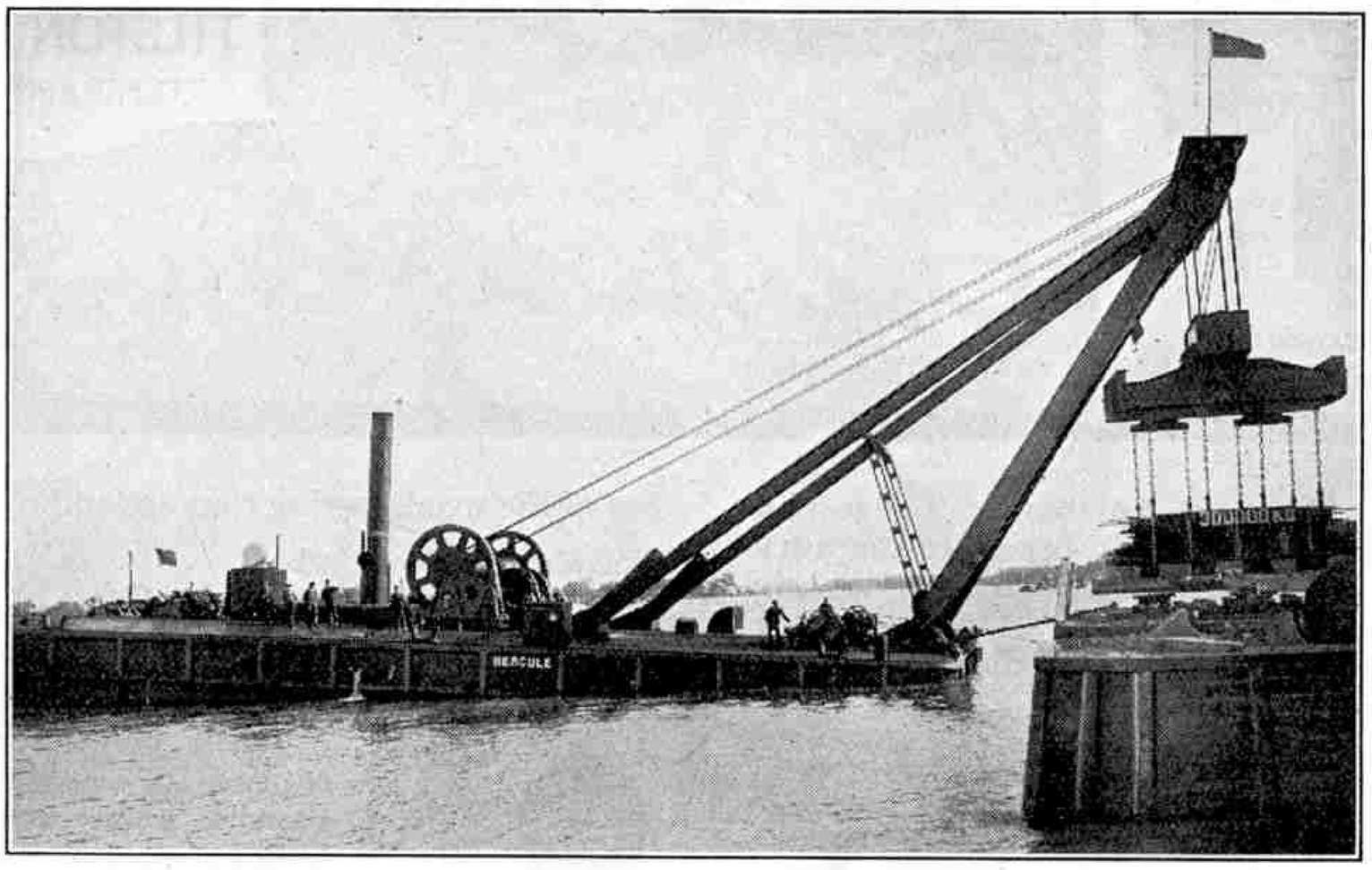
The many advantages arising out of the use of concrete blocks in the construction of jetties and breakwaters are well known. The blocks are, of course, cast in moulds on the shore, the concrete being mixed by special mixers. As compared with the ordinary method of concrete construction on the site, the use of blocks effects a great economy, and the greater the size of the blocks used, the greater is the economy. As the limits placed on the size of the blocks are those imposed by the capacity of the cranes and the block-handling gear employed, it is not to be wondered at that among block-setting cranes we find some of the largest cranes in existence.

In our issues for January—April 1925, we dealt fully with block-setting cranes and the particular circumstances in which they are employed. We think, however, that our readers will be interested to have additional particulars of a giant floating crane of a similar type now being used in Spain for lifting massive concrete blocks.

For the present harbour works in Spain, the blocks used weigh 260 tons each, and measure 35 ft. 5 in. in length; 19 ft. 9 in. in width; 10 ft. 7 in. in height; and 2 ft. 7½ in. in thickness. After these massive blocks have been made on the shore, they are carried by a travelling gantry to the water-side, where the "*Hercule*" lifts them and places them on heavy pontoons, which are then towed out to sea to where the work is taking place. The crane follows the pontoons to sea, and all having arrived at the site, it lifts the blocks and places them in position, under the guidance of divers. A large number of pontoons may be used and a further economy is thus effected by many blocks being taken out to sea on one voyage.

The general arrangement of the crane is seen in our first two photographs, which show the crane handling a load of 300 tons, 40 tons of which is made up by the block handling gear.

It will be noticed that in neither view is the deck of the pontoon horizontal. As a matter of fact, the deck is never horizontal whether the pontoon be loaded or light.



Side view of the 300-ton Floating Crane

The pontoon is of immense strength and measures 115 ft. 6 in. in length, 59 ft. 6 in. in breadth and 13 ft. 1½ in. in depth. It is protected from injury by horizontal fenders made of elm and carried round the sides, supported by vertical struts. Built throughout of steel, it is given rigidity by two longitudinal and three transverse bulkheads, completely watertight and divided into twelve compartments.

Two of the outer compartments of those aft are used for water-ballast, the middle compartment being used for stone-ballast. Forward of the stone-ballast compartments, and between the two longitudinal bulkheads, is situated the boiler that supplies steam to the main and auxiliary winches. The boiler is of the marine type and generates steam at a pressure of 120 lbs. per sq. in. with a heating surface of 970 sq. ft. A duplex-feed pump is installed, as well as a ballast pump that also serves as the circulating pump for the winch condenser.

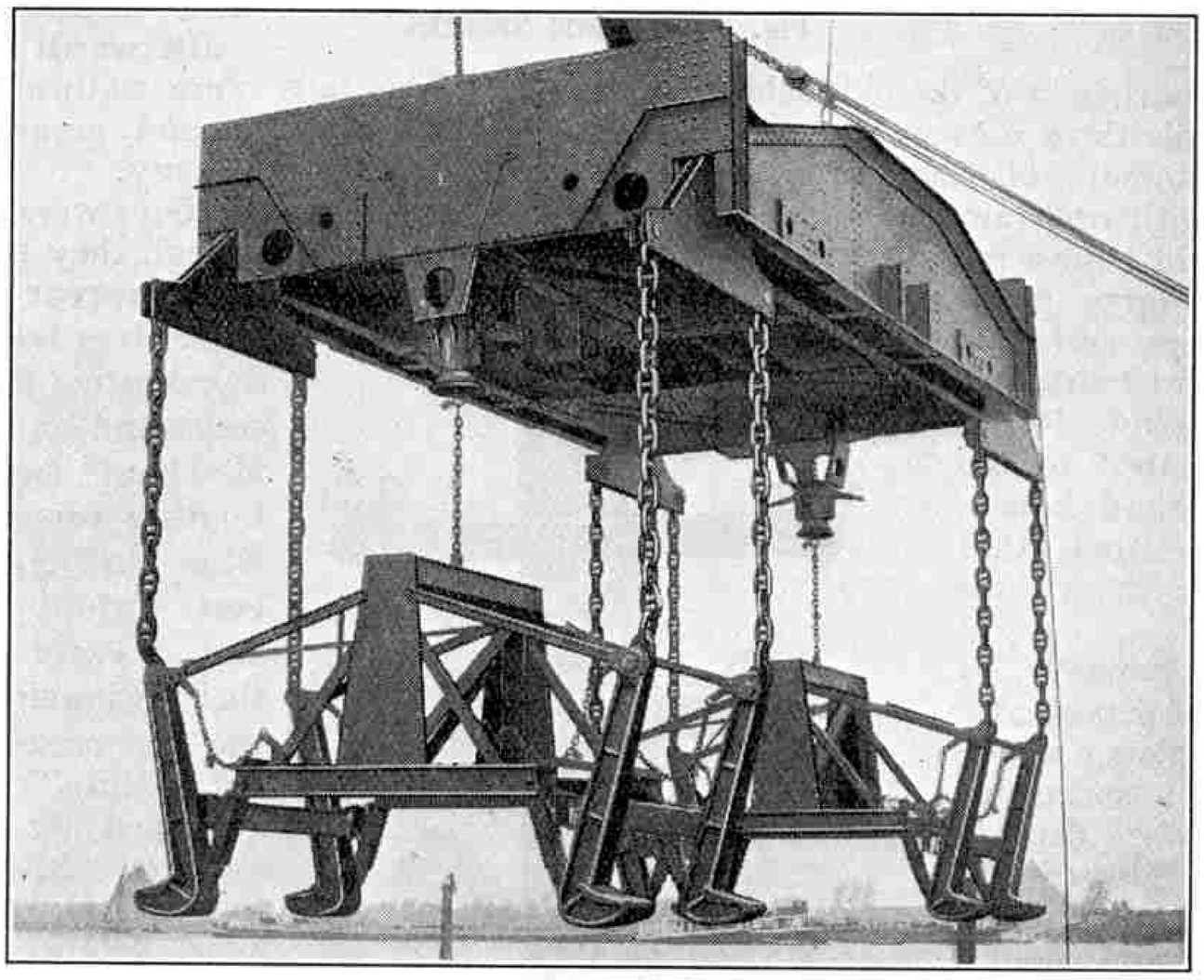
Coal bunkers are fitted on each side of the boiler and accommodation for a crew of six is provided in the forward compartments.

The crane itself, built up of steel plates and girders, is of the "sheers" type and has two fore and two aft legs, pin-jointed to shoes on the deck above the longitudinal bulkheads.

When the crane is lifting a load the stresses are carried by the longitudinal bulkheads and not by the deck itself. Accordingly, the bulkheads are stiffened and braced to give them additional strength, the deck being relieved of stresses by carrying through it the side plates of the shoes, and bolting them directly to the bulkheads at each side.

The necessary rigidity is obtained by ties and cross bracings, particularly noticeable in the case of the front pair of legs, which are built up from plates and angle girders. The rear legs are composed of straps and angles stiffened by lattice girders and are connected to one another at their centre and strutted at each end of the tie-member. Both fore and aft legs are connected at the top by steel pins, the lower ends of all the crane members being connected to shoes on the deck in a similar manner.

There are two fixed blocks, the steel pulleys of which are housed in a strong framework erected at the top of the fore legs. The upper blocks have four sheaves and the lower ones three. The load is taken by two tackles, each of which has six falls composed of 61 wires of six strands, giving a rope of 7 in. circumference.



Photos courtesy] [*N. V. Intern. Scheepsbouwmij "de Maas"*

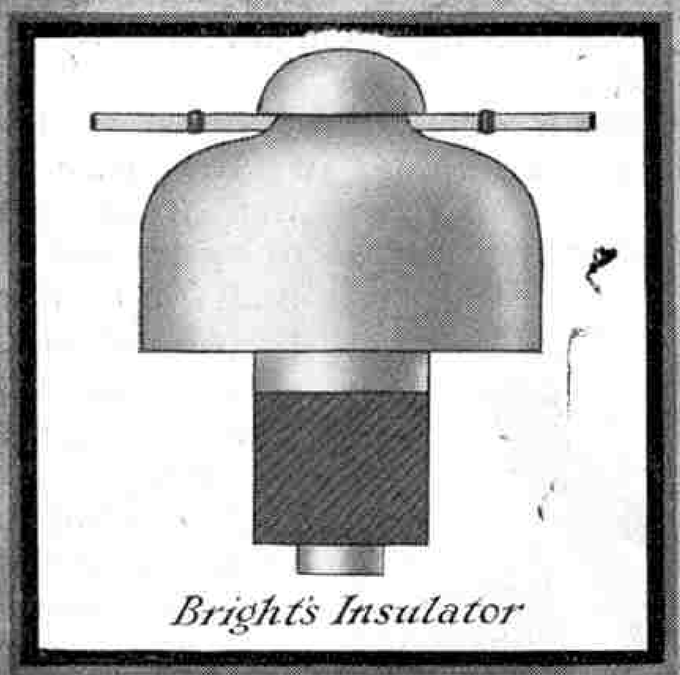
The Block-setting Gear

Two ropes from each tackle are taken to the main winch, located aft of the crane, and their length is such that it is possible to lower a load to a depth of over 39 ft. below the level of the water.

To eliminate friction in moving the blocks below water, a heavy ball-bearing, fixed in a cast-steel water-tight casing, supports the bolt for the load frame. This enables the divers to easily move the blocks, so that they may be manœuvred accurately into their correct positions below water.

One of the most interesting features in block-setting cranes is the gear used for handling the concrete blocks. From the lower illustration on this page it is seen that in this case the frame is built up of three pairs of longitudinal plate girders, coupled at their ends and in intermediate positions by cross-girders.

The bolt from the lower blocks is pinned to the middle of a framework on which there is a (*Continued on page* 690)



Lives of Famous Engineers

XXXIV. SIR CHARLES TILSTON BRIGHT
TELEGRAPH ENGINEER

IN the first of our articles on Submarine Telegraphy ("*M.M.*" July 1925) we referred briefly to the work of Sir Charles Tilston Bright. This month we commence an account of the career of this eminent engineer who, at the age of 21, in establishing telegraphic communication between Great Britain and Ireland, was—to use the words of Lord Kelvin—"The first to lay a cable in really deep water."

Charles Tilston Bright was born on 8th June, 1832, near Wanstead, Essex, and was brought up with his brothers William and Edward. The family home adjoined Hainault Forest, a picturesque area in Essex that was de-forested in 1850, and had spacious grounds attached.

Boyhood Sport

The father was a keen sportsman of the old-fashioned type and the boyhood of his three sons was happy and healthy. The private tutorship of their early years was pleasantly mingled with open-air pursuits. They fished as soon as they could hold a rod, their favourite training ground being a large pond, partly surrounded by trees and well stocked with tall weeds and bulrushes, situated in an adjacent meadow. Roach and carp generally succumbed to the appetising baits of paste and honey, aided by a little cotton wool, that their father had shown them how to make.

One particular carp, however, a fine energetic fellow, persistently eluded the youthful anglers, whose excitement grew with each successive defeat. Drastic action was decided upon and Charles and Edward devoted their pocket money to purchasing extra strong gut traces and hooks. These were brought into regular use and early one morning the carp made their acquaintance! Some exciting warfare followed, until anglers and fish alike were feeling rather exhausted. Suddenly the fish made off into a belt of thick weeds less deeply placed than his previous selections, and refused to budge. A council of war was then held as to how his lordship was to be got out of the weeds, seeing that no landing net was available.

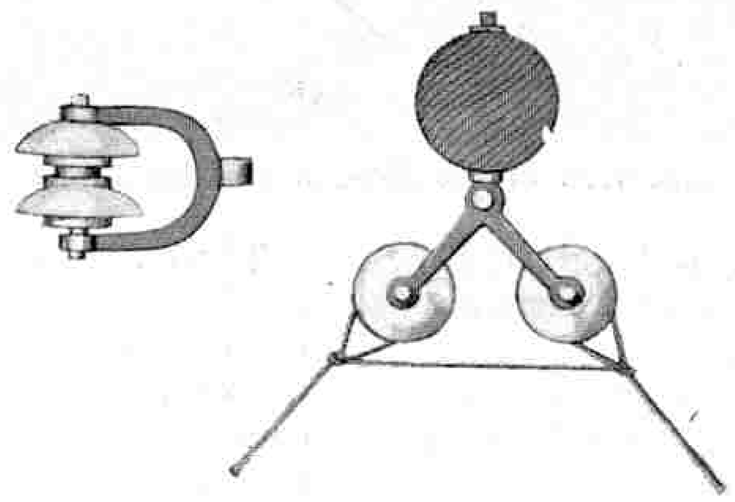


Fig. 1—Terminal Shackles

The Carp's Downfall

In this crisis Charles' inventive genius came to the rescue. From some haymakers at work in a field close by he borrowed a rake, and wading into the pond from a shallow spot cautiously approached the densely growing weeds wherein the carp was hiding. A movement betrayed the fish, whose agitated entry into the thick weeds had resulted in his becoming fast in them. With a quick movement Charles had the rake under him and hoisted him, tackle and all, to the surface. Pressing a handful of weeds over fish and rake, Charles enthusiastically conveyed his prize ashore. The carp was afterwards found to weigh nearly 8 lb. The lads were naturally immensely proud of their achievement and greatly relished eating some of their old-time enemy.

In due course the boys were sent to Merchant Taylors School where, although they became moderate scholars, they appear to have distinguished themselves bodily rather than mentally, representing their school in the racquet court and on the river. In those days Merchant Taylors held a position in boating somewhat similar to that of Eton, and enjoyed the benefit of the best Oxford coaching. The brothers had an early opportunity of exercising their swimming powers, for on one of the first occasions on which they went out in an "outrigger" the eight was swamped by the wash of a passing steamer. Altogether the brothers had to swim for their lives on eight occasions before completing their boating career on the Thames.

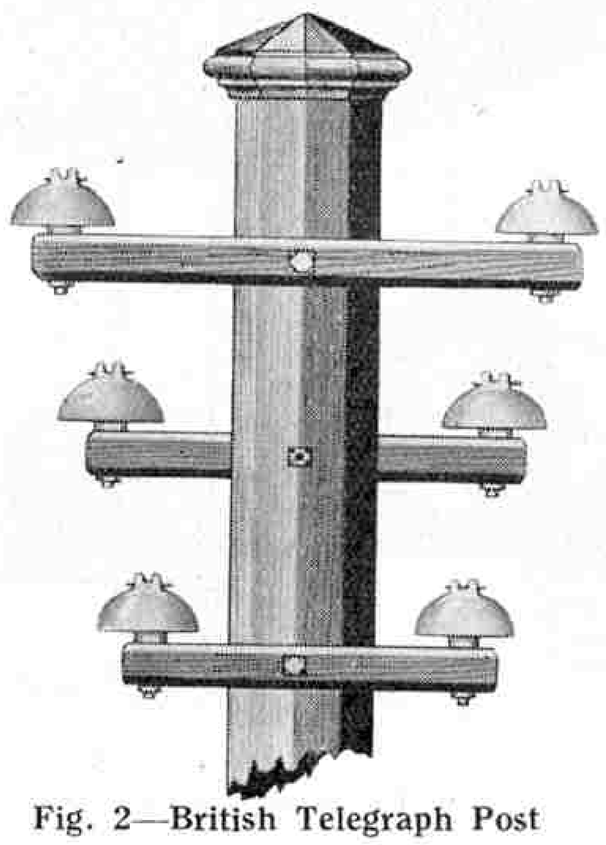


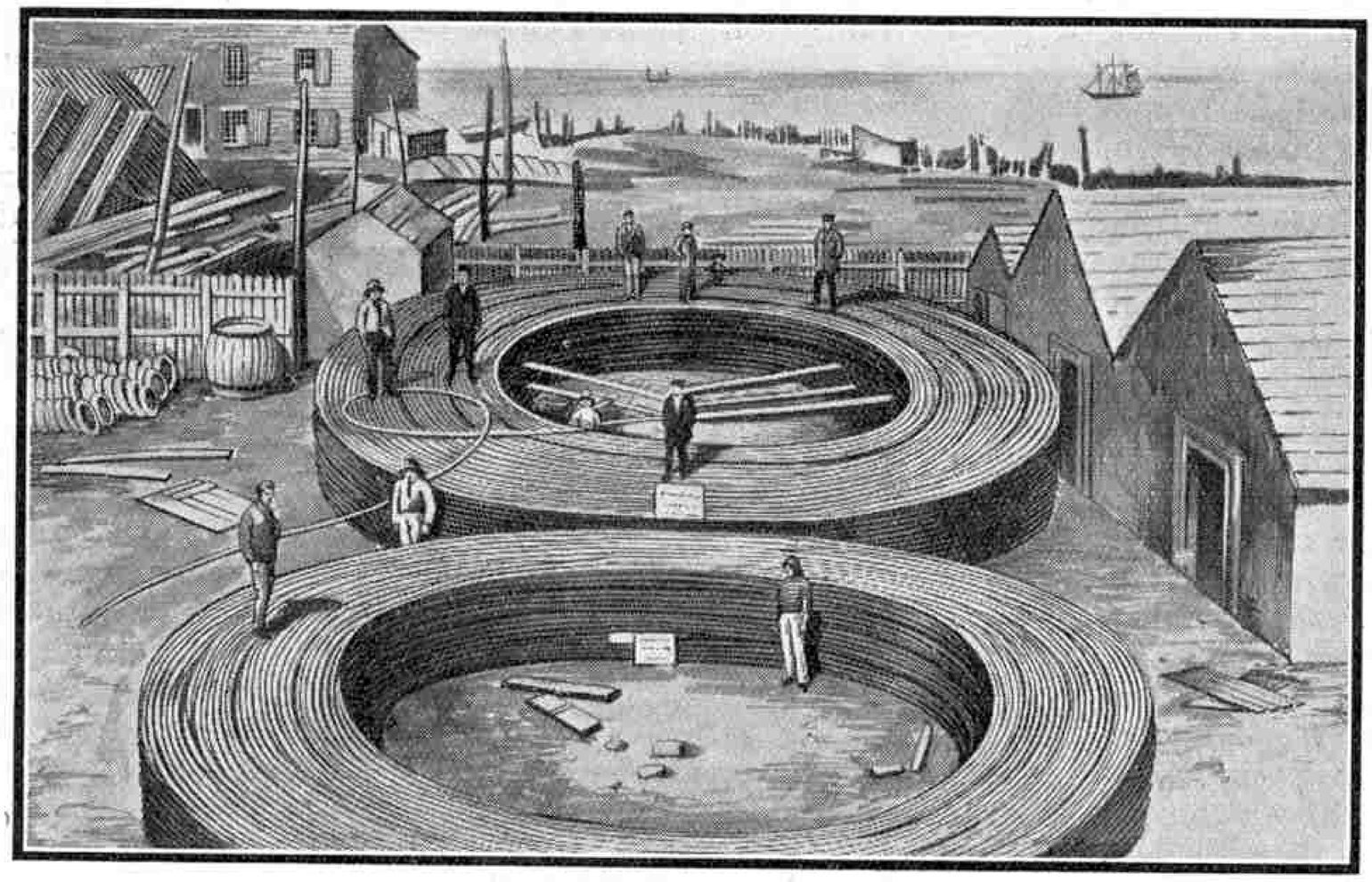
Fig. 2—British Telegraph Post

On account of pecuniary losses sustained by their father, the boys had to forgo their intended Oxford career, and in 1847 Charles and Edward joined the newly-formed Electric Telegraph Company, Charles commencing as a telegraphic clerk at Harrow Station on the London and North Western Railway.

Joint Invention Book

The telegraph instruments then being fitted by the company were of the Cook and Wheatstone single-needle type (described in the "*M.M.*," March 1925). These instruments were very slow in operation, and a great weakness of the system was the liability of the needle to waver during its beat, which frequently led to an operator misreading the signals. The brothers turned their attention to these and other difficulties and before long had commenced a series of minor inventions calculated to improve the efficiency of the system.

To register a patent in those days, however, cost at least £150 in agents' and stamp fees, and this sum was utterly beyond the brothers' financial resources at the time. They therefore commenced what they called a "Joint Invention Book," in which they entered complete details, together with the necessary drawings. The contents of the book were added to from time to time as new inventions were made, and the book was kept carefully locked away until such time as their common fund should be sufficient to enable them to apply for the protection of a patent.



Irish Cable Coiled Ready for Shipment

Monopoly Breaks Down

The monopoly that the Electric Telegraph Company at first enjoyed was destroyed by the exorbitant charges made for their services, which had the effect of bringing into existence other companies whose price-cutting tactics readily found favour with an aggravated public. One of the newly-formed concerns, the Magnetic Telegraph Company, successfully legislated in 1851 for the exclusive right to lay overhead lines along the public highways of the United Kingdom. Edward became associated with this company in the same year and was installed at the Liverpool office of the firm. Charles also withdrew from the Electric Telegraph Company about the same time on becoming assistant engineer to another new company called the British Telegraph Company.

The "Magnetic" Company

The Magnetic Company proved very successful and was soon re-organised into a more powerful concern entitled the English and Irish Magnetic Telegraph Company, having its headquarters in Liverpool. Edward Bright became manager of this company and in 1852 Charles Bright, then scarcely 20 years of age, was invited to become Engineer-in-Chief, which offer he accepted, severing his connection with the British Telegraph Company.

First Patent Obtained

The brothers thus were once more working together and in the same year they took out their first patent under the signature of "E. B. and C. T. Bright." This patent was remarkable in many ways, particularly in that it contained no less than 24 separate inventions. Among these may be mentioned the porcelain insulator for fixing aerial telegraph wires mounted on posts, which proved to be a very efficient method of insulation. It won the approval of Lord Kelvin and was immediately adopted on an extensive scale, while, in one form or other it still remains in use. Then there was the shackle or terminal insulator employed for terminations and wherever the wire has to be taken at an angle round a corner, or in other cases where great strains are involved. Then came the system of aerial telegraph posts fitted with arms of varying length to avoid the possibility of one wire dropping on another; a repeater for re-transmitting currents in both directions on a single wire, and a method of testing insulated conductors in order to localise faults.

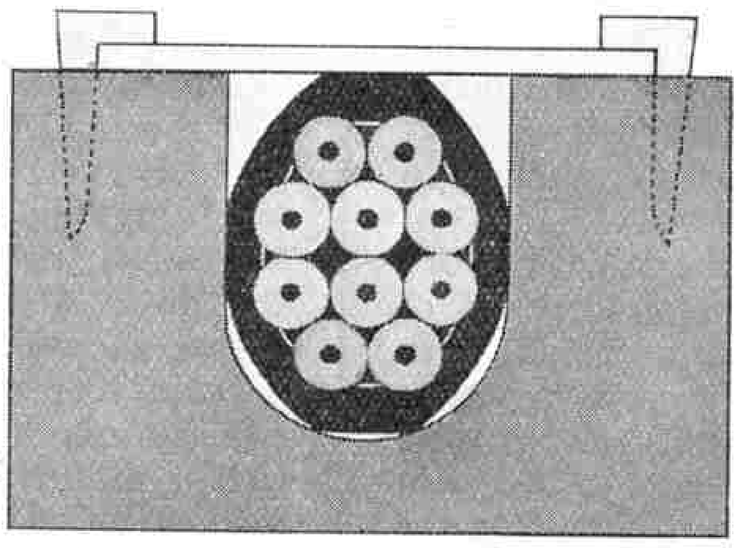


Fig. 3—Underground Cable System

This patent was taken out when the brothers were respectively 21 and 20 years of age but it contained the results of four years' combined work.

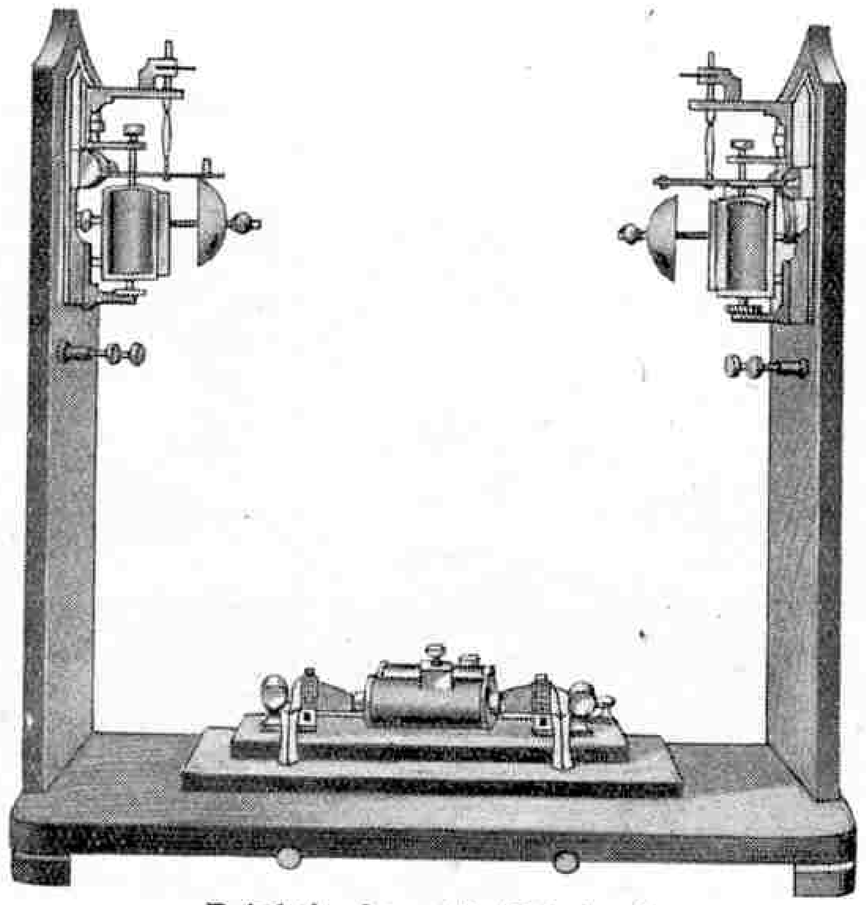
Vast Telegraphic System

During 1852 Charles Bright superintended for the company the completion of a vast telegraphic system throughout the United Kingdom. This included a main trunk line along the highroads, consisting of two gutta-percha-covered wires laid in troughs underground between London, Birmingham and Manchester; from there by railway to Liverpool and Preston; and six wires onward, also underground, to Carlisle, Dumfries, Glasgow and Greenock. From Dumfries six underground wires were laid to Portpatrick to meet the company's Irish cable. In Ireland the underground system was extended from Donaghadee to Belfast and from there via Newry and Dundalk to Dublin, comprising altogether nearly 7,000 miles of wire.

It is interesting to note that although the insulating qualities of gutta-percha had been realised by Faraday and Werner Siemens as early as 1847, this was the first instance in the British Isles in which any length of gutta-percha-covered cable had been laid underground.

Bright's Underground System

An important point in any underground system is that of protecting the insulating coating of the cable from damage. After considering a great variety of schemes Charles Bright decided that the cables through towns should be laid in 2½ in. cast-iron piping, divided longitudinally, so as to allow of laying in the wires more quickly than was possible with the old system in which the wires were drawn through ordinary gas piping. Along country roads he laid the wires in creosoted wooden troughs cut into long lengths. The idea is clearly shown in the accompanying illustration. The wires, covered with gutta-percha, were bound together with tarred yarn and laid in the trough, which was afterwards closed by a galvanised iron lid fastened in position by clamps. The trench, which was about 3 ft. deep, was then filled in.



Bright's Acoustic Telegraph

Cable-laying Feat at Manchester

It was in connection with the laying of underground wires in iron troughs at Manchester about this time that Bright was first brought into public notice. It was obviously essential that the heavy traffic should not be interrupted more than was absolutely necessary, but Bright made up his mind that he would carry out the work without interrupting the traffic at all. In a single night he had the streets up, deposited the wires, and laid down the pavement again before the majority of people were out of bed next morning. We quote the following description of the method of work from the very interesting life of Sir Charles Tilston Bright by his son, Sir Charles Bright, F.R.S.E., M.I.C.E., M.I.M.E., M.I.E.E., to whose courtesy we are indebted for a great deal of our information and also for permission to reproduce various illustrations.

"The following arrangements for the night's work go to show the prescience and energy characteristic of him. A large number of navvies were engaged, with competent foremen. To each gang was assigned a given length of street, along which the flagstones were to be lifted, the trench opened to the requisite depth, and the under-halves of the pipes laid and linked at the bottom. Another gang at once followed, wheeling the drum (whose breadth exceeded that of the trench), and unwinding the rope of wires into the under-halves of the pipes previously laid down. A further gang followed for applying, linking, and tightening the upper-halves of the pipes, while yet another set of men filled up the trench and replaced the flags. This operation, though easily described, required at this early stage of telegraphy a great deal of consideration, coupled with very active and determined control throughout the short night."

A Thrilling Scene

The intense activity and excitement that prevailed on this occasion may be realised from the following extract from a letter written at the time by Charles Bright himself :—

"I was at Liverpool last night, getting our wires from the station to our offices in the Exchange. From the great traffic during the day, it is impossible either in Liverpool or Manchester to do anything by *day*, and unless I keep a sharp eye on the men, either the pipes are laid too near the surface, or they break gas or water pipes and cause expensive repairs. Moreover, they never do a third of the work at night unless I am with them!

"Last night I did the quickest piece of telegraphic work which has ever been done. We began at ten, and by eight in the morning we had laid piping containing eight wires under the streets nearly half a mile, and all repaved.

"Can you fancy such a scene? A long row of men with pick-axes, followed by others with spades, and after them a gang of men laying pipes and wires, and, to conclude, another set re-laying the paving-stones. This row of workmen are lighted up by large fire-grates at intervals, flaring and smoking away like beacons on the coast—a perfect Babel of voices—the continual sharp knocking of the pickaxes and the scraping and clanging of the pipes being laid and hammered up, added to continued shouting for this or that tool. If you can conjure up this, you can fancy my figure appearing in the light here and there with two or three foremen—quite in my element, only I don't like the night!"

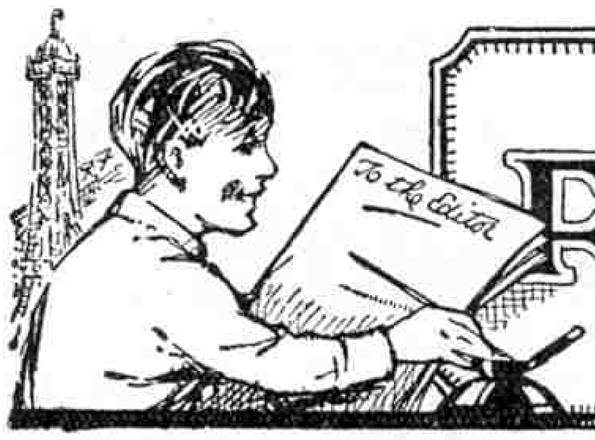
Charles Bright subsequently carried out similar work in the streets of London, Liverpool and other large towns.

First Irish Cable Completed

In 1853 Bright superintended the laying of the first effective cable to Ireland. This was the third submarine cable laying to be carried out with success, the previous two being one across the Channel and the other between Dover and Ostend. The Irish cable differed from these two, however, in the fact that the depth of water was very much greater. Three previous attempts to lay a cable across the Irish Channel had failed, and in preparing for this fresh attempt every possible care was taken to ensure success. The design of the cable was improved in many respects, its weight being seven tons to the mile, and its manufacture was carried out without any particular difficulty. When ready the cable was coiled up on the wharf ready for shipment and ultimately was stored away in the hold of the laying vessel.

The cable expedition consisted of the steamer "*William Hutt*," which had the cable and telegraphic apparatus on board, the "*Conqueror*" and the "*Wizard*," all three ships being under the navigation of Capt. Hawse, R.N. Operations were commenced from the Irish coast, the shore end of the cable being landed about two miles south of Donaghadee Harbour, Co. Down.

The apparatus and methods employed in cable-laying in those days were very crude. Each coil of the cable was turned over bodily by the men below before emerging to the guide pulley above, from where it passed through a speed-measuring appliance to a large (*Continued on page* 697)



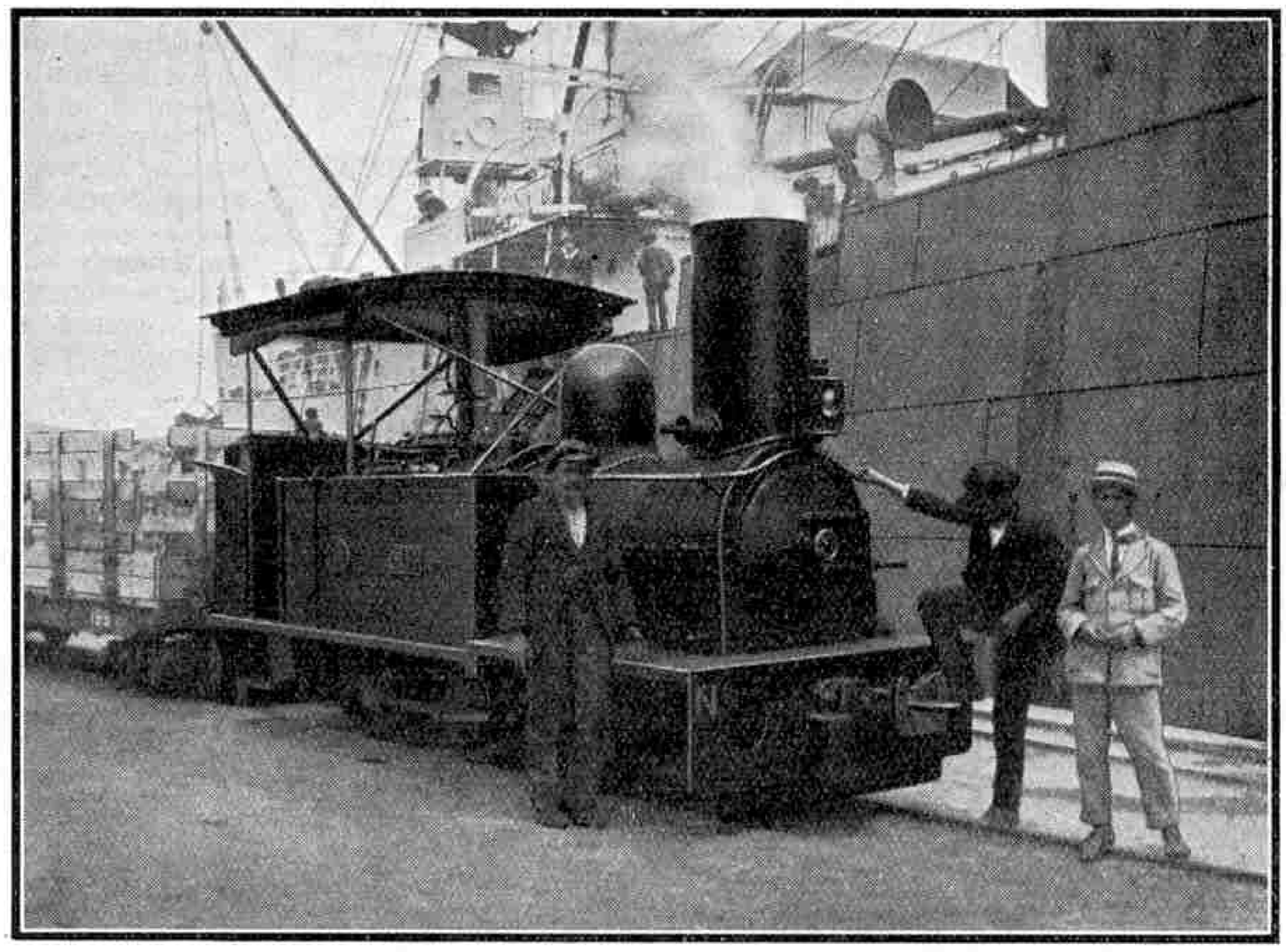
FROM OUR READERS

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

A Narrow-Gauge Railway in Cyprus

The accompanying photograph shows a small loco that runs on the narrow-gauge railway in the Island of Cyprus. The loco is on the quay at Famagusta. The ship behind it is the "*Scottish Prince,*" just in from Alexandria, and is discharging baulks of creosoted wood with which the trucks are being filled.

The railway runs from Famagusta—a city over 2,000 years old—through the great central plain of Cyprus to Nicosia, the capital of the island, and then on to the village of Evrykhou, the terminus. Evrykhou is the station for Mount Troödos, the Mount Olympus of the ancients, where the Government officials and many visitors go during the hot summer months for the sake of the cooler air and the wonderful views.



Narrow-gauge Loco in Cyprus

The gauge of the railway is 2 ft. 6 in. and its total length 18 miles, including a branch line of four miles to the copper mines of Skouriotissa. There is one train a day each way, and while the notice boards guarantee that the trains shall not start before the time advertised, they discreetly say nothing about the time of arrival! The line runs for many miles through acacia trees, which in spring are very beautiful, and which also help to prevent the embankment being washed away.

The first section was opened in 1905 and the full line was completed in 1915, at a time when it was urgently needed for the conveyance of timber, grain, etc., to the coast for the use of our troops in Egypt and Palestine. On the days when the mail boats arrive at Famagusta, a special train conveys passengers to Nicosia.

Cyprus was famous in ancient times for its splendid forests, which for a long period provided the Greek monarchs of Egypt with timber for their fleets. According to the historian Pliny, the Romans obtained their supplies of copper from this island. The metal was known to them as "*aes cyprium,*" which was afterwards corrupted into "*cuprum,*" from which our word copper is derived.

M. A. F. HIRST (Solihull).

Crossing the Line

Many people are under the impression that the time-honoured ceremony of "Crossing the Line" is no longer observed on shipboard to-day. This is by no means the case, however, as the following description of a recent crossing will show.

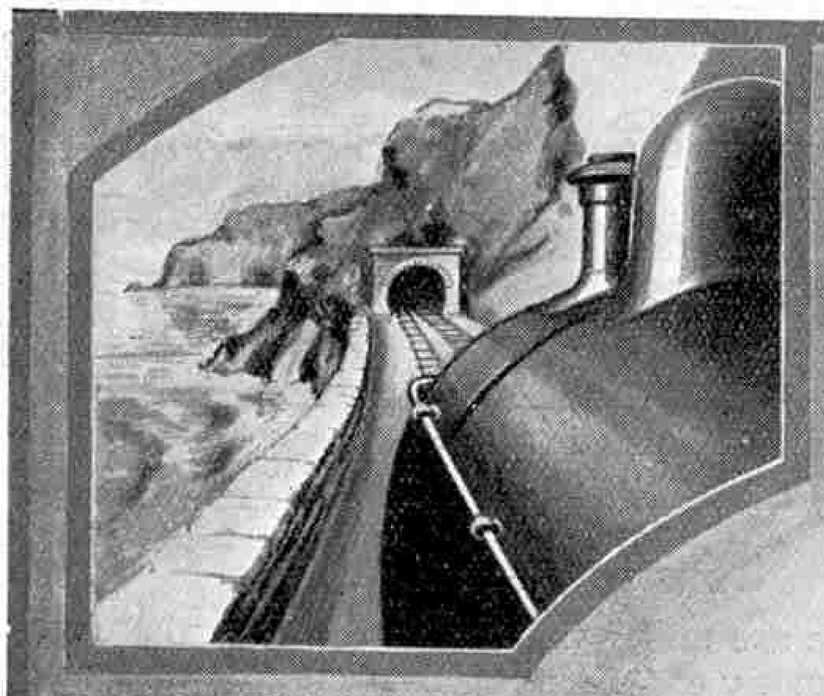
Our ship, the S.S. "*Hororata,*" left England on 10th April with 615 emigrants on board. By 27th April we were near the Equator, and on the evening of that day King Neptune came on board with some of his followers and announced that at 3 p.m. on the next day he would hold court on board and punish all miscreants. He warned us that he would deal very severely with anyone who abused or ridiculed his court.

We crossed the line at 9 a.m. on 28th April and punctually at 3 o'clock King Neptune and his courtiers appeared and went in procession around the deck. First came two men carrying rods, then King Neptune and his Queen guarded by four constables, then the Doctor, the Executioner and the "Duckers," and finally Counsel for the Prosecution and Counsel for the Defence.

A large rectangular tank with a wooden seat at one side had been erected on deck and this was kept constantly full of water by means of two hosepipes. Into this tank the "duckers" now plunged.

The court took its place on a raised hatchway on one side of the tank. A charge was read out against someone and immediately the constables sought to arrest this individual. Having been captured the victim was tried and invariably found guilty, after which he was ordered to be examined by the doctor. First of all the victim had his pulse tested to the sound of a particularly noisy alarm clock. He was then made to say "ninety-nine," after which his temperature was tested with a huge thermometer mounted on a board, and finally a piece of dough was pushed into his mouth!

If the victim was found physically unfit he was fined a certain number of bottles of beer. (*Continued on page 704*)



Railway News of the Month

New Tipping Wagons

A new type of side-tipping wagon that has been placed on the market consists of two self-discharging bodies mounted on a standard wagon frame. The principal dimensions of the wagon are as follows :—Length over buffers, 17 ft. 10 in.; total height above rails 8 ft. 6¼ in.; length of each body inside, 6 ft. 3 in.; width of each body inside, 7 ft. 1 in.; depth of bodies, 2 ft. 3 in.; capacity in cubic feet, per body, 190.

The bodies are mounted and supported on rockers in a horizontal position and a feature of their design is that they can be tipped independently of one another at three different angles. The movement is so easy that no mechanical power is required to tip the bodies and they can be pulled or pushed by hand to the original horizontal position.

* * * *

New Loco Depôt at Exmouth

When the extensive alterations now being carried out at Exmouth Junction, on the Southern Railway (Western Division), are completed, the works will be the most up-to-date locomotive depôt in the country. In addition to the installation of an electrically-operated coal plant and turntable, new wagons and carriage repair shops and engineering shops are being built and a new marshalling yard for goods trains is being laid out. These modern facilities are being provided on the site of the old depôt, which is admirably situated for speedy communication with the whole of the division. Lines radiate from the junction to Topsham, Barnstaple, Ilfracombe, Bude, Plymouth, Sidmouth and London.

* * * *

L.N.E.R. Orders

Recently orders for 200 first and third-class passenger coaches and all-steel luggage brake vans have been placed by the L.N.E.R., the orders being divided among eight firms.

* * * *

Progress in S.W. Africa

The first railway to be constructed in South-West Africa was built by the Germans in 1897 and consisted of a narrow gauge track from Swakopmund, on the coast, to Windhoek, the capital. By 1914 the line had been extended southward to Kalkfontein. On the outbreak of war it was decided to invade the German territory from the South, and to facilitate this process it was necessary to link up the Union of South Africa railways at Prieska with Kalkfontein, a task that was completed in record time.

To-day the mileage in use is 1,352 and further construction is going forward from Windhoek to Gobabis. Ultimately the line will be continued from this latter town to connect with the Union line to Rhodesia.

Difficulties Explained

(1)—White Line on L.M.S. Wagons

Many readers have written to ask the meaning of the diagonal white line that appears on the sides of certain of the new L.M.S. goods wagons.

The object of this line is to distinguish all specially constructed vehicles, such as those with end doors or bottom doors, or wagons specially built for specific traffics. Such vehicles usually are restricted to certain jobs and, owing to their limited number, have to be kept for these jobs and not used for ordinary goods traffic if it can be avoided.

The distinctive marking enables these vehicles to be picked out readily in a yard full of wagons, without the necessity of a man walking all round and examining each one to ascertain whether it is a special wagon or not. In short, the diagonal white line is a time-saving device.

The Passing of the Lift

The escalator—that source of confusion to the unversed country cousin—is slowly but surely replacing the lift as the means of conveyance from the street level to the platforms of the London Underground tube system. Already escalators are in use at 24 stations, and the opening of the Morden tube extension will bring the total number in use in London up to 85.

* * * *

New Loco for Union Pacific

A new type of loco, equipped with twelve driving wheels and fitted with three cylinders, is being built for service on the Union Pacific route between Cheyenne, Wyoming, and Ogden, Utah. This line passes over the greatest altitude reached by a railway in the U.S.A., 8,000 at Sherman Hill, in Wyoming. The loco will be 102 ft. 6 in. in length, 16 ft. 1½ in. in height and 11 ft. 2 in. in width.

Shields Tube Railway

The project for the construction of a tube railway under the river Tyne, between North and South Shields, has received the approval of the Ministry of Transport and a Bill authorising the scheme is to be presented in Parliament.

The railway will consist of a single line running between stations placed at Howard Street, North Shields, and Mile End Road, South Shields, and it is anticipated that the journey will occupy only 50 seconds. A three-minute service is to be run and it is estimated that the yearly total of passengers will be not less than 5,000,000.

* * * *

North Road Station, Darlington, on the L.N.E.R., must be popular among winged creatures, for during the past few months two swarms of bees, an owl, and a pair of racing pigeons have made their homes in the roof of the station premises!

* * * *

Indian Railway Construction

Work has begun on two new Indian railways that are being constructed as joint enterprises of the Governments of India and the Punjab. These two lines are known respectively as the Kangra Valley Railway and the Shahdara-Naroal Railway. The former will play an important part in transporting material into the hills in connection with the hydro-electric schemes now being pushed forward by the Indian Government and further, being of the same gauge as the Kalka-Simla line, will provide an extension of existing lines.

The construction of the two lines is the commencement of an important era of railway development in North-West India, for six other schemes are under consideration.

* * * *

Coal Consumption per Engine Mile

On the L.N.E.R. the average consumption of coal per engine mile for passenger services is 53.11 lb., while in the goods service the consumption is 70.06 lb. The comparative figures for the other large railway groups are as follows :—L.M.S. 52.06 lb. and 65.23 lb.; Southern 45.29 lb. and 55.80 lb.; G.W. 40 lb. and 54.82 lb.

* * * *

At the beginning of last month the Belgian State Railways were handed over by the Government for operation by a private company to be known as the Société Nationale des Chemins de Fer Belges.

English-built Coaches for Egypt

The Metropolitan Carriage, Wagon and Finance Co. Ltd., of Saltley, who have a contract for coaches and steel wagons for the Egyptian State Railway, have recently shipped to Egypt the first passenger coaches that have been completed. Three coaches were despatched from Birkenhead and three from Brentwood Docks, the waterside depôt of the Great Western Railway, whilst 100 wagons and three coaches were despatched from Newport docks.

The coaches shipped from Birkenhead travelled from Birmingham during the night and owing to their width, arrangements had to be made by the L.M.S. Railway for traffic to be stopped on the adjoining set of metals. Special bogies were provided for the conveyance of the coaches, which were placed in such a manner that they could be moved sideways at certain points, as necessary, to clear platforms and other obstructions. From Birkenhead they were put aboard the S.S. "*Henzada*" and despatched to their final destination.

In the case of the three coaches that were sent through the Port of London, here again special temporary bogies had to be supplied, as the dimensions of the consignment exceeded the gauge restrictions, the coaches actually travelling safely at a height of 13 ft. 3 in. with a maximum width of 10 ft. 8½ in. The carriage builders solved the problem of clearing platforms, etc., by fitting special screw gear enabling the bodies of the coaches to be moved laterally to the extent of 10 in. out of centre. This screw gear was operated by two men at each end of the car in turn, accordingly as the various obstacles in the course of the journey were encountered.

Having arrived without mishap at Brentford, the coaches were hauled by G.W. Railway cranes into specially constructed barges of 200 tons capacity. The Thames Steam Tug Company undertook this work and saw the freight safely into the King George V. Dock for shipment to Egypt.

* * * *

Some Interesting Statistics

The recently-published returns of railway traffic for last year contains a mass of interesting information of a miscellaneous nature concerning the working of the principal groups.

During the year nearly 75,000,000 parcels were conveyed by rail, and of these the L.M.S. carried over 31,000,000; the L.N.E.R. 20,000,000; the G.W. 12,000,000 and the Southern 8,500,000. Approximately 278,000,000 gallons of milk were carried, and of this total the L.M.S. carried 94,500,000 gallons in 7,250,000 cans. The G.W. carried 85,000,000 gallons.

It is possible to detect many of the principal features of a railway by examining its traffic returns and thus it is interesting to find that out of a total of 83,843 tons of meat carried, the Southern handled over 53,000 tons. That is accounted for by the entry of so great a quantity through the Southampton docks. Out of 473,000 tons of cheap rated fish the L.N.E.R. handled 274,000 tons, from which may be deduced the fact that the L.N.E.R. serves the fishing centres along the East Coast.

* * * *

A Record Speed of over 102 m.p.h.

Mr. Flewellen set up his speed record in May 1904, when he ran a competitive mail train against an engine (belonging to what was then the London and South-Western Railway) from Plymouth to Paddington. "We attained a speed of 102.2 miles an hour," said Mr. Flewellen, "and that record has never since been reached by any engine anywhere in the world. The journey of 246 miles was covered in three hours forty-one minutes' running time, with a stop of four minutes at Bristol. When we ran into Paddington I nearly fell off the train. I have been 600 miles in one day standing on the footplate all the way."

Asked what he will do when he retires, Mr. Flewellen remarked: "Well, I have a garden and a little car, and if I cannot be happy, I am a fool."

* * * *

Gunpowder in Severn Tunnel

The restrictions in regard to the conveyance of explosives and other dangerous goods through the Severn Tunnel have been withdrawn. Formerly goods of this nature had to make a long detour via Gloucester—involving, in many cases, a journey of double the distance via the tunnel—so that the abolition of the restrictions will considerably expedite the transit of the goods affected.

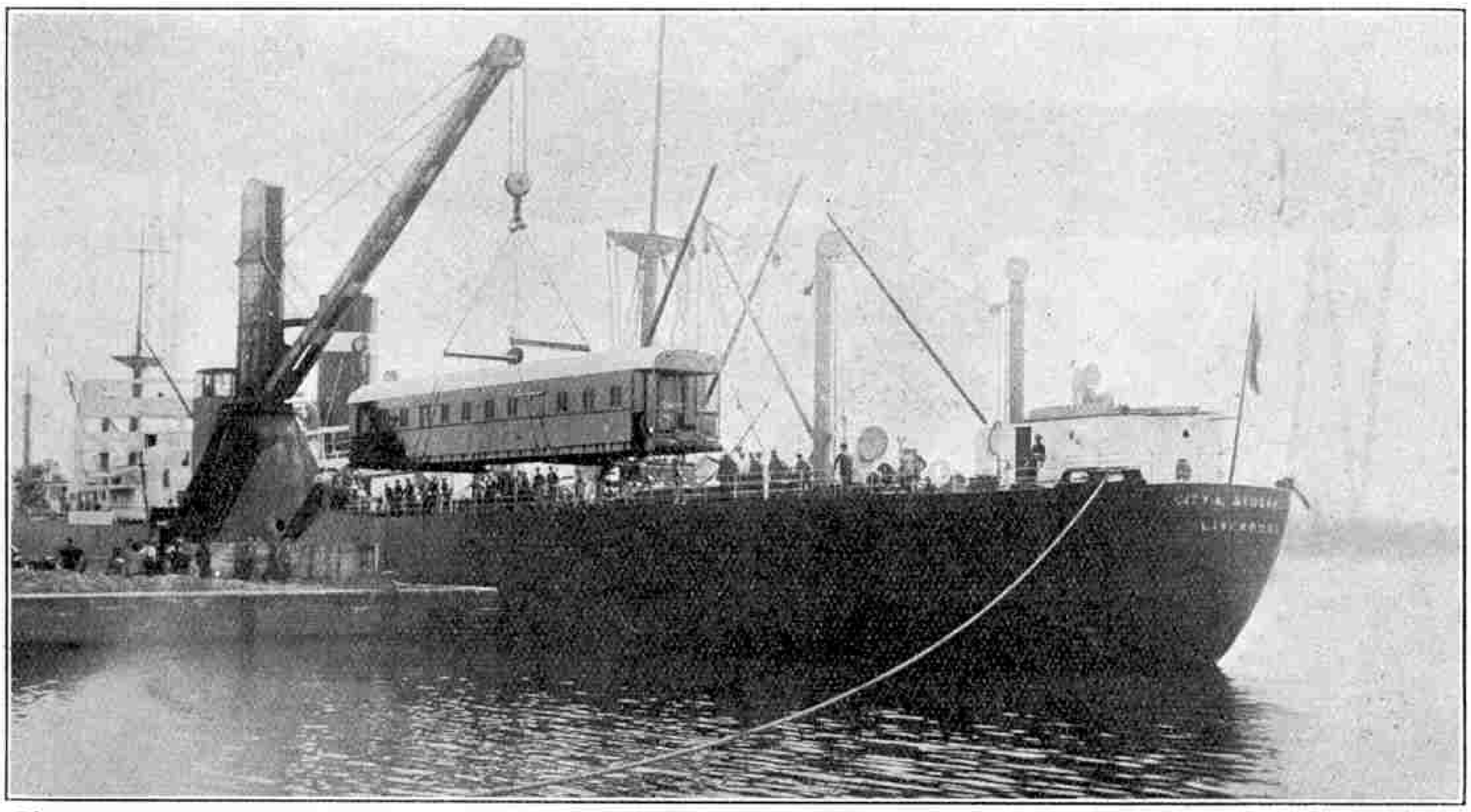


Photo courtesy] [*G.W.Rly. Magazine*

One of the English-built coaches built for the Egyptian State Railway being lifted on board the steamer at Newport for shipment to Egypt

A New "Castle" Loco

The advent of the "*Launceston Castle*," No. 5000, which has just been turned out of Swindon shops, marks an interesting development in the history of G.W.R. locos. Hitherto, 4-cylinder six-coupled express engines belonging to that line have been allotted numbers between 4000 and 4099, but these numbers have now all been exhausted and as a result of the continued multiplication of the "Castle" class engines, it has become necessary to start a new series commencing with the number 5000, the numbers between 4100 and 4999 being already devoted to other Great Western locomotive types.

Two sister engines, numbered 5001 and 5002, of the same type have also made their appearance and have been named after the castles at Llandovery and Ludlow respectively. Including five engines of the previous "Star" class and one "Pacific," which have been rebuilt to conform with other locomotives of the "Castle" type, there are now 36 of these powerful express locomotives in service.

* * * *

A Trackless Train

Considerable interest was caused at Liverpool recently by the arrival of what is claimed to be the world's first trackless train. This train, which comprises an engine and Pullman coach, is about 50 ft. in length, and is equipped with rubber tyres. The petrol-driven engine develops 90 h.p. and is capable of a speed of 50 m.p.h. The Pullman carriage has sleeping accommodation for five, and a wireless set, gramophone, etc.

The train has completed a 25,000 miles' tour and is at present touring the provinces. It has already visited the principal cities of America, Germany, France, and Russia. In London it was used to collect subscriptions for the rebuilding of Middlesex Hospital.

* * * *

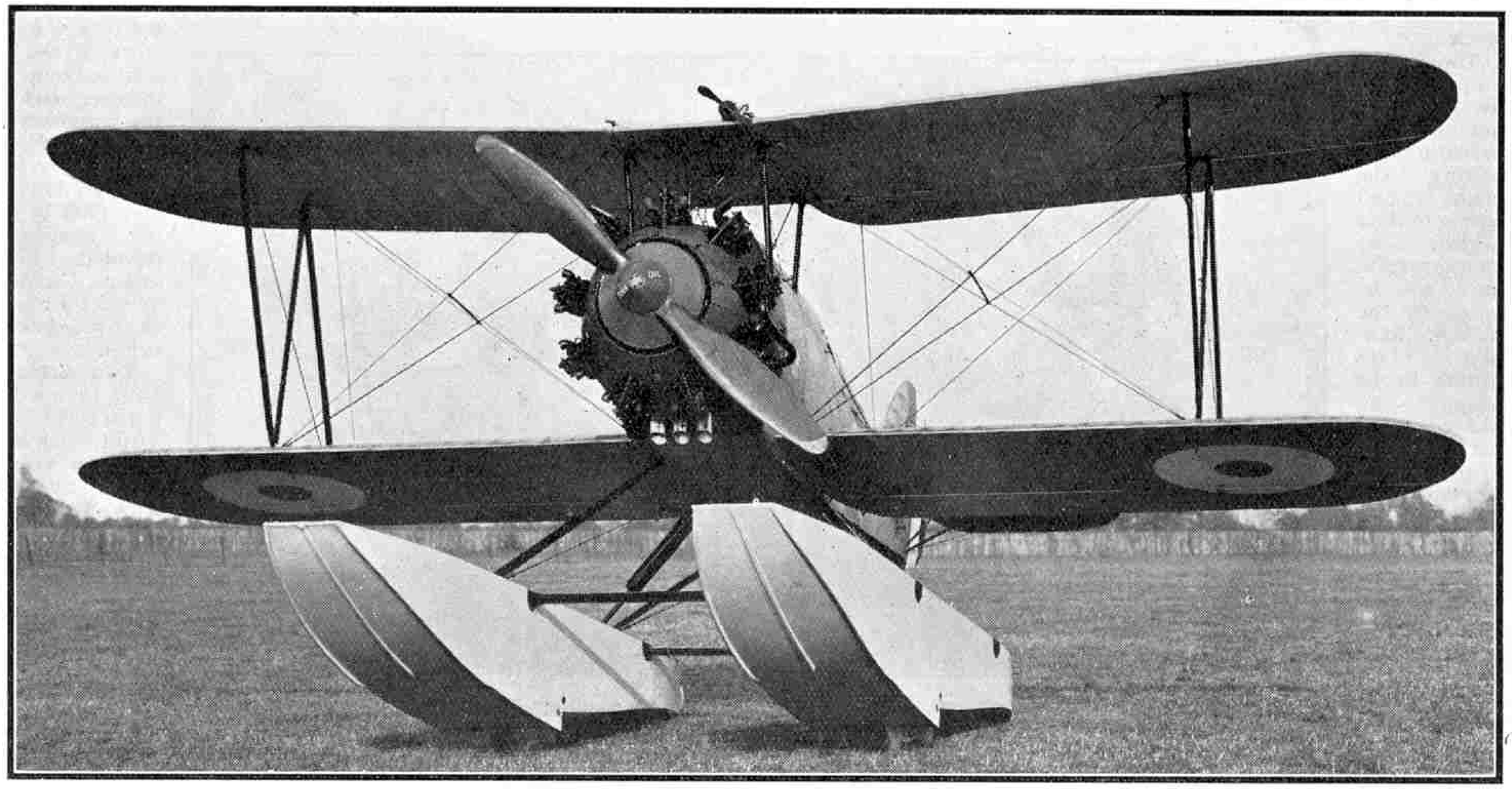
New Swiss Electric Locomotives

Work is in hand at the works of the Sécheron Co., at Geneva, on the electrical equipment of four locomotives which will be among the most powerful in the world.

Intended for service on the Lotschberg Mountain Railway, the locomotives are being fitted with six 700 h.p. motors, and will be used to haul trains that hitherto have required two engines. The locomotives have nine axles, and are 82 ft. in length.

The Conquest of the Air

XIX. The Parnall "Plover"—A Single-Seater Ship Fighter



Parnall "Plover" converted to Amphibian

THE Parnall "Plover" is a single-seater ship fighting aeroplane designed for taking off from, and landing on, the decks of aircraft-carriers, and a sling fitted to the fuselage enables the machine to be hoisted on board an aircraft-carrier.

By the removal of the under-carriage, and the attachment of floats, the "Plover" may readily be converted to an amphibian. The area of the main planes is 306 sq. ft.; the span 29 ft., length 23 ft. 8 in. and height 10 ft. 5 in. The useful load, including pilot, electrical gear, instruments, etc., is just under 500 lbs. With a total weight of 2,851 lbs. the speed at 800 ft. is 145 m.p.h. with a Bristol "Jupiter" engine.

Exceptionally Clear View Ahead

An interesting feature is the fact that the wings are detachable and when detached are extremely rigid. This is a detail that is specially valuable when the machine is being transported and also when it is stowed away below the deck of an aircraft-carrier.

The undercarriage has a special double-acting oil cylinder with rubber blocks in compression. This type of landing gear has practically no bounce or rebound even under the worst landing conditions.

The pilot's cockpit is situated just behind and below the top rear spar, and owing to the heavy stagger the downward view and the view right ahead is very good. Special attention was given to this point in the design, for a good forward view is most important, both when landing and when fighting.

The pilot is well screened from the wind and his guns are arranged one on each side of the cockpit inside the screen. The rear cover of each gun may be readily lifted for clearing jambs, and both guns and ammunition boxes are quickly removable from the machine. The rear gun attachments are adjustable in order that both guns may be brought to bear upon the same target when necessary. The instruments on the dash include air-speed indicator, an altimeter, revolution indicator and, of course, the usual oil and petrol gauges. The aperiodic compass is mounted centrally on a special duralumin bracket underneath the dash.

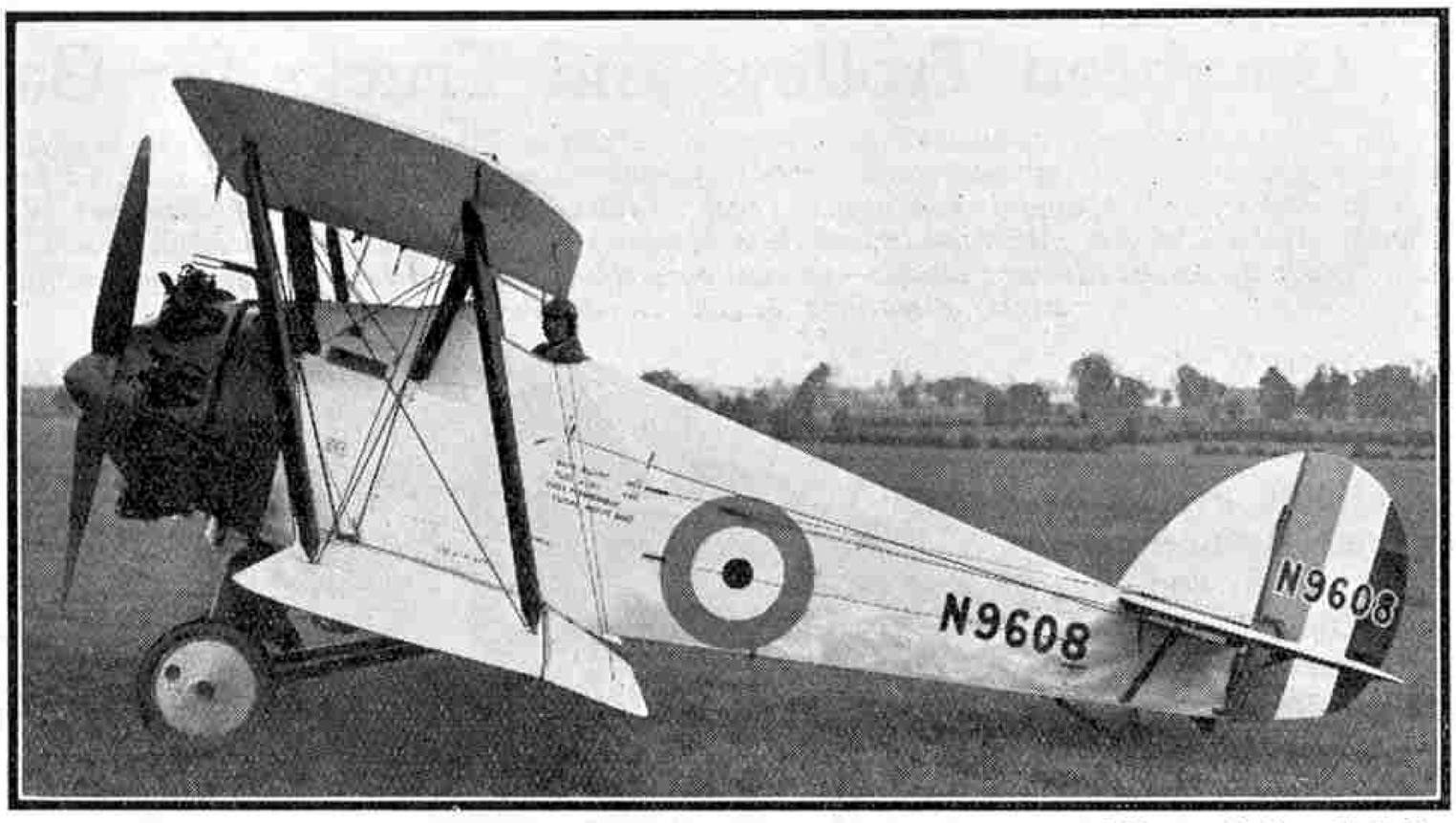
Control is by joy-stick and rudder bar, the latter being adjustable in a fore and aft direction to suit the various leg lengths of different pilots. A lever for operating the flaps, and a hand-wheel for varying the tail-plane incidence, are placed on the left of the pilot. Throttle and altitude controls are mounted on the left-hand side of the cockpit, unwanted movement of the engine controls being prevented by a special spring and friction disc. The hand petrol-pump and starting magneto with switch are located on the right of the pilot's seat, where are also the oxygen apparatus and Verey pistol clip and cartridge boxes.

The Engine is Easily Removable

The machine is intended for use with either a Bristol "Jupiter" or Siddeley "Jaguar" engine and considerable attention has been paid to the accessibility of the engine and of the cockpit. A special cowling clip

has been employed to enable the whole of the detachable fairing on the machine to be removed within a minute. The engine mounting, which is attached to the fuselage, is of steel construction, the engine plate being of channel-girder type. The engine with its plate is fixed in position on the mounting by four bolts and is readily removable by their withdrawal.

The fuselage is built in one piece, from the fireproof bulkhead immediately behind the engine to the transom. Aft of the pilot's cockpit the sides are ply-covered, but the top bays under the top fairing are braced by swaged rods. Inspection doors are provided at the rear and give access on each side to the tail-skid shock-absorber, which is of rubber in compression, the tail-skid itself being provided with a readily replaceable shoe.



Photos courtesy] [*Messrs. G. Parnall & Co.*

Parnall "Plover" fitted with Bristol Jupiter Engine

The tail-plane, elevators, fin, and rudder together form one rigid unit. A turn of the hand-wheel in the pilot's cockpit is sufficient to move the tail-plane through its entire range. The fin is adjustable to enable the pilot to fly with his feet off the controls when he so desires. Ease of control is assured by balancing the elevators.

In the main plane, permanent jury struts are provided at the inner end, and these run from the bottom front spar to the top and rear spars, respectively. They are so arranged that when in position their extra resistance is practically negligible.

The ailerons, which are controlled by means of a lever on the left of the pilot's seat, may be used as flaps to reduce the landing speed. It is interesting to note that a differential aileron control is employed, thus making the lateral control light to handle in spite of the fact that the ailerons extend the whole span. (Incidentally it may be mentioned that the de Havilland differential aileron was described in our issue of August 1926). The wire aileron control forms a complete circuit in each wing unit, and when removing the wings it is not necessary to disconnect or slacken off these circuits. When the wings are in position a link in each circuit is attached to the end of a lever in the fuselage. Cables passing over pulleys are eliminated by the use of chain and sprockets.

The machine carries 46 gallons of petrol in a main tank and 6 gallons of petrol in a gravity tank. The main tank is situated under the pilot's seat and the gravity tank in the fairing above the engine and forward of the pilot. A Vicker's wind pump supplies petrol direct to the carburettors through a three-way cock, and a bye-pass also leads to the gravity tank. Any surplus from the gravity tank returns to the main tank through an overflow pipe, a non-return valve being arranged in the pipe leading from the pump to the three-way cock. The three following systems of feed are therefore available :– (1) Gravity tank to engine only ; (2) pump only to engine ; and (3) gravity and pump to engine.

In addition to the above arrangements there is an entirely separate hand-pump system fitted from main to gravity tank. A petrol level gauge, fitted to the pilot's dash, enables the pilot to see at a glance the quantity of petrol in his main tanks.

A special valve is fitted to the bottom of the main tank making it possible to quickly discharge the whole of its contents in the case of emergency. It opens instantaneously and gives a free bore of 3″ diameter for the escape of petrol.

Provision has been made for the installation of a separate gas starting unit, which is found convenient when the machine is used as an amphibian. The gas-starter may be installed beneath a hinged aluminium cover, which is the form that the fairing takes in the fuselage frame immediately abaft the pilot's cockpit. This allows the pilot to start up the auxiliary engine by means of a ratchet handle, as he kneels on his seat and hinges over the cover.

As has already been mentioned, the "Plover" is converted into an amphibian by removing the undercarriage used with the land machine. Suitable fittings are provided on the fuselage for the fitting of an amphibian chassis, which is so designed that no matter what may be the deflection of the shock absorbers, there is no alteration in the angle of the float bottom relative to the machine.

The floats are of boat-built type and have watertight compartments, with fixed wheels projecting below the bottom in the neighbourhood of the step. Water rudders are fitted and controlled, in conjunction with the rudder, by the rudder bar.

Previous articles in the "Conquest of the Air" series have appeared as under :—

1.	The Lympne Trial for Light Monoplanes ...	March	1925
2.	Beardmore "Wee Bee I."	April	,,
3.	Super-Seaplanes for U.S. Navy	May	,,
4.	Argentine Airman's Attempt to Circle the Earth	June	,,
5.	Parnall "Pixie III."	July	,,
6.	De Havilland "Moth"	August	,,
7.	Beardmore-Rohrbach All-Metal Flying Boat ...	October	,,
8.	Fokker C.V. Scout	November	,,
9.	Vickers "Vimy" Ambulance	December	,,
10.	The Cierva Auto-Giro Flying Machine	January	1926
11.	Boulton "Bugle"	February	,,
12.	The Flight from London to the Cape	March	,,
13.	Light Aeroplane Clubs	April	,,
14.	D.H. 54 (de Havilland "Highclere")	May	,,
15.	Vickers (Rolls-Royce) "Vanguard"	June	,,
16.	De Havilland "Hercules"	August	,,
17.	Handley Page "Hampstead"	September	,,
18.	The Gloster "Gamecock"	October	,,

MECCANO
STANDARD MECHANISMS

Section X. Overhead Trolleys and Trucks for Gantries, etc.

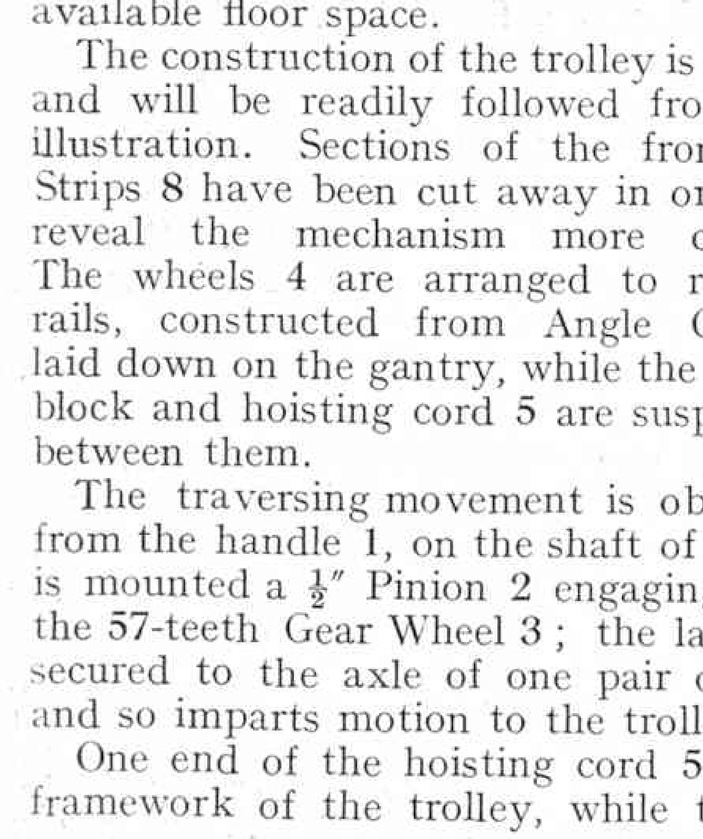
Continuing the series of articles dealing with various novel aspects of Meccano model-building practice, we describe in this number several different types of overhead travelling mechanisms for model cranes, gantries, etc. In previous issues we have dealt with Gear Ratios, Belt Mechanism, Pulleys, Levers, Clutches, Drive-Changing Mechanisms, Brakes, Bearings, Steering Gear, Screw Mechanism, etc. We have termed these Meccano movements "Standard Mechanisms," for they may be adapted with advantage to numerous Meccano models—in most cases without any alteration, but in some few instances with only slight alterations to the standard movement.

STANDARD MECHANISM No. 151 illustrates an overhead traveller of a type that is in common use in almost every branch of constructional engineering. It is designed for use in connection with gantry cranes, and is sometimes adapted to traverse the length of a large girder slung between two carriages running on rails built into the walls of a factory or workshop, thus making it possible to bring the hoisting block over any point in the available floor space.

The construction of the trolley is simple and will be readily followed from the illustration. Sections of the front $2\frac{1}{2}$" Strips 8 have been cut away in order to reveal the mechanism more clearly. The wheels 4 are arranged to run on rails, constructed from Angle Girders laid down on the gantry, while the pulley block and hoisting cord 5 are suspended between them.

The traversing movement is obtained from the handle 1, on the shaft of which is mounted a $\frac{1}{2}$" Pinion 2 engaging with the 57-teeth Gear Wheel 3; the latter is secured to the axle of one pair of running wheels 4, and so imparts motion to the trolley.

One end of the hoisting cord 5 is connected to the framework of the trolley, while the other end is led round a $\frac{1}{2}$" loose Pulley carried on the shank of a bolt 9 in the pulley block 10, and wound on the Crank Handle 11. The load is prevented from falling back when hoisted by means of a Pawl 6 and Ratchet Wheel 7 (see S.M. 84).



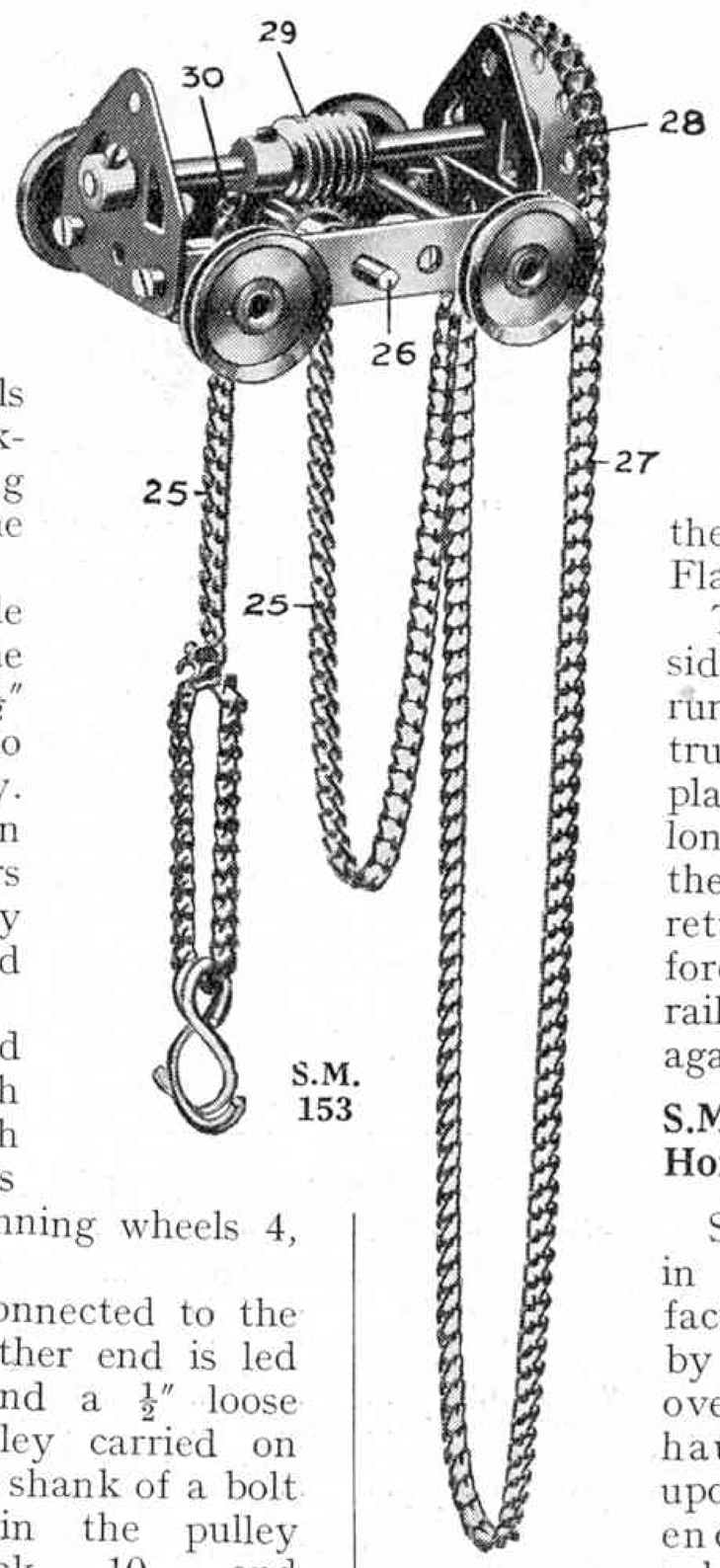
S.M. 151

S.M. 152—Truck, with Automatic Discharge

This truck is designed to run on overhead rails and to discharge its contents automatically on reaching a predetermined point.

The $4\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plate 1, forming the bottom of the truck, pivots about the Rod 2, and carries a short Double Angle Strip 3, which is spaced away from the Plate by means of five Washers placed on each of the bolts 4. A short Rod 5 journalled in the strip 3 carries a $\frac{1}{2}$" loose Pulley 6, which runs upon a third rail laid in the centre of the track on which the Flanged Wheels 7 are guided.

This centre third rail dips down the side of a chute placed beneath the truck runway, with the result that, on the truck reaching this spot, the bottom plate 1 falls open, since the Pulley 6 is no longer supported, and the contents of the truck are discharged. As the truck returns for a fresh load, the Pulley is forced up the sloping end of the centre rail, until the bottom of the truck is again closed.

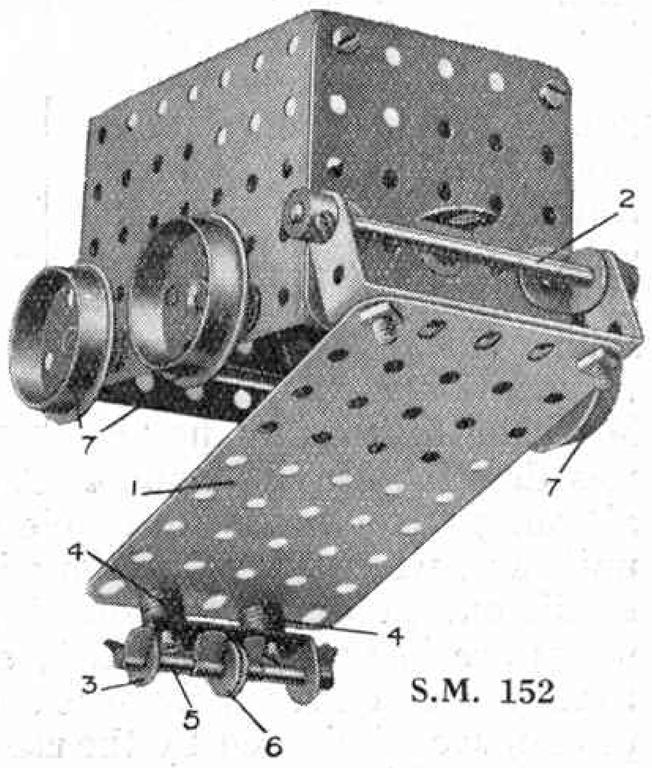


S.M. 153

S.M. 153—Overhead Trolley, with Chain Hoist

S.M. 153 illustrates a device employed in many factories and workshops to facilitate the movement of heavy loads by hand power. The trolley runs upon overhead rails, and the load is raised by hauling upon an endless chain (represented by Sprocket Chain 27 in the model).

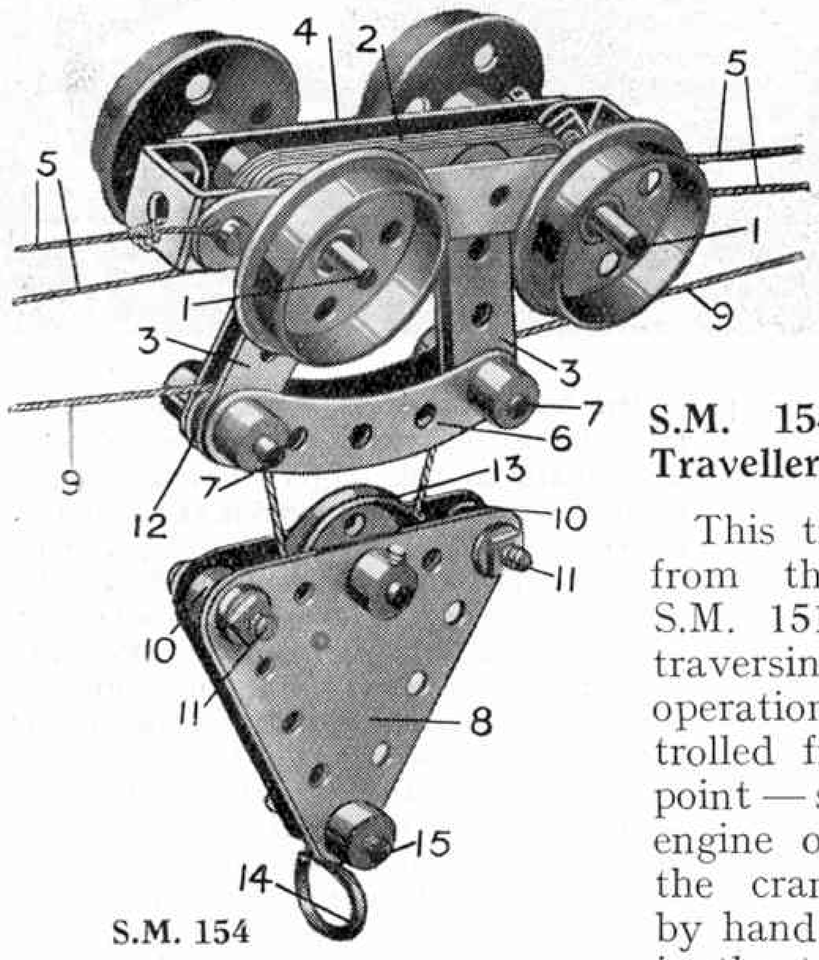
It will be observed that the trolley is constructed from two $2\frac{1}{2}$"×$\frac{1}{2}$" Double Angle Strips bolted together at each end by two Flat Trunnions. The chain 27 rotates a Sprocket Wheel 28, on the shaft of which is a



S.M. 152

Worm 29 engaging a $\frac{1}{2}$″ Pinion on the Rod 26. A $\frac{3}{4}$″ Sprocket Wheel 30, also secured to the Rod 26, engages a further length of Sprocket Chain 25, one end of which is secured to the framework of the trolley, and the other carries the hooks supporting the load.

This Hoist is used to handle the material to be cut in the Meccano Stone-Sawing Machine (Model No. 617) and may be employed in all similar models.



S.M. 154

S.M. 154—Overhead Traveller for Gantry

This traveller differs from that shown in S.M. 151 in that the traversing and hoisting operations are controlled from a distant point—such as the engine or gear-box of the crane—instead of by hand gear mounted in the traveller itself.

The axles 1 of the travelling wheels are journalled through the ends of four $2\frac{1}{2}$″ Strips 2 placed together and spaced by Washers in a central position in the trolley 4. Two pairs of 2″ Strips 3 are bolted to the Strips 2 and are connected at their lower ends by Curved Strips 6. $\frac{1}{2}$″ loose Pulleys 12 on short Rods 7 form guides for the hoisting cord 9, which passes round a 1″ Pulley 13 in the pulley block 8. The latter is constructed from two Triangular Plates spaced apart by Collars 10 and secured by $\frac{3}{4}$″ Bolts 11. The Hook 14 is suspended from a 1″ Axle Rod 15.

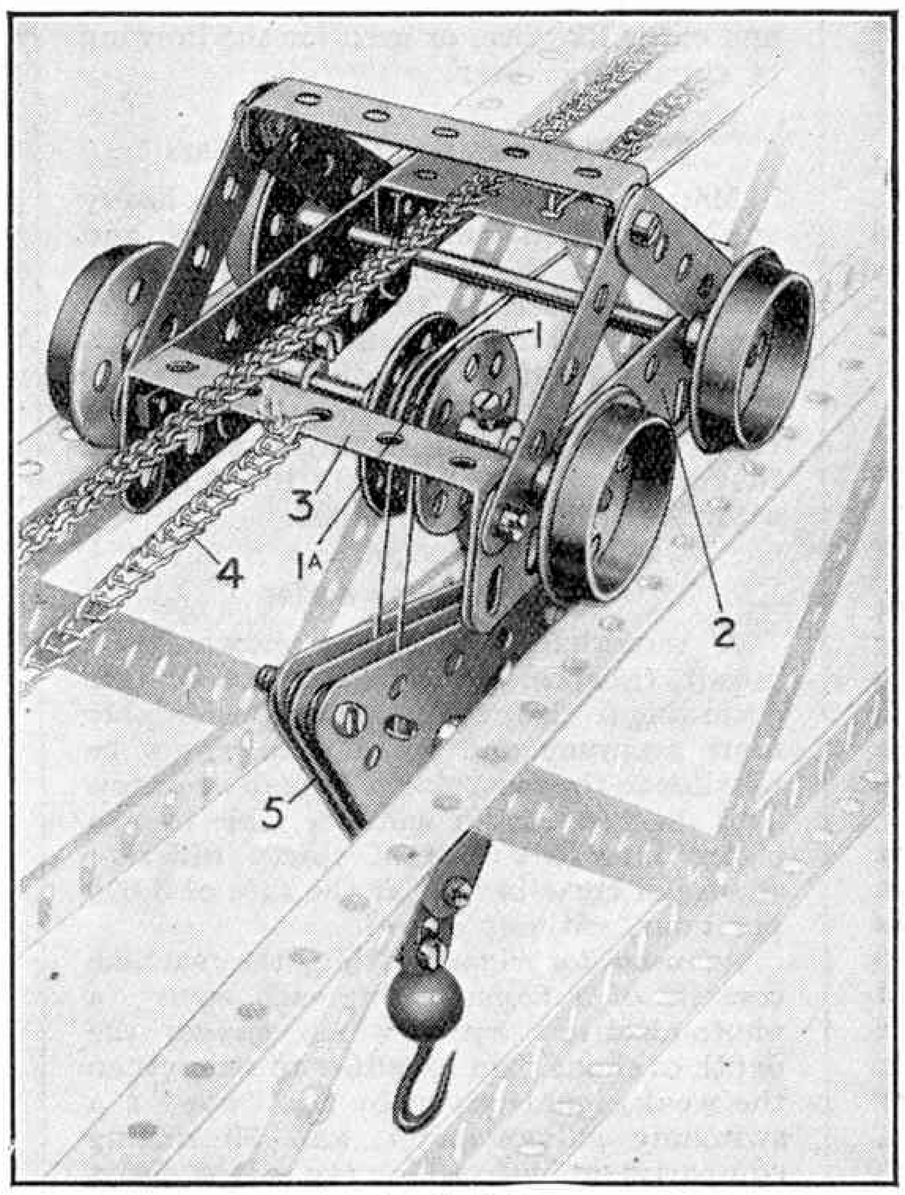
The trolley is caused to travel along the rails by means of the cord 5, both ends of which are secured to the framework 4 (see S.M. 169, Endless Rope Traversing Gear).

S.M. 155—Overhead Traveller for Gantry

This apparatus fulfils similar duties to S.M. 154 but is of slightly larger and more sturdy construction. The wheel-base 2 is constructed from two $3\frac{1}{2}$″ Flat Girders connected by $2\frac{1}{2}$″ × 1″ Double Angle Strips 3. The traversing movement is imparted by means of a Sprocket Chain 4, the ends of which are connected to the Bent Strips 3 (see S.M. 169).

A feature of this trolley is the two-sheaved pulley 1 with specially deep grooves, which form guides for the hoisting cord. This pulley consists of two Bush Wheels and two 1″ loose Pulleys, and is built up in a similar manner to that described in S.M. 39, but in this case the 1″ Pulleys 1A should be free to rotate at different speeds between the Bush Wheels. If necessary Washers may be placed between the wheels to reduce friction.

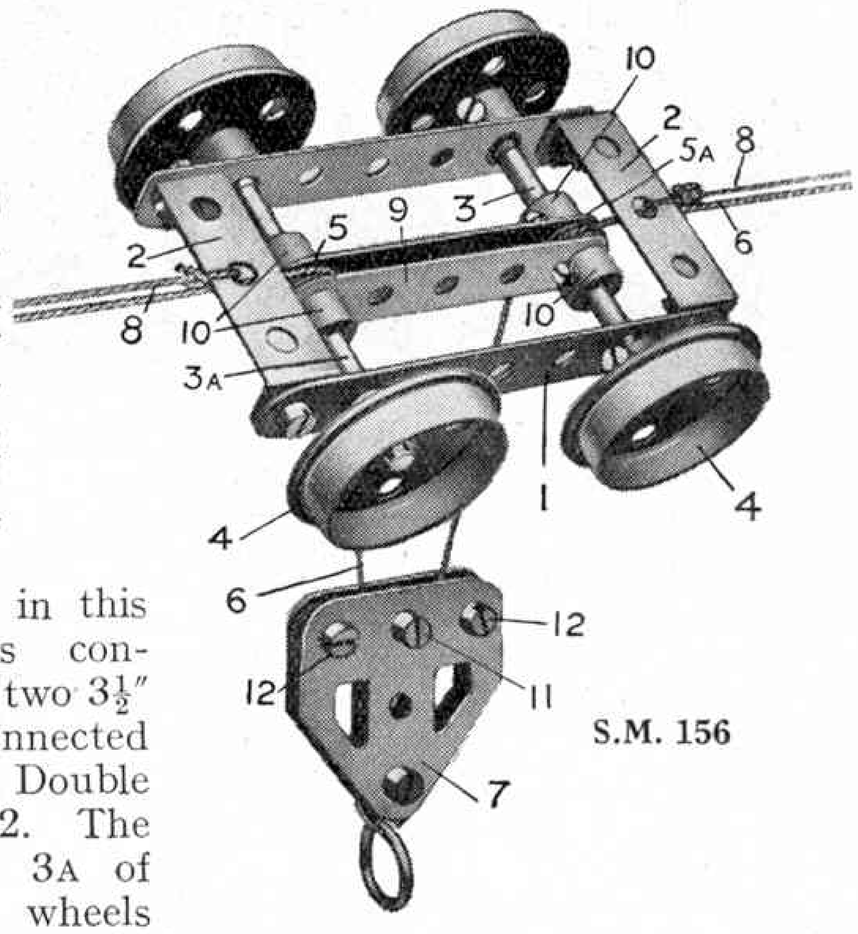
The pulley block 5 is described in S.M. 32 (Section III.)



S.M. 155

S.M. 156—Overhead Traveller for Gantry

S.M. 156 shows an alternative form of traveller having similar functions to those of S.M. Nos. 154 and 155.



S.M. 156

The trolley in this illustration is constructed from two $3\frac{1}{2}$″ Strips 1 connected by $1\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strips 2. The axles 3 and 3A of the running wheels carry two $2\frac{1}{2}$″ Strips 9 held between Collars and set-screws 10. The hoisting cord 6 is led over a $\frac{1}{2}$″ loose Pulley 5, situated between the $2\frac{1}{2}$″ Strips 9 on the axle 3A, and passes round a second $\frac{1}{2}$″ Pulley carried on the shank of the bolt 11 in the pulley block 7; from thence it passes over a further $\frac{1}{2}$″ Pulley 5A on the axle 3.

The traversing movement of the trolley is obtained from the cord 8, the ends of which are shown connected to the cross Strips 2.

The pulley block 7 is built up from two Flat Trunnions bolted together, Washers being placed between the Trunnions on the shanks of the bolts 12.

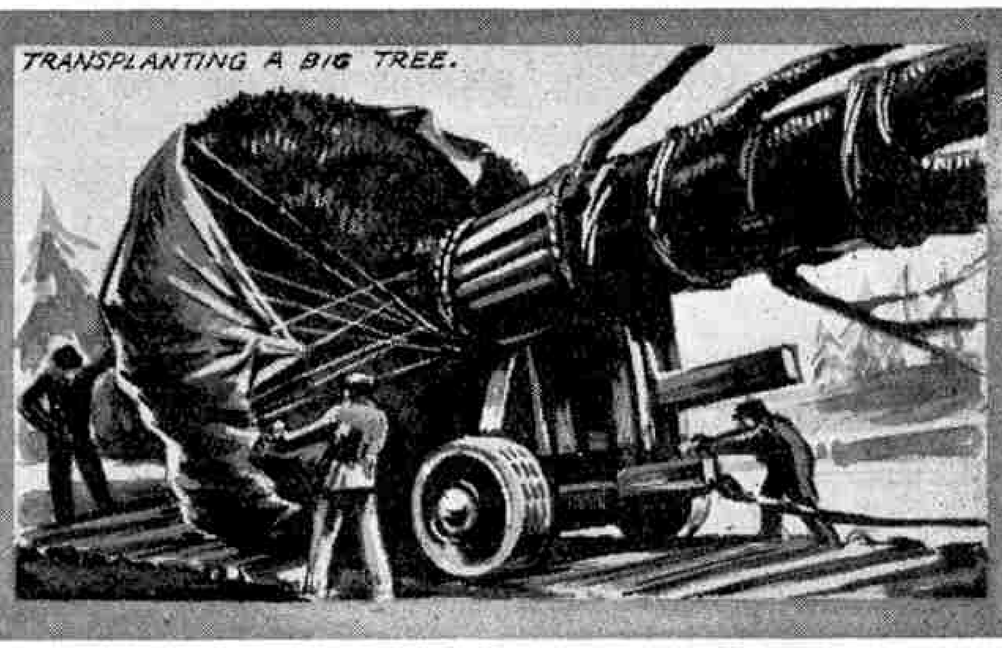
Travelling Mechanism for Transporter Bridge

Another interesting overhead traveller is incorporated in the Meccano Transporter Bridge (Model No. 713). The trolley in this case is of the inverted type—that is, it hangs below the rails upon which its travelling wheels are guided—and supports a passenger carriage suspended from it by a number of cords, representing the cables used in actual practice.

The object of this arrangement is to bring the floor of the carriage on a level with the roadway on either side of the river, while the bridge that supports it on its travels to and fro across the water is at such a height that even the largest ships may pass beneath it without hindrance.

A further example of Overhead Trolley mechanism is shown in S.M. 68 (Section V.)

Our Wonderful World



A New Ray

The latest ideas of those who explore the mysteries of the atom suggest that possibly there is another form of matter in addition to those we already understand. When Sir Wm. Crookes experimented with vacuum tubes he named the glow that fills them, when an electric current is passed through them, the Fourth State of Matter. Now Dr. R. A. Millikan, of California University, has made a discovery that may be called the Fifth State of Matter.

The Fourth State of Matter discovered by Crookes has been identified in later years with electrons, which are the atoms of electricity binding together by their movement the atoms of matter. The latest discoveries seem to suggest that there is, perhaps, something smaller than an electron, and which moves at a greater speed than most electrons. Dr. Millikan refers to this as a new kind of ray that is a hundred times more penetrating than X-rays.

We know that X-rays will pass through substances that stop ordinary light—their wave-length is such that they can make their way between the atoms of molecules of matter that stop light rays, which are of longer wave-length. The new Millikan rays have even more remarkable powers of penetration, for whereas the X-ray is stopped by half-an-inch of lead, the new rays can pass through a six-inch block of it.

It is believed that the rays discovered by Dr. Millikan reach us from space continuously, and that all space is filled with this form of radiation, which passes to-and-fro in all directions.

* * * *

The Romance of Rubber

Rubber for everyday purposes has become so much a part of our existence that it is hard to believe that thirty years ago the only rubber known was a wild product obtained in Central and South America. There was no attempt at cultivation in the rubber-bearing districts, but the governments of the countries concerned were already well aware of the vast potential value of the plant. In the effort to prevent so valuable an asset from passing into other hands, laws were passed to prohibit the export of rubber seed, but the British authorities were alive to the situation and it was arranged to send a botanical expert up the River Amazon to obtain some of the seed with a view to development at Kew and, later, planting in suitable parts of the Empire. It is now a matter of history that the seed was obtained, safely brought to England and germinated at Kew.

In 1900 only a few hundred acres had been planted in different parts of the East. The demand was only then beginning to grow. By 1905 the area planted had grown to 60,000 acres, and with the rapid increase of use of motor transport this acreage grew to nearly 1,000,000 by 1910. It is impossible to state to-day the exact acreage under development, but nearly 60 per cent. is owned by British planters. From that one small "smuggling" episode has sprung one of Britain's greatest industries.

* * * *

Wonderful Bamboo

The hope of Dr. Naji, of Birmingham University, that bamboo fibre may be made into a textile fabric for clothes-making, may add to the already remarkable list of uses to which the tree and its products can be adapted. In the tropics bamboo stems are used for building houses, and the leaves for thatching them, and bamboo furniture has found its way all over the world. The poles serve also for many other purposes, from masts to water-pipes, while the split wood is made into mats, sails, hats, and has not been overlooked by the paper-maker. Young bamboo shoots are eaten like asparagus, or pickled in vinegar. The pith yields a saccharine juice which serves as a substitute for sugar, and the seeds can be boiled and eaten like rice, or used for the brewing of a palatable beer.

* * * *

Field 'Phones for Doctors' Cars

Motor traffic is expected to be so heavy at Nottingham during the sittings and festivities of the congress of the British Medical Association that field telephones have been installed to facilitate parking. It will be possible to call up any car or cars at a moment's notice. This is the third visit of the B.M.A. to the city. The first was in 1857, when only 100 delegates attended, the second in 1892.

* * * *

Electric Cigar Sorter

A remarkable machine, shown at a recent tobacco exhibition, sorts objects according to their colours with considerably more accuracy and speed than would be possible to the most skilful human operator. This machine is, for instance, able to sort cigars into any one of thirty different shades of cigar-brown, at the rate of 3,600 per hour, without error!

As used for cigar sorting, the machine consists of a finger to lift each cigar; a photo-electric "eye" which gauges the depth of shade; an amplifier to strengthen the weak signals given by the "eye"; a switching galvanometer, and 30 sorting compartments into which the sorted cigars fall.

Briefly described, the operation is effected as follows:—A hopper conveys the cigars to the finger, which picks up each one in turn and places it at the bottom of the "eye." This resembles a small X-ray tube and is connected by two terminals to a battery, the whole being covered by a light-proof case. One of the terminals is covered with potassium. In darkness no current can flow between them but when light is reflected from the object at the base of the tube this affects the potassium-covered terminal, causing it to emit a very weak stream of electrons. It is obvious that the darker the colour, the weaker the reflected light current consequent upon the light action. This electric stream is picked up by the amplifier and conveyed to the galvanometer, at which stage the current has just sufficient strength to set the ammeter needle in motion.

While the "eye" is viewing a cigar, the needle swings freely until it comes to rest at a point on a scale corresponding to the strength of the current transmitted. The arc described by the needle is split into 30 divisions, each provided with an interlocking terminal to grip the extension catch, or "dog," depending from the tip of the needle.

The switching arrangement prevents contact being made between any terminal and the needle until the latter ceases to swing, but at the moment that contact is established, a heavy current passes through the needle, the "dog" and the terminal—the three close the circuit—and it is this current that operates the magnetic trips on the circular sorting trap. The cigar, now being conveyed in troughs upon the table, is thus guided to its proper compartment, according to the depth of its colour.

The machine is so accurate that an examination of its work is unnecessary. Indeed, it is doubtful whether anyone could distinguish even a minute difference between all the cigars in any one compartment, and the only human aid required is supervisory to keep the machine supplied.

It is intended to adapt the machine to the needs of other industries in which the fine grading of colours is a matter of great importance.

* * * *

An Alloy as Hard as a Diamond

A new alloy, claimed to be harder than the hardest steel although not quite as hard as a diamond, has been produced by the metallurgical experts of a steel plant at Wetzlar, Southern Germany. This alloy, which consists of a fused mixture of metallic tungsten and tungsten carbides, is stated to retain its cutting power for a longer period than a diamond, since the diamond being crystalline and brittle, ultimately loses its cutting power through the chipping of its crystal edges.

Paper from Peat

If Ireland's natural resources are fully developed there is every possibility of a great paper-making industry springing up in that country. Many years before the manufacture of paper from wood pulp, a system of manufacturing it from peat had been invented. Only peat of the fibrous variety can be employed, and it produces paper of great strength, although not of sufficiently fine quality to be of service in the printing industries.

First of all the earthy substances of the peat are washed away and the residue is soaked for some hours in a caustic lye. Later it is soaked in a weak solution of hydrochloric acid, washed and steeped in a solution of alum and then bleached with chlorine. The peat then receives an admixture of rag-pulp and the resulting combination is treated in precisely the same way as wood pulp to produce the finished article.

It is estimated that there are over 180,000 square miles of peat beds in Ireland, and as the preservation of the available timber from too rapid depletion is already being considered seriously in Canada, the United States and other timber-producing countries, there would appear to be every prospect of a highly successful Irish industry.

* * * *

Stainless Iron

At a recent conference of the Institution of Motor Engineers held at Manchester it was announced that an iron-chromium alloy had been discovered that possessed the valuable property of freedom from stain. An interesting feature of this stainless iron is that it is so soft that it can be used for all ordinary engineering purposes, and after a reduction in costs of manufacture has been effected it will be possible to use it for all purposes for which galvanized iron hitherto has been employed. Thus it will be seen that considerable sums will be saved that previously had to be spent in painting ironwork in order to preserve it.

An interesting comparison is afforded between stainless iron and stainless steel. The latter is so hard that it is almost impossible to employ it in any ordinary engineering operation.

* * * *

Whale Research Operations

An expedition has recently sailed from England, under the direction of the Government of the Falkland Isles, to investigate the habits of whales in the Antarctic Seas with a view to securing information upon which to base legislation designed to overcome the danger of whales in the Southern Seas being hunted to extinction. The expedition is housed in the "*William Scoresby*," a ship specially built and equipped for the work, 125 ft. in length, drawing 13 ft. 6 in. and having a beam of 26 ft.

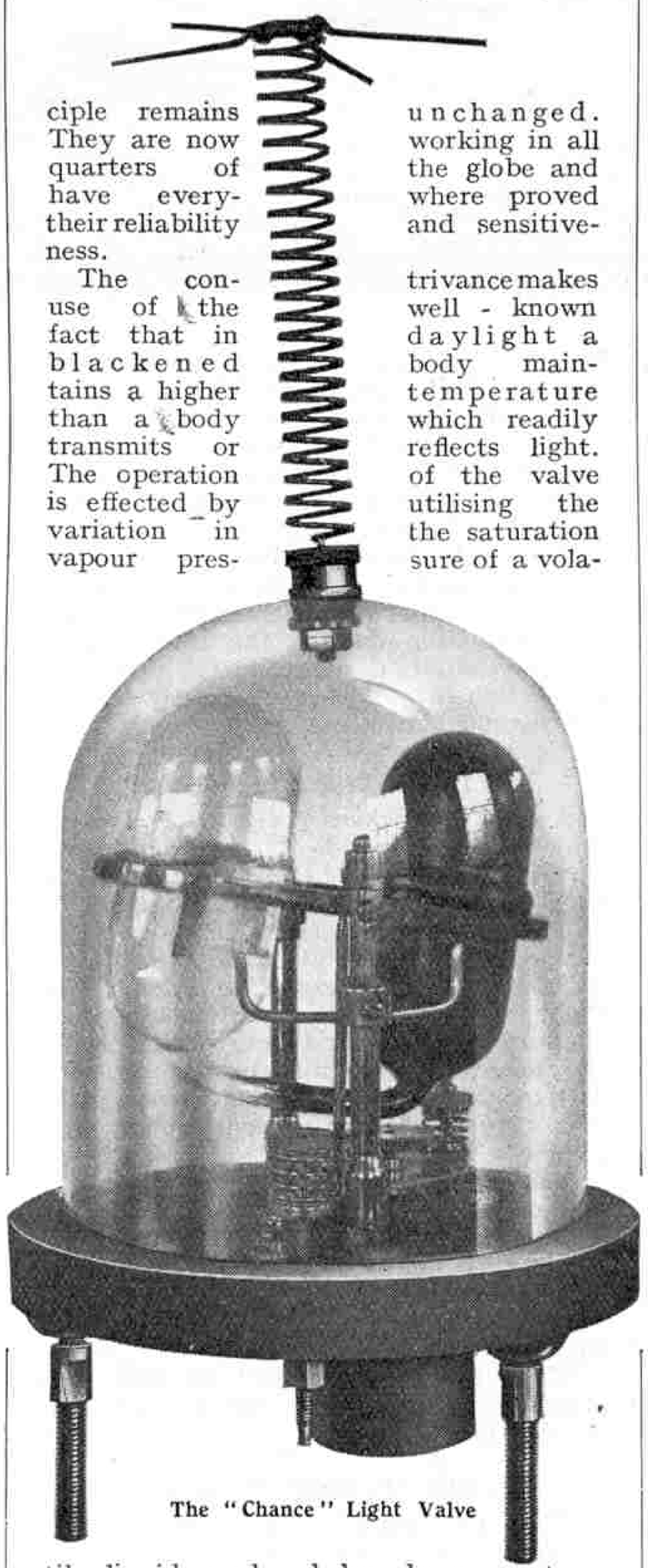
One of the duties of the expedition will be to shoot a small silver-plated dart into the body of every whale encountered, and to accomplish this task a small gun, mounted on a platform placed well forward and handled by an expert marksman, will be used. Each dart will bear a number and every whaling station in the world has been asked to report to London the capture and the apparent age of the whale. In addition to its whaling duties, the "*William Scoresby*" will undertake deep-sea trawling for research purposes.

The "Chance" Light Valve

This valve is for use with unattended Marine Lights using either gas or electricity, its purpose being to save gas or current by turning it on and off automatically in the evening and morning.

The type particularly described here is that for use with gas, but the essential parts are similar for use with electricity. Improvements have been made in details of design since this valve was first put on the market, but the general principle remains unchanged. They are now working in all quarters of the globe and have everywhere proved their reliability and sensitiveness.

The contrivance makes use of the well-known fact that in daylight a blackened body maintains a higher temperature which readily than a body which reflects light. transmits or of the valve The operation utilising the is effected by the saturation variation in sure of a volavapour pres-



The "Chance" Light Valve

tile liquid produced by change in temperature.

The part of the apparatus which furnishes the power for actuating the valve consists of two glass bulbs, connected by a tube as clearly shown in the accompanying illustration, which is reproduced through the courtesy of Chance Bros. & Co. Ltd., the manufacturers of the valve.

The two bulbs are filled by a suitable volatile liquid, such as ether, the space above the liquid being filled with vapour of the liquid. When such an apparatus is exposed to light, the blackened bulb develops and maintains a slightly higher temperature than the transparent bulb. In consequence, ether vaporises in the former, and ether vapour condenses in the latter, until the greater vapour pressure in the blackened bulb is balanced by the head of liquid ether pushed over from it to the transparent bulb.

The extra weight of the liquid in the transparent bulb operates the Valve through a simple and reliable mechanism. The inter-connected bulbs are supported by a carrier, which rocks on pivots and communicates its motion to the valve mechanism by a lever. By this means the transfer of a comparatively small weight of liquid from one bulb to the other brings into action a very considerable force to close the valve.

A small by-pass burner is allowed to burn continuously day and night and the whole apparatus is protected by a stout glass cover, surmounted by a special bird scarer, in the form of a spring, as illustrated.

Owing to the great increase in the vapour pressure of a volatile liquid, due to a very small rise of temperature, the Light Valve is a very sensitive and efficient contrivance. It has been subjected to many tests, and even on the dullest winter's day experienced in England, in these tests, the Flasher was always extinguished. When a period of excessively dull light supervenes the lamp is turned on. It may confidently be reckoned that, even in this climate, the Light Valve will save the waste of gas, on an average, during at least 40% of the 24 hours through the year.

In most unattended lights, the additional first cost of the Light Valve is balanced at the outset by the saving in gas cylinders and connections. The more important daily economy which the valve effects in the consumption of gas, and the periodic saving in the heavy cost and labour of transporting the cylinders before and after re-charging, are therefore obtained without expense.

The Chance Light Valve is so sensitive that in cases where it is used in connection with a large lantern, i.e. one of the lantern house type, it can be placed inside it if so desired instead of on the roof; this position gives it added protection and it has been found by experience that there is very little difference in the time of turning on and off and, therefore, in the amount of gas saved when used in this way.

* * * *

Silk from Mushrooms

Recent analyses of mushrooms have disclosed that their matter consists almost entirely of cellulose of a very superior quality. When treated to produce the fibre for artificial silk, a soft, silky mass was obtained, and in view of the simplicity of raising mushrooms on a large scale it would seem that a valuable source of raw material has been found.

* * * *

A Moving Island

Corsica, the island birthplace of the famous Emperor Napoleon, is reported to have moved its position by nearly 33 feet in the past 100 years. A geological survey party engaged in research into the theory that the earth's crust is moving horizontally, made this interesting discovery but a witty Italian journalist suggests that the island, which is moving eastward, away from France, its owners, toward Italy, is endeavouring to display its desire to become an Italian possession.

Trans-Atlantic Flight Disaster

After several postponements due to reports of unfavourable weather along the proposed route, and also to minor defects in the triple-engined Sikorsky machine, Captain Fonck, the famous French pilot, attempted a start upon the trans-Atlantic flight to which reference was made in these notes in July. The attempt was disastrous. After taxi-ing along the surface of the Roosevelt Aerodrome, Long Island, for nearly three-quarters of a mile, the machine lifted slightly and then crashed and immediately burst into flames. The pilot and his mechanic, Lieut. Curtin, were able to save themselves, but the two other members of the crew lost their lives. The machine was completely destroyed.

* * * *

Lands End to John O'Groats

Flying a D.H. Moth light aeroplane, Colonel the Master of Sempill recently flew the 630 miles between Lands End and John O'Groats, respectively the most southerly and northerly points of the British Isles, in 8 hours 14 minutes. This is the first time that this journey has been accomplished by air. By any other than the direct air route the distance between Lands End and John O'Groats is not less than 800 miles, and the fastest time recorded by road was made by a motor-cyclist, who did the trip in 1912 in 30 hours. The train time for the journey is over 30 hours.

The Master of Sempill had intended to fly back to Lands End on the following day, and took off on the return flight at 8 a.m. Unfortunately engine trouble developed before the machine had travelled half a mile and a forced landing had to be made on very rough ground. One wheel of the under-carriage was badly buckled and the propeller was smashed, but fortunately the airmen escaped uninjured. The damage was too great to be repaired on the spot and later the aeroplane was dismantled and taken to Wick to be despatched to Croydon by rail.

* * * *

Remarkable Height Record

M. Callizo, the famous French airman, recently set up a new world's record by climbing to an altitude of 40,782 ft., the highest point ever reached by a human being. This feat of endurance, for it is more dependent upon human pluck than mechanical perfection, was achieved over the Buc Aerodrome. The previous record was 39,587 ft., created by M. Callizo at Villacoublay in 1924.

The engine used in this new record flight was a 450 h.p. Lorraine-Dietrich, and after slightly less than one-third of the climb had been accomplished oxygen was pumped into the engine by a Rateau compressor. Special precautions were taken to guard against the machine breaking up by contraction due to the intense cold encountered, and every metal part and connection was loosened slightly before the flight commenced.

* * * *

R.A.F. Cruise to Aden

A flight of Vickers "Victoria" aircraft, under the command of Air Commodore C. R. Samson, C.M.G., D.S.O., A.F.C., Chief Staff Officer, Middle East Command, Royal Air Force, recently set out from the R.A.F. station at Heliopolis, Cairo, on a long-distance cruise to Aden. The flight is one of a series of extended cruises that are being carried out by the Royal Air Force to test air route arrangements and to gain service experience with post-war types of aircraft along routes not regularly flown over.

The route for the outward flight is Aswan, Atbara, Port Sudan, Massowa, and thence across the Red Sea to Aden. The return journey will be made by way of Khartum and Wadi Halfa and the total distance to be covered is approximately 4,500 miles.

The Vickers "Victoria" machine is a 25-seater troop carrier fitted with two Napier Lion engines.

* * * *

The Blackburn "*Iris*"

This big three-engined flying boat, to which reference was made on this page last month, has now successfully completed its trials at the Air Ministry's Felixstowe seaplane station. The machine is still on the "secret list," but it is possible to state that in trials it has exceeded a speed of 100 m.p.h., and is therefore the fastest machine of the type yet built. The stability of the boat is excellent and it is capable of riding out at anchor any storm falling short of full gale force. A peculiarity of the "*Iris*" is the abnormal disturbance of water it creates when "taking off," but on the other hand the landing is perfect. Much of its equipment is common to the ordinary surface boat and includes anchors, lifebelts and boat-hooks.

German Aviation

A recently-completed census of machines in use regularly on the Continental air routes shows that while Great Britain has only 16 machines, Germany has 133. It should be pointed out, however, that German aviation, owing to the restrictions on military flying imposed by the Treaty of Versailles, is practically confined to civilian and commercial flying.

Although Germany out-numbers Britain, her machines are considerably inferior in point of size and power. Moreover, more than 40 per cent. of the German commercial machines are fitted with British-designed engines.

* * * *

New Airship for Russia

The Soviet Government have ordered a new semi-rigid airship, similar in type to the "*Norge*" used by Capt. Amundsen in his flight over the North Pole, from the Italian manufacturers. The ship will be driven by six engines and will have an approximate gas capacity of 1,870,000 cubic feet.

* * * *

Flights over Mont Blanc

Lieutenant Thoret recently succeeded in making three separate flights over Mont Blanc. During these flights he dropped food and electrical accessories close to the Vallot observatory, in order to test whether it would be possible to convey food supplies to the staff at those times when the observatory is cut off from the outside world owing to the severity of the weather. The experiments were highly successful.

* * * *

Fuel Consumption Tests

The Zenith Cup, which is awarded annually in a contest based on the lowest fuel consumption in relation to useful load carried, has been won by a Jupiter-engined Farman machine.

The competition took place in France and on the first day a flight was made from Paris to Lyons, a distance of 385 kms. (239.23 miles). On the second day the return journey was made. Seven competitors started, the engines used including Jupiter, Salmson, Anzani and Walter types. In addition to the Cup, the Farman Company were awarded a prize of 30,000 francs, and the pilot received a prize of 3,000 francs.

Cobham's Greatest Flight

In our April issue we gave a brief account of Sir Alan Cobham's great flight to the Cape and back, and now we have to record the completion of an even greater achievement, the 28,000-mile flight to Australia and back.

The famous airman left Rochester on the outward flight in June in the same D.H. Seaplane that had carried him to the Cape. Nothing of particular note took place until the machine was over the Arabian Desert between Baghdad and Basra, when there was a tragic accident to Mr. A. B. Elliott, as already related in these pages. As the aeroplane crossed India the monsoon was in progress and the torrential downpour reached almost incredible limits down the Burman coast to Rangoon. In Malaya better conditions were encountered and eventually Sydney was reached on 11th August.

The return journey was begun from Melbourne on 29th August, but the attempt at a quick dash home was defeated by rain, at times so heavy that it was impossible to see for more than 20 yards, which held up the machine in Burma for several days. The flight came to a triumphant termination on 1st October, when all London turned out to welcome the great airman as he alighted on the river opposite the Houses of Parliament.

The actual flying time for the whole distance of 28,000 miles was approximately 320 hours.

At a luncheon given by the Air Minister (Sir Samuel Hoare) it was announced that the King had conferred a Knighthood of the Order of the British Empire upon Mr. Cobham in recognition of his great services to British aviation. It was announced also that the Air Force Medal had been bestowed upon Sergt. Ward, who took over the duties of mechanic after the death of Mr. Elliott, and that Mr. Capel, who acted as second mechanic on the homeward flight, had been created a Member of the Order of the British Empire.

We give below a list of Sir Alan Cobham's long-distance flights to date :—

1921—5,000 miles tour round Europe in three weeks.
1922—8,000 miles flight to North Africa and Italy.
1923—12,000 miles flight to North Africa, Egypt and Palestine.
1924—Flight from London to Africa and back, 1,250 miles, in 12½ hours.
1924—17,000 miles flight to Rangoon and back piloting Air Vice-Marshall Sir Sefton Brancker.
1926—16,000 miles flight from London to Cape Town and back.
1926—28,000 miles flight from London to Australia and back.

Aeroplane Ambulances

Aeroplanes are certain to play an important part in the military hospital services in the next war, and France already has decided to establish a small aerial ambulance squadron for service in Syria. The type of machine used for the purpose at present carries only one patient, but owing to its small size it requires only a restricted landing space and thus can lie close up to the fighting line ready for use when required. The early form of aeroplane ambulance was intended mainly to provide comfortable transit for serious casualties, but now it is recognised that the speed of these machines, 70 m.p.h., will prove an important factor in saving life by the speedier transport to hospital of dangerously wounded men.

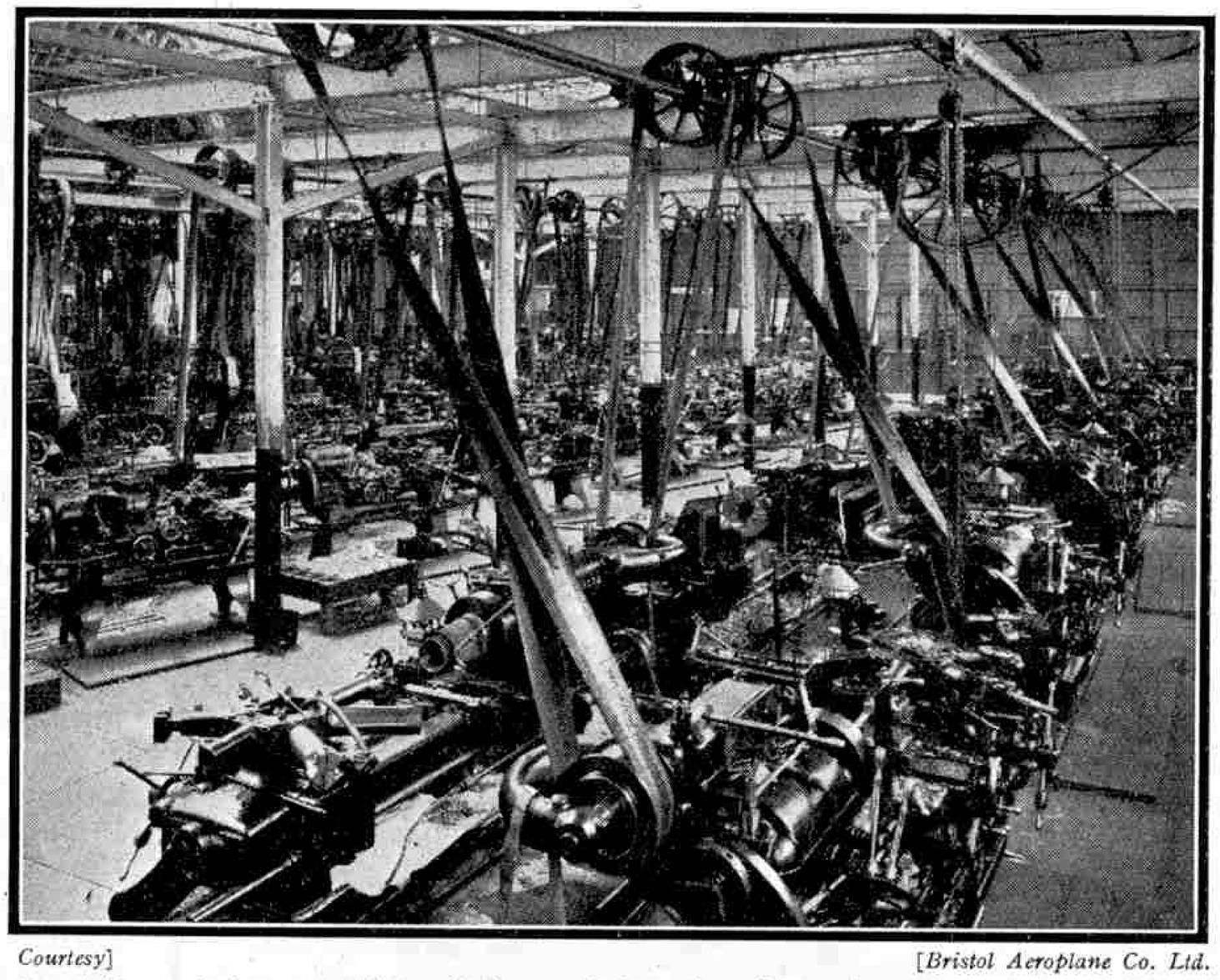
* * * *

A Flying Army

Small troop-carrying aeroplanes have been found so successful in military operations in Iraq that a new fleet of bigger machines is now being built. The designs show each aeroplane to be capable of carrying 24 men, and when fully laden each will weigh nearly nine tons. Gun racks and folding seats are provided along each side of the cabins, and the flying speed of the machines is 104 m.p.h.

Each squadron of the new machines will be able to carry 200 fully-armed soldiers in a few hours to a point which ordinary desert transport would take several days to reach.

Where "Cherubs" Come From!



Courtesy] [*Bristol Aeroplane Co. Ltd.*

In one of our early issues we shall describe the manufacture of aeroplane engines—now an important industry in this country. Our illustration shows some of the Capstan lathes at the factory of the Bristol Aeroplane Co. Ltd., where the famous "Jupiter" and "Cherub" engines are made.

Bristol "Cherub" Engine Successes

The recent light aeroplane meeting at Lympne provided an unusually interesting series of contests and remarkably fine performances were accomplished by the machines fitted with Bristol Cherub engines.

The main event consisted of reliability trials and prizes to the value of £5,000 were offered. The trials included a series of flights covering 2,000 miles in seven days' flying, during which a minimum speed of 50 miles per hour had to be maintained. Points were awarded also on the basis of fuel consumption per unit of useful load carried. At the end of the sixth day only four machines remained in the contest and each of these was fitted with a Cherub engine.

The seventh day revealed a surprising standard of efficiency, for each of the machines maintained its time schedule with only a few seconds variation. The winning machine was a Hawker Cygnet, followed in order of merit by a R.A.E. Cygnet, a Bristol Brownie and a Parnall Pixie.

In the races held subsequent to the principal events, Cherub - engined machines secured two first, three second and three third places.

The accompanying illustration shows a view of part of the works where the "Cherub" engines are made and, as mentioned thereunder, we hope shortly to print an illustrated article on this interesting manufacture.

* * * *

Eagles Attack Aeroplanes

A new thrill has to be added to the excitement of aviation. Machines passing over the mountains bordering the Greek coast have been attacked by several large eagles whose eyries are located among the mountains. On one occasion recently a machine owned by the Greek Government was attacked, the bird finally coming into contact with the propeller, which was smashed. The machine became out of control and crashed, the pilot being killed.

* * * *

New Route to America

Investigation of a new air route from the Continent to America, via the Faroe Islands, Iceland and Greenland, is being conducted by two German scientists. It is stated that the proposed route is commercially practicable and that the journey from Hamburg to the time of landing in North America would take only from 1½ to 2 days, this period including an overnight stay at Reykjavik (Iceland).

Suggestions Section

Edited by "Spanner"

(61)—Overhead Gear for Electric Loco

FIG. 61 illustrates an interesting Meccano model of a current collector, or pantagraph, of the type used on electric locomotives employing the overhead wire system. It is adaptable to all Meccano locos of this type, and its realistic appearance and design will be appreciated on comparison with Fig. 61a, which is reproduced from actual practice and shows the device fitted to the roof of an electric loco or motor coach. The pantagraph depicted in the latter illustration is a product of Brecknell, Munro & Rogers Ltd., the well-known Bristol firm of engineers.

The lower portion of the Meccano apparatus is built up from four 2" Threaded Rods 1 rigidly connected to the 2" Rods 2 and 2a by means of the Collars shown. Further Collars 3 are mounted on the Rods 1, but care should be taken to see that they are not screwed on too far as the 2" Rods 4 should be able to turn freely in these Collars.

The upper 2" Threaded Rods 5 enter four further Collars placed on the Rods 4; this time the Threaded Rods should be screwed up tightly, in order to grip the Rods 4. The other ends of the Threaded Rods partly enter four more Collars mounted on a 2" Threaded Rod 6. The latter is capable of turning freely in all four Collars, and carries at either end a Threaded Boss 7.

A piece of stout copper wire, 8, is next bent as shown and inserted in the transverse holes of the Bosses; it may be secured in position by a grub screw 9 screwed into the end of each Boss.

The pantagraph is prevented from toppling over or sagging to one side by means of pieces of Sprocket Chain 10 and 11, which are arranged to permit a vertically-folding or extending movement only. It should be noted that the chains are arranged oppositely—that is, while chain 10 passes under its respective Collar on the Rod 2a and over the Collar on Rod 2, chain 11 passes over the Collar on Rod 2a and under that on Rod 2. A Meccano Spring connecting the Rods 2 and 2a by means of Collars and set-screws tends to pull these screws together, thus raising the Rods 1 and extending the pantagraph, with the result that the copper wire 8 presses against the overhead wire carrying the current.

The pantagraph is mounted on two 2" Angle Girders which are secured to the loco roof by means of four 6 B.A. Screws, the necessary insulation being obtained by fibre bushes and washers. The current is led to the motors via the framework of the pantagraph and the insulated wire 12, which is bolted to one of the 2" Girders.

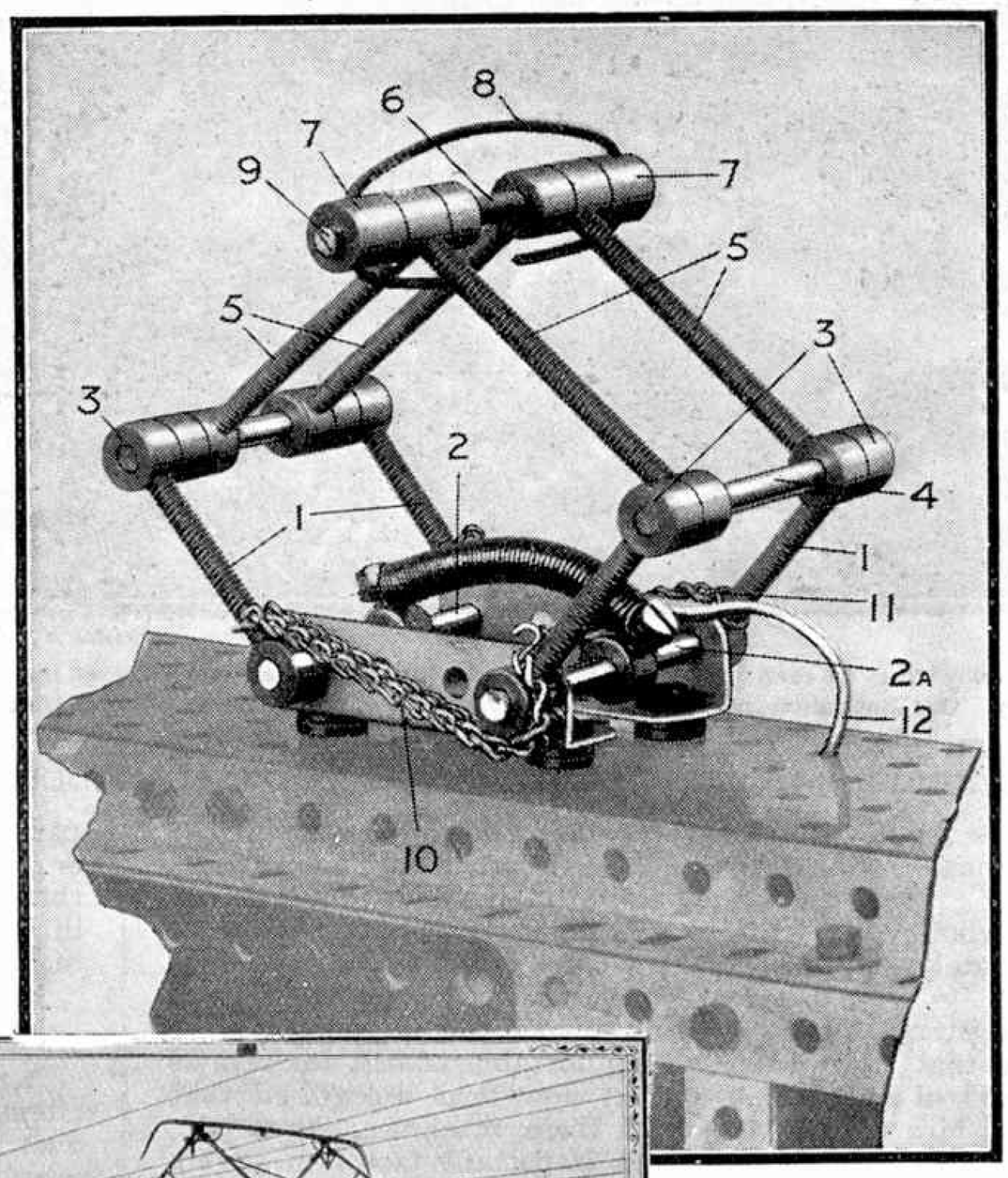


Fig. 61

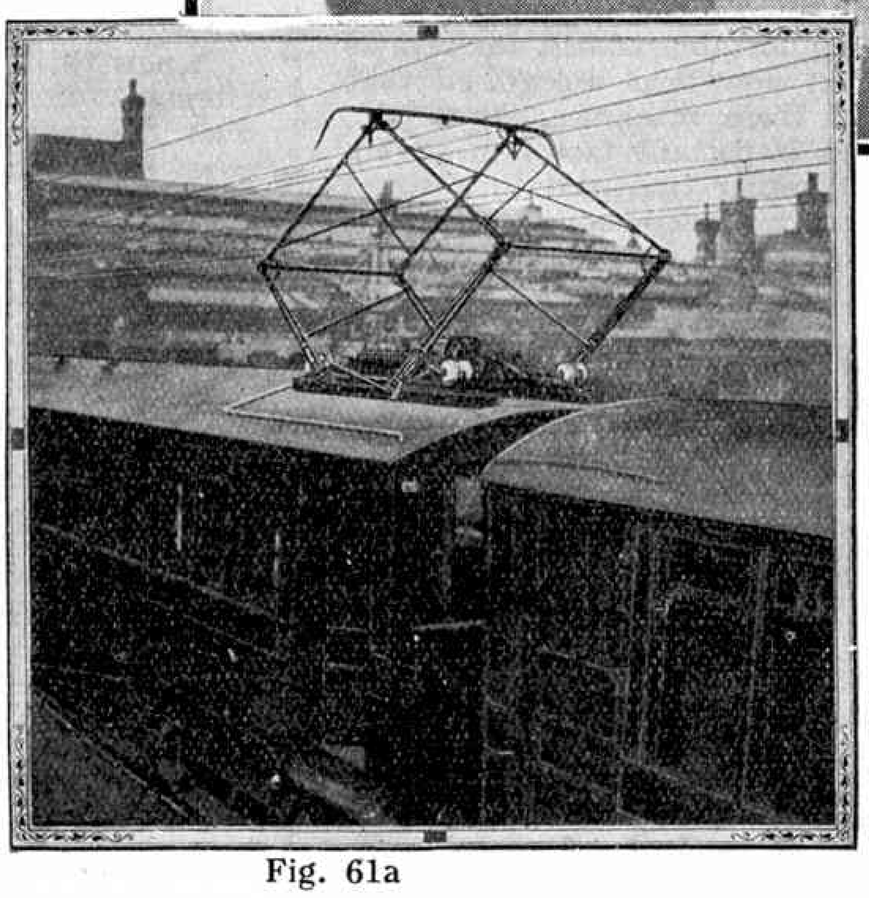


Fig. 61a

Overseas "Cum Bak" Competition

In the Overseas Section of this competition, as in the Home Section, a large number of entrants succeeded in correctly solving the problem of the "Cum Bak," and in order to allocate the awards we were obliged to take into consideration the age of the competitors and the degree of lucidity with which they explained their solutions.

The prize, consisting of Meccano goods to the value of half a guinea, has been presented to J. Fisher, of 122, Le Strange Street, Glenunza, S. Australia, while the following competitor will each be presented with a Certificate of Merit: D. R. Heeramaneck (New Gamdevi, Bombay); J. R. Moss (Napier, N.Z.); L. Anderson (Muskoka, Ontario, Canada); C. A. Harischandra (Colombo, Ceylon); A. G. Reid (Bayswater, Auckland, N.Z.); B. Swift (Montreal, Canada); C Glenny (Wanganui, N.Z.)

(62)—Strip-bending Machine

(Warwick Dobson, Glasgow)

This simple but very interesting model may be built with a No. 3 Meccano Outfit, as will be seen from the list, appended below, showing the parts used in its construction. It represents a device for bending bars or rods of metal to circular form, and may be put to practical purpose in shaping strips of tin or similar material.

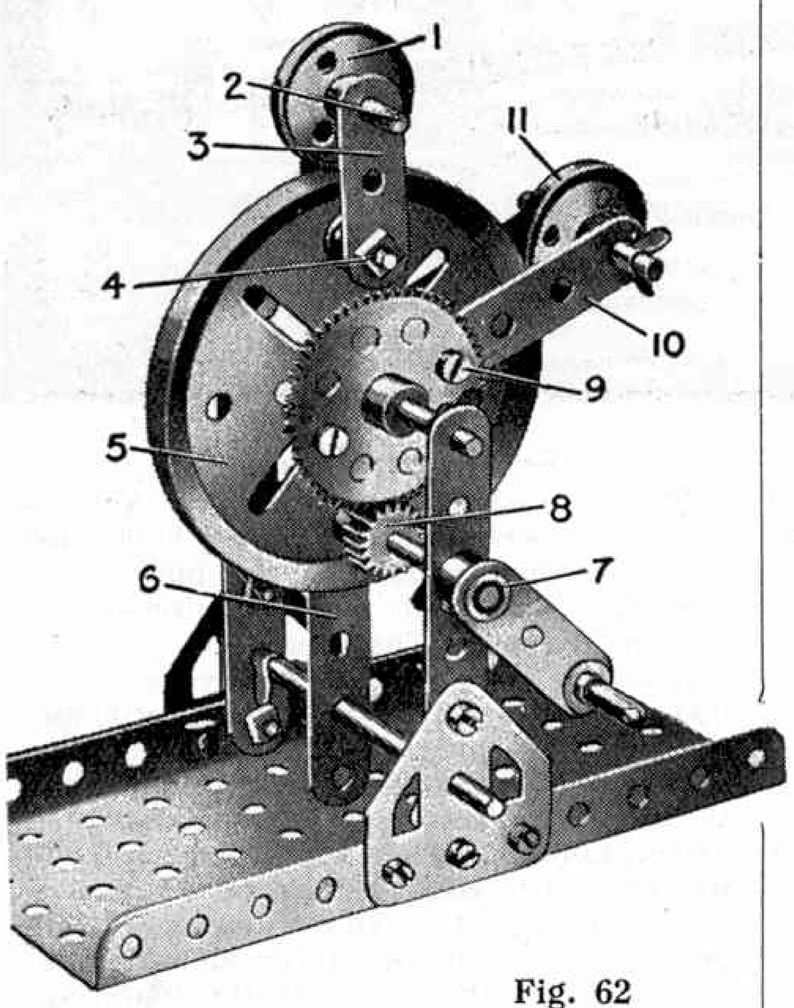


Fig. 62

A loose Pulley 1 is spaced by a Collar and Washers in the centre of the short Rod 2 journalled in a $1\frac{1}{2}$″ Strip 3. The latter is secured to the end of a $\frac{3}{4}$″ Bolt 4 and spaced away from the 3″ Pulley 5 by means of a number of Washers. The opposite end of the Rod is supported by a $5\frac{1}{2}$″ Strip 6.

The handle 7 is secured to a $3\frac{1}{2}$″ Rod carrying a $\frac{1}{2}$″ Pinion 8. This engages with a 57-teeth Gear Wheel 9 mounted on another $3\frac{1}{2}$″ Rod which is free to revolve in the boss of the wheel 5. The Gear Wheel 9 carries a 3″ Strip 10 forming one of the bearings for a short Rod carrying a second 1″ loose Pulley 11, the other bearing consisting of a $2\frac{1}{2}$″ Strip, one end of which is held in place on the axle of the Gear Wheel 9 by means of a Collar. The Pulley 11 is also spaced by means of a Collar and Washers so that it lies immediately above the groove of the Pulley Wheel 5.

The material to be shaped is passed between the two loose Pulleys and the top of the wheel 5, and on rotation of the handle 7 the arm 10 is caused to move downward, so forcing the object to the same curvature as the circumference of the 3″ Pulley Wheel 5.

Parts required :

1	of No.	2	2	of No.	18B	10	of No.	38
2	,, ,,	3	1	,, ,,	19B	1	,, ,,	52
1	,, ,,	4	2	,, ,,	22A	4	,, ,,	59
1	,, ,,	5	1	,, ,,	26	1	,, ,,	62
1	,, ,,	6A	1	,, ,,	27A	1	,, ,,	111
2	,, ,,	16	6	,, ,,	35	1	,, ,,	115
1	,, ,,	17	10	,, ,,	37	2	,, ,,	126A

This Month's Awards

Warwick Dobson will be presented with seven shillings and sixpence for Suggestion No. 62, and the three boys mentioned in connection with No. 64 will each receive a special Certificate of Merit and a complimentary copy of "Meccano Standard Mechanisms."

(63)—Electric Fan

Although electric fans are not much in evidence in this country during the month of November we cannot resist reproducing this well-designed and extremely practical Meccano model. The new coloured Meccano parts will add a very attractive finish to the apparatus, and indeed the completed model forms an ornament suitable for use in any part of the house, or on the office desk. If the 100-?50 volt Motor is used in its construction, the necessary current may be obtained by tapping the house supply through any convenient lamp-socket.

The fan unit is mounted on roller bearings consisting of fourteen Steel Balls arranged round the circumference of a Bush Wheel bolted to the interior of a Wheel Flange 1, with its boss protruding at 2. The Wheel Flange is bolted to a Double Bent Strip 3 carried on a $\frac{3}{4}$″ Bolt in the top of the upright $5\frac{1}{2}$″ Girders. The pivot about which the fan turns consists of a Pivot Bolt passed through the centre hole of the $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flat Plate 4 and gripped by the set-screw in the boss 2 of the Bush Wheel.

A $\frac{1}{2}$″ Pulley 5 bolted to the motor armature immediately behind the fan wheel transmits motion to a 2″ Pulley 6 by means of Meccano Spring Cord, and a Worm on the shaft of the latter Pulley engages with a $\frac{1}{2}$″ Pinion secured to the Rod 7. This Rod carries another $\frac{1}{2}$″ Pinion 8 gearing with a 57-teeth Gear Wheel 9 secured to a Pivot Bolt passed through the plate 4. The bolt also carries a Crank 10, which is further secured to the Wheel 9 by means of a $\frac{1}{2}$″ Bolt 11, and connected pivotally to a $3\frac{1}{2}$″ Strip 12. The latter is attached in a similar manner to a $2\frac{1}{2}$″ Strip 13 rigidly bolted to the Double Bent Strip 3. It will now be seen that as the Crank 10 slowly rotates through the action of the Worm, the fan moves to and fro in a semi-circular path, so varying the direction of the powerful current of air produced by the revolving Propeller Blades.

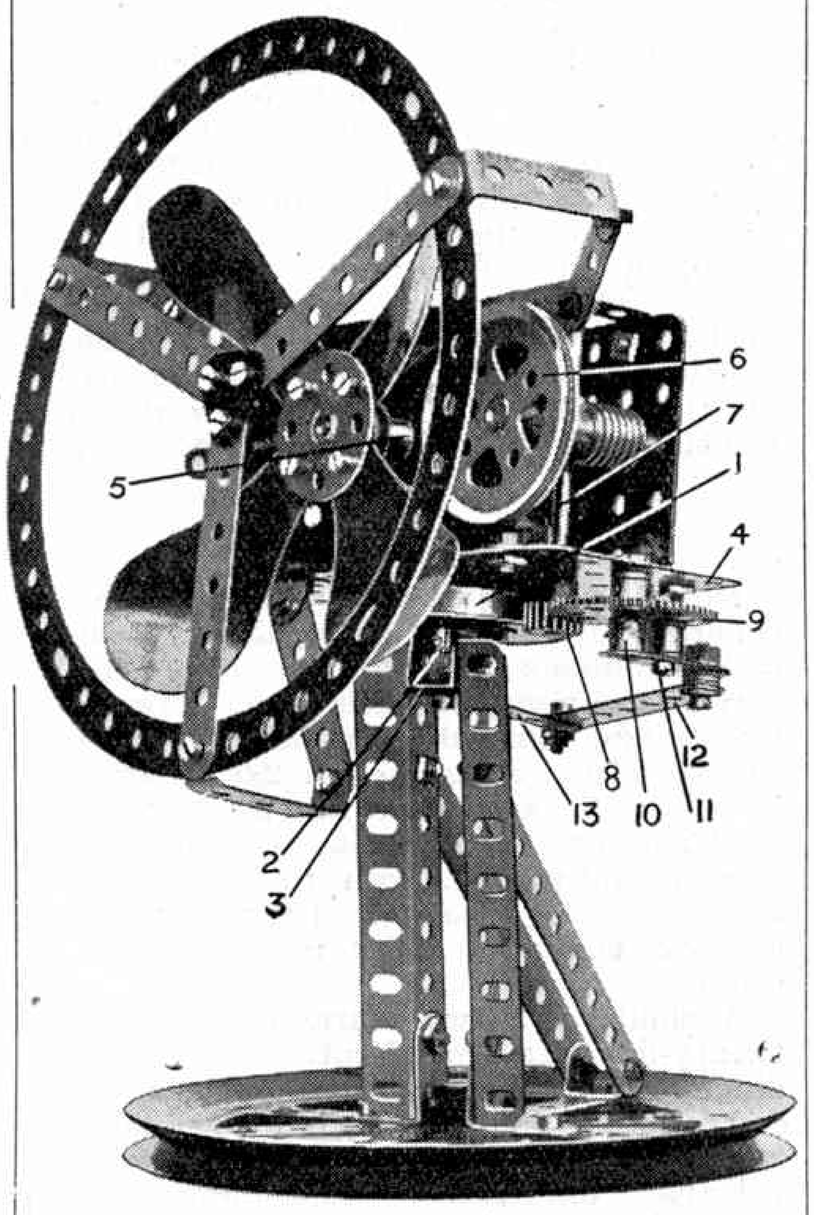


Fig. 63

(64)—Knife Switch

(B. Gilbert, London, E.15 ; H.M. Upward, St. Albans ; and G. Kaplan, Johannesburg)

The design of the useful knife switch shown in Fig. 64 was based upon suggestions received from the above mentioned boys. The arm 1 is pivoted by bolt and lock-nuts to a Trunnion 2, which

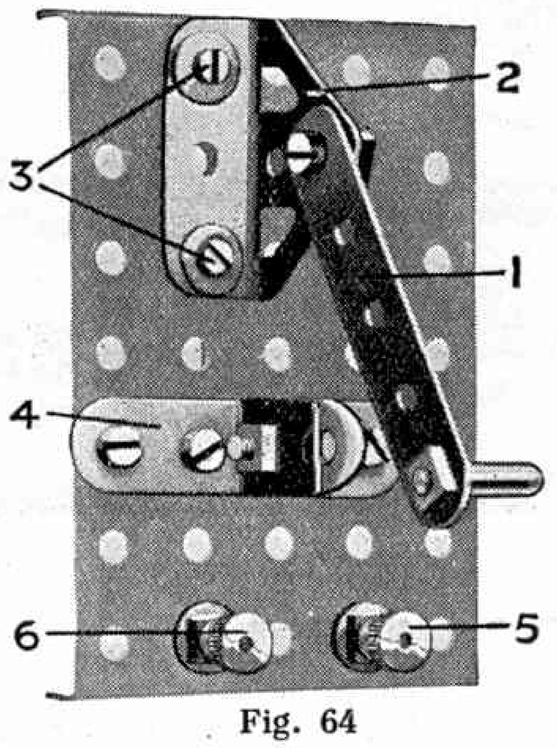


Fig. 64

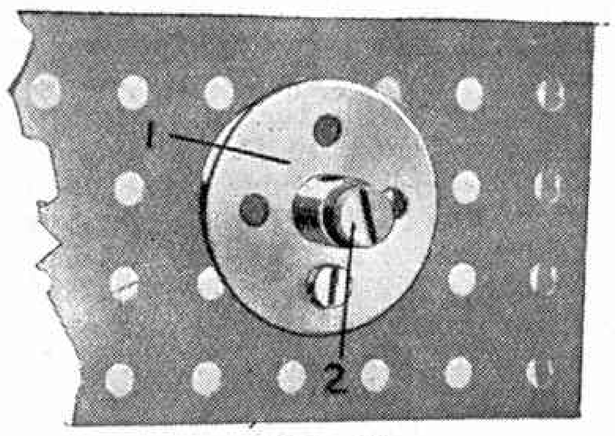


Fig. 65

is insulated from the base of the switch by means of Meccano Insulating Bushes and fibre Washers placed on the two 6 B.A. Bolts 3. The contact piece consists of two 1″ × 1″ Angle Brackets 4 bolted to the base plate, and having their protruding ends slightly bent as shown in order to grip the switch arm more readily.

The terminal 5 is threaded on a 6 B.A. Bolt insulated from the base and connected by a piece of covered wire to one of the bolts, 3 ; the second terminal 6 is bolted direct to the metal plate.

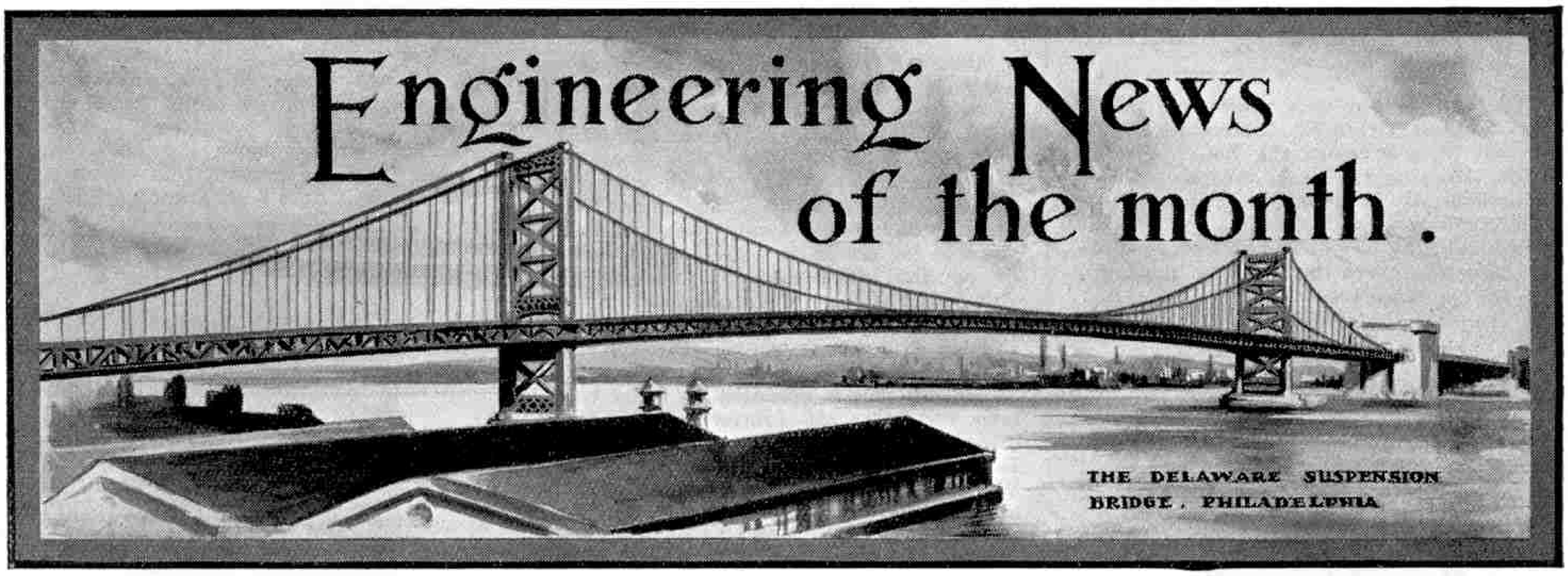
(65)—Electric Contact Button

This remarkably neat Meccano switch of the push button type may be used in connection with electric bells, buzzers, flash-lights, etc., as well as in innumerable Meccano models.

It consists essentially of a Flanged Wheel 1 and Pivot Bolt 2. A small compression spring, obtained by cutting two or three turns from the spring found in the Meccano Buffer (Part No. 120a), is placed between the head of the bolt and the boss of the wheel. The contact piece comprises a 6 B.A. Bolt secured with its head immediately beneath the shank of the Pivot Bolt 2. If the switch is mounted on a metal base, as in the illustration, the contact bolt must be insulated, of course, by means of fibre bushes and washers.

A wire should be secured to the bolt holding the Flanged Wheel in place and another to the insulated contact bolt. The circuit is completed by pressing down the Pivot Bolt, which is prevented from falling out of position by a nut placed on its extreme end.

Engineering News of the month.



THE DELAWARE SUSPENSION BRIDGE, PHILADELPHIA

A Mill Below Ground

Many and lurid have been the stories of the Yukon winter but although the majority of such yarns have been grossly exaggerated, there still remains sufficient truth to enable one to understand the almost overwhelming difficulties encountered by those engaged in the gold mining industry in their attempts to maintain operations all the year round.

A novel scheme is now being carried out at the Keno Hill Mine of the Treadwell Yukon Company, where the whole of the company's ore-dressing mill is being built underground. By this means, it is anticipated, the water used can be kept liquid, a condition practically impossible in a surface plant in the Yukon during the winter months.

* * * *

New Baltic Seaport

A seaport to be used principally for timber export is being constructed by the Soviet Government at the mouth of the River Ouga on the Baltic Sea close to the Esthonian frontier and the river bed has been dredged to a depth of 16 ft. for a distance of over three miles. The fact that this port will be free from ice for a longer period than Leningrad will make it of considerable importance to the Russian timber exporting trade, and it is proposed to build a new railway to link the port with the main lines.

* * * *

New American Bridge

In addition to the bridge now under construction between New Jersey and Staten Island, the New York port authority are contemplating still another. This will be of the suspension type, approximately three miles in length and will span the Hudson river. It is estimated to cost £10,000,000, and will take nearly five years to build.

The work will be carried out by American engineers but a Scotsman is closely identified with the scheme. In this connection, it is interesting to note that a prominent official of the New York port authority recently visited the Liverpool and London docks in search of ideas that could be used to improve the docks in New York.

* * * *

Laying a New Cable

Two new cable ships, the "*Dominia*" and the "*Faraday*," recently sailed from the Thames on their maiden voyages en route for remote parts of the Pacific. Between them they carried nearly 7,000 miles of cable, to be laid between Vancouver and the Fiji isles, there to connect with the new cable to Australia recently laid on behalf of the Pacific Cable Board.

Starting from the Fanning Island, a lonely cable station in mid-Pacific, the "*Dominia*" will work to Vancouver while the "*Faraday*" works from Fanning to Fiji, each vessel laying 200 miles of cable per day. The ships are both equipped with a set of new scientific instruments that will automatically record the varying depths of the sea as the cable is paid out.

* * * *

Southampton Dock Extensions

The most ambitious scheme undertaken by any dock authority for many years is that now being put in hand at Southampton by the Southern Railway Company. The estimated cost of the complete scheme is £13,000,000, and it is anticipated that the programme will extend over twenty years.

Additional quay accommodation to the extent of 16,000 ft. is to be provided and over 400 acres of mudland reclaimed. A new deep water channel 600 ft. in width and 35 ft. in depth is to be dredged and this will involve the removal of 8,000,000 cubic ft. of mud.

Some idea of the extent of the new docks when finished will be gained when it is stated that twenty vessels of the size of the "*Majestic*" or "*Berengaria*" would be able to berth at the same time.

* * * *

Road Materials Test

Motorists using various roads in the counties of Essex, Hertfordshire, Kent and Middlesex shortly will have the curious experience of passing over between twenty and thirty different kinds of road surface within a distance of 2,000 yards. This is due to experiments that the Ministry of Transport are carrying out in the counties mentioned, with the object of discovering the behaviour of various types of road materials under modern traffic conditions.

A similar test was carried out some twenty-five years ago in Kent. Twenty-three different road surfaces were laid down, end to end, within a stretch of road slightly more than a mile in length, and very valuable information concerning the materials used was obtained in this way.

New Spanish Warships

The Spanish Government have authorised an expenditure of nearly £30,000,000 to be devoted mainly to the building of new warships, and the re-equipment of existing vessels. The programme is to be spread over a period of 10½ years, commencing from July last, and the principal items in the programme are three light cruisers each of 10,000 tons displacement; three destroyers; twelve submarines; two oil-tankers, each of approximately 6,000 tons capacity; coaling ships and aeroplanes.

It is probable that all the new vessels will be built in Spain, but a considerable proportion of the armament and other materials, it is anticipated, will be purchased in Great Britain.

Spain is not alone in adding to the strength of her navy. The Argentine Government recently invited tenders for two light cruisers of 5,000 tons displacement, two destroyer flotilla leaders of from 1,500 to 2,000 tons, two gunboats of approximately 800 tons, and three submarines of about 600 tons surface displacement. All these ships are to be completed by December, 1928, and keen competition is going on between British, French, German, Italian and United States shipbuilders for the work.

* * * *

Proposed New Thames Bridge

An interesting proposal for the construction of a new bridge across the River Thames was mentioned recently before the Royal Commission on London Cross-River Traffic. The suggestion is to construct the bridge to lead from Woolwich Common across the river, the other end of the bridge leading on to the Barking by-pass road at Beckton. The river crossing would be effected by a single span, 1,140 ft. in length, with a clearance of 160 ft. at high tide.

On the north side the bridge would be extended across the docks, each being crossed by a single span. The spans would be supported by towers and in the principal of these, batteries of lifts suitable for vehicular and pedestrian traffic would be installed. In this manner dock traffic would be afforded direct access to the bridge, thus avoiding the necessity for making a long detour to overcome the gradient.

The estimated cost of the complete structure is approximately £3,500,000, allowing for a 40 ft. roadway with sidewalks each 10 ft. in width.

S.S. "*Andalusia*"

The second of the nine new liners under construction for the Blue Star Line was launched recently from Messrs. Cammell, Laird & Co.'s Birkenhead shipyard. The new ship has a displacement of 14,000 tons and is fitted for both passenger and freight traffic. Accommodation for 180 passengers is provided and it is a noteworthy feature of this portion of the vessel's design that a considerable number of single berth staterooms are available. On the majority of ocean liners, the single berth accommodation is scant—due, of course, to the necessity for providing the maximum number of berths in a minimum of space—and strangers have had to share cabins for the period of the voyage.

The new liner is named "*Andalusia*" and has a sister ship, the "*Almeda*," on the point of completion at Birkenhead. Another sister ship, the "*Avila*" was launched on the following day from Messrs. Brown's yard on the Clyde.

Each of these ships is intended for the London - Argentine run and can carry 4,000 tons of chilled meat. This is the first entry of the Blue Star Line into the passenger trade, but the action has been taken under compulsion. By the laws governing the operating of the Blue Star ships to the Argentine, they are not allowed to carry cargo from England and in consequence the ships must travel in ballast outward, passenger traffic alone being available.

* * * *

Berlin's Radio Tower

One of the most interesting of wireless masts was recently put into service when the new "radio tower" of the Berlin broadcasting station was opened for service. It stands approximately 430 ft. above the ground and at the top is a look-out gallery. Half way up the tower is a restaurant that can provide accommodation for 200 persons at one sitting and a lift runs from top to bottom of the tower for the convenience of patrons. For emergency use there is an interior ladder with 650 rungs.

The total weight of the tower is but 400 tons, remarkably small for so high a structure, and the whole rests on a foundation of thin porcelain plates.

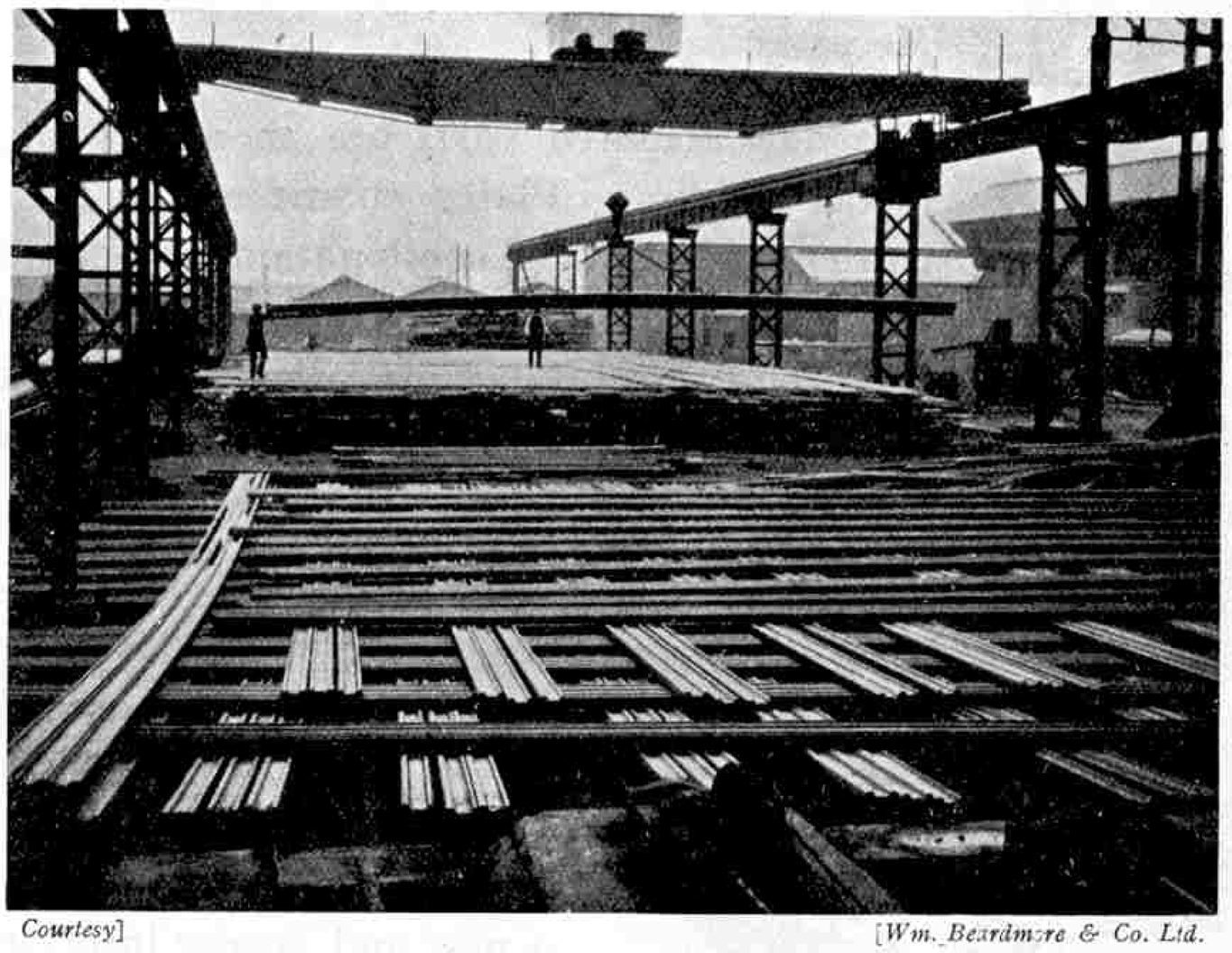
* * * *

Submarine Depôt Ship

The Admiralty has placed an order with Vickers Ltd., of Barrow, for a large submarine depôt ship. The propelling machinery will consist of twin-screw double-acting internal combustion engines built at Barrow of British materials under license from the German M.A.N.Company.

The Beardmore Ice Breaker

So successful has been the work of the "*Krisjanis Valdemars*," the ice-breaker built for the Latvian Government last year by Wm. Beardmore and Co. Ltd., that navigation has been reopened in the Gulf of Riga, in spite of the exceptional weather. Conditions are unlikely to be so severe again this winter, and thus the responsible authorities have been able to announce that in future Riga will remain open to shipping throughout the year.



Courtesy] [*Wm. Beardmore & Co. Ltd.*

Our photograph shows thousands of steel rails being stacked at a large engineering works, preparatory to final tests before delivery.

Gas Pipes Under the Sea

To provide a supply of gas adequate to permit the inhabitants of Walney Island, off the North Lancashire Coast, to use gas cookers and fires, it has been necessary for the Barrow Corporation to lay a chain of gas pipes under the sea from the mainland to connect with existing pipes on the Walney promenade.

* * * *

A 2,000,000-Volt Transformer Installation

To be used principally for research into high voltage transmission problems, a 2,000,000 volt six-transformer test set has been built in the laboratory of the Leland Standford University, U.S.A., and will operate at the highest voltage ever produced at commercial frequency. The design is on what is known as the "chain connection," and experiments may be conducted at different voltages and conditions by using various combinations of transformers.

Two of the transformers are insulated from the ground for 350,000 volts and two for 700,000 volts by insulating cylinders. Although each cylinder is only 37 ins. in diameter with a $\frac{3}{4}$ in. wall, they will support one of the transformers weighing 45,000 lbs. with a mechanical factor of safety of 12,000 per cent.

World's Largest Turbo-Electric Liner

A 22,000 ton electrically-driven passenger liner, the largest of its type in the world, is being built by the Newport Shipbuilding Company in the United States.

The new vessel will be 600 ft. in length, 80 ft. in breadth and 52 ft. in depth, and accommodation for 362 first class and 368 tourist passengers will be provided. The power installation, consisting of high pressure turbo-generators of 18,000 h.p., driving motors coupled to twin propellers, and twelve water-tube boilers, is being supplied by the General Electric Company.

Among the novel features of the ship are large side ports, through which automobiles may be driven on board. There are also private baths for all the first class rooms, and unusually large deck spaces for promenading and sports. The vessel will have a speed of 18 knots and will be able to carry approximately 7,800 tons of freight. Two other ships of a similar type are also to be built, and when completed each will be placed on the Panama-Pacific line's New York-Californian service.

* * *

Long Submarine Power Cables

A record in the laying of under-water high voltage lead-covered cables is believed to have been created by the laying of three 33,000 volt cables under the River Mississippi at St. Louis. The cables which are approximately $4\frac{1}{2}$ in. in diameter, were manufactured in lengths of 2,500 ft., weighing over 27 tons. Before the production of these cables the maximum length that could be manufactured was approximately 1,200 ft., and when laying the previous 21 cables across the river at this point it was always necessary to splice the cables.

The company propose to lay 24 more of the 2,500 ft. single-length cables during the next three years, making a total of 48 cables at the Cahokia crossing.

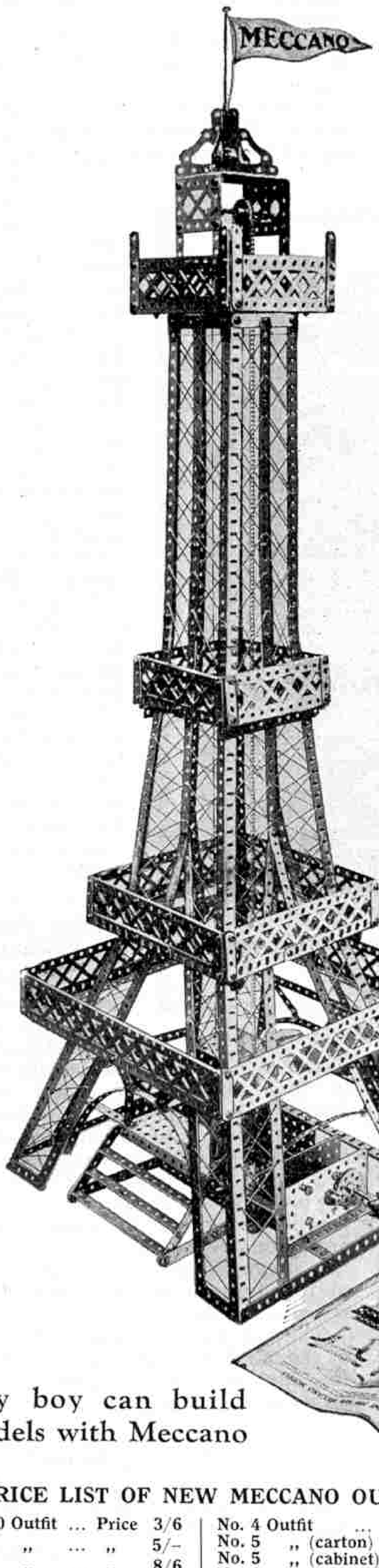
* * * *

The Navy Beaten?

For six years a huge floating dock, 720 ft. in length, 98 ft. in height and weighing 10,000 tons, has lain at Portsmouth, while British naval experts have endeavoured to discover "how it works."

The dock is one of those delivered to Great Britain by Germany in 1920 under the reparations scheme and it is believed that its secret machinery was tampered with by the Germans before delivery, with the object of rendering the dock useless. The "wreckers" so far succeeded that the dock recently was towed to Rosyth to be broken up.

The Boys built it—in colours—and Dad helped



STANDING over six feet in height, this splendid model in colours of the Eiffel Tower is an example of the models boys can build with the New Meccano.

The new coloured parts are an added joy to Meccano model-building. Plates enamelled in red and Braced Girders in green, in combination with the shining steel Strips and bright brass Gear and Pulley-Wheels, give a wonderful appearance to Meccano Bridges, Towers, Cranes, and hundreds of other real engineering models that can only be built with Meccano.

The Meccano system is the same as before, ingenious and fascinating, but the new colours are a fine improvement. Users of the old Meccano should get the new coloured parts and begin model-building again with a new and keener interest.

Any boy can build Models with Meccano

Send for this book FREE

The New Meccano Book will tell you all about it—in colours. It will show the new Accessories and Outfits, as well as new models accurately constructed, just as you—and even your Dad—can construct them.

Supplies of this book will not be available until 15th November but all readers of the *"M.M."* desiring copies should at once send in their applications together with the names and addresses of three of their chums. All requests will be dealt with in strict rotation. Send a postcard to Meccano Ltd., Dept. M.B., Binns Road, Liverpool, to-day.

PRICE LIST OF NEW MECCANO OUTFITS

No. 00 Outfit	...	Price	3/6	No. 4 Outfit	...	Price	40/–
No. 0 „	...	„	5/–	No. 5 „ (carton)		„	55/–
No. 1 „	...	„	8/6	No. 5 „ (cabinet)		„	85/–
No. 2 „	...	„	15/–	No. 6 „ (carton)		„	105/–
No. 3 „	...	„	22/6	No. 6 „ (cabinet)		„	140/–
				No. 7 „ „		„	370/-

THE NEW MECCANO

MECCANO LTD., BINNS ROAD, LIVERPOOL

In Reply

In these columns we reply to suggestions regarding improvements or additions to the Meccano and Hornby Train systems. We receive many hundreds of such suggestions every week, and consequently we are able to publish only ideas that show particular interest or ingenuity. Every idea, however, whether acknowledged in these columns or not, is carefully examined and considered. Practical suggestions that prove to be in popular demand are marked down for adoption at the first available opportunity. It would be of great assistance if readers, when submitting suggestions for consideration, would write them on separate sheets of paper and include their name and address on each sheet used.

Suggested Meccano Improvements

"SUGGESTIONS" ANNUAL.—Thank you for your suggestion that we should publish every year a book containing a selection of articles from the "Suggestions Section." We already have a scheme of this nature in hand, and we hope to make an announcement concerning it before long. (*Reply to Colin Acland, Rockdale, Sydney, Australia*).

IMPROVED CLOCKWORK MOTORS.—We are experimenting with the possibilities of re-designing the Clockwork Motor to conform in shape with the Electric Motors. We note that you consider the new form would be more suitable in model motor-cars and similar models. (*Reply to J. E. Lockett, Manchester; F. Bennell, London, N.W.2; N. C. Aldons, Ipswich; R. P. Cole, Tring, and others*).

SMALL CLOCKWORK MOTOR.—We are not in favour of introducing a Meccano Clockwork Motor of the small size that you suggest, as such a motor would be adaptable to very few models. (*Reply to W. Chisholme, Morley, Nr. Leeds*).

SLOWER CLOCKWORK MOTORS.—We regret we are unable to adopt your suggestion as it is not possible to reduce the speed of the Clockwork Motors without a corresponding loss of power. (*Reply to N. Horton Smith, Oversley, Nr. Alcester*).

Suggested New Meccano Parts

IMPROVED CHANNEL SEGMENTS.—We shall bear in mind your suggestion that the small lug at each end of the Channel Segment should contain two holes instead of one, in order that these parts may be connected together more rigidly. (*Reply to S. D. Cozens, Alberni, B.C.*)

TYRES FOR 3" WHEELS.—Your idea for using up old inner tubes of bicycles to make tyres for the 3" Wheels is very good, and it is possible that other readers may care to adopt it. (*Reply to S. R. Bansal, Delhi, India*).

THREADED STRIP-COUPLINGS.—We have experienced very little demand for these parts, but your suggestion has been duly noted. (*Reply to J. A. Grant, York*).

STEERING WHEELS.—We are unable to adopt your suggestion concerning the manufacture of steering wheels for model motor-cars, etc., as the existing parts may be used for this purpose quite easily. (*Reply to D. Davies, Bedford*).

2" RUBBER TYRES.—The question of introducing rubber rings similar to the existing Part No. 142, but of a diameter to fit the 2" Pulley Wheel, has been noted and will be examined carefully. (*Reply to M. Plummer, Guernsey, and H. N. Upward, St. Albans*).

ARCH PLATES.—Your suggested part is very ornamental but would serve no useful purpose. Excellent arches may be made with the existing Curved Strips. (*Reply to B. Manson, Beaconsfield*).

MOTOR-CAR ACCESSORIES.—We are unable to adopt your suggestions regarding the introduction of miniature speedometers and imitation glass windows, etc., for use in connection with model motor-cars. These parts would be only ornamental, and would serve no useful purpose. (*Reply to N. C. Aldous, Ipswich*).

MINIATURE TYPE-FACES.—We are interested in your suggestion that we should introduce a set of miniature type faces, mounted in such a way that they may be screwed to Meccano parts like ordinary nuts and bolts, for use in connection with model printing machines and type-writers. The possibilities of your idea will have very careful consideration, but we fear that it would prove very costly to put into practice. (*Reply to R. de Y. Bateson, Harrogate*).

Suggested Hornby Improvements

STEAM TRAINS.—We regret we are unable to adopt your proposal regarding the introduction of steam-driven locos. Clockwork and electricity are by far the most popular forms of motive power in small model railways. (*Reply to C. Hare, Southport and J. Watson, Liverpool*).

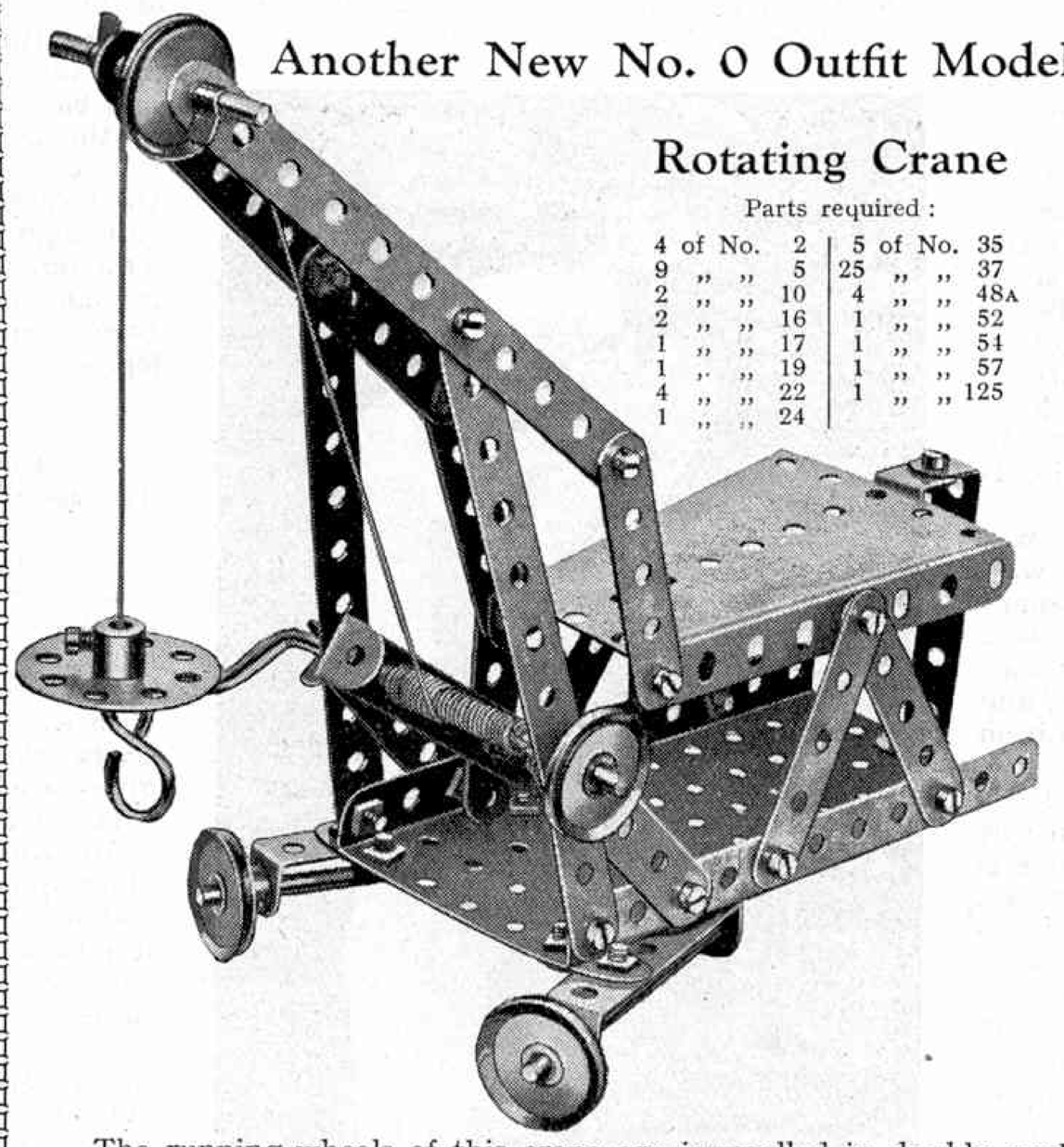
ELECTRIC LOCOS.—We note your suggestions that ordinary Hornby locos should be fitted for electrical working. Meanwhile we would mention that the Hornby Riviera "Blue" Loco may already be obtained equipped in this way. (*Reply to A. Hodgkinson, Fleetwood; J. Archer Rossall Beach and S. Abbott, Lesmahagow*).

Another New No. 0 Outfit Model

Rotating Crane

Parts required:

4	of No.	2	5	of No.	35
9	" "	5	25	" "	37
2	" "	10	4	" "	48A
2	" "	16	1	" "	52
1	" "	17	1	" "	54
1	" "	19	1	" "	57
4	" "	22	1	" "	125
1	" "	24			



The running wheels of this crane are journalled in double angle strips bolted to the base plate and secured at an angle by means of flat brackets. The rear of the base plate is supported on a double bracket. The jib is bolted loosely to the supporting 5½" strips and is connected by 2½" strips to the sector plate which pivots about its supporting bolts. By moving this sector plate the elevation of the jib may be altered as desired. The movement is controlled by a double angle strip mounted on the crank handle and connected pivotally to the plate by means of a 2½" strip. A reversed angle bracket bolted to an upright double angle strip in the rear of the model serves to restrict the movement of the sector plate.

This model secured First Prize in the Overseas "No. 0 Outfit" Competition for H. W. Turner, of Hastings, New Zealand.

ELECTRIFYING LEVEL CROSSINGS.—Your suggestions are receiving careful consideration. (*Reply to A. Hodgkinson, Fleetwood, and C. G. Draffery, Musselburgh*).

SLIP-COACH ATTACHMENT.—The question of slip-coach operation has received attention for some time past. We note your various suggestions. (*Reply to J. P. Bartlett, Cowes; M. Beach, Southampton; and others*).

SINGLE-TRACK LEVEL CROSSING.—We shall consider the advisability of introducing this accessory in addition to the existing crossing. (*Reply to A. V. Strong, Cardiff; F. T. Dyer, Felsted, Essex; C. G. Draffery, Musselburgh; and S. J. Colman, Cardiff*).

COLOURED SMOKEBOXES.—See our remarks on this subject in the May "*M.M.*" (*Reply to J. H. Neville, Darlington, W. Australia*)

SLOW SPEED FOR LOCOS.—See our reply under the heading of "Two-Speed Gear for Locos" in the May "*M.M.*" (*Reply to S. Christopher, Newport*).

HORSE VAN.—We will go carefully into the question of adding to Hornby rolling-stock a special van of the type used for conveying horses by rail. (*Reply to R. Lyle, Hereford; D. H. McNiell, Dunloaghaire, Co. Dublin; E. Watson, Hebden Bridge; K. Thompson, Belper; W. Buckell, Penge, S.E.20; J. Gilchrist, Hemel Hempstead; and others*).

BRAKE ON TURNTABLE.—Your suggestion that the Turntable should be equipped with a brake has been noted for further consideration. (*Reply to N. F. J. Ward, Berkhamstead, and J. P. Bartlett, Cowes*).

TWO-SPEED GEAR FOR LOCOS.—See our reply on this subject in the May "*M.M.*" With reference to your suggestion for vacuum brake pipes we would refer you to the January issue. (*Reply to J. H. Neville, Darlington, W. Australia*).

IMPROVEMENTS IN LEVEL CROSSING.—We shall carefully examine your suggestions, to the effect that the rails on Hornby Level Crossings should be of the standard single-rail length and spaced apart to conform with Parallel Points. (*Reply to A. V. Strong, Cardiff*).

FAIRLIE LOCOMOTIVE.—We regret we are unable to adopt your suggestion regarding the introduction of this type of loco. (*Reply to H. Smith, Weymouth*).

LIVE RAIL FOR CROSSINGS, ETC.—We would point out that in actual practice "live" rails are not laid down on level crossings, owing to the great danger that they would constitute to pedestrians and road traffic using the crossings. The impetus of the train must be relied upon to carry it over this "blind spot" in the track. We shall bear in mind your suggestion re electrified Turntables. (*Reply to L. Ison, Northcote, Victoria*).

2-4-2 AND 4-4-2 LOCOS, ETC.—Your various suggestions regarding alterations and additions to the existing Hornby locos have been noted. It is our opinion, however, that these alterations would not improve to any great extent the general efficiency and appearance of the locos, but they would result in a big increase in the price of same. (*Reply to E. Crilley, Kenilworth; C. Dawe, London, E.17; J. H. Neville, Darlington, W. Australia; A. Machin, Levenshulme, Manchester; Rhodes Laird, Pukekoke, Auckland, N.Z.; and J. Spencer Smith, York*).

EIGHT-COUPLED LOCOS.—Locomotives with eight coupled wheels would be quite unsuitable for Gauge 0 working, as they would be able to negotiate only curves of very large radius. (*Reply to H. A. Trim, Guildford*).

LIFE GUARDS FOR LOCOS.—The advisability of adding life guards in front of the loco wheels, as in actual practice, will be examined carefully. (*Reply to A. J. Young, Sheffield*).

LARGE PETROL TANK WAGON.—There appears to be little demand at present for an eight-wheeled (two bogies) petrol tank wagon. (*Reply to H. A. Trim, Guildford*).

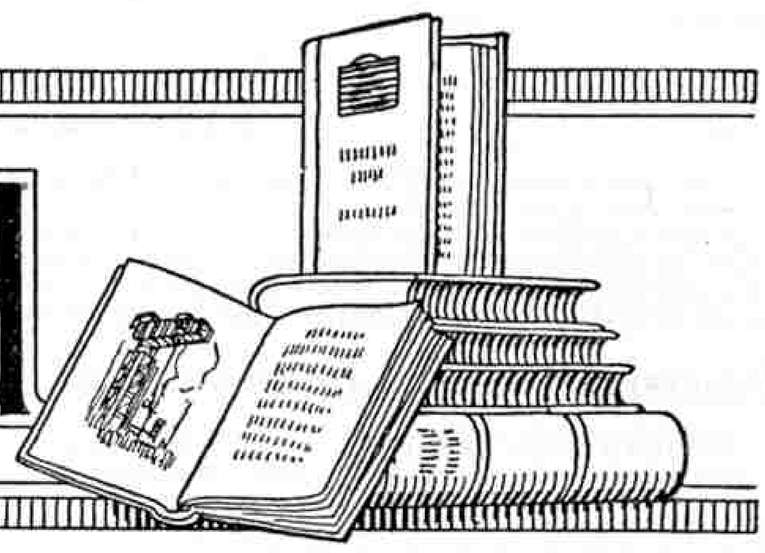
CLOCKWORK LORRIES, ETC.—The manufacture of clockwork motor-lorries and model taxis would constitute a departure from our usual practice. We suggest that Meccano models of these accessories should be used in conjunction with Hornby railways. (*Reply to E. L. Chapman, Toronto, N.S.W.*)

VARIABLE SPEED FOR LOCOS.—We doubt whether your suggestion regarding the addition of speed-changing gear in Hornby locos is practicable, although the possibilities of a slow drive for goods locos have engaged our attention for some time. (*Reply to D. R. Heeramaneck, New Gamdevi, Bombay*).

LARGER VIADUCTS.—We do not think that a Viaduct fitted with taller arches would be of much practical use in a Hornby layout, for it would necessitate the provision of steeply-inclined approaches. (*Reply to G. Harvey, Woodford Green*).

"SOUTHERN COLOURS."—We continue to receive a large number of letters on this subject and shall be pleased to hear from all other readers who are in favour of the introduction of Southern Railway livery to Hornby Trains. See our replies in previous issues. (*Reply to H. G. Bridge, Bournemouth; H. Helliwell, Sheffield; D. F. E. Nash, Sutton; H. Smith, Weymouth; J. Neville, Darlington, W. Australia; and others*).

Books to Read



Readers frequently write to me asking if I can recommend books that are both of interest and of use. On this page I review books that specially appeal to Meccano boys. I do not actually supply these books, which may be obtained either through any bookseller or direct from the publishers.—EDITOR.

"Steeplejacks and Steeplejacking"

By William Larkins

(Jonathan Cape. Price 6/–)

The recollections and reminiscences of a man whose life has been spent in climbing and repairing the highest steeples and chimneys in the country, cannot fail to be interesting. Everyone is interested in a steeplejack, as is evident from the fact that whenever one is at work there is always a large crowd down below watching him. The work is dangerous and exciting and requires men of strong nerve, and this book shows that at least one steeplejack is not lacking in ability to write an exciting story and that he is not altogether without humour.

One of Mr. Larkins' greatest feats was the decoration of the Nelson column with 40 tons of laurel wreaths on the centenary of Trafalgar. Fixing the ladders was a very difficult task, because spikes or nails could not be driven into the column, and even when they had been placed in position the difficulties only began. At the summit of the column is a cornice—probably the heaviest projection in the whole of Great Britain. This cornice is not flat as it would seem from the ground, but is bevelled with a sharp slope and was covered with 1 in. depth of greasy soot. In spite of this difficulty Mr. Larkins beat the record of 2½ days for the climb and accomplished the business in 5½ hours. The excitements and dangers of some of his chimney climbs will make our more sympathetic readers shudder for the safety of these men who, one concludes, must be entirely without nerves.

* * * *

"Admiralty Handbook of Wireless Telegraphy, 1925"

Prepared by Capt. W. G. H. Miles, R.M.

(Published by H.M. Stationery Office. Price 5/– net)

In this edition this eminently useful work has been thoroughly revised and brought up to date. Its nineteen chapters deal competently and comprehensively with all phases of Wireless Telegraphy. The two excellent opening chapters on Wave Motion and Electricity and Magnetism are followed up by well-summarised sections on Electric Generators and Motors, Transformers, Receiving Circuits, Amplifiers, Aerials, Directional Reception and Transmission, etc.

The value of the whole work is greatly enhanced by a complete cross-reference index to the numbered sections and by a useful glossary of wireless terms. The book is, in short, an invaluable work of reference for the student of Wireless Telegraphy.

"Junior Cricket"

By G. W. R. Treadgold

(Dent & Sons Ltd. 2/6 net)

To the enthusiast at any sport there is never a close season and with the cricketer especially there are two distinct phases of his game—the period spent upon the field and the longer period spent in preparation for the coming season.

Jack Hobbs, from "Junior Cricket" reviewed on this page.

It is during the latter period that the really enthusiastic player gathers together his theoretic knowledge in readiness to apply correct principles in actual play and it is as a help in this direction that we recommend this handy little volume. Although written primarily for the younger player, the soundness of its advice and instruction make it worthy of the attention of every cricketer. Batting, bowling, wicket-keeping and fielding are dealt with in detail, and are followed by a particularly interesting section dealing with the duties of a captain and the various problems with which he has to deal. The book is illustrated by a number of well-chosen photographs of prominent players in action, and we feel sure that our readers will welcome this volume and give it an important place on their bookshelf.

Bélèd-es-Siba

By W. E. D. Allen

(Published by Macmillan & Co., London. Price 8/6)

This is an interesting volume of sketches and essays of travel—a literary mixture of grave and gay life and events in other lands. The author gives us an account of his wanderings considerably off the beaten track in the Moroccan wilderness and into the Caucasus, through Serbia and back again. There is also an account of the less-known Moroccan Independent Country; the operation of the Allies in the Caucasus in 1853; the Serbo-Turkish campaign in 1876; and the treaty of Trianon. The book concludes with an account of the "Man in the Panther's Skin," one of the most notable Georgian legends.

* * * *

"The A.B.C. of Relativity"

By Bertrand Russell, F.R.S.

(Published by Kegan Paul, Trench, Trubner & Co. Ltd. Price 4/6)

Most people know that Einstein has done something astonishing but few know exactly what he has done. Among the numerous volumes now competing to inform the public concerning the intricacies of this difficult matter of Relativity, there are few, if any, so likely to give satisfaction to inquiring readers as "The A.B.C."

Mr. Russell is a master of mathematical philosophy with the gift of clear exposition, and he shows us that Einstein has revolutionised our ideas of the physical world and of the universe in general. The subject is, of course, most difficult to explain in a simple manner and even though Mr. Russell is well known as being able to explain the most complicated things, the book demands concentrated attention from the reader and is more suitable for our older readers, and their fathers and uncles. It is an ideal book on relativity for all except the mentally lazy—who are already sufficiently well catered for by other books on this subject!

* * * *

"Copper"

By N. E. Crump

(Wm. Rider & Son Ltd., London. Price 10/6 net)

Readers who take a special interest in our series "*The Story of Metals*," will find this book of service in extending their knowledge of the metal copper beyond the scope of the articles in our issues of February, March and April, 1925.

This book is not a technical treatise but has been written with the idea of placing before the average reader a general survey of copper—where it comes from, how it is manufactured and what are its uses. The various sources of supply throughout the world are dealt with interestingly and in considerable detail, and the history of the trade in copper is traced from its earliest days to the present time. To many readers the chapters on

the smelting and refining of the metal will be of special interest more especially as they are free from all unnecessary technicalities.

In addition to being of interest to the general reader, the book will be of special value to those who intend devoting themselves to mining or metallurgy. The only serious criticism of the volume to be made is that it contains few illustrations, and a number of good photographs undoubtedly would have increased its attractiveness.

* * * *

"Athletics"

By Harold M. Abrahams

(Published by Geo. G. Harrap & Co. Ltd. 2/6 net)

For many years there has been a steady output of books on athletics written by men who by virtue of their own prowess had gained the right to be regarded as experts. Most of these books have been written with the object of giving genuinely sound advice to beginners in the various branches of athletics, but the value of many of them has been seriously discounted by the fact that the authors regarded their subject from too narrow a viewpoint, and were intolerant of any methods other than their own "pet" ones.

The present volume is noticeably free from defects of this kind. Throughout his remarkably successful career as an athlete, Mr. H. Abrahams has been a close observer of the many small items that lead to success or failure, and in the course of his fourteen chapters he concentrates an astonishing amount of advice. At the same time he is never dogmatic and he has no fads. His sound commonsense attitude may be illustrated by the following extract from his remarks on food:—"No food contains any 'mysterious property' which can be good for, say, hurdling and no use for pole-jumping. Spring cabbages are just as good for three-milers as for long and high jumpers, if they agree with them. A thing is good or bad for a man according as it is digestible or indigestible. No particular dietary will suit all athletes, and it is foolish to quarrel with a vegetarian who may well find that he has produced his best form on leeks and pistachio nuts. Good luck to him!"

Mr. Abrahams lays much stress on regularity of meals and has a sly dig at certain schoolboys who "are apt to receive nourishment most of the day from their pockets, checked only by the vigilance of their form-masters or the parlous condition of their finances."

A particularly interesting chapter deals with the mental aspect of athletics including the curious phenomenon known as "getting the wind up" before a race, and the book is brought to a close by some very sound general advice regarding the anxious few moments before the commencement of a contest.

The book is illustrated by a selection of excellent photographs.

"Bang!" The Start of a Sprint (from "Athletics" by H. M. Abrahams, reviewed on this page).

"The Great Book of Ships"

(Oxford University Press. Price 1/6)

A ship in full sail, skimming over the blue sea, the spray reaching to her white sails, the seagulls following in her wake—what a sight! It is this cover picture that tempts the reader to dip into the pages of this book which he will read to the end.

We read of the history of ships, from the coracles of the ancient Britons to the present-day ocean-going liners, in an intimate way that makes us imagine the author to be a sailor who has lived all his life on the ocean wave, and a student with a wide and varied knowledge of ships.

The book, intended for the younger boy, is printed on strong paper that will stand much handling and the print is large and bold. There are many sketches of craft of all kinds—war-canoes, Egyptian ships of 1600 B.C., the Victory after 1805—and an excellent representation in colours of the "*Majestic*" in all her stately beauty. It seems unbelievable that such a book as this, with all its information and illustrations, can be published at so low a price as 1/6 but there it is! It will make a fine Christmas present for your young brother.

* * * *

"Thunder Boy"

By Olaf Baker

(Thornton Butterworth. Price 7/6)

No boy will read this splendid book without taking a new and greater interest in all wild creatures, and feeling that he understands and sympathises with them in a way he has never done before. To this author birds and animals are personalities, and their thoughts and feelings, their hopes and fears, are sketched by a skilful and understanding friend.

In the opening pages we are introduced to the hero, a little Indian baby, thoroughly enjoying life as he lies in an opossum-lined pine-wood box. This is "Thunder Boy," whose adventures commence at once, for when his mother takes the baby boy on a long journey she is attacked by wolves, and although she reaches the Indian camp safely, she dies shortly afterwards. "Thunder Boy" grows up in the country where the pale-faces have not yet penetrated and his meetings with the hostile warriors of other tribes, and with fierce animals, and his hair-breadth escapes, make thrilling reading.

"The Earth and the Stars"

By C. G. Abbot

(Chapman & Hall Ltd. Price 15/-)

In this book an astronomer of the famous Smithsonian Observatory writes of the wonders of the universe in simple language, and succeeds in compressing into his 264 pages, material that could readily fill a hundred volumes of the same size.

He first deals with some of the famous astronomers and their instruments, then describes the Solar System and the Minor Planets. Other sections are devoted to the Sun; Eclipses; the Constellations; the Distances, Sizes and Motions of the Stars; New Stars, Variable Stars and Star Clusters. One chapter, that no doubt will particularly interest our readers, describes methods of measuring solar heat, and of actually utilising this heat in the form of solar engines and solar cookers. There are useful appendices dealing with the Solar Eclipse of 24th January 1925; the Tides; List of Constellations, etc. A vocabulary of astronomical terms is included.

Modern astronomy consists of much more than an observatory and a good telescope, and that the astronomer must also be capable of carrying out considerable work in the laboratory is evident from the chapter dealing with such subjects as Atomic Structure; Measurement of Light Velocity; the Constitution of the Earth, and other physical subjects of a similar nature.

The book is illustrated with some remarkably good photographic plates and numerous line diagrams.

Interesting New Books

We hope to deal with the undermentioned books in an early issue.

"EVOLUTION"
by J. Graham Kerr, F.R.S.
(Macmillan & Co. Ltd.), 8/6

"CLINTON'S QUEST"
by P. F. Westermann

"SEA SONGS AND SHANTIES" *by* Whall
(James Brown & Son, Glasgow), 2/6 net

"CLOUDS AND WEATHER PHENOMENA"
by C. J. P. Cave
(Cambridge University Press), 5/- net

"SAILING SHIPS AT A GLANCE"
by Carr Laughton (Architectural Press), 6/-

"EVOLUTION AND CREATION"
by Sir Oliver Lodge (Hodder & Stoughton), 3/6

"CASTLES"
by Sir Charles Oman (G.W.R. Co.), 5/-

"TWENTY-SIX GOOD STORIES FOR BOYS" (Religious Tract Society), 3/6

"THE BOY'S OWN ANNUAL"
(Religious Tract Society), 12/6

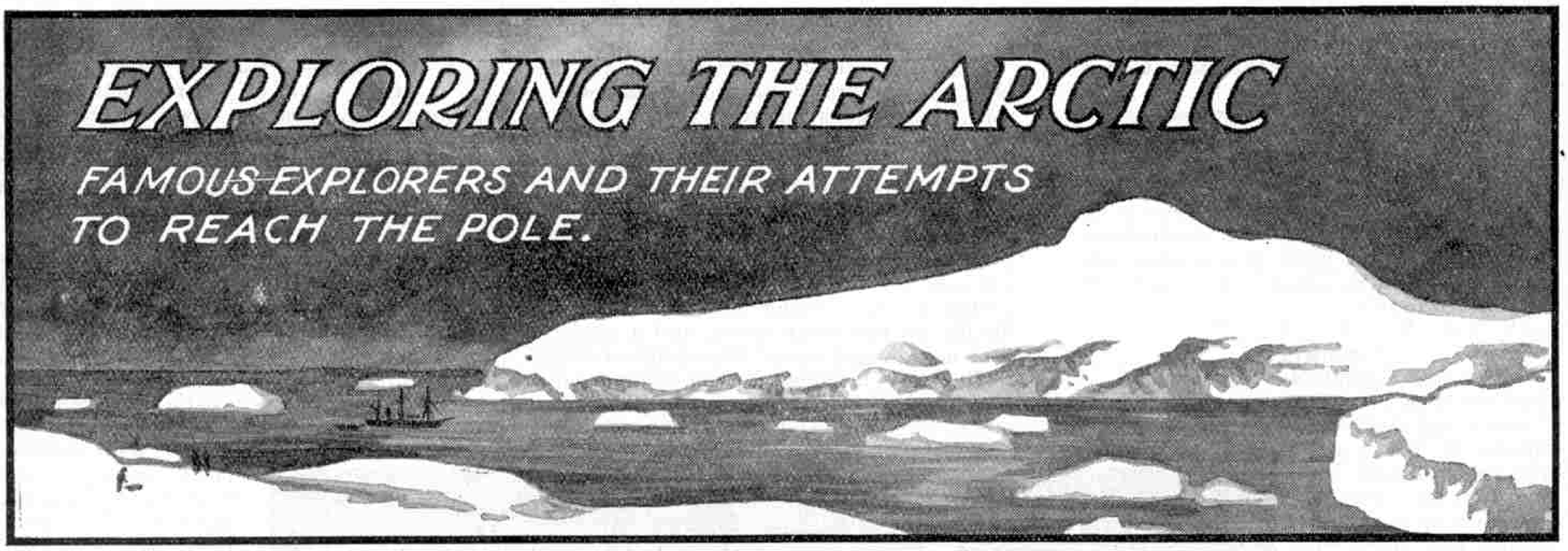
"EMPIRE ANNUAL"
(Religious Tract Society), 5/

"THE SCHOOLBOY'S ANNUAL"
(Religious Tract Society), 3/6

"TROOP ONE OF THE LABRADOR"
by Dillon Wallace
(Religious Tract Society), 3/6

"THE TWENTY-FIVE SWORDSMEN"
by Escott Lynn (Chambers), 5/-

"SCIENCE FOR ALL"
by Sir Charles Sherrington (Ward Lock), 6/-



III. JOHN DAVIS AND WILLIAM BARENTS

THE next attempt to discover a north-west passage was made by Davis, an accomplished and determined seaman who made three expeditions in three succeeding years.

John Davis was born at Sandridge, near Dartmouth, and was probably a playmate—and certainly a life-long friend—of Sir Humphrey Gilbert and his brothers, and of Sir Walter Raleigh.

Davis was probably one of the moving spirits in the quest of the north-west passage and in 1585 was appointed captain of an "exployt," in which he set out for the Arctic, with two vessels—"*Sunshine*" and "*Moonshine.*"

The expedition, which had been fitted out at the expense of certain merchants, left Dartmouth on 7th June and on 20th July the voyagers reached the east coast of Greenland, which Davis named the "Land of Desolation." He landed on the west coast and made friends with the Eskimos by instructing some musical members of his crew to strike up some dance tunes. To the merry music that ensued, the staid explorer and his men capered about, much to the astonishment of the natives, whose number gradually increased.

From an] [*Old Engraving*

Sebastian Cabot, who discovered Newfoundland in 1497, was the first to suggest a search for the North-West Passage

"At length," Davis tells us in his narrative, "one of them poynting up to the sunne with his hande would presently strike his brest so hard that we might hear the blowe. This he did many times, before he would any way trust us. Then John Ellis the master of the "*Mooneshine*" was appointed to use his best policie to gaine their friendshippe: who struke his breast and poynted to the sunne after their order: which when he had diverse times done, they began to trust him, and one of them came on shoare, to whom we threwe our caps, stockings and gloves, and such other things as then we had about us, playing with our musicke, and making signes of joy, and dancing."

Davis traded with the Eskimos, buying from them canoes, seal-skins, spears and darts. He then crossed what has since been named Davis Strait and reaching land, anchored below "a very brave mount," which he named Mount Raleigh after the friend of his boyhood days. In these waters, "altogether voyd from ye pester of ice," he saw white bears "of monstrous bignesse." He rounded the southern point of the land, which he named Cape of God's Mercy, and after entering Cumberland Strait, returned to England.

A second voyage, made in 1586 and financed by merchants, consisted of three ships and a pinnace. When Greenland was reached two of the vessels sailed up the east coast and the other two made for Gilbert Sound, Lat. 64°N., where the crews again made friends with the Eskimos. Davis then crossed to Baffin Land, and traced part of the coast, and the sea between these two coasts is now named Davis Strait, in commemoration of his explorations.

His search for a north-west passage was blocked by a "most mighty and strange quantity of ice, in one intyre masse, so bigge that we know not the limits thereof." He crossed Frobisher Bay and off Labrador

found a great shoal of codfish, some of which he caught, salted, and brought home.

In the following year he was off again to the Arctic, his object being "the isles of the Molucca on the coast of China."

Reaching Gilbert Sound, having sighted Greenland, he sailed northward to 72° 12′ N., the "furthest north" attained up to that time. Here he discovered a lofty granite island, which he named Sanderson's Hope. He saw "no ice towards the north, but a great sea, free, large, very salt and blue, and of an unsearchable depth." Wind and ice prevented his further progress and he had to turn first to the west and then to the south. He ran down the coast of Baffin Land, crossed Davis Strait, discovered what later became known as Hudson Strait, and returned home.

He was ready to sail a fourth time to the Arctic, when the coming of the Armada upset his plans.

* * *

From the painting by Millais] [*By permission National Gallery*

The Boyhood of Raleigh

The English were not the only searchers for a north-west passage, and there were now, and subsequently, many other explorers at work. We have not space to deal with the work of these earlier explorers at length, but must content ourselves with referring only to the discovery of Spitzbergen, a place that has played an important part in almost every expedition, even down to the present day.

Early in the 16th century the Dutch were eager to discover a northern route to China and India, more especially as the Spaniards and the Portuguese claimed the routes by the Cape of Good Hope and the Straits of Magellan and jealously guarded them.

As early as 1565 the Dutch had settled at Kola, in the north of Lapland, and soon afterwards sailed round the peninsula into the White Sea to Archangel where they established a factory.

In 1594 the merchants of Amsterdam fitted out the "*Mercury*" and placed Willem Barents in command. He set sail for the Arctic with the idea of discovering a passage around the northern end of Nova Zembla, because of the difficulty that ships were experiencing in penetrating the Sea of Kara. Barents sighted Nova Zembla on 4th July, and having sailed round Cape Nassau reached Lat. 77° 20′ N., thus beating Davis's "farthest north." During the next month he endeavoured unsuccessfully to find a way through the ice-floes and although in doing so he sailed 1,700 miles, he only progressed 25 miles, having constantly to tack ship!

In a second voyage Barents did little but attempt to enter the Kara Sea, his passage being blocked by the ice. In 1596 he went as pilot with an expedition that achieved important results. They discovered an island, which they named Bear Island. They so named it from the fact that they here saw a huge white bear, which they chased in a boat intending to slip a noose over its head. When they were near enough to do so, however, the bear looked so big and savage that their courage failed them and they returned to their ship for more men, and an armoury of "muskets, harquebasses, halberds and hatchets." With these they attacked the bear for over two hours and, after an exciting fight, at length managed to kill it.

Continuing their voyage they sighted Spitzbergen, which they believed to be Greenland. They were soon stopped by pack-ice, but proceeded around the most northerly point of Nova Zembla, and reached Ice Haven. Here "the ice began to drive with such force that we were enclosed round about, and yet we sought the means to get out, but it was all in vain. At that time we had liked to have lost three men that were upon the ice, if the ice had held the course it went. But we drove back again and the ice also, whereon our men, being nimble, as the ship drove by them, one of them caught hold of the beak-head, another of the shrouds, and the third of the main brace, and so by great adventure by the hold they took they got into the ship again, for which they thanked God with all their hearts."

On the same evening of this adventure (26th August 1596) the explorers reached Barent's Bay, and here they were forced to remain for the winter.

Barents and his crew have the unenviable distinction of being the first Europeans to successfully face a winter in the Arctic. They built a house from the timber of their wrecked vessel, and in the following spring, after terrible sufferings, set out for the coast of Lapland in small boats. Barents died, however, before the party reached Lapland. His voyages are the most important up to the time of the sixteenth century, for the establishment of the great whale and seal industries resulted from them.

Ship's Helm Indicator in Meccano

A Safety-First Measure at Sea

By H. F. Lane

Further evidence of the practical value of Meccano is forthcoming almost daily. In this article our contributor, who is an authority on navigation, describes a simple helm indicator that he devised from Meccano and fitted to a certain steamship as a precaution against possible error on the part of the quartermaster, which might easily result in collision or grounding of the ship. Other articles by the same author will appear in future issues. These will deal with "hunting gear" (used in connection with steering engines), emergency steering gear, the Flettner rudder, and other similar subjects that are known to few individuals apart from those who are directly connected with maritime occupations. The interesting mechanical movements involved in each case will be demonstrated in a simple manner with the aid of Meccano.

BEFORE describing the construction of the Meccano helm indicator, it will be useful to consider the general arrangement of a ship's steering gear in order to understand fully the functions that the indicator is designed to fulfil. Fig. 2 illustrates diagrammatically a typical arrangement of the connections between the steering wheel and the rudder of a ship. The Meccano indicator is shown attached to the side of the binnacle on the upper bridge and is connected to the steering wheel on the lower bridge by means of Meccano Universal Joints and shafting A.

It is the duty of the officer of the watch to guide the ship on her course, while the quartermaster actually operates the helm. The officer of the watch is stationed on the upper bridge, from where he has a better all-round view, while the quartermaster is on the lower bridge, in order that the wheel, etc., may not impede the movements of the officer. The latter has his own compass with which to check the course and a voicepipe down which to pass orders to the quartermaster.

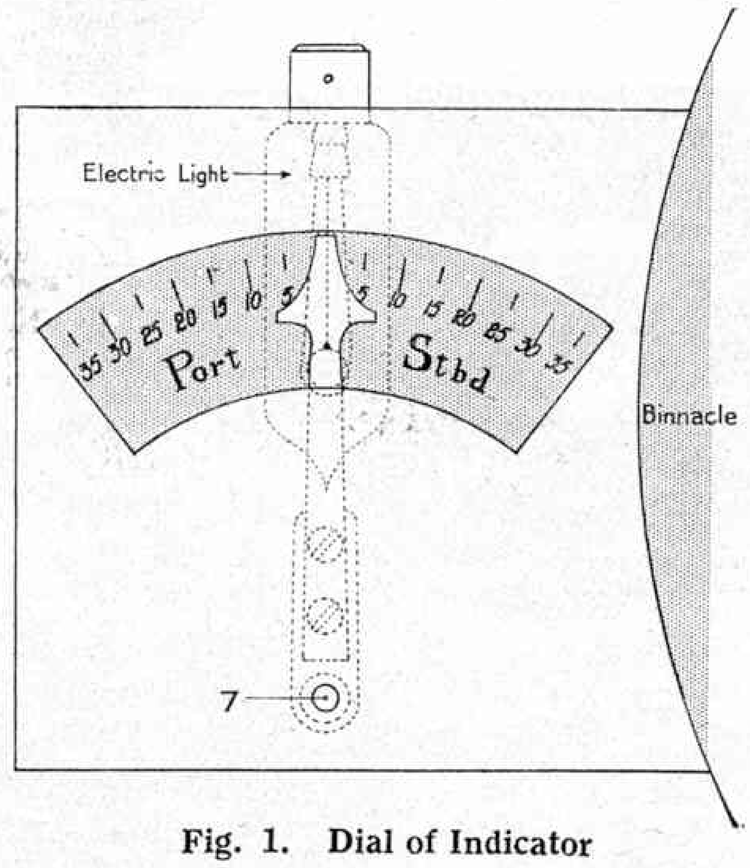


Fig. 1. Dial of Indicator

Directing the Course of a Ship

The rudder is actually moved by a steam engine, the valve of which is operated by the movement of the wheel on the lower bridge, the connections between the two being carried out through shafting, bevel gears, universal joints, etc. The mechanism is so arranged that the rudder moves to port or starboard according to the direction in which the steering wheel is rotated.

Full helm—that is, the maximum angle to which the rudder may be turned—is normally 35 degrees on either side, but there are of course any number of intermediate positions. In usual practice, positions 5 degrees apart are used when giving helm orders. While a ship pursues a straight course, steering wheel and rudder are central save for occasional small movements to either side made by the quartermaster to correct slight deviations, known as "yaw," and to hold the ship to her course.

Should the quartermaster receive an order from the officer of the watch to put on—say—20 degrees of "starboard helm," he moves his wheel in the required direction until the pointer on top of the steering column shows "starboard 20°," and then keeps it there. The engine moves the rudder over until the latter reaches 20 degrees of starboard helm, when steam is shut off by means of what is known as "hunting gear," and the rudder remains in its new position until the wheel is again moved. The wheel and the rudder may be described, therefore, as being continuously "in step."

As long as the rudder is in any position other than central the ship will move in a circular path, the radius of which depends on the extent of the angle of helm used. Consequently when, after an alteration of course, the compass informs the officer of the watch that he has reached the desired course, he will order the helm to be put "amidships." The quartermaster then centres his wheel, the rudder again becomes central and the ship steadies on the new course, yaw being corrected as before by small independent movements of the helm either way.

It must be remembered, however, that once a heavy ship starts swinging in this way, the turning movement will not cease immediately the helm is returned "amidships."

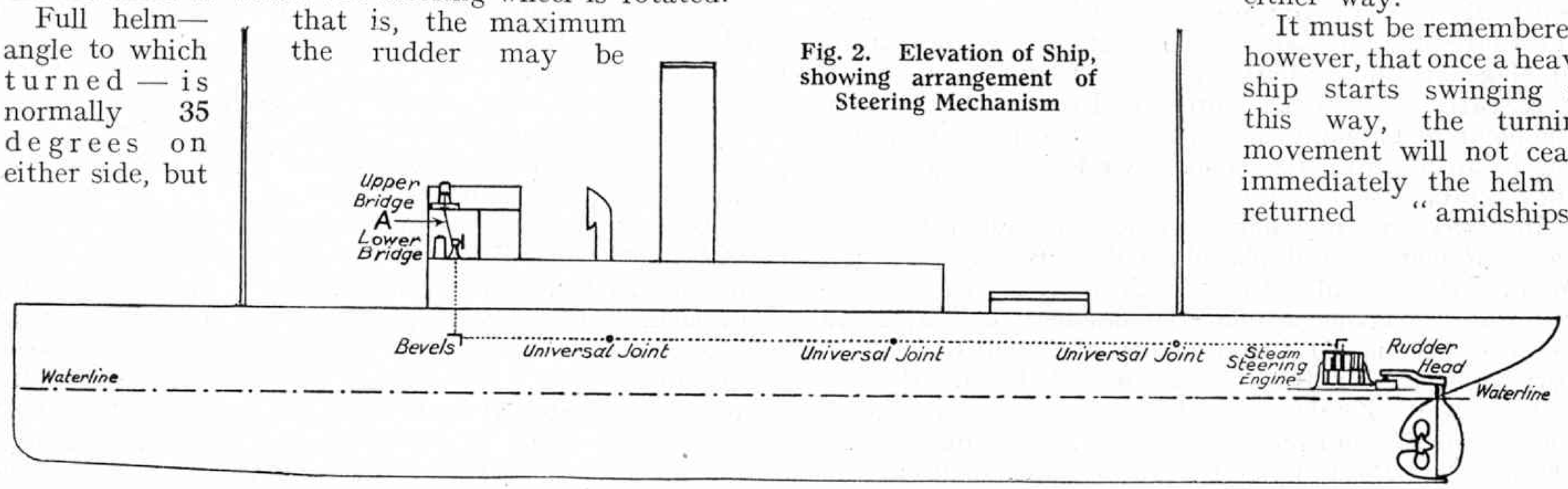


Fig. 2. Elevation of Ship, showing arrangement of Steering Mechanism

Therefore it is always necessary to centre the rudder some time before the ship reaches the new course, and usually to put a little helm on the other way for a few seconds to stop her when she arrives there.

The Collision Danger

It is obvious that, should the helm at any time be put the wrong way through some error, the ship will start turning in the wrong direction, and if in crowded waters may get into a dangerous swing before there is time to stop her and correct the helm.

Let us suppose that the officer of the watch has ordered "starboard 20°" and for some reason the rudder has been turned in the wrong direction. Half a minute will elapse before either the swing of the ship or the movement of the compass will enable the officer to see which way the ship is turning. But though this initial movement is slow and small, the swinging force exerted by the rudder angle has been accumulating, and even if the helm is now immediately put amidships the ship will continue to swing with increasing speed in the wrong direction for some time. Actually a bigger angle than the original (correct) starboard helm will be needed to stop her and induce her to start swinging again, this time in the right direction. On certain occasions it may be impossible to correct her in this way in time to avoid a serious collision or grounding of the ship.

It will now be appreciated of what immense assistance would be some device that would enable the officer of the watch to know instantly whether the quartermaster had obeyed his order correctly. Actually, in the larger ships, this result is almost invariably achieved by means of an electrical repeat device controlled from the rudder-head itself, but nothing whatever is fitted in many of the smaller vessels. The drawings reproduced herewith show how Meccano was harnessed to perform this very important function in a certain steamship which, on several occasions prior to its introduction, had been in considerable danger of collision or grounding through an error on the part of the quartermaster in operating the wheel.

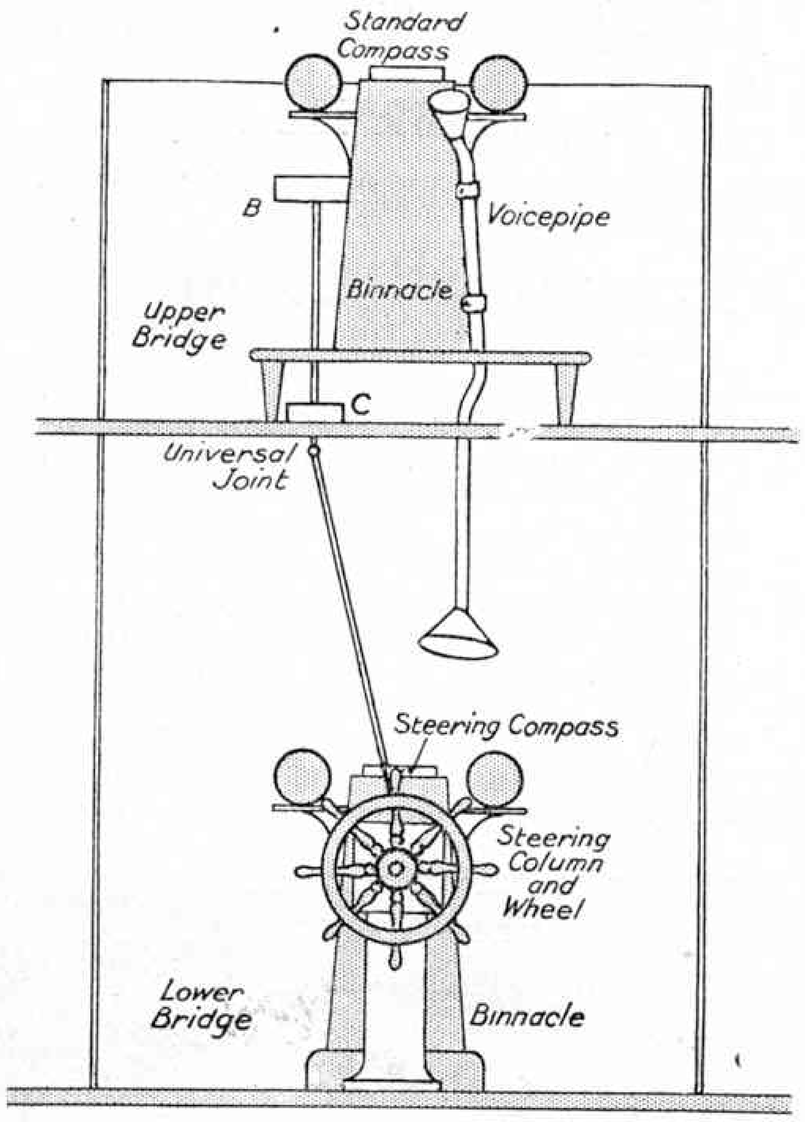


Fig. 3. Athwartship elevation (looking forward), showing bridge controls

Construction of the Indicator

The indicator (Fig. 1, and B, Fig. 3) consists essentially of a small pointer, placed within convenient proximity of the officer of the watch, and faithfully recording the movements of the rudder. The pointer is actuated from the steering wheel, the necessary reduction gear being provided by a train of Gear Wheels enclosed in the gear box (C, Fig. 3) bolted to the deck. This gear box is shown in detail in Fig. 4. The shaft 1 leads down to the lower bridge, where it is connected by means of a Universal Coupling to a vertical Rod journalled in brackets secured to the fore-side of the steering column. The outer end of the steering wheel shaft is turned down to receive a $\frac{3}{4}$" Contrate Wheel, which engages with a $\frac{1}{2}$" Pinion secured to the lower end of this vertical Rod.

The movement of the Rod 1 is transmitted through a $\frac{1}{2}$" Pinion and 57-teeth Gear Wheel, giving a reduction ratio of 1 in 3, to a secondary Rod 2. This, in turn, is coupled by similar means to another Rod 3, which drives the Rod 4 by means of a $\frac{3}{4}$" Pinion engaging with a 50-teeth Gear Wheel 5, and a 1" Gear Wheel secured to the latter shaft imparts movement to the Rack Segment 6 bolted to the Rod 7. This leads up to the indicator case attached to the binnacle and carries at its upper end a Crank 8, to which the pointer is secured.

Illuminated Dial

The gearing is arranged to provide the necessary reduction to enable the total movement of the steering wheel ($3\frac{1}{2}$ turns to either side) to result in the largest possible movement of the pointer without the rack 6 becoming disengaged with the 1" Gear Wheel on the Rod 4. Each complete revolution of the steering wheel moves the rudder through an angle of 10 degrees to port or starboard, according to the direction of rotation, and the indicator dial (Fig. 1) may easily be marked out after a few preliminary turns of the wheel.

The indicator casing and gear box used on the ship were constructed from metal, in order that they should be water-tight. The dial consists of a piece of celluloid, and is illuminated at night by means of an electric bulb placed directly below it in the indicator case, as shown in Fig. 1. Apart from these items the only non-Meccano parts are the brackets on the steering column, which form bearings for the vertical Rod, and the longer pieces of shafting. The latter are of brass, and were used in place of Meccano Rods in view of the fact that such a length of steel would affect the movements of the compass.

It will be noted from the above that the steering orders relate to the position of the *helm*, and not the rudder itself. Hence the indicator will move towards port when the ship is turning in a starboard direction, and vice versa.

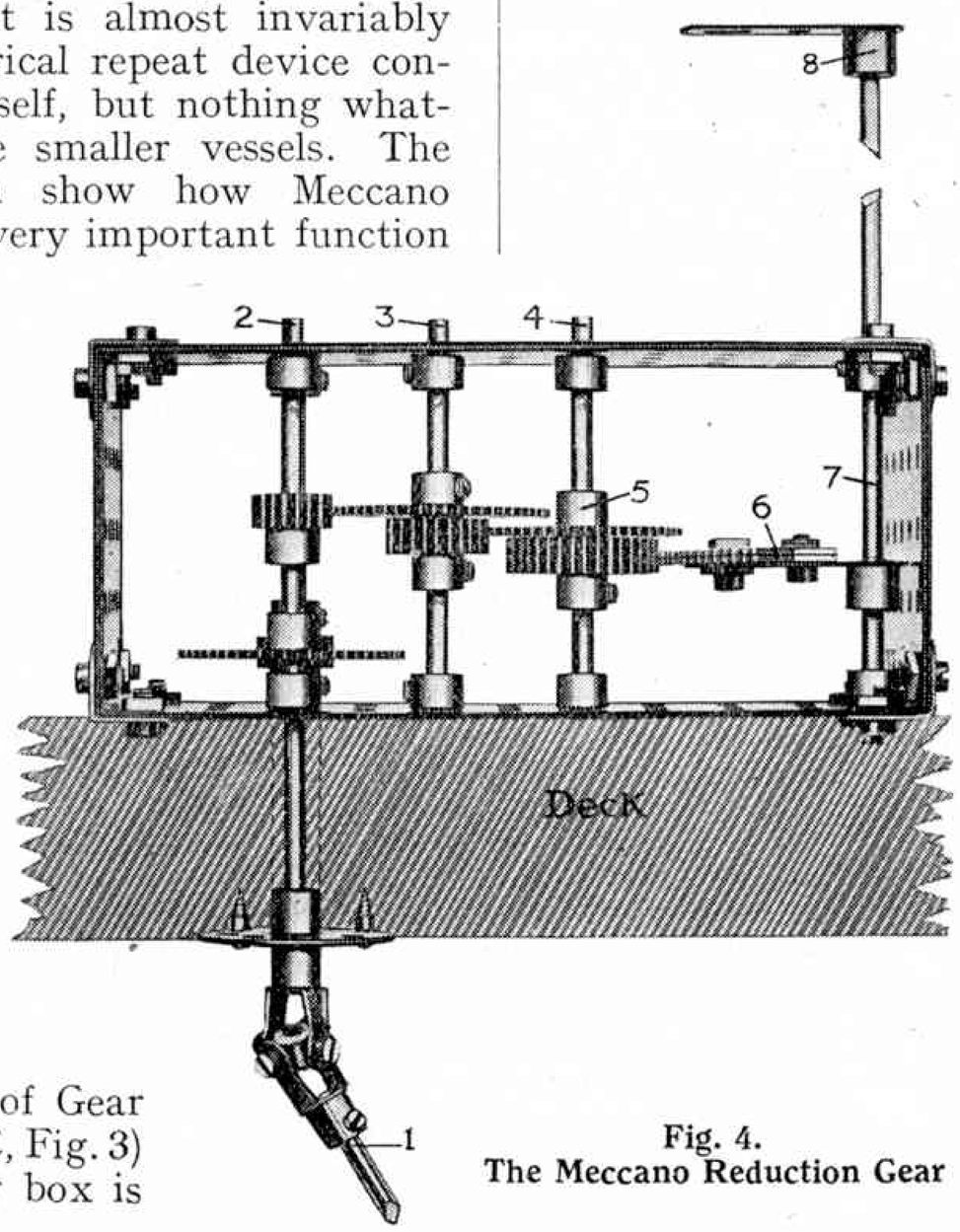


Fig. 4. The Meccano Reduction Gear

Results of Meccano Model-Building Contests

By Frank Hornby

"Originality" Competition

AS I had anticipated, there were few models submitted in this competition that represented subjects not previously reproduced in some form with Meccano. Nevertheless, the absence of originality in the general outlines of the models was more than compensated for by the many entirely novel and very ingenious uses made of the standard Meccano parts in their construction. It seems safe to say that the number of new adaptations that bright Meccano boys can find for these parts is quite unlimited, and I am sure they cannot indulge in a more profitable pastime than that of working out their own ideas in this connection.

The results of the contest are as follows:

First Prize (cheque for £3-3s.): William Goodwin, 140, Church Street, Eccles.

Second Prize (cheque for £2-2s.): Reginald Mason, 75, Stoney Rock Road, Burmantofts, Leeds.

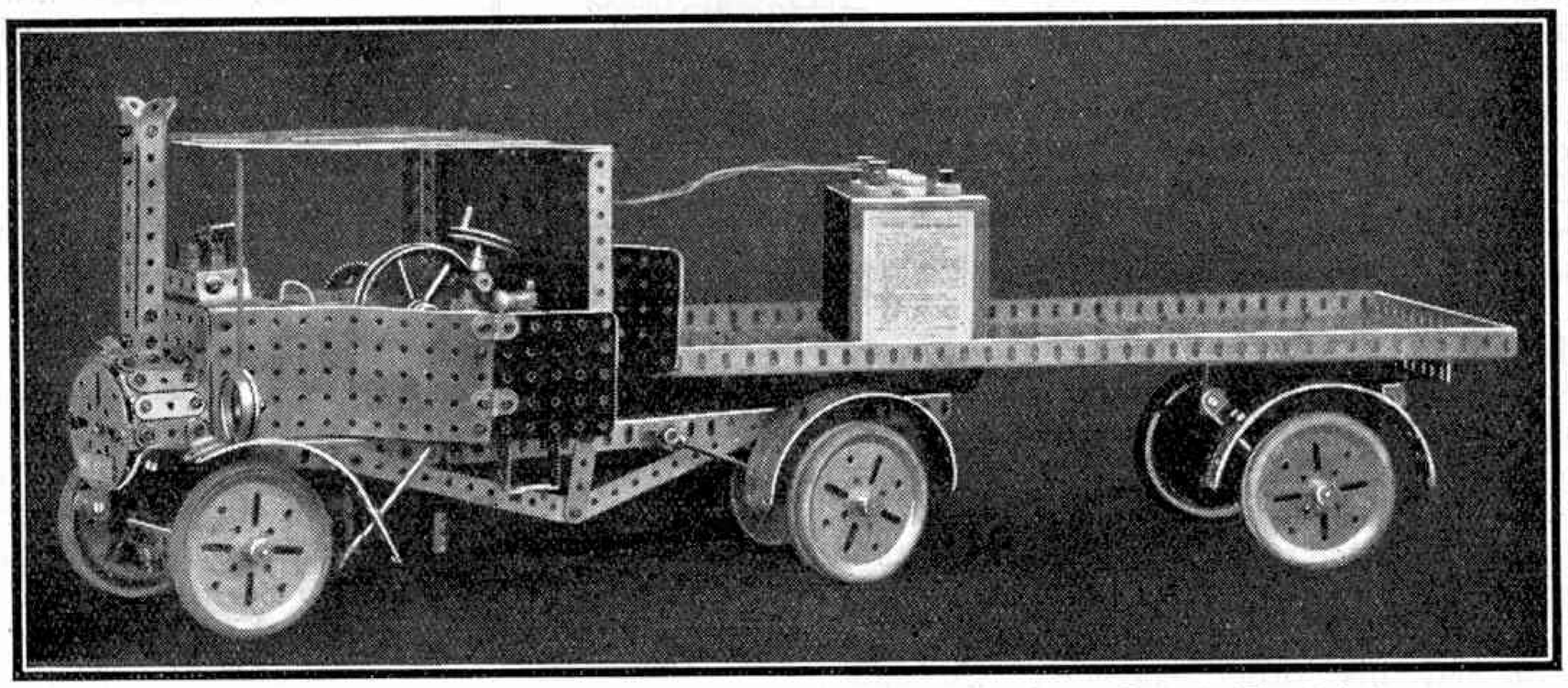
Third Prize (cheque for £1-1s.): Eric A. Robbins, Rushmore House, Bewdley Hill, Kidderminster.

Prizes of 10/6 each: Clement Hulme, Marple; Spencer Reed, Bridgwater; H. A. Davies, Llanrwst, Denbighshire; J Russell, Abbey Hill, Edinburgh; A. D. Mackenzie, Ipswich; C. W. Burdekin, Bournemouth.

The following competitors, who are amongst those gaining Certificates of Merit, have been selected as deserving special mention:—

Hugh Ford, Northampton; E. C. Burrage, London, E.4; E. Body, Liverpool; Thomas Kinloch, Kirkintilloch; T. B. Field, Forest Row, Sussex; L. W. Grey, London, E.6; V. George, Nuneaton; André Nikola, Wembley Park; W. P. Cole, Felbridge, Sussex; J. J. McManus, Derry, Ireland; J. Anderson, Jr., Glasgow; S. R. Didsbury, Bootle, Liverpool; A. Marshall, Cromer; W. Airey, Liverpool; J. Redding, Salisbury; J. Ashley, Maidenhead; R. Elsmore, London, N.W.4; G. H. Lyon, Skipton, Yorks.; F. Arcari, Swansea; R. Titterton, Derby; C. Glover, London, W.10; B. R. Gibbs, London, S.W.18; G. Burnett, Hornsea, Nr. Hull; A. J. McLeod, Wembley; P. Dixon, Sheffield.

It will be seen from the illustration reproduced on this page that the first prize-winning model represents a Foden steam wagon of the six-wheeled type. It is very realistic in appearance and is complete down to such details as an imitation water pump, safety valve, mechanical horn, opening doors, and front and rear lamps, etc. The number plates were obtained from the name-stamping machines that may be found on most station platforms. The model is driven by a 4-volt Electric Motor built into the engine mechanism, and the transmission gear provides two speeds forward and a reverse. Current is supplied from the Accumulator placed on the trailer, but I would suggest that this might be dropped into a framework of Meccano Strips bolted beneath the floor of the vehicle, as more space would then be available for goods accommodation and the compactness and general appearance of the model would be improved further. The trailer rests on ball bearings fitted to the steam wagon. The rear road wheels of the latter each consist of two 3" Pulley Wheels placed together and fitted with the Meccano Rubber Rings to represent tyres. Unfortunately the photographs submitted are not suitable for reproduction, but our Model-building Department hopes to reconstruct the car when a suitable opportunity occurs. The dummy engine is of the twin overhead-valve type, and the cylinders are represented by Couplings bolted to two or three Double Brackets connected together to indicate the water jackets. Amongst other original features in this car I may mention the use of Spring Cord to represent water pipes and Meccano Healds for wire connections.



A Meccano model of a "Foden" six-wheeled Steam Wagon, built by W. Goodwin (First Prize)

Another excellent model of a motor cycle, sent in by J. Russell, is included in the cash awards. This model comprises an efficient foot brake, which, on being depressed, tightens a cord passing round the groove of a 1½" Pulley Wheel bolted to the rear road wheel, while a hand brake, consisting of a Threaded Pin screwed into a Collar on the handle-bars, operates in a similar manner on the front wheel. The flywheel (a 1" Pulley) is driven by a belt passing round the shanks of a ring of bolts secured in the rear road wheel.

Motor Cycle and "Morgan" Runabout

Reginald Mason was presented with Second Prize for an interesting model of a motor cycle and side-car. This is built to a larger scale than the Meccano models of this type that have previously been featured in the Magazine. The road wheels, for example, consist of 6" Pulley Wheels fitted with special rubber tyres, whilst power is supplied by a 4-volt Motor built into the cycle frame.

The gear box comprises a clutch movement and two speeds forward, and a foot brake is provided which operates on a Hub Disc bolted to the rear 6" Pulley Wheel. The carburetter, controls, foot-boards, number-plates, silencer, lamps, and horn are all represented by Meccano parts, and two lengths of Spring Cord form very realistic connections between the carburetter and the controls on the handlebars. A kick-starter is also provided and consists of a Rack Segment working on a ½" Pinion. The side-car is well designed and mounted on springs, and includes a wind-screen and opening door.

Several competitors submitted models of three-wheeled and other types of light cars, and the Third Prize was awarded to Eric A. Robbins for an excellent representation of the well-known 1926 "Aero" Morgan.

"Selected Parts" Contest

The number of entries received in this competition was far below that recorded in other contests, but this is not surprising when one considers the difficulties of the problem that we had set our readers. It will be remembered that competitors were asked to construct original models from a given list of parts and it was stipulated that no other accessories of any kind might be used. The results in Sections A and B are as follows:

Section A (Boys under 12): 1st Prize (Meccano products to the value of £2-2s.): Peter Luke, 62, Lewisham Park, London, S.E.13. Second Prize (Meccano products to the value of £1-1s.): S. Smith, Church Street, Liverpool. Third Prize (Meccano products to the value of 10/6): K. W. Adams, 3, Danehurst Road, Wallasey.

Special Commendation (Certificates of Merit): J. Dean, St. Albans; A. S. Richardson, London, N.W.11; J. Beach, Clacton-on-Sea; and P. Gregory, Brighton.

Section B (Boys over 12): Prizes same as in Section A. First Prize: L. L. Nicholson, 6, Rockcliff Road, Rawmarsh, Rotherham. Second Prize: L. Henley, 52, Portland Road, Gillingham. Third Prize: R. T. Milne, Columba Road, Blackhall, Midlothian.

Special Commendation: K. W. Helmore, London, E.7; D. Macdonold, Epsom; T. J. Mullins, Birkenhead; H. Gale, Gillingham.

Overseas No. 5 Outfit Competition

The following are the results of Section C of the "No. 5 Outfit" Competition :—

First Prize (Meccano products to the value of £2-2s.) : R. C. Weelands, 122, Cardigan Street, Stanmore, N.S.W. Second Prize (Meccano products to the value of £1-1s.) : F. Mulligan, Minnehaha Avenue, Takapuna, Auckland, N.Z. Third Prize (Meccano products to the value of 10/6) : William Dixon, 5163, Cartier Street, Montreal, Canada.

Special Commendation (Certificates of Merit) : F. Blundy, Melbourne, Australia ; R. Luke, Blackburn, Australia ; W. G. Holder, Port-of-Spain, Trinidad ; Svante Eriksson, Taranaki, New Zealand.

An excellent representation of a petrol-driven road roller obtained First Prize for R. C. Weelands. The roller in this model consists of a series of Flanged Wheels mounted in a framework pivoted to the front of the vehicle and connected by Sprocket Chain to a transverse shaft, which may be rotated by means of Worm Gear from the steering wheel. The principle of this steering gear is similar to the alternative method described under Standard Mechanism No. 118 (Steering Gear for Tractor). The rear road wheels each consist of two 3" Wheels (No. 19a) placed together on the back axle.

The Second Prize-winning model takes the form of a threshing mill, and in view of the number of parts available, I consider this entry reflects much credit on its designer. The various mechanical details found in the actual apparatus—fans, conveyor, shaker, etc.—are all included, and are connected together by means of Sprocket Chains and wheels.

William Dixon's model of a street trolley-car comprises several interesting details, such as a spring-controlled trolley-arm and lamps, etc. I gather from the photographs and particulars submitted that the four pairs of Flanged Wheels on which the car runs are journalled in a fixed wheel-base, but I consider the model would be greatly improved if these were mounted, if possible, in two bogies, so that curves may be negotiated if necessary.

Amongst the entries receiving special commendation is an aeroplane built by F. Blundy. The fuselage, engine and other details of this model are most realistic, but the main wings appear to be a little too ponderous in construction.

Overseas "Bridge" Competition

First Prize (cheque for £3-3s.) : N. O'Neill, New North Road, Mt. Albert, Auckland, N. Zealand. Second Prize (cheque for £2-2s.) : Mario Cavallini, 285, Via Cavour, Rome. Third Prize (cheque for £1-1s.) : R. O. Jukes, Cricklewood, S. Canterbury, New Zealand.

Prizes of 10/6 each : George P. Henwood, Takapuna, Auckland, N.Z. ; Frank Thorp, Montreal, Canada ; H. C. van Doorn, Utrecht, Holland ; L. Fisher, Johannesburg ; Isaac Grek, Vrede, O.F.S., S. Africa ; A. A. M. Bollen, Utrecht, Holland.

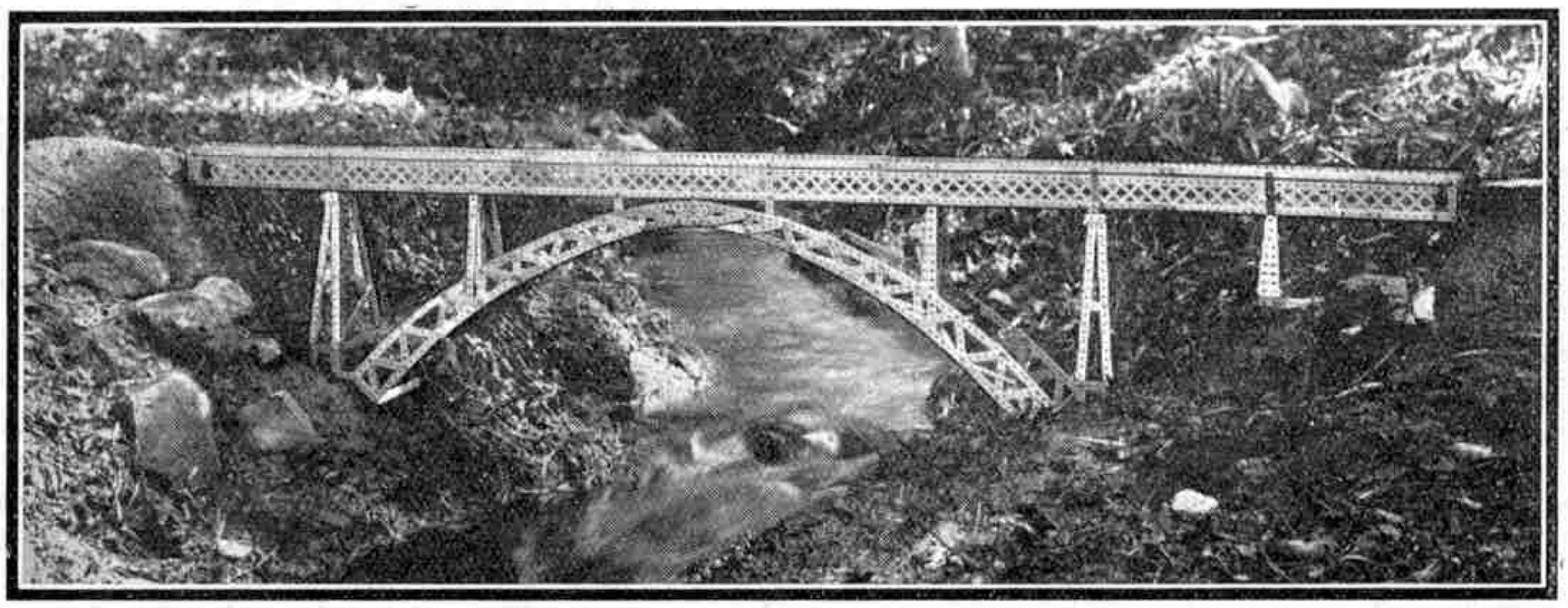
The following competitors, who are amongst those gaining Certificates of Merit, have been selected as deserving special mention :—

R. Brown, Montreal, Canada ; G. S. M. Rappini, Rome, Italy ; C. B. L. Osborn, Geo. Demerara, British Guiana, S.A. ; W. H. Mitchell, West Maitland, N.S.W. ; W. Chatfield, Hamilton, Ontario ; B. Hochrüder, Toowoomba, Queensland ; B. N. Turveyor, Bombay ; S. S. Aiyar, Bandra, Bombay ; J. Churchward, Avoca, Victoria, Australia ; I. K. Menon, Malabar, S. India ; J. A. Cook, Mackay, North Queensland ; B. H. Moloney, N. Eliya, Ceylon ; H. W. Turner, Hastings, N.Z. ; J. W. Loaring, Windsor, Ontario.

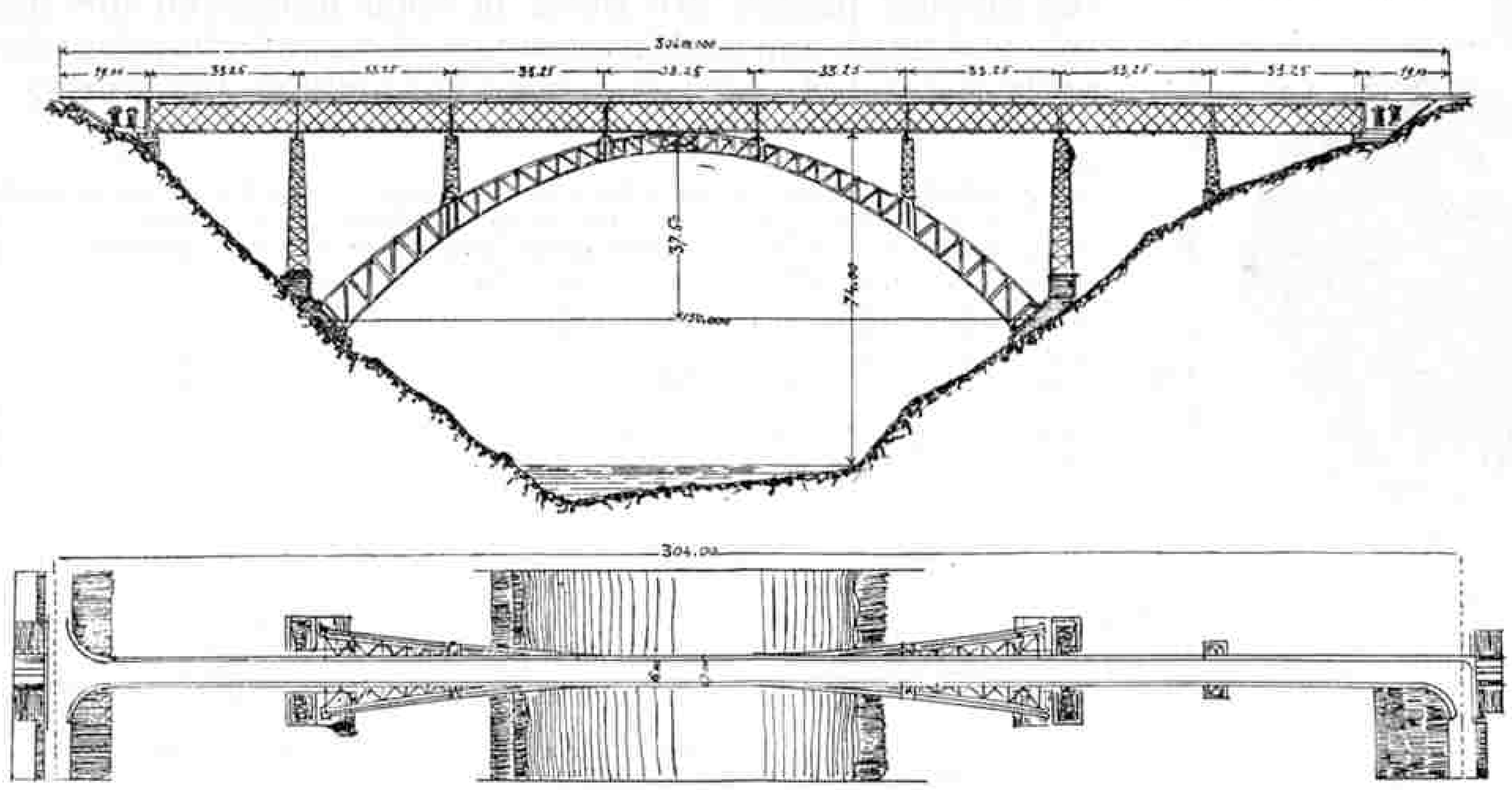
Bridges form a popular subject for reproduction in Meccano, and the entries in the Overseas Section of this Competition are no less worthy of praise than those received in the Home Section.

The First Prize was secured by Nevill O'Neill for a model of the Forth Bridge. This is of imposing dimensions and is fitted with a double set of rails forming part of a Hornby model railway. The proportions of the bridge are excellent and altogether the model forms a very creditable reproduction of the famous structure across the Forth.

M. Cavallini's model is reproduced herewith, and our readers will note the clever manner in which it is embodied in a miniature landscape that shows up the graceful proportions of the model to great advantage. I am also including on this page an elevation and plan of the famous Panderno Bridge on the River Adda in Italy, from which the model was designed, as these should enable readers to obtain a better idea of the realistic appearance of the Meccano structure. It should be noted that the dimensions shown on the drawings are in the metric system.



This reproduction of the Panderno Bridge secured Second Prize for Mario Cavallini in the Overseas Bridge Contest



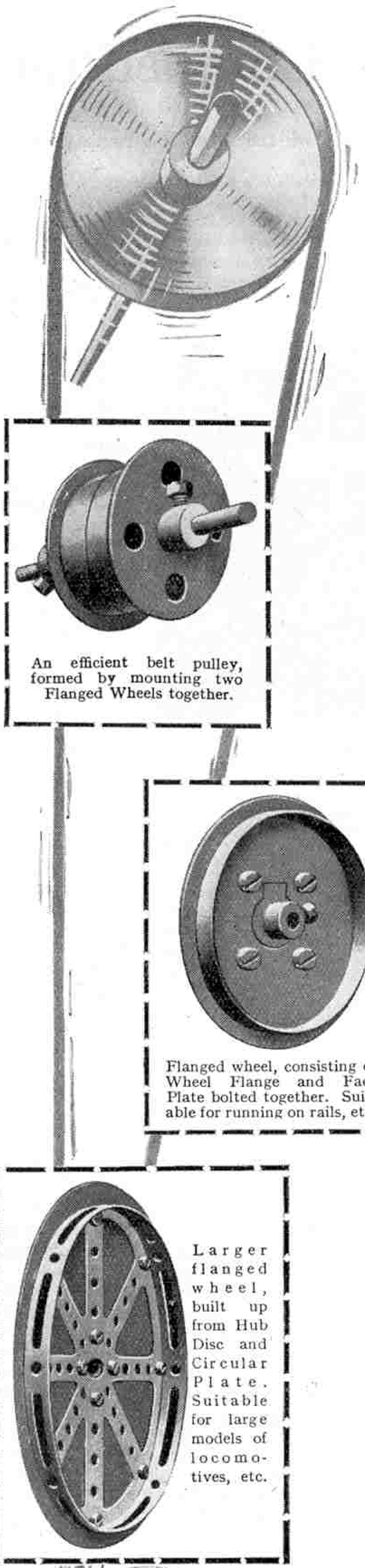
Elevation and Plan of the Panderno Bridge. This affords an interesting comparison with the Meccano Model illustrated above

The bridge comprises two roadways, one below the other, the upper one being reserved for road vehicles, while the lower one carries a railway. The dimensions of the model are as follows : overall length, 6½ ft. ; height, 1 ft. 4 ins. ; span of arch, 3 ft. 8 ins. ; rise of arch, 1 ft.

A model of the proposed Sydney Harbour Bridge secured Third Prize for R. O. Jukes. It consists of a single high arch, from which the roadway is suspended by means of a number of vertical ties.

An exceptionally fine effort sent in by G. P. Henwood represented the Quebec Bridge, which it will be remembered, consists of two huge double-cantilever arms supporting a central roadway. H. C. van Doorn submitted two entries, both representing drawbridges. One of these (the prize-winning entry) is caused to open by means of rack mechanism operated by a convenient hand-wheel, while the other is of a smaller and more primitive type that can be operated in actual practice by hand power. It consists of a small pivoting bridge connected to one end of an overhead beam, the other end of which must be pulled down in order to raise the bridge. The beam is suitably counter-balanced at its free end.

A very interesting model of the Tower Bridge, London, was the work of L. Fisher. His entry reproduces to an accurate degree the architectural features and splendid proportions of the famous bridge.



An efficient belt pulley, formed by mounting two Flanged Wheels together.

Flanged wheel, consisting of Wheel Flange and Face Plate bolted together. Suitable for running on rails, etc

Larger flanged wheel, built up from Hub Disc and Circular Plate. Suitable for large models of locomotives, etc.

MECCANO

ACCESSORY PARTS

WHEELS

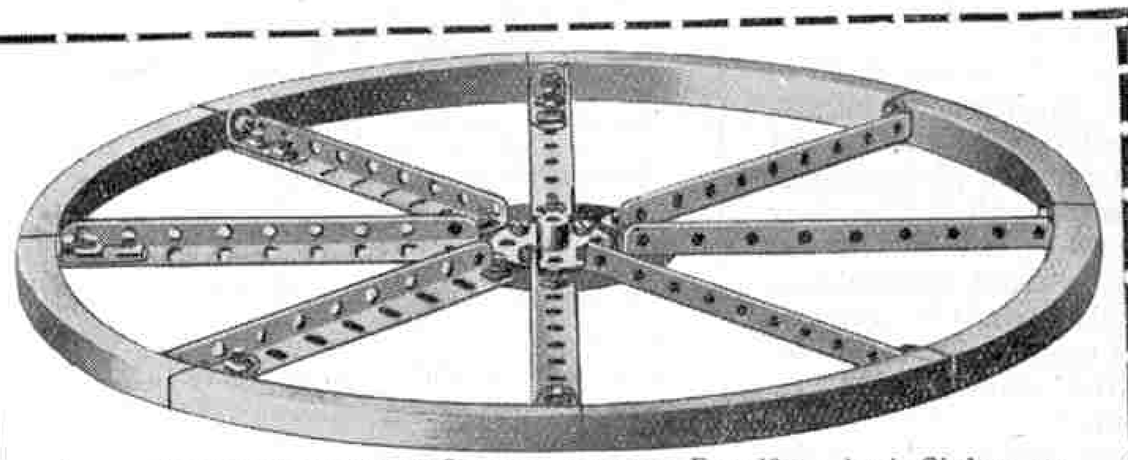
SOMEBODY has said that the wheel is the world's greatest invention. However much truth there may be in this statement it is safe to say that from a remote period—when prehistoric man made the first steps towards its evolution by discovering the use of log rollers—to the present day, the wheel has proved to be one of the greatest assets in engineering.

Wheels take an important place in the Meccano system, of course. There are 31 accessory parts that may be placed under the category of Wheels, ranging from ½" to 6½" in diameter, while other parts readily lend themselves to the construction of still larger or different types of wheels. The list appended below contains particulars of a number of such Meccano parts. Gear and other toothed wheels are not included, for space has previously been devoted to them in this Magazine. All the smaller pulleys are made of solid brass, and are marked with the splendid finish and perfect accuracy of manufacture for which all Meccano parts are noted and appreciated throughout the world.

No.		s.	d.
19a.	Wheels, 3" diam. with centre boss and set-screw. 10 spokes, for use as road-wheels ... ... each	0	8
20.	Flanged Wheels, 1⅜" diam. For use as belt pulleys or rail wheels ... ... „	0	6
19b.	Pulley Wheels, 3" diam. with centre boss and set-screw, V-grooved ... ... „	0	8
19c.	„ „ 6" „ „ „ „ „ „ ... ... „	2	6
20a.	„ „ 2" „ „ „ „ „ „ ... ... „	0	6
21.	„ „ 1½" „ „ „ „ „ „ ... ... „	0	6
22.	„ „ 1" „ „ „ „ „ „ ... ... „	0	4
22a.	„ „ 1" „ without „ „ „ „ ... ... „	0	2
23.	„ „ ½" „ „ „ „ „ „ ... ... „	0	2
23a.	„ „ ½" „ with „ „ „ „ ... ... „	0	4
24.	Bush Wheels, 1⅜" diam., perforated 8 holes ... ... „	0	6
109.	Face Plates, 2½" diam. For use in lathes, etc. Perforated and slotted ... ... „	0	4
118.	Hub Discs, 5½" diam., 8 spokes; outer rim perforated and slotted ... ... „	1	3
119.	Channel Segments (8 to circle, 11½" diam.) Channel section, ½"×½" ... ... „	0	4
123.	Cone Pulleys, 3 V-grooves "in steps," 1¼", 1", and ¾" diameters ... ... „	1	3
132.	Flywheels, 2¾" diam. die-cast white metal alloy, with brass boss and set-screw. Separately turned and finished on lathe, enamelled and stoved. Milled groove round outer circumference and small grooved pulley at centre ... ... „	2	3
137.	Wheel Flanges, 2⅛"×¼". May be bolted to any of the larger pulleys ... ... „	0	4
142.	Rubber Rings (round section). May be used with 3" Pulleys to represent pneumatic tyres ... ... „	0	4
143.	Circular Girders, 5½" diam., L-section. Slotted and perforated ... ... „	1	0
145.	Circular Strips, 7" diam. over all, perforated ... ... „	1	0
146.	Circular Plates, 6" diam. May be used as flywheels, etc. ... ... „	1	3

Your dealer will be pleased to show you all the Meccano Parts. Ask him for a complete list, or write for one direct to

MECCANO LIMITED, BINNS ROAD, LIVERPOOL



Large wheel, built up from 8 Channel egments, Face Plate, Angle Girders, etc. May be used as base for rotating models, or fly-wheel in Beam Engines, and many other purposes. Diameter 11½ ins.

GRAND MECCANO
Model-Building Competition
First of a New Series

EQUAL OPPORTUNITIES FOR BOYS OF ALL AGES

This competition is the first of a new series that will be continued throughout the present winter season. It differs somewhat from the recent monthly contests in that there are no stipulations as to the type of model that may be submitted. On this occasion we wish to give full rein to our readers' inventive abilities. As in every previous contest, the most telling point will be originality—either with regard to the type of apparatus selected as the subject of the model, or to the novel uses of Meccano parts or movements employed in its construction. It is a perfectly simple matter to participate in these competitions, for no entry forms or fees are necessary. The contests are organised with the sole object of encouraging our readers to make the best possible use of their Meccano Outfits during the dark evenings of Winter.

HOW TO COMPETE

All models submitted in the competition must be the competitors' own unaided work, both in design and construction. Any size of Outfit or quantity of parts may be used, but it is important to remember that it is not necessarily the most intricate or elaborately-constructed models that will carry off the prizes.

It will be observed from the particulars given in the centre of the page that entries received from readers residing in the British Isles will be divided into three sections, according to the competitors' ages. The object of this arrangement is to ensure that every competitor will be called upon to compete only with the work of boys of approximately the same age as himself. It was not considered necessary to divide the Overseas Section in the same manner, but in this section also the age of the competitors will be taken into careful consideration by the judges.

The first prize in each section will be awarded to the competitor who builds the model that the judges decide to be the best entered in that section, and the second and third prizes will be awarded to the second and third best models, and so on.

FOUR SECTIONS

Entries in this Competition will be divided into the following Sections :—

Section A : for Competitors over 16 years of age.
Section B : for Competitors over 12 and under 16 years of age.
Section C : for Competitors under 12 years of age.
Section D : for Competitors residing outside the United Kingdom.

LIST OF PRIZES

The following prizes will be awarded for the best models received IN EACH OF THE THREE SECTIONS A, B AND D :

First Prize : cheque for £3-3s.
Second Prize : ,, £2-2s.
Third Prize : ,, £1-1s.

Six Prizes, each of Meccano Products to value of half a guinea.

Certificates of Merit and complimentary copies of "Meccano Standard Mechanisms."

The Prizes in SECTION C are as follows :—

First Prize : Meccano Products to value £2-2s.
Second Prize : ,, ,, £1-1s.
Third Prize : ,, ,, 10/6.

Six Prizes, each of Meccano Products to value 7/6.

Certificates of Merit and complimentary copies of "Meccano Standard Mechanisms."

IMPORTANT

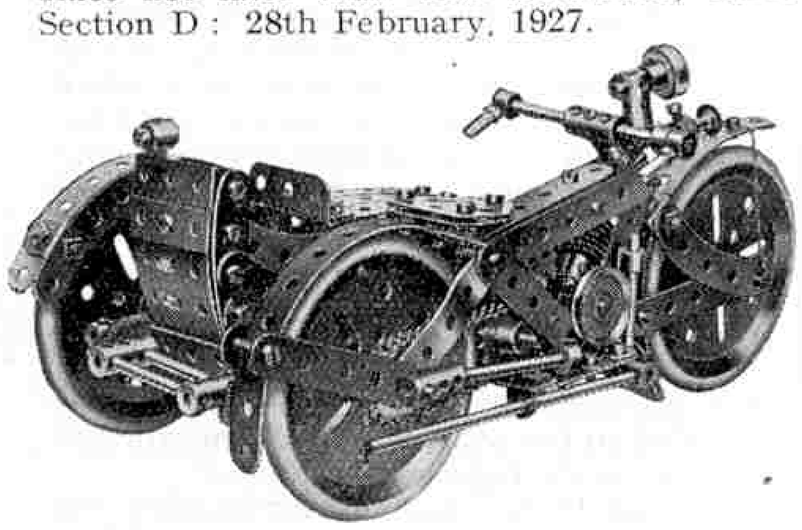
Readers should send in clear photographs or good drawings of their models, together with any explanations that may be necessary, although the latter should be made as brief as possible.

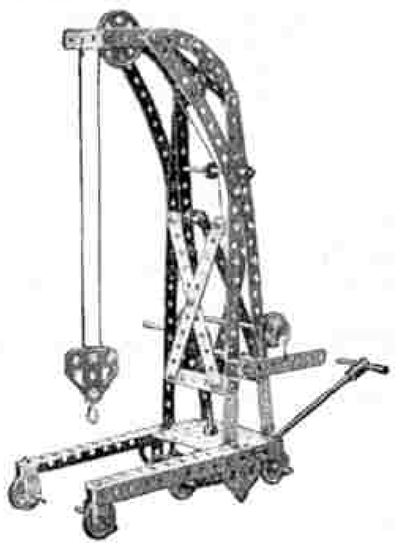
The following instructions should be followed closely. The competitor's name and address must appear on the back of each photograph or sheet of paper used, together with his age, name of the competition ("October" Competition), and section in which the model is entered. Envelopes should be addressed "October" Competition, Meccano Ltd., Binns Road, Liverpool.

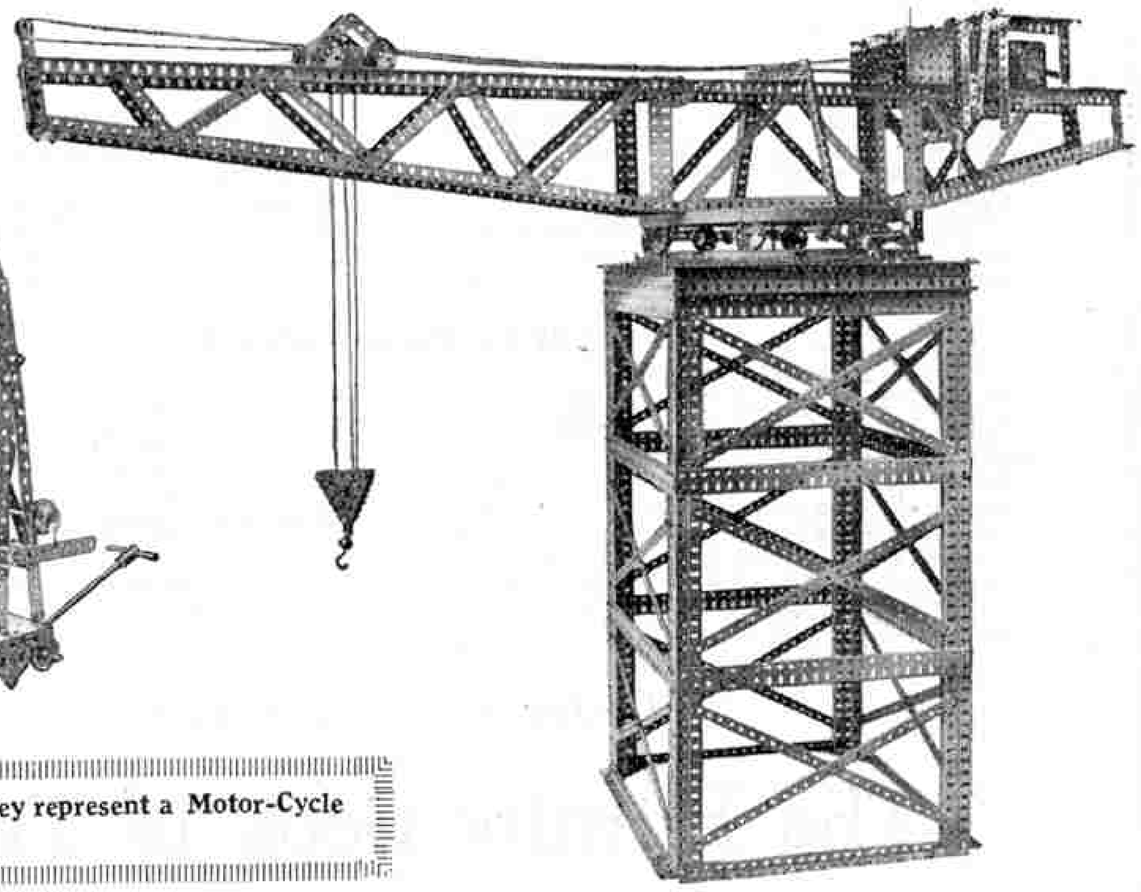
Models should not be sent. A clear photograph or good drawing is all that is necessary. Photographs or drawings of unsuccessful contributions will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry, but it should be noted that photographs of prize-winning models become the property of Meccano Ltd.

CLOSING DATES

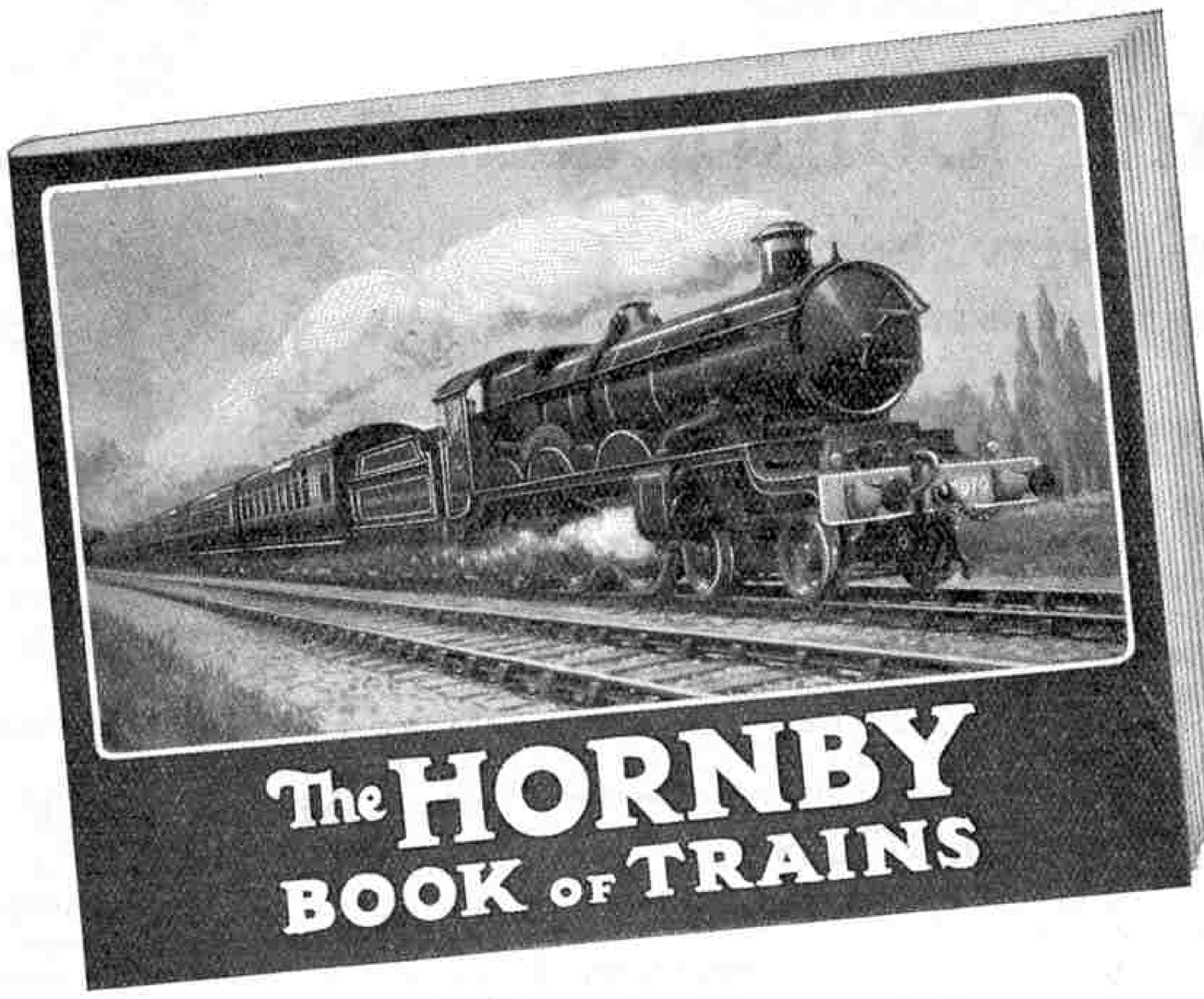
Entries for Sections A, B, and C must be received at this office not later than 15th December, 1926. Closing date for Section D : 28th February, 1927.







These fine models have all won prizes in past model-building competitions. They represent a Motor-Cycle and Side-Car, Platform Crane and Hammer-Head Crane.



The 1926 Hornby Book of Trains

This year we are producing an entirely new edition of the Hornby Book of Trains and we want every reader of the "Meccano Magazine" to make sure of getting a copy by placing an order at once, either direct with us or with his dealer.

The book will be beautifully printed on art paper and will consist of 48 pages ($11'' \times 8\frac{1}{4}''$). A splendid reproduction of the "Cornish Riviera Express" at speed will be printed on the cover.

It will be remembered that last year we devoted the first half of the book to a story of the locomotive from its earliest days. This year the same amount of space will be occupied by a detailed description of the locomotive and other interesting items of railway practice. The following are the chief subjects that will be dealt with :—

THE BOILER AND ITS PARTS.
HOW THE ENGINE WORKS.
HOW AND WHY STEAM IS SUPERHEATED.
RAILWAY BRAKES.
THE STORY OF BRADSHAW'S RAILWAY GUIDE.
HOW TRAINS ARE LIGHTED AND HEATED.
SIGNALS AND SIGNALLING.

PARTICULARS OF HORNBY TRAINS

The second half of the book will again be devoted to a beautifully illustrated description of all the complete Hornby Trains and Rolling Stock and Accessories in the Hornby Series. The illustrations will be printed in four colours and the reproduction of the Hornby Trains will be most realistic.

HOW TO ORDER THE BOOK

Address your orders to "Hornby Book," Meccano Limited, Binns Road, Liverpool, and please write your name and address clearly.

The price of the book is 3d. (post free), and a remittance for this amount should be sent in stamps. There is no reduction if more than one copy is ordered. Orders will not be acknowledged.

We hope to have the Hornby Book of Trains ready for delivery on or about the 22nd November. All orders will be carefully filed and as soon as the book is ready they will be executed in the rotation received.

ORDERS FROM OVERSEAS

There is a special edition of "The Hornby Book of Trains" for Overseas readers, and copies have already been despatched to fill orders received from Overseas. Readers in Australia, New Zealand, or South Africa who require copies should address their orders to our agencies as detailed in the next column. Readers living in countries other than those mentioned should order from Meccano Ltd., Binns Road, Liverpool, and send a postal order for 6d. with their order. The price for all orders from outside the United Kingdom is 6d.

AUSTRALIA. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W. P.O. Box 1832.

NEW ZEALAND. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.

SOUTH AFRICA. Arthur E. Harris (P.O. Box 1199), Textile House, Von Brandis Street, Johannesburg.

Order your copy now!

The Hornby Book of Trains

Choose your own . . . . CHRISTMAS PRESENT

IT is a wonderful sensation to sit down and study illustrations and descriptions, and select your own Christmas present. Try it! The Special Christmas Number of the "*M.M.*" will contain advertisers' announcements of all kinds of splendid toys, books, and all manner of articles for giving pleasure to boys at Christmas. We are going to make at least one boy happy by giving him the very thing he wants from amongst the articles advertised in our columns. Full particulars of this competition—in which everyone has an equal chance—will be announced in next month's "*M.M.*" on 4th December (Price 6d.).

Order your copy *NOW!*

Lifting 300-ton Concrete Blocks at Sea—

(*Continued from page* 659)

series of holes from which are suspended triangular steel-plates. From the two other angles of these triangular plates are hung massive chains supporting cast-steel hooks, the toes of which fit into holes in the concrete blocks. The hooks are widened at their ends in order to give a greater bearing surface in lifting the blocks.

Engagement is made possible by the connection of opposite sets of hooks to link mechanisms, which are themselves controlled by a motion independent to that provided by the main lifting tackle.

The central portions of these mechanisms are moved by wire ropes working from two auxiliary winches, placed on the deck at each side of the crane and seen in our illustrations near the base of the fore-legs. When the links are moved sufficiently to permit of complete disengagement of the hooks with the concrete blocks, a conical fitting at the top of the suspending chain is caught by two pawls. This causes the entire framework and its tackle to be hauled up, leaving the concrete block in position. When it is desired to reverse the process, the equipment is lowered into place, the pawls are released, and the central link system is then lowered until the hooks engage with the holes provided in the block.

The main winches are steam-driven and consist of two equal sets of barrels, having right- and left-hand grooves to accommodate the two pairs of ropes. One of the intermediate shafts of each winch is coupled to the other, and thus the winches always work together.

Special brakes provide for holding the full load of 300 tons in suspension. When necessary further security is given by safety pawls, which are placed in position whenever a load is to be held suspended for any length of time—as, for instance, when being taken out to sea.

Across Africa by Motor Car

A Wonderful Trip from the Cape to Cairo

By J. Harrison

THOSE of us who, a few months ago, went to the London Polytechnic to meet Major and Mrs. C. Court Treatt, received a pleasant surprise, for the appearance of the gallant major and his charming wife was very different from that of the rough pioneers of our imagination. It was difficult to believe that these cultured people had left the comforts of civilisation to undertake a journey, the record of which deserves a place in the history of our race. During this journey they underwent almost every kind of hardship to which a human being can be subjected and the grim-looking, grey Crossley car exhibited in the Polytechnic Hall showed unmistakable evidence of the gigantic struggle through which it had passed.

The expedition consisted of Major and Mrs. Court Treatt and Mr. F. C. Law, Mr. T. A. Glover, Mr. E. Hinds and Julius Mapata. The last-named is the son of a Nyasaland native chief who speaks thirty-two native dialects in addition to English. He was the diplomat, ambassador and general factotum to the expedition.

The party left Capetown in two Crossley tenders on 13th September 1924, and reached Cairo on 24th January 1926—sixteen months later—after covering 12,732 miles.

After travelling over good roads to Johannesburg and thence through Northern Transvaal, they reached Southern Rhodesia, where they visited the colossal ruins of Zimbabwe, the citadel built ages ago by some forgotten race to protect its gold camps. In Southern Rhodesia they "met the rains," which converted the country to quagmires through which the cars had to be hauled axle deep in mud. Branches were cut down and thrown into the mire to form some sort of surface, but sometimes these branches gave way and hindered the work of digging out the cars. In this section five miles a day was regarded as good going, but often a fifth of a mile represented twenty-four hours' progress.

The cars floundered along over incredibly bad roads and once or twice rafts were constructed to ferry them across swollen rivers. In one stretch of 250 miles no less than 120 bridges were constructed or strengthened. These bridges were weird and wonderful affairs, constructed without nails or bolts, and they were so rickety that one would have hesitated before walking over them, let alone driving a car across. Once one of the cars broke loose from its tow rope on a steep hill and, as the brakes failed to hold it, ran backwards. In due course it was hauled up again with a broken back axle, and then these plucky pioneers mended it on the spot with no other materials than those made from trees that they felled.

The party pushed on to Lake Tanganyika and Nyassa and then crossed the equator by way of the Eldama Ravine, where the temperature at night fell almost to freezing point.

After traversing Kenya Colony and Uganda they reached Southern Sudan where they found swamps and long matted grass. There was no wood available of which to make bridges and the cars had to be dragged through the rivers by natives. The magnetos, carburetters and electrical equipment were removed, and then white men and natives swam across in a body, splashing and shouting to frighten away the crocodiles. The heavy cars gradually sank into the water until they were totally submerged. This happened five times on the journey.

At the eleventh hour the expedition almost came to an untimely end. Near the Shellal mountains, where there is no way along the river banks, the cars were loaded up with as much water as they could carry and the party set off into the eastern desert. Three times the party failed to pass over the mountain, but six days later they broke through and met the search party that had been sent out to scour the desert for them. By that time the expedition had run out of water and had no food other than the animals they shot. Even flour and salt had given out and they were hampered by fever. The worst was over, however, and they pushed on to Luxor, from where they headed for Cairo and home!

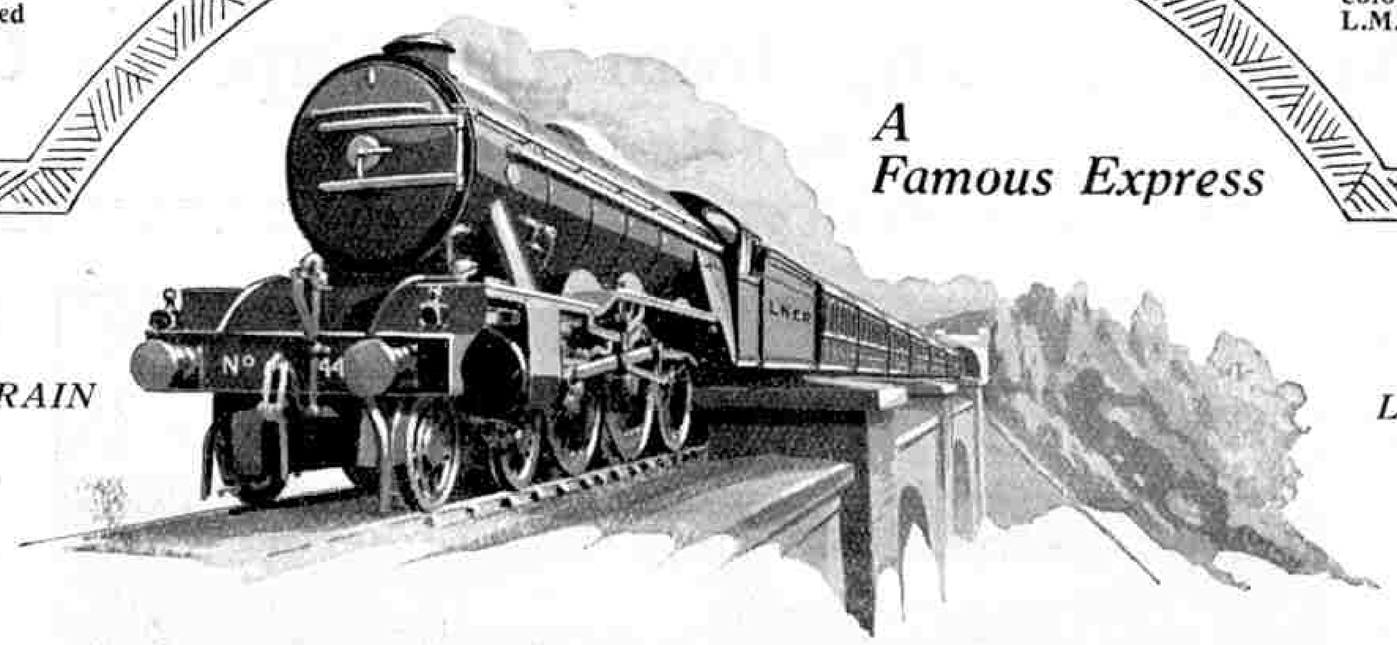
Our two illustrations show the submerged cars, with electrical equipment and carburetters removed being dragged across rivers by natives

Guarantee

Hornby Trains are tested and their efficiency is guaranteed. A form of guarantee is furnished with each loco.

Hornby Trains are richly enamelled, highly finished in four different colours, and lettered to represent L.M.S., L.N.E.R. and G.W. locos and rolling stock.

A HORNBY TRAIN



A Famous Express

LASTS FOR EVER!

The Flying Scotsman

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FOR over sixty years the "Flying Scotsman" has left London for Edinburgh at 10 a.m. Dead on time this famous train may be seen every day pulling majestically out from King's Cross. At the same instant its twin brother starts from the opposite point, Edinburgh, for the 390 odd miles race to London.

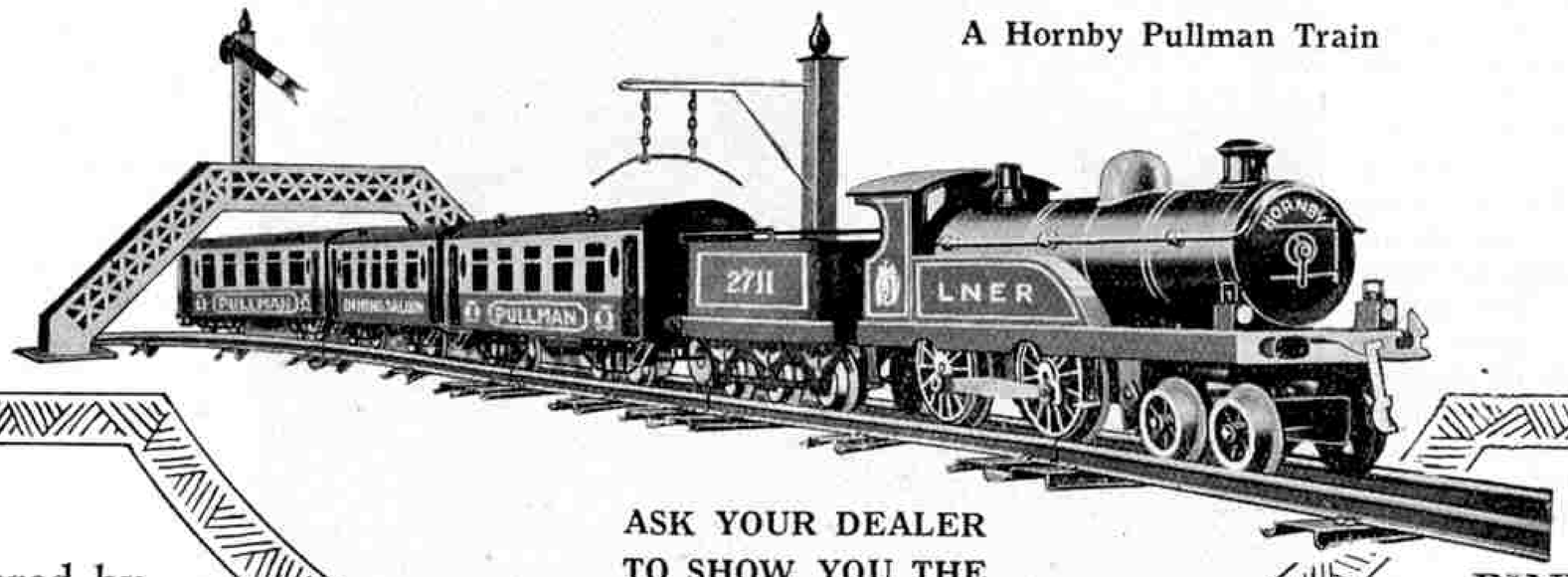
The average speed of the "Flying Scotsman" is forty-nine miles per hour. What would happen if Dad ran his car at that average speed? Speaking of Dad, has he seen the Hornby Trains? Xmas is coming along at "Flying Scotsman" pace. Ask Dad to buy you a Hornby Train and see that you have it in time for Xmas morning.

You can buy Hornby Locos—the most efficient locomotives ever produced—for 10/6 upwards, and complete Hornby Train sets from 17/6 upwards—all superbly enamelled and finished in the correct colours of the leading railways.

Naturally, the more you can afford the more complete will be your Hornby Train system. You can build it up by degrees with buffers and lamps; signals, bridges, and stations; turntables and tunnels. There are all lengths of rails, too, both curved and straight, and all kinds of points and crossings enabling you to build up a real miniature railway track.

HORNBY CLOCK WORK TRAINS

A Hornby Pullman Train



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HORNBY TRAINS

Manufactured by
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Early Railway Companies

The Origin of the Four Railway Groups of To-day

THE stories of the Stockton and Darlington and the Liverpool and Manchester Railways have already been told in these pages. In this article it is proposed to give some account of how the present-day grouping of the railway companies has come about.

Shortly after the commencement of the work of constructing the Liverpool and Manchester railway Stephenson was asked to undertake the construction of a short line of about 16 miles to open up communication between Leicester and the colliery districts in the western part of the county. He felt that he must decline to undertake any additional work, however, but recommended his son Robert for the post.

Towards the end of 1830, therefore, Robert Stephenson commenced the construction of this line, which became known as the Leicester and Swannington Railway, and it was opened in 1832. At the Swannington end the line terminated in a long incline of 1 in 17, and this was worked by ropes and a stationary engine, put down by Stephenson in 1833 and, we believe, used occasionally even to-day.

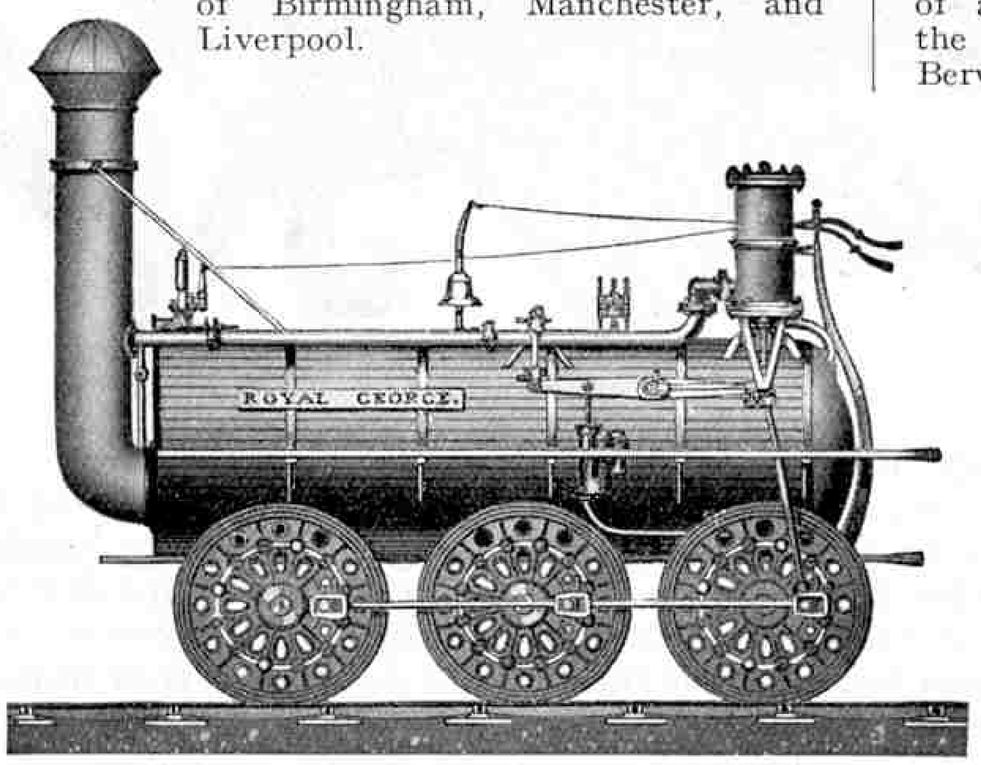
The London-Birmingham Railway

The construction of a railway between London and Birmingham was next taken in hand, and Stephenson, having been consulted as to the route, was appointed engineer of the line in conjunction with his son. In spite of the usual strong opposition from landowners, canal proprietors and others, the Bill was passed in 1833, and by the beginning of 1840 work was making satisfactory progress, Robert Stephenson, with the consent of his father, having been appointed sole engineer.

The length of the line to be constructed was about 112 miles and the engineering difficulties proved to be very great. In order to construct a level road from valley to valley considerable excavations had to be made. These included Tring Cutting, 2¼ miles in length and 75 ft. in depth, and the Blisworth cutting, 1½ miles in length and 65 ft. in depth. Eight tunnels, with a total length of 7,336 yards, were necessary, the most difficult problem of all being the construction of the tunnel under Kilsby Ridge. Here the inrush of water was such that it was necessary to pump continuously for eight months before the workings were cleared. The London and Birmingham Railway was finally completed in September 1838.

Another important railway constructed at this period was the Grand Junction Railway, from Birmingham to Manchester and Liverpool by way of Crewe and Warrington. George Stephenson and Joseph Locke were the engineers, and the line was opened in 1837.

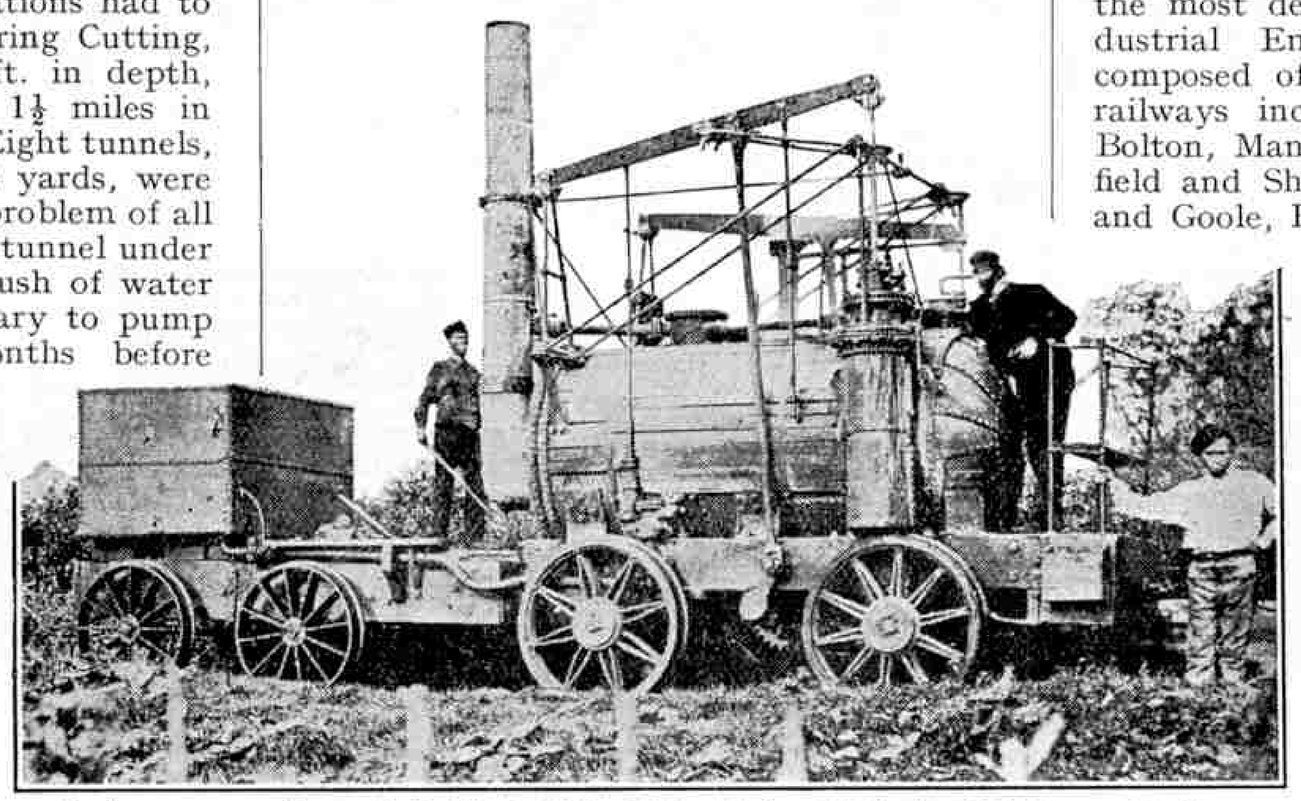
The great importance of the London and Birmingham and Grand Junction Railways lay in the fact that they opened up direct railway communication between London and the great provincial towns of Birmingham, Manchester, and Liverpool.



The "Royal George," the first loco with six coupled wheels

By this time England was fully awake to the value of railways. Companies for the promotion of railway schemes sprang up like mushrooms all over the country and an enormous amount of public capital was raised for the purpose. Some lines were well planned and quickly proved successful, but many others were planned so badly that their financial failure was inevitable.

It soon became very clearly evident that the numerous railways could not be worked separately with economy, and gradually the larger and better-managed companies began to absorb their smaller neighbours. It was in this manner that the great railway companies of pre-war days came into existence and reached a wonderful pitch of efficiency.



A famous engine, "Puffing Billy," built in 1813 by William Hedley, of Newcastle-on-Tyne

Although the ancestry of the North Eastern Railway may be traced back to the Stockton and Darlington Railway, the line grew up more directly from a series of amalgamations of railways covering the area between York, Newcastle, and Berwick. Before the War, the North Eastern had a larger tonnage of mineral and coal traffic than any other railway in the Kingdom, and it was also the largest dock-owning railway company.

The Midland Railway was formed in 1844 by an amalgamation of the Midland Counties Railway, which met the London and Birmingham line at Rugby; the North Midland, from Derby to Sheffield and Leeds; and the Birmingham and Derby Railway. In pre-war days the Midland Railway had more capital invested in it than any other and once on its feet it grew rapidly, expanding in all directions. Its greatest constructional undertaking was the Settle to Carlisle line running through Kirkby Stephen and Penrith. The Midland was the first company in England to run Pullman cars and the first to abolish second-class carriages.

The London and North Western Railway grew out of the first big line leading out of London—Robert Stephenson's London and Birmingham Railway. Its rise took place in 1846 from the amalgamation of the Manchester and Liverpool, the Grand Junction, and the London and Birmingham lines. Afterwards it acquired the Lancaster and Carlisle Railway and subsequently the Chester and Holyhead line. Later it penetrated into Yorkshire and on 31st December 1921 amalgamated with the Lancashire and Yorkshire railway.

The Lancashire and Yorkshire Railway assumed the title in 1847, and possessed a wonderful network of lines traversing the most densely populated areas of industrial England. The company was composed of a large number of smaller railways including the Manchester and Bolton, Manchester and Leeds, Huddersfield and Sheffield, Wakefield, Pontefract and Goole, East Lancashire, West Lancashire and other companies.

The Great Western Railway was planned and built by I. K. Brunel, the famous engineer. Once the main line from London to Bristol was in active operation the railway proceeded to develop by a steady process of extension and amalgamation. It received a set-back through having to change its gauge, but having surmounted that trouble it made rapid progress. In 1906 the Fishguard-Rosslare route was opened, providing the shortest sea passage

Control *Your* Trains from Your Signal Cabin with

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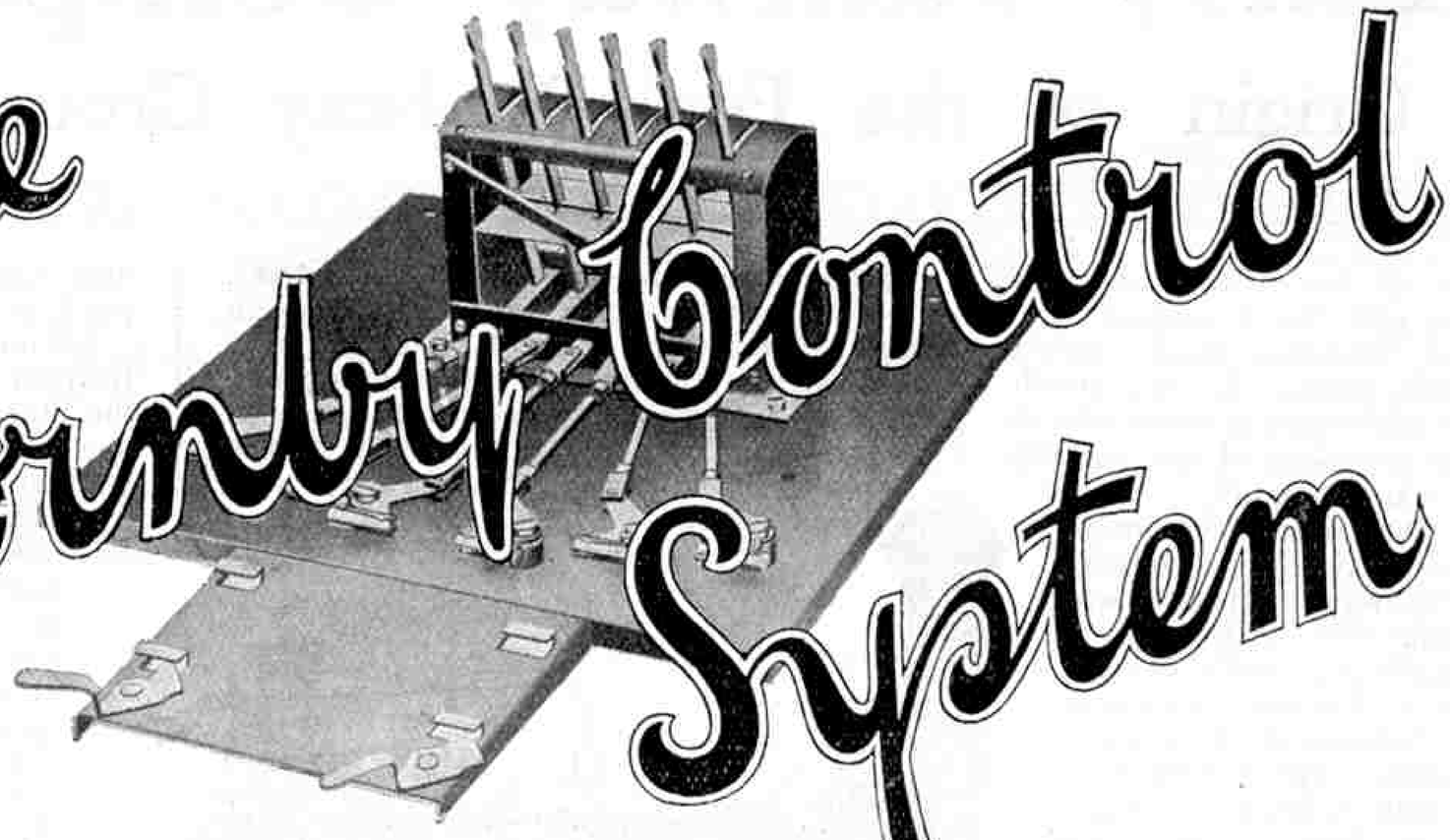

THE majority of boys who possess miniature railway systems have no doubt often felt a desire for some contrivance that would enable them to run their railway in a realistic manner from the signal box without the constant necessity of having to handle individually the trains, signals, points, etc. This desire is quite natural, of course, and in order to gratify it we have introduced a new system of control for Hornby railways. This system enables you to manipulate the signals and points and to govern the starting and stopping of your trains entirely by the operation of levers in your signal cabin.

The component parts in the Hornby Control System are made up in two different Outfits. The No. 1 Outfit is for use with rails of 1 ft. radius and is intended for operation with "M" series, No. 0 and No. 1 locos and rolling stock. The No. 2 Control Outfit is designed for rails of 2 ft. radius, and is intended for use with the new type of No. 2 locos and the Metropolitan clockwork and the "Blue" Train clockwork locos. The addition of one of these Control Outfits to a Hornby Train Set increases enormously the amount of fun and interest that can be obtained.

A special article dealing with the Hornby Control System is now being prepared and will appear in the December number of the "*M.M.*" Order your copy now.

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No. 1 Outfit Complete ... ... **35/-** No. 2 Outfit Complete **35/-**

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No. 2 Pullman Set ... **65/-** No. 2 Tank Passenger Set ... **50/-** No. 2 Riviera "Blue" Train ... **70/-** No. 3 Metropolitan Train Set ... **55/-**

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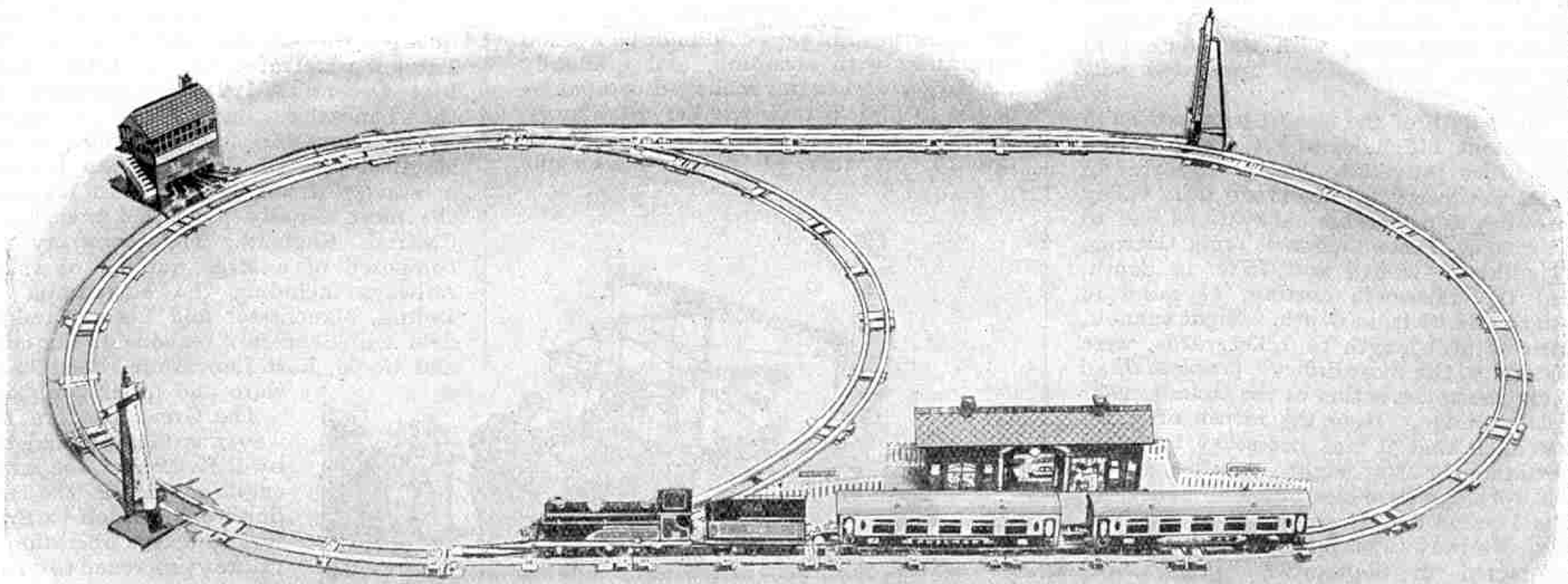

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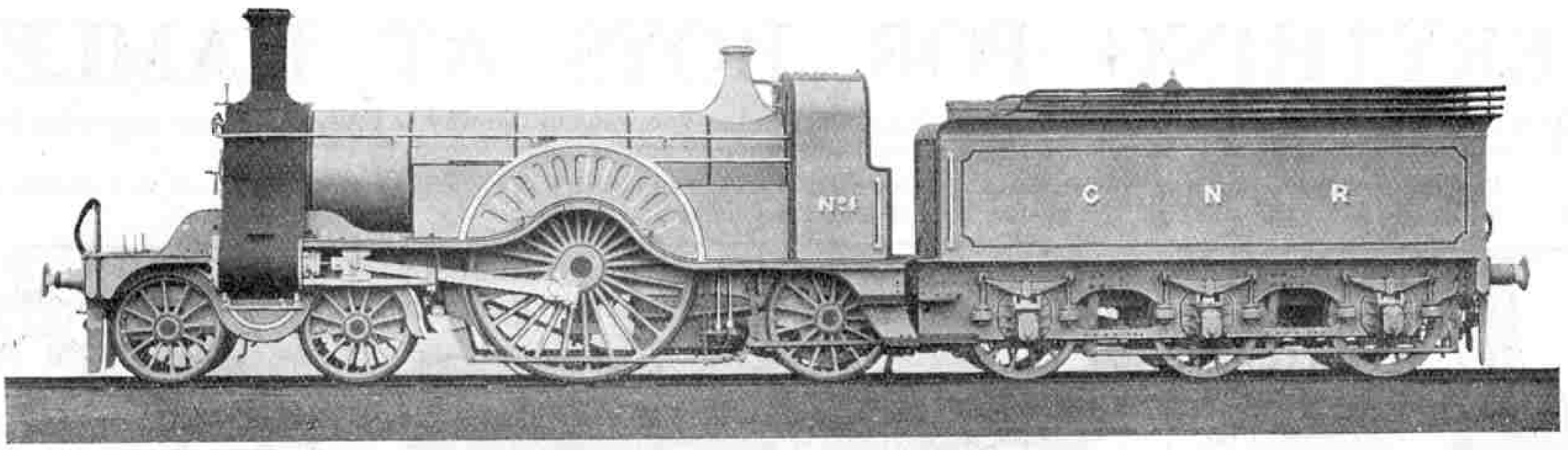

A "Single-Driver" Express Passenger Loco, built at Doncaster in 1870

between England and Ireland. The Great Western has always been famous for fast running, and in 1906 the company commenced the "*Cornish Riviera*" express service from Paddington to Plymouth, a distance of 226 miles—the longest non-stop run in the world.

The Great Northern Railway from its earliest days was a fighting line, persistently striving for greater speed. It originally consisted of a main line between London and York, but later obtained a strong grip on Lincolnshire and finally obtained running powers to Manchester and Liverpool. The Great Northern was the first British company to introduce restaurant cars, this innovation taking place in 1879 between King's Cross and Leeds.

The Great Eastern Railway grew out of a combination of the Eastern Counties line and the Northern and Eastern line, which originally were of 5 ft. gauge. Afterwards one small line after another was absorbed, and the resulting company took the name of Great Eastern in 1862. At one time the Great Eastern had the reputation of being nearly the worst railway in the country, and the story of its growth to one of the best in the country is a romance worth reading.

South Coast Railway

The London and South Western Railway began its career with a line from London to Southampton. In 1830 the shippers and merchants of Southampton, who had watched with keen interest the progress of the Liverpool and Manchester Railway, realised the tremendous effect that the railway was likely to have upon the shipping of Liverpool. Consequently they decided that Southampton must follow Liverpool's example and in 1834 an Act was obtained for a line to connect the port with the Metropolis. The line was opened in the same year as the London and Birmingham Railway and it was originally called the London and Southampton Railway. Later, Portsmouth wanted a railway, but refused to be served by a branch of a line in which the name of the rival port appeared. After some discussion tact prevailed and the line was re-named the London and South Western.

This railway connected the three great naval stations of Portsmouth, Portland, and Plymouth with the great military camps at Salisbury and Aldershot, and possessed more military stations than any other line. It was also the first line to give a trial to automatic signalling, the tests taking place in April 1902.

The London Brighton and South Coast Railway consisted of a network of lines covering a large portion of south London, almost the whole of Sussex and extending into Surrey, Kent and Hampshire. The construction of this line was first suggested in 1825 but nothing happened for some ten years. The London and Brighton Company was incorporated in 1837 and the first portion of it from Brighton to Shoreham was opened in 1840.

Part of the main line to Brighton passes along what was formerly the bed of a canal belonging to the London and Croydon Railway. This latter line is noteworthy as having been one of the lines on which the atmospheric system was tried, but the scheme failed here, as elsewhere, owing to the extreme difficulty of keeping the pipes airtight. In 1899 the company introduced trains consisting

George Stephenson, the pioneer of railways

entirely of Pullman cars, and was the first to adopt electricity for train lighting.

The South Eastern and Chatham Railway resulted from an arrangement for united working made in 1899 between the South Eastern and the London, Chatham and Dover Companies. The South Eastern Railway included two of the oldest railways in the south of England —the London and Greenwich, opened in 1837, and the Canterbury and Whitstable, opened in 1830.

The story of the London, Chatham and Dover Railway is closely connected with Thomas R. Crampton, born at Broadstairs in 1816. In his early days Crampton was an assistant to Sir Marc Brunel and afterwards served on the Great Western Railway under Daniel Gooch. Later he commenced designing locomotives, in which he was extremely successful. It was Crampton who, in 1851, came forward with £15,000 and thus made possible the laying of the cable between Dover and Calais, the first successful submarine cable in the world.

The Great Central Railway appeared at a later date than the other great trunk lines of the country. It began in 1837 as the Sheffield Ashton-under-Lyne and Manchester Railway, which afterwards became the Manchester, Sheffield and Lincolnshire railway. This consisted mainly of cross-country lines from Manchester to Sheffield, Lincoln, Grimsby and Cleethorpes, with branches to Barnsley, Wakefield and elsewhere. The line ultimately succeeded in getting to London at Marylebone and then changed its name to the Great Central. One great undertaking carried through by the Great Central was the development of the huge dock at Immingham.

The Scottish Railways

In Scotland, the North British Railway dates back to 1844 when the original company was incorporated for a line from Edinburgh to Berwick with a branch to Haddington. Subsequently the Edinburgh, Perth and Dundee, the West of Fife, the Edinburgh and Glasgow and the Monkland and other railways were added. Two of the great engineering works of this line were the bridges over the Forth and the Tay. The first Tay Bridge, which was opened for traffic in 1878, was partially destroyed during a storm in December 1879. A second bridge was constructed alongside the original and opened in 1887.

The Caledonian Railway practically originated with the Glasgow and Garnkirk line opened in 1831. The company grew steadily by amalgamation, particularly in the years 1865–1867. This railway owned many docks and possessed a fine fleet of steamers on the various lochs and rivers.

The Glasgow and South Western Railway originated in 1840 as the Glasgow, Paisley, Kilmarnock and Ayr Railway, and took this title on amalgamation with the Glasgow, Dumfries and Carlisle Railway. It included the line between Kilmarnock and Troon, the first railway opened in Scotland, dating from 1811 and worked by horse-haulage. A great feature of the Glasgow and South Western Railway was its splendid fleet of Clyde steamers.

The Highland Railway originated with the Inverness and Nairn line, 15 miles in length, which opened in November 1855, and followed the usual course of growth by extension and absorption. One of the features of this line is its extensive use of the snow plough.

The great North of Scotland Railway Company was incorporated in 1846 for a line between Aberdeen and Inverness, with various branches. This line made far more extensive use of the electric telegraph than the other Scottish railways, and it never had any second-class carriages.

(*Continued on page* 697)

EVERYTHING FOR BOYS AT HAMLEYS!

BOYS! Pay a visit to Hamley's and you will find exactly what you want in the way of toys, games, and conjuring tricks with which to baffle your friends, and sports requisites of every description.

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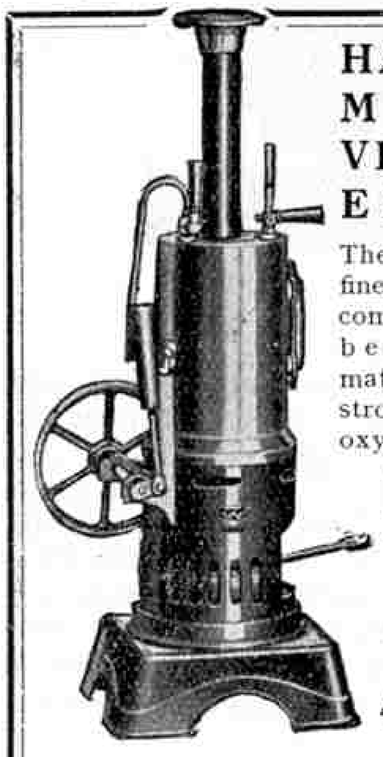

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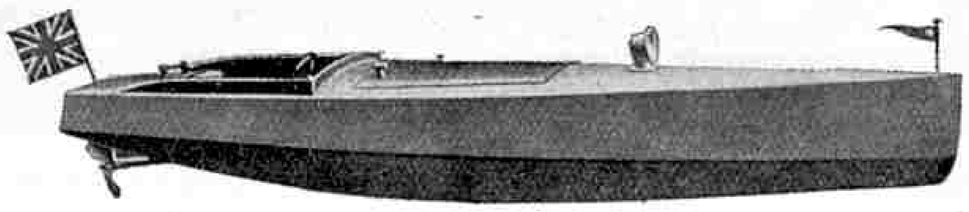

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The hull is built of specially selected mahogany 25" long, enamelled white above the water-line and green below. The boat is fitted with a powerful self-starting motor operated by a miniature turnbuckle switch in the cabin and a brass double-blade propeller threaded on the shaft. Price **31'6**

Batteries 6d. each.

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Single Shot Pistol fires No. 1 Saloon blank cartridges. Prices **1/11** and **2/11**. Postage **6d.** extra.

THE WALDEN REVOLVER

Heavily nickel plated 10 chambered revolver. Complete with ejecting pin and safety catch. For stage purposes, also the motorist, cyclist and traveller generally. Automatic action which permits of 10 cartridges being fired consecutively. Calibre, No. 1 Saloon blank cartridge size. Short or long barrel at the following prices, **8/11** (post free **9/5**), **12/11** and **16/11**

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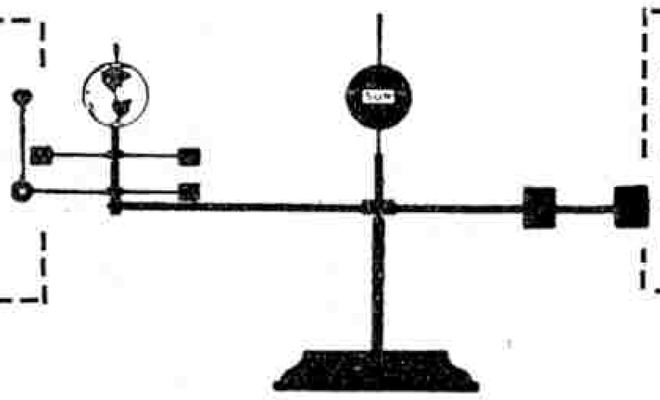

A new device which will appeal to all Meccano enthusiasts

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MODEL TO ILLUSTRATE
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Designed by GEORGE G. SHERRIN

Demonstrates:—

How the Flettner Rotor Ship goes without Sails.
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and a host of other problems which have engaged the attention of scientists and engineers.

The apparatus can be built up into various models, and the experimentist is held fascinated hour after hour. In fact,

there is no end to the amusement and instruction which can be obtained from it.

Supplied in wooden box, size 8¾ by 7¾ by 2½ inches with illustrated Handbook. **Price 20s. net.**

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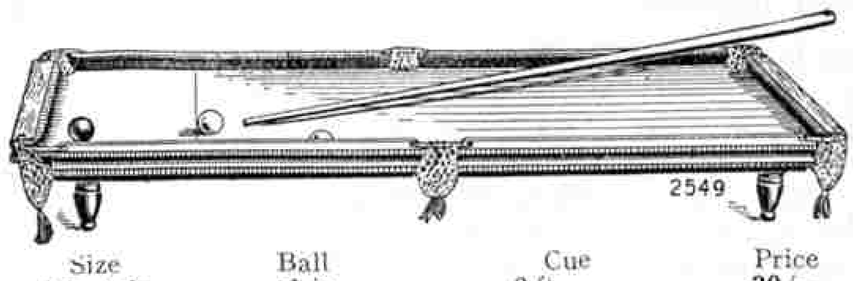

Size	Ball	Cue	Price
3 ft. 6 in.	1¼ in.	3 ft.	**30/-**
*4 ft. 6 in.	1⅝ in.	3 ft. 6 in.	**60/-**
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Part carriage and packing **1/6** extra.

**Models de Luxe, sizes as above, with specially fixed heavy slate beds, beautifully finished, £6-10-0 and £8 respectively. Carriage Forward.*

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CUP BAGATELLE TABLE

Seasoned and highly polished oak frame, rubber cushions. Complete with two cues, marking board, balls and chalk. These tables are fitted with adjustable feet, and a perfectly level surface can thus be obtained. Size 4 ft. by 18 in. Price **37/6** Carriage Paid.

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We carry complete stocks of Hornby Trains and Accessories. Post orders per return.

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Our illustrated catalogue ready in November. Post free to "Meccano Magazine" readers.

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BIRMINGHAM

From Coal Dust to Briquette

The World's Dirtiest Factories

The prolonged coal stoppage drew a great deal of attention to the "briquette" or coal brick. Householders who previously despised this form of fuel found themselves only too glad to make use of it and in most cases discovered that it was not so bad after all!

The briquette is not a particularly attractive-looking article but its process of manufacture is distinctly interesting, if only for the fact that it is produced in what are undoubtedly the world's dirtiest factories. From top to bottom such a factory is inches, sometimes feet, deep in coal dust, and its atmosphere is a whirl of ebony filth. The workers are appallingly grimy and the black pall spreads for several hundred yards around the factory.

The raw material is small coal. This coal is produced in the mine when the large blocks of coal are cut, and until some 50 years ago was regarded as useless and thrown on the colliery scrap heaps. This enormous wastage ceased however with the development of the patent fuel industry. In order to utilise this coal all that is necessary is something to bind it together so that it may be made in brick-shaped blocks of convenient size for industrial or domestic use.

The first step in the process of manufacture is to tip the coal from the wagon into a trough, from which a chain bucket scoops it up and transfers it to the floor above. In the meantime another elevator has similarly raised a quantity of pitch, which is the binding material chiefly used in this country. The coal and the pitch are shot into separate hoppers of a distributor, where they are automatically measured and passed in their correct proportions down a hopper into the mixer.

The mixer is a circular machine, in outward appearance not unlike a centrifugal fan. Inside it are steel beaters turning round a shaft, and these beaters break up the pitch and the coal to the necessary fineness and also mix them together very thoroughly. The mixture now passes into a trough underneath, from where another elevator takes it up and shoots it into the great "pug mill" of the fuel press. The pug mill is a large cylinder forming the top of the press. The mixture is forced down this by means of revolving arms and at the same time steam is admitted. The pitch then melts and a hot fuel mixture is produced.

The steaming mixture next passes to a large feeding pan beneath the pug mill. This pan stands over a massive die table, which is a great circular iron casting having round its horizontal top face ten sunk moulds, each the size of a block of fuel. Each mould is fitted with a rectangular presser and normally these pressers are at the bottom of the moulds.

The die table is moved round by the press mechanism, one mould space at a time, and as each mould reaches a certain position an arm in the feeding pan fills it with mixture. Each mould then comes over a lever actuated by a steam piston. Immediately it is in position this piston automatically pushes the presser up into the mould, and the mixture is thus compressed between the presser top, the mould sides and a heavy pressure plate that closes the top of the mould. As the table rotates still further the bottom of the presser rises on an inclined plane and the newly-made briquette is lifted to the table top, from where it is removed automatically by means of a travelling band.

There are other types of presses that have pistons entering the moulds from outside and which press on both sides of the briquette.

The pressure in the machines described is about 12 cwt. to the square inch, which produces a very satisfactory block. For good industrial blocks the coal is ground to pass a quarter-inch mesh and for the nicer-looking domestic blocks slightly smaller. Presses range from "babies," producing every hour 10 cwt. of blocks of about three inches cube and weighing about 12 oz., up to giants capable of making blocks 10 in. by $6\frac{3}{4}$ in. by $5\frac{1}{2}$ in., and weighing 16 lb. each, at the rate of 20 tons per hour. A works running two of these large presses would turn out about 200 tons a day.

The shiny steaming briquettes produced from the filthy sticky mixture by the relentless squeezing of the presses are loaded on to trucks and sent spinning away along tiny tramways to be stacked in gigantic heaps.

In normal times in this country one-and-a-half million tons of fine coal are made into patent fuel every year. Vast quantities of briquettes are exported to hot countries where stacked coal deteriorates very rapidly. Briquettes are not subject to this deterioration and are therefore used on a huge scale in such countries by railways and factories.

Early Railway Companies—

(*Continued from page* 695)

The foregoing railway companies maintained their independent existence until 1921, when an Act of Parliament was passed requiring them to arrange themselves in four groups to commence operation in 1923. The main object of this grouping was economy in working, with a view to a corresponding reduction in charges to the public.

The four groups are now as follows :— London, Midland and Scottish (7,525 miles), consisting of the London and North Western; Midland; Caledonian; Glasgow and South Western; Highland and other smaller lines. London and North Eastern (6,714 miles), comprising the North Eastern; Great Northern; Great Central; Great Eastern; North British; Great North of Scotland, and some smaller lines. Great Western (3,795 miles), consisting of the old Great Western line with the addition of the whole of the Welsh Railways. Finally, the Southern Railway (2,199 miles), consisting of the South Eastern and Chatham, London, Brighton and South Coast, and London and South Western Railways with smaller lines.

There still remain nearly fifty railways outside the four great groups. Most of these lines possess less than twenty miles of track and are of very little national significance, but included among them are the London electric railways group, and the dock railway systems at Liverpool and Manchester, both of which possess over 100 miles of track.

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Lives of Famous Engineers—

(*Continued from page* 66)

drum on deck. The cable was given several turns round this drum before finally passing into the sea over a rail at the stern. In order to control the cable's rate of delivery the drum was fitted with a flexible iron strap on its circumference, attached to a lever hand brake. On the whole the laying proceeded successfully, although on several occasions the ship had to be stopped in order to straighten out tangled turns of the cable, and in due course the shore end was landed in Mora Bay, north of Portpatrick, Wigtownshire.

Immediately the end was in position the following message was telegraphed to Dublin :—

May 23rd, 1853.

"The Directors of the British and Irish Magnetic Telegraph Company beg to acquaint His Excellency the Lord Lieutenant that they have this morning successfully effected communication between the shores of Great Britain and Ireland by means of a submarine cable from Port Patrick to Donaghadee."

This cable lasted for many years, needing only slight repairs from time to time.

Inauguration of Weather Reports

During 1854 the brothers were hard at work, Charles in completing a network of thousands of miles of telegraph wires, and Edward in organising the staff and service. At this time both Charles and Edward rendered valuable assistance to Admiral Fitzroy in the inauguration of his scheme of daily telegraphic weather reports in connection with the newly-formed Meteorological Department of the Board of Trade and the storm warning system organised by the Admiral. They arranged for the necessary instruments to be set up at a number of the company's stations, the staff were instructed to take observations twice daily, and these were telegraphed to the Meteorological Office in London by means of an ingenious code drawn up by Admiral Fitzroy and Charles Bright.

In 1855 the Magnetic Company adopted a new telegraphic bell instrument invented by Charles Bright and known as the acoustic telegraph. This instrument was a great improvement upon those then in use and its general principle consisted in the sounding by different currents of two bells of different pitch. The letters and words were formed from the difference in the tone and the number of beats, the ordinary Morse alphabet being employed. This form of telegraph, like the Morse sounder and other instruments of to-day, required only one wire, but it had a great advantage in speed by reason of using both positive and negative currents, whereas the Morse instrument is available only for one current.

In 1856 some of the underground lines of the Magnetic Company began to give trouble and it was decided to extend as much as possible the overhead system. Finally the company absorbed the British Telegraph Company, which had exclusive rights for overhead lines along the high ways, and subsequently underground wires were used only where circumstances made them necessary or desirable.

Charles Bright remained Engineer-in-Chief to the Magnetic Company until about 1860, after which, being very fully occupied with other work, he retained only a consulting position. Edward Bright then took over the engineership in addition to the general management.

Is your Meccano Outfit up to date?

"The Steam Era for Meccano"

Do you realise that if you are driving your models by clockwork or electricity, you are not only failing to make them realistic but your methods are out of date? A steam engine, if British made by model engine specialists, can do all that the old power units can do as regards power, safety and reliability and in addition you get—realism!! Your models are no longer toys but real engineering models—actual replicas in miniature of the large commercial machines. Nine-tenths of the working models in the Meccano Catalogue are in practice driven by steam. Imagine your Meccano crane hoisting the load amidst clouds of steam and the roar of a high speed steam engine! Doesn't it sound real and isn't it just that reality that your models have lacked?

BRITISH MADE THE WOR-MAR TRADE MARK. JENKINS PATENT

STEAM ENGINES FOR MECCANO OR OTHER MODELS

all have Meccano standard drilling (by permission of Meccano Ltd.) and therefore, apart from giving double the power and wear of foreign engines, are the only engines which can be built into a Meccano model. The power and speed is marvellous—3-5000 revolutions per min. guaranteed. Don't be put off with a flashy looking German engine—it won't pull and will not wear. Out Wormar engines are entirely made of solid brass and steel, not painted tin. Fully guaranteed. Postage abroad usually 2/3 extra—any excess refunded.

£5 PRIZES

are being offered for the best Meccano Model driven by a Wormar Engine. 1st Prize £2, 2nd Prize £1 5s., 3rd Prize 15s., and 4 prizes of 5s. each. Entries close (Britain) Feb. 28th, 1927, (abroad) Mar. 31st, 1927. Conditions as usual "*M.M.*" Contests and the winning drawing or photo to be judged by the editor of "*M.M.*" Commence designing your models now—hurried designs rarely win. Do not send actual models—photos and drawings only to 163, King St., Luton. Send stamp for full particulars.

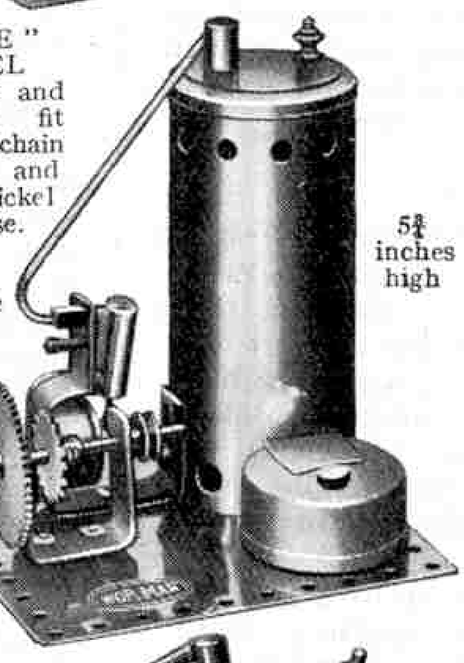
IMPORTANT

We have made plans for 4 times the quantity of engines sold last Xmas—but orders are rushing in and we may run short. Our next batch cannot be ready until January, so if you want to secure yours for Xmas and cannot buy now, send P.O. 6d. (as guarantee), state model required, when your engine will be labelled and packed aside until you send the balance.

"TROJAN" MODEL Base of Tinned Steel **5/11** Post Free **6/6** C.O.D. **6/10**

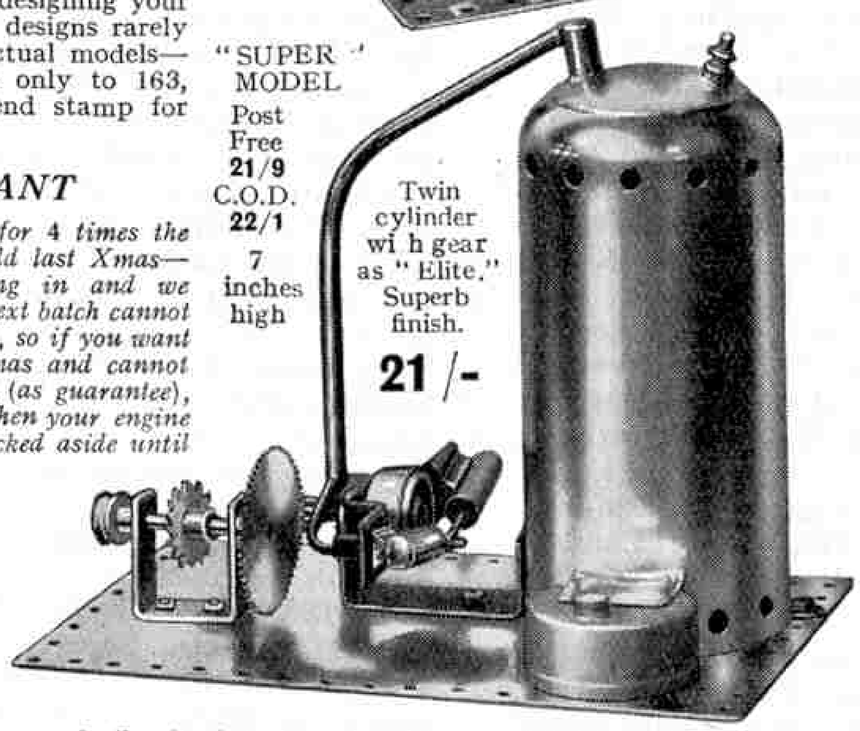
5 inches high

"ELITE" MODEL with gear and shaft to fit Meccano chain sprockets and pulleys. Nickel plated base. **10/6** Post Free **11/1** C.O.D. **11/5**



5¾ inches high

"SUPER" MODEL Post Free **21/9** C.O.D. **22/1**



7 inches high

Twin cylinder with gear as "Elite." Superb finish. **21/-**

Illustrated booklet free.

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DRIVE YOUR MECCANO MODELS BY STEAM!!

THE WOR-MAR "TROJAN" MODEL STEAM ENGINE

will drive easily every type of Meccano Model

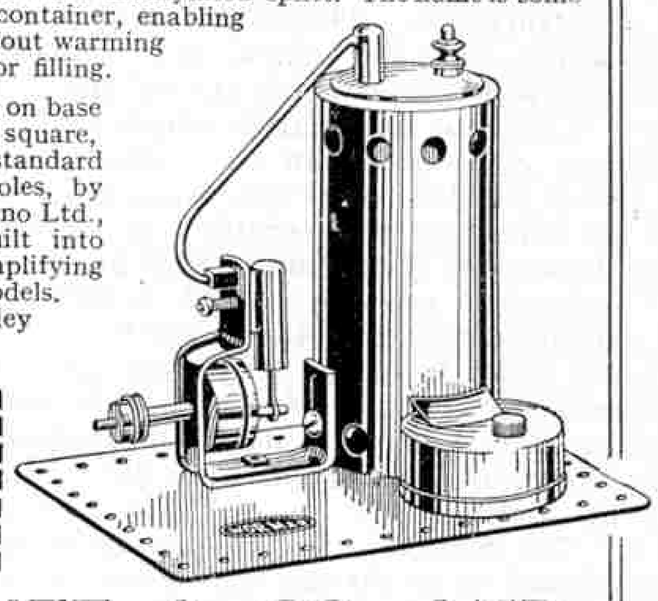
Here is a description:

ENGINE Our special design; accurately ground brass oscillating cylinder with solid brass piston, scientifically lapped out to ensure steam-tight fit, thus securing abnormally high power for this size engine. Bore, ⅜ in. Stroke, ½ in. Heavy brass flywheel, 1¼ in. × 7/16 in., beautifully turned and highly burnished finish. Each engine tested and guaranteed to attain 3,000 to 5,000 revolutions per minute.

BOILER Solid drawn brass, 1½ in. × 2½ in., highly polished, complete with safety valve, fire box, and small funnel for filling.

LAMP Special safety type to burn methylated spirit. The flame is some distance from spirit container, enabling intense heat to be generated without warming unburnt spirit. Small funnel for filling.

BASE The whole is mounted on base of tinned steel 4¾ in. square, the edges being drilled with standard Meccano pattern equidistant holes, by kind permission of Messrs. Meccano Ltd., thereby enabling it to be built into Meccano models, as well as simplifying attachment to bench or other models. Hole in centre of base under pulley to allow for underneath drive.



Complete with safety lamp, filling funnel and directions in strong box PRICE **5/11** POST FREE

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FOR EVERYTHING MECCANO

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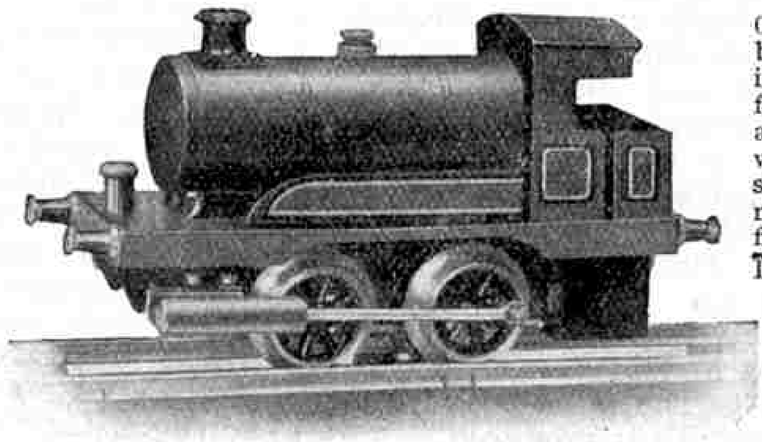
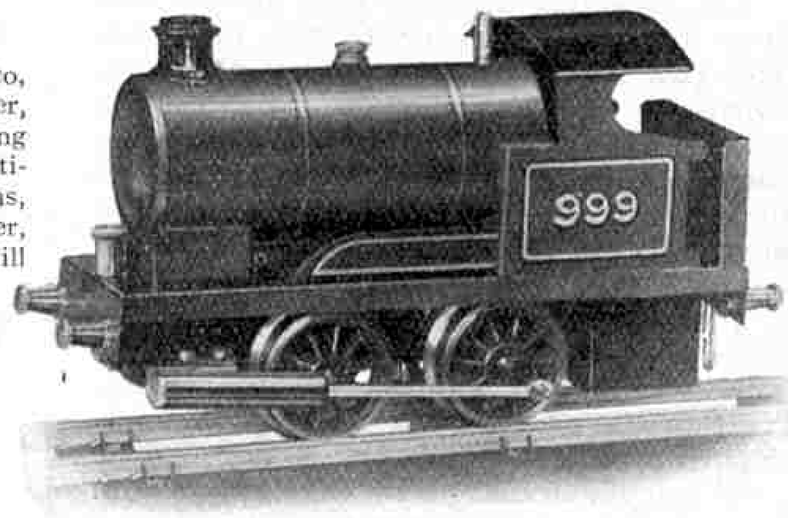
STEAM LOCOMOTIVES



0 Gauge Loco, brass boiler, brass oscillating-cylinders, anti-friction pistons, automatic oiler, wind guards. Will steam about 15 minutes with one filling. L.M.S. or L.N.E.R. colours.

Price 12/6

Postage **6d.**



Strong heavy loco, 0 gauge, brass boiler, brass oscillating cylinders, anti-friction pistons, automatic oiler, wind guards. Will run for half mile with one filling. Exhaust through the funnel.

Price 21/-

Postage **6d.**

W. H. HULL & SON

MODEL RAILWAY SPECIALISTS

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Established 1884.

Competition Page

Doublet Word Puzzles (II.)

If one may judge from the number of requests for similar contests sent in by entrants in our September competition, Doublets have proved that they have lost none of the fascination that made them so popular when first invented by Lewis Carroll. Therefore, to provide readers with another opportunity to test their skill, we have decided to hold a second "Doublets" competition.

To serve as a guide to new readers, we will explain again the very simple rules of this form of puzzle.

Two words, each containing the same number of letters, are given and are termed the Doublet. It is required to change the first word into the second by placing connecting words between them, each word differing from its predecessor by the alteration of *one letter only*. These connecting words are termed "links." It is obvious of course that only words of exactly the same length as those comprising the Doublet may be used.

It is important to note that only well-known English words are admissible and names of persons or places are not allowed.

To guide our readers in solving the Doublets given below, the following examples are given :—

Fit HOOK to BOLT 2 links wanted.
HOOK-book-boot-BOLT.

Change PIG to RAT 2 links wanted
PIG - pit - pat - RAT

It will be seen that only one letter is changed in each link and there is no re-shuffling of the letters.

Below we give the list of Doublets to be solved. It will be seen that no clue is given to indicate the number of links required to complete the chain and intending competitors should note that the fewer the number of links, the better the solution.

Use	COAL	as	FUEL
Change	COLD	to	HEAT
Raise	EARL	to	DUKE
Brush	GRIT	from	ROAD
Press	BELL	to	RING
Promote	MINOR	to	MAJOR
Strike	COIN	at	MINT
Fit	SHIP	with	MAST
Make	LION		ROAR
Wash	FACE	with	SOAP

Prizes of Meccano or Hornby Train goods to the value of 15/–, 10/– and 5/– respectively will be awarded to the senders of the best three sets of solutions, and consolation prizes, value 2/6 each, will be given to the eight next best solutions.

Entries should be addressed to "Doublets No. 2, Meccano Magazine, Binns Road, Liverpool," and sent to reach this office not later than 30th November. Overseas closing date : 28th February, 1927.

19th Drawing Contest

For our drawing competition last month we had as the subject the fastest known form of road transport, the racing motor. This month we set the slowest—a Steam Roller. We doubt whether there is a single reader of the "*M.M.*" who has never seen a steam roller, and consequently we look forward to a record entry.

Competitors will be divided into two groups as usual. A for boys aged 16 and over and B for those under 16. Prizes of drawing or painting materials or Meccano Goods (to be chosen by the winners) to the value of 10/6 and 5/– respectively will be awarded to the first and second prizewinners in each section, in addition to a number of consolation prizes, value 2/6 each. Each entry must bear the name, age and address of the competitor and should be forwarded to "19th Drawing Contest, Meccano Magazine, Binns Road, Liverpool." Closing date, 30th November. Overseas, 28th February, 1927.

Results

September Essay

Many varied proposals designed to improve the conditions under which cricket Test Matches are played were recommended in the essays submitted in this contest. Some were wildly impracticable; others, though decidedly novel in comparison with suggestions made by eminent cricketers, nevertheless were based upon sound reasoning.

Competitors generally were emphatic in their opinion that to tamper with the size of the equipment, or the length of the pitch would strike a blow at club cricket—the heart of the game—which stands in little need of alteration. Several competitors recommended a revision of the rule regarding l.b.w., and suggested that a batsman should be out if he plays with his legs any ball that would have struck the wicket. That would force the batsman to play with his bat any ball pitched outside the stumps that was turning on to the wicket.

The matter seems to resolve itself therefore into a question of the amount of time allowed for play. The general consensus of opinion was that four days at least should be allowed, and in many cases an extension of playing hours per day was advocated. Other essayists suggested the adoption of an 8-ball over, claiming that this would secure a saving of at least two hours in a four-day match.

Some readers urged the extension of the matches to six days, pointing out that any extension beyond three days means the loss of individual players from the county teams for the next three days at least. Therefore no additional hardship would be imposed.

The following awards were made :—

First Prizes : Section A, F. P. B. Ward (Waldridge Fell, Co. Durham) ; Section B, P. Andrews (Norbury, S.W.16). Second Prizes : Section A, R. M. Davies (Wrexham) ; Section B, L. N. Adamson (Caterham Valley, Surrey).

September Doublets

It is unfortunate that the fact of the Overseas section still being open prevents us from commenting at length upon this competition, but there is one point that may be mentioned. Several readers—intending competitors—wrote asking for information on certain points arising out of their interpretation of "doublet" rules. Obviously, to have answered these letters would have conferred an advantage that was not available to other competitors, and readers generally are asked to note that we cannot enter into any correspondence regarding competitions while such competitions are open.

The following were the successful entrants :—
1. P. W. Pearse (Kingston-on-Thames) ; 2. M. S. Y. Fowler (Teddington) ; 3. F. W. R. Banham (Birmingham) ; 4. G. Aylward (Wembley).

30th Photo Contest

The awards were as follows :—

First Prizes : Section A, P. Lambert (Harrogate) Section B, M. S. Price (Cardiff). Second Prizes : Section A, J. T. Toller (Ipswich) ; Section B, G. D. Coxhead (Wanstead, London, E.11).

Overseas Results

24th Photo Contest

The awards were as follows : First Prizes : Section A, J. Thomason (France) ; Section B, R. Fraser (Ontario, Canada). Second Prizes : Section A, S. T. Edwards (New York, U.S.A.) ; Section B, R. Franklin (Brisbane, Australia).

25th Photo Contest

This competition was for "Record" photographs and proved to be one of the most interesting that we have had for many months. The examination of each individual print provided quite a miniature tour of the world. Figure studies predominated and many quaint types of persons were depicted. Thus we had the native coin-divers at Singapore, a rickshaw runner of Shanghai, a snake charmer of India, a syrup seller and an Arab dancing girl from Cairo. The allocation of the awards called for more than usual care for the interest of the print constituted the basis of its scoring power.

The following were the successful entrants. First Prizes : Section A, E. Gray (Natal, S. Africa) ; Section B, N. Langsdorp (Queensland). Second Prizes : Section A, H. C. Van Doorn (Utrecht, Holland) ; Section B, H. Tsumura (Tokyo, Japan),

26th Photo Contest

The results are as follows :—

First Prizes : Section A, F. Tomlinson (Bombay) ; Section B, V. Duncan (Winnipeg) ; Second Prizes : Section A, L. Morrisby (Hobart, Tasmania) ; Section B, H. Tsumura (Tokyo, Japan).

May Essay

The results are as follows :—

First Prizes : Section A, Nee Sing (F.M.S.) ; Section B, G. Mackay (Southland, N.Z.) Second Prizes : Section A, T. S. Richards (Ontario, Canada) ; Section B, H. Gibson (Port Elizabeth, S.A.)

May Sharp Eyes

The results were as follows :—

1. G. D. L. Peris (Slave Island, Ceylon) ; 2. W. M. Flandeeka (Colombo) ; 3. D. Beadle (Cape Province, S.A.) ; 4. A. Smith (Geraldine, N.Z.)

The Secretary's Notes

The news will be welcomed by Meccano Clubs generally that the list of models available for loaning to Clubs has again been increased. The models available for loan are the following :– Transporter Bridge ; Workshop ; Motor Chassis ; Horizontal Engine ; Marine Engine ; Big Wheel ; Meccanograph ; Stiff-Leg Derrick ; Aeroscope ; " Baltic " Tank Locomotive. In certain special cases other models may .be built and loaned on the request of Leaders, but only those in the above list can be definitely promised.

Models from Headquarters

The popular scheme of introducing Club Magazines is growing apace, and among the Clubs that have not yet introduced their own journals, many are planning to do so this winter. An interesting issue of the " Middlesbrough Meccano Monthly," sold by Middlesbrough M.C. at 1d. per copy, was recently sent to Headquarters for perusal. This included an amusing series entitled " What to do at the Seaside " to which various members contributed. Several are sufficiently amusing to be quoted. Ben Allick's idea of a good time seems to have rather a " sameness " about it, for he advises : " On arriving at the Seaside you should partake of a good, square meal. Then if you are a swimmer—go and have a dip. This should be immediately followed by another good, square meal. Then, if there is a Concert Party on the Pier, go and listen to it. Follow this up with a good, round meal (by way of variety). Then go for a ride on a donkey (but not unless you are an experienced rider, or you will look a bit of an ass yourself). Then partake of a light dinner of about fifteen courses, and finally roll home."

Amateur Magazines

Tom Sizer on thinking of the seaside immediately waxes poetic with the following result :—" Take a jolly steamer trip, then enjoy a lovely dip. Eat a big vanilla ice ; it will vanish in a trice ! Take a stroll along the sands ; listen to the lovely bands. Feed at some delightful spot ; where the soup is steaming hot. Fish for whitebait from the Pier ; give the nigger troupe a cheer. Play at Leap-frog on the beach ; grasp all joys within your reach. Hurry off and catch your train. Dash it ! Back to work again ! "

Middlesbrough Talent

Castle Douglas M.C.

Castle Douglas Meccano Club was formed in November 1925, and under the wise Leadership of Mr. Peter Thomson has made steady progress from its very first meeting. The membership is not large, but a spirit of great enthusiasm prevails. Mr. Thomson is shown in the centre of the photograph, and on his right is Mrs. Murray, the treasurer, who has rendered valuable help to the club in many directions. The President is Mr. J. Whiteley, to whose generosity members are indebted for their comfortable club room.

During the past three or four months I have received a number of letters from members of certain clubs inquiring how it was that, while some clubs were given long reports on the " Club Notes " page, their club received only a very few lines. This is a matter that lies entirely in the hands of club secretaries. If I receive only a brief, casually written report containing few details, it is obvious that I cannot possibly give that club a long note. On the other hand, a carefully prepared report giving a full but concise account of a club's doings enables me to prepare a note that is not only of reasonable length but also is of interest to members of all other clubs. I appeal to club Leaders to co-operate with me by impressing upon their secretaries the importance of sending in good reports.

* * * *

It is with regret that I have to announce the disbandment of Claygate Juvenile Club, which has been in existence for seven years under the Leadership of Mr. J. W. Haynes. This club has had an interesting career and it was one of the first clubs to introduce a girls' section which, under the guidance of Mrs. Haynes, proved remarkably successful. The disbandment is due to the fact that the Leader is leaving Claygate, and the final meeting took the form of a tea and concert at which Mr. and Mrs. Haynes were presented with a number of gifts from club members and other well-wishers.

* * * *

The number of girl members of the Guild is already large and is steadily growing. I should like more of these girls to join the Correspondence Club, and I wish to emphasise the fact that there is no entrance fee or payment of any kind required. Any girl members of the Guild who would like to join the Correspondence Club should write for enrolment forms to the Girls' Section at Headquarters.

* * * *

Leaders are urged not to overlook recommendations for Special Merit Medallions for good work.

The Best Age!

Our photograph shows two members of Stotfold Pioneer M.C. as they appeared in the local Hospital Procession. The club carried off first prize.

CLUB NOTES

Herne Bay M.C.—Has added to its long list of successes by a fine Exhibition held at Herne Bay Pier Pavilion. A Hornby Train layout including a large variety of rolling stock proved very attractive and a notable feature was a special display of the coloured New Meccano. Two models were loaned from Headquarters, the Aeroscope and Stiff-Leg Derrick, in addition to which there was a good display of Meccano and Fretwork models. Club roll: 36. *Secretary*: C. W. Russell, 4, Clifton Villas, Herne Bay.

Exeter M.C.—Recruiting is carried on continuously. Considerable local interest has been aroused by the sight of a fine Tramcar model made in Meccano and Woodwork, which tours the city with its enterprising builders. It is fitted with electric light and looks a fine sight at night, and it usually carries the club Mascot, known as Master Pax, as driver. Three Football Teams are being run this season. A new rule is established in the Electrical Section whereby every boy must be prepared to deliver a lecture if given one week's notice. A committee of six members and the Leader has been formed. Club roll: 221. *Secretary*: H. G. Lendon, "Homeside," 72, Old Tiverton Street, Exeter.

Castle Douglas M.C.—Activities have been recommenced and a good session is anticipated. New members wishing to be enrolled should communicate immediately with the *Secretary*: Richard Haugh, 26a, King Street, Castle Douglas.

Weston M.C.—A new club-room has been obtained and a special Exhibition of Models is to be held shortly. A Motor Chassis will be loaned from Headquarters for the occasion. Club roll: 22. *Secretary*: Ralph B. Nichols, 3a, Royal Parade, Weston-Super-Mare.

Stockton-on-Tees M.C.—Recent events include a Contractors' Night, Hornby Nights and Games Nights, which have been greatly enjoyed. An Exhibition is planned to take place this month. Club roll: 22. *Secretary*: N. Middleton, 14, Victoria Avenue, Norton Road, Stockton.

Richmond (Surrey) M.C.—So enthusiastic are the members that it is proposed to hold two meetings each week in future instead of one. Members are preparing to dress a stall in a forthcoming Bazaar at Richmond, for which all sections are working hard. A concert is arranged to take place at Christmas. Club roll: 23. *Secretary*: A. R. White, 15, Albert Road, Richmond.

Stationers' School M.C.—The first meeting of the new session took the form of a visit to the Model Engineer Exhibition in London, which proved most interesting. Future meetings will be mainly devoted to Model-building and Lectures. *Secretary*: G. H. Dunkling, Stationers' School, London, S.W.17.

Marsh Street, Conway (London) M.C.—An outing to the London Museums was arranged a short time ago and proved very enjoyable. Lecturers for the Winter Session are being approached and many interesting evenings are anticipated. Club roll: 50. *Secretary*: W. O. Knight, 22, Howard Road, Walthamstow, London, E.17.

Harwich M.C.—Early in the new Session an Exhibition is to be held and members are working hard in preparation. The club is being divided into two sections. On club nights members under eleven years of age will hold their meetings from 6.15 to 7.15, and those over eleven will meet at 7.30 and disperse at 9. The junior syllabus includes Meccano Model-building, Coloured Plasticine Modelling, Bead-making and Games; and that of the seniors comprises Fretwork, Meccano, Raffia Mat-making, Plasticine Modelling, Enamelling and Stencilling. Owing to the unavoidable resignation of the treasurer, Mr. J. Brooks, the post has been filled by Mr. Chas. Jeffries, Deputy-Leader. Mr. House has been appointed librarian. Mr. P. L. Wittingham of the Church Army, the club's former Deputy-Leader, has offered to present a silver cup to the boy who accomplishes the best work for the club throughout the year. The cup will be engraved with the name of the winner, who will be entitled to hold it for one year. Club roll: 100. *Secretary*: A. E. Ward, Osborne House, Pepys Street, Harwich.

Beccles Excelsior M.C.—Members are organising a great Recruiting Campaign. Special leaflets are being drawn up, and the Leader, Mr. Watts, is having them printed for distribution by members. Club roll: 21. *Secretary*: B. Jack Andrews, 30, Station Road, Beccles.

Chalmers Church (Alloa) M.C.—Sound progress is reported. The local dealer, Mr. Stirling, is preparing a fine display of Working Models, with the co-operation of club members, for Christmas. It is hoped to recruit many additional members during the winter. Leader: Mr. John Mein, 1, Hawkhill Cottages, Clackmannan Road, Alloa.

Teignmouth Congregational M.C.—This recently affiliated club is making good progress. The President is the Rev. H. R. Veale, and Mr. W. F. Rowse has accepted the position of Leader. The syllabus includes Model-building, Nature and Wireless Talks, Football and Gymnastics. Club roll: 19. *Secretary*: Donald Ford, 16, Higher Brook Street, Teignmouth.

Haslingden Secondary School M.C.—The new Session promises to be very successful and the membership is increasing. It is proposed to organise a concert in the near future and the story of "Dick's Visit to Meccanoland" may be enlarged upon and adapted as a sketch. Chess, Draughts, and Table-Tennis Tournaments are being arranged. Club roll: 30. *Secretary*: Kenneth G. Tupling, 16, Alexandra Terrace, Haslingden, Rossendale, Lancs.

Southport M.C.—The two sections, Nuts and Bolts, have played several football matches. Club-room activities are now being arranged. A Concert is in preparation, an item of which is to be the Meccano play "Nonsense Nana." Club roll: 18. *Secretary*: W. E. Williamson, 10, Delamere Road, Ainsdale, Southport.

Meccano Club Leaders

No. 30 Miss Gertrude Viney

Richmond (Surrey) Meccano Club is justifiably proud of its Girls' Section and above we reproduce a photograph of Miss Viney, the Leader. The club has been in existence since 1924 and Miss Viney first became interested in its activities in connection with its frequent concerts, the success of which has been due to a considerable extent to her voluntary services as pianist.

The Girls' Section was formed in May of this year and Miss Viney immediately undertook the responsible task of organising it. Her enthusiastic efforts have met with well-deserved success, and to-day the section is flourishing in every respect.

Liverpool M.C.—Several successful meetings have been held since the holidays. A Model-building Competition was won by J. Hesketh, with a Locomotive, and other good models included a Windmill, an Automobile and an Ice Yacht. Preparations are being made for an Exhibition to be held at an early date. Club roll: 22. *Secretary*: L. Hodkinson, 5, Cobham Avenue, Moss Lane, Orrell Park, Liverpool.

Norwich M.C.—A promising club has been formed. The President is the Rev. D. L. Saberton, York Villa, Chapel Field Road, through whose kindness a fine club-room has been obtained, with lighting and heating free of charge. The Leader is Mr. F. Sercombe, 84, Chapel Field Road, Norwich. The secretary and several members are presenting Meccano Outfits to provide equipment for general club use. Club roll: 22. *Secretary*: Lionel H. Oates, 90, New Market Street, Norwich.

Skelmanthorpe Wesleyan M.C.—Has lost its former leader, Mr. Irving Tyas, who has left the neighbourhood. There are four adults controlling and guiding the club, however, and a successful Winter Session is assured. A new Leader will be elected as soon as possible. Local Meccano boys desiring to join should apply to Mr. R. Gordon Field, Pilling House, Skelmanthorpe, Nr. Huddersfield.

St. Mary (Newington) M.C.—Good progress is reported, and the Club is working at high pressure in preparation for the Annual Exhibition. A regular course of model-building is to be followed throughout the session, good models being noted and reproduced for special occasions. The Club has a fine library, and Miss D. Treves has adopted the position of hon. treasurer and librarian. The Model Railway Section is progressing well, under the guidance of Mr. T. A. Denny. Model-building competitions and lantern lectures are well represented in the syllabus. Club roll: 118. *Secretary*: Mr. C. A. Curle, 37, Pullens Flats, Peacock Street, London, S.E.17.

Australia

Waverley M.C.—Is now affiliated with the Guild. A good club-room has been obtained and Mr. F. Worstead is the enthusiastic Leader. At recent meetings activities have included Model-building, the exchange and study of Foreign Stamps, and Mock Trials. Cricket is to be taken up soon and a steady increase in the membership is anticipated. Club roll: 7. *Secretary*: Victor Worstead, 101, Cowper Street, Waverley, Sydney, N.S.W., Australia.

Hampton M.C.—A sound club has been formed at Hampton and was recently granted affiliation with the Guild. It is proposed to erect a platform in the club-room for the production of "tableaux." Interesting engineering discussions are arranged for the future and the club is to publish its own Magazine, on which the members are working enthusiastically. Club roll: 9. *Secretary*: F. G. Wallis, 9, Kerford Street, Hampton, Victoria, Australia.

Clubs Not Yet Affiliated

Worthing M.C.—A small club is being formed and the first meeting was well attended. Mrs. Knowles, of "Shanklin," St. Thomas Road, has kindly consented to act as Leader and has placed a room at the disposal of the members. *Secretary*: Raymond Knowles, "Shanklin," St. Thomas Road, Worthing.

Cranham M.C.—Is developing well. A recent visit to the London Zoological Gardens proved very interesting and members saw the diving birds and sea lions being fed, and watched the elephants bathing. A Model-building evening was devoted to the construction of a model house. A Woodwork Competition is under consideration. *Secretary*: J. G. Cheshire, Post Office, Cranham, Essex.

Darlington M.C.—Has been inactive for some time owing to the absence of a Leader. Strenuous efforts at reorganisation are being made, however, and Darlington boys are invited to support the efforts of the *Secretary*: A. K. Pankhurst, Beech House, West Auckland Road, Darlington.

Dublin No. 1 M.C.—A promising club has been established. The chief drawback at present is the absence of a proper club-room but steps are being taken to remedy this defect at an early date. Mr. Cockrane is the Leader and is working steadily towards affiliation with the Guild. Club roll: 12. *Secretary*: Mr. G. J. Seymour, 49, Eccles Street, Dublin.

Leytonstone M.C.—Is progressing along sound lines, and promises to become very successful. Boys wishing to join should write to the Secretary. Club roll: 16. *Secretary*: G. L. Twelvetree, 1, Grove Crescent, Littlehampton.

Ashburton M.C.—Sound progress is being made by this newly formed club. At a recent meeting the Leader had two small tree trunks brought to the club-room and laid on trestles. The members were required to construct Meccano bridges across the trunks and imaginary water below, and a very enjoyable evening was spent. It is proposed to include a special club parade and display of models in the forthcoming Annual Concert of Ashburton Preparatory School. Club roll: 15. Leader: Miss C. R. Bolt, 131, Anerley Road, London, S.E.20.

Clifton (South Africa) M.C.—Has an adult Leader, the Rev. T. Higgs, and a club-room, and is developing along sound lines. It is hoped that affiliation with the Guild will be effected in the near future. *Secretary*: Hermann Jacobsen, 169, Loveday Street, Clifton, Johannesburg, South Africa.

Proposed Clubs

Bootle M.C.—A keen Meccano enthusiast at Bootle is trying to form a club and invites the support of Meccano boys in the district. Boys interested should get in touch with J. Dempsey, 403, Stanley Road, Nr. Marsh Lane, Bootle, Liverpool.

Rotherham M.C.—A club is in process of formation and boys interested are invited to communicate with the promoter of the movement, A. E. Wood, 26, Norfolk Street, Rotherham.

Sutton-in-Ashfield M.C.—It is suggested that a club be formed, and the gentleman who is promoting the scheme is prepared to take Leadership. A club-room is already secured, and boys interested are invited to communicate with Mr. J. Winfield, 1, Hardwick Street, Sutton-in-Ashfield.

Brixton Hill (London) M.C.—Boys interested in the formation of a Meccano club at Brixton Hill should communicate with H. Astle, 75, Brixton Hill, London, S.W.2.

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RULERS OF AUSTRIA AND HUNGARY

By R. Kay Gresswell

ALTHOUGH very many series of portrait stamps have been issued from time to time by various countries of the world, we believe that the one issued by the Austro-Hungarian Monarchy on the 1st January, 1908, to commemorate the 60th year of the reign of Francis Joseph I., is unique in at least one respect. It shows the portraits of seven kings or queens of Austria, making an unbroken portrait gallery of the rulers of that country from 1711 to 1916, over two hundred years. This is a record, we think, that no other series of stamps can equal.

The House of Hapsburg

These rulers were members of the famous family known as the House of Habsburg or Hapsburg, which, originating in the 11th century so far as that name is concerned, grew in importance until it became the most powerful family in Europe. Members of this family were dukes and archdukes of Austria from the year 1282; Roman emperors and German kings from 1438 to 1806; kings of Spain from 1516 to 1700; kings of Hungary and Bohemia from 1526; and emperors of Austria from 1804, until the declaration of the republic in 1918.

It is with the Austrian branch of the family that we are concerned at the moment. This modern Hapsburg-Austrian empire was definitely founded by Ferdinand I. (1556-1564), the grandson of the famous Emperor Maximilian I. and brother of the Emperor Charles V.

Ferdinand was succeeded by his eldest son Maximilian II. The latter's son in his turn followed Maximilian II. but proved so unsuccessful a ruler that the family agreed that he should be replaced by another member, named Matthias. This ruler proved just as unsuccessful, however, and in 1619 he was followed by Ferdinand II., nephew of Maximilian II.

This man was an active and firm ruler and he served to improve the prospects of Austria considerably, but the Thirty Years' War proved disastrous to Austria, so that Ferdinand III., who had succeeded his father in 1637, was forced to yield Alsace to France.

Leopold I., son of Ferdinand III., followed his father and reigned for forty-eight years, dying in 1705. He was succeeded by his son Joseph I., who, dying in 1711, was followed by his brother Charles VI., who is the earliest king to be illustrated in the series of Austrian stamps to which we have already referred. He is shown on the one heller value, which is reproduced on this page.

Charles VI. and Maria Theresa

Charles VI. was born in 1685 at Vienna and when the Spanish branch of the Hapsburg family became extinct in 1700, he succeeded to the throne of that country in opposition to the Bourbon Prince Philip V., to whom the crown had been left by will. This brought about the War of the Spanish Succession but when in 1711 Charles' brother, Joseph, died, Charles was persuaded to give up his claim to the Spanish throne and to be satisfied with being ruler of the Austrian dominions.

He was crowned in December 1711, and as his only son died while still a child, most of his energies were directed towards the passing of a law called the Pragmatic Sanction to enable his daughter Maria Theresa to reign after him.

When Charles died in 1740, he was duly succeeded by Maria Theresa, although there was a considerable opposition, which however, the queen was able to overcome. After the first few months of her reign she had no further trouble concerning her right to rule. She reigned for forty years, during the whole of which time she formed one of the central figures in the politics of Europe. Similarly to all the other heads of the House of Hapsburg, she had a great belief in the importance of her position and took a very active part in the government of her country. She was engaged in wars with various of the European nations and although not by any means always successful she was able to maintain the dignity and importance of the Austrian people.

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10/6 Gibbons Stamp Albums	for	**7/6**
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Method of adding to your collection. When you buy PACKETS you buy DUPLICATES. I will send you a book of 1,111 different stamps from which you may select any 100 for 3/–.
BUY ONLY THOSE YOU REQUIRE.
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ZOO PACKET 7d.
ABYSSINIA, large pictor.; 4 **Persia,** 1903; **China,** dragon; **Tanganyika,** giraffe; 2 **Sudan** camel (large and small); **West Australia,** swan; 2 **Poland,** eagle; **Mexico; Newfoundland,** caribou; 7 **Finland,** lion; **New Zealand,** Victory; 4 **Malay,** tiger; **Orange Riv. Col.,** etc.; 40 diff. all showing animals or birds, **7d.** post free.
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My 6d. "Bumper" Packet of **120** high-grade Stamps incls. Trans-Jordania (mint), Algeria (pict.), S. Rhodesia, fine old French, Canada, U.S.A., etc. No give-away junk, but super-value. **Grand set of 5 picturesque Guatemala FREE** if you ask for my famous "Better" Approvals (noted for value) with packet.
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Philatelist, Westcliff Terr., Ramsgate.

Artts Ccegillnot Ampsst Adoty-
What do these four jumbled words mean? Send your solution, ask to see our approval sheets of Stamps, and enclose two penny stamps for postage, &c. If your answer is correct we will then send you **absolutely free** 25 Asiatic Stamps, or a Stamp Wallet filled with Stamps.
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FREE—25 diff. Mint Colonials.
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To applicants for my APPROVAL SHEETS enclosing 2d. postage ONE of the following sets will be sent FREE.
4 ARMENIA 8 MALAY STATES
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20 JAPAN 10 VENEZUELA
The six sets will be supplied for 1/3 if you ask for APPROVAL SHEETS.
FELIX SYKES, NEW BARNET.

LINDSEY'S LIBERAL LOT
100 **Different** including **Triangular Ecuador.** Offered **ABSOLUTELY FREE** to responsible applicants for my approvals.
Write and Reap. Mention "*M.M.*"
H. LINDSEY, 27a, The Square, G.P.O. Box 10, St. Annes-on-Sea, Lancs.

YOU MUST NOT MISS THE THRILLING SERIAL
"THE RADIO STAMP"
Now running in the "JUNIOR STAMP MAGAZINE." (The only stamp paper published for Juniors). It started in June. Tell your Newsagent you **must** have the back numbers. It only costs **2d.** a month (by post 2½d.)
HARRIS PUBLICATIONS LTD.,
46, Victoria Street, London, S.W.1.
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Please mention "Meccano Mag."

FREE PICTORIALS FREE
20 grand pictorials including Germany (aeroplanes), Jugo-Slav (chain breaker), Mozambique (pictorials), French Cols. and other good varieties. Just send a p.c. requesting approvals and this gift will be sent by return. Beginners' Album holds 2,000 stamps, 1/3 post free.
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Free ONE HUNDRED different stamps all from **ONE COUNTRY** to approval applicants enclosing postage. 22 Salvador (1906 issue and official cat. about 10/–) 1/6. 20 Bolivia, 10d.; 20 Nyassa, 1/3; 30 Cuba, 10d.; 100 French Cols., 1/–; 25 Venezuela, 6d.; 50 Chili, 1/3; 30 Paraguay, 1/3; Complete sheets of German stamps, 2/3 per dozen different sheets. All postage extra.
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Postage extra. Please ask for full list.

75 Belgium	1/3	15 Persia	6d.
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204 French Cols.	4/–	25 Siam	1/6
400 Germany	7/6	86 Switzerland	5/–
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Mention Meccano. 10% discount on 10/– or more.
E. HARROD, Woodcraft Lodge, Godshill, Fordingbridge (Hants.), via Salisbury.

1,000 *MINT* STAMPS 1/9!!!
1,000 well assorted **MINT** Stamps, everyone a perfect MINT specimen, for **1/9**, postage 3d.
25 Bavaria, **3d.**; 25 Finland, **5d.**; 30 Portugal, **4d.**; 50 Belgium, **6d.**; 25 Jugo-Slav, **9d.**; 30 Portugal Col., **4d.**; 50 Czecho-Sl., **6d.**; 20 Liechtenst., **2d.**; 100 Austria, **6d.**; 50 Danzig, **1/–**; 50 Poland, **8d.**; 50 Sweden, **7d.** Post Extra. FREE Mint Set with Approvals.
COLLINS, 12, Clevedon Street, Moston, Manchester.

50 SUPERIOR FOREIGN AND COLONIAL STAMPS. All different and many unused including the following valuable **Mint British Colonials;** Cayman Islands, Fiji, Kedah, Kelantan, Kenya and Uganda, Palestine, Seychelles, Sudan, Turks Islands and Caicos and Zanzibar, and used Canada, Malaya, India and a British postage stamp in use over **85 years ago.** Price 4d. This packet is offered at less than cost price and will only be supplied to bona-fide applicants for approval sheets. Clearance Prices. Large Discount.
TURNER, 162, EAST HILL, LONDON, S.W.18.

100,000 STAMPS FREE!
DETAILS of the above remarkable gift scheme together with 25 Fine Bavaria will be posted to every "*M.M.*" reader who writes asking to see our Inimitable Approvals enclosing stamp for part postage.

THE "MYSTIC" PACKET.
The Celebrated Exclusive Packet containing approx. 1,000 Unknown Stamps (British, Foreign & Colonial, Mint and Used), in bundles loose, on paper, etc., just as received from Agents abroad, Shippers, etc. Often purchasers of these real mystery packets find rare pieces—scarce overprints, high value Colonials, etc.—and one Stamp sometimes discovered is worth more than the cost of the whole packet. No two packets are alike, so send for one or more NOW and start a long dark wintry evening treasure-hunt of your own. Prices 1/3 each, 3 for 3/6. Abroad 3d. packet extra.
Mystery Gift with each Order.
ASTLEY & CO.,
(M.), 135, Raby Street, Wolverhampton

Crossing the Line—(*continued from page* 663)

On the other hand, if he was found fit, he was lathered with a horrible sticky white paste and shaved with a razor about 4ft. long. He was then pushed backward into the tank and immediately seized by the "duckers."

Most of the victims were comparatively quiet but one proved fractious and in fact rough. As a punishment for this the Executioner seized the bucket of paste and inverted it over him, so that the sticky mess covered his hair and face and a great quantity went down his back!

To end up in the proper manner, someone pushed King Neptune into his own tank. The water washed away the disguise and revealed the familiar features of—the boatswain!

L. JONES (Maxwelltown, N.Z.)

In 1779 she performed her last public act by signing the peace of Teschen and thus avoiding war with Prussia. A year later she died, to be succeeded by her eldest son, Joseph II.

Maria Theresa was portrayed on the two heller value of the series of stamps, while two of her sons, Joseph II. and Leopold II., who eventually succeeded his brother, were shown on the 3h. and 6h. values respectively.

The Reforms of Joseph II. and Leopold II.

Joseph II. had been taking an important part in the government of the state for some time before his mother's death in 1780, and when he became emperor he at once began to carry out many reforms that he thought would assist in making his empire greater and more important. He did not prepare the way for these reforms gradually as is always the wiser method, but instructed his government to carry them out all at once, with the result that both at home and abroad he became disliked and distrusted and was consequently what might be termed an unsuccessful monarch.

He died in 1790 and was succeeded by his brother, Leopold II., who unfortunately only reigned for two years. He had had considerable experience of ruling before he became emperor, since he had been Grand Duke of Tuscany for twenty-five years. He had made a great success of ruling this small state and had made it much more prosperous than he had found it and it is highly probable that he would have done something similar for his Austro-Hungarian domains had he lived long enough. As it was he was barely able to repair the damage done by the headstrong reforms of his elder brother.

The End of the Roman Empire

He was succeeded by his son, who as Francis II. was the last Roman emperor and as Francis I. was the first emperor of Austria. All the rulers of what was called Austria before 1914 and the neighbouring countries had been known hitherto as Roman emperors, but now that this title was becoming meaningless and since if it were retained it would pass out of the Hapsburg family, Francis took the wise course of abdicating from it and making himself the first emperor of Austria and Hungary.

He was a supremely cautious man, a great believer in his absolute power and throughout his reign he was gradually bringing more and more power into the hands of the emperor. While in his case it was perhaps the best thing that could have been done, considering the state of the country at the time of his accession, the unwisdom of it became apparent when Francis died in 1835, to be succeeded by his eldest son, Ferdinand I. He had suffered from fits during his childhood and had temporary periods of actual insanity during the whole of his manhood.

Obviously such a man was quite incapable of ruling the country himself and his father's foreign adviser, Prince Metternich, with others, carried on the state affairs. They were by no means successful, however, with the result that riots broke out in many parts of the country.

The Emperor Francis Joseph I.

Eventually Ferdinand was compelled to abdicate in favour of his nephew, Francis Joseph I., who was then aged eighteen and who reigned from 1848 until his death in 1916.

During the whole of his long reign, Francis Joseph took as active a part in the government of his country as had any of his predecessors, and although he was compelled to grant a constitution with a parliament to Hungary, yet he maintained his active part in the affairs of that country. In Austria he remained practically absolute monarch. He had a remarkable power of grasping complicated political situations and of knowing how to deal with them. He made several mistakes as do all men, but he left Austria in a much stronger position than he had found it.

There is not room here to describe all his multifarious activities during his reign of nearly seventy years but the part he took in the beginning of the Great War was fully described in the August issue of the *"M.M."* (see page 503) and this may serve to show the type of man he was. His portrait is illustrated on these pages by means of the 5h. and 30h. values of the 1908 series of stamps, but he also appeared on the 10, 25, 35, 50, 60 heller, 1 and 10 kronen values of the same series, these stamps showing him at various ages. Francis I. is shown on the 12h., and Ferdinand I. on the 20h. values of the same series.

Result of the September Stamp Contest

An extraordinary volume of entries demonstrated once more the great popularity of Stamp Competitions. It was proved further that readers of the *"M.M."* not only collect stamps but also study them. Out of the many hundreds of entries received only one competitor named correctly fewer than ten of the stamps.

More than sixty competitors succeeded in correctly naming the complete set and it was necessary to examine carefully the means by which the stamps were identified. The placing of the awards was not an easy task but eventually they were as given at foot of next column.

The Rhodesian Stamp Problem

Solution to Puzzle

The easiest way in which to distinguish the two stamps is by noticing the ends of the ribbon bearing the words "Justice—Commerce—Freedom" which go behind the hind legs of the supporters in the first type and which are curled so as not to do so in the second.

Other differences are: On the same ribbon, between "Justice" and "Commerce" and also between "Commerce" and "Freedom" shading lines run along the ribbon in the first, across the ribbon in the second type. A leaf projects above "Commerce" in the second type.

On the ribbons bearing the words "Incorporated—by—Royal Charter," the shading at the ends and at each side of "by" is closer in the second type.

Outside the value tablets there are in the first, dots of colour, in the second, radiating broken lines.

The second "a" of "Africa" is less concealed in the second by the ears of the supporter (which is a springbok).

The clover leaves below the motto are altered, the details of the crown are different, and the scroll-work round the margins of the stamps is considerably altered, especially below the upper value tablets.

The "ground" on which the lion is standing is different in the second type and the elephant's tusk in its front paw now touches the circular frame-line.

On the second type on the shield, the shading is closer generally; the two bulls are more distinct; the hulls of the three ships are darker; each ship has three masts and flags instead of only one each; the shading lines on the elephant are diagonal instead of vertical and the ear is different.

There are, of course, other smaller differences but these are the most obvious.

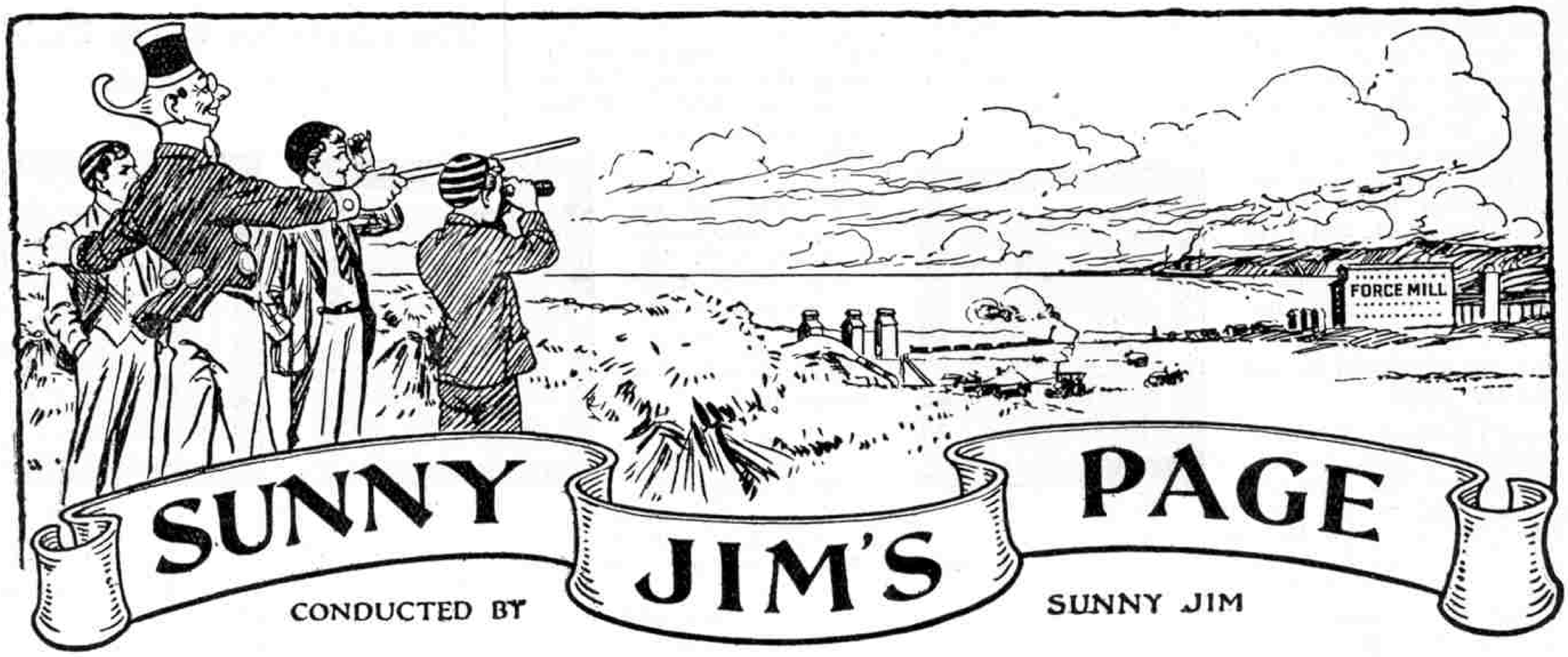
Incidentally it may be of interest to notice that there are two dies of the first type of these two stamps. The stamp we illustrate is Die II. and has the lion shaded all over. In Die I. it is only partly shaded and, in addition to other minor differences, there is a small dot of colour to the right of the tail of the right-hand supporter of the shield.

Stamp Contest Result—*(continued from previous col.)*

1. H. W. Welch (Limpsfield, Surrey).
2. S. Hoyle (Bradford).
3. R. V. Smith (Eltham, Kent).

The actual identities of the stamps are as follows, the order being that of the numbered illustrations:—

Prussia; Brazil; Spain; Abyssinia; Venezuela; Alsace and Lorraine or German Army of Occupation (1870-1); Austro-Hungarian Monarchy or Austria-Hungary or Austria; Turkey; Dantzig; Japan; Holland; Switzerland; Bosnia and Herzegovina; Austro-Hungarian Monarchy or Austria-Hungary or Austria; Russia; Ukraine; Batum. (In the cases of Nos. 6, 7 and 14, each of the alternatives given is equally correct). Nos. 4 and 17 proved the biggest sources of error: 4 being very popularly attributed to Persia and 17 to Russia. Nos. 6, and 13 to 16 also puzzled many competitors.



197, GREAT PORTLAND STREET, LONDON, W. 1.

NOW THEN YOU ENTHUSIASTS . . . . !

When you come across "something good," don't keep it to yourself. Pass it on. Your friends too, may be able to benefit from your discovery.

Just think how much we owe in our daily life to the "passing on" habit.

Jack has just read a jolly exciting yarn. Does he skulk away with the book under his arm, afraid that someone else may read it too? Not likely! Jack's a good fellow, and he's mighty keen on telling you all about it so that *you* can read it too.

Jim has just built a new Meccano model. "Come along you fellows and have a look at it," shouts Jim. And along you go, glad to have a chance to share in Jim's enthusiasm.

It is this "pass it on" spirit that helps to make the world go round. It brings us in touch with many things we otherwise would never have noticed.

You fellows know a whole lot more about Meccano than do those chaps who never see the Meccano Magazine. You are enjoying something they know nothing of. If any of them are friends of yours, you are only too keen to pass on to them the Meccano idea. You want to see them join in the fun.

You also are quite an authority on "Force," the food that brings health and strength to all who eat it; the most nourishing and best tasting food you ever knew. You know how health depends on the *kind* of food we eat. You know what sorts of food are good for you, and what kinds to avoid.

Just think of it! Thousands of fellows know nothing about these things at all! How many of your friends could tell you all *you* know about food values. How many know that a fellow can write to Sunny Jim whenever he likes and always be sure of getting an interesting letter in return?

You know these things. You are a "Force" enthusiast. A boy who has never tasted "Force" should be as much a curiosity to you as was the Kangaroo to the first explorer in Australia.

You can go off in the morning after a plate of crisp health-giving "Force" flakes and steaming hot milk, feeling fit for any old thing. Don't leave your chum to muddle along on unscientific foods while you have this big advantage over him. Get him enthusiastic too! Interest him in the extensive and important subject of health. Tell him how strong, manly frames depend on the right *kinds* of food. Show him the difference between "eating a lot," and *digesting* a lot. Food has to be both digestible *and* nourishing before it even can *start* to feed.

If he still wants a little encouragement, make him taste "Force." If necessary send me his name and address and I'll send to him, with your compliments, a free sample packet of "Force" and help to get him set on the road to better living.

Let's all make up our minds to *enjoy* life and get the most out of everything we do. This can only be accomplished if we have first the *will* to "do," and secondly the energy to carry this through. If we have the last mentioned necessity the first will develop naturally.

If you *know* you can do something the next step is to *want* to do it.

Boys! Get around spreading the good news about the finest food that ever was invented. Don't be selfish and keep the good things all to yourself.

See how many "Force" converts you can make, determined to live the healthy life. Every moment is precious. Let us live so that we have the energy and the will to make the most of each second.

Remember to write direct to me whenever you like. I'm always glad to hear from each and all of you. Let's know how you get along with this "pass on the good news" idea. See how many you can get to join the happy band of health-boosters.

Now! All together:—

VIGOR! VIM! PER-FECT TRIM!
"*FORCE*" MAKES US *FIT!*
LIKE SUN-NY JIM!

Yours for fitness,

Sunny Jim

Result of the "Picture" Competition

(Announced on September "Sunny Jim's Page")

Hundreds of keen Meccano enthusiasts applied themselves to the task of criticising the picture with 20 mistakes. Some were so keen that they "found" more than twenty! Strangely enough, although all the mistakes were found collectively, not one competitor found them all for himself. The first three prizes have been awarded in order of merit to the three whose lists most closely compared with my original list of errors that was handed to the artist. The faults as they appeared on my list were as follows:—

1. Summer scene—trees bare.
2. "Force" is WHEAT. Oats in foreground.
3. Sunny Jim holds an Australian flag.
4. Sunny Jim to wear black trousers.
5. No belt between engine and thresher.
6. Canadian cultivator instead of Reaping machine.
7. Saddled racehorses in cultivator.
8. Wheat to threshing machine in milk float.
9. Threshed wheat to train in a buggy.
10. Southern engine.
11. L.N.E.R. truck.
12. Train in motion while being loaded.
13. Rails end in the wheatfield.
14. Chimney stacks on the elevators.
15. No telegraph wires.
16. Shadows *towards* the sun.
17. Boy tearing waxpaper from "Force" packet.
18. Knife and fork on plate.
19. Word "Force" in wrong place on packet.
20. No traces to horses in cultivator.

THE WINNERS.

2/6 per week for 8 weeks will be sent to
E. A. M. WEDDERBURN,
Burns Cottage,
Moffat,
Dumfrieshire.

2/6 per week for 4 weeks will be sent to
ALBERT GODDARD,
54, New Moss Road,
Cadishead, Manchester.

5/- cash will be sent to
A. C. W. ALDIS,
Craig-y-Dow,
Dorridge, Birmingham

and consolation prizes will be sent to the many hundreds of others who made praiseworthy efforts.

HAVE YOU TASTED HOLFORCE YET?

These wonderful little "squares of nourishment" have all the concentrated food value of "Force" (with which they are made) plus the extra nourishment of eggs, butter, milk, sugar and flour.

Ask your grocer for the 6d. packet, or send me a 6d. p.o. and your grocer's name, and I'll send you a packet post free.

Sunny Jim,
197, Gt. Portland St.,
London, W.1.

Fireside Fun

TOO MANY!

" Mother, is it true that an apple a day keeps the doctor away ? "

" Yes, darling, why ? "

" Because, if it is, I kept about ten doctors away this morning—but I'm afraid one'll have to come soon."

* * * *

Teacher : " Now, Johnny, tell me the word having the opposite meaning to misery."

Johnny : " Happiness."

Teacher : " And gladness."

Johnny : " Sadness."

Teacher : " Correct, and now, the opposite to woe."

Johnny : " Gee-up."

* * * *

" Daddy, may I ask you a question in arithmetic ? "

" Yes, my boy, I am only too glad to find you so interested in your lessons."

" Well how many times what makes seven ? "

* * * *

A GOOD MODEL!

Two men chanced to be sitting opposite to one another in a tube train. Presently one of them produced a note book and proceeded to make a sketch of the other. After he had completed the drawing he shut up the book and returned it to his pocket.

The man opposite was both interested and gratified by his attention, and leaning forward he said, " You are an artist, I perceive, sir." " No," replied the other, " I am not exactly an artist. I am a designer of door knockers."

* * * *

Teacher : " What three words do you use most in school, Tommy ? "

Tommy : " I don't know."

Teacher : " That's right. Those are they."

This Month's Short Story

There was a young fellow named Paul,
Who went to a fancy dress ball ;
He thought he would risk it
And go as a biscuit,
But a dog ate him up in the hall.

* * * *

American newspaper reporter (interviewing professor famous for his criticisms of the press) : " And in what State were you born ? "

Professor : " Unless my memory fails me, in the state of ignorance."

Reporter (writing swiftly) : " And how long have you lived there ? "

* * * *

Mistress (to little girl) : " Now, if your father handed to your mother a pound note, two ten-shilling notes, and three half-crowns, what would be the result ? "

Little girl : " An inquest."

* * * *

A BARGAIN!

An Englishman visiting an Irish town boarded a jaunting car behind two sorry looking nags. At the end of the journey he tendered the driver a 10/– note. The driver looked at the note, and jumping from the box, exclaimed, " Sure, sorr, they're yours ! "

* * * *

A young officer, hearing someone celebrating the exploits of a prince who had killed six men with his own hand, became somewhat disgruntled.

" Bah ! " said he, " I would have you know that the very mattresses I sleep upon are stuffed with nothing else but the whiskers of those whom I have sent to slumber in the other world."

* * * *

HER LATE BROTHER!

Molly : " Daddy, what is the midnight sun ? "

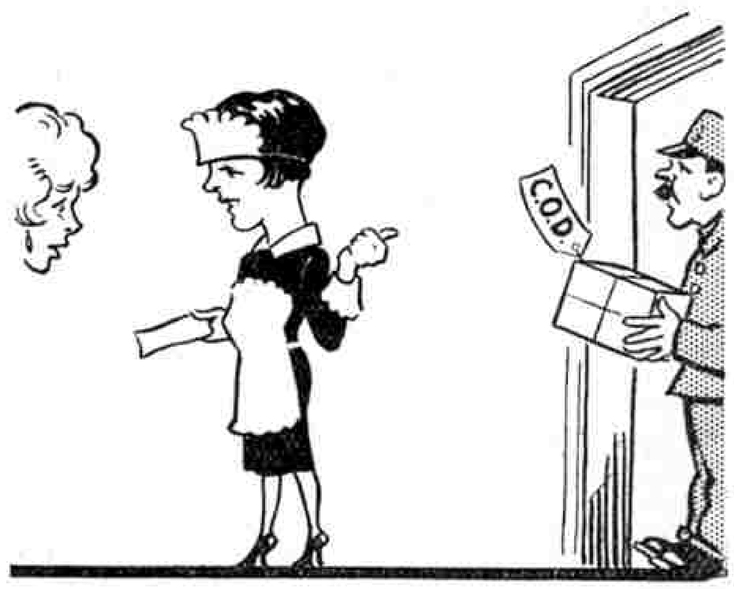
Daddy : " Better ask your brother, my dear. He's qualifying for the title."

* * * *

First Typist : " The idea of your working steady eight hours a day ! I would not think of such a thing ! "

Second Ditto : " Neither would I ; it was the boss who thought of it."

C.O.D.



" Ma'am, here's a man at the door with a parcel for you."

" What is it ? "

" It's a fish ma'am and it is marked C.O.D."

" Then make the man take it straight back to the dealer, I ordered trout."

* * * *

A travelling nigger troupe in Kentucky had had very bad luck, and, consequently, low wages. Everywhere they had had very small audiences, but on nearing Honeyville they heard that all the seats were booked. When they arrived at the station they left the train and crowded into a very old brake. As they were jolting along the road, the manager, who had been expounding the merits of the town and the excellent prospects, said : " Look, my bonny boys, even the sunset is better here than anywhere else ! "

" Sunset ! " said the old negro driver, " that ain't a sunset, boss ; that's de show you're going to, burning down ! "

* * * *

Minister : " Why is it that I never see you in church on Sundays, William ? "

William (a gamekeeper) : " Well, sir, I do not want to drive the congregation away."

Minister : " What do you mean ? "

William : " Well, sir, if I was in church, half the people would be out poaching ! "

* * * *

THE LAST STRAW!

With a jolt the car came to a sudden stop in the middle of the busy street. The self-starter refused to act, and the driver was forced to dismount and endeavour to crank up the engine with the aid of the handle.

For five minutes he twirled furiously, while a small crowd collected. At length a short-sighted old lady stepped forward and pressed a penny into the hand of the perspiring motorist.

" My good man," she said gently, " I wish all barrel organs were as silent as yours ! "

JAEGER

Pure Wool

The New "Meccano" Jersey

This Jaeger "Meccano" Jersey is made in the special "Meccano" pattern. It wears splendidly and prevents chill when a boy gets hot, as every boy will sooner or later. The "Meccano" Jersey appeals to every boy at once as well as to the "grown-ups" who study the health, happiness and appearance of children.

22″	24″	26″	28″	30″ Chest
7/–	7/9	8/6	9/3	10/–

Colours :—Navy body with Light and Dark Saxe dice effect.
Mid Grey body with Black and White ,,
Fawn body with Brown and Saxe ,,
Brown body with Fawn and Red ,,
Saxe body with Navy and Dark Saxe ,,
French Grey body with Lt. and Dk. Saxe ,,

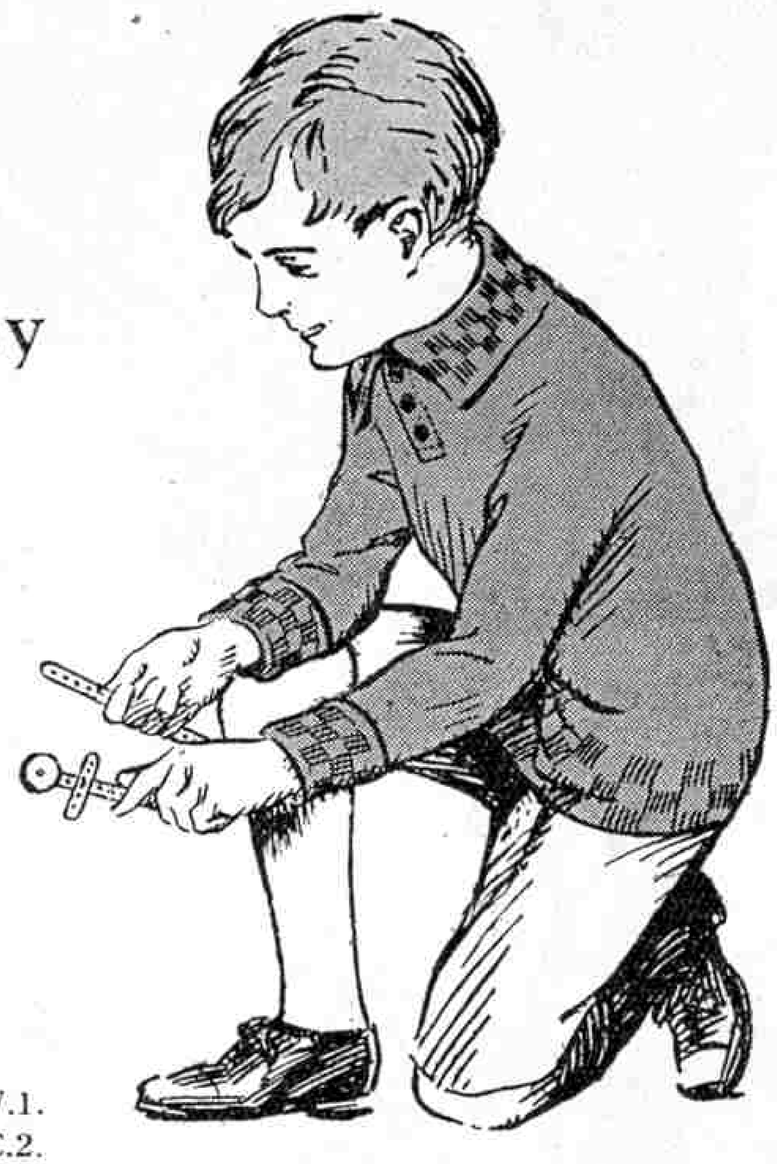
Three-quarter Hose, Turnover Tops to match

3, 4	5, 6, 7	8, 9, 10
2/9	3/3	3/9

Obtainable only from Jaeger Depots and Agents.
(*Write for the address of your Local Agent*).

JAEGER HEAD RETAIL DEPOT : 352/54, OXFORD ST., LONDON, W.1.
WHOLESALE & SHIPPING : 95, MILTON ST., LONDON, E.C.2.

BRANCHES : AUSTRALIA—Melbourne, 325, Flinders Lane. Sydney, 38/44, York Street.
CANADA—Montreal, 1187, Bleury Street.



The New "Meccano" Jersey

THE MECCANO BOY'S STAND-BY
THE TUBE OF

SECCOTINE

The World's Great Adhesive. Registered Trade Mark.

WITH it he can mend a thousand things—his bats, balls, boats, boxes, bags, books, &c. He can make numberless things that a boy likes. He can help his mother by mending breakages in house furniture, anything—everything.

NOTE. There is nothing messy about Seccotine. Use the spike or pin supplied to open a new tube—at top of cone—press gently at end of tube (at folded part) for as much adhesive as is needed—then replace spike or pin which acts as stopper. Keep folding tube end as contents are withdrawn. Give mended article adequate time for drying.

TUBES are 4½d. (vest pocket box), 6d. and 9d. each. Sold everywhere.

Mothers should know that cups, saucers, tumblers, etc. intended to hold liquids, hot or cold—should be mended with FIRMAS (Heat Seccotine). Tubes 6d. each.

McCAW, STEVENSON & ORR LTD.

The Linenhall Works BELFAST

BRITISH MADE

LOTT'S BRICKS

ARTIFICIAL STONE

FOR YOUR MODEL RAILWAY OR FARM

Lott's Bricks add a new interest to Model Railways of any size, with them you can construct Bridges, Stations, Houses, Towers—in fact a complete Village.

You can also plan and build Factories, Workshops, or Engine Sheds to house your working models.

PAIR OF HOUSES
Box 3 Tudor Blocks
Price 21/–

LOTT'S BRICKS.
In Boxes Complete.

6 Models	...	2/–
12 ,,	...	3/3
30 ,,	...	5/–
48 ,,	...	10/–
72 ,,	...	17/6
100 ,,	...	42/–

Every Set is self-contained with Plans, Bricks, Roofs, etc.

KINDERGARTEN.

Box 1 ... 18 Designs 2/–
,, 2 ... ,, 5/–

SOME PROVINCIAL STOCKISTS

ABERDEEN	E. A. McMillan Ltd.
BOURNEMOUTH	J. E. Beale Ltd.
BIRMINGHAM	Lewis's Ltd.
,,	W. H. Hull & Son.
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BRADFORD	Brown, Muff & Co. Ltd.
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BATH	J. S. Common & Sons.
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COLCHESTER	Sands & Co.
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DARLINGTON	A. Lascelles.
EDINBURGH	Jenners Ltd.
,,	Thornton & Co. Ltd.
,,	Robert Maule & Son Ltd.
EASTBOURNE	Carters Stores.
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GLOUCESTER	J. R. Pope & Sons.
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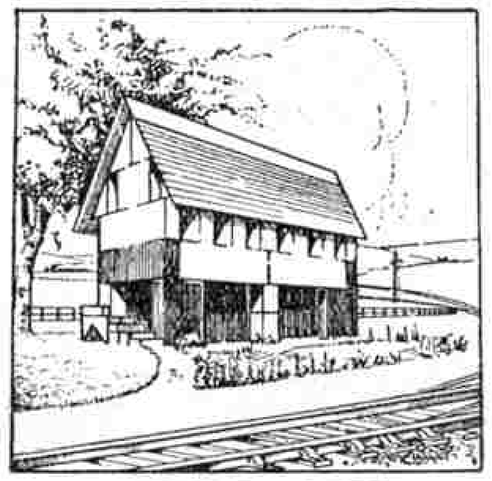


SIGNAL CABIN
From Box OA

TUDOR BLOCKS.
In Boxes Complete.

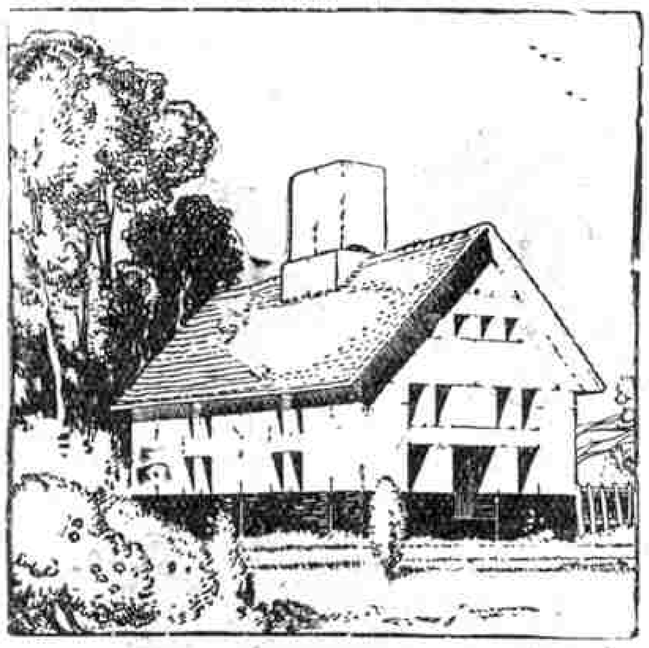
Box 1	12 Models		3/6
,, 2	18 ,,		7/6

The Sets below also contain Thatched Roofs.

Box 3	24 Models	21/–
,, 3A	(Supplem't)	25/–
,, 4	30 Models	42/–

GARDEN SETS.

Box 1 ... 4/– and 6/–
Containing Trees, Shrubs, White Paling Fences, Roofs and Golden Sand.



A Model from Box 2
Price 10/–

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CAMDEN TOWN	Bowman Bros.
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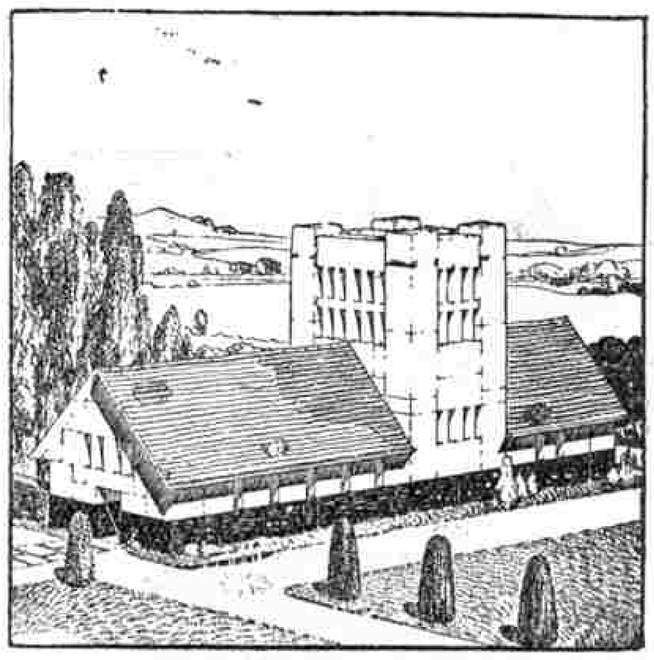
WRITE FOR ILLUSTRATED LIST AND ADDRESS OF YOUR NEAREST AGENT



A Model from Box 3
Price 17/6

LOTT'S BRICKS LTD., WATFORD, England

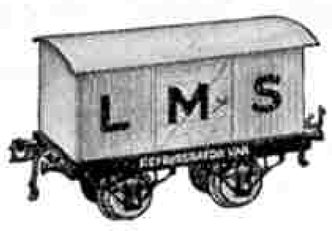
ROLLING STOCK AND ACCESSORIES

(HORNBY SERIES)

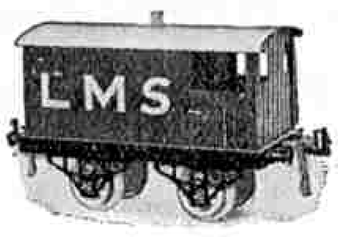
There are now 50 different train accessories—Stations, Signal-boxes, Lamps, Wagons, Level-Crossings, Foot-Bridges, Turntables, etc. Further accessories will be added to the system from time to time, and will be announced in the pages of the "*M.M.*"

All Hornby Rolling Stock and Accessories are built in correct proportion to the size, gauge, method of coupling, etc., of the Hornby Trains and all have the uniformly beautiful finish that is the great feature of these trains. With these accessories you can build up a most realistic railway system, and the splendid range of rails, points, and crossings make possible endless variety in rail layout. Ask your dealer to show you specimens of the new products that have recently been introduced.

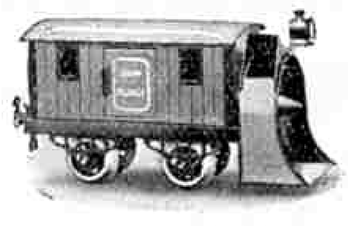
BRAKE VAN
Finished in grey, with opening doors. Price **4/-**



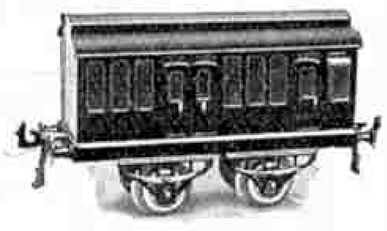
***REFRIGERATOR VAN**
Enamelled in white, with opening doors. Price **4/-**



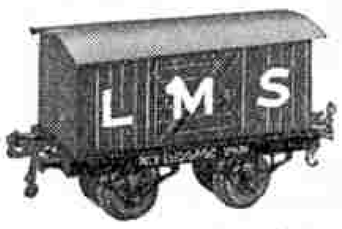
BRAKE VAN
Finished in grey, with opening doors. Price **4/-**



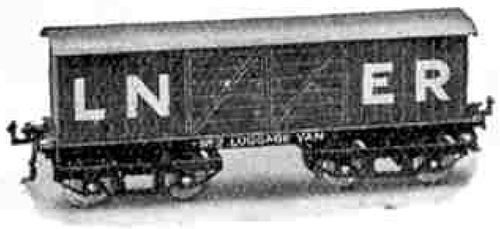
***SNOW PLOUGH**
With revolving plough driven from front axle. Price **5/6**



***GUARD'S VAN**
Realistic design, fitted each side with opening doors. Price **3/6**

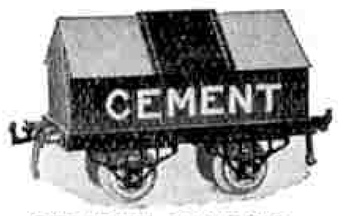


***No. 1 LUGGAGE VAN**
With opening doors. Price **4/-**

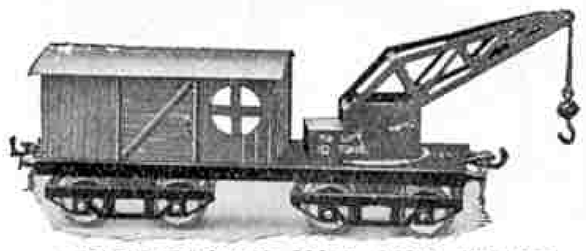


***No. 2 LUGGAGE VAN**
Finished in blue and green. Fitted with double doors. Suitable for 2-ft. radius rails only ... Price **6/6**

***MILK TRAFFIC VAN**
Fitted with sliding door, complete with milk cans. Price **4/6**

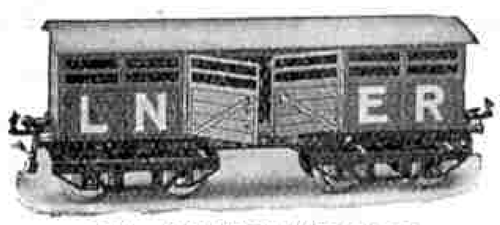


CEMENT WAGON
Finished in grey and black. Price **4/-**

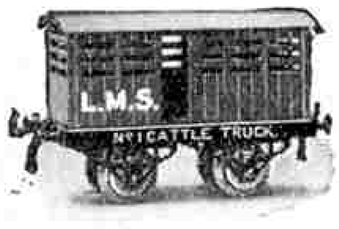


***BREAKDOWN VAN AND CRANE**
Beautifully coloured in grey and black, with opening doors. Suitable for 2-ft. radius rails only ... ... Price **7/-**

SECCOTINE WAGON
Beautifully finished in blue, with opening doors. Price **4/-**



***No. 2 CATTLE TRUCK**
Splendid model fitted with double doors. Suitable for 2-ft. radius rails only ... ... Price **6/6**

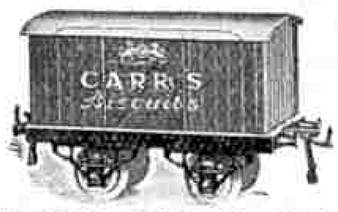


***No. 1 CATTLE TRUCK**
Fitted with sliding door. Very realistic design. Price **4/-**

SIDE TIPPING WAGON
Excellent design and finish. Price **3/6**

ROTARY TIPPING WAGON
Finished in grey and green. Price **4/-**

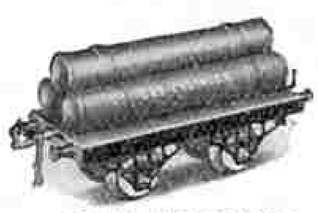
CRAWFORD'S BISCUIT-VAN
Finished in red, with opening doors ... Price **4/-**



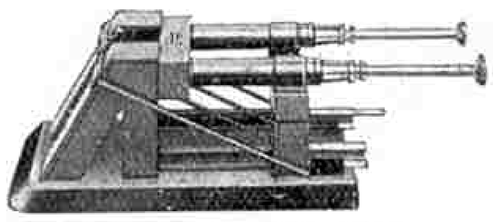
CARR'S BISCUIT VAN
Finished in dark blue, with opening doors. Price **4/-**

JACOB'S BISCUIT VAN
Finished in crimson lake, with opening doors. Price **4/-**

***GUNPOWDER VAN**
Finished in red, with opening doors. Price **4/-**

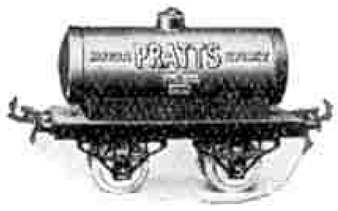


***GAS CYLINDER WAGON**
Finished in red, lettered gold. Price **3/-**



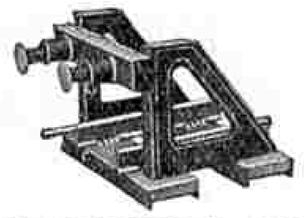
HYDRAULIC BUFFER STOP
Price **5/-**

PETROL TANK WAGON "SHELL"
Finished in red. Price **3/-**

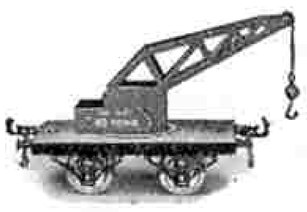


PETROL TANK WAGON "PRATTS"
Finished in green. Price **3/-**

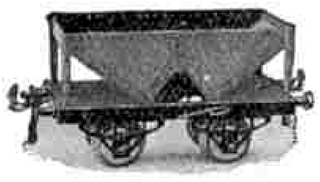
MOTOR SPIRIT TANK WAGON "NATIONAL BENZOLE"
Price **3/-**



SPRING BUFFER STOP
Price **1/6**



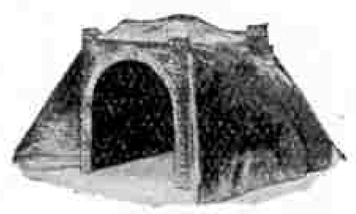
***CRANE TRUCK**
Finished in grey and black ... Price **4/6**



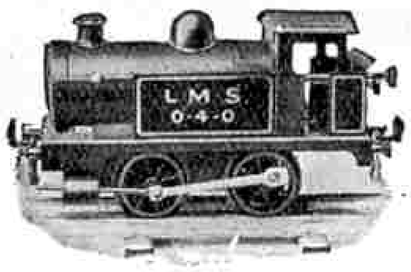
***HOPPER WAGON**
Mechanically unloaded. Finished in grey and black ... Price **4/-**

***TROLLEY WAGON**
Finished in grey and red. Suitable for 2 ft. radius rails only ... Price **6/-**

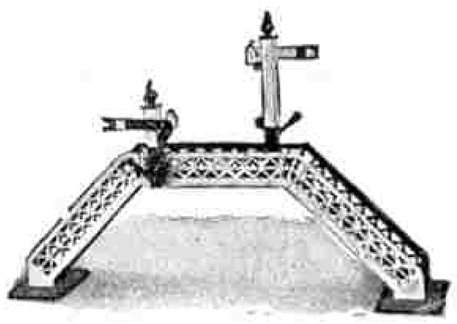
TURNTABLE
Price **5/-**



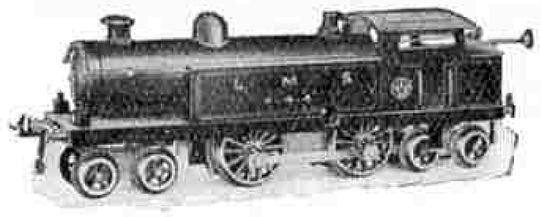
TUNNEL
Realistic and finished in colours ... Price **7/6**



HORNBY No. 1 TANK LOCO
Gauge 0, in colours to represent L.M.S., G.W. or L.N.E.R. Companies' locos. Price **12/6**



FOOTBRIDGE
No. 1. With detachable Signals Price **6/-**
No. 2. Without Signals ... „ **3/6**
Signals only ... ... per pair **2/9**



HORNBY No. 2 TANK LOCO
Beautifully finished in colours to represent L.M.S., G.W. or L.N.E.R. Companies' locos. Fitted with reversing gear and brake mechanism ... ... Price **30/-**

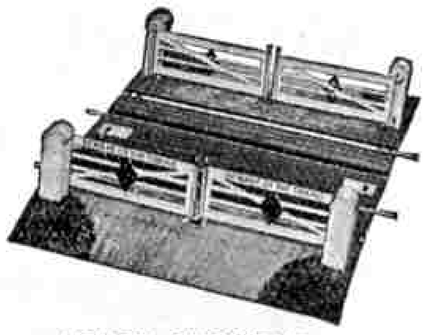
**Lettered L.M.S., G.W. or L.N.E.R.*

ROLLING STOCK AND ACCESSORIES

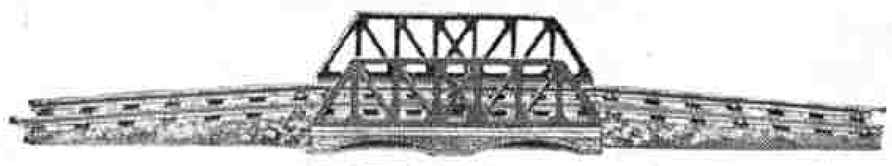
(HORNBY SERIES—*continued*)

SIGNAL CABIN
Dimensions: Height 6½-in., Width 3½-in., Length 6½-in. Finished in colour and lettered "Windsor." Roof and back open to allow signal-levers to be fitted inside cabin if desired.
Price **6/6**

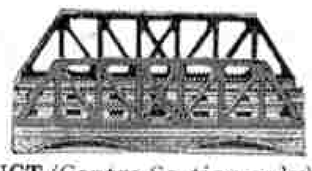
RAILWAY STATION. Excellent model, beautifully designed and finished. Dimensions: Length 2-ft. 9-in., breadth 6-in., height 7-in. Price **12/6**



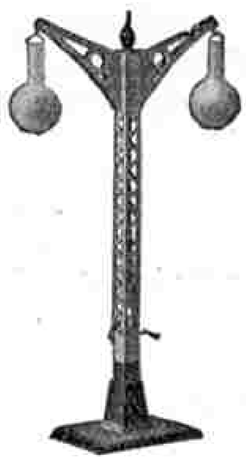
LEVEL CROSSING
Beautifully designed in colour. Measures 11⅛ × 7¼-in. with Gauge 0 rails in position.
Price **6/6**



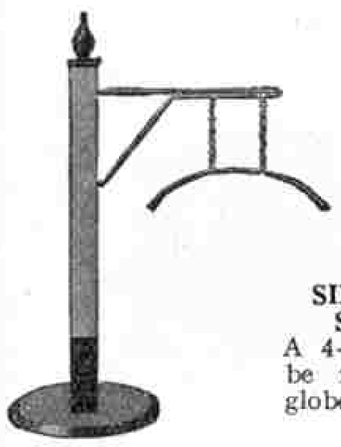
VIADUCT. Price **7/6**
ELECTRICAL VIADUCT. Price **8/-**



VIADUCT (Centre Section only) Price **4/6**
ELECTRICAL VIADUCT (Centre Section only) Price **5/-**

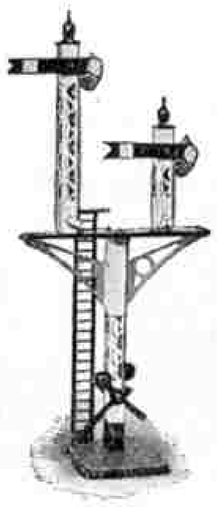


DOUBLE LAMP STANDARD
Four-volt bulbs may be fitted into the globes.
Price **4/-**

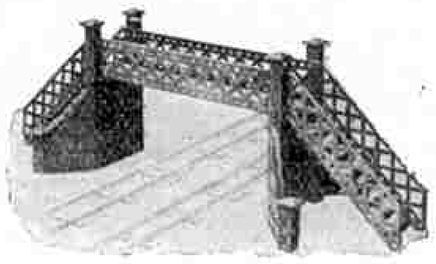


LOADING GAUGE
Price **1/9**

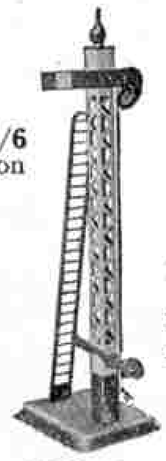
SINGLE LAMP STANDARD
A 4-volt bulb may be fitted into the globe. Price **3/-**



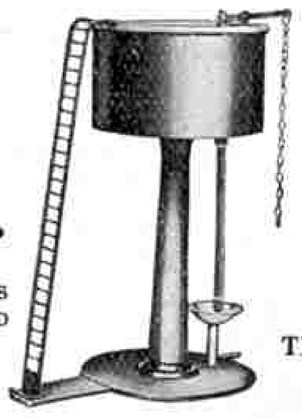
JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14-in. in height.
Price **5/6**



LATTICE GIRDER BRIDGE
Constructional type. Strong and well proportioned.
Price **10/6**

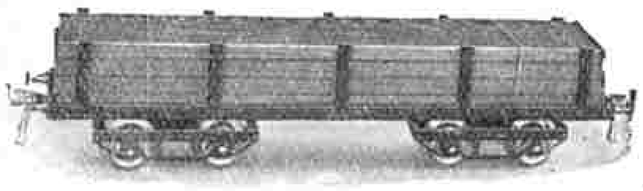


SIGNAL
Price **2/6**

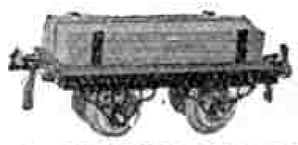


WATER TANK
Brightly coloured in red, yellow and black, 8½-in. in height, with flexible tube and pump lever.
Price **6/6**

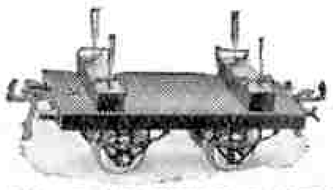
TELEGRAPH POLE
Price **2/6**



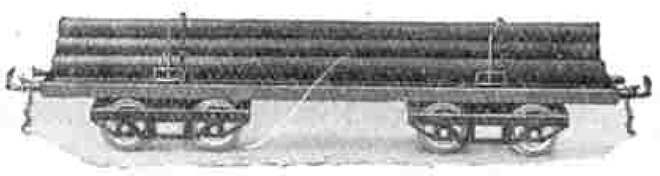
***No. 2 TIMBER WAGON**
Beautifully enamelled in green. Suitable for 2-ft. radius rails only ... ... Price **4/6**



No. 1 TIMBER WAGON
Beautifully enamelled in green.
Price **2/-**



***No. 1 LUMBER WAGON**
Fitted with bolsters and stanchions for log transport.
Price **2/-**



***No. 2 LUMBER WAGON**
Fitted with bolsters and stanchions for log transport. Suitable for 2-ft. radius rails only.
Price **5/-**

PLATFORM ACCESSORIES
No. 1. Miniature Luggage.
Price per set **1/6**

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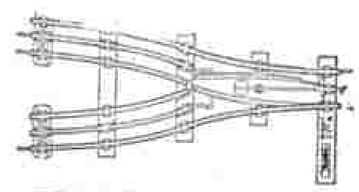
No. 3. Platform Machines, etc.
Price per set **1/6**

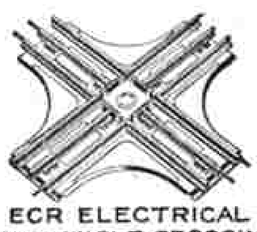
PLATFORM ACCESSORIES
No. 2. Milk Cans and Truck.
Price per set **1/6**

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

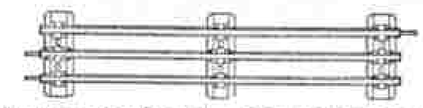
RAILS, POINTS AND CROSSINGS



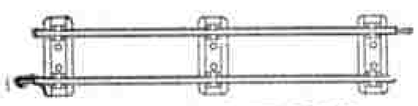
EPPR2 ELECTRICAL PARALLEL POINTS (RIGHT-HAND)



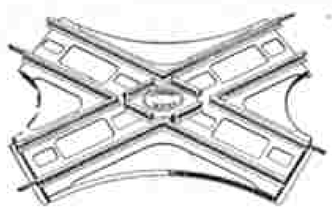
ECR ELECTRICAL RIGHT-ANGLE CROSSING



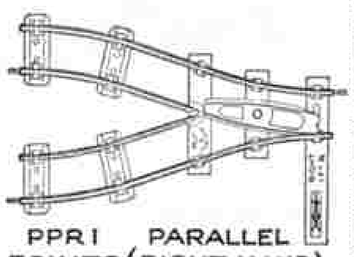
EB1 ELECTRICAL STRAIGHT RAIL



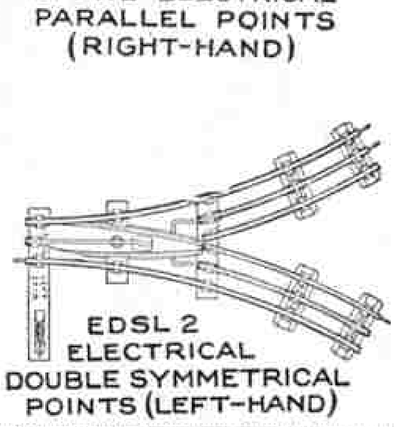
B1 STRAIGHT RAIL



CA1 ACUTE-ANGLE CROSSING

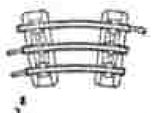


PPR1 PARALLEL POINTS (RIGHT-HAND)

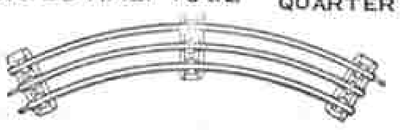


EDSL 2 ELECTRICAL DOUBLE SYMMETRICAL POINTS (LEFT-HAND)

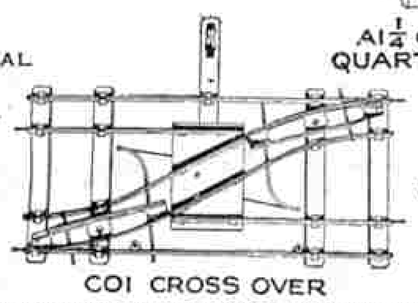
EA1½ ELECTRICAL CURVED HALF RAIL



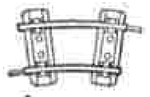
EA1¼ ELECTRICAL CURVED QUARTER RAIL



EA1 ELECTRICAL CURVED RAIL

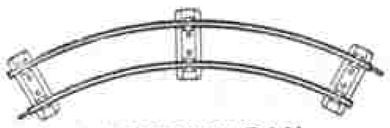


C01 CROSS OVER

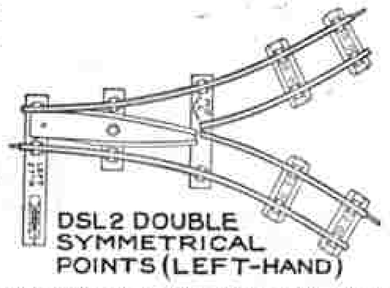


A1¼ CURVED QUARTER RAIL

A1½ CURVED HALF RAIL



A1 CURVED RAIL



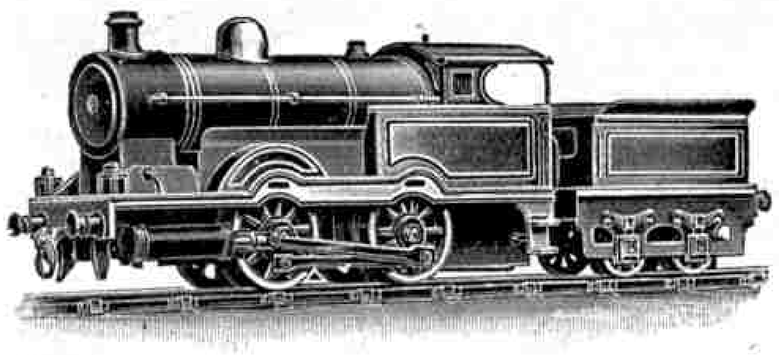
DSL2 DOUBLE SYMMETRICAL POINTS (LEFT-HAND)

Hornby Rails, Points and Crossings are built for hard wear and for smooth running. They are made of the finest materials and hold together rigidly and strongly, for real workmanship is put into them. All Hornby Rails, Points and Crossings are Gauge 0, 1¼", and the Electric rails are fitted with a third rail for collecting shoe.

ASK YOUR DEALER TO SHOW YOU SAMPLES

YOUR CHOICE OF THE
WORLD'S FINEST RAILWAY MODELS

BASSETT-LOWKE SCALE MODELS have set the fashion for the past 25 years, and the new models introduced this season surpass everything previously made in realism and mechanical perfection.



MODEL 0-4-0 GENERAL PURPOSES LOCOMOTIVE

A reliable "ALL-BRITISH" steam locomotive that will take sharp curves.

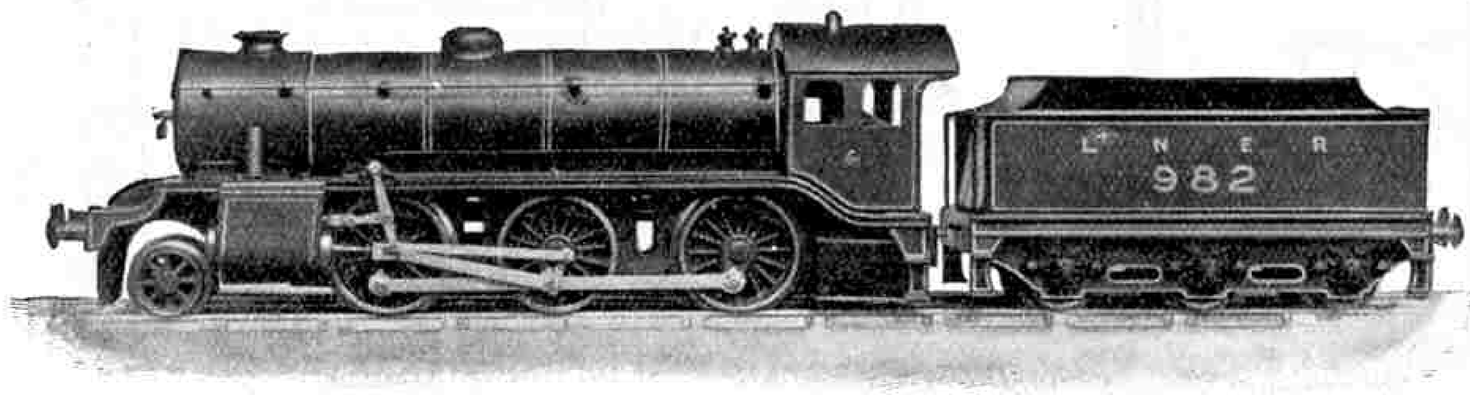
Steel Frames; Brass Boiler; Piston valve cylinders; full automatic lubrication; turned Cast Iron wheels; vaporising spirit lamp. A good all-round model, easy to handle and work, a good steamer, maximum hauling capacity. Can be supplied in L.M.S., G.W.R., old L.N.W.R. and old C.R. colours.
No. 6460, Gauge 0, Price **42/-**

THIS IS THE LOCOMOTIVE

which was running continuously throughout the eight days of The "Model Engineer" Exhibition.

THE TRIUMPH OF THE SHOW!

If you were not fortunate enough to see this loco running at the Exhibition, call at one of our Branches—addresses below—and make a careful inspection; we will welcome it!



MODEL L.N.E.R. "MOGUL" 2-6-0 TYPE LOCOMOTIVE.

In Clockwork, Steam, and Electric for Gauge 0; Electric and Steam for Gauge 1.

The steam models were pulling a train for a non-stop run of over 20 minutes, and covering a distance of over half-a-mile.

We are now supplying the 2-6-0 "Mogul" type locomotive in the design and colours of the four Companies, viz.:—L.M.S., L.N.E.R., G.W.R. and Southern, in either electric, clockwork or steam. .. .. .. Standard Price **£5 5 0**
Also in Gauge 1 in L.M.S. and L.N.E.R. patterns and colours and in electric or steam .. .. Standard Price **£12 12 0**

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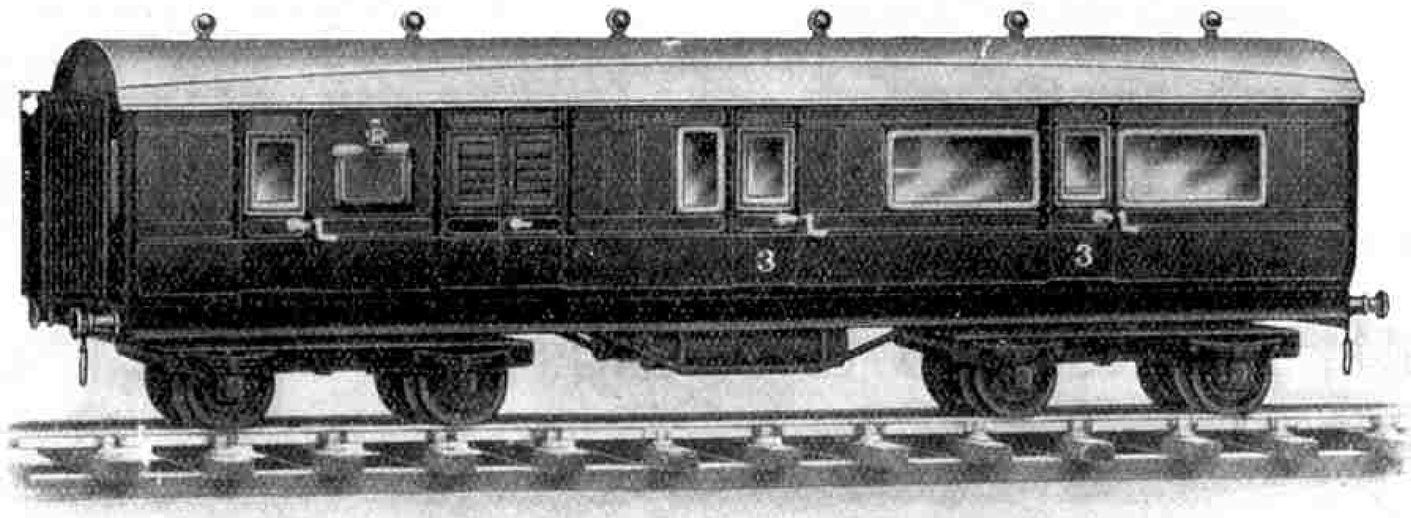

First-class corridor and brake third vehicles in the colours and style of the four Railway groups, viz.:—L.N.E.R., L.M.S., G.W.R. and Southern.
These coaches are standard vehicles and are fitted with two four-wheel bogies with solid wheels: corridor connections and doors to open, in Gauge 1.

Gauge 0. 13 ins. long, Price from **11/6** each
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Full Particulars, see List A/17

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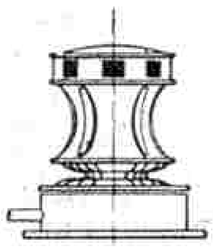

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Works and Head Office:

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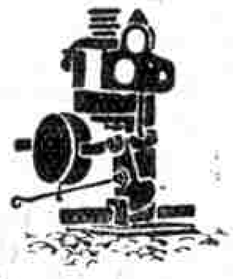
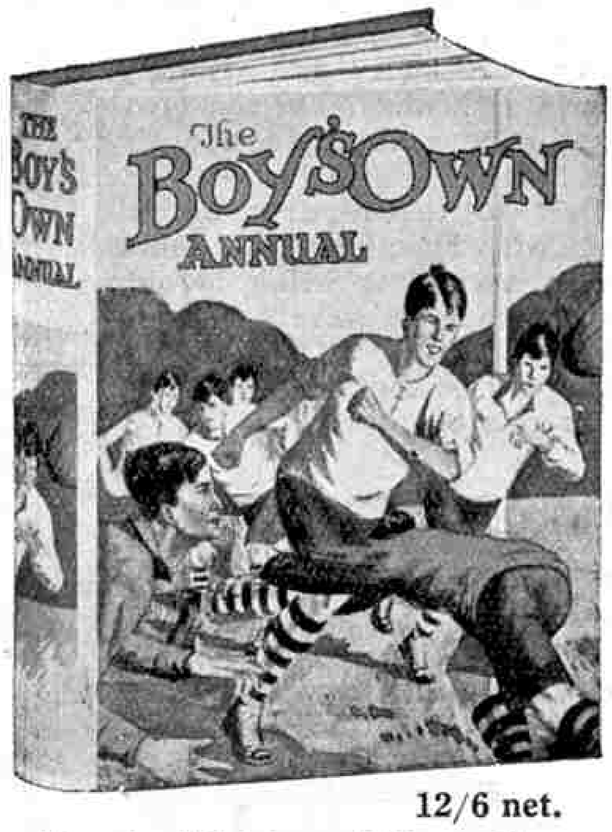


London Branch: 112, High Holborn, W.C. 1. **Edinburgh Branch: 1, Frederick Street**

Best Books for Boys



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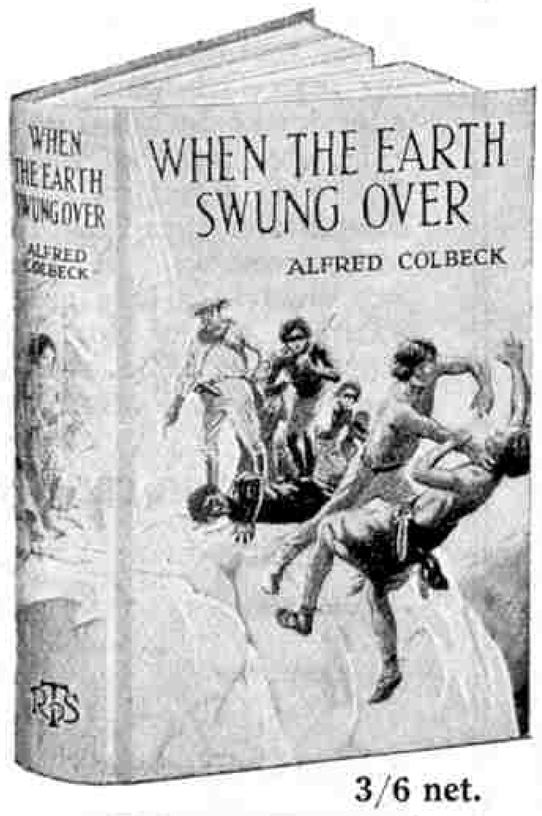
There is nothing to equal this magnificent volume. It has over 700 large, well-packed pages of reading and pictures and many coloured plates—more than enough to last any boy the whole year through.



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A most exciting adventure story, containing a shipwreck ; capture by savages ; marvellous escape ; rescue ; and many other thrills.

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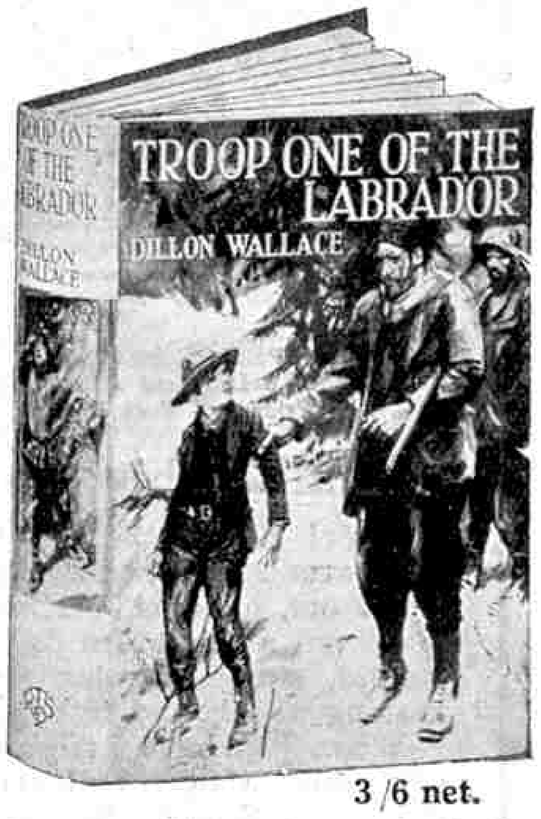
This enthralling story of how Jerry pulled himself together will delight all boys—and their sisters !



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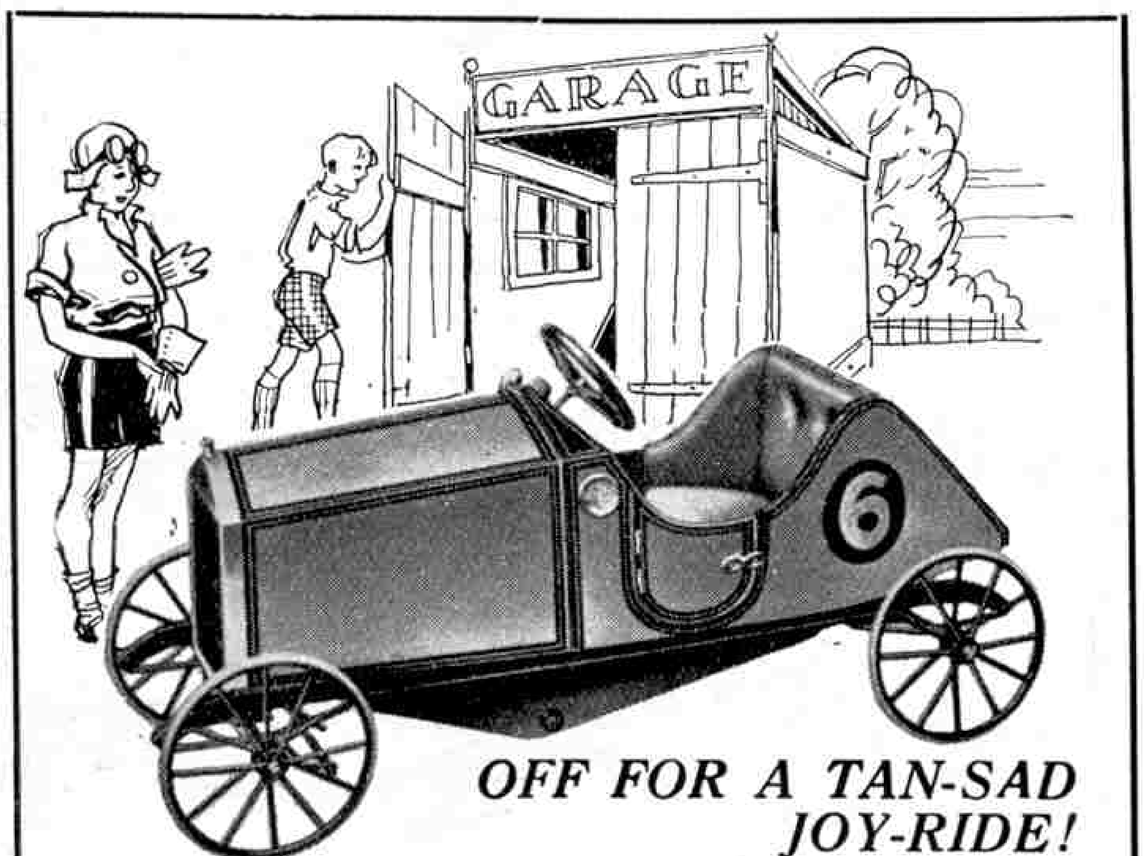

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This is one of the new 1926 TAN-SAD Wheel Toys. For real fun—every day—there is nothing like a Tan-Sad motor. Look at the 'Sports Model' illustrated above. It is fitted with speedometer and clock on the dashboard, license holder, mirror and horn. The near side door opens whilst the door panels and bonnet are attractively beaded. Transmission is by double crank pedal movement. Colours :—orange, red and black lined gold with grey radiator - - - Price 65/-

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7 days FREE TRIAL carriage paid and all risk in transit taken by Riley's.

You can see and test a RILEY BILLIARD TABLE before you buy

Riley's "Home" Billiard Table shown resting on ordinary dining table.

14/- DOWN

Riley's have made the purchasing terms for their "HOME" BILLIARD TABLE so easy that everybody can have their own *real* billiard table and test it before buying.

A postal order for 14/- sent to-night will bring the popular 6 ft. size Riley "Home" Billiard Table (complete and ready for play) to rest securely on your own dining table. The balance of the purchase price you pay in easy monthly instalments while you use the table. Here are the various sizes of "Home" Billiard Tables together with cash and easy-to-pay prices.

4′ 4″ × 2′ 4″	...	£7 0 0	*or in*	8/6
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6′ 4″ × 3′ 4″	...	£11 15 0	*monthly*	14/-
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Riley's Combine Billiard and Dining Tables (Oak or Mahogany in various designs). These are beautiful dining tables and perfectly true billiard tables. Fitted with patent raising and lowering action, supplied with highly polished top and all accessories needed for the game. Prices for the Mahogany Round Leg design are :—

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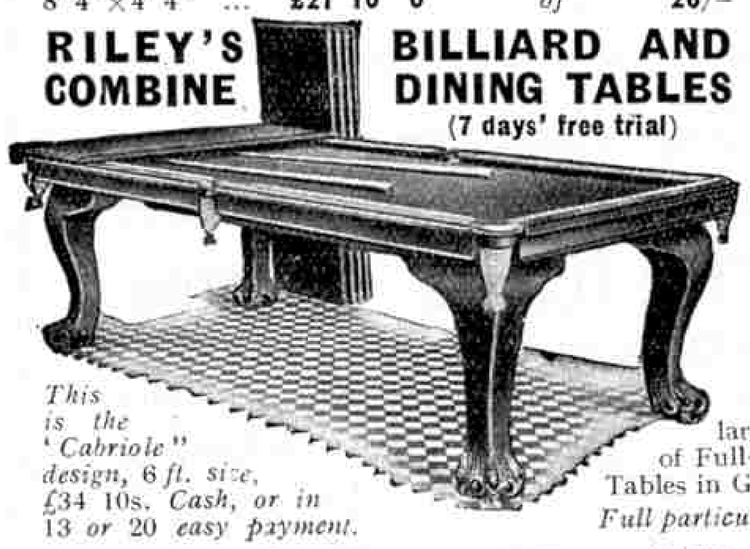
7′ 4″ × 3′ 10″	£33 0 0
8′ 4″ × 4′ 4″	£43 0 0

or in 13 or 20 monthly payments.

RILEY'S COMBINE BILLIARD AND DINING TABLES

(7 days' free trial)



This is the 'Cabriole" design, 6 ft. size, £34 10s. Cash, or in 13 or 20 easy payment.

Riley's are also the largest makers of Full-Size Billiard Tables in Great Britain. *Full particulars sent free.*

Write to-night for COLOURED PRICE LIST

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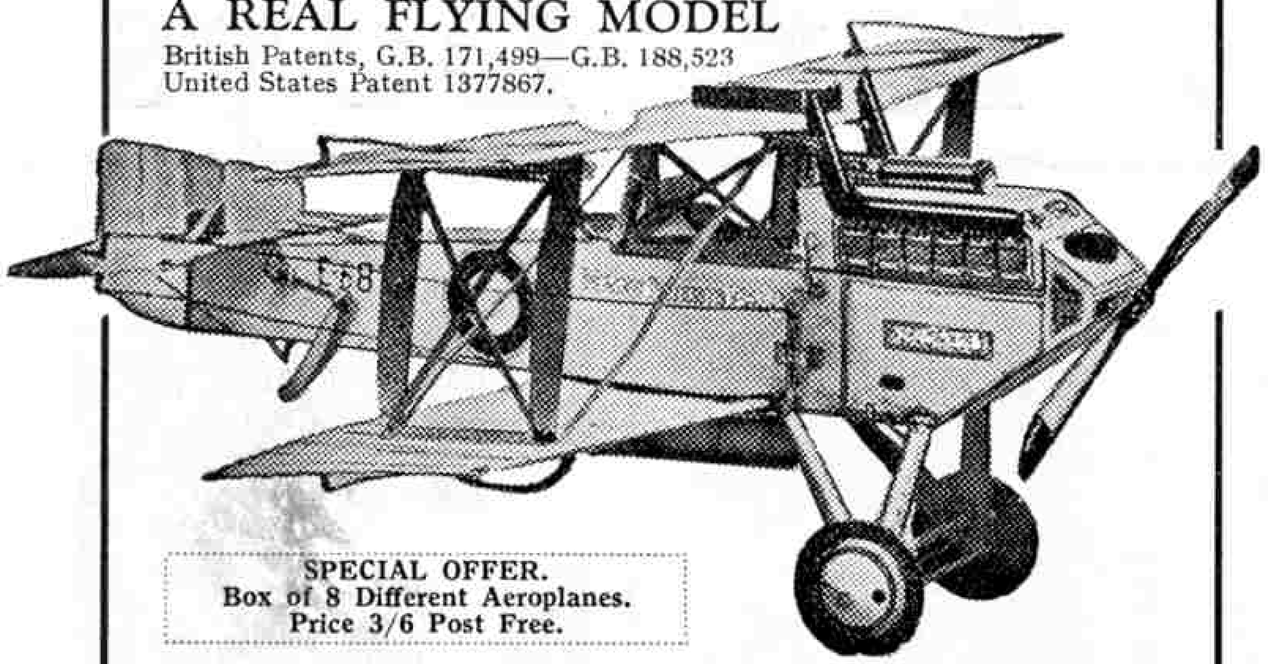
A REAL FLYING MODEL

British Patents, G.B. 171,499—G.B. 188,523
United States Patent 1377867.



SPECIAL OFFER.
Box of 8 Different Aeroplanes.
Price 3/6 Post Free.

Build This Fine Model Aeroplane

Boys ! Here is the very thing for you. This model has all the parts and controls that you'll find on the big planes. Elevators, ailerons, machine-guns, pitot tubes, windscreens and even a miniature dashboard with dummy instruments, gauges, etc. Real elastic shock absorbers are fitted to the landing wheels and tail skid.

When you have built up the model you can make it do everything that a real plane can do.

Size of Model 12″, Span 13″ Long.

Complete Set of Cardboard Parts printed in colours, together with all necessary Elastic, Wood, Wire and Book of Instructions.

PRICE 1/- (Post 4d. extra)

Catalogue of other Models. Price 2d., post free.

Send P.O. off to-night to

WILLIAM E. APPLEBY (N/C) & CO.

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Glasgow Meccano Boys

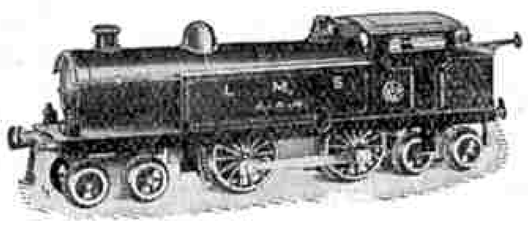
You can get ALL your requirements in MECCANO or HORNBY TRAINS or ACCESSORIES from

C. BELL

THE CHILDREN'S HOUSE,

320, BYRES ROAD, GLASGOW, W. 2.

HORNBY No. 2 TANK LOCO



THIS SPLENDID MODEL SENT CARRIAGE FREE TO ANY ADDRESS IN GREAT BRITAIN BY FILLING IN COUPON BELOW.

The Children's House

320, BYRES ROAD, GLASGOW, W. 2.

Please send me CARRIAGE FREE one HORNBY TANK LOCO No. 2.....(state which railway colour desired) for which I enclose the sum of 30/-.

Name .....

Address .....

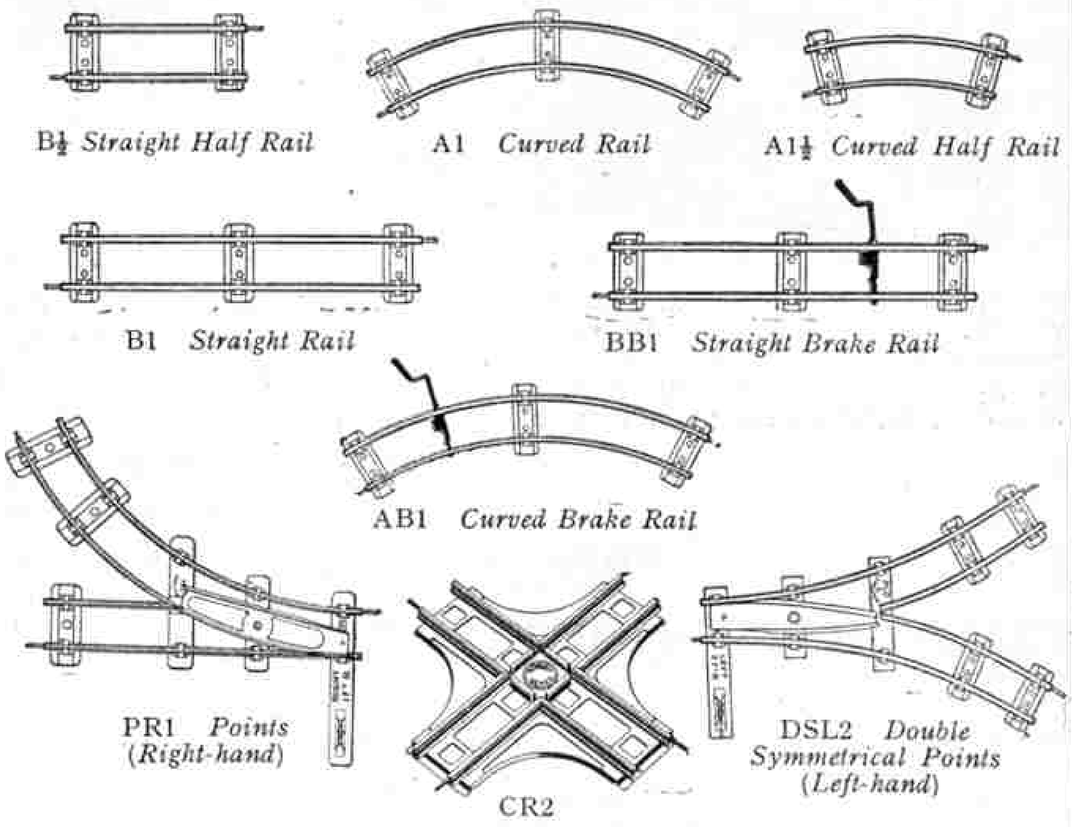
Rails, Points and Crossings

Gauge 0, 1¼″. **Hornby Series.** **Alternate Pegs.**

Hornby Rails, Points and Crossings are built for hard wear and for smooth running. They are made of the finest materials and hold together rigidly and strongly, for real workmanship is put into them. Note the great superiority both in quality and appearance of the Hornby rails, etc., a few of which are illustrated below.

There is practically no limit to the number of rail formations that may be built with Hornby Rails, Points and Crossings. A number of very interesting layouts are illustrated in a new booklet that we have published, entitled "The Hornby Train System." The price of this booklet is 3d. and a copy will be sent you, post free, on receipt of a remittance for this amount.

RAILS FOR CLOCKWORK AND STEAM TRAINS



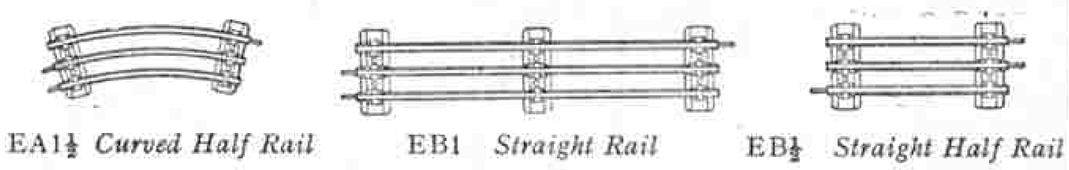
B½ *Straight Half Rail* — A1 *Curved Rail* — A1½ *Curved Half Rail*

B1 *Straight Rail* — BB1 *Straight Brake Rail*

AB1 *Curved Brake Rail*

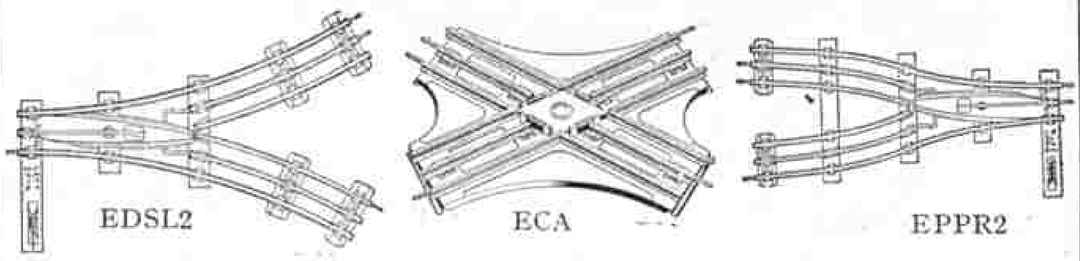
PR1 *Points (Right-hand)* — CR2 — DSL2 *Double Symmetrical Points (Left-hand)*

RAILS FOR ELECTRIC TRAINS



EA1½ *Curved Half Rail* — EB1 *Straight Rail* — EB½ *Straight Half Rail*

EA1 *Curved Rail* — ECR — EPL2



EDSL2 — ECA — EPPR2

PRICES OF RAILS, POINTS AND CROSSINGS ILLUSTRATED ABOVE.

A1	Curved rail ...	doz.	4/6	EA1½	Curved half rail	doz.	5/-
A1½	Curved half rail	,,	3/6	EB1	Straight rail ...	,,	7/-
AB1	Curved brake rail	each	6d.	EB½	Straight half rail	,,	4/6
B1	Straight rail ...	doz.	4/-	EPPR2	Parallel points (right hand) ...	each	6/-
B½	Straight half rail	,,	3/-	EPL2	Points (left hand)	,,	5/-
BB1	Straight brake rail	each	5d.	EDSL2	Double symmetrical points (left hand)	each	6/-
PR1	Points (right hand)	,,	2/3	ECR	Right angle crossing	each	4/-
DSL2	Double symmetrical points (left hand)	each	2/6	ECA	Acute angle ...	,,	4/-
CR2	Right angle crossing	each	1/9				
EA1	Curved rail ...	doz.	8/-				

Manufactured by :

Meccano Ltd., Binns Rd., Liverpool

Remember! Remember! The Fifth of November!

AND DON'T FORGET

BROCK'S FIREWORKS

The goods that have stood the test of public opinion for over

TWO HUNDRED YEARS

AND ARE STILL THE WORLD'S BEST

MADE ONLY BY

C. T. BROCK & CO.'S "Crystal Palace" Fireworks Ltd., SUTTON, SURREY

The Largest and Oldest Firm of Firework Makers in the World, Established 1725

GIFTS WORTH HAVING!

Obtainable at

FRANBERS'

Be sure and get a Copy of our profusely illustrated Catalogue—containing WIRELESS, ELECTRICAL and MINIATURE ACCESSORIES.

Send 2d. to-day for it.

A recent unsolicited Testimonial received :—

Cycle Hand Lamp, complete with Bulb and Battery ... **3/11** (Postage 4d.)

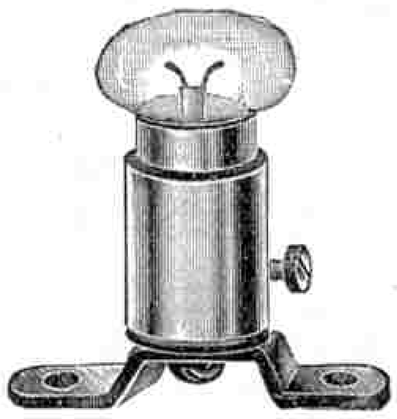
Ideal Torch Case complete with Bulb and Battery ... **1/11** (Postage 4d.)

MARKET DRAYTON, SALOP.

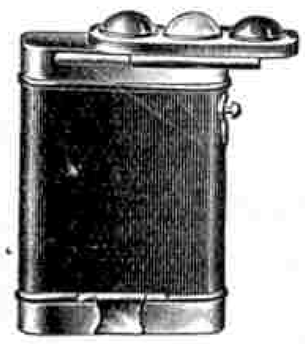
Dear Sirs, August 11th, 1926.

Some time ago I bought some Wireless goods from you and with them made a Crystal Set to see if I could hear anything at a distance of 154 miles from London. The result was simply splendid. They were all your goods and although they were very cheap, they were better than Goods costing twice the price.

Yours truly,.....



M.E.S. Holder, complete with Bulb ... ... **6d.** (Postage 2d.)



Scout Case, complete with Bulb and Battery **1/11** (Postage 3d.)

Satisfaction or money returned in full.

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The Mail Order House for Everything Wireless and Electrical.

Note New Address—**58, BIRCHWOOD CRES., SPARKBROOK, BIRMINGHAM.**

"EVER-READY"

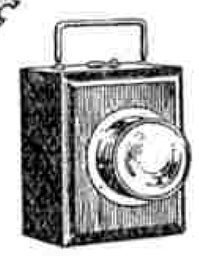
PORTABLE LAMPS & BATTERIES

"Throw a bright light on any subject"

Indoors or outdoors, all the year round, in town or country, there's an **"EVER READY"** to suit all purposes.

BRITISH AND BEST

On Sale by all good-class Stores, Ironmongers and Electricians everywhere.



No 1860

No 2003

No 2000

No. 1860. OAK HAND-LAMP. 2¼" Bull's-eye, Nickel Fittings ... ... Price **10/6**
3-cell Batteries ... ... each **1/6**

No. 2003. "SPOTLIGHT" FOCUSSING TORCH, projects 300 ft. beam Price **10/6**
Large 3-cell Torch Battery each **1/3**

No. 2000. "SPOTLIGHT" POCKET LAMP, Nickel-Plated or Leather Covered Price **3/6**
Standard 3-cell P.L. Battery each **9d.**

Insist on "EVER READY" Dry Batteries for long, efficient service.

Complete Catalogue post free from—

The Portable Electric Light Co. Ltd.

Dept. G.I., 120, Shaftesbury Avenue

LONDON, W.1.

Meccano & Hornby Train Supplies

All the dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Trains and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

ACTON'S SPORTS SUPPLY CO.,
ACTON. EALING.
WIMBLEDON. HARLESDEN.

HARRY BROWN,
1, Moss Lane,
ALTRINCHAM.

J. WOODHALL,
256, Grange Road,
Phone : B'head 621 BIRKENHEAD.

MERCER'S DOLLS' HOSPITAL,
68, Darwen Street,
BLACKBURN.

SELLEN'S BAZAAR,
54, Waterloo Road,
BLACKPOOL, S.S.

BROWN, MUFF & CO. LTD.,
BRADFORD.

W. CARTER,
15, Bridge Street,
opp. Mechanics' Institute, BRADFORD.

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Tel. : Brighton 957 BRIGHTON.

GYLES BROS. LTD.,
Tel. 2888 24, Bridge Street, BRISTOL.
188, Whiteladies Road, Clifton, BRISTOL.
Tel. 143

JOHN HALL (TOOLS) LTD.,
BRISTOL. NEWPORT.
CARDIFF. SWANSEA.

SALANSON LTD.,
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4, High Street, CARDIFF.

SAM TAYLOR,
Silver Street,
Tel. 320 BURY.

HAROLD HUNT,
38, Spring Gardens,
Tel. 202 BUXTON.

A. M. HARRIS,
" Wilces Toy Shop,"
14, High Street Arcade, CARDIFF.

H. W. GILL,
23 & 24, Pittville Street,
CHELTENHAM SPA.

R. H. JEPSON,
1, Cross Cheaping,
COVENTRY.

PURSEY & MOCKRIDGE,
The Sports Outfitters,
Tel. Dartford 173 DARTFORD.

HENRY WHALLEY,
195, Duckworth Street,
DARWEN.

RATCLIFFES TOYERIES,
19, Osmaston Road,
DERBY.

C. E. MELLER,
" Dolls' Hospital,"
DONCASTER.

JOHN ARCHIBALD,
20, Woolcomber Street,
DOVER.

JAMES L. DIXON,
14, Suffolk Street,
(off Grafton St.) DUBLIN.

DIXON'S,
41, High Street,
DUNDEE.

DRAFFEN & JARVIE LTD.,
Nethergate,
DUNDEE.

CARTER'S STORES,
2, Terminus Buildings,
Tel. 953 EASTBOURNE.

BASSETT-LOWKE LTD.,
1, Frederick Street,
EDINBURGH.

WRIGHT'S DOLLS' HOSPITAL,
14, High Street,
ERDINGTON.

UPTON BROS. LTD.,
Sandgate Rd. and Tontine St.,
FOLKESTONE.

HARRY HUBBARD,
8, High Street,
(Opposite the Cricketers) GILLINGHAM.

ROBERT BALLANTINE,
103½, St. Vincent Street,
GLASGOW.

CLYDE MODEL DOCKYARD,
22-23, Argyll Arcade, GLASGOW.
Model Makers to the Admiralty, the Railway Coys., etc.

The MARVEL MART (Wm. Ross & Co.),
110, West Nile Street,
GLASGOW.

POLLOCK & CO., 36, Bridge St. and
222 and 245, Argyle Street
and 39, Paisley Rd. West, GLASGOW.

WELTON & MESSENT,
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HAMPSTEAD, N.W.3.

FLETCHER'S TOYLAND,
77, Deardengate, HASLINGDEN.
Grand Building, RAWTENSTALL.

HAMMOND'S LTD.,
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SMITH & DANIELS,
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LEEDS.

PEARSON & DENHAM (PHOTO)
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ROBOTHAM,
" Baby's Kingdom,"
Tel. 4809 LEICESTER.

LLOYD & SON,
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LEWES.

BYCROFTS EMPORIUM,
366, High Street,
LINCOLN.

C. LUCAS, Hobbies Depot,
35, Manchester Street,
LIVERPOOL.

Reliance Cycle & Motor Co.,
29/31, Manchester St., Liverpool.
Argyle & Conway Sts., Birkenhead.

THE ARUNDEL CYCLE & MOTOR STORE, 52, Church Road, Upper Norwood, LONDON, S.E.19.

Meccano & Hornby Train Supplies

The thirty dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Train and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

W. HUMPHRYS & SON,
Estab. in 1840
269/271, Rye Lane, Peckham, LONDON.

F. R. POTTER & SON,
43, Market Place, LOUGHBOROUGH.

H. G. PARTRIDGE & CO.,
10, Chapel Street, LUTON.
Tel. 234

BARR'S CHILDREN'S PARADISE,
49, Deansgate, MANCHESTER.
Tel. City 165

BAXENDALE & CO. LTD.,
Miller Street, MANCHESTER.
Tel. 5900 City (20 lines)

A. FRANKS LTD.,
95 & 97, Deansgate, MANCHESTER.
90, Bradshawgate, BOLTON.

A. INMAN,
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EDWARD LLOYD,
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JOHN NESBITT LTD.,
42, Market Street, MANCHESTER.

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30-36, High Street, MARGATE.

R. SCUPHAM & SONS,
35, Linthorpe Road, MIDDLESBROUGH.

DIBBS' DOLLIES' HOSPITAL,
NELSON, LANCS.

ALFREDS, TOY SHOP,
77, Northumberland Street, NEWCASTLE-ON-TYNE.

WILLIAM OLLIFF,
13, Grainger Street West, NEWCASTLE-ON-TYNE.

THE OXFORD SPORTS DEPOT,
117, St. Aldates', OXFORD.

JANES & ADAMS,
13, The Promenade,
And Branches. PALMERS GREEN.

A. J. ROBERTSON,
39-41, Broad Bridge Street,
Tel. 374 **PETERBOROUGH.**

R. MARSDEN & SON LTD.,
115, Church Street,
Tel. PRESTON 1314 **PRESTON.**

DEAN & HOLT,
78, Yorkshire Street, ROCHDALE.

SHEFFIELD PHOTO COMPANY,
6, Norfolk Row (Fargate),
'Phone 3891 **SHEFFIELD.**

A. J. TINKER,
20, London Road, SHEFFIELD.

WILSON, GUMPERT & CO. LTD.,
57, Fargate,
Tel. 489 **SHEFFIELD.**

BIRMINGHAM & COVENTRY CYCLE CO., 140 & 151, Above Bar, SOUTHAMPTON.

OSBORN & CO.,
9, High Street, SOUTHAMPTON.

S. T. SIMPSON & SON,
589-595, Lord Street,
Tel. 999 **SOUTHPORT.**

H. W. GINN,
The London Motor, Cycle & Sports Co.,
Tel. 252 Staines **106, High St., STAINES.**

TAYLOR BROS.,
Great Underbank,
Tel. 630 **STOCKPORT.**

SAXONS LTD.,
29/30, Holmeside, SUNDERLAND.

SPORTS HOUSE — **WOKING & WEYBRIDGE.**

Set of 12 Railway Postcards—Locomotive Jig Saw Puzzle—72 Railway Picture Stamps and 2 Scale Model Sheets of L.N.E.Ry. Flying Scotsman and latest type Sleeping Car—all sent for 5/- post free.
THE LOCOMOTIVE PUBLISHING CO. LTD.,
3, Amen Corner, LONDON, E.C.4.

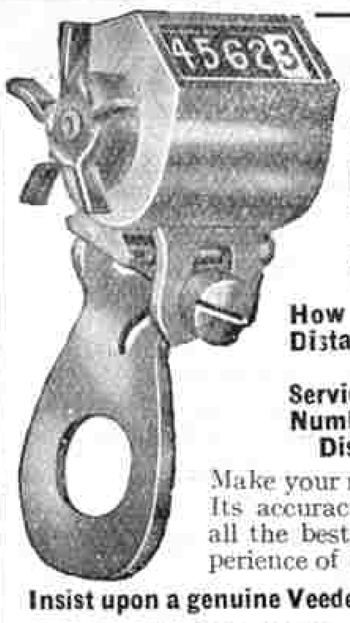
'Mend your Punctures while you Ride'

FORGET TYRE TROUBLE

and go care - free on your way. Tubes treated with our IMPERVO increase the joys of your Cycle.
"The Story of IMPERVO"

FREE

to Meccano Readers.
Write NOW for a Copy.
H. COLYER & CO. (Dept. 31a), 5, Point Hill, Greenwich, S.E.10.



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How far you have been.
Distance from one place to another.
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Number of miles to destination.
Distance travelled, etc.

Make your riding doubly interesting. Its accuracy has been endorsed by all the best authorities and the experience of your fathers for 30 years.

Insist upon a genuine Veeder—see the name thereon.

Made in Two Models:
Regular 6/6, Trip 15/-.
MARKT & CO. (London) LTD.,
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LONDON, S.E. 1.

IF YOU WANT a really accurate reliable and easily fitted Cyclometer get a "Milo." For 26 or 28 in. wheels, price 4/-, post paid.—Fairhaven, St. Budeaux, Plymouth.

THE WORLD'S GREATEST CYCLE OFFER

£10 FOR £6

The frame of the Graves **'Speed King'** Cycle is rust proofed, enamelled Black & Coach lined (or can be supplied all Black if desired) Fitted with

B.S.A. 3-SPEED GEAR
DUNLOP Roadster Cord Tyres
RENOLD CHAIN
MIDDLEMORE'S Three Coil Spring Saddle

Lady's or Gent's model same price. Carriage Paid. Terms: 8/- now, & 8/- monthly. Complete Approval.

Catalogue Post Free. J. G. Graves Ltd. Sheffield.

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is the most useful accessory for all kinds of model building. It can be an actual part of the model, or used in a similar way to mortar, or even glue, to hold other parts together, or keep them in place. It is made in 10 colours, is clean, and ever plastic. May we send you full particulars and samples —or better still send for a

Rainbow Box

with 6 colours and full particulars.

9d. or Post Free **1/-**

HARBUTT'S PLASTICINE LTD.

99, Bathampton

BATH

AQUARIUM FISH

And Plants in great variety, interesting Pond Creatures, Fish Foods, etc.
The Stocking of **ORNAMENTAL POOLS** a Speciality.
New Catalogue and Guide 3d. post free.

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Fish Farm, Beam Brook, Newdigate, Surrey.

GOLDFISH

Gold and Silver Fish 3d. to 5/- each.
Fancy Fish always in stock, including Golden Orfe, Catfish, Paradise Fish, Mirror Carp, Sunfish, etc., from 6d. each.
Vallisnesia, 4d., Root Weed, 1/- Ble.
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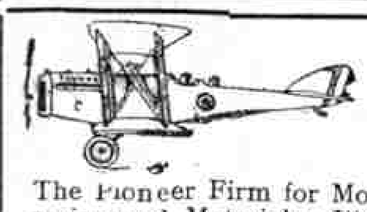
Over 10,000 Goldfish and Fancy Fish actually on view.
Send for complete Free Price List.

DE VON & CO., 127, King's Cross Rd., London, W.C.1.

'Phone: Museum 0767.
Telegrams: Fishing, London.



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2 FREE GIFTS! PURSE & POCKET KNIFE Given Away to all who buy a Pen!

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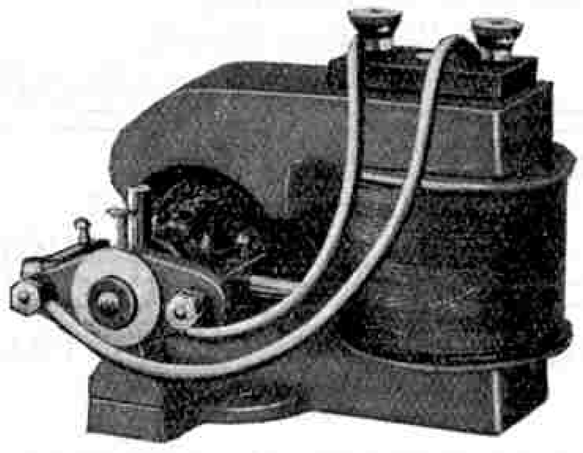
DYNAMOS



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High Class, English made.
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Shunt Wound. Built up Copper Com.
Adjustable Brush Gear.
Bored on Lathe, Perfect, Minute Armature Clearance. Suitable for Accumulator Charging.

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Catalogue, 28 pages, 9d.

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One minute from Notting Hill Gate Station.

ROLLER SKATES

Like **Meccano** and **Hornby Trains** they are still as **popular** as ever with all **healthy boys and girls.**

Many years of wear can be got out of them as they are **adjustable** to any size.

We sell the **best make** only, yet our **Prices** are the **lowest** in the trade.

No. 3 with Threaded Clamps and Case-hardened Steel Wheels ...	5/- pair
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Postage and Packing 1/-. Colonies and Abroad 5/-

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Everything for Home Cinematographs

Call or Write

Illustrated Lists Free.

Machines from **8/6** to **£16** and upwards. Acetylene, Electric, and Gas Lighting Sets, and all other Accessories for Home Cinemas of all sizes. Sample Film 1/-, post free. 1,000 ft. length, **7/-**, post free.

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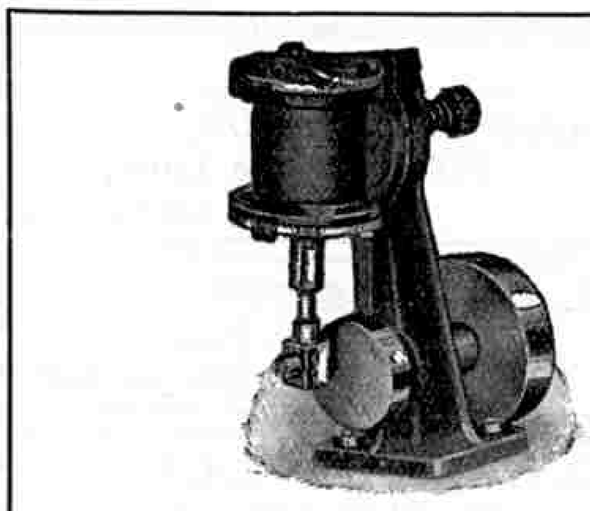

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This engine can be built with a screwdriver and we give full instructions. We *guarantee* the engine to work well.

S.T. Engine Parts .. 5/- } *Post*
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20-Shot Rapid Repeater Action Pea Pistol. Fires a pea 25 feet at the rate of 100 a minute. A Regular Pocket Lewis Gun. Bright Nickel finish, each in box with ammunition. A better shooter than you have ever had before. Send 1/6 and don't miss our latest quick-firer. Foreign and Colonial Postage 9d. extra.

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With our Fittings and Instructions you can build a £40 Sideboard Model for 40/-

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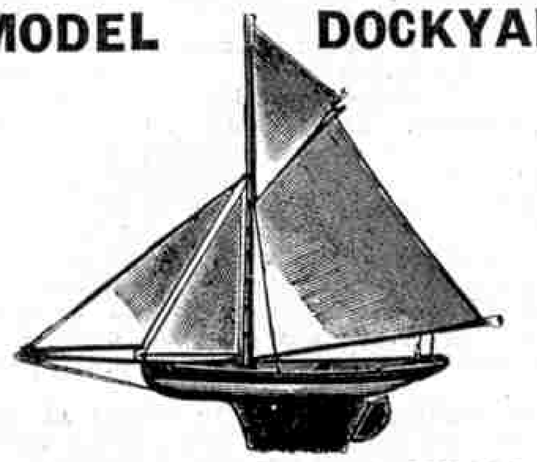
KENSINGTON MODEL DOCKYARD



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Requisites for
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AIR GUNS AEROPLANES
Electric Motors & Accumulators

Send 1½d. Stamp for List "M."

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Boys!—

build a working model railway, realistic in appearance and efficient in operation, by using

HORNBY TRAINS
AND ACCESSORIES

Model Railway enthusiasts will find their every want satisfied at the

Arundel Cycle & Sports Stores

"The Hornby Train Shop"
52, Church Road, Upper Norwood, S.E.19

Learn to shoot with
"HARMLESS"
Rifles and Pistols.

The "HARMLESS" Rifle shoots with accuracy india-rubber tipped arrows which adhere to the target by suction.

Can be obtained at all stores, toy and sports shops, but insist on seeing the word "HARMLESS" on the target.

Rifle sets at
3/-, 4/6, 6/-, 7/6 & 9/6
Pistol sets at
2/6, 3/6 & 5/6

As illustration 6/6 post free from manufacturers—

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BOYS MAKE YOUR OWN LEAD SOLDIERS

Cowboys, Indians, Animals, Zulus, Model Station Staff, Rodeo, etc. Our CASTING MOULDS make thousands from any scrap lead WITHOUT PREVIOUS EXPERIENCE. Send stamp to-day for illustrated catalogue.

Complete mould ready for work 2/6
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Mention "Meccano"

Good News

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is now ready.

1/6 Design included. 9d. post free.

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Lists for Wireless, Meccano, Model Railways, Motor Boats, Mouldings, now ready—Free.

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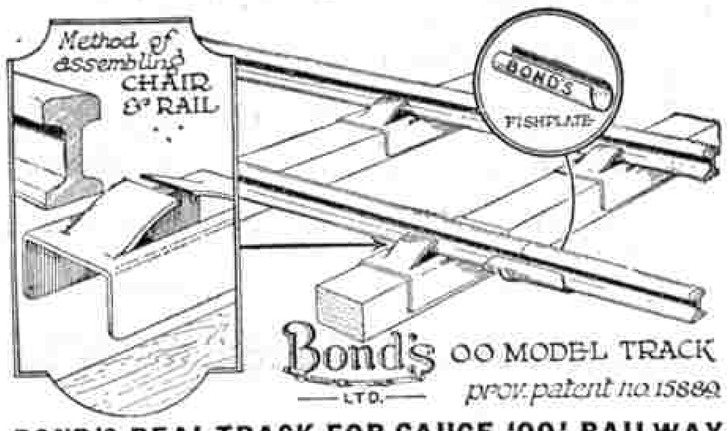
Let us develop your films. We will enlarge one of the best in each complete spool
FREE. FREE.

C. LUCAS
35, Manchester St., Liverpool
Hobbies Famous Depôt.
Agent for Messrs. Meccano Ltd., Messrs. Bassett-Lowke Ltd.

LAY OUT YOUR "00" RAILWAY WITH REAL RAILWAY TRACK.

It is easy to lay correctly.
Straights, Curves, or Points.
It is cheap and can be purchased in small quantities.



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RAIL is scale correct Bull Head, 2d. per foot length.
CHAIRS are Spring Steel, prov. patent, 1/4 per 100.
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RAIL LAYING TOOL, 4d.
Try our Box. To make 3 feet track **2/9** Post 3d.
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BOND'S LTD., 254, Euston Road, LONDON, N.W.

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ELECTRIC LIGHT

These wonderful Dynamos light brilliantly 4-6v. lamps, and are very easy to work. 5/6, post 6d. Delivery by return of post.

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EDINBURGH AGENTS
for MECCANO and
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A complete stock of all Hornby Train Accessories and Meccano parts.

JENNERS PAY CARRIAGE

WANTED A MECCANO BOY.

A vacancy occurs for a Meccano boy, preferably just leaving school and resident in Liverpool district, who possesses skill in model-building and an elementary knowledge of mechanical engineering. Applications must be in writing and should be accompanied if possible by particulars of qualifications. Box 1109, Meccano Magazine.

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Mechanical Parts of a 1st-class
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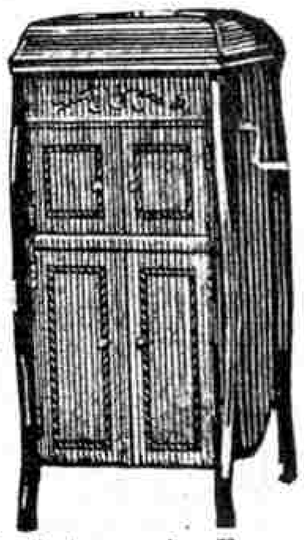

Double Spring Motor, 12 in. Turntable, Swan Tonearm, Superior Sound Box, Internal Horn, as fitted by other firms in £10-£20 Gramophones All bar the wood **£2:8** Cash
This set supplied with polished Oak or Mahog. 40-in. high Cabinet as shown ... ... **£5:5** Cash or 18/- deposit and 11 monthly instalments of 9/- carr. paid in U.K. 7 days' trial. Money back if dissatisfied. Other Sets from 24/9 Machines from 27/6. Motors 9/- Dealers to send Trade Cards.
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If you have anything to sell or wish to buy anything take advantage of the service offered by a small advertisement in these columns.

The "*M.M.*" is read by approximately 100,000 people every month. It circulates in every country where the English language is spoken. If you wish to sell your duplicate stamps, your rabbits, or your tools, or to purchase a loud speaker, a steam engine, a model yacht, or a hundred-and-one other things, you will be able to do so through the columns of the "*M.M.*"

The rates are one penny per word, with a minimum of 1/- (cash with order).

Your advertisement must be received before the 10th of the month for insertion in the following month's issue.

If a Box Number is used, 4d. should be added to cover the cost of postage of the letters to the advertiser from this office. The letters will be posted one week after the advertisement appears, and a second batch a month after the advertisement appears. They will be sent more frequently if additional postage is included with the advertisement.

IMPORTANT.—Advertisements dealing with any article in the Meccano catalogue cannot be accepted.

READERS' SALES

(*Rate: 1d. per word, min.* 1/-).

Stamp Collectors. Exchange Stamps, Correspondence through Cairo-Karachi Air Mail Service.—Karimji Tayabbhai Khandwala, 721, Napier Road, Karachi.

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Electric Miniature Table Railway, brand new cost 25/-. Quick sale 15/-. Particulars — Dazeley, Aylsham, Norfolk.

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About 900 Stamps, many very rare, four together worth 40/-; 15/-.—Box 1101

CUT THIS OUT. 'Meccano' Pen Coupon Value **3d.**

Send 5 of these coupons with only 2/9 direct to the **Fleet Pen Co., Fleet Street, E.C.4.** You will receive by return a splendid British 14-ct. Gold Nibbed Fleet Fountain Pen value 10/6 (Fine, Medium, or Broad Nib). If only 1 coupon is sent the price is 3/9. 3d. less for each extra coupon up to 4 (Pocket Clip 4d.) Satisfaction guaranteed. Your own name gilt letters, either pen 1/- extra.

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MECCANO MAGAZINE

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

EDITORIAL AND ADVERTISING OFFICES:—

BINNS ROAD, LIVERPOOL.

Telegrams: "Meccano, Liverpool."

Publication Date. The December "*M.M.*" will be published on the 4th December and may be ordered from any Meccano Dealer or from any Bookstall or Newsagent price 6d. per copy. A copy will be mailed direct from this Office price 8d. (post free).

To Contributors. The Editor will consider articles and photographs of general interest; payment will be made for those published. Whilst every care will be taken of those submitted, the Editor does not accept responsibility for any loss or damage. A stamped addressed envelope should be sent where the contribution is to be returned if unacceptable.

Binding Cases. Spring-back Binders to take a number of "*M.M.'s*" are supplied, covered with imitation leather and lettered in gold, price 3/- each (post free).

Meccano Writing Pads. Fifty sheets of tinted bank paper, each printed with Meccano boy at head, 1/- (post free) large, and 6d. (post free) small.

Advertisements

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/- per line (average seven words to the line), or 10/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest circulation figures, will be sent on request.

Press Day, etc. Copy must be received not later than 10th of each month for publication in 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 4d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Obtaining the "*M.M.*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Magazine* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 6d. per copy, or mailed (post free) direct from Liverpool, 4/- for six issues, or 8/- for twelve issues.

IMPORTANT.

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the home market. 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.

CANADA:	Meccano Ltd., 45, Colborne Street, Toronto.
AUSTRALIA:	Messrs E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND:	Messrs. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.
SOUTH AFRICA:	Mr. A. E. Harris (P.O. Box 1199), [redacted]'extile House, Von Brandis St., Johannesburg.

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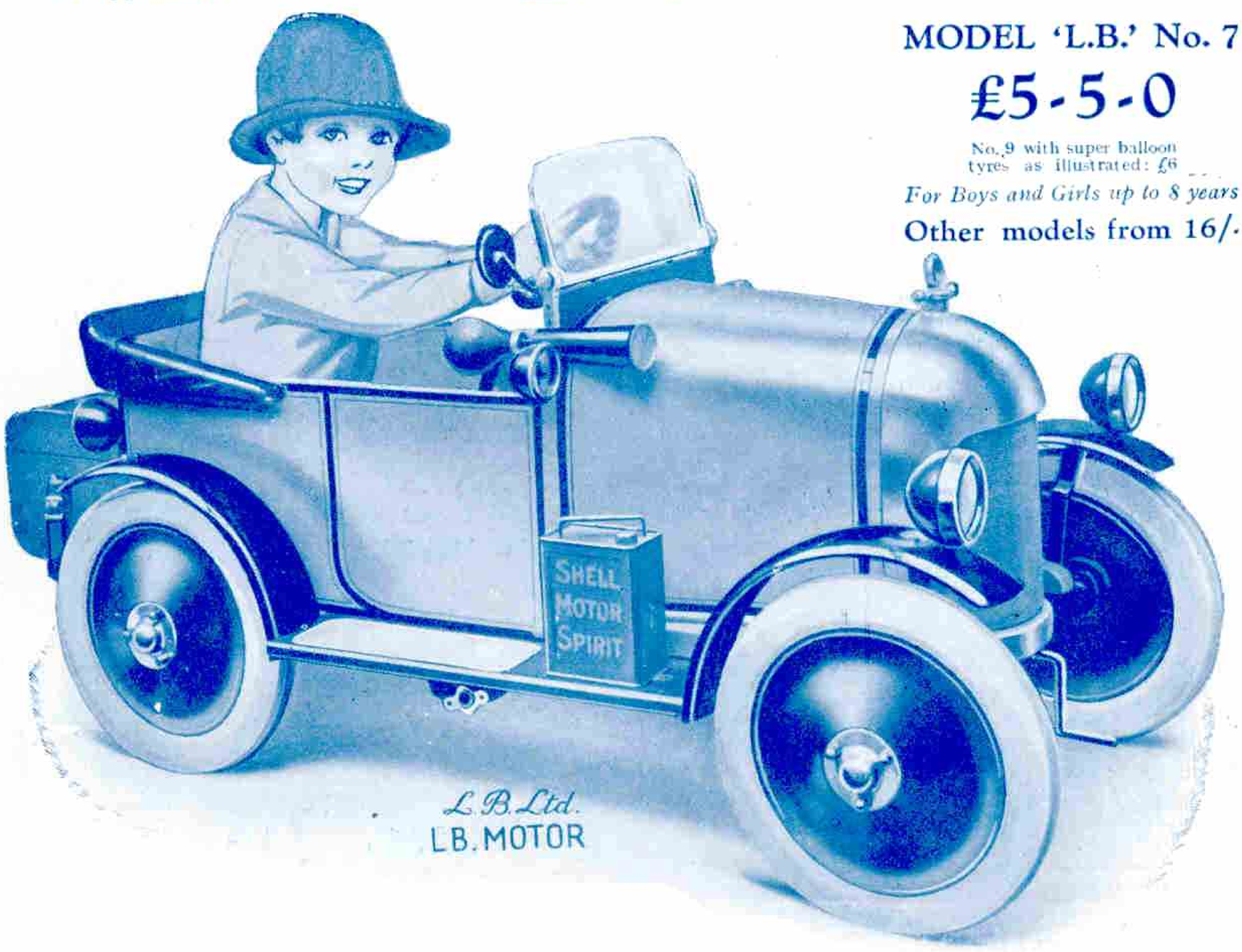

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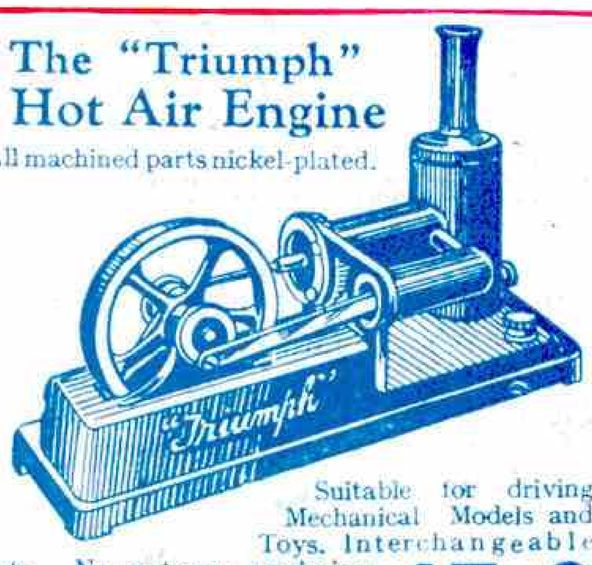
All machined parts nickel-plated.



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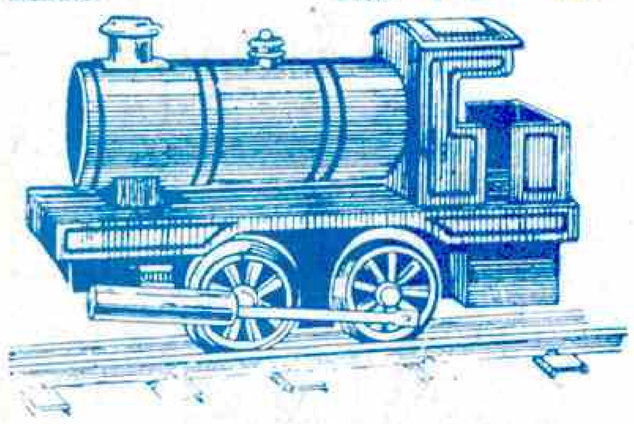

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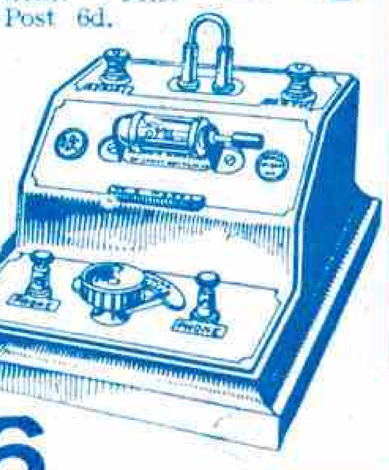

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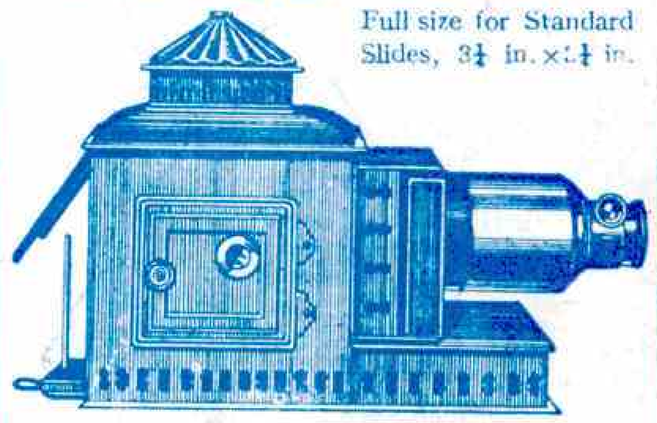

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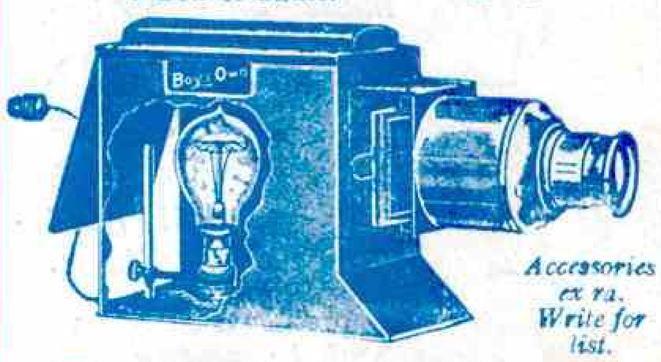

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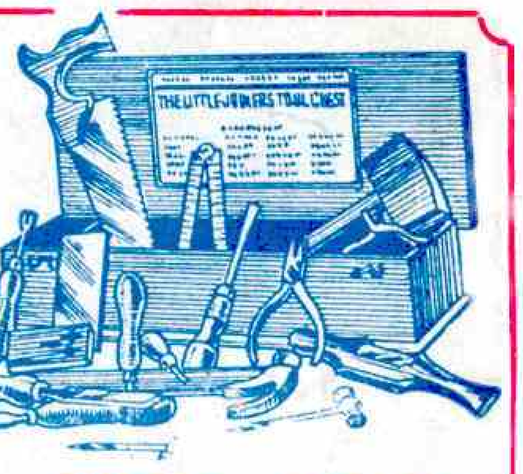

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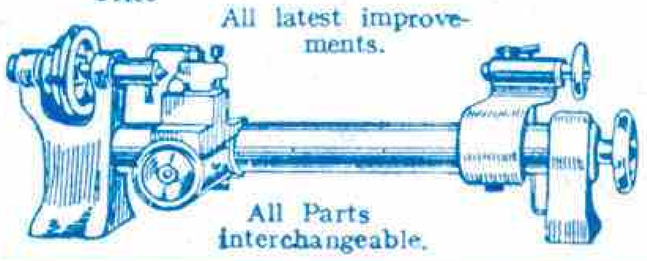

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