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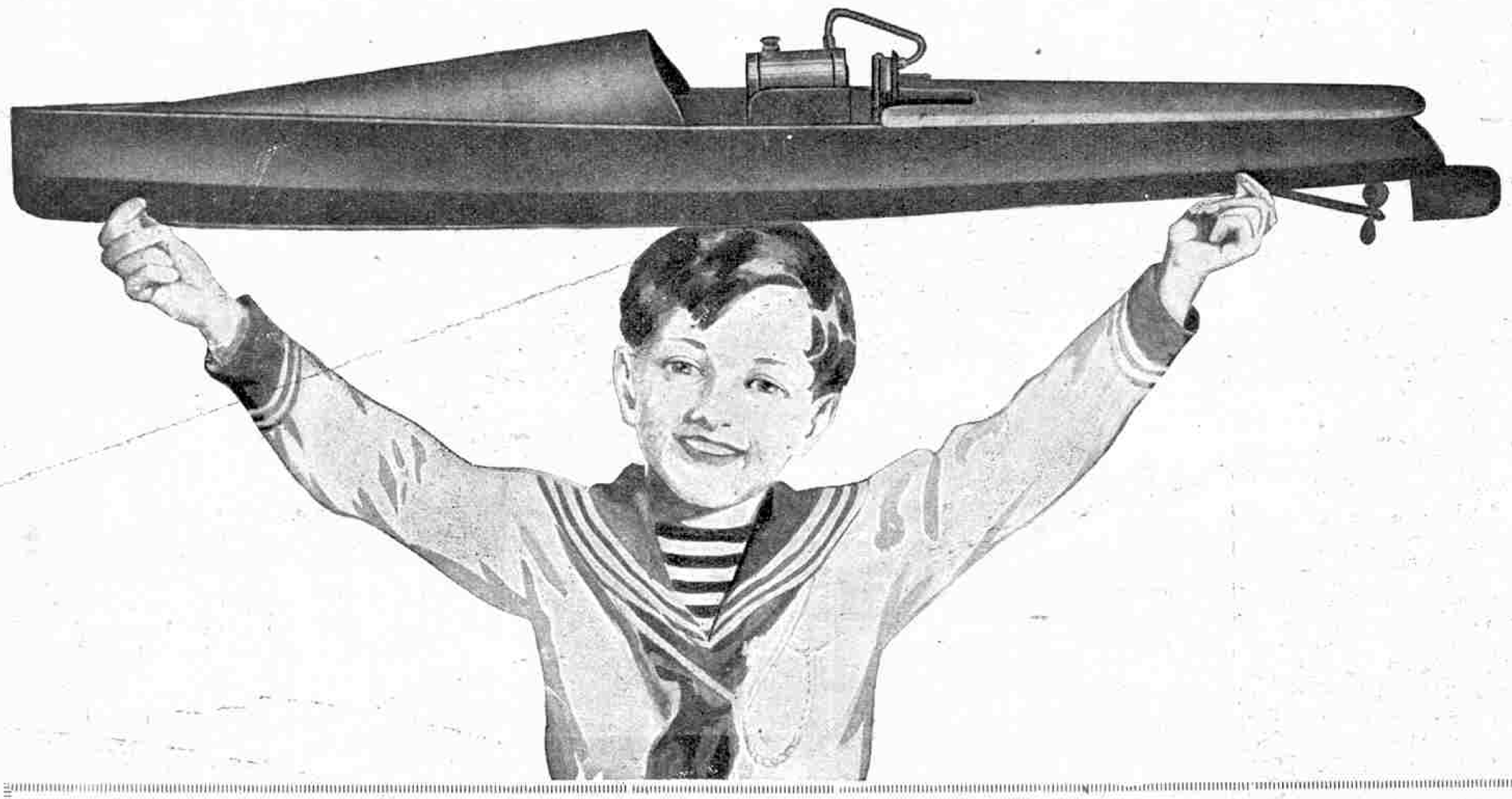

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MECCANO MAGAZINE

PUBLISHED
IN THE INTERESTS
OF BOYS

Vol X, No. 8

August 1925

With the Editor

A Famous Author's Blunder

In dealing with the Centenary celebrations of R. M. Ballantyne, the famous author of boys' stories, I mentioned in the June Editorial that in his earlier books he laid some of his scenes in countries that he had never seen. The inevitable result was that in his third book, "*Coral Island*," he made at least one great blunder. I offered a guinea to the reader whose letter was first received, pointing out the blunder.

The winner is H. T. Bolus (of Cannon Hill, Birmingham) who points out that the great blunder occurs in the following extract (Chapter IV) dealing with cocoanuts:—

"Peterkin bounded up the tall stem like a squirrel and returned with three nuts, each as large as a man's fist. 'You had better keep them till we return,' said Jack. 'Let us finish our work before eating.' 'So be it, captain, go ahead,' cried Peterkin, *thrusting the nuts into his trouser's pocket.*"

The winner's comment on this is: "Cocoanuts as they grow on the tree are enveloped in a husk four times the size of a man's fist, so that it would need a very large pocket to hold three cocoanuts." With this we must all agree!

More Mistakes in "Coral Island"

I was very pleased with the large number of replies, and the prompt response in this competition. The entries were more numerous than I had expected, and most of them came to hand on the 1st and 2nd June.

Several other mistakes that Ballantyne made were pointed out by other readers. These included Jack finding flints on the shore, "as it is unlikely that flints would be found on a coral island unless washed up by the sea." (C. MacDonald, Insch, N.B.) "There are no such things as the 'coral insects,' described in Chapter XVI" (M. Keidan, Bradford). "In one place it states in the book that "We saw . . . . . millions of little active sea creatures continuing the work of building up a living rampart." Coral is made only at a depth of from 15 to 30 fathoms, and at this depth diving apparatus would be required to see it." (W. R. Stevens, London, E.C.1). "The boys' reference to 'hills and dales' cannot be true because no Coral Island rises more than 10 ft. above the sea level." (H. Thompson, Glasgow and H. Weale, Keston, Kent). "The book says the South Sea Islanders are coal black, but really they are olive or red-brown in colour." (W. Harvey, Hastings). A curious printer's error is also pointed out (by G. Everest of Seven Oaks) "Jack remembered having *sword* once of a sword-fish attacking a ship." The word "sword," should, of course, have been "heard."

A large number of readers mentioned another error—that of the author describing penguins as inhabiting the small islands of the tropical seas. They point out that penguins are found in the Antarctic, and are not usually found in a climate so hot as that in which the legendary Coral Island was supposed to be situated.

I do not know how many of these mistakes were ever pointed out to Ballantyne, but I feel sure that, were he alive, he would agree with me that readers of the "*M.M.*" include boys with the sharpest eyes in the world—as has been proved time after time!

Next Month's "M.M."

As already announced, our September number will be a special and enlarged Railway Centenary issue. There will be a splendid coloured cover, and as many pages as possible will be devoted to railway matters. For instance, a special article will deal with postage stamps on which engines or railways appear; the Photographic Competition will be in connection with railway subjects; the Fireside Fun and Competition pages will also centre on railways.

The special Railway Centenary Celebrations that were held at Darlington will be fully described and illustrated. There will be articles dealing with the historical aspect and the early history of the locomotive, and a page of famous inventors associated with the discovery and perfection of the steam engine. Other special features include "How to Make a Model Railway Station," "New Series of Metropolitan Tank Locos;" "The Fastest Train in Britain;" "Novel Test for New Locomotives;" "Model Locomotive Trials on the Eskdale Railway;" "Steam Locos without Fires;" "The Story of Bradshaw's Railway Guide."

The number of this special issue to be printed is limited and every reader should order a copy at once, to avoid disappointment. The price is 3d. as usual.

Tell your Friends about the "M.M."

Although our circulation during the last year has increased to over 50,000 copies each month, I want to see it still further increased, and in this connection my readers can help me very considerably by obtaining new subscribers. There must be over a million Meccano boys in this country who would all enjoy the "*M.M.*" if only they knew of the existence of this Magazine. Although we do everything possible to make known the "*M.M.*" by advertising it and by including notices in every Meccano Outfit, Hornby Train Set, Manual and Catalogue that we issue, it is a surprising fact that there are tens of thousands of Meccano boys who do not know that such a Magazine is published. If our present readers will show their "*M.M.*" to their friends and mention it wherever possible, it will help me to make our Magazine more widely known. If every reader obtains only one new subscriber in this manner, we should double our circulation, and this would enable me to add even more literary pages to each issue. If you have a friend who is not a regular reader of the "*M.M.*" send me his name and address, and I will see that he has a specimen copy mailed to him free.

How to Obtain the "Meccano Magazine"

In reply to numerous recent enquiries, I should like to announce that there should be no difficulty whatever in obtaining the "*M.M.*" promptly on publication date—that is, the 1st of each month. The Magazine may be ordered from any Meccano dealer, and there is at least one Meccano dealer in practically every town in this country. If any of my readers do not know which firms are Meccano dealers I shall be glad to send a list of Meccano stockists in any town, on request.

The "*M.M.*" may also be ordered through any newsagent. If your newsagent cannot obtain it from his wholesaler, I will arrange that he receives supplies direct. If there is any difficulty in the matter ask him to write to me.

Finally, those who cannot obtain the Magazine from either a Meccano dealer or a newsagent—owing, perhaps, to living in some remote part of the country—may have it posted to them direct from this office. The subscription is 2/- for six issues and 4/- for twelve issues including postage.

SWISS, FRENCH AND ENGLISH RAILWAYS COMPARED

By H. E. Underwood

Photo] [*Machine Works, Oerlikon*

Express on the Loetschberg Railway

(*Concluded*)

LAST month the first instalment of this article dealt with Swiss, French and English railway organisation and we described also the famous Swiss tunnels of St. Gothard and Simplon. We now describe a famous French tunnel, the Mont Cenis, the best-known of all French tunnels, for it was the first tunnel through the Alps and connects France with Italy. The line here is worked (electrically) by the Italian railways as far as Modane on the French side.

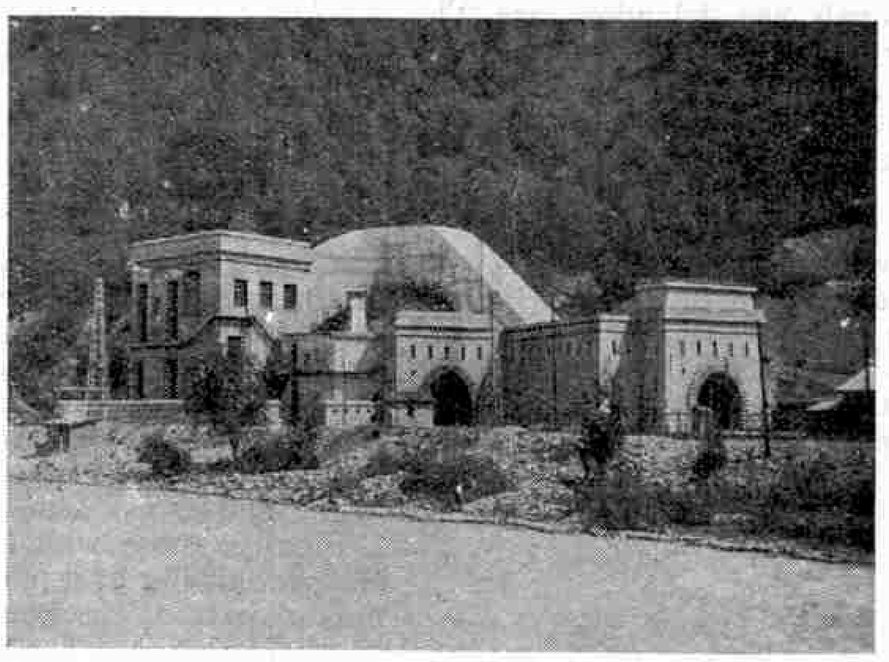
The Mont Cenis Tunnel

The construction of the Mont Cenis Tunnel was a remarkable engineering feat for its day. Work was commenced at both ends of the tunnel in 1857, the boring of the holes for the blasting charges being done by hand until the end of 1860 at the southern heading and until 1862 at the northern heading. Compressed air rock drills were then introduced and the average rate of progress was nearly trebled. It was speeded up even more during the last few years of the work.

The rock along the southern or Italian portion of the tunnel was on the whole easier to work than that on the French side, so that the two headings met at a point 2,107 yards nearer the French end than the Italian end. The wall between the two headings was cut through on Christmas Day 1870, 13 years and 1 month from the commencement of the work, and by the following day the aperture was sufficiently enlarged for the tunnel to be traversed from end to end.

The tunnel proved to be 15 yards longer than had been calculated, and the small error of 12 in. in level was probably due to this discrepancy in length. The direction of the two headings was perfectly correct, showing with what accuracy the alignment had been made from the two ends. Two short curved tunnels were subsequently made near each end to connect the railway in the tunnel with the approach railways on each side, with the result that the actual length of tunnel through which the trains run is very nearly eight miles.

The opening of the Mont Cenis railway for traffic took place in 1871, nearly a year after the tunnel headings had been joined. The tunnel cost about £3,000,000 or £225 per yard.



Swiss entrance to Simplon Tunnel, near Brigue. The electric ventilating plant is seen on the left

In passing we may note that all other French tunnels are less than three miles in length.

There are many important bridges and viaducts in France, notably the Morlaix viaduct on the Rennes-Brest line, 183 ft. in height. Generally speaking, these French structures have much in common with those on English lines and therefore do not require any special description.

Speeds and Non-Stop Runs

Before passing on to describe the locomotives and rolling stock it will be interesting to consider two points of great importance to all railways—the average speeds and the length of non-stop runs. Before the war comparatively long non-stop runs were a regular feature on the French railways. The Paris-Royon express, for instance, ran regularly from Chartres to Thouars, a distance of 149 miles, without stopping. This may not seem a very brilliant performance when compared with that of certain Great Western trains in England, but the absence of really long non-stop runs in France must be attributed to the lack of water troughs on most of the main lines. The world's record for speed was held for a short time by the Paris-Brussels express, which ran from Paris to St. Quentin in 93 minutes at an average speed of 62 miles an hour. The normal average speed of a French express train is between 50 and 56 miles per hour.

In Switzerland the latest type of

electric locomotive has a maximum speed of 56 miles per hour. The fact that there are no faster locomotives than this in Switzerland is due to the majority of the lines traversing hilly or mountainous country, and good climbing capacity is therefore the quality most looked for in a Swiss locomotive.

Owing also to the nature of the country, curves have had to be constructed of comparatively small radius, thus imposing a further obstacle in the way of high speeds. Long non-stop runs are very rare and what was once the longest of these—from Lucerne to Bellinzona, a distance of 106 miles—has now been discontinued.

Photo courtesy] [*Swiss Federal Railways*

Express Train at Fluelen Station, St. Gothard Railway

French trains are noted for keeping bad time and it is by no means unusual for a train to arrive at its destination an hour late or even more. We can scarcely imagine the remarks that a regular passenger on, say, the "Flying Scotsman" would make if he had to travel in France! In this country we are so accustomed to our trains—at any rate our main line expresses—arriving dead on time, that we scarcely appreciate what this means. After even a few day's travel on the Continent, however, we are in a better frame of mind to understand how efficient our railway science really is.

The bad running of the French trains has a serious effect upon the Swiss railways, as most of these are international. For instance, the Swiss railways take over through cars from Paris to Milan at the French frontier and hand them on to the Italian railways at the Italian frontier. Thus if the French trains are late, the Swiss trains are delayed in consequence. This applies not only to the main line expresses but also to the branch line trains, for the latter have to wait for the expresses and so the delay is handed on.

Switzerland, being surrounded by four countries, has to act in railway matters as an intermediary between them, and has rightly been called "The Turntable of the Railways of Europe."

Rolling Stock

Turning now to the rolling stock, we find at once that there are great differences between the systems of the three countries, especially for local trains.

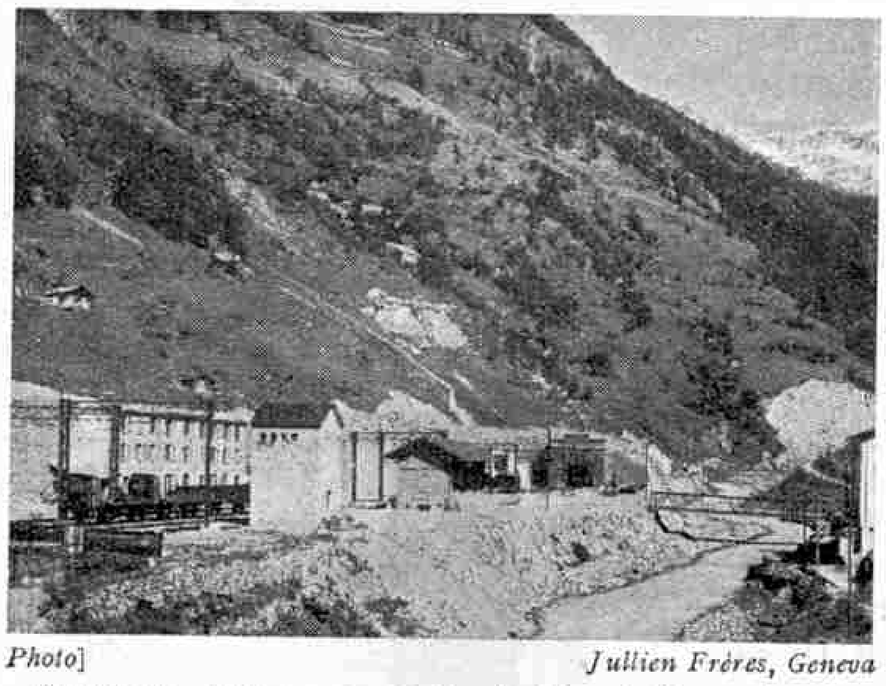
Swiss coaches for local trains are planned on the lines of a tramcar, in that they have a door at each end opening on to a platform. Steps at both sides of these platforms assist travellers to climb into the car, and an opening at the end with a small folding metal floor allows the conductor to pass from one end of the train to the other.

These coaches are usually six-wheeled, while express coaches are eight-wheeled. The interior of the carriages is similar to that of English carriages for the first class, the second class is a little better than the British third, and in the third class, as on the Continent in general, there are no cushions, the seats being of wood like those in a tramcar.

In France the coaches on local trains, like our English coaches, are built on the side-door system.

All sleeping cars belong to the International Sleeping Car Company, which has its headquarters in Paris. This company owns sleeping and dining cars on all European railways except in Germany. In Switzerland the dining cars, except those in international service, are owned by the Swiss Dining Car Company. The various "trains de luxe," including the Simplon-Orient Express (Calais to Constantinople and Athens), are made up exclusively of sleeping, dining and luggage cars owned by the International Company.

Goods wagons are of the same type all over the Continent and are larger than English wagons. Most of them are fitted with the Westinghouse brake, so that brake vans are never seen.



Photo] *Jullien Frères, Geneva*

Southern Entrance of Loetschberg Tunnel, at Goppenstein

Locomotives

And now we come to the most interesting and distinctive feature of all railways—the locomotives.

In France, electrified lines are very few and therefore steam locomotives only will be considered in that country. The best express on the Nord system, the Paris-Brussels "flyer" to which we have already referred, was hauled by a "Baltic" compound loco capable of working a 400-ton train at 75 miles an hour. This company, as also the P.L.M., has a number of American engines brought over during the war, some of which still had "U.S.A." painted on the tender in 1921. On the P.L.M. the fastest trains are drawn by 4–6–2 locos, while many 4–6–0's are used and also a number of 4–6–4 tanks. A speciality of this line is the "Mastodon" 4–8–0 compound, while the Paris-Orleans has several 2–10–0 ("Decapod") locos. The last-named line uses 4–6–2 compounds for its expresses.

A new and powerful engine designed by M. H. Mestre, engineer of the Est Railway, has recently been tried, and 50 others of the same type have been ordered. This loco is of the 4–8–2 type and is over 80 ft. in length.

The above-mentioned locomotives represent some of the types in general use on French railways, and it will be noticed that the compound engine is greatly in favour.

Swiss steam locomotives on the Federal Railways are mostly 4–6–0 compounds for express trains, 2–10–0 and 2–8–0 for goods, and 2–6–0 or 2–6–2 tanks for local trains. The electric locomotives are principally of the 2–6–2, 2–6–4 or 2–4–4–2 types for express and local trains and 2–6–6–2 for goods traffic. The maximum speed is about 56 miles per hour for the express locos and about 40 miles per hour for goods engines.

Colour of Locos and Coaches

In France the colour of the rolling stock varies according to the owning company. The Paris-Orleans and Nord systems, for instance, have green coaches, while on the P.L.M. the coaches are dark red, yellow and green for first, second and third classes respectively.

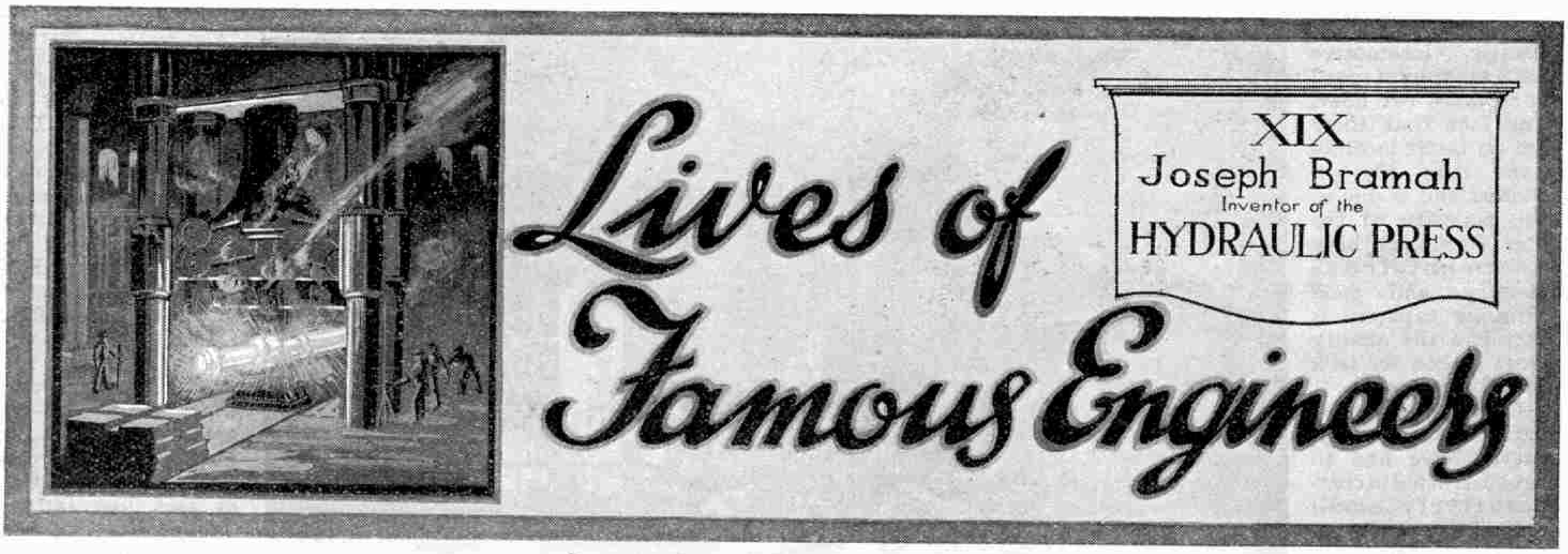
The locomotives are usually coloured by their own smoke, but if by any chance some paint is visible it is green!

Swiss steam locos are black and the electric locos red. Coaches on the Federal railways, at present, are mostly black, but they are gradually being re-painted green, especially on the electrified lines. On the other Swiss railways the colour of the rolling stock varies, as in France.

Passenger trains on French lines are divided as follows:—The "train de luxe," to which we have already referred; the "rapide," which stops at very few stations; the "express," a fast train but which stops at all important stations, and the "omnibus," which stops everywhere.

In Switzerland there is the "train de luxe"; the "direct," which is the fastest train; the "omnibus," which stops at all stations; and in addition on some lines—Geneva-Lausanne, for instance—the "train-tramway," which stops at every station and also at a number of small

(*Continued on page 426*)



INVENTORS, like poets, are born, not made. A man may be brought up in the midst of the most suitable surroundings, have the best possible training in every branch of science and engineering, and yet—unless he possesses certain natural qualities—he will never be an inventor in the real sense of the word. It is not easy to decide exactly what are the qualities that go to produce an inventor, but these certainly include quick and accurate observation; the power of immediately grasping the effect of a mechanical combination and what will take place if that combination is slightly altered; a considerable amount of imagination and, last but not least, sufficient perseverance to carry on, in spite of failure after failure, to ultimate success.

Bramah as an Inventor

Inventors may be divided roughly into two classes. First there are those whose inventive instincts are aroused whenever they come in contact with any mechanism that is not doing its work efficiently. Second, there are those who in their early days are filled with the ambition to produce a certain mechanism, and who confine themselves to the development and perfecting of that mechanism, practically to the exclusion of everything else.

Bramah, whose career we are briefly describing this month, was an inventor of the first type. He was not an inventor of the highest rank, but nevertheless much of his work was of permanent value. In addition, he brought about the foundation of a school of distinguished mechanics who devised the first really effective machine tools. From these tools have developed the marvellous mechanisms of the engineering shops of the present day.

Joseph Bramah was born in 1748 at the village of Stainborough, near Barnsley in Yorkshire, where his father rented a small farm. Joseph was the eldest of five children and he commenced work upon the farm at an early age. His favourite hobby at that time was making musical instruments. His only tools were very imperfect ones made for him out of old files and razor blades by his great friend the village blacksmith, but in spite of this handicap he turned out some excellent work, including a violin cut out of a solid block of wood.

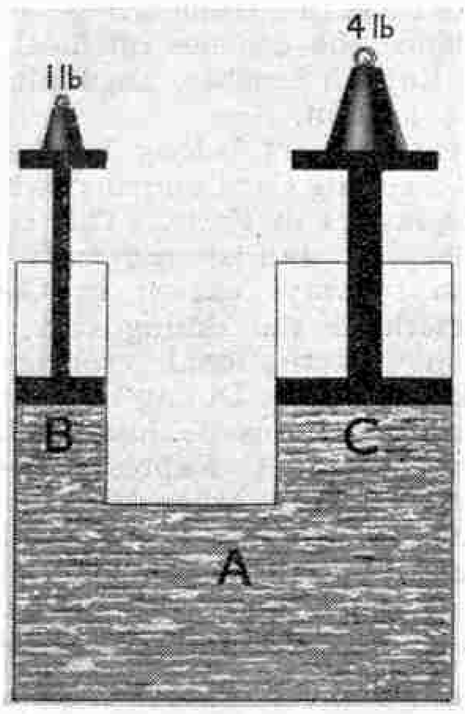


Fig. 1

Career Changed by an Accident

It is quite likely that Bramah would have remained a ploughman all his life but for an accident that occurred when he was about 16. This resulted in an injury to his right ankle that made him unfit for farm work. He was confined to the house for a considerable period, which he spent in carving various articles out of wood. His ability for this class of work was obvious to everybody and when he was able to to get about once more he was apprenticed to the village carpenter, under whose tuition he soon became an expert workman.

At the termination of his apprenticeship he realised that there was little prospect for him in his own locality and he therefore resolved to try his fortune in London, and he made the journey on foot. He soon found work with a cabinet maker and remained with him for some time, after which he set up in business on his own account.

Bramah's first invention was connected with household water apparatus and was sufficiently successful to place him on a sound footing. It is interesting to learn that at this time he sent for the blacksmith of his native village, who had made him his first tools, to take charge of the blacksmiths' department in his rapidly growing business.

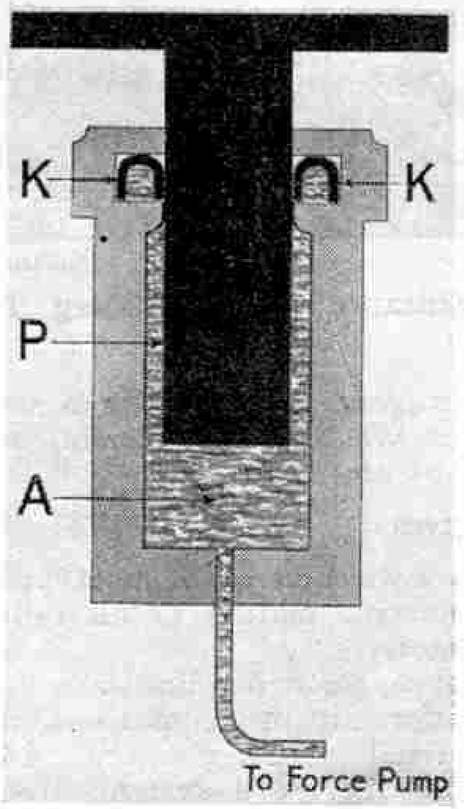


Fig. 2

The Bramah Lock

Shortly afterwards Bramah turned his attention to the invention of a satisfactory lock. The locks in use at that time were very imperfect and afforded little protection against expert thieves, but in 1784 Bramah took out a patent for a lock of a greatly improved type.

The security of this lock depended upon the principle of combinations. It consisted of a thin disc of metal placed inside a barrel and arranged so that when it was free to turn it operated the bolt of the lock by means of a pin on its under side. Normally the disc was prevented from

turning by a number of steel strips called sliders, lying in slots around its circumference. The sliders were pressed upward by means of springs, but could be forced downward by the key.

In the end of the key barrel were cut notches to fit the sliders. These notches were cut to different depths and therefore some of the sliders were pushed downward more than others, thus giving rise to the different combinations. When all the sliders had been depressed to their correct distances they were free to pass round the barrel along with the central disc that carried them, and the turning of the key thus opened the lock.

For a long time this lock was regarded as impregnable and a notice was exhibited in Bramah's shop window in Piccadilly, offering £200 to anyone who succeeded in picking the lock. Ultimately an American named Hobbs succeeded in picking it after considerable difficulty.

Machine Tools Devised

The value of Bramah's lock was soon recognised by the public and a very considerable demand for it sprang up. The success of the lock depended very largely upon the precision with which its various parts were made and finished, and Bramah was faced with the necessity for devising machine tools capable of turning out these various parts in sufficient quantities, and at the same time of uniform accuracy.

In devising these various machines he was very greatly assisted by Henry Maudslay, his foreman. Maudslay had a remarkable capacity for the devising and construction of machine tools, and in a future issue we hope to give an account of his extremely interesting career. Bramah and his foreman between them overcame all preliminary difficulties and very soon the lock-making business became a source of considerable profit.

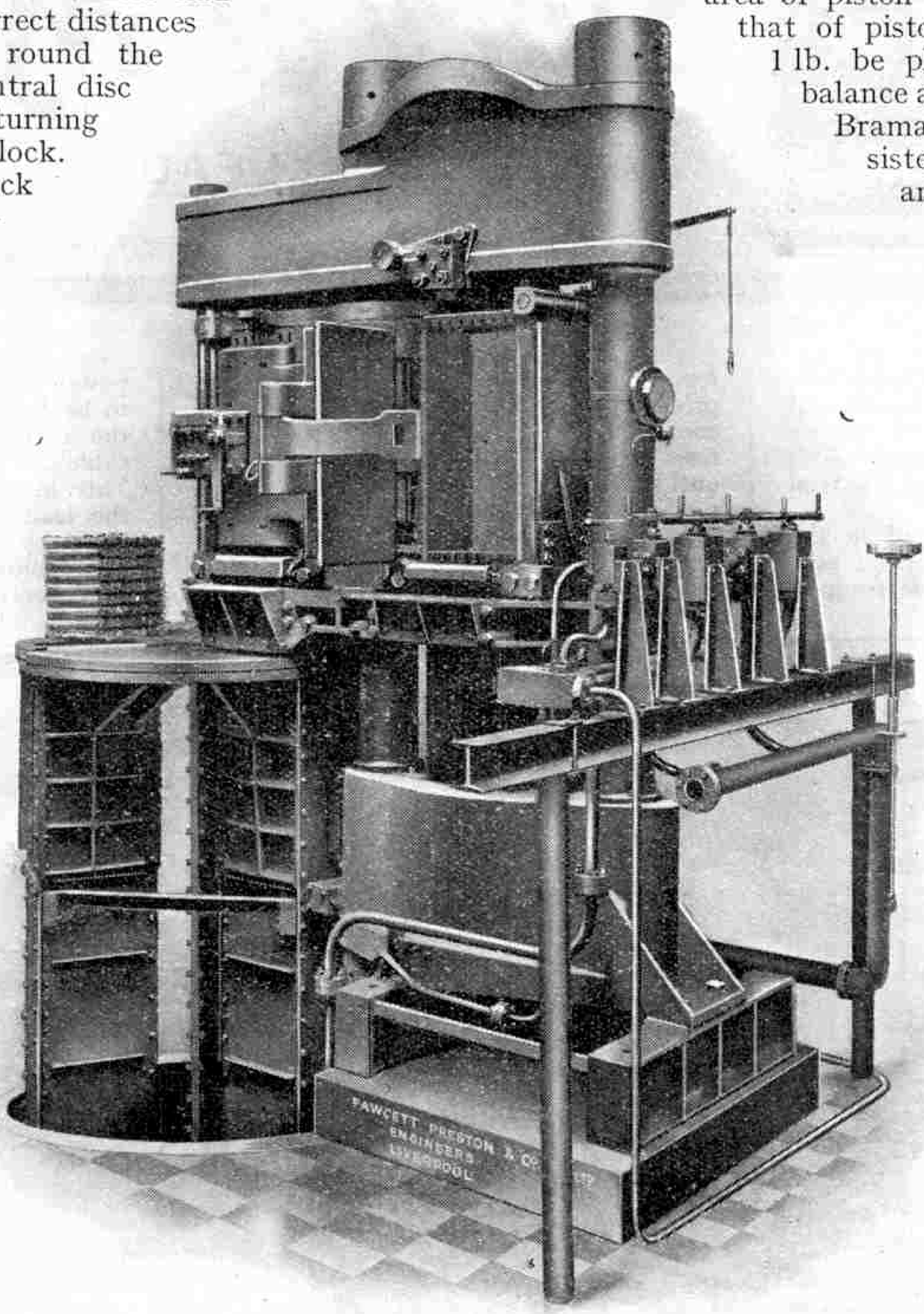


Photo courtesy] [*Messrs. Fawcett, Preston & Co. Ltd.*

A Modern Hydraulic Press for compressing Cotton or other Fibres into bales to reduce the cost of Freight

The Press compresses bales to a density of 56 lbs. per cubic foot and at the rate of 40 bales per hour, each bale weighing 500 lbs. The press weighs about 90 tons and exerts a pressure of about 2,000 tons.

Hydraulic Press Patented

In 1795 Bramah patented the hydraulic press, by which invention he is best known.

The principle underlying the action of the hydraulic press was put forward by Pascal, the famous French mathematician (1623-62), as follows:—"If a vessel full of water, closed on all sides, has two openings, the one a hundred times as large as the other, and if each be supplied with a piston which fits it exactly, then a man pushing the small piston will exert a force which will equilibrate that of 100 men pushing the large piston, and will overcome that of 99."

This important principle may be illustrated simply by reference to Fig. 1. The water vessel A has two cylindrical necks each fitted with a piston. The bore of cylinder B is one inch and that of cylinder C two inches. The area of piston C is therefore four times that of piston B, and if a weight of 1 lb. be placed on piston B it will balance a weight of 4 lb. on piston C.

Bramah's hydraulic press consisted essentially of a large and massive cylinder (A, Fig. 2) in which worked a closely-fitting solid plunger P. A force pump of very small bore communicated with the bottom of the cylinder and by means of this pump small quantities of water were forced at high pressure beneath the plunger, thus gradually forcing it upward. In this apparatus the cylinder A represents the large cylinder C in Fig. 1, and the force pump takes the place of the small cylinder B.

Maudslay Solves a Problem

In constructing his hydraulic press Bramah was baffled for a long time by the difficulty of preventing the escape of water between the top of the cylinder and the plunger, The problem was that of securing a joint sufficiently free to allow the piston to slide up through it and yet at the same time sufficiently watertight to withstand the internal pressure exercised by the pump.

Bramah tried all kinds of devices but without success, and at one time it appeared that his invention was doomed to failure. In this dilemma the ever-ready Maudslay came to the rescue and solved the problem in a simple manner by the use of what might be called a self-tightening collar. A collar of sound leather of U-section (K, Fig. 2) was fitted, convex side upward, into a recess turned in the neck of the cylinder at the place formerly occupied by the stuffing-box. When the high-pressure water was turned on it forced apart the edges of the collar and thus caused the leather to apply itself to the surface of the rising plunger with a degree of tightness proportionate to the pressure of the water. As soon as the

(*Continued on page* 394)

The Story of Metals

I. LEAD.

IN our June issue we described the mining of lead ore and the subsequent processes through which it passes before the pure metal is produced. This month we deal with the various practical applications of the metal.

We are all familiar with lead in the form of pipes in our houses. Lead pipe has probably been in use in one form or another for some 2,000 years. In our June issue we mentioned that lead pipes laid down in Rome, Herculaneum, and Pompeii some 1,800 years ago have lasted to the present day, the long life of these pipes being due to the fact that the coating of oxide that forms upon lead does not penetrate as deeply into the metal as does rust in iron pipes, but forms a protective coating which effectually prevents further corrosion.

The Latin word for lead is "*plumbum*" from which we get our English word plumber, which leads us to infer that the plumber's occupation is one of great antiquity.

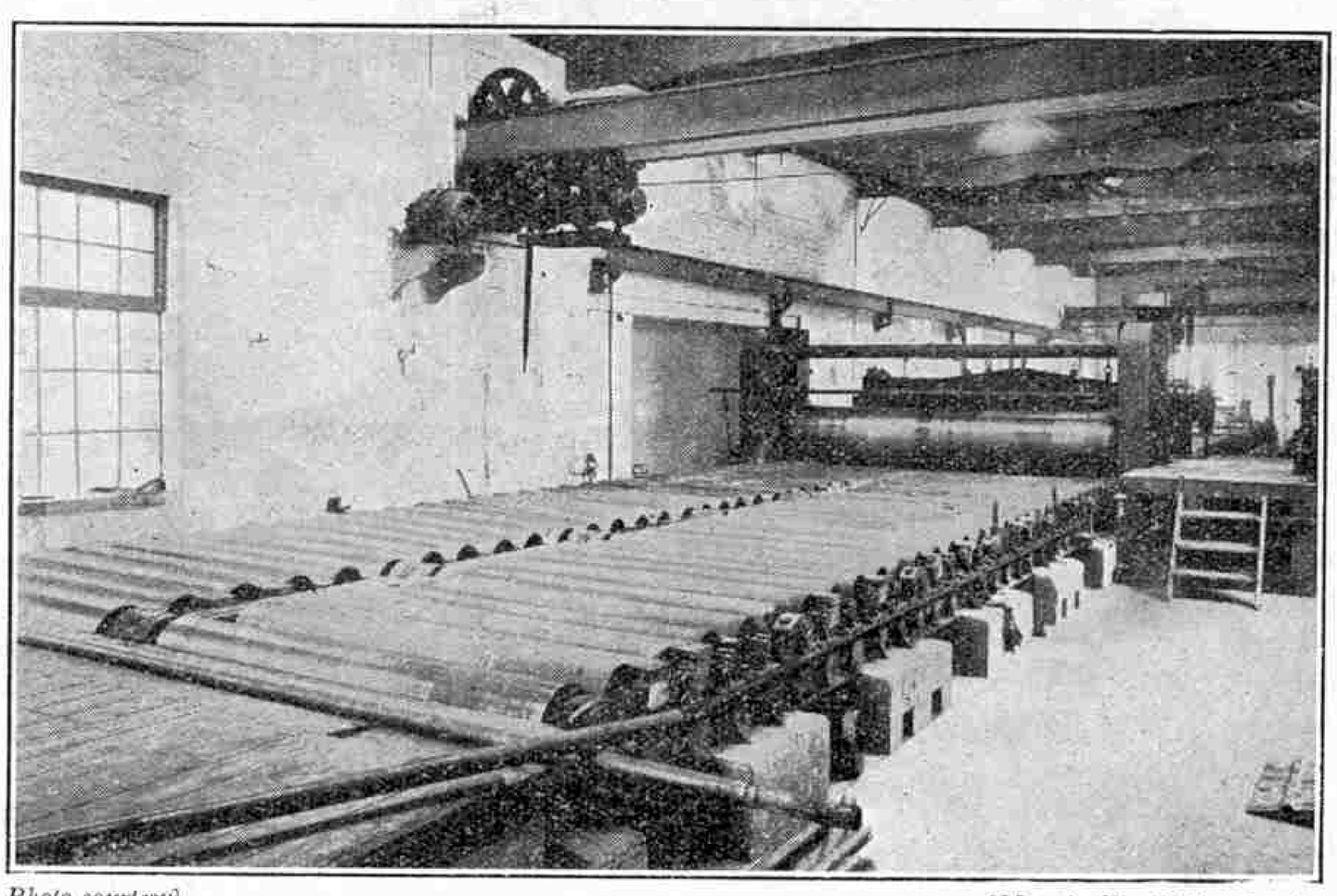


Photo courtesy] [*Mr. A. W. Wylie, London*

Electrically-driven Rolling Mill for Lead Sheet

Making Lead Pipe

The Romans made their lead pipe by bending over a piece of sheet lead until its edges touched and then burning these together.

This method of making lead pipe is only used to-day for pipe of very large diameter. The majority of modern lead pipe is made by a process known as "extruding," which consists of forcing molten lead through a die by means of hydraulic pressure.

The process is carried out in a large vertical cylinder at the top of which is a cylindrical plunger. In the centre of this plunger is a hole the diameter of which is the same as the outside diameter of the pipe to be made. A steel rod is fixed in the centre of the hole of the plunger. Molten lead is run into the cylinder and allowed to cool until it assumes a plastic condition. When all is ready for the process to commence hydraulic pressure is applied to force the cylinder containing the lead up to and round the fixed plunger. The lead is then forced out of the opening in the plunger and round the steel rod, thus forming itself into a pipe of exactly the required diameter.

If lead rod is required instead of lead pipe, the same method of extruding is adopted, the only difference being that the steel rod round which the pipe forms itself is not used, so that a solid rod is formed. Lead wire also is extruded, for lead cannot be drawn out like steel or copper. Solder, to which we shall refer later, is also often extruded in the form of wire.

Lead has many advantages over iron for domestic piping. It does not corrode, it is less likely to burst as the result of frost, and if a burst does occur a temporary repair may be effected by hammering the edges of the break together, which of course cannot be done with iron piping.

Lead-Sheathed Cable

We are all familiar with the gigantic reels of lead-sheathed cable that are seen in our streets when electric light and power cables are being laid. It appears to be a common idea that a lead pipe of the correct size is made and that the cable is then drawn through the pipe. This idea is quite wrong, however, for the lead sheathing is formed round the cable by a process of extruding.

A hollow core is made and this is set in a proper relationship to the die and pipe is made in the manner that has just been described. In this case, however, the core and die are so constructed that the pipe when made contracts down on the cable and pulls it through along with it. The sheathing can be put on tightly or loosely at will, according to the nature of the particular cable.

Mysteries of Solder

We have all at one time or another watched a plumber at work with his soldering iron, neatly joining together two pieces of lead or tin, and probably it has not struck us that there was anything very remarkable about the process. As a matter of fact, however, soldering is a process that presents many peculiar features.

Solder is made of tin and lead, and it is a curious fact that the alloy melts at a lower temperature than either metal separately. The result is that, by use of this lead-tin mixture, lead or tin may be soldered without being melted in the process. The so-called soldering iron used by the plumber to supply the necessary heat to melt the solder is usually made of copper, as this metal conducts the heat better and is more readily followed by the solder.

Frequently soldering is done by machinery, as in the case of the manufacture of tin cans and the sealing of them after they are filled.

The Use of a Flux

We all know that the plumber in his soldering operations uses what is known as

a "flux." Without the flux the solder could not be made to "stick." When the heated soldering iron is applied to the surface of a metal the latter tends to oxidise immediately, and the oxide forms a thin coating that effectually prevents the junction of the solder with the metal.

The flux has two functions—it prevents the oxide from forming, or, in case any does form, it dissolves it immediately. Several fluxes of varying efficiency are in use, one of the commonest being a mixture of zinc chloride and sal ammoniac.

Lead Alloys for Sprinklers

We have already mentioned that an alloy of lead and tin melts at a lower temperature than either metal alone. By the addition of bismuth and cadmium, alloys with even lower melting points may be produced. Such alloys are employed in automatic sprinklers for large factories and works, where the danger of fire is always great. Under normal conditions the valves controlling the sprinklers are maintained in a closed position by means of a solder of the alloy. When a fire occurs the temperature quickly rises, and at a certain point the solder melts and the valves automatically open and release the water.

The melting points of the various metals to which we have just referred are as follows :—Lead 620°F, tin 450°F, bismuth 504°F and cadmium 610°F. An alloy of all these metals may be made, however, that has a melting point as low as 158°F.

Rolling Lead Sheet

The illustration on the previous page shows a large rolling mill for rolling lead into sheets. A slab of the metal is run backward and forward between the rollers, which are very gradually brought closer and closer together until the sheet reaches the required thickness. The mill in our illustration is electrically driven and is capable of applying enormous pressure. Lead sheet rolled out in this manner is used for covering and protecting large surfaces.

For some purposes, however, lead sheet is not so suitable as steel sheet coated with lead. This coating may be effected by placing the steel sheet —previously cleaned with acid and dipped into a flux—in a bath of molten lead, afterwards withdrawing it and draining off the excess lead.

Lining Iron Pipes

Sometimes a thicker coating of lead is required than can be secured by this dipping process. This is the case with iron pipes that require to be provided with a heavy acid-proof lining. Such a lining may be obtained by casting the lead.

Inside the iron pipe is placed a core of such diameter as to leave between it and the pipe a space equal to the thickness of the lining required, and molten lead is then poured into that space. As an alternative a lead pipe may be fitted closely inside the iron pipe and bonded to it by applying heat to the exterior of the latter. The lead pipe thus becomes "sweated" to the iron.

This sweating process is employed for lining large iron tanks with lead sheet in order to render them capable of holding corrosive liquids. Lead may be deposited also by means of an electroplating process.

Lead Wool

From very ancient times lead has been used for fixing iron bolts to masonry, the molten metal being poured into a hole around the bolt so that when it cooled it united the bolt firmly to the masonry.

A modern and interesting development of this process is the use of lead wool or shredded lead. A mass of what may be called lead threads is pressed round the bolt with a hammer and a caulking tool. During the process the lead fibres become squeezed and pressed together into a solid mass as compact as if molten lead had been used.

Lead wool is made by passing the molten metal through a sprinkler perforated with extremely tiny holes. The threads of metal thus produced quickly solidify and are twisted loosely into a rope. Shredded lead consists of very fine thread-like shavings planed off from the cold metal.

Lead in Ammunition

Lead plays an extremely important part in the making of ammunition. The smallest shot are made by an interesting process of dropping from a shot tower. Molten lead, to which a minute quantity of arsenic has been added, is poured into a pan the bottom of which is perforated with extremely small holes. The height up the tower at which this pan is placed is decided by the size of the shot to be made, the largest shot being dropped from the highest level.

The molten lead finds its way through the holes in the pan in the form of drops. These fall to the bottom of the tower into a tank of water, which breaks their fall and prevents them from flattening as they would if they fell upon a solid floor. From the tank of water the shot are dried and polished and are then carefully tested for uniformity in shape and size.

The dropping process can only be used for small shot and larger shot are therefore cast. At one time all such casting had to be done by hand, but of recent years mechanical moulding methods have been introduced.

Type Metal

In the early days of printing, each printer made his own types by cutting out the letters on small pieces of wood or soft metal. This process was very slow and gradually a method was evolved of casting separate types by means of moulds in sand or other convenient material. At first the casting was done entirely by hand but the growing need for speed resulted in the development of type-casting machines. Still later came machines that not only cast their own type but set it by the operation of a keyboard, the best-known of these machines being the Linotype, which is used in newspaper offices throughout the world. Lead has been a very important factor in this development of type-setting, for the casting metal that is used, and which is known as type metal, consists of an alloy of lead, antimony, tin and perhaps a little copper.

There are many other valuable applications of lead in the glass, pottery, rubber and other industries. We have not space here to deal adequately with these applications, and therefore we shall postpone them until we come to deal with these individual industries in a series of illustrated articles that we think will prove of great interest to our readers.

From Mine Prospector to Millionaire

The life stories of men who have risen from poverty to great wealth are nearly all similar in one respect, namely, that the rise has been gradual and spread over a long period of years of strenuous work. Sudden rises to wealth are rare and therefore all the more interesting. One of the most remarkable instances of such a sudden rise is that of an American mine prospector named George Carson, whose portrait we reproduce above.

Years ago, in the course of his search for mineral wealth, Carson became interested in copper and gradually there grew up in his mind the outline of a new method of smelting copper ore. Bit by bit he worked out the details of his process and ultimately he took out a patent. His next step was to put his process before the great copper companies, but here he met with bitter disappointment. Firm after firm refused to have anything to do with his scheme, and ultimately he gave up all hope of ever having it accepted.

Recently, however, a wonderful change of fortune occurred. In some way or other Carson found out that one of the largest copper smelting and refining companies in the world was using his process, and further inquiry revealed the amazing fact that this firm had been employing the process for nearly 20 years! Carson at once took steps to enforce his rights. He succeeded in obtaining the assistance of a group of financiers, and commenced an action against the company to recover the money due to him. A prolonged legal struggle ensued, and a few weeks ago Carson finally won his case, the United States Court of Appeal upholding his claim against the company.

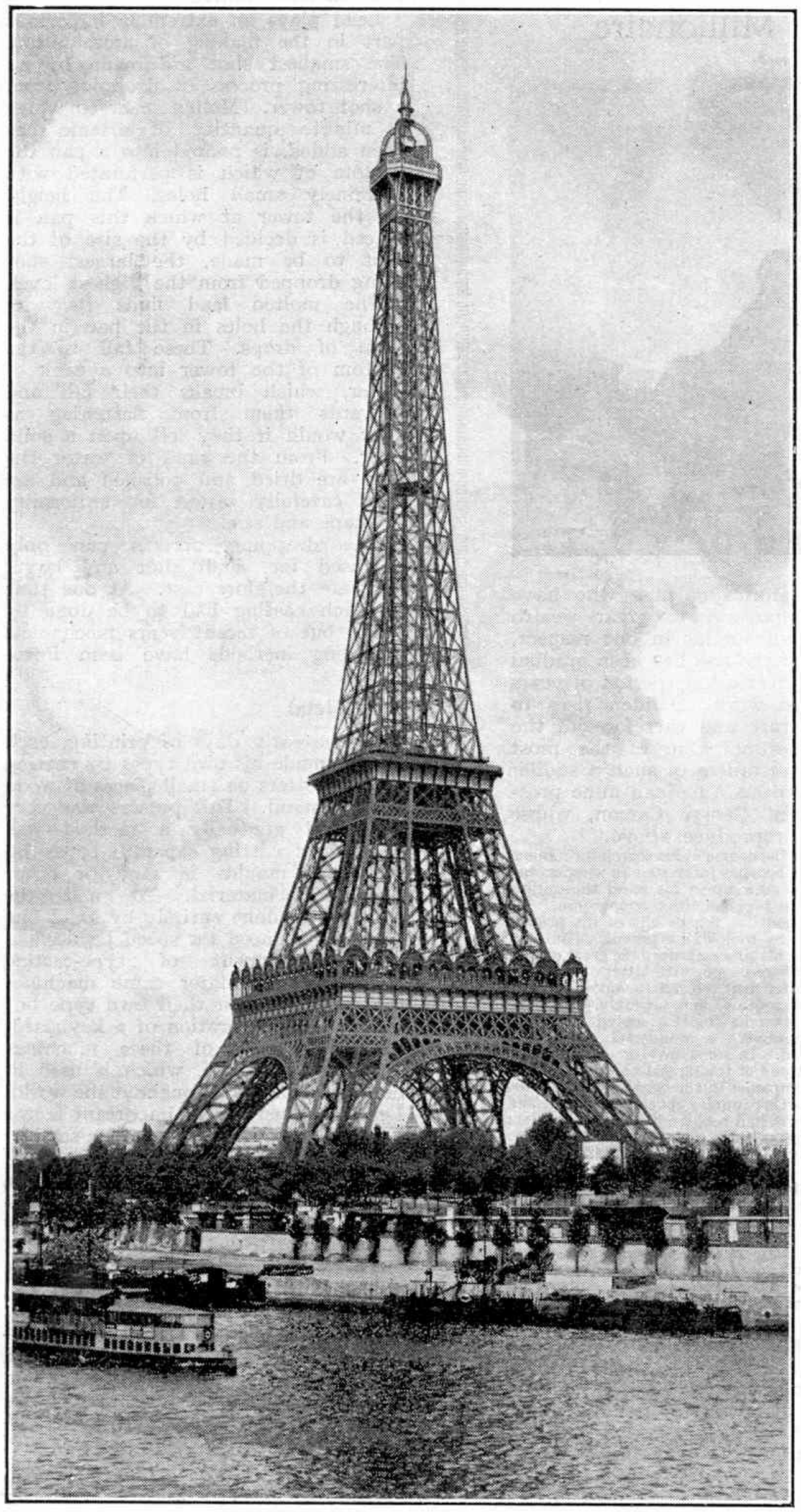
As the result of this decision, Carson, the penniless mine prospector, becomes entitled to the huge sum of £5,000,000.

NEXT ARTICLE:—

ALUMINIUM

The Highest Structure in the World

The Eiffel Tower and its 6,500 Tons of Iron



Eiffel's Masterpiece
The Eiffel Tower is the Highest Structure in the World

FROM the time of the Tower of Babel to the present day, very high buildings and objects have always exercised a great fascination. The Pyramids of Egypt, one of which is 484 ft. in height, and the Colossus of Rhodes, a bronze statue 105 ft. in height, are early examples of high structures, those of more recent origin including Cologne Cathedral, 528 ft. in height and the Washington Obelisk, 541 ft. in height.

In 1886 a French engineer, Gustave Eiffel, proposed to erect for the Paris Exhibition of 1889 a building that should dwarf every previous structure. His proposal met with strong criticism, and many prominent engineers ridiculed the idea and predicted the speedy collapse of such a towering structure. Eiffel had absolute confidence in the success of his scheme, however, and he commenced operations and persevered with his task. In two years, to the confusion of his critics and the astonishment of his friends, the great Tower was completed in the Champs de Mars, where it stands to this day with unimpaired strength.

A Great Engineering Triumph

Gustave Eiffel was born at Dijon on 15th December, 1832. From his early boyhood he was determined to become an engineer, and was so successful at school in all subjects connected with mechanical or engineering matters that he was placed as a student in the Paris School of Arts and Crafts. Here he qualified as an engineer, and while quite a young man was appointed to superintend the construction of an iron bridge over the river Garonne at Bordeaux. By 1868 he had succeeded so well as to be able to establish his own engineering works, and from that time onward his name became closely associated with striking engineering achievements all over the world. He built the famous Garabit Viaduct of Cantal, the great bridge over the River Douro at Oporto, and the movable dome at the observatory at Nice.

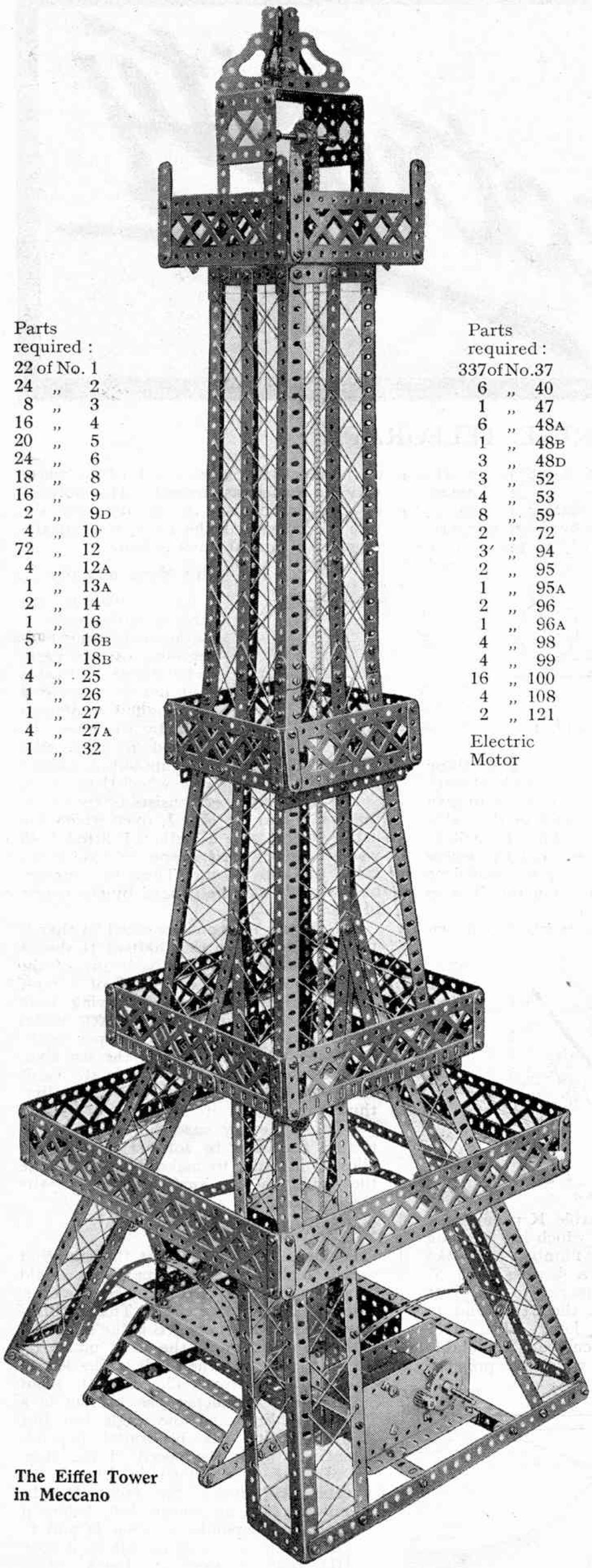
For many years Eiffel gave particularly careful study to the combined effects of iron columns and cross ties, and he was the first engineer to use the compressed air method in bridge construction. After several years of experience in connection with metal bridges, he undertook successfully the building of the framework of the huge Statue of Liberty in New York harbour in 1884, and five years later he became world-famous as the designer and constructor of the great Eiffel Tower—the highest building in existence.

The Massive Foundation

In erecting this huge structure Eiffel's first task was to secure foundations capable of supporting the enormous weight of the tower—6,500 tons. Four trellis-work piers were decided upon and work on the foundations for them was commenced early in 1887. The two piers furthest from the river Seine presented comparatively little difficulty, as a thick layer of gravel was found at a depth of 16½ ft., the ordinary water level of the river. The other two piers gave more trouble, however, as their foundations had to be taken down to twice this depth in order to reach the gravel.

The masonry foundations rested upon concrete, and the four uprights of each of the four pedestals were fixed to the masonry by anchor bolts. In order to counteract any possible displacement of the anchor bolts, a hydraulic press was inserted in each of the four feet of the structure.

The tower itself was built of a series of main ribs braced together by elaborate trellis work. As far as possible the various parts of the structure were finished in the workshops and hoisted to their final positions by cranes, leaving only the junctions to be completed. Two-and-a-half million rivets were used, and on the verticality of the tower being carefully tested, when



Parts required:

22	of No.	1
24	„	2
8	„	3
16	„	4
20	„	5
24	„	6
18	„	8
16	„	9
2	„	9D
4	„	10
72	„	12
4	„	12A
1	„	13A
2	„	14
1	„	16
5	„	16B
1	„	18B
4	„	25
1	„	26
1	„	27
4	„	27A
1	„	32

Parts required:

337	of No.	37
6	„	40
1	„	47
6	„	48A
1	„	48B
3	„	48D
3	„	52
4	„	53
8	„	59
2	„	72
3′	„	94
2	„	95
1	„	95A
2	„	96
1	„	96A
4	„	98
4	„	99
16	„	100
4	„	108
2	„	121
Electric Motor		

The Eiffel Tower in Meccano

the structure had reached the height of 720 ft. it was found to be absolutely correct. The total cost of the tower was £260,000, of which the State contributed £60,000.

Electric Lifts for Visitors

The total height of the tower is 984 ft. from the ground or 1094 ft. above sea level. The first platform is 189 ft. up—only 27 ft. lower than the towers of the Cathedral of Notre Dame, Paris. The second platform is 380 ft. up and the actual tower that rises from this second platform is 526 ft. in height, finishing at the third platform at a height of 906 ft.

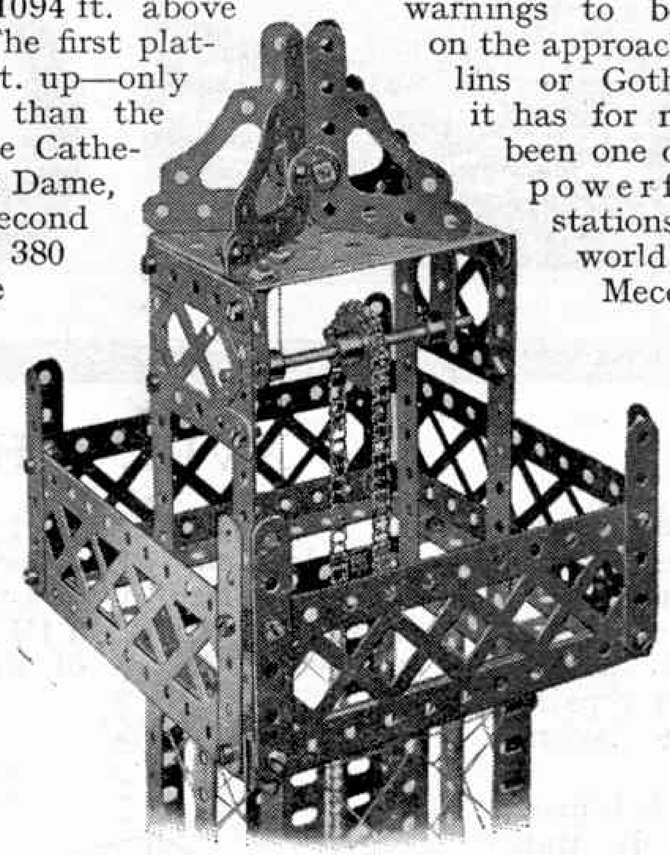


Fig. A

The campanile and lantern above the third platform bring the structure to its full height of 984 ft.—more than twice the height of the dome of St. Paul's Cathedral. A further comparison will no doubt interest the large numbers of our readers who have visited Blackpool. The Blackpool Tower, which seems to reach almost to the clouds, is only 500 ft. in height—scarcely more than half the height of the Eiffel Tower!

The Tower proved a great commercial success during the Exhibition of 1889, and tens of thousands of visitors took a trip to the top to enjoy the wonderful view. Afterwards it was found to be unprofitable, however, and was eventually taken over by the municipal authorities of Paris, partly with the idea of using it as a scientific observatory. The tower has always been very popular with sightseers on account of the marvellous view of Paris and its surroundings that can be obtained from the highest gallery, and for the use of these sightseers electric lifts are installed. Several spectacular feats, such as climbing to the top by means of a loose rope and cycling from the highest platform to the ground, have also been staged from the Tower.

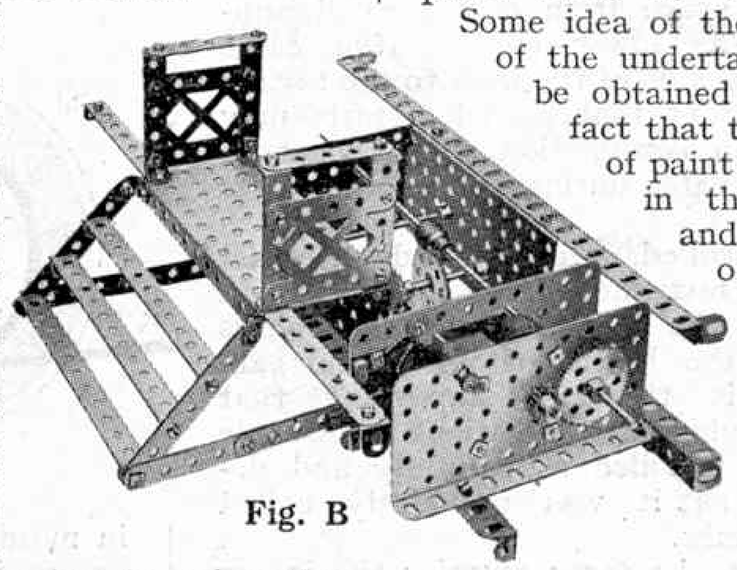


Fig. B

The Tower during the War

During the war the Eiffel Tower proved of the greatest value as an anti-aircraft observation post, enabling warnings to be sounded on the approach of Zeppelins or Gothas. Also it has for many years been one of the most powerful radio stations in the world. Many Meccano wireless amateurs, and especially those who possess valve sets, are familiar with the well-known call sign of the Eiffel Tower—FL. In this connection the Tower received what is perhaps its greatest vindication when General Ferrie, Inspector of French Military Telegraphs, said that "FL." served so many important scientific and military purposes that if such a tower had not already existed it would have been necessary to build one.

It is interesting to know that last year the Tower received the fifth coat of paint since it was built. Some idea of the vastness of the undertaking may be obtained from the fact that thirty tons of paint were used in the process and the job occupied 100 men a total of 4,000 hours!

Eiffel was always extremely proud of his achievement, and the success of his original plans must have been a source of great satisfaction to him. Until the time of his death, in December 1923, he maintained a flat on the third floor of the Tower. There, 906 ft. above the ground, the great engineer would retire to his comfortable room to think in quietness of the past and plan out new schemes for the future.

The Eiffel Tower in Meccano

The Meccano model of the Eiffel Tower is well known.

(*Continued on page* 389)

XVIII. THE SUBMARINE TELEGRAPH

LAST month we briefly described the history of submarine telegraphy from the days of the brothers Brett to the present time. We now come to the methods employed in laying the cable and in repairing it when it becomes damaged.

After a cable is manufactured it is transferred to a ship containing equipment for storing and laying it, and also for grappling for it and bringing it to the surface if a break should occur. The paying-out apparatus is shown diagramatically in Fig. 1.

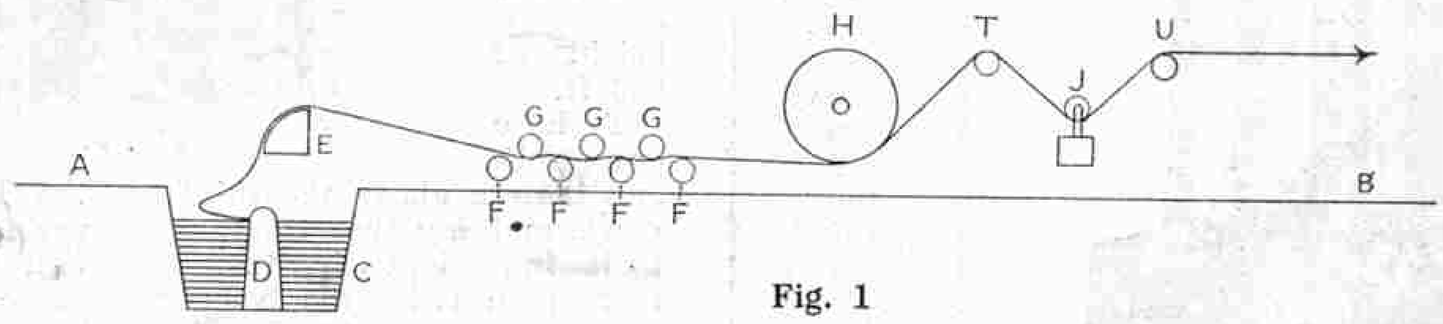


Fig. 1

In this figure the line AB represents the deck of the cable ship. The cable is coiled in a tank C, slightly broader at the top than at the bottom, and having at its centre a cone D. The cable is coiled round the cone, each layer or "flake" being laid flatly and precisely filling the space from centre to circumference. The lower end of the cable is led up the side of the tank to the testing cabin in order that electrical tests may be made in conjunction with the shore end of the cable during the whole process of laying.

Once uncoiled, a cable tends to twist itself into intricate curves and knots on account of the various twists and spirals in which the layers of its interior are laid. It is therefore important that during paying-out operations the cable should be uncoiled as carefully and deliberately as it was previously coiled into the tanks.

Owing to the tarry exterior the layers of cable would be apt to stick to one another, but this is prevented by giving the cable a coat of whitewash before it is stowed away, and during the whole period of its stay in tanks, either in the factory or on the cable ship, it is kept under water to prevent it from drying-out and losing its flexibility.

Fig. 1 shows only one tank, but actually a cable ship has three or four different tanks each containing a section of the cable.

Paying Out

Now let us suppose a section of the cable has to be laid. It is first led over a guiding quadrant E; then alternately over and under the series of pulleys FG; under the paying-out drum H, round which it passes several times, and through the dynamometer mechanism TJU to a pulley (not shown) at the stern of the ship, from which it passes into the water. Of the pulleys FG, those lettered G may be raised or lowered with reference to those lettered F, so as to give any desired amount of bend to the cable passing through them. The F pulleys are provided with brakes, and the whole system is designed to give sufficient back-pull to the cable to make it grip the paying-out wheel H.

In Fig. 2 the paying-out wheel is shown

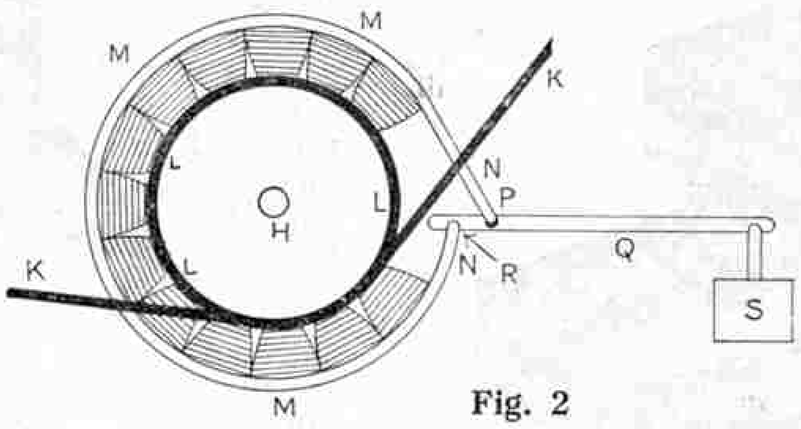


Fig. 2

in more detail. The cable K passes in a groove in the wheel H which has pressing against its rim L a number of brake blocks M attached to a flexible band N, one end of which is attached to the pivot P of the lever Q and the other end to the point R on this lever. The lever carries on its outer end an adjustable weight S, by means of which the pressure of the blocks M on the rim L of the wheel may be varied as desired. The purpose of this mechanism is to regulate the rate of paying-out the cable so that the correct amount of slack is laid.

Mile Marks on Cable

Each mile of the cable is indicated by a marker consisting of a wrapping of jute yarn, and the length of cable paid out is calculated from the number of turns made by the wheel H, checked by these mile marks. The rate of paying-out is gauged by the rate at which the wheel H revolves.

The dynamometer consists of two fixed pulleys T and U, Fig. I, over which the cable passes, and a pulley J fitted to a weighted block that is free to slide vertically up and down. Thus the tension on the cable may be gauged by the height of the block J.

An electric motor is arranged so that it may be coupled to the shaft of H should it be necessary to haul back any of the cable owing to the discovery of a fault or to an excess of slack having been paid out. The amount of slack varies from three per cent. to ten per cent., according to the contour of the sea floor. It must be sufficient to enable the cable to adapt itself easily to any inequality, thus preventing it spanning across a hollow. In every case, however smooth the sea floor may be, some slack is always allowed in order to make it easy to raise the cable to the surface when repairs become necessary.

The Danger of Spans

It might be thought that the fact that sufficient slack had been paid out would be a guarantee that no spans could occur, but that is not the case. This is illustrated in Fig. 3, where AB is the sea level, CDE the sea floor, F the stern pulley on the ship, and GH the cable. The length of cable GH from pulley F to the point H where it touches the bottom is a straight line, and the angle this line makes with the horizontal depends entirely upon the speed of the ship.

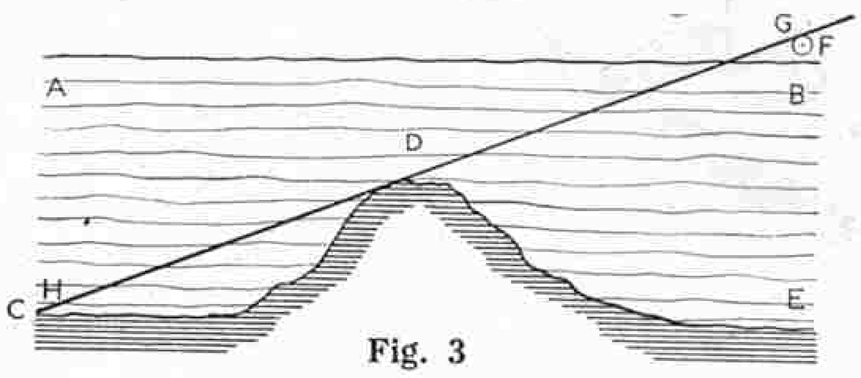
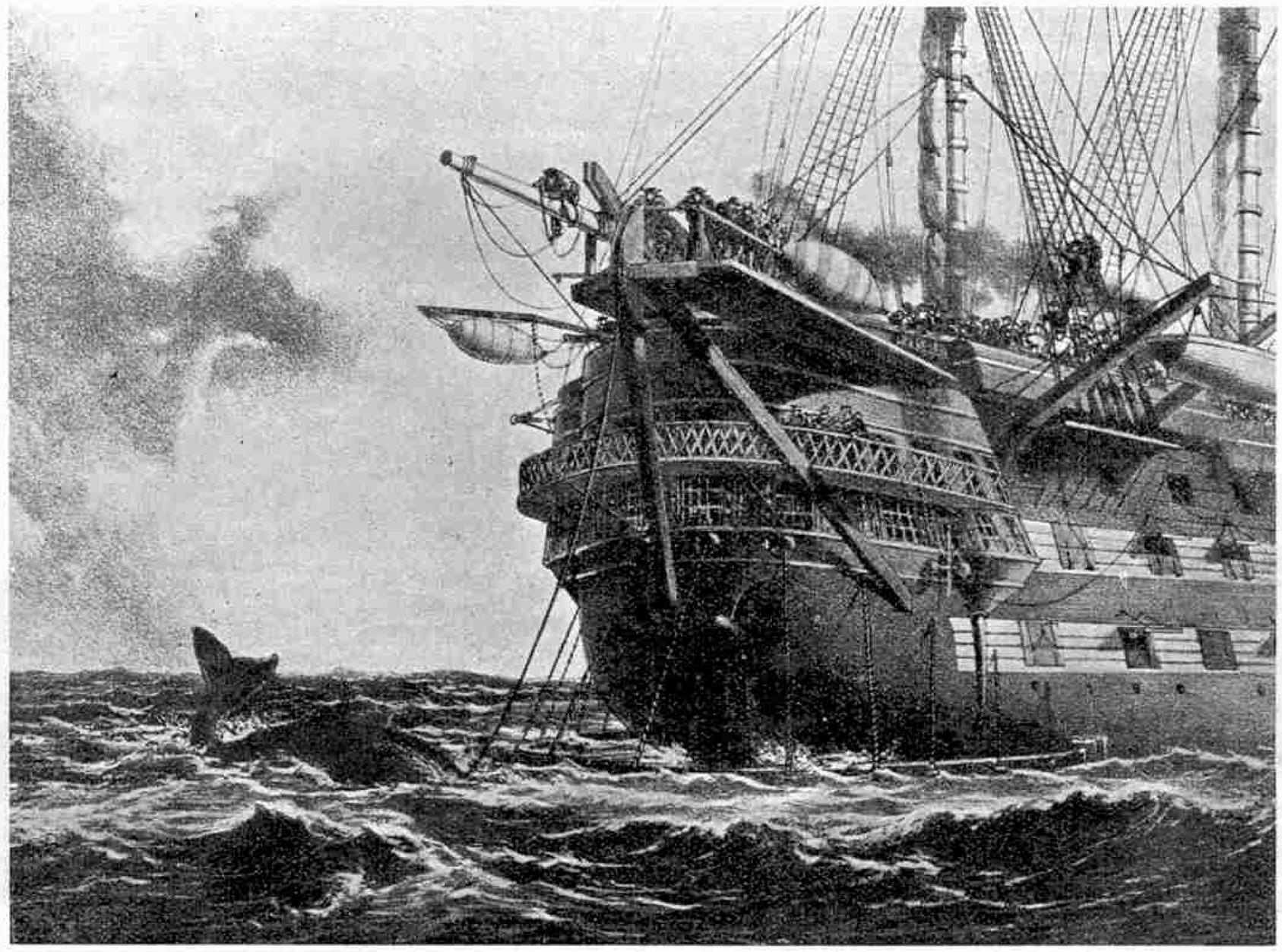


Fig. 3

In the case shown in Fig. 3 the cable will touch the point D, the summit of a submarine hill, before it touches the points between D and C. Consequently it will be left in a span HD that is sure to break either

immediately or at some future time. If considerable slack is paid out, the cable, provided it is sufficiently heavy, will slip across point D towards C until most of the section HD is resting on the ground CD. During this sliding, however, the outer covering of the cable is almost certain to be damaged so that a breakdown will result sooner or later.

Thus it will be seen that, in order to ensure success, not only must the necessary amount of slack be laid, but also the ship must be running slowly, the actual speed being determined by the nature of the sea floor. It is interesting to note that at a depth of 3,000 fathoms, with the ship steaming at her normal cable-laying rate of rather less than eight knots, there is more than 25 miles of cable still in suspension between the ship and the bottom of the sea.



Courtesy] [*White Star Magazine*

H.M.S. "Agamemnon" laying the Atlantic Cable of 1858. A Whale threatens danger

An Ingenious Slack Indicator

Messrs. Siemens Bros. and Co. Ltd., have produced a very ingenious and simple slack indicator, a portion of which is shown in Fig 4. A threaded rod A carries a thin disc B fixed to a threaded boss C. In contact with B is a cone D fixed to the rod E and arranged so that its line of contact is parallel to A. The rod A is driven by gearing from the axle of the paying-out drum and therefore its speed depends upon the rate at which the cable is being paid out. The rod E with the cone D is driven by a steel wire that is continuously paid out from the stern of the ship without any slack. The disc B is driven by friction from the cone D, and on account of the thread on rod A will always take up such a position that it rotates at the same speed as A. Thus if E rotates faster than A, B will move to the left, and if slower it will move to the right. To a certain extent the indicator may be likened to a continuously variable friction gear, the position of the disc B along the rod A indicating the amount of slack actually paid out.

By the use of this mechanism the brakeman's task is considerably simplified, and elaborate calculations from data obtained from the dynamometer and varying with the weather conditions are rendered unnecessary.

International Cable Signal

While a ship is actually engaged in laying a cable she flies the international cable signal, consisting of two red canvas globes with a white canvas diamond between them, hung vertically in the rigging. The globes are about 2 ft. in diameter and are hung 6 ft. apart. At night the cable sign consists of lanterns arranged vertically, the top and bottom ones red and the middle one white. All other ships on seeing this signal give the cable ship a wide berth in order that she may continue her straight course uninterrupted. A detour of a mile or so might mean two or three miles of cable unnecessarily paid out, and such a length of cable represents a good deal of money. Another reason for all other ships getting out of the way of a cable ship is that the latter, being attached to the cable, is greatly hampered in her movements.

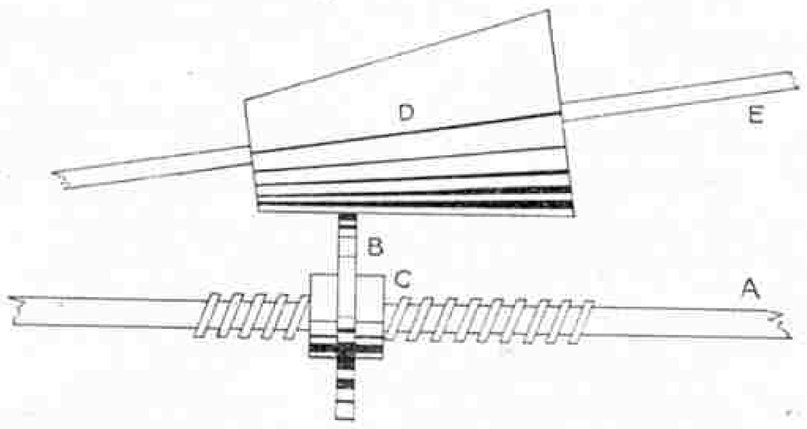


Fig. 4

During the whole time that paying-out is taking place the electrical continuity of the cable is under constant observation. From the moment when the testing instruments have been attached to the first shore end landed, electrical experts are on watch at both ends of the cable and signals are exchanged at stated intervals until the cable has been completely laid. In the testing room on board the ship there is always an electrician on duty watching the reflection of a spot of light from a mirror galvanometer. This light is in constant motion owing to induced electric currents of various origins. Every fifth minute, however, an impulse is sent through from the shore end which gives the little mirror a decided swing in one direction, and indicates that so far there is no break, electrical or mechanical, in the cable. When the cable ship first leaves shore there is a great deal of irregularity in the movements of the galvanometer, but the operation of the instruments tends to become steadier with every successive mile of cable laid. The combination of cold and pressure on the bed of the sea improves the insulating qualities of the gutta - percha covering of the copper conductor.

Cable Casualties

However well a cable may be manufactured and laid it is always liable to injury and breakdown. The danger of injury is, of course, much greater near the shore than it is at great depths, for below a depth of a very few fathoms there is no movement of the water, even when the severest storms are raging on the surface. Close to shore, however, a sandy sea floor is often moved considerably by the force of a storm, and whatever is lying upon this sand is moved also. Consequently, when a severe storm occurs, the portion of a cable close to land is very likely to be damaged. On rocky coasts also the cable is liable to constant chafing which eventually wears through the insulation.

Even in the deepest water, however, the cable is exposed to danger. For instance, a great storm may send a fine ship down to find its last resting place across a cable. Off the west coast of Ireland, where many trans-Atlantic cables converge and where during the war the activities of German submarines were considerable, repair ships when grappling for cables that have failed have on various occasions pulled up funnels and other parts of wrecked ships. One cable belonging to the Western Union Telegraph Co., was put out of action recently by what is believed to be the wreck of a large ship sunk by a submarine so that its keel lay across the cable. In the course of a few years the weight of this ship, together with a slight shift of its position, wore through the insulation. Several miles of cable had to be abandoned and a new section spliced in to pass round this obstruction.

(*Continued on page* 425)

New "King Arthur" Locomotives

4-6-0 Super-heated Express Locos for Southern Railway

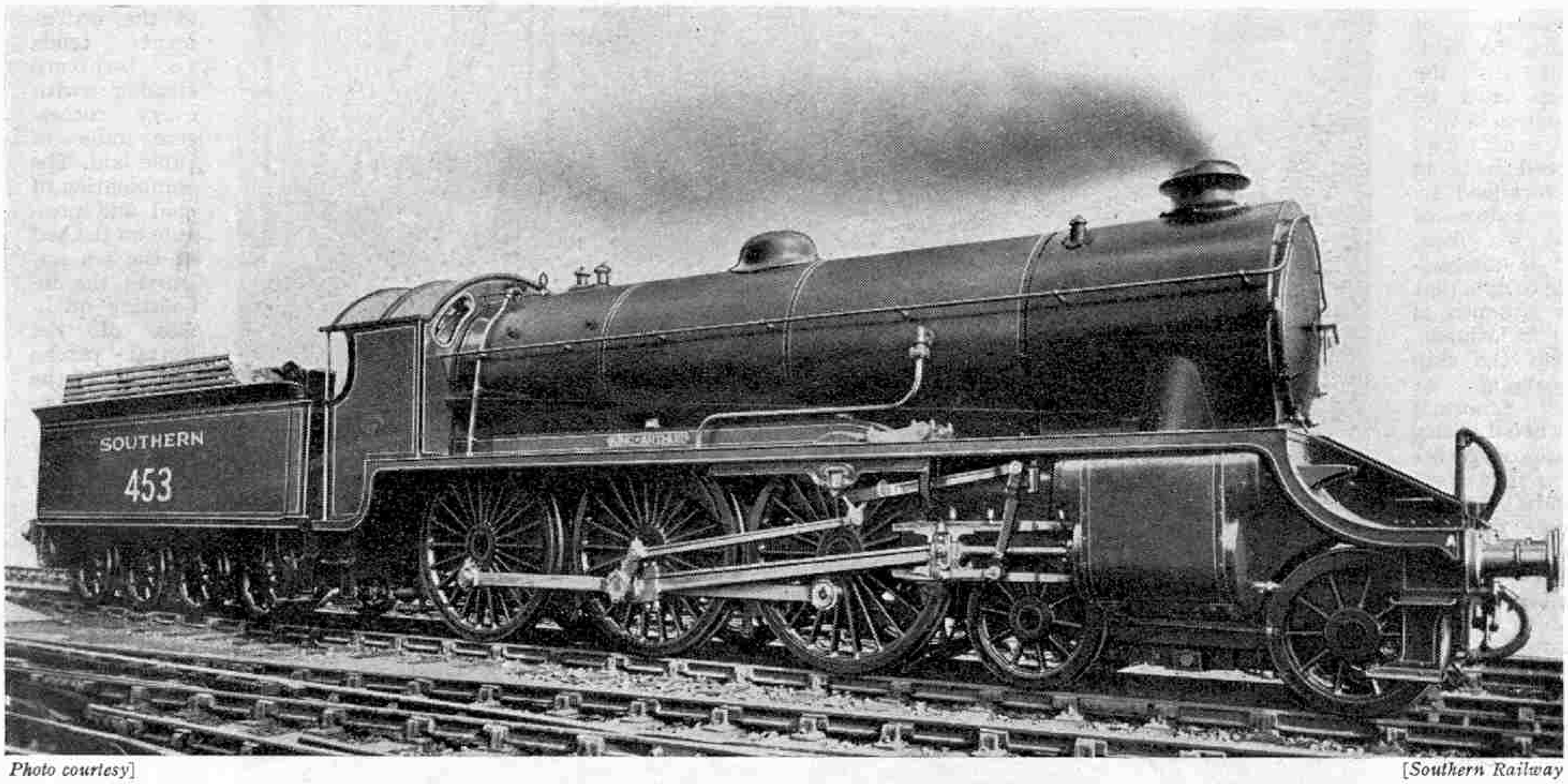


Photo courtesy] [*Southern Railway*

No. 453 "King Arthur," the original of the 4-6-0 type of express passenger locos of the Southern Railway

A BATCH of ten 4–6–0 rebuilt superheater express locomotives numbered 448–452 and 453–457, are now being constructed at the Eastleigh works of the Southern Railway. The first two locos of this class, Nos. 453 and 454, are named "*King Arthur*" and "*Queen Guinevere*" respectively. Both are now in service and the remainder will be completed and put into service shortly.

Alterations in Design

Before rebuilding, the locos had wheels of 6 ft. diameter and four cylinders, 15 in. diameter by 26 in. stroke, driving on two axles. As rebuilt they are similar to the latest London and South Western express locos, however, and have 6 ft. 7 in. wheels. Various modifications have been introduced by Mr. R. E. L. Maunsell, C.B.E., the chief Mechanical Engineer of the Southern Railway.

There are now two cylinders, 20½ in. in diameter by 28 in. stroke, and a working steam pressure of 200 lb. per sq. in. The valve gear has been altered to give a longer travel of about 6⅜ in. to the piston valves in full gear.

The boiler is standard for the class, but it is fitted with the Maunsell superheater, having Header vacuum relief valves, Ross safety valves, and a larger chimney. The Ashford sight feed lubricator is arranged to feed into the steam pipes that join the cylinders outside the smoke box.

Loco Details

The overall dimensions of the locos have been reduced in height and width to enable them to be worked on any section of the Southern Railway. Pumps are fitted to maintain the vacuum for the brake. The tenders are of the original design, but the wells and the Drummond feed water heater have been removed.

The leading dimensions and particulars of weights, etc., are as follows :—

Cylinders (two)	20½ in. dia. by 28 in. stroke
piston valves	19 in. dia.
Wheels—driving (six)	6 ft. 7 in. dia.
bogie (four)	3 ft. 7 in. dia.
Heating surface, firebox	162 sq. ft.
tubes 2 in. dia.	1,252 sq. ft.
5¼ in. dia.	464 sq. ft.
Total	1,878 sq. ft.
Superheater	337 sq. ft.
Grate area	30 sq. ft.
Working Steam pressure	200 lb. per sq. in.
Tractive effort at 85% h.p.	25,320 lb. or 11.3 tons
Tender—water capacity	4,300 galls.
coal capacity	5 tons
Weight on coupled wheels	59 tons 3 cwt.
in working order, engine	79 tons 18 cwt.
tender	49 tons 3 cwt.
Total weight in working order, engine and tender	129 tons 1 cwt.

Successful Trials

Locomotive No. 453 ("*King Arthur*") has already been put into main line service with quite satisfactory results. It was attached to the 1 p.m. express, Charing Cross to Folkestone (Central), the load of which was specially strengthened to consist of eight double-bogie

coaches and five Pullman cars, a total weight behind the tender of 413 tons, exclusive of passengers and luggage.

Although the locomotive was restricted to a maximum speed of 60 miles per hour, the journey was accomplished over this unusually difficult section of railway several minutes within the regular booked timing.

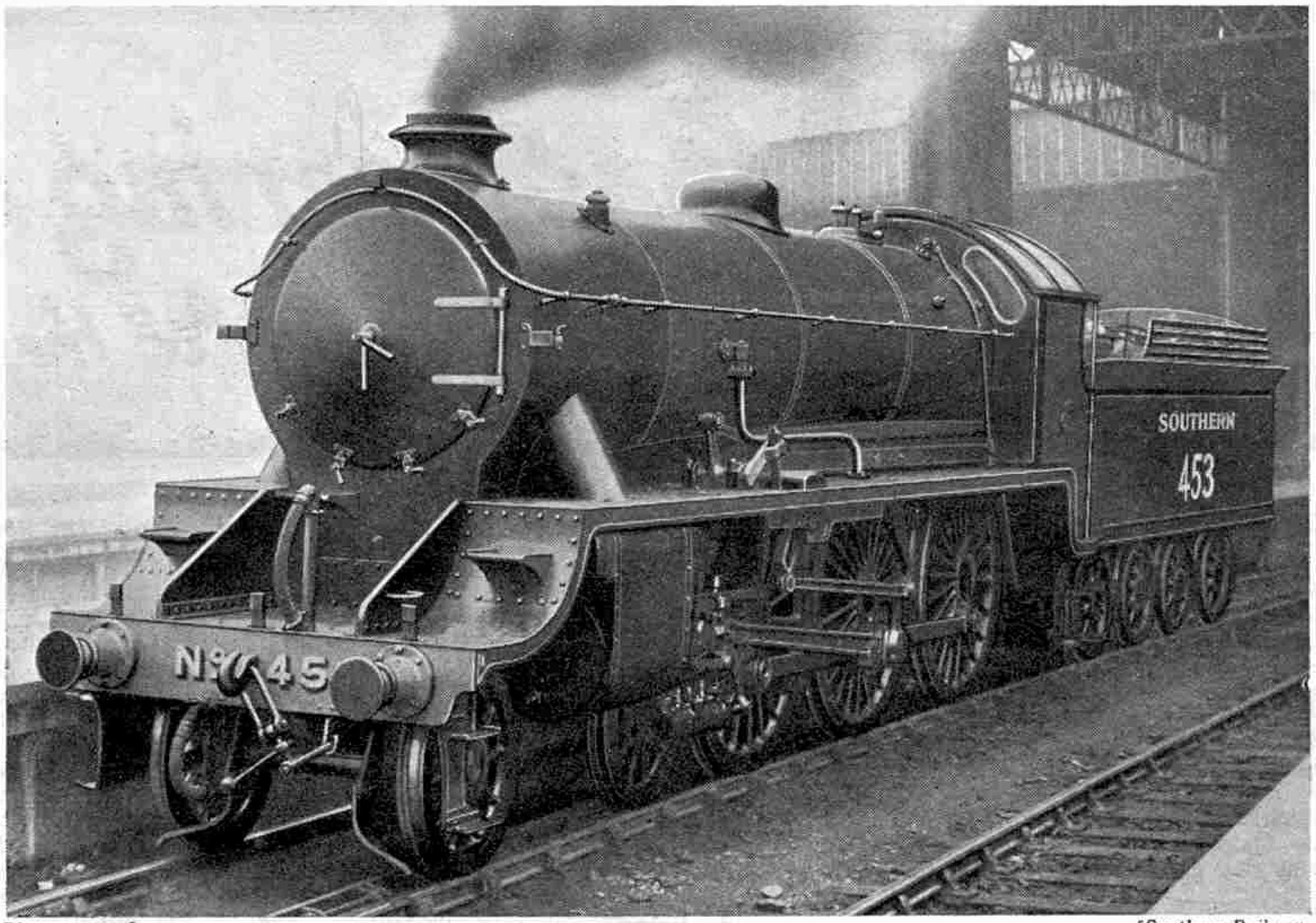


Photo courtesy] [*Southern Railway*

The "King Arthur" outside Victoria

Naming the Engines

The policy has been adopted of giving names to the new and rebuilt engines, bearing some relation to the districts in which they are destined to serve.

The 4–6–0 giant express locomotives of the King Arthur class will each be named after one of the Knights of the Round Table.

Thousands of holiday-makers in days gone by have clambered over the rocky old fortress known as King Arthur's Castle, perched high up on Tintagel cliffs in North Cornwall. Equally as many have visited the little town of Camelford, which is the Camelot of King Arthur's Legends, and Slaughter Bridge where King Arthur is supposed to have fought his last battle.

It is therefore very appropriate that the new engines should be named after the Knights of the Round Table, as many of them will be in the holiday traffic to the romantic district known as "King Arthur's Land." Ten will also be put into traffic this summer on the boat train services from London to Folkestone and Dover.

Hitherto the working of these important trains has been confined to locos of the 4–4–0 type (various S.E. and C.R. classes) owing to weight restrictions on certain bridges, etc., which as the result of various strengthening operations have recently been removed. Apart from the 2–6–0 mixed traffic locos, designed by Mr. Maunsell for the late S.E. & C.R., the new type will be the first six-coupled passenger locos to work on this section.

The following is the list of names of the "King Arthur" class locomotives :—

Drummond Type 4-6-0 Locos Rebuilt at Eastleigh

No.		No.	
448	Sir Tristram	453	King Arthur
449	Sir Torre	454	Queen Guinevere
450	Sir Kay	455	Sir Launcelot
451	Sir Lamorak	456	Sir Galahad
452	Sir Meliagrance	457	Sir Bedivere

Urie 4-6-0 Express Passenger Locos

No.		No.	
736	Excalibur	742	Camelot
737	King Uther	743	Lyonnesse
738	King Pellinore	744	Maid of Astolat
739	King Leodegrance	745	Tintagel
740	Merlin	746	Pendragon
741	Joyous Gard	477	Elaine

Urie 4-6-0 Express Passenger Locos (*continued*)

748	Vivien	752	Linette
749	Iseult	753	Melisande
750	Morgan le Fay	754	The Green Knight
751	Etarre	755	The Red Knight

The "*Red Knight,*" No. 755, is painted in the standard olive-green livery, but its nameplates have a scarlet background.

New Locos Ordered

No.		No.	
763	Sir Bors de Ganis	778	Sir Pelleas
764	Sir Gawain	779	Sir Colgrevance
765	Sir Gareth	780	Sir Persant
766	Sir Geraint	781	Sir Aglovale
767	Sir Valence	782	Sir Brian
768	Sir Balin	783	Sir Gillemere
769	Sir Balan	784	Sir Nerovens
770	Sir Prianius	785	Sir Mador de la Porte
771	Sir Sagramore	786	Sir Lionel
772	Sir Percivale	787	Sir Menadeuke
773	Sir Lavaine	788	Sir Beaumains
774	Sir Gaheris	789	Sir Guy
775	Sir Agravaine	790	Sir Villiars
776	Sir Galagars	791	Sir Uwaine
777	Sir Lamiel	792	Sir Hervis de Revel

These fine locos will carry brass name-plates as shown in our first illustration of No. 453, with the words "King Arthur Class" in small letters beneath the name of the engine.

The names to be given to the eleven "Atlantic" 4–4–2 type express passenger locos of the Brighton Section are as follows :—

No.		No.	
421	South Foreland	37	Selsey Bill
422	North Foreland	38	Portland Bill
423	The Needles	39	Hartland Point
424	Beachy Head	40	St. Catherine's Point
425	Trevose Head	41	Peveril Point
426	St. Alban's Head		

The new express passenger tank loco 2–6–4 type, No. 790, will be named the "*River Avon,*" and the nine other new locos of this class ordered will also bear names of rivers (as shown below), and will probably be used on the London-Eastbourne fast expresses.

No.		No.	
790	River Avon	795	River Medway
791	River Adur	796	River Stour
792	River Arun	797	River Mole
793	River Ouse	798	River Wey
794	River Rother	799	River Test

Engineering News of the Month

Electric Power Breakdown at Warwick

Owing to a fault in the cable near Warwick, Rugby was recently without electric light or power for nearly 10 hours. As it was found on investigation that the usual supplies of current could not be restored for some time, arrangements were made with the British Thomson-Houston Co. to receive power from their generating plant. The B.T.H. Co. immediately carried out the work entailed, which included laying a cable through the factory, and by 9.50 p.m. on the same day current was supplied as usual.

* * * *

Swiss Hydro-Electric Power

During 1924, hydro-electric development in Switzerland increased by 80,000 h.p. Other new hydro-electric plant, with a capacity of 320,000 h.p. is also either being built or under consideration, and fear was at first entertained that the sites were being developed too quickly. It has now been found that this is not the case, however, as there is already a demand for the power to be developed by the stations still awaiting construction.

* * * *

"Beam" Station for Winthorpe

The Spilsby Rural Council recently decided not to oppose the Government's scheme for the erection of a "Beam" radio-telegraph station at Winthorpe, near Skegness. The station will be used for communication with India and Australia and will be distantly controlled from London. The masts will be 300 ft. in height and the site has already been inspected by the Marconi Company's engineers.

* * * *

Dover Station Improvements

A sum of £325,500 is to be spent by the Southern Railway Company on improvements at two of the three Dover Stations. Of this amount £190,000 will cover the cost of a new locomotive depot on the site of the old Town station and the demolition of the existing depot. A further £135,000 will be spent on enlarging the passenger and goods accommodation at Priory Station, which will then possess two platforms, each 700 ft. in length by 22 ft. in width. The two platforms will be joined by a subway 18 ft. in width and on the town side new station buildings will be erected. A new goods shed will be built on the site of the existing locomotive depot, while on the same site there will be three groups of sidings capable of accommodating 114 wagons.

Another P. & O. Liner

The "*Comorin*," a new vessel of 15,000 gross tons, built by Messrs. Barclay Curle & Co. Ltd., for the Australian Service of the Peninsular and Oriental Steam Navigation Co. recently underwent successful trials on the Clyde, attaining a mean speed of 17½ knots. The "*Comorin*" has a length of 545 ft., a breadth of 70 ft. and a depth of 46 ft. Of the 600,000 cubic ft. of cargo space available, half is cooled by refrigerating machinery and insulated for the carriage of perishable materials and produce. Passenger accommodation is provided for 200 first-class and 100 second-class passengers, the cabins being of the single and two-berth types only.

The vessel is driven by balanced twin-screw quadruple-expansion engines, steam being supplied by seven boilers working at a pressure of 220 lb. per sq. inch, burning oil fuel under forced draught. Other features of the ship are the mechanical operation of watertight doors and ventilation, and the large number of lifeboats provided.

* * * *

Record Cargo Handling

What is believed to be a record in loading grain at the port of New York was recently achieved by the Atlantic Transport Line, when four elevators with a combined capacity of 8,000 bushels per hour were worked at the same time alongside the steamship "*Minnetonka*."

This ship and her sister ship the "*Minnewaska*" are the only vessels entering the port of New York with hatches sufficiently far apart to take four elevators alongside at once. The length of each elevator is 140 ft., and the four, lying end to end, occupy 560 ft. of the ship's side. Each elevator handled 214 tons of grain per hour, making 856 tons an hour for all four.

As a full cargo of grain for either of these ships is 60 loads, a load corresponding to 8,000 bushels, the total capacity of each ship is 480,000 bushels, weighing 12,840 tons.

* * * *

New Motor Ships

Messrs. Furness Withy & Co. have recently invited tenders from British shipbuilders for the construction of four new motor ships. The vessels have been under consideration for some time, and it is hoped that on this occasion the orders will go to British yards, particularly as the recent order for five fifteen-knot ships was obtained by Germany. The new ships are to be slightly slower than the five already ordered.

The New Zambesi Bridge

A note on the proposed new Zambesi Bridge, appeared in the February number of the "*M.M.*," and it is interesting to learn that the Government propose to sanction the necessary expenditure for the construction of the bridge. The total cost will be nearly £1,000,000. The site for the bridge will be Sena, 150 miles from the mouth of the Zambesi, and the necessary plans and specifications have already been prepared.

The main bridge is to be three-quarters-of-a-mile in length, but owing to the fact that in the flood season the river covers the low-lying land, a quarter-of-a-mile concrete gantry and a mile stone embankment will be erected between the bridge and the left bank of the swollen river. Work on the bridge will be commenced as soon as the expenditure has actually been authorised.

* * * *

A New Aqueduct

A new aqueduct to carry the Leeds and Liverpool Canal over Yorkshire Street, Burnley, is to be constructed by Messrs. Wellerman Bros., of Sheffield. The structure will be of steel and reinforced concrete with a 70 ft. span, which will allow double-deck cars to pass instead of only single ones as is now the case. As the aqueduct has to be built without interfering with the working of the canal, a temporary trough will be constructed outside the present aqueduct.

* * * *

The Majestic's Record

On a recent voyage, the White Star liner "*Majestic*" landed 2,570 passengers at Southampton. This is stated to be the largest number of passengers to be carried from New York by any one steamer since 1914. A special army of porters had to grapple with the enormous number (over 7,000) packages of baggage, which the passengers brought with them. Within two hours three special boat trains had left the ship's side for London.

* * * *

Meccano Motor-Cycles

The "thinning down" of their machines to bring them to within the 150 lb. limit was a feature among the entrants for the recent Tourist Trophy Races in the Isle of Man (Douglas).

J. A. Porter weighed-in by drilling the mudguard stays, gear-lever and brake drums, so that his machine looked as if it were made up of Meccano parts.—"*Daily Mail*."

New Liners

Several new liners for use on the Atlantic passenger routes have been and are being completed. On 22nd May the new Cunarder "*Ascania*" left Southampton on her maiden voyage to Quebec and Montreal. The "*Ascania*," which was built by Sir W. G. Armstrong Whitworth & Co. Ltd., at their works on the Tyne, has a gross tonnage of 14,000. The vessel burns oil fuel and has twin screws driven by double-reduction geared turbines. She is a two-class ship, with accommodation for 520 first-class and 928 third-class passengers, the third-class quarters having received special attention with a view to attracting tourists.

Two more Cunard liners, the "*Alaunia*" and the "*Carinthia*," the latter a vessel of some 20,000 tons, will shortly be completed.

The Anchor liner "*Caledonia*," of 17,000 tons, is also nearing completion. She will run on the Glasgow–New York service and will also be used for cruises.

Another new Atlantic Liner is that reported to have been ordered from Messrs. Harland and Wolff Ltd., by the White Star Line for their Canadian trade. The new vessel will be of the same class as the "*Regina*," carrying cabin and third-class passengers only. With a gross tonnage of 18,000, or 1,500 tons larger than the "*Regina*," she will be the same length, 575.3 ft., but slightly larger in breadth. She will be constructed to carry a large number of passengers and a big cargo, and will be driven by twin screws at a speed of 16 knots.

* * * *

Canal from Baltic to Black Sea

The scheme has now been revived for the construction of a canal from the Baltic to the Black Sea. The first scheme proposed is to make a canal connecting Lodz, Warsaw, Poznau and Danzig, for the transport of coal. Side canals will branch off to the mining districts. If the canal is constructed, coal from Poland will have a better prospect of reaching the Baltic market, as at present the miners can only send by water approximately one-twentieth of their production. Approximately one-fifth of the coal from the Westphalian district is sent by water.

Another proposed canal for coal transport will be from the Danube, via the Pruth, Dniester, and Sau, to the Weichsel. Rumania is also interested in the project, and the total cost, estimated at 1,000,000,000 gold lei, would be divided between Poland and Rumania, Poland bearing about two-thirds of the cost and Rumania the remainder. * * * *

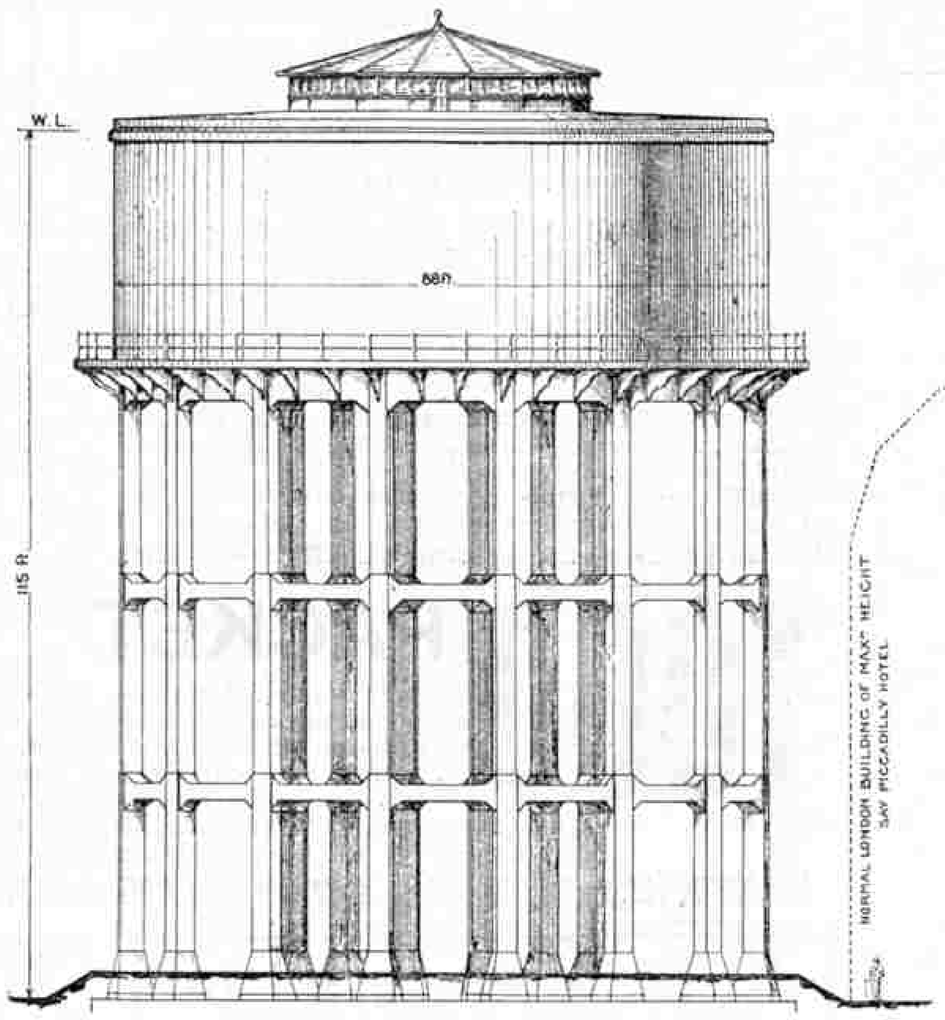
New Staffs. Road

A new road is to be made between Burton and Branstone, the total cost of which will be £50,000. Representatives of the Burton-on-Trent Corporation and the Staffordshire County Council recently decided to adjourn further consideration of the matter until it is seen what financial assistance the Ministry of Transport are prepared to give to the project.

Ropeway to be Dismantled

A large part of the Khyber ropeway, which, since its erection in 1919 has handled a maximum of 200 tons of goods per day, is to be dismantled owing to difficulties with the Afghans. The total length of the ropeway is 19 miles.

Largest Water-Tower



The above illustration—kindly sent to us by Mr. W. H. Thorpe, Civil Engineer—shows a huge reinforced concrete water tower of one million gallons capacity, believed to be the largest tank of its type in existence.

This tower was designed and detailed by Mr. Thorpe for the late Hon. R. C. Parsons, M.I.C.E., Engineer to the Water Company at Rosario, S. America. It has 30 ft. depth of water, the height from the ground to the finial being 131 ft. The total load at the base of the columns is about 8,600 tons, of which the water weighs 4,470 tons.

The surrounding country is flat and the Tower, which has now been in service about twelve months, is visible from all directions for many miles.

New Seismograph Station

A new seismograph station, established at St. Anne de la Pocatiere, Quebec, is situated close to the centre of the area affected by the earthquake of 28th February. It will assist in the work of those maintained by the Dominion Observatory at Saskatoon, Halifax and Ottawa, and by the Meteorological Service at Victoria and Toronto.

* * * *

Loch Katrine Waterworks Alterations

Members of the Glasgow Corporation recently visited the Loch Katrine Waterworks on their annual inspection tour. They were given an opportunity of seeing the new road which, built along the north shore of the loch, is being continued to Strone. Owing to the water level in the loch being raised it became necessary to make extensive alterations in the aqueducts, sluices, and inlet basins, and these are now nearly completed. A new pier has been made at Stronachlacher and lighting and heating for the residential buildings and works is provided by the recently-built power station.

New Motor Ships for Italy

A report from Italy states that two new twin-screw motor passenger liners, each having a gross tonnage of about 23,500, are being built by the Cantieri Nava'e Triestino, Malfroncone, for the Consulich Navigation Company of Trieste. The new vessels will carry 3,000 persons (including crew) and 9,000 tons of cargo, will be 691 ft. 3 in. in overall length and have a beam of 79 ft. 6 in. and a depth of 45 ft. 6 in. They will be propelled at a speed of 20 knots by two sets of Burmeister and Wain oil engines, developing 24,000 shaft h.p. at 105 r.p.m. The vessels will carry sufficient lifeboat accommodation for all on board, some of the boats being fitted with wireless and motors.

Large as these motor vessels are, a still larger one is to be built for the Italian General Navigation Company of Genoa. The vessel will be 706 ft. in length, 82 ft. 6 in. in breadth and 51 ft. 3 in. in depth, while the propelling machinery will consist of four sets of double-acting two-cycle four cylinder engines driving quadruple screws. The total output of the engines will be 28,000 shaft h.p. at 125 r.p.m. The auxiliary machinery will consist of eight Diesel electric generating sets, developing 4,825 brake h.p. The ship will be built at the Ansaldo Yard, near Genoa.

* * * *

100-Ton Shipyard Fitting-out Crane

What is said to be the most powerful crane on the Pacific coast of America is a 100-ton shipyard fitting-out crane recently built by Messrs. Cowans, Sheldon & Company, of Carlisle, and commissioned by the Burrard Dry Dock Company of North Vancouver. The jib of the crane has an outreach of 80 feet.

* * * *

Floating Dry Dock for Mediterranean Fleet

Leaving Sheerness on 1st June in charge of six naval tugs and a destroyer escort, the 700 ft. ex-German floating dock, which it is understood will be used for docking the Mediterranean Fleet capital ships, arrived safely at Malta on 27th June.

* * * *

Emergency Arrangements at 2LO

The broadcast transmitting apparatus at the old 2LO station at Marconi House has been re-established, and will be kept ready for instant use in case of any breakdown at the Oxford Street Station. There have only been three breakdowns in 18 months, which period represents 75,000 hours of transmission.

* * * *

Power Plant for Buenos Ayres

The Electricity Supply Company of Buenos Ayres has under consideration the construction of a new power plant with a total capacity of 500,000 kilowatts, of which the normal output will be 400,000 kilowatts. The plant will really consist of five stations of 100,000 kilowatts each, and these will be able to work either in conjunction or separately.

Stamps for Sale

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100 DIFFERENT STAMPS FREE. Send for ½d. approvals.—Cox, 135, Cambridge Road, Seven Kings.

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"The 'New Issue Packet' you sent me gave every satisfaction." 14/6/25.

"Stamps received, for which many thanks. I have got a good few more added to my collection out of them."

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Those who wish to complete their sets of "*M.M's*" will be interested to hear that we have in stock a few copies of recent issues.

All Magazines up to and including December, 1921, are out of print. A few dozen copies remain of each number from January to December, 1922, with the exception of the issues of March and April. Copies of each of the 1923 issues are also available, with the exception of February, June, September, October and November, which are sold out. Copies of back issues will be sent post free, price 3d. each, but early application should be made, as the number available is very small. The price of the December 1924 issue is 5d. post free.

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In the advertisement columns of the "*M.M.*" a reader recently offered 2/6 per copy for certain early numbers of the "*M.M.*" in order to complete his file. This offer indicates the value placed upon the "*M.M.*" by some readers, and we suggest that you should see that your file of copies is complete. Keep the Magazines in the special spring-back binder illustrated here. This binder has a strong stiff back, holds a large number of copies, and keeps them neat and clean. Covered in black imitation leather, tastefully tooled, lettered gold, its price is 3/- (post free).

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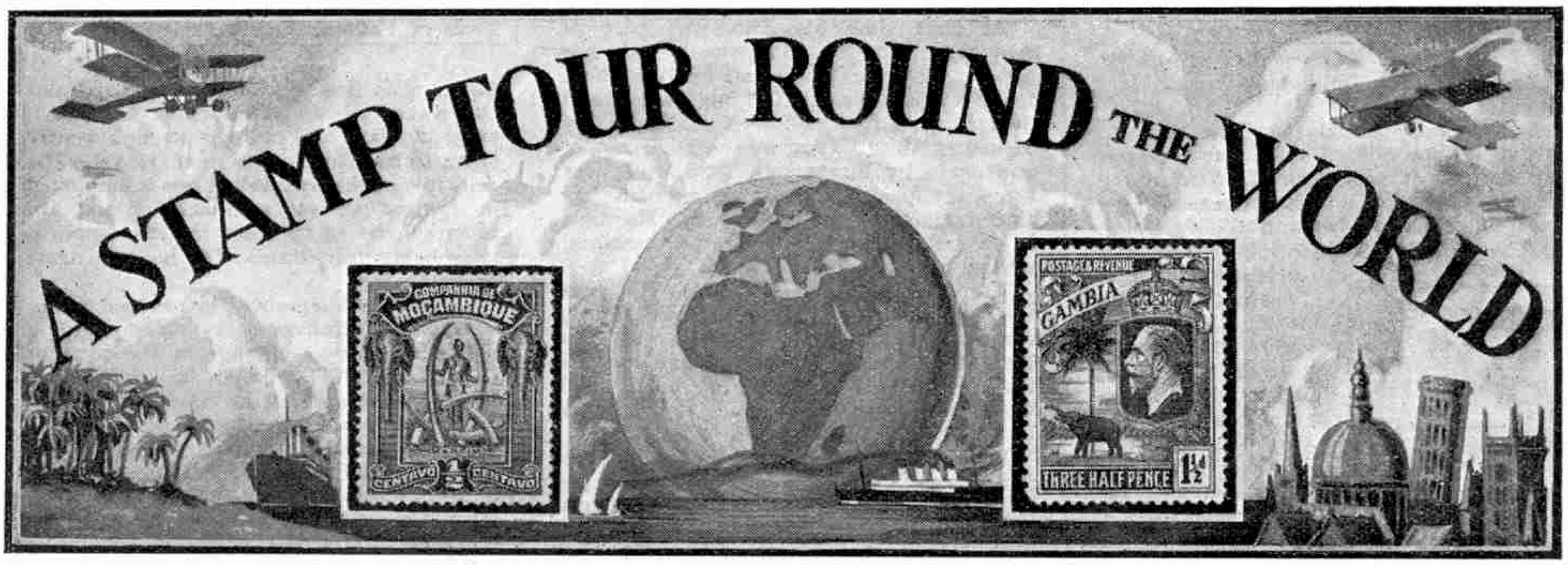


XII. EGYPT, ERITREA AND DJIBOUTI

LEAVING our aeroplanes at the Pyramids, we take the electric tram for the journey of eight miles to Cairo, the Arabic name for which is "*Misr-al-Kahira,*" often abbreviated to "*Misr.*" Cairo, the largest city in Africa, is the capital of modern Egypt and when the last census was taken in 1917, had a population of nearly 800,000. The city occupies a length of five miles along the eastern bank of the Nile, beginning at the old Roman fortress of Babylon.

The Citadel or El-Kala illustrated on the 50 mils. 1914 issue, occupies the south-eastern corner of the modern city. It is built on a spur of the Mokattem Hills, which rise 550 ft. above the town on the east. The building was erected about 1166 by Saladin (1138-1193), Sultan of Egypt, about whom we read in connection with the Crusades and King Richard I. of England. Since the time of Saladin the Citadel has undergone considerable alteration, however, and now contains a palace, built by Mehemet Ali, and a mosque of Oriental alabaster, the minarets and dome of which form one of the finest sights of the city.

A magnificent view of Cairo is obtained from the ramparts of the Citadel. Far below we see the city with the delicately carved domes and minarets of the mosques; the palaces and lofty towers; the gardens and squares; and the ancient walls surrounding all. We see also the gardens and palace of Shubra; the port of Bulak, and the broad river studded with islands. Away into the distance stretches the valley of the Nile, dotted with groups of trees. In the south-west we see the Pyramids and on the east are barren cliffs, backed by a waste of desert sand.

The Colossi of Thebes and Karnak Temple

From here we return by tram to our aeroplanes and resume our flight up the Nile valley until we reach the district of Thebes and Luxor, about 300 miles south of Cairo. Thebes was the ancient capital of Upper Egypt and here are the great colossi of "Memnon," attached to the temple of Amenophis III. (1914, 10 mils.) These are surpassed in size, however, by the stupendous black granite colossus of Rameses II., the builder of the Ramesseum in which it stands. This colossus was about 57 ft. in height and is estimated to have weighed about 1,000 tons.

At Karnak, a few miles from Thebes, is the Temple of Ammon, the greatest of all known temples and the work of many successive monarchs. Here is a series of ten pylons, one of which was shown on the 20 mils. value of the 1914 issue (illustrated here). Luxor, the neighbouring village, has recently been made prominent by the discovery of the tomb of Tutankhamen in the famous Valley of the Tombs of the Kings. Unfortunately, however, no views of this valley have yet formed the subject of the design of a postage stamp.

The Assuan Dam

Continuing, we next come to Assuan, about 150 miles south of Luxor, and three-and-a-half miles beyond which is the Assuan Dam (200 mils., illustrated) stretching across the Nile at the commencement of the First Cataract. At this point in the course of the river a natural dyke of granite stretches across the valley. By making use of this for the foundation it was possible to construct the dam entirely above the old river level so that no expensive under-water work was required. The dam is nearly a mile-and-a-quarter in length and is pierced by 180 sluices, some of which may be seen in the illustration.

The reservoir thus formed by the partial stoppage of the flow of the river forms a huge placid lake stretching upstream for 200 miles, with a capacity of nearly nine-

(*Continued on next page*)

A Stamp Tour Round the World—

(*Continued from page* 393)

and-a-half million millions of cubic feet of water!

As originally built, the dam held up only 3¾ million million cubic feet of water, but in 1907 it was decided to raise the top 26 ft. higher, thus increasing the storage capacity two-and-a-half times. This work was completed in 1912. The original structure was completed on 10th December 1902, to the design of Sir W. Willcocks, the contractors being the well-known firm Messrs. John Aird and Co., and the cost two million pounds sterling.

More Temples and Colossi

By March each year the winter floods have filled the reservoir and then the sluices are gradually opened until, by July, all are open and the river flows freely past. This magnificent triumph of modern engineering has already increased the fruitfulness of Egyptian land enormously, and a further increase will take place when the Khartum dam in the Sudan, now under construction, is completed. This dam is to hold up a reservoir of water of double the capacity of the Assuan dam.

Our final stop in Egypt is at Abu Simbel or Ipsambul, a group of temples built by Rameses II. about 1250 B.C. on the left bank of the Nile, some 200 miles direct from Assuan. These temples are hewn out of the solid rock forming the cliffs of the riverside (1914, 100 mils.) There are three temples, the chief of which was discovered by Burckhardt in 1812. Although the sand has been cleared from in front of them several times, it is continually drifting back, so that considerable expense is required to prevent the temples from becoming submerged again. The colossi shown on the stamp are 65 ft. in height and are accompanied by figures of the queen and children of Rameses, while over them is a cornice and a long row of apes worshipping the rising sun above.

The Ports of Abyssinia—Massawa and Djibouti

Having thus completed our visit to Egypt, we now fly due south-east for about 700 miles until we arrive at Massawa or Massouah, the chief port of the Italian colony of Eritrea. This colony is situated on the west coast of the Red Sea, and is bounded on the north-west by the Sudan, on the west by Abyssinia and on the south by French Somaliland. Massawa has a population of about 10,000 and is built partly on the mainland and partly on the islands of Massawa, Tautlub and Sheik Said. These islands are of coral, and most of the important buildings of the town, including the Government Palace (1910 issue of Eritrea, values above 5c., illustrated here), are built of this substance.

Here Christopher da Gama, brother of the famous explorer Vasco da Gama, landed in July 1541, with 450 musqueteers, to go to the relief of the Abyssinians who were being over-run by invading Moslems. They marched into the interior and receiving reinforcements of native troops, were at first successful, but a year later da Gama was defeated, taken prisoner and put to death.

At that time Massawa was part of Abyssinia, but in 1557 the island was captured by the Turks and held by them for over 200 years. It has since been held in turn by the Sherif of Mecca, by Mehemet Ali of Egypt, by the Turks again, and again by Egypt. In 1885 an Italian force occupied the territory, which has since remained an Italian colony. Massawa is the natural port of northern Abyssinia, although communications are poor.

From here we fly southward to visit the neighbouring French Somali Coast, the capital and chief port of which is Djibouti (often spelled Jibouti). This town issued its own stamps until 1902 when they were superseded by stamps issued for the whole of the district.

Between the years 1894 and 1902 the public were supplied with a series of huge stamps showing views of the town and district. The 2c. value is illustrated here. The apparent perforations round the stamp are part of the engraving, the whole series being issued imperforate. The town was founded by the French in 1888 and has been the capital of the colony since 1896. Its trade consists mainly in coaling ships and in acting as a port for southern Abyssinia, as there are no local industries.

NEXT MONTH:—

WESTERN ASIA.

Recent Issues: Cyprus

After having used stamps with the same border design during three reigns, Cyprus has now issued a new series showing the head of King George V. on a shield with the words "Postage" and "& Revenue" at the sides, the object being to combine the postage and revenue stamps in one series, instead of having two separate issues as previously. The old design has always been considered to have very little artistic merit but the new series does not appear to be a great improvement.

The first King George stamps of Cyprus appeared in 1912 and had a life of nearly ten years. Between 1921 and 1923 they appeared on paper watermarked multiple script CA and in 1922-3 various values were printed in new colours and additional values were added. All these however were withdrawn from sale and the remainders destroyed on 30th July 1924, the new type being on sale on 1st August.

Air-Mail Stamps

During the Lympne light aeroplane meeting of 1923, Mr. J. H. James carried about 125 letters in his machine from Lympne to Hastingleigh, dropping them in a bag near the post-office. These envelopes are now priced at £4.

The envelopes of letters carried on the return flight of R34 from New York are listed at £38.

Lives of Famous Engineers—

(*Continued from page* 381)

As soon as the pressure was relaxed and the water released, the collar collapsed, thus allowing the plunger to sink gently down to be ready for the next stroke. The principle of the hydraulic press is employed in a great variety of machines and appliances, one of its most familiar applications being in hydraulic lifts for passengers or goods.

Bramah subsequently introduced many valuable improvements in pumping machinery. By a change in the form of the piston and cylinder he obtained a rotary motion which he applied to many purposes, notably in a fire engine that was very successful. Another of his inventions, patented in 1797, was the beer pump, by means of which a publican could raise beer from the casks in his cellar to the level of the bar where it was to be served.

Introduction of Machine Tools

In 1802 Bramah introduced tools "for producing straight, smooth, and parallel surfaces on wood and other materials requiring truth, in a manner much more expeditious and perfect than could be performed by the use of axes, saws, planes and other cutting instruments used by hand in the ordinary way."

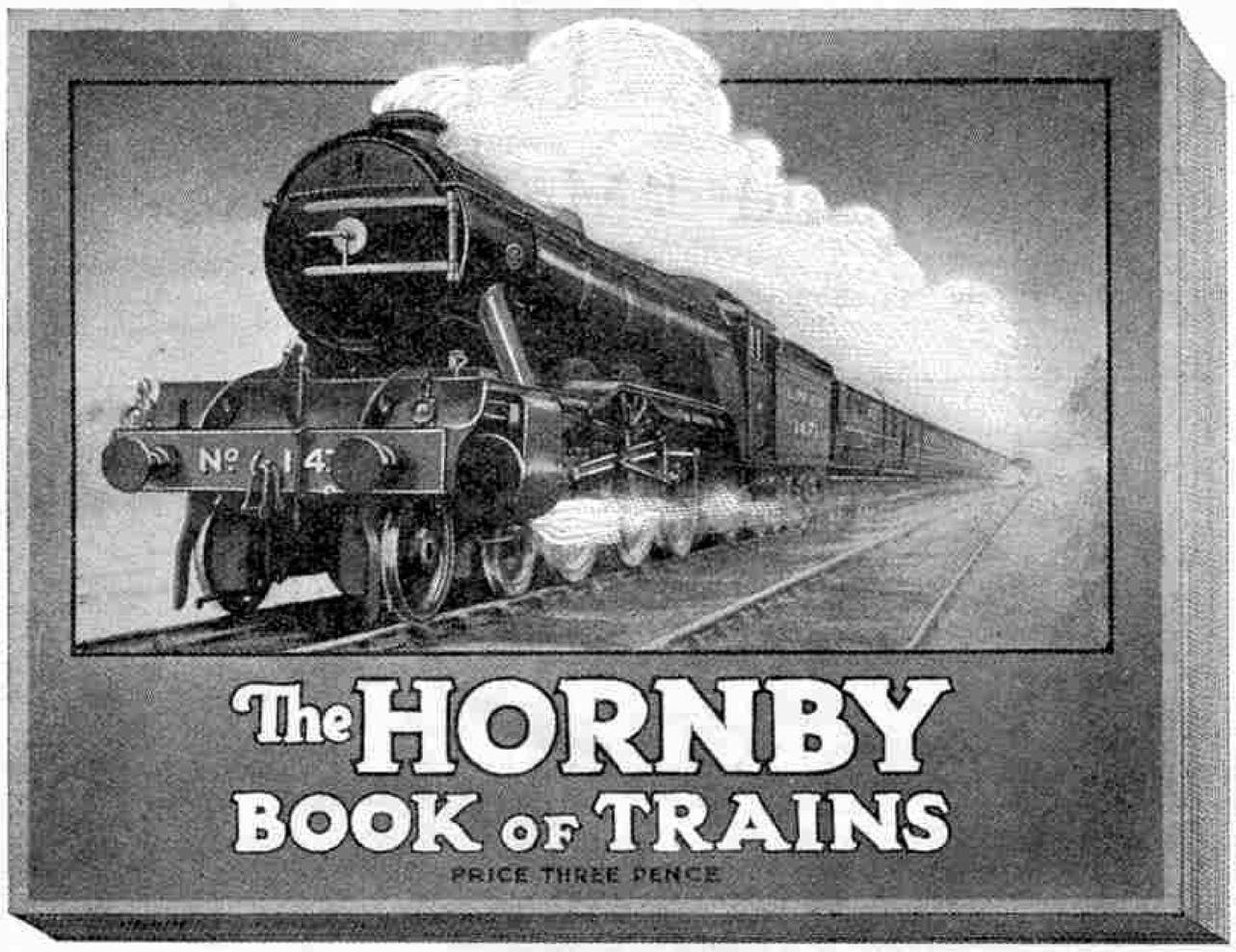
The tools were fixed on frames driven by machinery, some moving in a rotary direction round an upright shaft, some with the shaft horizontal like an ordinary wood-turning lathe and some on frames sliding in stationary grooves. In his own shops at Pimlico, Bramah used a machine with revolving cutters to plane metallic surfaces for his locks and other articles. He also introduced a method of turning spherical surfaces by a tool moveable on an axis perpendicular to that of the lathe, and of cutting concentric shells by fixing in a similar manner a curved tool of nearly the same shape as that employed by ordinary turners for making bowls.

Banknote Printing Machine

The Bank of England applied to Bramah in 1806 to construct a machine for more accurately and speedily printing the numbers and date lines on banknotes and he invented the necessary mechanism in a month. The employment of this machine in the Bank of England alone saved the labour of one hundred clerks, but its value lay principally in its greater accuracy, the legibility of the figures it printed, and the greatly improved check afforded by it.

Bramah also carried out a certain amount of civil engineering, including waterworks at Norwich, but his mechanical pursuits left him little time for work of this nature. He also contemplated various improvements in the methods of building bridges and canal locks but he did not live to bring any of these ideas to completion. While superintending the uprooting of trees at Holt Forest in Hampshire by means of his hydraulic press he caught a severe chill from which he never recovered, and he died on 9th December, 1814, in his 66th year.

Bramah was a man of admirable character and of such a cheerful temperament that he was welcome in any company. As a manufacturer he attained a great reputation for perfect workmanship and prompt attention and honest dealing. He was certainly the greatest mechanical genius of his time, and may be regarded as the real founder of the art of toolmaking.



A Splendid Train Book

As announced last month we have in active preparation a special publication entitled, "*The Hornby Book of Trains.*" This is being issued to commemorate this year's centenary of the railway and we advised our readers to make sure of their copy by booking their order. Since that announcement appeared we have been inundated with letters from all parts of the country and over 20,000 books have already been ordered! As the number to be printed will be limited, readers who have not already done so are advised to order their copy at once, and thus prevent disappointment by being unable to obtain a copy when the book is issued.

The "*Hornby Book of Trains*" will be a splendid production in every way, and we are sparing no effort to make the publication worthy of the name it bears. It will consist of 40 pages, the measurements of which are 11″ × 8¼″, of special art paper.

The first half of the book will contain an account of the story of the locomotive from its earliest days, dating back to before the time of the opening of the Stockton and Darlington Railway. Details of the pioneer work of Trevithick, Murdoch, and Stephenson will be given, with illustrations of the early locomotives as contrasted with the present-day giants. Particulars will be given of the leading locomotive types, such as the L.N.E.R. "Pacifics" and the Great Western "Castles;" methods of locomotive classification; some account of the rise and growth of the great railway companies; and other matters of interest to railway enthusiasts.

The second half of the book will be devoted to a beautifully illustrated description of all the Hornby Trains and the latest Hornby Rolling Stock and Accessories. These illustrations will be printed in four colours and the reproduction of the Hornby Trains will be most realistic. Thus not only will the book be an interesting souvenir of the Centenary, but it will also be the finest train catalogue that has ever been issued in any country.

Owing to the great cost of production and distribution, the number of copies printed will be limited, and orders will be executed in strict rotation. It will be a case of "first come—first served."

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), which may 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 at the end of September or early in October, but further details will be announced next month. Meantime, orders will be entered and executed in the rotation received.

Orders from Overseas.

There will be a special edition of the "*Hornby Book of Trains*" for Overseas readers. The price for all orders from outside the United Kingdom is 6d. Overseas orders should be addressed to our overseas agencies as below.

AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.

NEW ZEALAND: Messrs. Browning, Ifwerson Ltd., P.O. Box 129, Auckland.

SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

OUR MAIL BAG

In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

R. W. Godwin (Southborough).—"I hope you do not mind my stringing you off a letter like this, but it's all your fault because you should not get up such 'bon' things!" We do not mind a bit, Ronald, and we assure you that we intend to get up many things quite as 'bon,' or even 'bonner'! Many other readers have expressed a desire for the Hornby Train articles to be continued and we hope to arrange this before very long. The 24″ Meccano Girder Bridge will improve your railway greatly.

G. Hollingworth (Kidsgrove).—Your suggestion for a series of articles describing how Meccano is made is quite good and it is one we intend to adopt later. We quite agree that such articles would be very popular with our readers. We are glad to have your "good wishes for the "*M.M.*," and to hear that you "wouldn't dream of stopping reading it."

E. Scott (Horsham).—We are sorry that you were disappointed when the Giant Block-setting Crane articles ceased, but you will understand that we cannot give more than a certain amount of space to any one subject because we have so many others waiting their turn. We have not yet decided about a Nature Study page, but if we do start one you may be sure that we shall give a fair amount of attention to butterflies and moths—meantime the Aquarium articles should interest you.

Helen Holtby (Worthing).—"Thanks awfully for your letter and congratulations. I did grin when I heard that I had won a prize It is the first really decent prize that I have ever won, so I am feeling very bucked." We are delighted to hear this, Helen, andwe hope you will be successful in other competitions. Evidently Dad is as keen on the "*M.M.*" as you are, which is saying a good deal. We are interested to hear that you are always wishing you were a boy, but at any rate you are as enthusiastic about Meccano as any boy could be, and perhaps sometime you may decide that, after all, you are glad you are a girl!

D. Cox (Griffithstown).—"I am delighted with the "*M.M.*" you have sent me as it is the first I have had. I am going to be a Meccano boy and join in the fun the other boys have in the competitions." We hope that before long you will be successful in winning a prize, Douglas. We try to make the Magazine really helpful and we quite agree with your remark: "Why get a useless comic paper when for a penny more you can get a *real* Magazine?"

J. Dewar (Edinburgh).—There seems to be more enthusiasm than ever in the letters we are reading this morning, and we were interested to find in your bright note: "I can hardly control my feelings about the "*M.M.*" We work very hard to make the "*M.M.*" better and better month by month, and letters such as yours encourage us greatly. We may be able to introduce a serial story later, but many of our readers strongly disapprove of fiction.

N. White (Liverpool).—"Just a line to let you know how much I appreciate the "*M.M.*"—the book that never grows stale." Your suggestion for an article describing how the "*M.M.*" is compiled, edited, printed and delivered is quite good, and we agree that many readers would be interested in it. We shall keep this idea in mind and probably put it into action later.

C. E. Munro (Lomas, Argentine).—We were very glad to have your interesting letter. Your visit to the Central Argentine Railway Works must have been very enjoyable, and we were very interested to know that almost all the machinery is worked by compressed air. You must have been proud that your models of a cable winder and a girder crane pleased the Governor of the Province so much that he had a long chat with you. Thousands of Meccano boys all over the world will agree with you that "Meccano doesn't fail in anything"!

K. Yoshida (Tokyo).—We are glad to hear of your enthusiasm for studying insects and we do not think you could have a better hobby to come after Meccano. Your method of work—collecting the insects, sketching them and then letting them go—must make you quite popular in the insect world! We agree that it is fine to be able to collect pictures of insects without having to kill the creatures. Write again soon and send us a photo and particulars of your airship.

The Conquest of the Air

VI. The De Haviland "Moth"

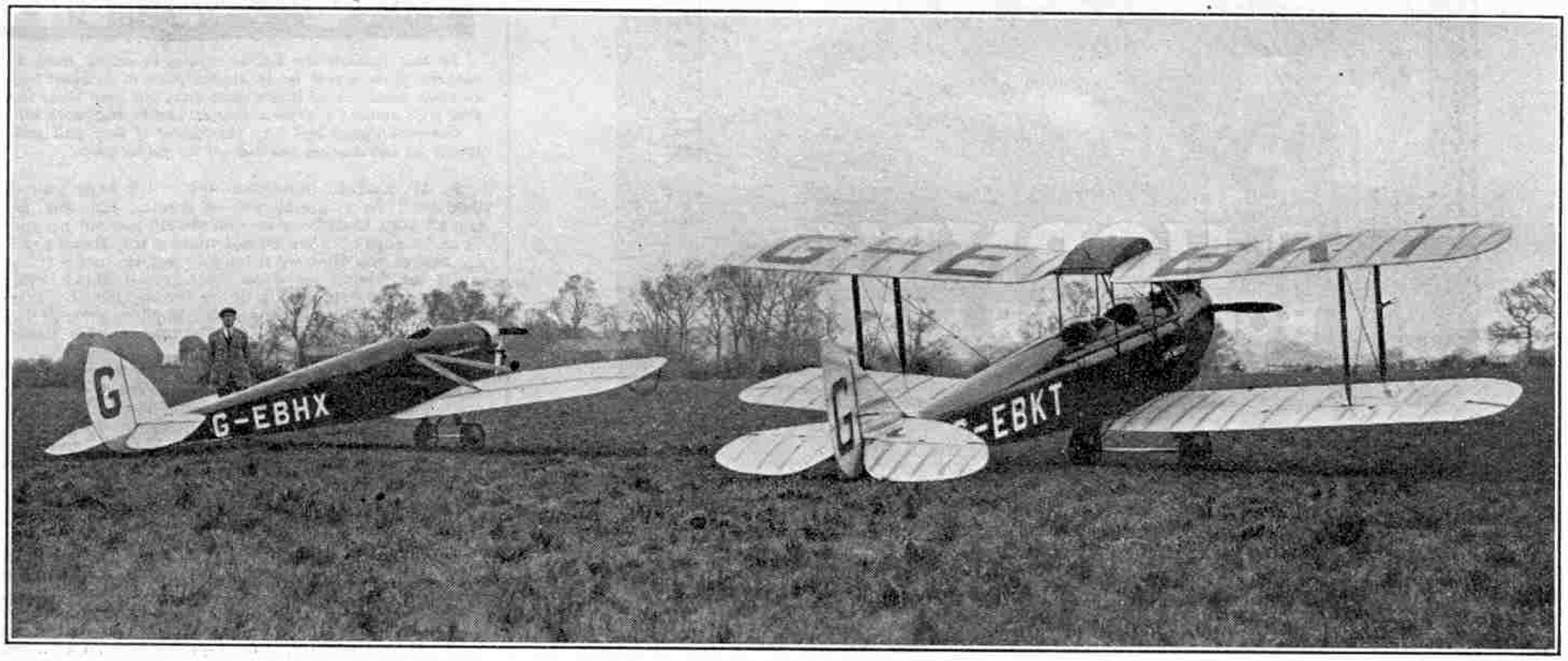


Photo courtesy] [*De Haviland Aircraft Co. Ltd.*

DH Type 53, "Humming Bird," (696 c.c. Blackburn engine) and DH Type 60, "Moth" (27-60 h.p. Cirrus engine)

THE De Haviland Type 60 two-seater light aeroplane, popularly known as the "Moth," is of particular interest for more than one reason. In the first place, the machine is unique in the fact that the planes are arranged to fold back along the fuselage to facilitate housing and transport. Not only does the folding of the wings allow the aeroplane to be stored in an ordinary garage, but it also allows the machine to be easily towed behind a motor-car along a road of ordinary width on which there is other traffic. Thus, supposing there be an aviation ground in a certain district, anyone living within easy access could own and fly a De Haviland "Moth" and store the machine at home, taking it by road to and from the aerodrome without any trouble.

London to Zurich and Back in a Day

The open span of 29 ft., required by the aeroplane in flight, is reduced to 9 ft. 8 in., with the wings folded back. The operation of folding the wings, or the alternative of spreading them, is not a long job requiring a number of mechanics, as might perhaps be supposed. It is claimed that it can be performed by one person in less than three minutes.

It was on an aeroplane of this type that Mr. Allan Cobham recently made his remarkable flight from Croydon to Zurich and back—a distance of about 1,000 miles—in one day. If any proof were needed that the "Moth" is capable of sustained flight, this feat surely affords it, for the outward flight occupied six hours and the homeward journey eight hours.

In order to make the journey without landing, an extra petrol tank was carried instead of a passenger, and for the whole flight the consumption of fuel worked out at 20 miles to the gallon. This is, of course, even better than is achieved by motor cars of the same horse-power.

The flight was undertaken purely and simply as a demonstration of the "Moth-Cirrus" combination, and upon his return Mr. Cobham reported that he did not suffer one moment's anxiety as to the ultimate success of the flight. The engine ran without a falter for the whole fourteen hours and the ease of control of the machine, combined with the comfort of the cockpit, made the journey a very pleasant one. It is interesting to note also that this was the first occasion on which Mr. Cobham had flown for fourteen hours in one day.

Mr. Allan Cobham in the machine in which he flew to Zurich and back in a day

"*M.M.*" Readers May Fly a "Moth"

The "Moth" was produced in the first place for use of private owners and Light Aeroplane Clubs, and it has been adopted as the standard equipment of the clubs recently formed in London, Manchester, Leeds, Birmingham, and Newcastle. These Light Aeroplane Clubs are being formed in different parts of the country with the support of the Air Ministry, and at the meeting of the Royal Aero Club this month one race is being specially organised for their members. No doubt, in a few years' time these clubs will be very popular and as aeroplanes of the "Moth" type will be largely used it is possible that quite a number of the readers who are perusing this page may in a few years' time be flying "Moths" through the medium of one or other of the new flying clubs.

In this connection, it is interesting to learn that it has recently been stated that on an average about five hours' instruction only is required to learn to fly, and this instruction can be obtained

through these clubs at a cost of about £10 or £12.

A Low Compression Engine Desirable

The "Moth" is by no means a frail craft demanding highly skilled attention, but has been designed on simple and robust lines to give reliability of running, ease of handling, and economical maintenance. It is fitted with one of the new 27/60 h.p. four-cylinder Cirrus engines, noted for their smooth and vibrationless running.

The petrol tank is divided into main and reserve compartments, the former having sufficient spirit for a three hours' flight, and the latter for half-an-hour. It is stated that when carrying auxiliary petrol tanks in place of a passenger, a flight can be made from London to Glasgow and back without stopping, and that the machine can remain in the air for over twelve hours without landing.

Owing to the limitation of 1,100 cc. at the last Lympne trials, engine-makers were forced to develop a high-compression engine with a high piston-speed, whereas the ideal engine for club and private work is rather on the low side as regards compression and piston speed. An engine of this type gives reliability over long periods without overhauls.

The "Moth" scores heavily because the power unit is of generous proportions, developing over 60 h.p. This has enabled the aeroplane to be planned on more ample lines and enables 50% of the h.p. in reserve to be obtained in level flight at about 70 to 75 miles an hour, an important feature that cannot be overestimated. In the early days of the new flying clubs it will be far better to employ an engine which, although not so economical on petrol consumption, has the more important consideration of reduced risk of engine failure and the compensating advantage of much less time and money spent on maintenance.

The Hand Starter for Engine

As already mentioned, the "Moth" is a two-seater, the pilot's and passenger's cockpits being placed in tandem. There is also accommodation in each for light luggage. Flying is particularly easy with light and effective control down to the lowest speeds and no peculiarities of behaviour.

The undercarriage, which employs rubber in compression, will absorb the shocks of landing on the roughest ground. With full load—that is, pilot, passenger and 60 lbs. of luggage—the stalling speed is 40 miles an hour. Its top speed is over 90 miles per hour.

A noticeable feature of the engine is the hand starter, which is operated by the pilot from his seat. Generally, the starting of an aeroplane engine requires the assistance of at least two men besides the pilot. The engine of the "Moth" can be started-up without any exertion or difficulty, however, and the pilot can handle and manœuvre the machine on the ground without assistance.

"I recently saw for the first time," a correspondent writes, "a simple hand-starter provided for starting an aeroplane. When I went up in a "Moth" with Mr. Hubert Broad, he merely pulled a lever twice and the engine began to tick over gently. Even when cold a few preliminary turns of the propeller, to suck in gas were sufficient to prepare the way for the hand-starter."

Photo courtesy] *[De Haviland Aircraft Co. Ltd.*

Front view of the "Moth"

A Trial Flight Described

Further describing his experience our correspondent writes :—"The passenger's cockpit, over the centre of gravity, is by far the most comfortable I have experienced. Even with a heavy coat there is no difficulty in accommodating oneself, and the cowling and windscreen make the use of goggles quite unnecessary.

"When I made my trial flight, the getting-off conditions were bad, owing to the aerodrome being waterlogged. We only got off after a much longer run than usual, but once off the machine had a very good rate of climb.

"It was doing 60 miles air speed with the engine revolution counter at between 1,550 and 1,600. At 1,650 the speed rose to about 65 m.p.h. and then we cruised round with the air speed anything from 70 to 75 m.p.h. with 1,650 to 1,700 revolutions indicated—just 300 short of the usual maximum and 400 below the absolute maximum. We landed at just under 50 miles an hour, but under better conditions its low speed is stated to be 38 miles an hour, while the top speed is 90.

"The weather was somewhat bumpy, but the machine was surprisingly steady, and Mr. Broad stated that it was exceedingly comfortable to fly. On his previous flight alone he had shown its powers by looping, spinning, and carrying out Immelman turns at about 1,000 ft. up with perfect ease.

The Strongly-Designed Engine

"The engine that makes all this possible is the 60 h.p. Cirrus, an air-cooled four-cylinder in-line type. The engine is rated to give 65 h.p. at 2,000 revolutions, and may be run at 2,100 in short bursts. Its normal 60 h.p. is delivered at 1,800, and at 1,700 giving the cruising speed already referred to, it is only being asked to deliver 33 h.p. It is then consuming a gallon of petrol per 25 miles flown, and its oil-consumption is a pint an hour.

"It is clear that the engine is normally not being taxed at all hardly—it is certainly a very comfortable engine to sit behind—and apart from that, as it is in part based upon the 120 h.p. Airdisco air-cooled engine, which in turn is based on the old Renault engine, some of the working parts have a very large margin of structural strength. The crankshaft, bearings, and connecting rods, for instance, are taken from the 120 h.p. engine and have passed the Air Ministry type tests in the larger engine and have stood the strain of working at 145 h.p. for an hour on the test bencn."

Interesting Details of the "Moth"

Admittedly the engine is on the heavy side at 260 lb., for its 65 h.p., but this is really of small account if it can be relied upon to run with the minimum of attention day after day under the conditions of club and amateur work. It is hoped it will run 200 hours or more between overhauls, and this translated into mileage means 15,000 miles at a conservative estimate.

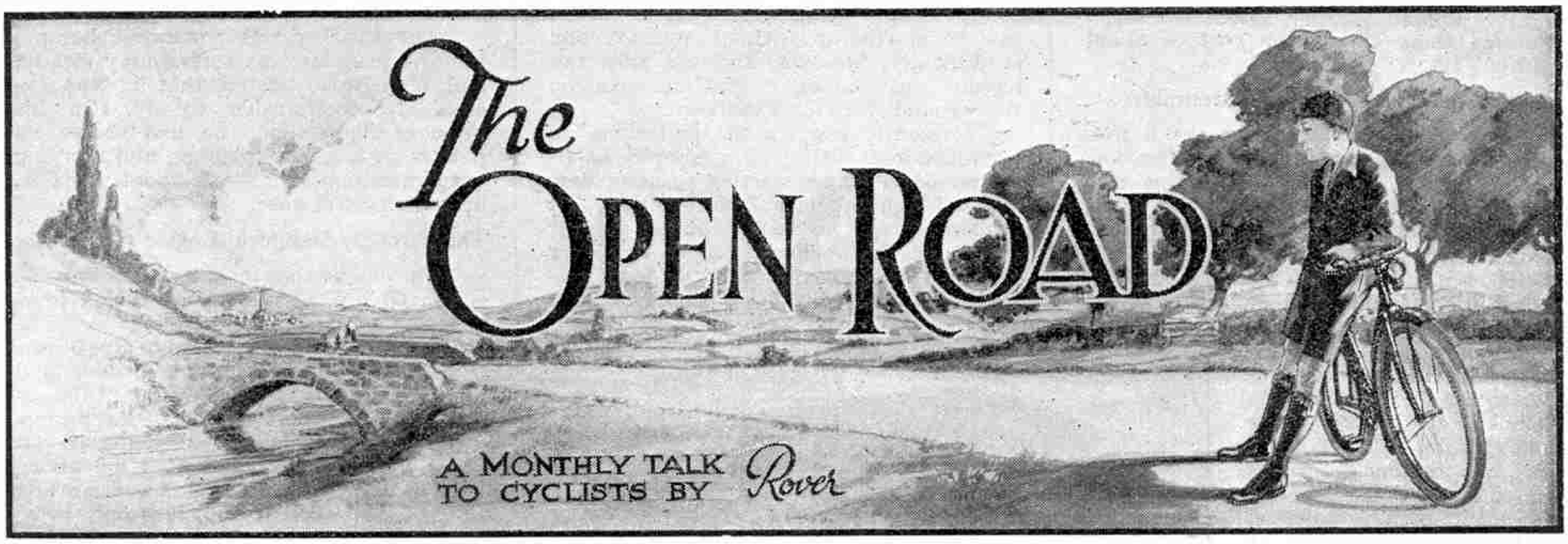
Particulars of the D.H.60 "Moth."

Speed at Ground Level	91 m.p.h.
Cruising Speed at 80% full power	80 m.p.h.
Stalling Speed	40 m.p.h.
Rate of Climb at Ground Level per minute ...	430 feet
Height attained at 500 yards from standstill	120 feet
Distance to Unstick (in calm)	120 yards
Run on Ground on Landing (in calm)	80 yards
Ceiling (absolute) ...	13,000 feet
Range at Cruising Speed ...	4 hours
Petrol Consumption per gal.	20 miles
Oil Consumption per hour	1 pint
Weights.	
Weight Empty	770 lbs.
Weight of Petrol (15 gallons)	110 lbs.
Weight of Oil (1½ gallons) ...	10 lbs.
Weight of Pilot	160 lbs.

Photo courtesy] *[De Haviland Aircraft Co. Ltd.*

Rear view of the "Moth"

(Continued on page 427)



II. A TOUR THROUGH SOMERSET AND DEVON: CHEDDAR AND WELLS

This is the second instalment of "Rover's" article on an enjoyable tour. The reader is to imagine that he is accompanying our contributor on a few days' cycling tour in Somerset and Devon. "Rover," who has averaged 5,000 miles a year for many years, is endeavouring to give helpful advice from time to time, as the reader pedals along in his company.

The start last month was made from Bristol and it is intended to make for the south-coast, and then to strike westward to Torquay, returning to Bristol by the main road through Exeter and Taunton.

WHEN riding long distances I usually divide the route into sections as equal in mileage as the various towns or villages en route will permit. It may be that I make, say, four sections. I know then, that my first stop represents one quarter of the whole journey, my second half and so on. The advantage of this plan lies in the fact that I make my trip a number of short rides, instead of one long one.

Watching Milestones

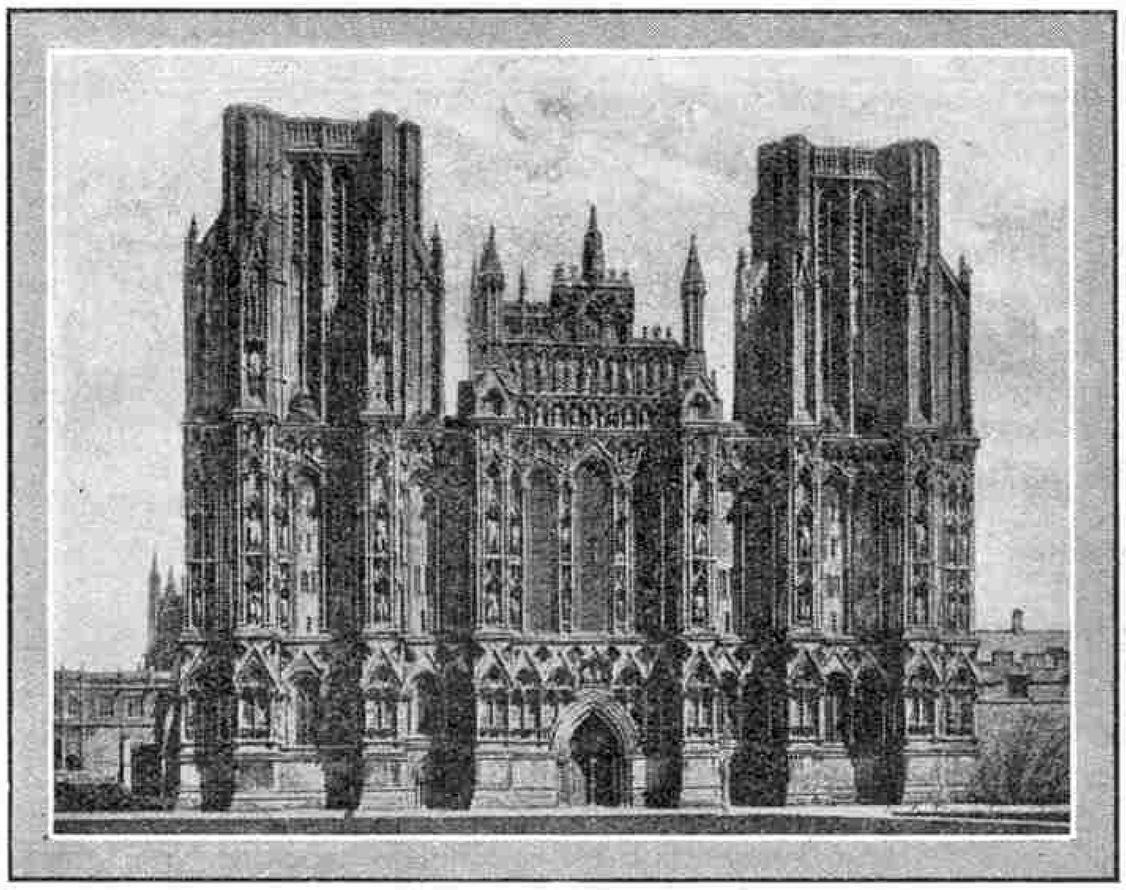
The very fact that you always have in mind the total number of miles you intend to travel tends to hasten fatigue and then, its generally "good-bye to pleasure." With my plan, however, you relegate the total distance to the background of your mind, and think chiefly of your first place of call. When you reach it you refresh yourself and rest awhile, forgetting such things as the miles already covered. Then you make a fresh start on your next short ride to the second stop. With experience, I am able to allot myself exactly the distances I know I can manage—always allowing something to spare, however, for reasons that will be obvious.

Some riders tell me that they never look at milestones. That is not always avoidable—in fact, it is sometimes very necessary and very desirable to watch the milestones—but it is surprising how fatiguing it becomes if we are *always* watching the milestones—something like a workman who keeps his eye on the clock all through the day waiting for the hour to "down tools." To him the days pass very slowly, but to those who get on with their jobs the times passes all too quickly.

Well, what about a short rest on that inviting mossy bank? There's a farmhouse over there and I am sure we shall be able to get a drink of good milk.

Cheddar Gorge and Wells

We are now rather more than halfway to Wells, and right on the Mendip Hills. Here everything seems to be much as it was in the time of the Ancient Britons and the Romans. I always look out for flint arrow-heads when I pass this way, but instead I generally run over a big stone or into a huge pot-hole! By the way, that reminds me that these Hills are full of wonderful water-holes and there are one or two most interesting books published about them. They are well worth reading, when you have the opportunity.



West Front, Wells Cathedral

Cheddar, with its world-famous Gorge and Caverns, lies a few miles over there on our right. I am hoping to bring you back that way, by way of making a good finish. . . . Well! if you are fit we will go forward once more.

We have to climb another hill, rising just a little more, to something like 800 ft., and then we drop down into Wells. See how this road stretches straight ahead. It is an old Roman road without any doubt, and the surface is splendid.

We must go carefully here, for three roads cross ours at fairly close intervals. As ours is on the down grade it is wise to ease up a little before we reach the crossings. Single file here, please, so I will drop behind you while this motor passes us. It is always best to move as quickly as possible to the side of the road, especially if the road is narrow, for even the driver of a Rolls Royce sometimes becomes impatient! It is not very nice to have a car going at well over 20 m.p.h. just grazing your elbow!

Through a Tunnel of Trees

Here is another instance where it pays to be cautious. This flock of sheep ahead, advancing in "massed formation," is perhaps more dangerous than the fast car—which you see has only just now got through and is away again on the far side of the flock. In each case the cyclist must give way, and it is a small matter to do so and not to be considered when you think of the risk incurred by being obstinate.

We come now to a rather awkward piece of down-hill for a mile or more. Fortunately, there are plenty of warnings and it is well not to ignore them—even should the danger not be as great as that threatened on the signs. Here we run through a large wood, where the trees almost form a solid archway overhead—which means, that from brilliant sunshine, we enter an almost dark tunnel. This is likely to cause trouble with an inexperienced rider but once we are accustomed to the gloom—and that doesn't take more than a moment—it is beautifully cool and refreshing in the "tree-tunnel."

Keep your machine well under control—for, apart altogether from possible obstruction, we may want to dismount. Woods are very tempting on a hot day, and many a pleasant rest have I taken by the side of a little waterfall that comes tumbling down, all unsuspected, in places similar to this. . . . There! we're out into the sunlight again, which seems all the hotter after that run through shadowland.

(Continued on next page)

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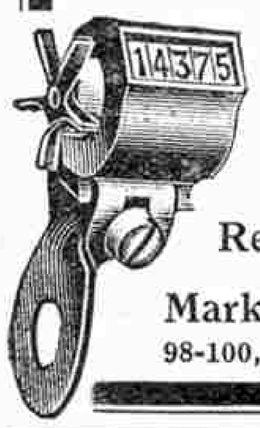

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JACKSON'S IMPERVO SALES LTD. (Dept. 31a),
5, Point Hill, Greenwich, S.E.10.

The Open Road—(*continued from page* 398)

A Quaint Old Town

Although we may fancy the road here to be quite level, it really has a decided gradient, with the result that our machines rapidly increase in speed. Applying both brakes frantically may easily bring about your downfall. Keep as cool as you can and put your brakes on gradually. There is quite a lot to be said on this point, but, as we have so successfully navigated that difficult piece, I will leave my remarks for another time.

Our road now joins the more popular one, and we are barely a mile from Wells. Here we come to a right-angle turn, so steady up, ring your bell, and keep well over to your left, so that we take a good wide sweep into the other road.

Here we are running into the little town itself, where we shall spend at least an hour. We will put up our bikes where they will be quite safe, and where we shall not have to worry about them.

The Famous Wells Clock

What a quiet, peaceful place Wells is. It almost seems as though it has not altered since the Middle Ages. The quaint shops and old fashioned Market Place, with the stream running down either side of the main street. Here is the Cathedral, with the magnificent West Front and the famous Wells clock. If we hurry round to the North side we shall see the figures outside strike the three-quarters with their battle-axes. Inside the Cathedral all is delightfully cool and so calm and peaceful too, that we can almost imagine ourselves back in the old world some centuries ago.

It is difficult to realise that there was once a stern and terrible fight on this very spot, yet in Cromwell's day a battle was fought here. Here is the famous Clock with quite a number of interesting things to see on the dial alone. On the top, the Knights circle around and at each stroke of the hour one unseats another from his horse, (I believe its the same one that gets thrown each time, poor fellow !) but he regains his seat as he passes out of sight round the back ! That quaint figure up in the niche strikes the quarters.

There are many old houses and other interesting things to be seen in this old world town, but unfortunately we cannot see them all to-day and we must reluctantly take our departure.

We now turn our faces towards Glastonbury, scarcely more than half-an-hours' ride, where we shall have a really good feed—I know we shall be ready for it by then.

(*To be continued*)

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Lady's Model same price

Terms :- 8/- with order, & balance 8/- monthly. Money refunded if at all disappointed.

J. G. GRAVES Ltd. Sheffield.

Catalogue Post Free.

Toy Casting Moulds

The casting moulds for toys supplied by A. Rodway (102, Long Street, Birmingham) continue to increase in number and interest and the latest catalogue to hand shows a really remarkable variety of patterns, ranging from soldiers and sailors to tanks and battleships, and from domestic animals to very realistic lions, tigers and elephants. The inevitable Red Indians also are not forgotten. The moulds continue of the same high standard and accuracy and the production of castings by means of them is a fascinating and profitable pastime.

Igranic Fixed Condensers

Fixed condensers are an essential part of wireless sets of any pretentions. In order to be of real value the capacities of such condensers must be known accurately, and the construction must be such that moisture or atmospheric conditions do not affect the working. The Igranic-Freshman fixed condensers are guaranteed to have capacities within five per cent. of their nominal values and their all-round quality and reliability is shown by their growing popularity. The Igranic Electric Co. Ltd., inform us that in order to meet the demand for these condensers they are now carrying 100,000 as a minimum stock.

Rover's Replies

J. Littlewood (Burnley).—You should really oil your machine regularly each week or before starting on a long run. Use only oil of good quality and take care to wipe away any excess oil each time.

T. Thistlewaite (Birmingham).—Perhaps the best way of keeping the nickelled parts of your bicycle bright and free from rust, with the least expenditure of energy, a smearing of vaseline should be applied once a week when you give the machine a good clean and overhaul.

Harry Thorpe (London, S.E. 1).—It is most necessary, Harry, that you should have your wheels "dead true." If I were you I should have the wheels seen to at once before anything serious happens.

W. Brown (Manchester).—It is almost impossible to answer your query regarding how long tyres should serve, for this naturally depends upon the quality of your tyres and the amount of cycling you do. I advise you to use some good British tyre, and not to have anything to do with unknown makes. If you wish to calculate the wearing qualities of the particular tyres on your bicycle, the best thing to do is to have a cyclometer fitted to show how many miles you ride before the tyre is worn out.

T. Linthorpe (Middleton).—"As I am having a bicycle built and cannot at the moment have a three-speed gear fitted, will you please tell me which is the best gear to have, high or low." If you can only have one gear you should certainly choose a medium one. A high gear is very nice on the level or downhill but is very tiring for hill-climbing and you will put up a better average speed with a medium gear.

R. Jackson (Newcastle).—"Are the puncture-sealing solutions I see advertised really satisfactory." There is no doubt whatever that these solutions are thoroughly satisfactory. Two well-known makes have been advertised regularly in the "*M.M.*" for a long time and I have not yet had anything but good reports regarding these solutions. Follow the instructions carefully and you will say "goodbye to puncture troubles.

John Edwards (Welshpool).—In answer to your query regarding your driving chain, the harsh cracking sounds you hear while pedalling show that the links have a tendency to mount the cogs of the chain wheel. To remedy this you should first take off the chain, place it in paraffin oil and leave it there to soak all night. Then clean it thoroughly and replace, adjusting it so that there is from ¾" to 1" play about half way between the chain wheels. If the noise has not disappeared the trouble is almost certainly due to worn links and the chain should be renewed.

Don't be Let Down by Punctures !

Use Fibermetic in your Motor Cycle or Cycle Tubes and NEVER be let down by Punctures. INSTANTLY AND PERMANENTLY stops air leaks up to ½ inch. Ends puncture mending and patching. **NEVER GOES BAD—NEVER STOPS FUNCTIONING.** Will last for years. Non-injurious to rubber. Complete satisfaction or money returned.

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L.N.E.R. Loco Notes

New 4-4-0 locos of the "Director" (Great Central) pattern are being used extensively on the North British section. In addition to being capable of excellent work they are very popular with the drivers and firemen. Names are being given to these locos, and are inscribed in gold lettering on the driving-wheel splashers.

Following upon the original North British locos of the "Scott" class, the names of these new locos are also taken from the characters in Sir Walter Scott's novels and poems. Among those so far christened are 6378, "*Bailie Macwheeble*"; 6379, "*Baron of Bradwardine*"; 6380, "*Evan Dhu*"; 6382, "*Colonel Gardiner*"; 6383, "*Johnathan Oldbuck*"; 6397, "*Lady of the Lake*"; 6385, "*Luckie Mucklebackit*"; 6398, "*David of Balmawhapple*"; 6400, "*Roderick Dhu*"; 6401, "*James Fitz-James.*"

* * * *

On a recent day of special excursion traffic the following locos from other sections of the L.N.E.R. were seen at King's Cross, London:—N.E. Section class R1 4-4-0's Nos. 1204, 1236, and 1239; Class Z "Atlantics," Nos. 704, 2200, and 2211; Great Central 4-cylinder 4-6-0 No. 5482. On the same day the G.W.R. 4-6-0 "*Pendennis Castle*" was at King's Cross Shed in connection with her trials over the L.N.E.R. main line.

* * * *

Locos passing through the repair shops at Gorton and elsewhere are being fitted with the new standard chimney, which is of the built-up pattern and rather similar to the styles adopted on the late Great Northern and North British sections.

* * * *

For suburban work, 0-6-2 tank locos of Doncaster design are working on the Glasgow-Helensburgh residential trains. Tank locos of similar wheel arrangement, but of Great Eastern design, take a share in local trains in the Leeds and Bradford district.

* * * *

New G.W.R. Locos

New locomotives of the "Castle" class are No. 4083, "*Abbotsbury Castle*"; 4084, "*Aberystwyth Castle*"; 4085, "*Berkeley Castle*"; and 4086, "*Builth Castle.*" No. 4009, "*Shooting Star,*" has been rebuilt with a larger boiler and other alterations which make it standard with the "Castle" class.

World's Biggest Excursion

The world's biggest excursion was entrained at Swindon on Thursday, July 2nd, when the G.W.R. mechanics and their families began their annual holiday. To convey them, 31 special trains, consisting of 415 coaches, left Swindon between 8.30 p.m. on July 2nd and 7.5 a.m. the next morning for seaside and inland towns all over the Great Western System.

Some 19,000 adults and 10,000 children took part in the excursion, and the works were entirely closed while the employees were on holiday.

Railway Mileage in America

Alaska ...	799	Honduras	559
Argentina ...	23,156	Jamaica ...	199
Barbados ...	498	Martinique	139
Bolivia ...	1,502	Mexico ...	16,443
Brazil ...	18,704	Newfoundland	951
British Guiana	104	Nicaragua	200
Colombia ...	926	Panama ...	298
Canada ...	39,540	Paraguay...	309
Chile ...	5,301	Peru ...	1,988
Costa Rica	546	Porto Rico	340
Cuba ...	3,005	Salvador ...	256
Dominican Republic	408	Trinidad ...	108
Dutch Guiana	37	United States	251,437
Ecuador ...	652	Uruguay ...	1,653
Guatemala	613	Venezuela	660
Haiti ...	167		
Hawaii ...	243	Total	371,741

New Australian Railways

Among the new railways to be constructed in New South Wales, for which the necessary approval has been given by the N.S.W. Public Works Department, is a line 161 miles in length between Grafton and Killarney, at a cost of £3,529,190. Also an electric railway from St. Leonards to Eastwood, a distance of between 8 and 9 miles, costing £649,600, and another from Inverell to Ashford, costing £224,000.

* * * *

A 12-Ton Wagon every 25 Minutes !

The Derby works of the L.M.S. are now turning out 12-ton merchandise wagons at the rate of one every 25 minutes, this time allowing for a first coat of paint. Vestibule passenger coaches, minus the upholstery, are assembled at the rate of one every half-hour. The doors for these carriages are put together in less than a minute each and through careful standardisation they can be fitted, without adjustment, into any carriage doorway.

German Turbine Loco

The first German locomotive to be driven by a condensing steam turbine has forward and reverse turbines, each developing 2,000 h.p. at 6,800 r.p.m. with double-gear reduction to the driving wheels. Part of the steam from either turbine passes through the casing of the other on its way to the condenser. The condenser consists of two cylindrical chambers connected one behind the other.

* * * *

New U.S. Railway Station

Every effort is being made to make the new Union passenger station at present under construction in Cleveland, Ohio, one of the most convenient stations in the United States. The new station will take between 10 and 15 years to build and will cost approximately £6,000,000.

* * * *

Race for Life with Train

Passing under a railway bridge at Cherry Tree Junction, on the Chorley-Blackburn line, a railwayman saw a semi-conscious man lying with his neck on the rail and a heavy goods train a few yards away.

A race between the railwayman and the train ended in the former dragging the man from the metals a few seconds before the engine thundered past.

* * * *

G.W.R. Buy Government Locos

Eighty of the remaining 2-8-0 ("W.D.") type, heavy freight locomotives, have been purchased by the G.W.R. from the Government. These locos are of former Great Central Railway type, but were fitted with Westinghouse brake and side couplings for working troop-trains of French rolling stock.

* * * *

World's Non-Stop Record

Although much attention has been drawn recently to the new L.M.S. nightly express which has no *booked* stop between Crewe and Perth (290 miles), the longest actual non-stop run remains that of the G.W.R. "Cornish Riviera" (Paddington-Plymouth, 225 miles), as the West Coast route train stops to change locos outside Carlisle station.

* * * *

G.W.R. Mineral Loco Hauls Express

A recent unusual sight was that of a 2-8-0 mineral loco of the "2800" class completing the journey of a main line express, the loco of which had developed a slight defect. The "2800" class have coupled wheels of only 4 ft. 7½ in. diameter.

Remarkable French Locomotives

The first of a new type of exceptionally powerful locomotives has recently been put to work on the Paris, Lyons and Mediterranean Railway. The new loco is a four-cylinder compound of the "Mountain" (4–8–2) type, and is intended for main-line express service between Laroche and Dijon, between which points there are severe grades.

A feature of the design is the location of the two high-pressure cylinders. These are placed between the frames and at the rear of the bogie, driving the second pair of coupled wheels, and the valve motion of all four cylinders consists of two outside sets of Walschaerts pattern, each set also working one inside cylinder.

An exceptionally large boiler is fitted, its working pressure being 227 lb. per sq. in., and the grate area, 54 sq. ft., is stated to be the largest in Europe.

The new locos are being built by the celebrated firm of Schneider et Cie of Creusot, and their regular task will be to haul trains weighing 600 tons at 75 to 80 kilometres (46½ to 49½ miles) per hour on the severe grades, and at 68½ m.p.h. on the level. The first of the class weighs 115 tons 3½ cwt. without tender.

* * * *

New L.M.S. Plans in Derbyshire

The L.M.S. are about to undertake widening and other works on an extensive scale near Chesterfield. Owing to the increasing traffic on the old Midland system between Chesterfield and Leeds, via Masborough, it is intended to widen the line from a point near Tapton Junction. New Whittington Station is to be rebuilt on a site some little distance south of the existing station. It is also proposed to construct a large concentration yard in the same vicinity, which will provide facilities for more expeditious marshalling of traffic from the congested Clowne and Doe Lea Branches. The project further provides for additional locomotive sheds at Barrow Hill (Staveley Works).

* * * *

Fashion Parade at 60 M.P.H.

A distinct novelty was introduced lately by the L.N.E.R. in the form of a parade of mannequins. This took place in a reserved saloon on the 11.15 Pullman express from King's Cross to Leeds and Harrogate. As the express gathered speed through the tunnels outside London, invitations to view the display of fashions were issued to lady passengers, and a picturesque array of hats and frocks took place before an appreciative audience while the "Flier" was working up to maximum speed. The display is claimed to be a distinct success, and is a high tribute to the smooth travelling of London and North Eastern expresses.

Southern Loco News

Large 4–6–0 locos of the "King Arthur" type now take their turn with the Boat expresses of the former S.E. & C. system. The introduction of such powerful locos will be an advantage in view of the heavy loads on these services during the summer months. Nos. 763 and 764 were recently seen passing a station on the Great Western Railway, with their coupling rods removed, and hauled by a G.W. loco. Nos. 765 and 766 were also noted crossing the River Mersey at Warrington in tow of a L.M.S. goods loco.

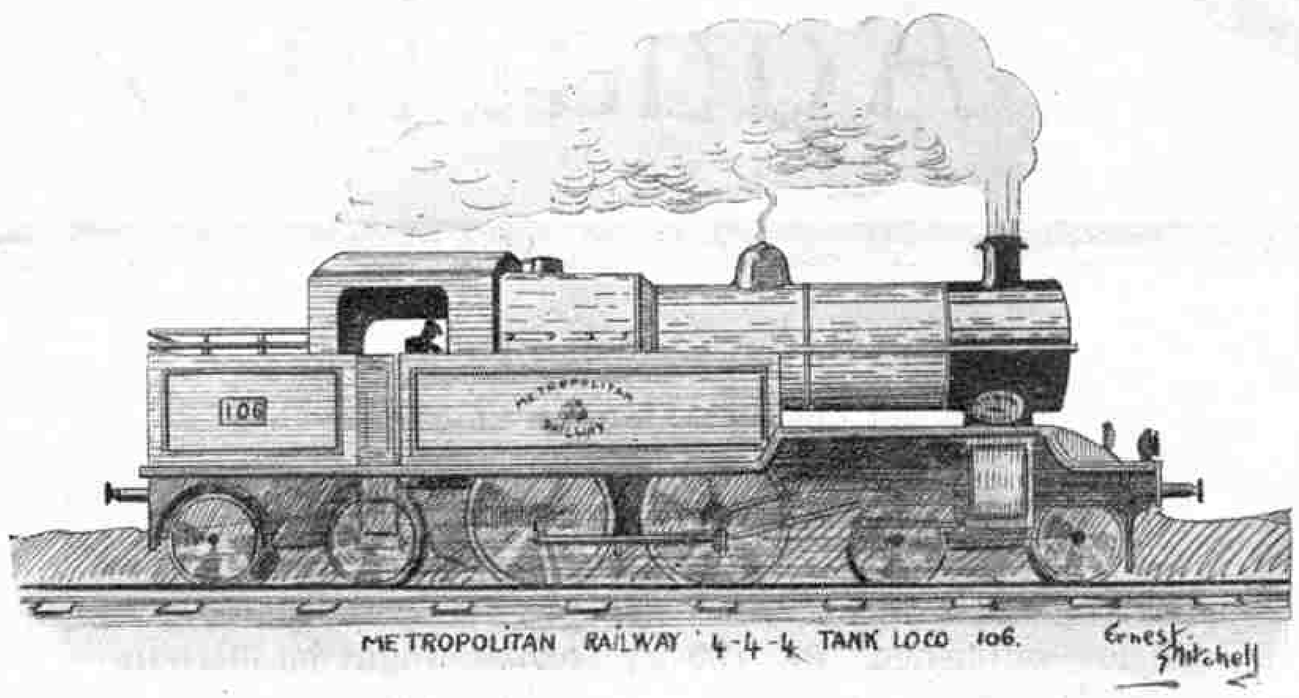
On the L.N.E.R., three of the new 2–6–4 locos, "River Arun," "River Ouse," and "River Rother" were also seen being hauled "dead" by a L.N.E.R. loco. All these locos, of course, were en route from their respective builders to the Southern Railway, but it is a coincidence that they should have been seen passing over each of the other great main lines at approximately the same date.

The miscellaneous tank locos, mostly of very old-fashioned design and manufacture, which formerly worked the various services in the Isle of Wight, have now been largely replaced by 0–4–4 T locos of the former L. & S.W.R. type.

* * * *

More Articulated Trains

A new train, constructed on the articulated principle, has commenced running between Paddington and Weymouth in connection with the G.W.R. new daylight service between Weymouth and the Channel Islands. The train consists of three units, the centre one consisting of first and third-class dining saloons with a kitchen car between. The three coaches are carried on four 4-wheeled bogies, one at each end and one at the point between each saloon and the kitchen car. The result is increased flexibility and freedom from oscillation, for, as we have explained in former articles on articulated trains, the whole train becomes a unit, and passengers experience a greater ease and smoothness than in carriages of the ordinary type. Trains built on this system are in increasing use on the East Coast Route expresses of the L.N.E.R., also on the London Suburban services of the former G.E.R. section.



This drawing of a Metropolitan 4-4-4 Tank Loco, by Ernest Mitchell (age 15) of Chester, was awarded Second Prize, Class B, in our Second Drawing Contest.

Southern Railway Veterans

A fair number of famous old Stroudley 0–4–2 express locos of the Brighton line are still in service. These veterans, although too light for working regularly under modern express conditions, are often to be seen on fast secondary expresses, sometimes hauling a considerable load.

Few classes of locos have ever attained the popularity of the celebrated Stroudley "Terriers" of the old Brighton line. These little 0–6–0 T machines must surely rank among the strongest ever built. Although they have now almost entirely disappeared from their original main line, the survivors of the class are to be found working on smaller branch lines and independently-owned railways. Two of them—formerly Nos. 638 and 683 (built in 1878 and 1880 respectively), have been purchased from the Government Surplus Depot at Dalmuir (Scotland) for working on the Shropshire and Montgomeryshire Light Railway. They are now renumbered 8 and 9 and bear the names "*Dido*" and "*Daphne*." S. & M. No. 7, "*Hecate*," is also an ex-Brighton "Terrier."

* * * *

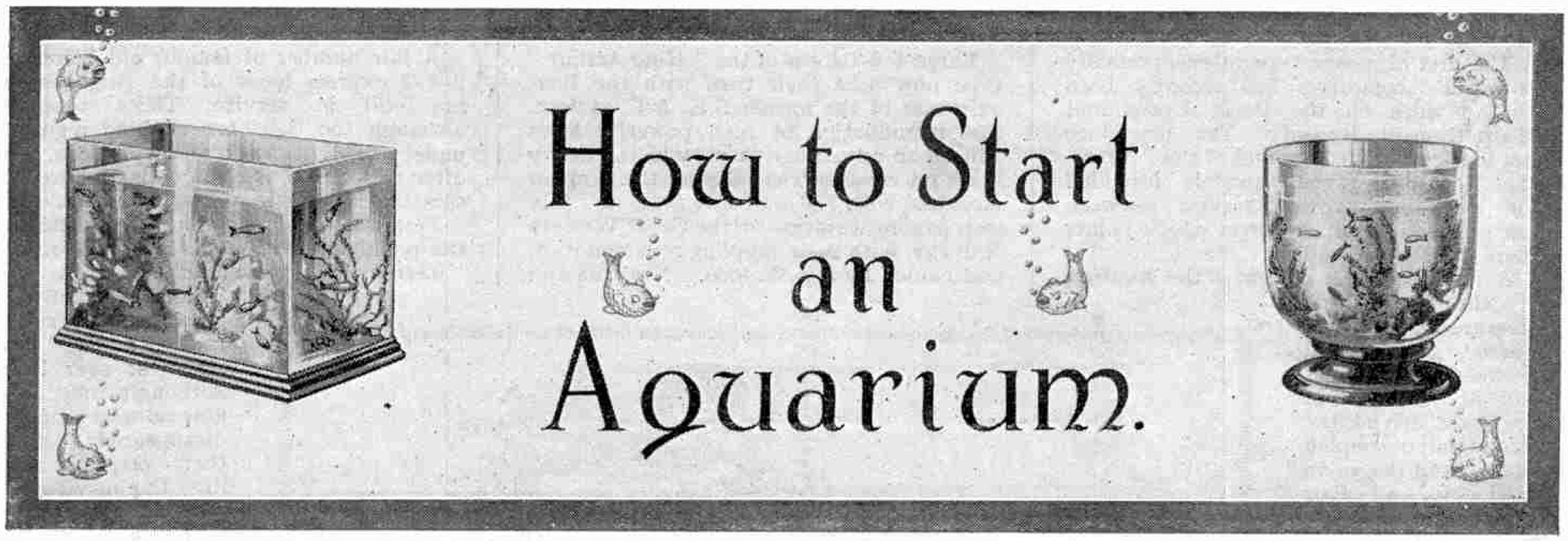
The New Ashover Light Railway

A new light railway 7½ miles in length and of 2 ft. gauge was opened in April between Ashover and Clay Cross (Derbyshire). At the latter place there are coal mines founded by George Stephenson in 1837 and still in operation. These, together with limestone, pig-iron, bricks, chemicals, tar, etc., form a considerable local industry and the primary reason for the Ashover Light Railway was to supply from the quarries at Milltown and Ashover, limestone for the furnaces and tar macadam plant, also for bringing down fluor spar and lead.

There are twelve stations and halts along the line, which traverses some beautiful scenery and is steeply graded in parts, banks of 1 in 37, 1 in 42, and 1 in 77 being encountered. In each case the gradient favours the heavy traffic and in the case of minerals only empties have to surmount the steep banks.

To work the line there are six 4–6–0 type tank engines built in 1917 by the Baldwin Loco Works of Philadelphia, U.S.A. for working British military light railways overseas. These fine little machines are painted in the new L.M.S. style and have driving wheels 1 ft. 11½ in. diameter, bogie wheels 1 ft. 4 in. diameter and outside cylinders 9 in. × 12 in. Their boilers are of 2 ft. 9 in. diameter and contain 83 tubes, while the steam pressure is 180 lbs. per square inch.

Passenger carriages are surprisingly comfortable and well-fitted for such a narrow gauge, and during the first three days after opening no less than 5,500 passengers were carried.



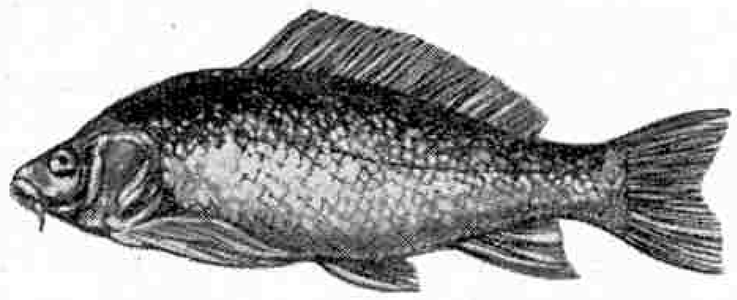
By W. COLES-FINCH

(Resident Engineer, Chatham etc. Water Co.)

III. SOME SUITABLE FISHES

HAVING filled and prepared the tank on the lines described in the article published in the May "*M.M.*," the water should be bright and clear. If the plants are thriving, they should give off beads of oxygen from time to time, which rise to the surface of the water in a silvery stream. When we see this, we may rest assured that all is well and if fishes are introduced there will be no distressing indications of suffocation by the little creatures swimming with their mouths close to the surface, as already described.

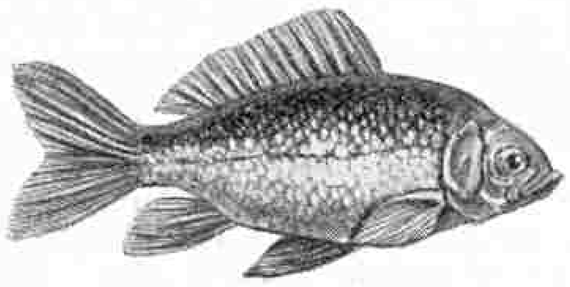
The great factor to be borne in mind is proportion—that is, a small aquarium demands small inmates. Nothing is more unsatisfactory from all points of view as a small aquarium overstocked with fishes that are too large and unable to move about more than, say, three times their own length in any one direction. It is far better to have small fishes, for to watch these darting about here and there pleases the eye far more than the sight of one large creature moving slowly and sluggishly only a few inches.



Common Carp
(*Cyprinus carpio*)

Hardy Fishes

There are many kinds of fishes that are suitable for the tank, but our first experience should be gained with the more hardy specimens. Golden Carp (*Cyprinus auratus*); Common Carp (*Cyprinus carpio*); Prussian Carp (*Cyprinus gibelio*), and a little group of the graceful Minnow (*Leuciscus phoxinus*) should suffice excellently for a time. These fishes must of necessity be small and few in number, for any attempt to crowd the tank is certain to result in failure. The thing to aim at is not a tank of imprisoned fish, but rather a miniature portion of a typical stream, with its thriving plants and healthy inmates.

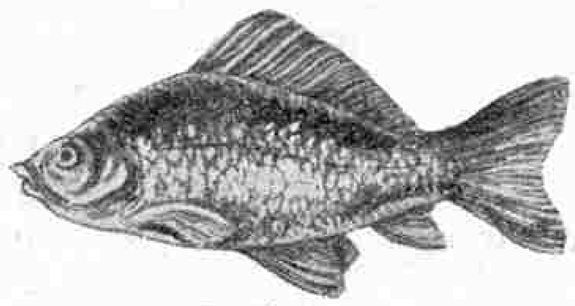


Golden Carp
(*Cyprinus auratus*)

Later, when the first fishes have settled down comfortably and made themselves at home, and if there is yet room to spare, a couple of Golden Orfe (*Leuciscus orfus*) might be introduced. These fishes are of lemon-gold colour, slim and graceful, quick in movement and superior in many ways to the sluggish, lazy Goldfish. They deserve to be much better known, for they are hardy, and the writer kept a pair of them, in company with other fishes, in his aquarium for ten years. At first they were tiny creatures about two inches in length, but they grew until they became too large for their home and they were then placed in a garden pond, where they lived for several years.

Refreshing the Aquarium

Even if the balance of plant and animal life in a tank is satisfactorily maintained, as described in our first article, it is desirable occasionally to take a little water from the tank and replace it by fresh water. Both operations should be carefully carried out by the use of a small siphon. Emptying the tank entirely should be carefully avoided. The shock due to the change of temperature alone is very distressing to the fishes and there is also the general disturbance of the plants, which checks their growth and upsets their natural form and beauty. A small syringe may be brought into use at times to revivify the water by withdrawing some of it and squirting it back again with as much force as possible. This operation has the effect of driving air under the water, which takes up the oxygen and thus becomes more fit to support life.



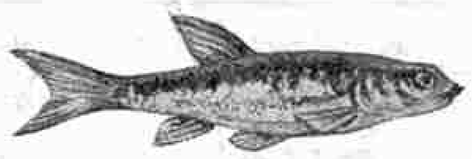
Prussian Carp
(*Cyprinus gibelio*)

If the glass becomes dull by reason of too much confervoid growth—probably induced by too much bright light—the natural growth of the plants will be checked. In this case the excessive growth may be removed quite easily by means of a toothbrush or a piece of sponge attached to a stick.

Food for Fishes

Fishes need very little food. Some of them are more particular than others, but generally speaking ants' "eggs"—which are really the pupæ of the ants—are welcome, forming excellent food.

Other suitable foods are finely chopped shrimp, raw meat, hard-boiled egg, small worms, or finely broken vermicelli. Small crustaceans and larvæ and pupæ of water flies from ponds and ditches would be a luxury but they are not a necessity. The eggs and fry of the water snails living in the tank also provide wholesome food for the fish.



Minnow
(*Leuciscus phoxinus*)

An Unpleasant Experience

In reference to ants' "eggs," care should be taken to make certain that they have been "kiln-dried" and their fertilisation destroyed. A sixpenny box of "eggs" once cost the writer £15! They had not been correctly prepared, and the whole lot hatched out and took up their residence behind the skirting board beneath the floor of the room!

At night the ants came out in battalions and covered the walls of the room, disappearing when daylight came. Every effort to get rid of them failed. As fast as some were killed a still greater number filled their ranks and nothing seemed to have any effect on them. Finally floors and skirting had to be taken up and the walls and all cavities treated with chemicals, and in this way the ants were finally destroyed.

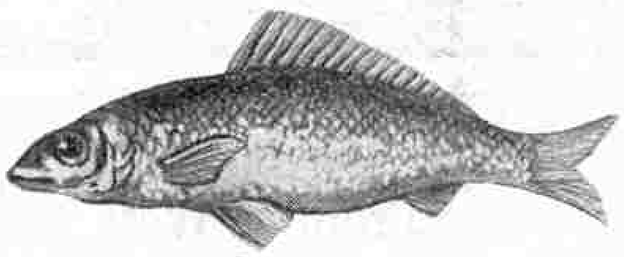
Removing Uneaten Food

On no account must small particles of food be left in the tank to decay. These particles may be removed quite easily, without disturbing the occupants of the tank, by means of a narrow glass tube, used as a "pipette." The top end of the tube is closed by pressure of the finger and the other end is lowered into the tank until it is just above the particle to be removed. The finger is then lifted and water rushes up into the tube carrying with it the offending particle. The top of the tube is again closed with the finger and the tube, with its contents, are then withdrawn from the tank.

A Pressure Jet

If a tank is of sufficient size to warrant the step, greater pleasure may be obtained and more creatures kept in healthy condition by laying on town's water. The jet, which need be no larger in diameter than a darning needle, may be turned downward so as to impinge upon the surface of the water. This tiny pressure jet will drive a stream of silvery air bubbles far beneath the surface of the water and the Minnows will gambol and rush up the glistening track in the most delightful manner. The downward jet may be removed and a fountain jet screwed on at will.

Such a jet provides a splendid means of aerating the water, but it does not obviate the necessity for maintaining healthy conditions by means of plant life. The jet merely enables an increased number of inmates to live in the tank and makes easier the task of balancing the vegetable and the animal life.



Golden Orfe
(*Leuciscus orfus*)

Under these favourable conditions and when more experience has been gained, we may introduce Gudgeon, Chub, Stone Loach, Rudd and the sluggish Tench. It will be fatal to the small members of the aquarium, however, if large specimens of these fishes are introduced among them. A fish in doubtful health should never be placed in the aquarium, but should be kept in a separate vessel until there is no doubt that it is healthy and above suspicion.

A Word of Warning

One word of warning must be given here. No risk should be taken by indiscriminately placing in the tank every aquatic creature that comes to hand, otherwise it may be discovered, all too late, that wolves have been placed with lambs, with an obvious and unfortunate result! For this reason it is not wise to risk the presence of water bugs, beetles or scorpions among the peaceful members of the tank until some knowledge of their various habits has been attained.

Over-feeding is bad for fishes and must be carefully avoided and, as already stated, any particles of food not consumed should be removed immediately before they have time to decay and pollute the water.

On the other hand, if fishes are not sufficiently fed they may be driven to cannibalism or to devour and exterminate smaller and weaker specimens of other species.

NEXT MONTH:—

POND LIFE IN THE AQUARIUM

The Highest Structure in the World

(*Continued from page* 385)

It was one of the first models, and although it has been improved on several occasions, it necessarily retains many of its original features. In fact, it is one of the few models that have not been improved out of all recognition from the early days of "Mechanics Made Easy." The model has appeared in Meccano advertising, on Outfit labels, and in other printed matter for many years, and in this manner has reached every civilised country in the world. It has even been said that were Meccano Limited ever to adopt a trade-mark, the model of the Eiffel Tower would admirably serve the purpose.

The construction of the model requires very little description, because it is so clearly evident from the accompanying photograph. As is the case in the real Eiffel Tower the Meccano model carries a lift electrically operated by the Meccano motor mounted at the base. The lift-carriage is raised or lowered by a sprocket chain, which passes over a sprocket wheel at the top of the tower, mounted on a rod journalled as shown in Fig. A. The sprocket chain is driven by the motor through worm-gearing as shown in Fig. B. The lift-carriage is guided by cords stretched from the top to the bottom of the tower.

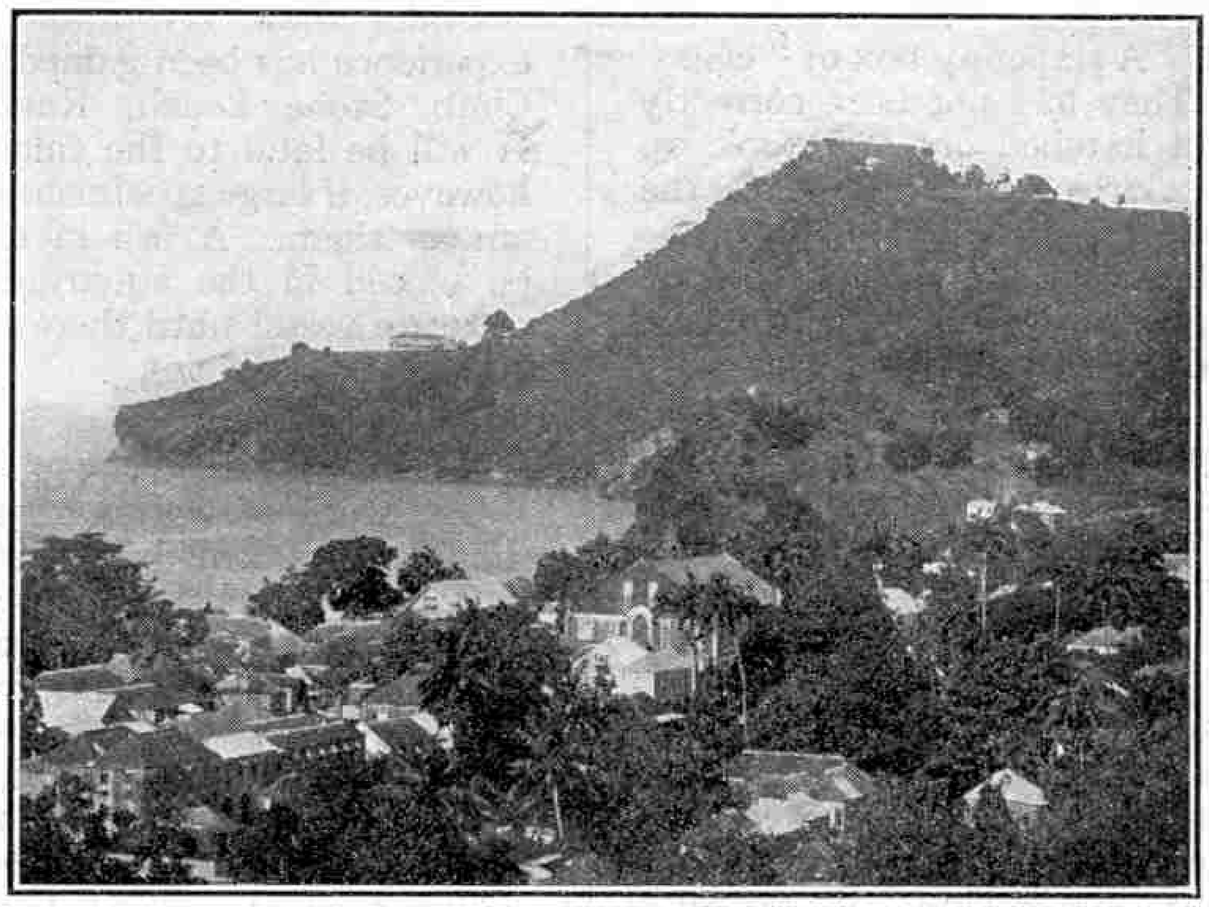
The two detailed views make the construction quite clear and there should be no difficulty whatever in building this model, which is capable of further improvement and elaboration—as, for instance, the fitting of an automatic reversing switch to mechanically reverse the motor when the lift-carriage reaches the base of the tower, and to operate it again when the carriage reaches the top of the Tower. Other elaborations will readily occur to 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.

From a West Indian Reader

I have been asked by the Editor to write a short description of the island of St. Vincent, where I live. This island, which owes its name to being discovered by Columbus on St. Vincent's day 22nd January 1498, is one of the lesser Antilles and is only 18 miles in length and 11 miles in breadth.

When discovered it was in the hands of the Caribs, and it remained so until 1627. In 1773 a treaty was concluded by which the Caribs acknowledged themselves to be British subjects, and in return were granted a large tract of land in the north-east of the island. In 1779 the island was surrendered to the French, but it was restored to the British four years afterwards by the Treaty of Versailles. The Caribs overran the island in 1795, but this rising was suppressed by Sir Ralph Abercromby in the following year. Afterwards most of the Caribs were taken to the Island of Balliceaux—one of the Grenadines, away to the South—and then sent to the Island of Ruatan in the Bay of Honduras.



View of Kingstown, showing Fort Charlotte in the distance

St. Vincent is very far behind the times and the capital Kingstown, where I live, is a quiet little town situated at the head of Kingstown Harbour and surrounded by a magnificent ring of mountains, dominated by Mount St. Andrew. It has three main streets running parallel to each other and intersected by smaller ones, and in spite of its small size it possesses the finest cathedral in the West Indies.

I spend most of my spare time, when not building Meccano models, in bathing, rowing, fishing and sailing. The bathing is specially glorious, and those of you who have read R. M. Ballantyne's book, "*Coral Island*," will understand what it is like. My chums and I have a special place for bathing called "Flat Rock." The main rock consists of a number of ledges off which we dive and try to reach bottom, which no one has yet succeeded in doing. The rock cannot be reached by land, so we often hire a boat and row over to spend a day there, and it may be guessed what a fine time we have!

There are many points of interest about our island. The most prominent is the crater of the volcano "Soufrière," which erupted in 1902 and caused much damage and loss of life, especially among the Caribs who lived just under the mountain. The Caribs, of whom there are now only a few left, are most interesting to talk to, and the men for the most part are handsome. At our public library may be seen many of the stones that the Caribs used in their warfare. They are all shapes and sizes and are highly polished, with one side ground to the shape of a hatchet with a sharp cutting edge.

There are many small islands and rocks around the coast of St. Vincent. One of them, Fort Duvernette, a large rock situated on the south side of the island not far from Kingstown, was fortified in the reigns of George II. and George III., and the old guns are still to be seen there.

Whale fishing is carried on extensively among the Grenadines and St. Vincent, and it is interesting to watch the native fishermen at work. It is a dangerous sport and one gets quite excited while looking on. The natives live largely on fish, which they catch from their little "catamarans," or rafts.

G. Blencowe, Kingstown.

An Early Iron Bridge

I was very interested to read a reference to the Iron Bridge across the River Severn at Broseley, in a recent number of the "*M.M.*," and I think that some readers will like to have some further details regarding this bridge. I should therefore like to give a description from a book, called "*The Wilkinsons*," by John Randall, in which this bridge is described. Here it is:—

"On the abutments of the stone work are placed iron plates, with mortices, in which stand two upright pillars of the same. Against the foot of the inner pillar the bottom of the main rib bears on a base plate. This rib consists of two pieces connected by a dovetail joint in an iron key and fastened by screws. Each piece is 70 ft. in length. The shorter ribs pass through the pillar, the back rib in like manner, without coming down to the plate. The cross-stays, braces, circle in the spandrils, and the brackets connect the larger pieces so as to keep the bridge perfectly steady, while diagonal and cross-stays and top-plates connect the pillars and ribs together in opposite directions.

"The whole bridge is covered with top-plates, projecting over the ribs at each side, and on this projection stands the balustrade of cast iron. The road over the bridge, made generally of iron slag, is 24 ft. in width and 1 ft. in depth. The span of the arch is 100 ft. 6 in. and the height from the base line to the centre is 40 ft. The weight of iron in the whole is 378 tons 10 cwt.

"On the largest or exterior rib is inscribed in capitals 'This bridge was cast at Coalbrookdale, and erected in the year 1779.'"

A toll is still taken (½d.) but the bridge is but little used because of the erection of what is known as the "Free Bridge."

It is interesting to note that the first iron barge was built at Broseley in 1787 and that the first iron railway lines were made and laid down at Coalbrookdale about 1760. The first iron pot was made in this district, although I regret I do not know the date of this latter achievement. E. L. Bray, Horsehay, Salop.

A Chat About Caves

Nearly all boys, like myself, are interested in caves. By caves I do not mean miserable little holes in the side of a cliff, but grand caves such as the Adelsberg Cave in Austria and Fingal's Cave on the Island of Staffa.

Many caves are very beautiful, especially those hollowed out of limestone rock by the action of water. Carbonic acid in the water dissolves the limestone, and thus the constant dripping into the cave forms stalactites which hang downwards from the roof, and stalagmites which rise up from the floor below. Sometimes after a great number of years the two meet and form pillars of the most marvellous shapes, which sometimes defy even the cleverest sculptor to copy. The caves in the Cheddar Cliffs are like this.

Our British caves, however, cannot rival the caves on the Continent and elsewhere abroad. The cave of Adelsberg, for instance, mentioned above, is such a wonderful place that it is impossible for a boy like myself to give a good description of it. Close to the entrance it is of a dull stone colour, but further in the pillars are of the purest white. Some of the stalagmite beds have been tinged red, and the crystalline fragments produce the effect of diamonds on a red cushion. In some places the stalactites take the form of thin sheets which, when struck, give forth a musical sound. The chain of vaults extends several miles underground. The great beauty of it all is very bewildering, and you are constantly going into different vaults each of which seems to be more beautiful than the last.

The cave of Adelsberg is in fact one of the wonders of the world.

W. H. Waters, Clapham, London.

How Iron Wire is Made

From the Ingot to the Finished Product

by J. W. Taylor

MOST metals can be drawn out into wire to some extent, this depending upon what is called the "ductility" of the metal. Metals that are extremely hard, such as antimony and bismuth, can only be drawn with very great difficulty. On the other hand, the soft metal lead cannot be drawn into wire at all. Different methods are employed for drawing out metals for different purposes, and the following article describes briefly the method usually employed for the manufacture of ordinary iron wire.

First of all a mixture of pig iron, red ore and hammer slag is placed in a reverberatory furnace and rabbled into three white-hot balls of metal. This process, which is known as "puddling," was described in the "*M.M.*" for June 1924. The three balls of metal are then withdrawn from the furnace and taken to a steam hammer. The metal is manipulated beneath the hammer by a man known as a "shingler," who also instructs the hammer driver as to the weight of blow required. The metal emerges as a solid bar of about 2 ft. by 4 in. by 4 in.

From the hammer the bar is taken away to be rolled, and it retains sufficient heat for this process to be carried out without reheating. The rollers, which are three in number and placed one above the other, are pinion-driven and grooved to depths varying from approximately 2 in. to $\frac{3}{8}$ in. The bar is passed through the centre and lower rollers and returned through the centre and top rollers, and after having passed through each groove in turn it measures about 11 ft. by 4 in. by $\frac{3}{4}$ in.

Scale Removed by Acid

The bar is now sheared into 1 ft. lengths and taken to the ball furnace, in which the lengths are piled in fives or sixes according to the gauge of rod required. In the furnace each pile becomes welded into a white hot "bloom," which is then passed through other rollers in order to reduce the section evenly until a rod with a 1 in. section is produced. This in turn is taken through a smaller set of rollers, the grooves of which are more semi-circular. While passing through the next set of rollers, which are self-feeding, the scale on the metal is loosened by water dripping on to the rollers and is then removed by a scraper. This precedes the entry to the final set of rollers wherein the required gauge is set. A circular drum about 30 in. in diameter coils the rod as fast as it is completed.

The rod, in coils of about 100 yards, is now ready for the wire factory, its gauge being approximately $\frac{1}{4}$ in. in diameter. In the factory the ends of each coil are pointed in a machine specially constructed for this purpose and the coil is then taken to the cleaning shed and lowered into a vat of acid in order that all remaining scale may be removed. After this process the coils are well rinsed with water to remove any traces of acid and then, to prevent rust, are steeped in hot lime water and immediately removed to a drying shed.

The coil now reaches the wire drawers, the first of whom is called a "ripper," and his duty is to reduce the gauge of the rod down to No. 8. This is done in two or more stages according to the initial size of the rod.

Annealing and Cleaning

The gauge is reduced by drawing the rod through a drawer's plate—set by the wire drawer to various sizes according to the gauge required, and lubricated by Russian tallow—on to a steel drum known as the "block," which is about 24 in. in diameter and revolves at the rate of about 20 revolutions per minute. During the first stage the machine is hand fed, but for subsequent drawing the coil is taken off the block and placed on a drum at the side of the bench, from which it is again drawn through the plate, on each occasion through a smaller hole. When No. 8 gauge is reached the ripper binds with tie bands the coil of wire thus drawn.

It will be appreciated that, as the diameter of the wire is now less than half the diameter of the rod, the coil is increased considerably in length, and also that, owing to the pressure exerted upon the wire, the coil is now warm and hardened in temper. In order to restore the wire to its former pliable condition it is necessary for it to be annealed in a vertical tubular furnace, which is usually fired for about four hours and then allowed to cool gradually for eight hours. After the wire is removed from this furnace the cleaning process already described is again carried out.

The wire is now ready for finer drawing and unless an intermediate gauge is required it is drawn in two stages down to No. 12. If a still finer gauge is desired it is usual to re-anneal and clean the wire before proceeding in order to prevent the wire breaking under the strain, a risk that becomes greater proportionately with the fineness of the wire.

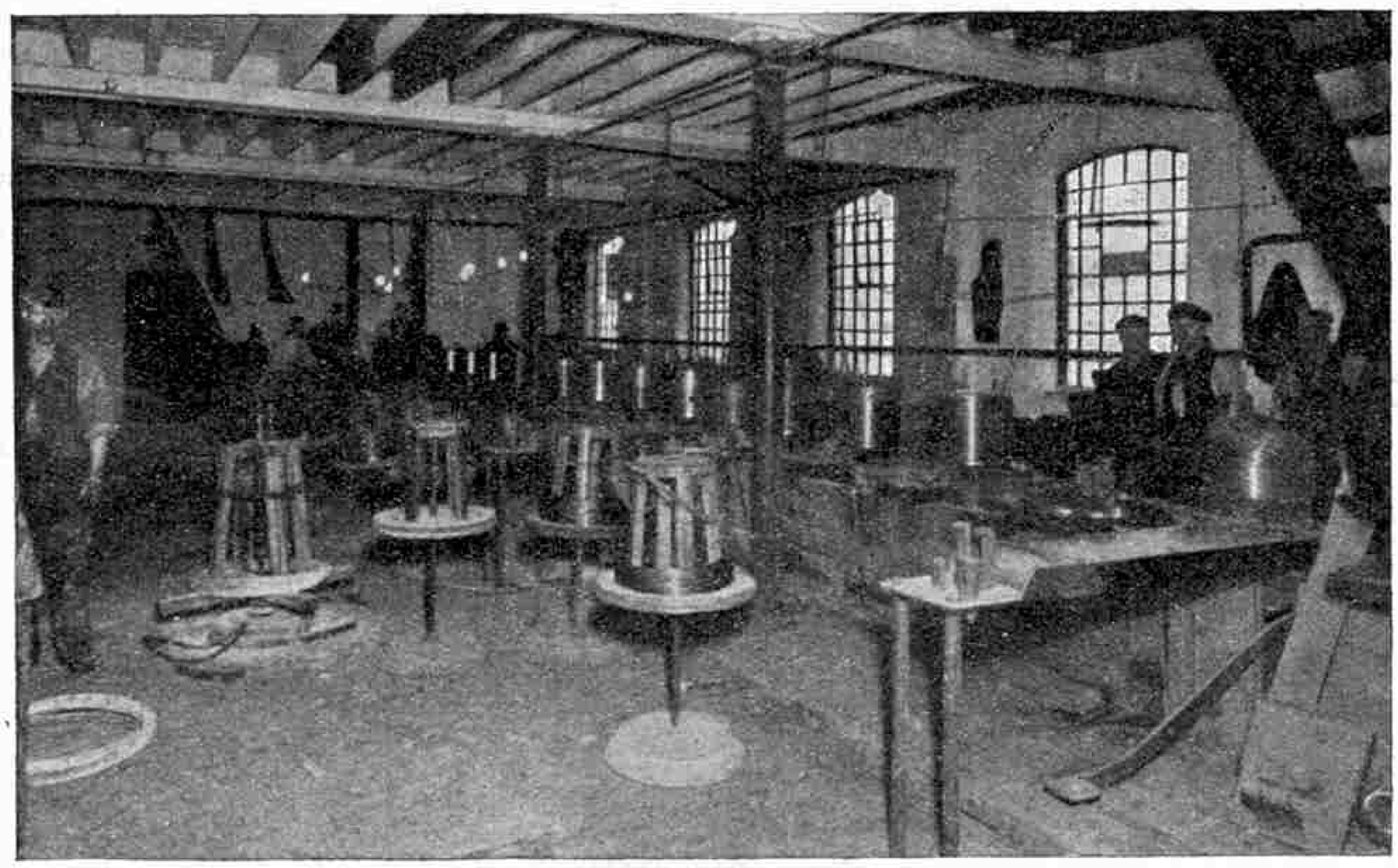


Photo courtesy] [*Longford Wire Co. Ltd., Warrington*

Interior of a Wire-Drawing Mill

Galvanised, Tinned and Japanned Wire

Unless the wire is of exceptional quality it cannot be reduced more than four stages at one time without re-annealing and cleaning. After leaving the wire drawer for the last time the wire must once more be annealed unless it is required to be "bright" or "copper-coated." If required "bright" no further work is entailed, but if the wire is to be copper-coated it is necessary, before the final drawing, to steep the coil in a vat containing a specially-prepared copper sulphate solution.

The appliances used for wire drawing become considerably lighter from No. 14 gauge upward, the blocks being reduced to 16 in. in diameter up to No. 19 gauge and 9 in. diameter beyond, the smallest size, known as a "jigger block," being capable of dealing with the finest wire made.

Other classes of wire not yet mentioned include galvanised, tinned and Japanned wire. In the case of galvanised wire,

(*Continued on page* 426)

In the Land of the Rising Sun

Greetings to "*M.M.*" Readers from the East

MOST of our readers know that the Meccano Manuals and other publications are printed in 16 languages, and that Meccano depôts are to be found in all parts of the world. We wonder how many of our readers understand exactly what this means, and if they realise how wide-spread the Kingdom of Meccano really is.

When you sit in your home in England, or Canada, or Australia, or wherever it is that you live, do you ever think of the boys of other nations who are also building Meccano models? Many of these boys are situated in vastly different surroundings, and play under very different conditions from your's—yet you all enjoy the same hobby, face the same mechanical difficulties, and learn the same lessons.

From time to time we have published photographs of Meccano boys in the Argentine, in New Zealand, in Australia, and in other distant parts of the world. This month we are pleased to be able to reproduce some photographs of two of our young friends in Japan.

These photographs reached us from the "Land of the Rising Sun" at a time when it was cold and wet in England, and they brought a ray of joyous sunshine into the Editorial office. They made us realise there is a land where the sun often shines, and if it is not shining out-of-doors, we feel confident it shines wherever the smiling faces of our two happy little friends may be!

Some time ago Mr. S. Sakurai wrote us a very interesting letter from Nakayamate-dori, Japan, telling us how his two sons spent many happy hours with Meccano; how they thought out new models; and how they endeavoured to improve upon the models shown in our Manuals, as all true Meccano boys should!

Kenichi, the elder of the two boys, is nine years of age, and he has been a Meccano boy for eighteen months. He is already quite a clever young engineer and has built many fine models, Ships, Locomotives, Swing-Bridges, Pit Head Gears—but the models in which he is most interested are Cranes of all types.

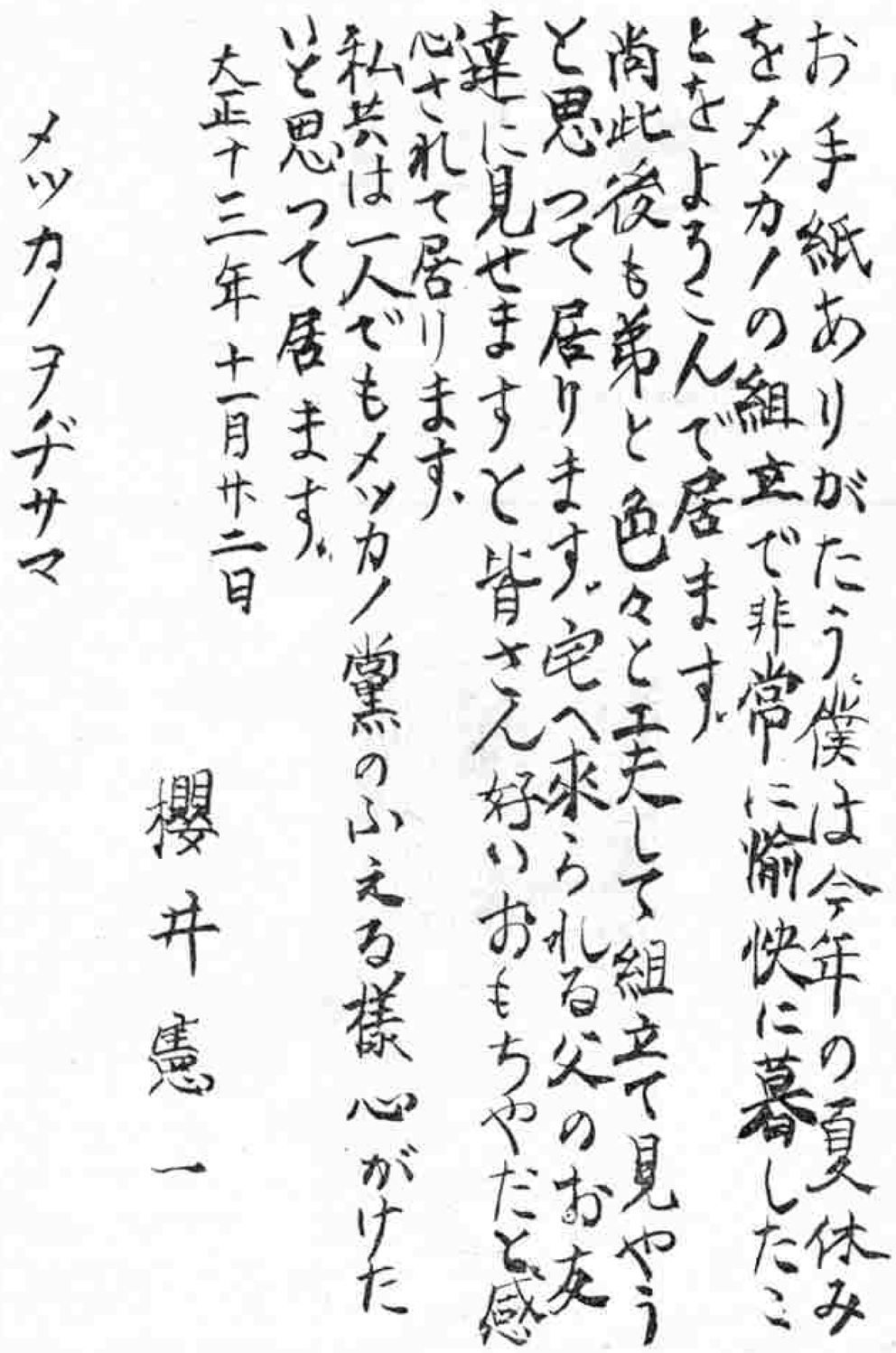
Kenichi's younger brother (aged six) caught "Meccano-itis" while watching him at work, and now the brothers have great fun seeing who can invent and build the finest model without assistance!

Mr. Sakurai very kindly sent us several photographs, five of which are reproduced here in a group. The top left-hand photograph shows Kenichi on his bicycle outside his home in Nakayamate-dori. It is interesting to note that although he is riding his bicycle, Kenichi is wearing the little wooden Japanese sandals. In the centre photograph our young friends are shown together in the sunshine, having been persuaded to leave their Meccano for a few moments in order to be photographed out of doors. The other three photographs are typical of several, which show Kenichi and his brother at work on their models.

But what pleased us nearly as much as the charming photographs was a letter from Kenichi himself. Although we have become fairly expert in deciphering Meccano boys' letters—in all kinds of bad writing and in all manner of languages—we must confess that we couldn't make head or tail of Kenichi's message.

It really was fortunate that his father had expected this, and enclosed a translation, as otherwise there would have been some considerable delay in our discovering the meaning of the letter!

This is what Kenichi wrote to us, reproduced exactly as it appears, each letter and each word a work of art in itself.


お手紙ありがたう僕は今年の夏休み
をメッカノの組立で非常に愉快に暮したこ
とをよろこんで居ます
尚此後も弟と色々と工夫して組立て見やう
と思って居ります宅へ来られる父のお友
達に見せますと皆さん好いおもちやだと感
心されて居ります
私共は一人でもメッカノ黨のふえる様心がけた
いと思って居ます
大正十三年十一月廿二日
櫻井憲一
メッカノヲヂサマ

Kenichi Sakurai's Letter to the Editor of the "M.M."

"Dear Uncle Meccano,

"I thank you for your letter. I am delighted to say that I have had most pleasant times throughout my last summer vacation in working up your Meccano models. And from now on I am going to continue this interesting work, together with my brother, making interesting structures to the best of our ability.

"I always show the models to the friends of my father when they call, and am very pleased to hear their admiration of the excellent toy.

"To increase the number of Meccano engineers is our wish, and we are always keeping it in our mind."

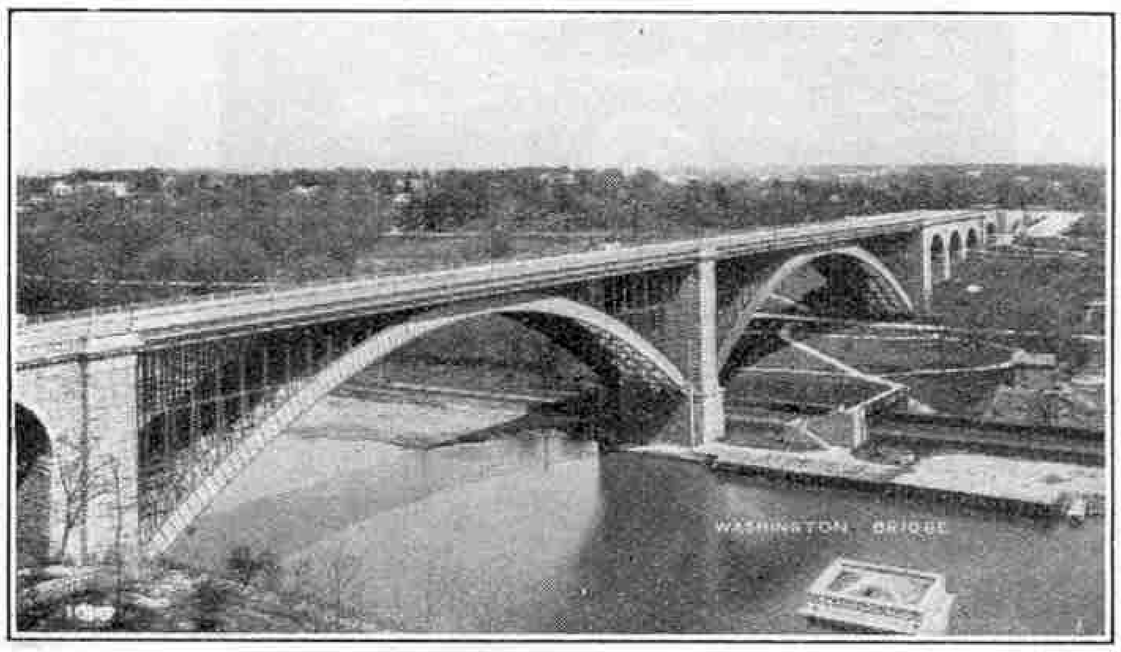
Yours truly,

Kenichi Sakurai.

We know that Meccano boys in all parts of the world will join in extending the hand of good-fellowship to our little friends, thousands of miles away in Sunny Japan. We welcome them to Meccanoland and hope that there are many happy days in store for them.

FAMOUS BRIDGES—No 4

Washington Bridge and High Bridge, New York



Our cover this month shows two famous bridges, Washington Bridge in the foreground and High Bridge in the distance beyond.

Washington Bridge, to which a brief reference was made in our article last month, was constructed at a cost of over £600,000 and required two years to complete. Work was commenced in July 1886 and the Bridge opened for traffic in December 1888.

The Bridge crosses the River Hudson from Manhattan to New York, at a point where the river is 400 ft. in width. It is built in two tremendous steel arches, the span of each being 508 ft. One arch spans the river and the other bridges the land adjoining the water's edge. There is a clearance of 133 ft. under the bridge at high water, the length of the whole structure from end to end—including the masonry approaches—being 2,375 ft. and the width 86 ft. 7 in.

The accompanying photograph, published by the courtesy of the Department of Plant and Structures City of New York, gives an excellent idea of the unusual grace and beauty of this bridge and of the length of the two steel arches. The Bridge is, indeed, an excellent instance showing how nothing of beauty and grace of line need be sacrificed to gain requisite strength.

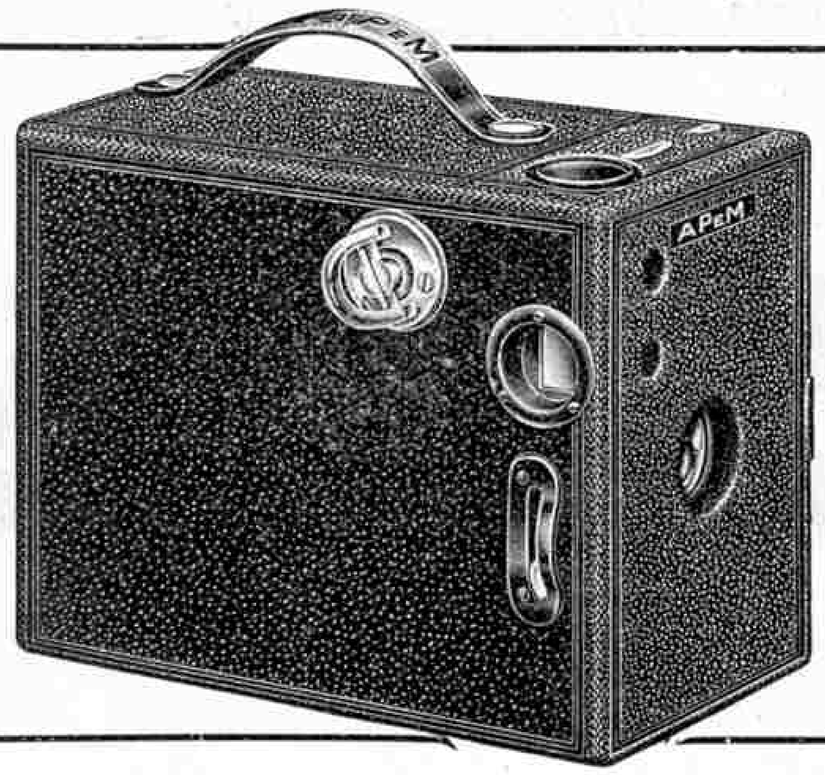
High Bridge, New York

The many-arched bridge in the background on our cover design is the High Bridge. This bridge was built in 1848, as part of the old Croton Aqueduct and carries three water mains with a water-carrying capacity of 90,000,000 gallons of water per day.

The Federal Government consider this bridge a menace to navigation, and plans have now been made for the removal of four of the masonry piers. These will be substituted by a steel cantilever arch of 420 ft. span with a rise of 103 ft., leaving an unobstructed waterway and removing the menace to navigation.

A depth of 15 ft. of water is provided at low water and the estimated cost of remodelling the Bridge is £200,000. The new steel arch, a cantilever, will be sprung from rock to rock, and will eliminate any danger of the future settling of High Bridge.

Essential for Successful Photography:



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V. SEASIDE AND HOLIDAY PHOTOGRAPHY

DURING this month and next, our readers will be on holiday, most of them no doubt at the seaside. As the majority of them will have taken cameras—in many cases for the first time—we propose to devote this article to the subject of holiday photography at the seaside.

Brilliance of Light

The most noticeable difference between photography at the seaside and in inland towns is in the strength of the light. The intense brilliance of the light at the seaside, which is trying to the eyes until one gets used to it, is due to the clearness of the air and the large amount of light reflected from sea and sky. On this account seaside photography is comparatively easy as regards the exposure problem, and even those with the cheapest types of camera are able to secure good results without difficulty. Indeed, in the late morning and early afternoon hours, when the sun is blazing down from a cloudless sky, it becomes really difficult to under-expose on such subjects as open beach scenes or ships in the open.

Low Viewpoint for Waves

The sea offers boundless opportunities to a keen photographer but it is remarkable how seldom it is really well depicted. The great secret in photographing breaking waves is holding the camera low down, the lower the better. Waves photographed from a high viewpoint become flattened and appear insignificant in size, but on the other hand waves may be made to appear much bigger than they actually are by utilising the lowest possible position for the camera.

Many of the most striking seaside photographs are those of a combination of sea and rocks, and if a really rough sea occurs during one's holidays the chance of making striking pictures should be seized immediately.

Photo by] [*Aly A. Shawky*

Native boats sailing up the Nile, a print entered in one of our recent Photographic Competitions

Blank Skies

No photograph in which the sky is represented by blank white paper can be considered successful and this is particularly the case with seascapes. The low horizon at the seaside, with the corresponding vast expanse of sky, affords an ideal opportunity of obtaining good cloud photographs either in combination with the sea and shipping or just alone. It might be thought that the photography of clouds was monotonous, but as a matter of fact it is extremely interesting, and as no two clouds are ever exactly alike, the variety is infinite.

There are two methods of obtaining clouds in a photograph. The first is to secure both cloud and landscape or seascape together on the plate or film, and the second is to "print-in" the clouds from another negative.

Clouds and Landscape

The main difficulty of securing cloud and landscape together is that the correct exposure for the clouds is so very much shorter than that for the landscape. Consequently, if the exposure for the clouds is correct the landscape is hopelessly under-exposed, and if correct exposure for the landscape is given, the clouds, unless they are of a very heavy type, are so much over-exposed as to be practically invisible in a print.

Generally speaking, in order to secure cloud and landscape together, what are known as "orthochromatic" plates or films must be used. The majority of films made to-day are orthochromatic and practically all plate-makers have one or two brands of orthochromatic plates of different speeds. Having obtained orthochromatic plates or films we shall probably find on trial that they do not give a noticeably better rendering of clouds. In order to secure the real benefit of these plates it is necessary to place in front of the lens a

(*Continued on page* 411)

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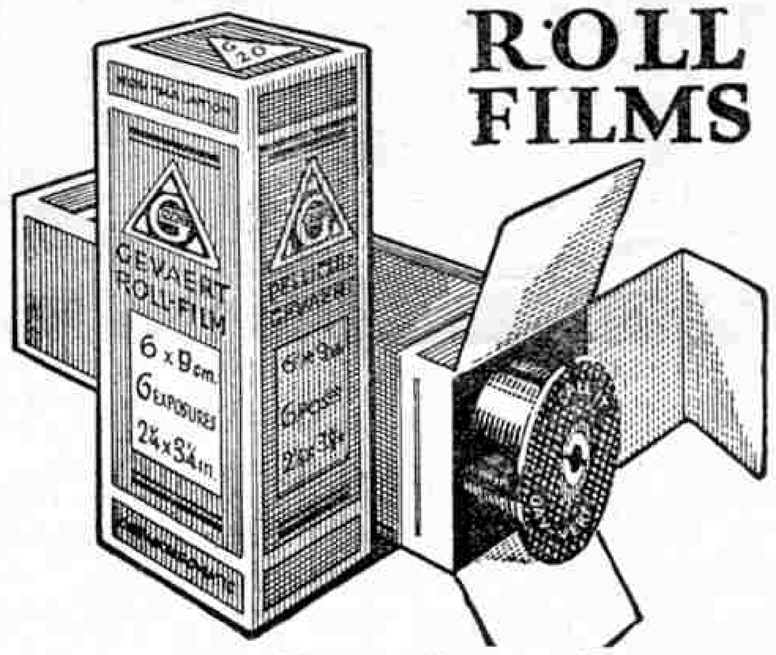

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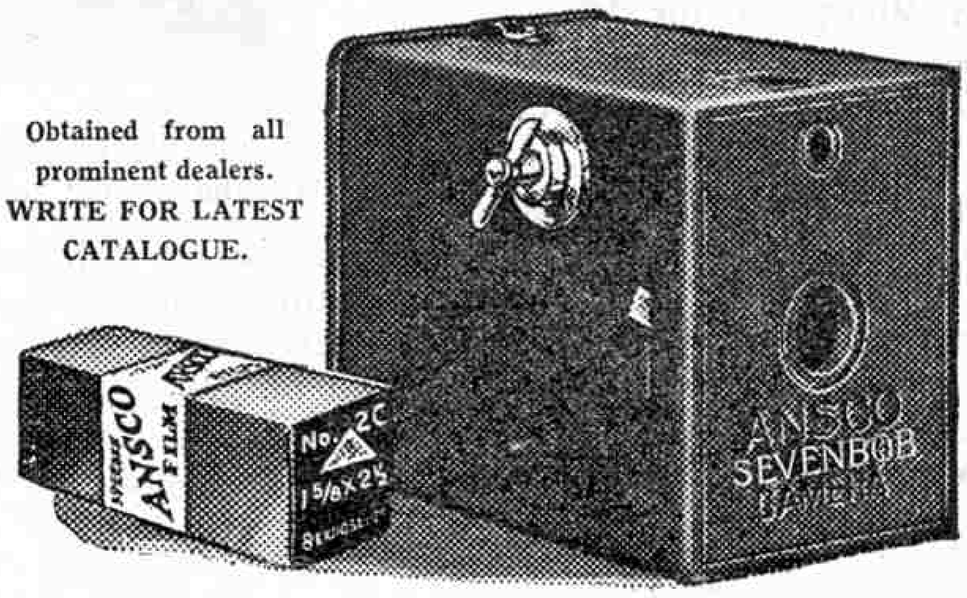

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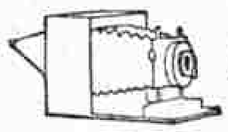

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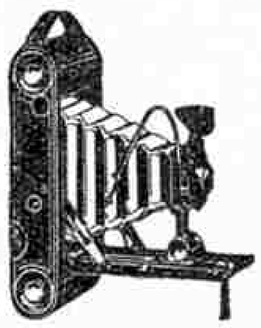

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Photography—(*cont. from page* 409)

"colour screen" or filter. The effect of such a screen is to make a longer exposure necessary, the actual increase depending upon the colour depth of the screen. For hand camera purposes a screen that requires an exposure three times the normal length is as deep as can be used as a general rule.

Screened Ortho Plates

There are also certain plates that are specially made to do away with the necessity of using a colour screen. These plates incorporate in the film a kind of yellow dye that acts in much the same way as a pale colour screen. These plates are known by various names indicating their peculiar type, such as Messrs. Gevaert's "Filtered Ortho," Messrs. Paget's "Orthochromatic Self-Filter" and Messrs. Wellington and Ward's "Anti-Screen." By the use of orthochromatic plates with a colour screen or of the screened plates we have just described, a great improvement in the rendering of clouds will be observed.

There is another method of securing the same result however, and this is by the use of a screen that is not of the same tint all over, but commences with clear glass and gradually increases in depth up to a fairly deep yellow. When this screen is placed in front of the lens the light from the sky passes through the yellow upper part while the light from the landscape passes through the colourless lower part. The result is that the light from the sky is, as it were, held back, and some approach to equality in exposure for clouds and landscape is attained.

The subject of orthochromatic or colour-correct photography is very fascinating and next month we shall deal with it in detail and show what remarkable results may be obtained.

Clouds on Separate Negatives

Even when we have overcome the difficulty of obtaining fairly good clouds along with our landscapes, we are still faced with the difficulty that when we want to photograph a particular landscape or seascape the cloud combinations are very seldom ideal for the purpose. Holidays, unfortunately, are strictly limited as regards time, and therefore one cannot wait indefinitely for suitable clouds to put in an appearance. The most satisfactory method of dealing with this problem is that of printing into the landscape suitable clouds from a specially-taken cloud negative. In doing this care must be taken that the clouds and the landscape are suited to one another. Photographers who print in clouds regularly take every opportunity of securing good cloud negatives so that they have a selection to choose from.

The actual photographing of clouds is not difficult because correct exposure can be given. Any landscape that may appear on the negatives is not required and the fact that it may be hopelessly under-exposed does not matter. In photographing clouds for the purpose of printing-in, a note should be made of the direction from which the light is coming, the time of day and the comparative height of the clouds. A note of this description will prevent the common fault of printing-in clouds illuminated from the right on a landscape illuminated from the left, or using sunset clouds for a landscape obviously taken at midday!

Printing-in

When it is desired to print-in clouds, the landscape is first printed and masked so as to leave the sky portion unaffected by the light. In order to do this take a thin piece of cardboard and draw across it a line roughly corresponding with the sky line and the landscape. Then cut the cardboard along this line and keep both pieces. The landscape negative is then placed in a printing frame, the sky portion of it is covered by the upper half of the sheet of cardboard, and a print is made. This print therefore will have the sky portion absolutely white and unaffected by light. Next, place the cloud negative in the frame, place the print in the correct position over it, cover up the landscape portion of the print with the other piece of cardboard and print the clouds on the sky portion of the print.

In order to avoid producing a sharp horizon line across the print the cardboard masks should be used about a quarter-of-an-inch away from the glass. This method is quite easy to manipulate with printing-out papers, but in using gaslight or other papers on which the image does not show before development, it is necessary to mark the paper to show the exact position of the sky line.

Unlimited Range of Subjects

The range of photographic subjects at the seaside is practically unlimited. If the coast round about be wild and rugged, with huge cliffs towering upward from the water's edge, there will be ample scope for many exposures. If the coast is low and sandy its beauties are not so obvious, but such a coast line generally affords compensations in regard to crowded beach scenes with their great variety of amusements and the constant coming and going of small boats taking passengers for a sail or for fishing.

Yachts or sailing boats are excellent subjects for the camera and as a rule are not difficult to take. Sometimes they may be photographed from a pier, but usually a better result is obtained by snapping them from the shore or from a small boat. A three-quarters view gives the best effect, and it will be found that a broadside view is disappointing. The arrivals and departures of passenger steamers also provide material for interesting and amusing snapshots, and at all times the local boatmen and fishermen at work are worthy of an exposure or two.

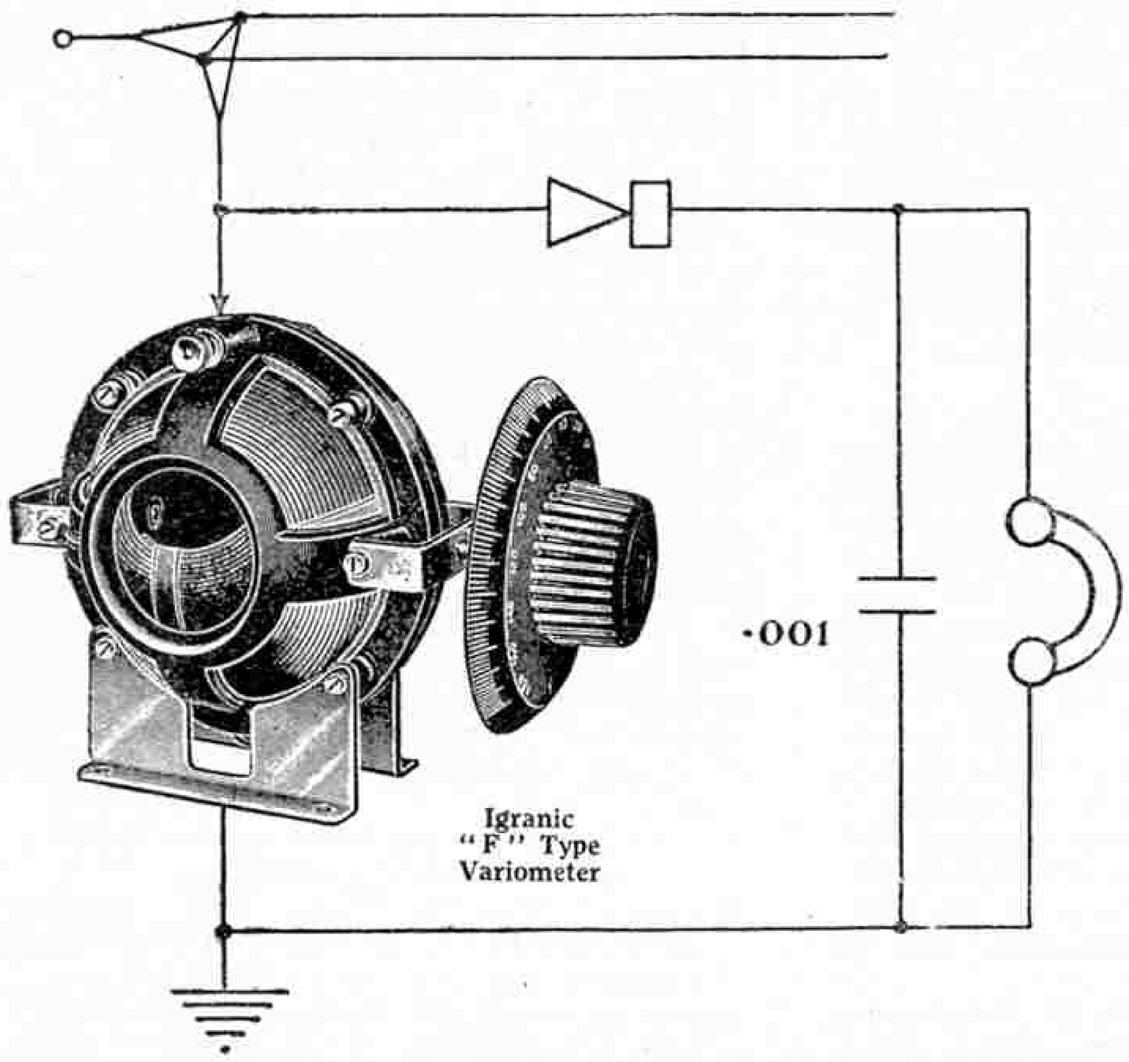
It may be worth while to mention that interesting snapshots may be obtained of the shore as seen from a small boat.

Lifeboat practice affords a particularly fine opportunity for snaps, and it is very interesting to take a series of pictures covering the whole practice from the launch of the lifeboat to its return.

In addition to all this there are the many interesting and amusing pictures to be made of one's friends, but on this matter no advice is needed.

Note to Competitors

We have recently received a considerable number of photographs obviously intended to be competition entries, but which did not state the particular competition for which they were entered. In many cases, owing to the nature of the subject of the photographs, we have found it difficult to determine for which contest the photographs were intended. We therefore wish to draw the attention of all entrants for our photographic competi ons to the necessity of writing on the back of the print the *number of t contest for which the print is an en'ry.*



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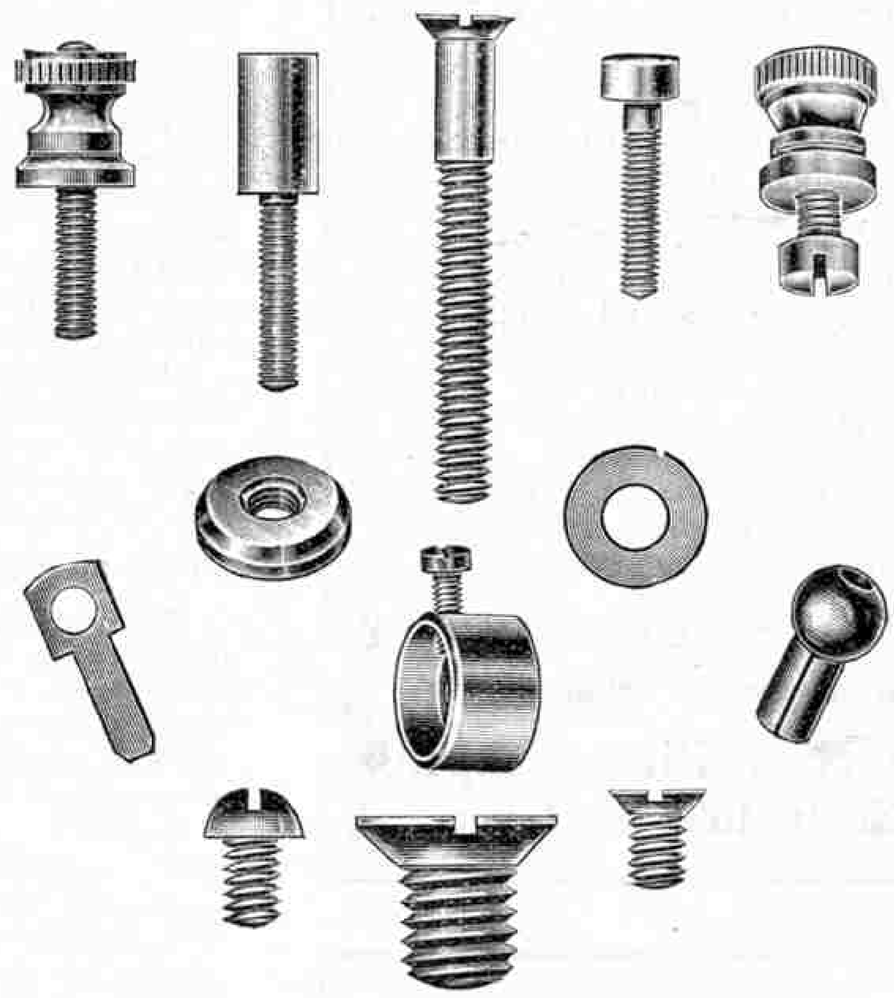

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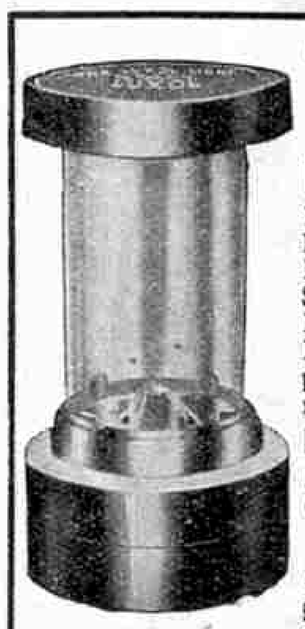

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Eighteenth Photo Competition

Our photographic article this month is devoted to holiday photography and we are arranging our Eighteenth Photo Competition to be in keeping with it. We have decided to offer a choice of subjects in order to try to attract readers of various tastes.

These alternative subjects are: "A LANDSCAPE (OR SEASCAPE) WITH CLOUDS," and "A BEACH ENTERTAINMENT."

The former will offord scope for those who intend to profit by the advice given in this month's photographic article, and the latter gives an opportunity for everybody at the seaside, since everything from a Punch and Judy show to Pierrots comes within its scope.

Each competitor must decide which of the subjects he prefers, and no competitor may enter for both subjects. Prints may be of any size and made by any process, and the work may be done by the competitor himself or by a photographic dealer. In the event of a tie for a prize preference will be given to prints that have been made by the competitor himself, and therefore every entrant must state on the back of his print by whom it has been made. In addition each print submitted must bear the name, address and age of the competitor clearly written.

The competition will be divided into two sections (A) For competitors of 16 and over. (B) For those under 16. Four prizes are offered—Photographic Goods to the value of £1/1/- and 10/6, to be chosen by the winners, as first and second prizes respectively in each section.

Closing date: 30th September (Overseas: 31st December).

Results

Fifteenth Photo Contest

Our Fifteenth Photo Competition, "MY FAVOURITE PET," brought in a really surprising array of animal portraits. There were ponies, horses, donkeys and goats, dogs fetching their masters' slippers, and a well-groomed black cat begging like a dog! Puppies of various ages were snapped while engaged in their favourite pastime of tearing things to bits, and from the look of anticipation on the faces of some of the pets we suspect the old trick of balancing a dainty morsel on the camera itself! Some of the sitters were so excited that they moved at the critical moment, thereby spoiling their portraits, and one competitor complained that her dog would persist in yawning just as the snap was being made!

Prizes were awarded as follows:—G. H. WALKER (Westgate-on-Sea), photographic goods value £1/1/-, and L. J. HAYNES (Putney), photographic goods value 10/6.

Sixteenth Photo Contest

The popularity of the subject for our Sixteenth Photo Contest, "A JUNE LANDSCAPE," was indicated by the entries which began to accumulate within a week of publication of our June issue. A welcome feature about the photographs submitted was the high percentage that were entirely the work of the competitors.

One of the commonest faults among the entries was that of including too much. In very many cases a great improvement would have been effected by trimming down the print, and thus getting rid of details that were not an essential part of the landscape and only served to distract attention. Still another fault was that of skies represented by blank white paper, giving the photographs an unnatural appearance. It is curious to notice how few amateur photographers ever think of trimming away the sky altogether, and yet it is surprising to notice the improvement brought about by so doing. This question of skies is dealt with this month in our photographic article (page 409) and it is hoped that all our photographic readers will read this section of the article carefully and try to improve their photographs in this respect.

It was no easy task to select the winners, but after careful consideration it was decided that the conditions of the contest were best fulfilled by F. G. BROOK (Ipswich), Section A, and G. W. MORGAN (New Cross), Section B, to each of whom prizes of Photographic Goods value £1/1/- have been awarded. The second prizes of photographic goods value 10/6 went to J. SANDHAM, JR. (Preston), Section A, and MISS DIANA MEEK (Stroud), Section B.

The special additional prize offered by Messrs. Gevaert Ltd. has been awarded to F. G. BROOK (Ipswich), whose study of "The Gainsborough Country," which won the first prize in section A, was printed on Gevaert Self-Toning Paper.

Overseas Results
Twelfth Photographic Contest

Some remarkably fine photographs were submitted in this competition, and the greatest care had evidently been taken in their finishing and mounting. We hope to publish one or two of the winning photographs before long.

Prizes have been awarded to the following:—M. STEVENSON (Cronalla, N.S.W.) and LEE EN KENG (Singapore), first prizes in Sections A and B respectively (Meccano Goods value 10/6). ALI A. SHAWKY (Cairo) and F. HARPER (Christchurch, N.Z.), second prizes in Sections A and B respectively (Meccano Goods value 5/-).

"Photographic Signposts"

For many years Burroughs Wellcome & Co., have made it an annual practice to issue a most attractive and really useful booklet on photography. The wonder is that each succeeding booklet is so fresh and that the story of the usefulness of 'Tabloid' Photographic Chemicals can be retold in a way so different and yet so fascinating. This year we are given a historical survey and then a number of practical photographic signposts pointing out the correct roads to success in exposure, development, toning, intensification and reduction. A new technique of desensitising so that development may be carried out by subdued white or yellow light, even when using colour-sensitive plates, is also described.

A copy of the booklet will be sent post free to any reader on mentioning the "*M.M.*" Apply to Messrs. Burroughs Wellcome & Co., Snow Hill Buildings, London, E.C.1.

A Holiday Photo Competition

Five prizes of one guinea each for the five best holiday snaps taken this month are being offered by Messrs. Burroughs Wellcome & Co. Typical holiday photographs are required and prints (of any size) only must be sent in the first instance. Each print submitted must be accompanied by the July or August light table, from the 'Wellcome' Photographic Exposure Calculator, Handbook and Diary 1925. Negatives must be developed with "Tabloid" Developer and those from which winning prints are made must be loaned for one month to Burroughs Wellcome & Co., who are to have the sole right of reproduction. Negatives will be returned if desired.

Entries should be addressed to "Photo Competition," Burroughs Wellcome & Co., Snow Hill Buildings, London, E.C.1, and sent on or before September 12th. There is no entrance fee and entry forms will be sent on application to Messrs. Burroughs Wellcome & Co. at the above address.

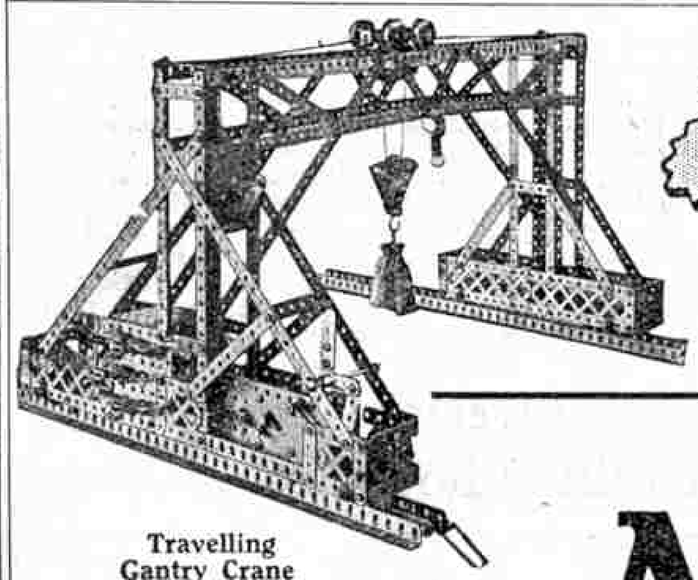
Ensign Speedy Roll Film

The makers of the famous Ensign Roll Film (Messrs. Houghton Ltd., 88-89, High Holborn, London, W.C.1), announce a splendid Photographic Judging Competition with handsome cash prizes.

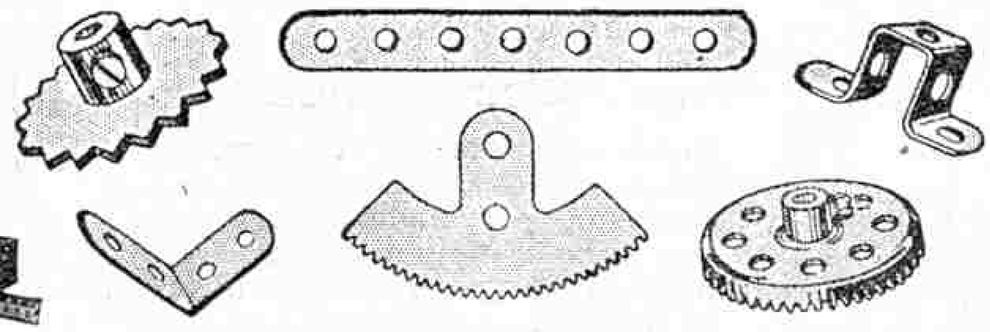
To every reader who sends a postcard asking for particulars of this Competition they will also send an interesting illustrated booklet, entitled "*How to take Photographs*," full of practical and really helpful information for the amateur photographer. A fully illustrated catalogue will also be sent to every enquirer, together with the leaflet giving details of the Competition, which is a particularly easy and interesting one, the competitors not being required to take photographs, but to judge the merit of photographs already taken.

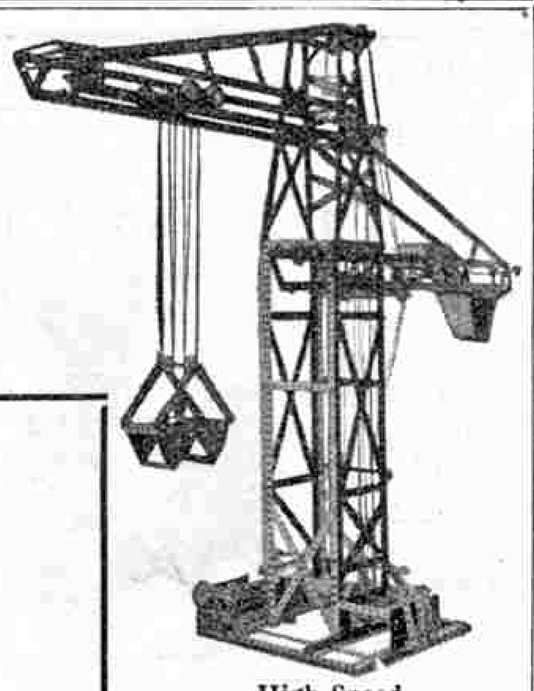
Lott's Bricks' Competition

The proprietors of Lott's Bricks have decided to extend and widen the scope of their Bridge-building Competition, recently announced in the Magazine. The revised conditions will permit of Meccano boys of all ages entering the various sections of the Competition and full particulars of the new rules will be announced in an early issue of the "*M.M.*" Intending competitors should watch Messrs. Lott's advertisements for this announcement.



Travelling Gantry Crane





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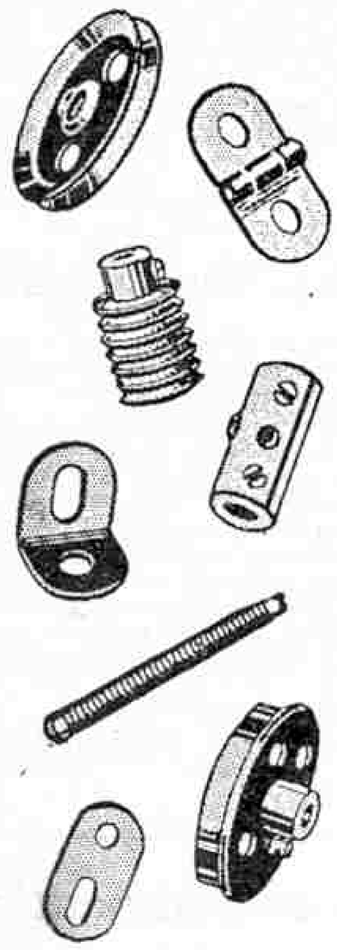
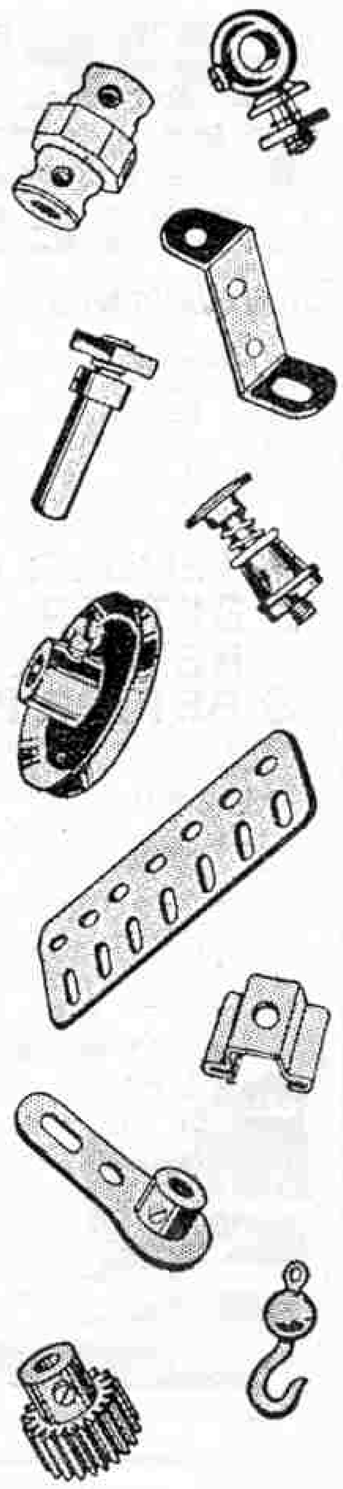


Meccano this year is heaps more fun than it has ever been before. Many new parts have been added recently, and this, of course, means new and better models.

There is no limit to the number of models any boy can build with a Meccano Outfit. The hundreds shown in the Instruction Manuals are just suggestions and no boy ever stops when he has built them—he goes on building new models that he invents himself.

That's why Meccano is such splendid fun. The Crane you build to-day is a Tower to-morrow, a Motor Chassis the next day and so on. You can build a new model every day for years, if you wish! They will be **real** models, too, all sturdy and strong because they are built of steel. Meccano parts are exactly similar to the parts used by real engineers, only smaller. That's why Meccano Cranes lift and swing heavy loads, Meccano clocks keep perfect time, Meccano motor-cars run, and Meccano Looms weave real fabrics.

Meccano models are easy to build—you only require a spanner and screw-driver and these are provided in every Outfit.

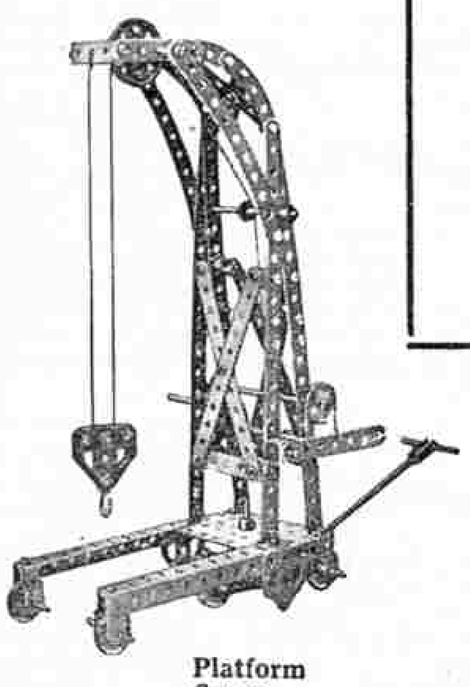


COMPLETE OUTFITS

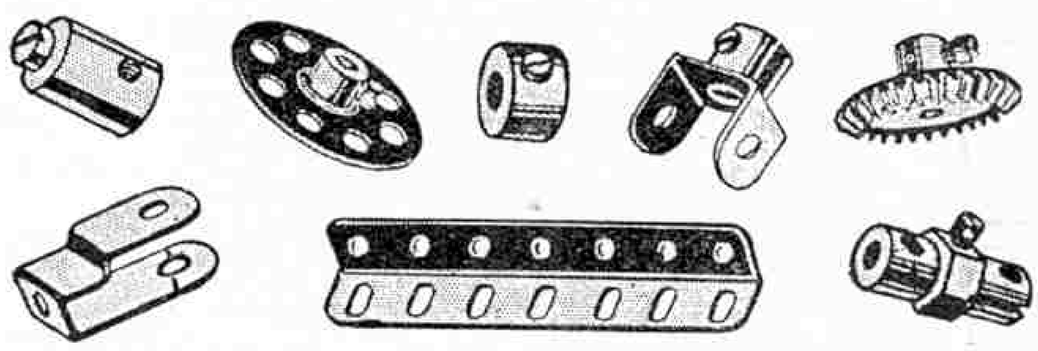
No. 00	3/6
No. 0	5/–
No. 1	8/6
No. 2	15/–
No. 3	22/6
No. 4	40/–
No. 5 (in well-made carton) ...	55/–
No. 5 (in superior oak cabinet with lock and key)	85/–
No. 6 (in well-made carton) ...	105/–
No. 6 (in superior oak cabinet with lock and key)	140/–
No. 7 (in superior oak cabinet with lock and key)	370/–

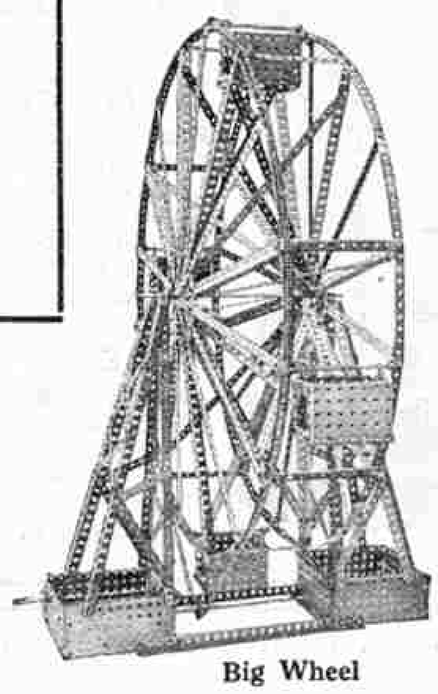
ACCESSORY OUTFITS

No. 00a	1/6
No. 0a	4/–
No. 1a	7/6
No. 2a	8/6
No. 3a	18/6
No. 4a	15/–
No. 5a (in well-made carton) ...	50/–
No. 5a (in superior oak cabinet with lock and key)	80/–
No. 6a (in superior oak cabinet with lock and key)	210/–
Electrical Outfit	42/–



Platform Crane





Big Wheel

August Puzzle Competition

IN spite of the hot weather and all the outdoor attractions of holiday times, last month's puzzle competition was not by any means neglected, and in fact the entries appeared to show an even greater amount of care and thought than usual.

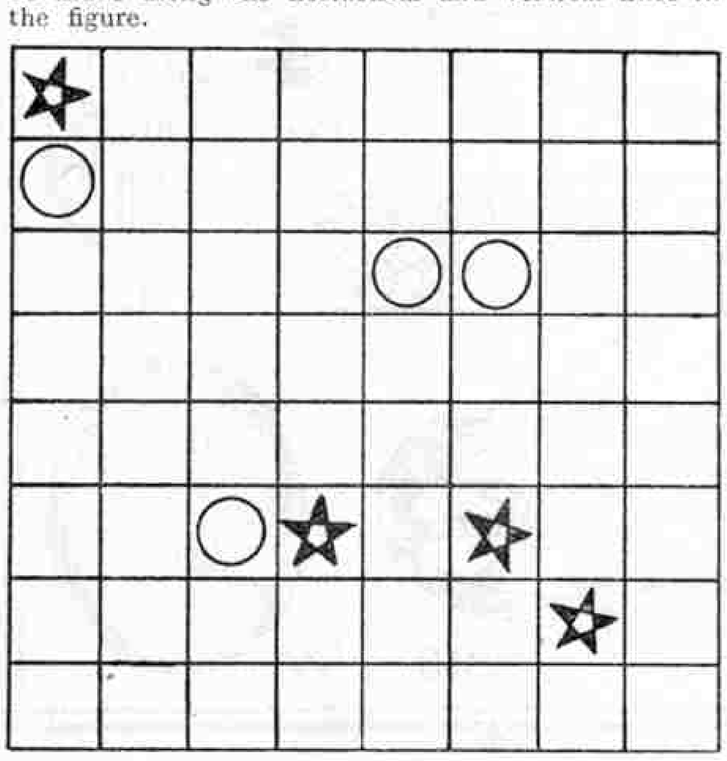
From time to time I have asked readers to send in any puzzles they come across that seem to them to be new. Summer holidays spent away from home, either in the heart of the country or at the seaside, inevitably involve meeting numbers of fresh people with fresh ideas, and so a splendid opportunity occurs for hearing new jokes and collecting new puzzles. I want each of my readers to try to get from his holiday friends one or two new puzzles and to send them to me. Every reader who has a puzzle published on this page receives half-a-crown, and the reader whose puzzle is considered the best in any particular month is awarded 5/–.

This month's competition is on similar lines to that for last month. Each competitor must send the solutions to six of the puzzles on this page. Three prizes are offered—Meccano goods to the value of £1/1/–, 10/6 and 5/– respectively—for the three best entries submitted.

The closing date of this competition is 31st August and there is no Overseas section.

Puzzle No. 109.

How may the diagram below be divided into four equal parts each of the same shape and each containing one star and one circle? The division must be made along the horizontal and vertical lines in the figure.



Puzzle No. 110.

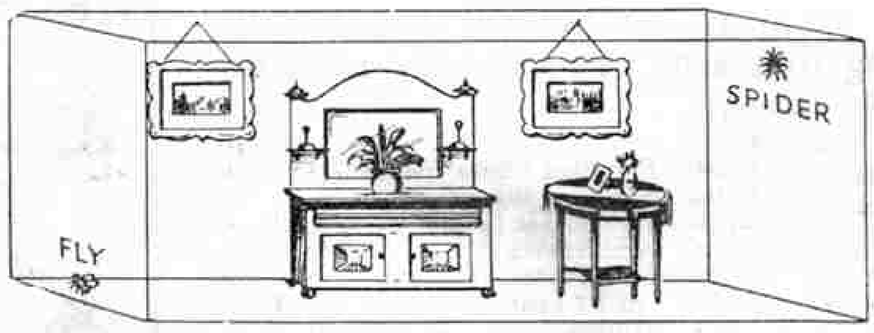
With slight changes in the order of the various letters the following four lines may be made into a charming little ballad :—

Daroun em hslal verho,
Ni dasesns ro lege,
Lilt silfe' rdaems eb vero,
Twees riemem's fo ethe.

* * * *

Puzzle No. 111.

A spider and a fly were in a room measuring 30 ft. long, 12 ft. wide and 12 ft. high. The spider was in the middle of one of the end walls, exactly a foot from the ceiling. The fly was on the opposite wall, exactly in the middle and a foot above the floor. We have supposed the room to be made of glass and the positions of the spider and the fly are shown in the sketch below :—



The fly was sleeping, and remained stationary all the time, but the spider saw his victim, crawled towards him, and effected a capture. The spider wanted to get to the fly as quickly as possible. Which way did he go?

Puzzle No. 112.

A milkman went to the dairy for his usual morning supply of milk, four gallons. The dairyman told the milkman that he was unable to supply four gallons because all his milk was in an eight gallon can and he only had a three gallon measure and a five gallon measure. The milkman replied that he did not see any difficulty in the matter, and at once proceeded to measure accurately four gallons with the aid of the two measures. How did he do it?

* * * *

Puzzle No. 113.

I am a boy's name of six letters. Transpose me and still I am a boy's name; transpose me once more and even yet I am the name of a boy.

* * * *

Puzzle No. 114.

A man went to market with twenty pence. He bought twenty birds, consisting of pigeons at 4d. each, larks at ½d. each and sparrows at ¼d. each. How many of each did he buy?

* * * *

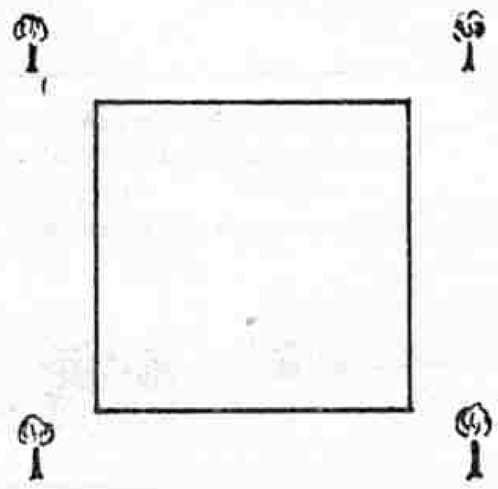
Puzzle No. 115.

I am a word of five letters meaning to frighten. Behead me and I am anxiety; again behead me and I become the unit of a French measure.

* * * *

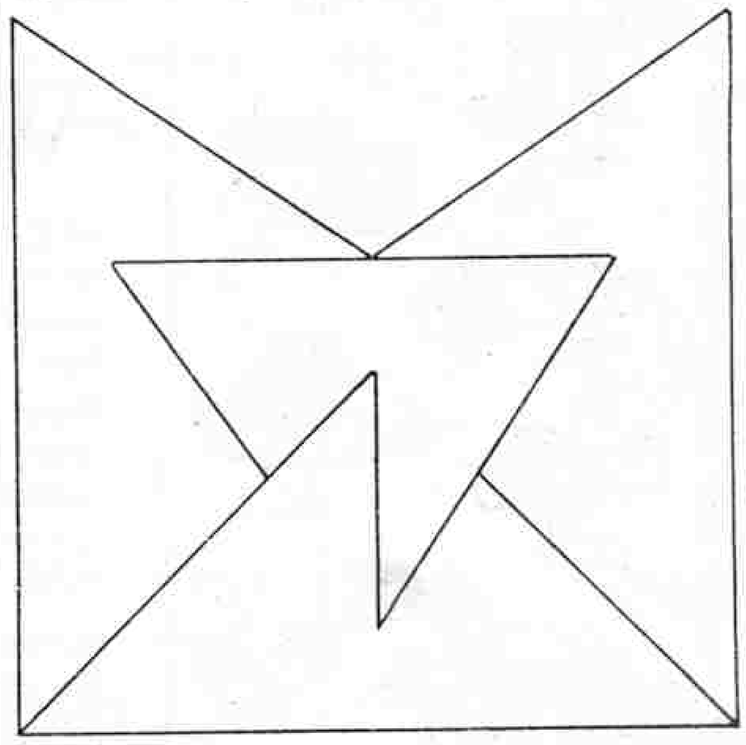
Puzzle No. 116.

A man has a square pond with a tree at each corner as in the following diagram. How can he double the size of the pond, still keeping the pond square and the trees in the same position?



Answers to Last Month's Puzzles

No. 102. The figure is divided as shown below.



* * * *

No. 103. 1. Great Yarmouth; 2. Ramsgate; 3. Southend; 4. Devonport; 5. Cumberland; 6. Felixstowe; 7. Broadstairs; 8. Gloucester; 9. Maidstone; 10. Portsmouth; 11. Brighton; 12. Rutland.

* * * *

No. 104. The six moves are as follows:—12 to 3; 7 to 4; 10 to 6; 8 to 1; 9 to 5; and 11 to 2.

* * * *

No. 105. Flower.

* * * *

No. 106

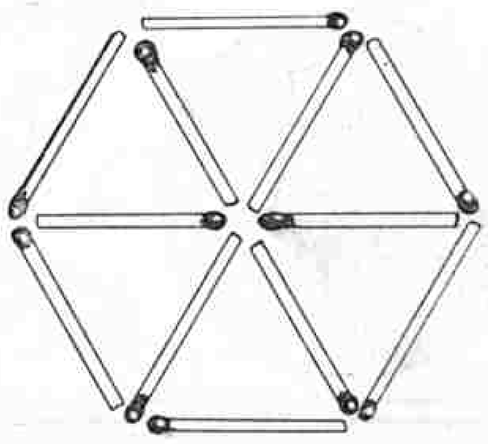
L	E	V	E	L
E	E	E	E	E
V		V		V
E	E	E	E	E
L	E	V	E	L

* * * *

No. 107. The words are Tremendous, Hazardous and Stupendous.

* * * *

No. 108. The solution is shown in the following diagram.



MECCANO

ACCESSORY PARTS

WE illustrate a selection of accessory parts that every Meccano boy will find useful in building the larger and more interesting models. Many of these parts have been only recently introduced, and although we know that they have a universal use (were it otherwise they wou.d not have been added to the system) we may not yet know all their applications. There are endless possibilities in the employment of Meccano parts; indeed, we wonder if there is now a mechanical movement known to engineering that any boy cannot duplicate with Meccano.

			s.	d.
10.	Flat Brackets ...	...½ doz.	0	2
11.	Double Brackets ...	each	0	1
12a.	Angle Brackets, 1″ × 1″	„	0	1
19A.	Wheels, 3″, with set screw	„	0	8
20.	Flanged Wheels ...	„	0	6
	Pulley Wheels :			
19B.	3″ dia., with set screw	each	0	8
22.	1″ „ „ „	„	0	4
22A.	1″ „ without set screw	„	0	2
24.	Bush Wheels	„	0	6
25.	¾″ Pinion Wheels ...	„	0	6
26.	½″ „ „ ...	„	0	4
27.	Gear Wheels, 50 teeth	„	0	9
27A.	„ „ 57 „	„	0	9
28.	1½″ Contrate Wheels ...	„	0	9
29.	¾″ „ „ ...	„	0	6
30.	Bevel Gears	„	0	10
31.	1″ Gear Wheels, 38 teeth	„	1	0
32.	Worm Wheels	„	0	6
33.	Pawls (complete) ...	„	0	4
43.	Springs	„	0	2
44	Cranked Bent Strips ...	„	0	1
45.	Double Bent Strips ...	„	0	1
50.	Eye Pieces	„	0	2
57B.	Hooks (loaded)	„	0	5
59.	Collars and Set Screws	„	0	2
62.	Cranks...	„	0	3
63.	Couplings	„	0	6
63A.	Octagonal Couplings	„	0	8
63B.	Strip Couplings	„	0	8
63c.	Threaded Couplings ...	„	0	6
64.	Threaded Bosses ...	„	0	2

			s.	d.
94.	Sprocket Chain	per length	0	6
96.	Sprocket Wheels, 1″	each	0	3
101.	Healds, for Looms ...	doz.	0	9
108.	Architraves	each	0	2
109.	Face Plates, 2½″ diam.	„	0	4
113.	Girder Frames	„	0	2
114.	Hinges	per pair	0	4
115.	Threaded Pins	each	0	2
116.	Fork Pieces	„	0	3
118.	Hub Discs, 5½″ diam.	„	1	3
119.	Channel Segments (8 to circle), 11½″ diam.	„	0	4
120.	Buffers	„	0	2
120A.	Spring Buffers ...	per pair	0	8
123.	Cone Pulleys	each	1	3
124.	Revsd. Angle Brackets, 1″	...½ doz.	0	10
125.	Revsd. Angle Brackets, ½″	„	0	6
126.	Trunnions...	each	0	3
126A.	Flat Trunnions ...	„	0	2
127.	Simple Bell Cranks ...	„	0	3
128.	Boss Bell Cranks ...	„	0	4
129.	Rack Segments, 3″ diam.	„	0	6
130.	Triple Throw Eccentrics	„	1	3
131.	Dredger Buckets ...	„	0	2
132.	Flywheels, 2¾″ diam.	„	2	3
133.	Corner Brackets ...	„	0	3
136.	Handrail Supports ...	„	0	3
137.	Wheel Flanges ...	„	0	4
138.	Ship's Funnels ...	„	0	4
139.	Flanged Brackets, Right	„	0	2
139A.	„ „ Left	„	0	2
140.	Universal Couplings	„	0	9
144.	Dog Clutch	„	0	6

You may obtain Meccano Parts from your Dealer

Competition Corner

"THE HAPPIEST DAY OF MY HOLIDAYS"

Holidays provide the only topic of conversation worth considering at this time of the year. We all spend our holidays in different ways, and even if two of us happen to stay at the same place it is very unlikely that we spend our time in the same occupations and amusements. Looking back on a holiday we always feel that some days were very much more successful than others. On some days for instance everything seems to go wrong from the commencement. Arrangements break down; friends fail to turn up at the arranged time; rain comes on at a particularly awkward moment, and the final result of all these little things is that the day is looked upon as a failure. There are other days, however—and fortunately they are in the majority—when everything goes well from morning to night, and we finish the day, tired out perhaps, but feeling that we have had a thoroughly good time.

This month we are announcing a competition on the subject of "THE HAPPIEST DAY OF MY HOLIDAYS." This is not a serious essay competition. All that a competitor need do is to send in a brief account of what he considers his most successful day, describing how the time was spent and the particular feature that made the day so successful.

Prizes will be awarded to the four competitors who send in the most interesting accounts of a day's doings, and in judging these essays we shall not allow spelling mistakes, poor writing or other similar matters to take an important place, credit being given principally to the interest of the description.

The contest will be divided into Class A for those of 16 and over, and Class B for those under 16, and the prizes will be Meccano goods to the value of £1/1/0 and 10/6 for the first and second in each section respectively.

Entries must be written on one side of the paper only and the competitor's name, address and age must appear on the back of each sheet used. Closing date: 30th September (Overseas: 31st December).

Eighth Drawing Competition

The change of our drawing competition subjects from land to sea has proved very popular, the entries for our seventh contest being of exceptionally good quality. This month our subject is "A WARSHIP." We do not specify any particular kind of warship and this may be anything from a submarine to a battleship, ancient or modern.

The competition will be divided into two sections: (A) For those of 16 and over and (B) for those under 16. Four prizes are offered—Drawing or Painting Materials (or Meccano Products if preferred), to be selected by the winners, to the value of 10/6 and 5/– respectively, for the first and second in each class.

During last month we had one or two queries from readers as to whether they were allowed to submit two drawings of the same subject. We take this opportunity of stating that any competitor may submit as many drawings as he likes for any competition. For instance, if a competitor wishes to submit a drawing of a destroyer and one of a battle cruiser he is quite at liberty to do so.

Competitors who wish their drawings to be returned must state this at the time of sending in their entries and must also enclose a stamped addressed envelope of suitable size.

Closing date: 30th September (Overseas: 31st December).

Results

Guild Motto Competition

The task of selecting a motto for any society or brotherhood is always difficult, and this is particularly so in the case of the Meccano Guild. Very many excellent efforts reached us, but not one of them possessed the distinctive quality that has made the "Be Prepared" of the Scouts a world-wide slogan.

Many mottoes had to be rejected because they were too long and clumsy. Others, again, seemed distinctly promising until we recalled that they were already in use in other connections, while a few struck the "Death or Glory" note and could only have been useful for a squadron of tanks or a flotilla of torpedo-boats in war-time!

There is a possibility that the motto we are all waiting for has been devised by an Overseas Guild member, and that, even when these lines appear in print, it is speeding across the seas among the thousands of letters that reach us every week from the four corners of the earth. In the circumstances we are not making any selection for Guild adoption at present.

Under the rules governing the competition, we have awarded a prize of 10/6 to George S. Marsh (Blackpool) for what we consider the most original and promising effort yet submitted.

May Painting Contest

Entries for this competition were numerous and in most cases good. The subject "MY HORNBY TRAIN," was one that lent itself to accurate work and it provided an opportunity for our railway enthusiasts to show that they were capable of portraying the various mechanical details in true perspective.

The prize-winners are as follows:—

First Prizes (Class A): G. E. OWEN (Bristol); (Class B) B. KEENAN (West Hartlepool), painting or drawing materials value 10/6. Second Prizes (Class A) R. J. BIGGS (Bristol); (Class B) E. W. HANNAN (Birmingham), painting or drawing materials value 5/–.

Competition Closing Dates:

HOME.	
Seventh Drawing	31st August.
August (Holiday) Essay ...	30th September.
Eighth Drawing	30th September.
Eighteenth Photo	30th September.
OVERSEAS.	
Guild Motto	30th September.
Essay (Easter Holiday) ...	30th September.
Painting (Hornby Train) ...	30th September.
Fifteenth Photo	30th September.
Sixth Drawing	31st October.
Sixteenth Photo	31st October.
Club Programme (Members only)	31st October.
Seventeenth Photo	30th November.
Seventh Drawing	30th November.
Cricket Voting Contest ...	30th November.
August (Holiday) Essay ...	31st December.
Eighth Drawing	31st December.
Eighteenth Photo	31st December.

Watch the Closing Dates:

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of any competitions for which they intend to enter. Week by week we receive entries for various competitions that have been closed for some time. Some of these entries are excellent and it is a pity for competitors' good work to be wasted on account of losing sight of the closing date.

May Essay Competition

At one time we thought that the number of entries for this contest was to be small, but as the closing date approached they rolled in from all parts. The literary standard was high, and it was pleasant to note that young essayists mostly realised the need for economy in words and simplicity of style. Some of the straight forward accounts of motor tours, picnics to the moors, or Meccano days indoors, made delightfully fresh reading, and the little humorous touches so pleasant in a holiday essay were not forgotten.

An interesting point was the number of writers who, on account of bad weather, were disappointed in not getting out into the country, but whose essays revealed very little discontent. The secret of this independence of the weather lay in their possession of the best alternatives to a day's fresh air—a Meccano Outfit or a Hornby Train.

Awards:—(Class A) First Prize, E. K. LAWRENCE (Nottingham); Second Prize, A. TAYLOR (Ellesmere Port). (Class B) First Prize, H. HALL (Ossett, Yorkshire); Second Prize, L. MATHEWS (Exeter).

June Puzzle Contest

The number of entries for our June Puzzles exceeded all expectations, and while the majority of competitors did well in the word-building puzzle, their industry was in many cases discounted by incomplete or incorrect answers to the minor puzzles. It may be of interest to state that in the word-building section the first and second prize winners compiled over 1,100 words, and the third prize winner over 1,000.

The three Prizes of Meccano goods value £1/1/–, 10/6 and 5/– are awarded to G. C. LUND (Kington, Hereford), D. J. HOPKIN (Bristol) and D. KNIGHT (Brighton) respectively.

Overseas Result

Fourth Drawing Contest

The subject of this contest was "A PETROL LORRY OR BUS," and a large number of very good drawings was received. Although the general standard of the work was high, it proved much more difficult to judge this Section than the Home Section of the same competition. This fact was largely due to the motor vehicles of foreign design and manufacture that figured very frequently among the drawings, and were generally formidable both from a technical and an artistic point of view. Incidentally the contest indicated the amazing migratory instincts of American standardised cars, which figured even on Egyptian deserts, in the Australian bush, and in some unfamiliar landscape or other nearly everywhere overseas!

Prize awards:—(Class A) First Prize, H. M. SMITH (Knysna, S. Africa). Second Prize, J. DE CONTI MANDUCA (Sliema, Malta). (Class B) R. A. ANNUM (Nsawam, Gold Coast) and J. GILLIES (Vancouver, B.C.)

The Secretary's Notes

Closing the Summer Session

As a suitable climax to the Summer months there is nothing to beat a well-organised Club Outing, Garden Fete or Sports Meeting. A special event of this description finds a place towards the end of the Summer calendar of most clubs, although the nature of such functions varies greatly according to the particular strength and circumstances of each club. The larger clubs favour a Garden Fete or a Sports Meeting. Either of these provides a splendid opportunity for parents and friends to assemble, and gives the Leader a chance to explain the aims and programme of the club. The function also may be made a source of revenue, and club finances are never very strong just at this time of the year!

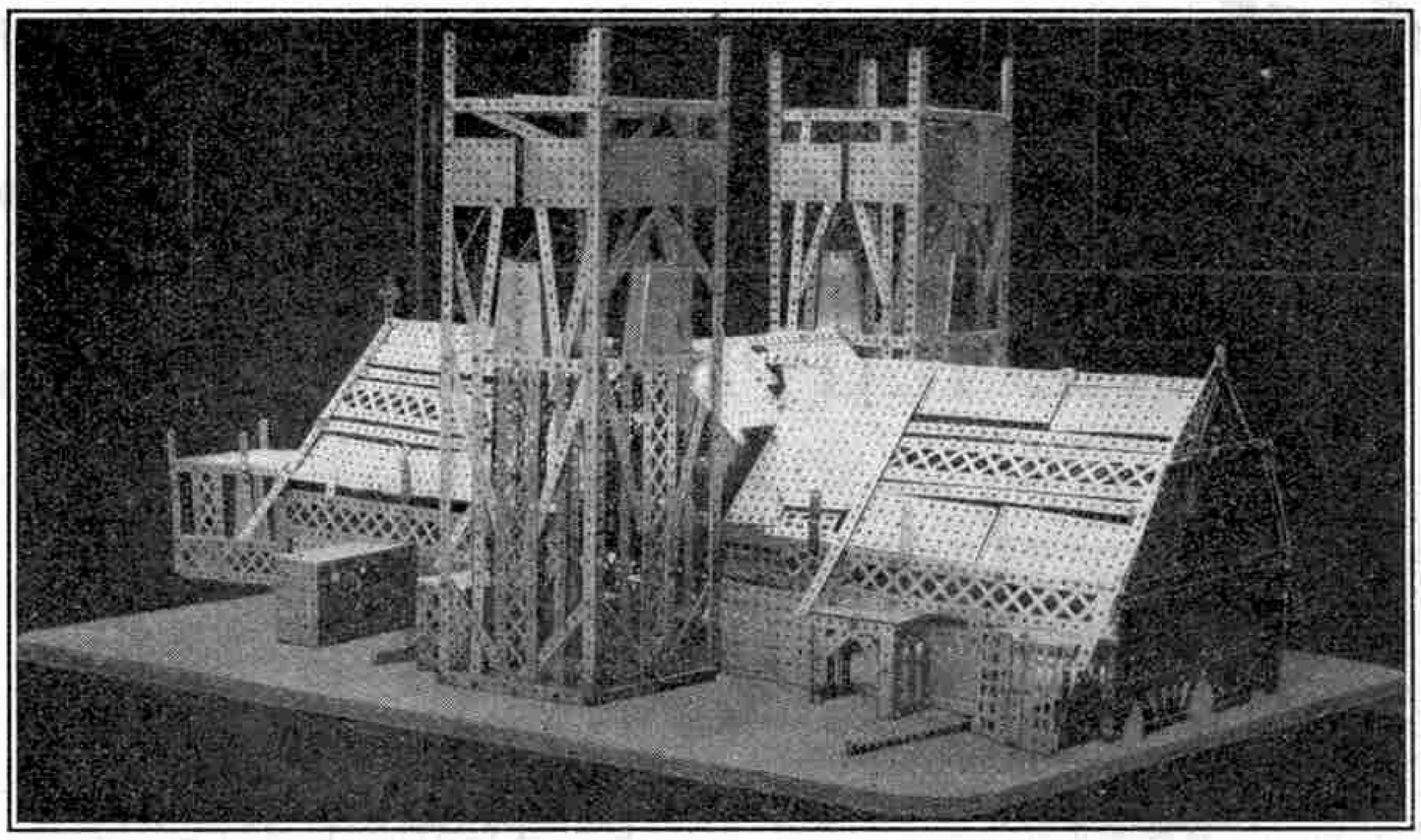
Club Magazines

Recently I have received many inquiries from club secretaries who wish to commence a club magazine. So much interest is shown in this fascinating side-line that I intend to devote a fairly long article to the subject very soon. In order to clear the way, however, and to make my article of direct interest to as many readers as possible, I should be glad if all club secretaries and intending magazine producers would send me a note giving some definite idea of their intentions. Many Meccano Clubs already publish monthly or quarterly magazines of one sort or another, and I should much appreciate notes from the respective editors giving me brief details as to their methods, and their experience on such points as the cost of printing, best copying systems tried, and handiest and most popular size and style.

The Correspondence Club

In my notes last month I included a paragraph about the Correspondence Club, and appended a list of the initials and hobbies of Guild members who await correspondents in the various countries named. Although it is yet too soon, for Overseas readers to have received their copies of the "*M.M.*" and taken the matter up, my note about the Correspondence Club generally has had a decidedly invigorating effect among British Guild members. Many have written for enrolment forms, and I am adding to my list of British and European boys desiring correspondents in the United States, South America and the Colonies. I want still more, and in the case of members who are not really particular as to what country their correspondents live in, if they will let me know this I shall be able to fix them up very quickly. The reason for this is that I have on my file a number of Guild members living off the beaten track, and in applying for a correspondent nobody even happens to name on his form their particular corner of the earth! To all who are now waiting to hear of correspondents let me say that my present arrangements will enable me to find them in the near future. I wish to emphasise another point. The first applicant for a correspondent in, say, India, is not simply placed in touch with the first Indian member on the list. On the other hand, great care is taken to introduce boys of roughly equivalent ages having the same hobbies and, judging from letters in my hands, the most likely to form a lasting postal friendship. It is in this fact chiefly that the great success of the Correspondence Club lies.

A Cathedral in Meccano



Our photograph shows a model of Exeter Cathedral constructed by the St. James' Meccano Club, Exeter. This model was 5 ft. long, its towers were over 2 ft. high and electric light and a peal of bells were fitted. It attracted great attention in Exeter and won high praise for the club and its Leader, Mr. M. C. Hodder.

Club Groups

Almost every day I receive snapshots of various kinds from members of clubs in all parts of the world, but it is comparatively rarely that I receive a good photograph of a club group. By a good photograph I mean one that has been carefully taken and which is clear and sharp and suitable for reproduction. I am anxious to publish a club group in the "*M.M.*" every month, if possible, and I want the Leaders and secretaries of those clubs that have not yet sent me a group to do their utmost to gather their members together and have a photograph taken while there is fine weather and good light. I should like all clubs to have such a group taken at least once a year and framed and hung up in the club room, to form a sort of photographic record of the club's career and to provide a souvenir of former members who may now be scattered far and wide.

Monthly Club Reports

I am glad to be able to announce that club secretaries are now giving much greater attention to sending in club reports to form the basis of a paragraph on the "Club Notes" page. There is a great deal of room for improvement in one matter however, and that is the date of sending in reports. A magazine such as the "*M.M.*" must be prepared and actually in the hands of the printer a considerable time before its publishing day, the first of the month, and unless I receive a club report in good time it is impossible for me to include it in the following month's issue. In future I want secretaries to let me have their reports *on or before the eighth of each month* as this will enable me to include such reports in the following month's issue.

Helping New Clubs

One of the greatest difficulties with which the Leader of a new club is faced is that of planning and conducting meetings. Probably he has not had any experience of Meccano club work and consequently he has little to guide him. This difficulty is speedily overcome by an enthusiastic Leader backed by enthusiastic members, but often much useful time is lost through commencing on wrong lines and having to make drastic changes afterwards. I am frequently appealed to by new Leaders for help on this matter, but the local circumstances of clubs vary so greatly that sometimes I find it very difficult to give really practical advice. It has occurred to me that the Leaders of old-established clubs might assist me, and through me the new clubs, by sending me a description of how they plan and conduct their meetings. What a new club requires is a practical and well-tried working scheme that it can adopt with confidence for its earlier meetings and subsequently use as a foundation on which to build up its own programme.

Holy Trinity (Barnsbury) M.C.—The clubroom has been completely renovated and now looks very well indeed. The second annual Concert was a great success although its financial results did not reach the previous level. Several successful outings and visits to factories and other places of interest have been held. Arrangements for next session include the seventh Annual Exhibition in October and the third Concert in November. A wireless aerial has been erected over the Parish Hall for the use of both the Meccano and Radio Clubs, and the two clubs are now joint owners of a portable set for use on field days. Special Merit Medallions have been awarded to F. Johnson and S. McDonald. Club roll: 30. Average attendance: 17. *Secretary*: Stanley A. G. Bone, "The Rosary," Kents Hill Road, South Benfleet.

King Edward VI. School (Aston) M.C.—Interesting papers have been given by members and a series of talks on "Practical Electricity" by the Leader, Mr. W. C. Chivers. Among models brought to club meetings were a Clockwork Racing Motor Car, a Morgan Runabout, and an Electric Chassis. A Stamp Section has been formed and is progressing well. Forthcoming events include an Exhibition of Models, Cycle Excursions and a visit to the Midland Counties Dairy. Club roll: 37. Average attendance: 24. *Secretary*: H. Mapp, 31, Thornhill Road, Handsworth, Birmingham.

Westcliff and District M.C.—Has recently secured a useful amount of publicity through the local newspapers. Forthcoming events include a Garden Party and the production of a Play written entirely by members. "The Hound," a well-written little club magazine, circulates among members. The Girls' Section has drawn up new rules. Meetings are being held monthly. The subscription for members is 2d., for committee members 3d., and for office-bearers 4d. Boys' Section—Club roll: 32. Average attendance: 100 per cent. *Secretary*: D. S. Cecil, 22, Valkyrie Road, Westcliff-on-Sea. Girls' Section—Club roll: 9. Average attendance: 100 per cent. *Secretary*: Miss Helen A. Cecil, 22, Valkyrie Road, Westcliff-on-Sea.

Bearwood M.C.—Cycle Runs and Cricket Matches are being continued and a big Recruiting Campaign is being carried on in order to ensure a good membership for the winter. Visits have been arranged to the works of Messrs. Cadbury and Messrs. Avery. *Secretary*: C. White, 72, Katherine Road, Bearwood, Birmingham.

Accrington M.C.—Has just celebrated its first anniversary. Rambles in the country and Cricket Matches are the chief activities, and many new members are being enrolled. Club roll: 24. Average attendance: 15. *Secretary*: V. Waterhouse, 45, Ramsbotton Street, Accrington.

Rosyth M.C.—A "Special Effort" week is to be held in October, when all Guild members in the district will receive a personal invitation to join the club. The Annual Excursion took place last month, Aberdour being the selected destination. D. Dowling has agreed to take charge of the Library. *Secretary*: E. T. Hunter, 79, Admiralty Road, Rosyth, Scotland.

Stockton M.C.—Mr. T. W. T. Richardson, of Gulval House, Norton-on-Tees, has consented to become President, and his talk on "Building Sites and Building" was greatly appreciated. Club roll: 17. Average attendance: 12. *Secretary*: N. Middleton, 14, Victoria Avenue, Norton Road, Stockton-on-Tees.

Meads (Eastbourne) M.C.—Cricket practices and matches are keeping members together. Rehearsals will shortly commence of a Meccano Play to be given at a concert in aid of the new Parish Hall where the club will make its headquarters. Club roll: 20. *Secretary*: A. A. Moore, 7, Rodmill Road, Eastbourne.

Newcastle-on-Tyne M.C.—Is specialising in the building of Model Locomotives, under the expert direction of the Leader, Mr. D. Gilbey, who is the founder of the Newcastle-on-Tyne Society of Model Engineers. Two complete Model Railways have already been constructed, and members are now co-operating in building a model L.N.E.R. Tank Loco. The frames are already complete of a new ½in. scale model Great Northern type "Atlantic." Other activities include Meccano Competitions and Cricket. Club roll: 38. *Secretary*: J. Stoddart, 71, Walker Road, Newcastle-on-Tyne.

St. James' Choristers' (Exeter) M.C.—The model of Exeter Cathedral, built entirely of Meccano parts and complete with bells, electric lighting, and an ingenious musical contrivance giving an organ-like effect, has now been dismantled after attracting much attention locally. In its place members are co-operating to build an Aerial Railway. The Annual Camp will be held this month. Club roll: 51. *Secretary*: L. Mathews, 44, Rosebery Road, Exeter.

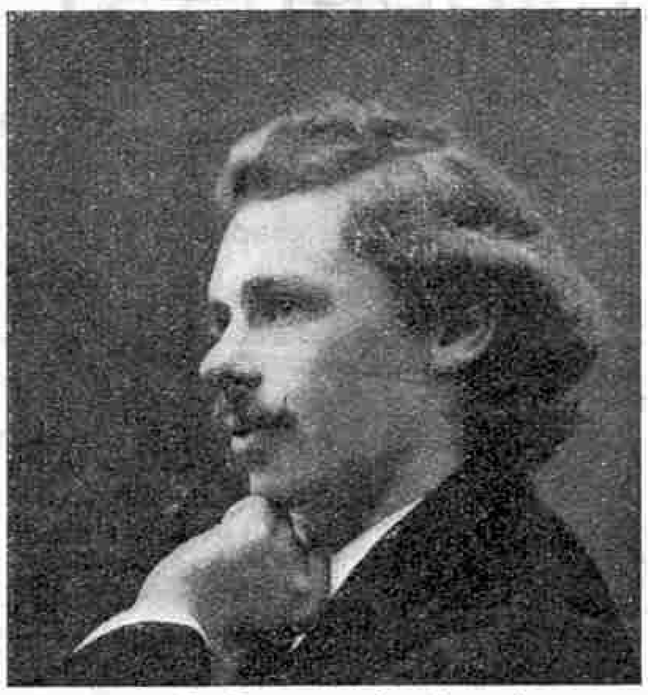
Claygate M.C.—The Annual Sports were held last month, a full programme being successfully carried out. Other features of the day included an Exhibition and sale of members' work, a display of Country Dancing by the girl members, and a Trek-cart and Tent-pitching Contest for Boy Scouts. The Leader, Mr. J. W. Haynes, has recently compiled a short history of the club, and it is interesting to trace its progress since 1919. The club now has its own headquarters in a well-fitted Army Hut. The Girls' Section continues to thrive and during the winter session there will be classes every night. Club roll: 86. *Leader*: Mr. J. W. Haynes, "Fontmell," Covers Road, Claygate, Surrey.

White Notley M.C.—Owing to many of the original members having left the village, operations have been suspended for a time, but should any Meccano boys in the district care to apply to the Leader, Mr. Carpenter, nr. Post Office, White Notley, Essex, he will be pleased to consider arrangements for resuming activities.

Beverley Road (Bolton) M.C.—Has recently been affiliated and Mr. T. Cooper is now Leader. Meetings are held each week in a room at the Beverley Road I.M. Sunday School, Bolton. During his holidays the secretary visited Guild Headquarters and was delighted to be shown round the Meccano factory. Club roll: 12. Average attendance: 10. *Secretary*: Hubert Henshaw, 35, Kendal Road, Bolton.

Meccano Club Leaders

No. 21. Pastor A. B. Grosvenor



Pastor A. B. Grosvenor has been for many years intimately connected with Meccano Clubs and the work of the Guild generally. Prior to 1920 he founded the Brightlingsea M.C. and was its leader until he left the coast town for Norwich, where in March of that year he founded the Norwich Enterprise Meccano Club, and became its Secretary. This Club was one of the earliest and most successful Clubs in the Eastern Counties and it owed almost everything to the enthusiastic example of Pastor Grosvenor. Valuable prizes were won in the 1921 and 1922 Inter-Club Model Competitions, and some of the models made by the Pastor himself evoked widespread admiration.

The summer of 1924 found Pastor Grosvenor transferred to Northwood, Middlesex, and he lost no time in starting a Meccano Club there. The Ruislip Common M.C. claims him as its leader to-day, and many Guild members regard him as a true friend to whom they owe much of their interest in Meccano and the Meccano Guild.

Pastor Grosvenor is keenly interested in Esperanto, and he regards this international language as being of particular value to members of the Meccano Guild as a means of communication with other members in any part of the world.

Malta

1st Malta M.C.—Recent activities have included Model-Building, Visits to Engineering Depots, Outings, Lectures and Papers by members, and various social functions. J. Savona, a member, has invented a new system of braking, which he made the subject of an interesting discussion-night. A strenuous Recruiting Campaign is to be organised. Club roll: 14. *Secretary*: Ant. J. Grech, 173, Prince of Wales Road, Sliema, Malta.

South Africa

Simonstown (South Africa) M.C.—Many new members have recently joined, and there is now an active Girls' Section, which, in addition to its Meccano activities, meets for Fancy Needlework Classes. At the conclusion of each club evening an hour is spent in recreation, and this feature is greatly appreciated. A visit to the battle cruiser, H.M.S. "Repulse," was arranged when she visited Simonstown Harbour. Club roll: 25. *Secretary*: L. W. Creasey, "Elsinore," Simonstown, South Africa.

Australia

Glenelg (South Australia) M.C.—In addition to Lectures and Talks on various subjects, members recently travelled 12 miles by motor to visit a Glass Works. An Essay Competition describing the works was afterwards held, the prizes (Meccano parts) being awarded to H. Curnow and D. Hiller. A novel Model-building Contest was recently held in which cotton-reels had to be substituted for wheels and rotary parts! Two pen-knives were offered as prizes by Mr. Inverarity. Club roll: 68. *Secretary*: Keith Holmesby, 22, Partridge Street, Glenelg, South Australia.

India

Calcutta M.C.—Continues to make good progress and the membership is still increasing. Special Merit Medallions have been awarded to M. L. Mitter and A. N. Roy Choudhury. Club roll: 40. *Leader*: Mr. M. N. Gan, M.A., Club Headquarters, 35, Beadon Street, Calcutta.

Clubs not yet Affiliated

Eagle (Enfield) M.C.—A Leader has been secured in Mr. F. Kebbel. The club has the use of a room at the local Y.M.C.A., and meetings are well attended. A Cricket Section has been going well and, in addition to regular Rambles, members are to have a day at Wembley this month. Club roll: 20. Average attendance: 20. *Secretary*: H. J. Simmons, 75, Fotheringham Road, Enfield, Middlesex.

Edinburgh Castle (Bow) M.C.—Meets for Model-building and Social Evenings alternately every week, and holds a monthly Essay Competition. The subject of the June Essay was "My Favourite Hobby," and the prize was awarded to E. Wedon. In the temporary absence of the Leader, Mr. F. Winn, the club has been conducted by Mr. Sidney Raffan. Club roll: 20. Average attendance: 16. *Secretary*: E. H. Wedon, 173, Turner Road, Bow, London, E.3.

Wyggeston Grammar School M.C.—Activities have been largely suspended for the remainder of the summer. New members are being steadily enrolled. *Secretary*: G. W. Darby, 30, Kimberley Road, Leicester.

High Brooms M.C.—Is making steady progress. It is hoped shortly to secure the use of a larger clubroom and the services of a Leader. *Secretary*: B. Smith, 50, South View Road, High Brooms, Nr. Tunbridge Wells.

Saltney Ferry (Chester) M.C.—Under the Leadership of Mr. F. Rowlands, regular meetings are being held in the splendid headquarters the club has secured. All Meccano boys in the district are invited to get into touch with the *Secretary*: E. Sanders, 10, Ewart Street, Saltney Ferry, Chester.

Rhos College M.C.—Has now a flourishing Library, and a club magazine is to be started. It is expected to secure a new Leader before the opening of next session. Club roll: 11. *Secretary*: G. E. Mellor, "Bradda," Allanson Road, Rhos-on-Sea, N. Wales.

Greenfield (Lancs.) M.C.—Meetings are limited in number owing to the high cost of the clubroom, but members are full of enthusiasm. The programme includes Wireless and special evenings devoted to Signalling and Telegraphy. It is expected shortly to increase the membership to 17. *Secretary*: Ronald Moss, Carr Lane, Greenfield.

West Tytherley (Wilts) M.C.—Is making good progress and has a substantial cash balance at the bank. The Rector of Tytherley, the Rev. Leahy, is now Leader. S. Knight, a member, made a clever model Colliery-Cage and Pithead, which attracted much notice at the club's first Exhibition, which was a decided success. Affiliation is now being applied for. Club roll: 8. *Secretary*: George Richards, 35, West Tytherley, Nr. Salisbury, Wilts.

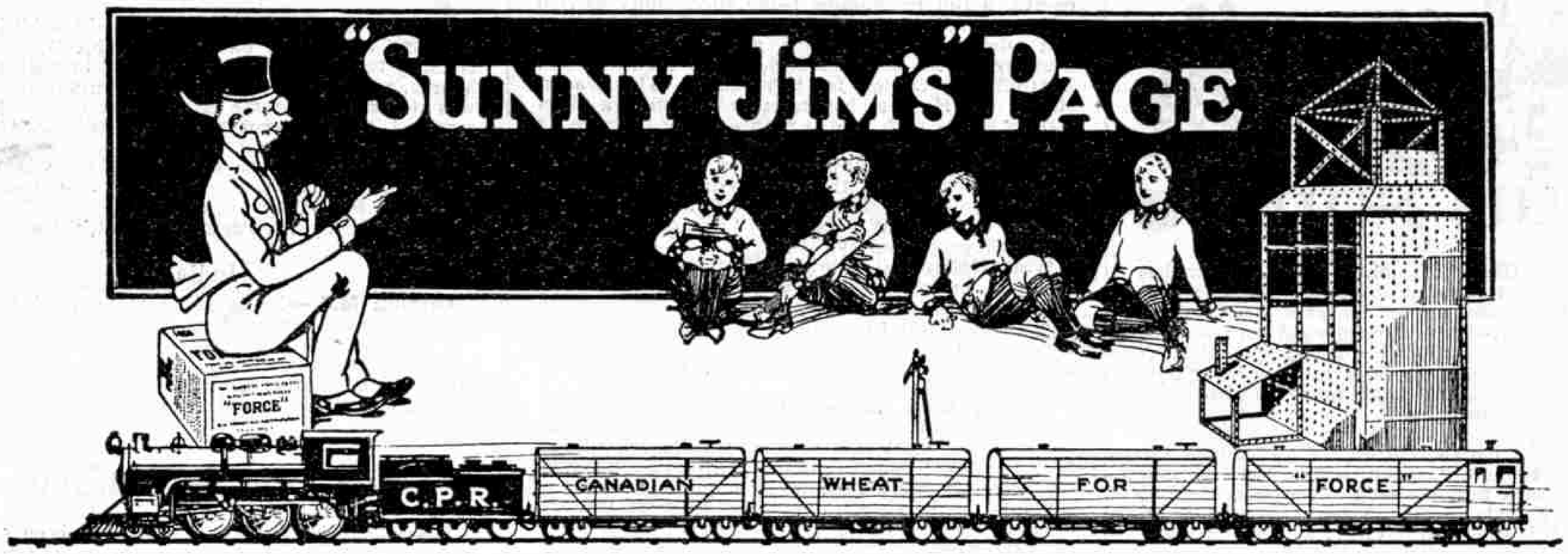
Brakpan (South Africa) M.C.—Has succeeded in obtaining Mr. Chas. F. Preller as Leader, and it is confidently expected that the enterprise already shown will lead to a really well-organised club. *Leader*: Mr. Chas. F. Preller, 10, Alma Hotel, Brakpan, South Africa.

Dunedin (New Zealand) M.C.—The new secretary, G. Howard, 24, Erin Street, Roslyn, Dunedin, reports that the outlook is good, and has sent in some interesting photographs of camping and boys' activities generally.

Clitheroe M.C.—Is temporarily closed down and will not reopen until the Winter Session. Excursions have been arranged to fill the interval. *Secretary*: Noel Cooke, 5, Buccleuch Avenue, Clitheroe.

Stamford M.C.—Difficulty is being experienced in finding suitable accommodation for the Winter Session. Many boys keenly interested in Meccano are waiting to join, and 24 is the number aimed at to place the membership of the club on a sound basis. *Secretary*: W. West, 19, Foundry Road, Stamford, Lincoln.

Wembley Hill M.C.—A Leader has been secured and it is hoped soon to have the club firmly established. Intending members should apply to H. Waters, 11, Clifton Avenue, Wembley Hill.



LEARN TO PLAY THIS NEW EXCITING GAME— IN THE PLAYGROUND—AT THE SEASIDE

Here's a new game for any number of players. It is the game I play with my boy chums after their school hours. It's a fine game for the playground, or the damp hard sand at the seaside. My chums call it "Sunny Jim's" game because I taught it them. You and your chums are sure to get hours of fun out of it too. Read the rules carefully and next time your friends stand around wondering what to play next, tell them all about "Sunny Jim's" game, and teach them the rules.

What It Is

On the ground you mark out a big map of Canada (you can easily get the outline for this from your Atlas). Twenty paces away you mark out the British Isles. In "Canada" you put a number of empty "FORCE" packets (say about 30, but any number will do). If you can't get 30 "FORCE" packets all at once, save them up, and in the meantime use boxes made to look like "FORCE" packets. You are now ready to play.

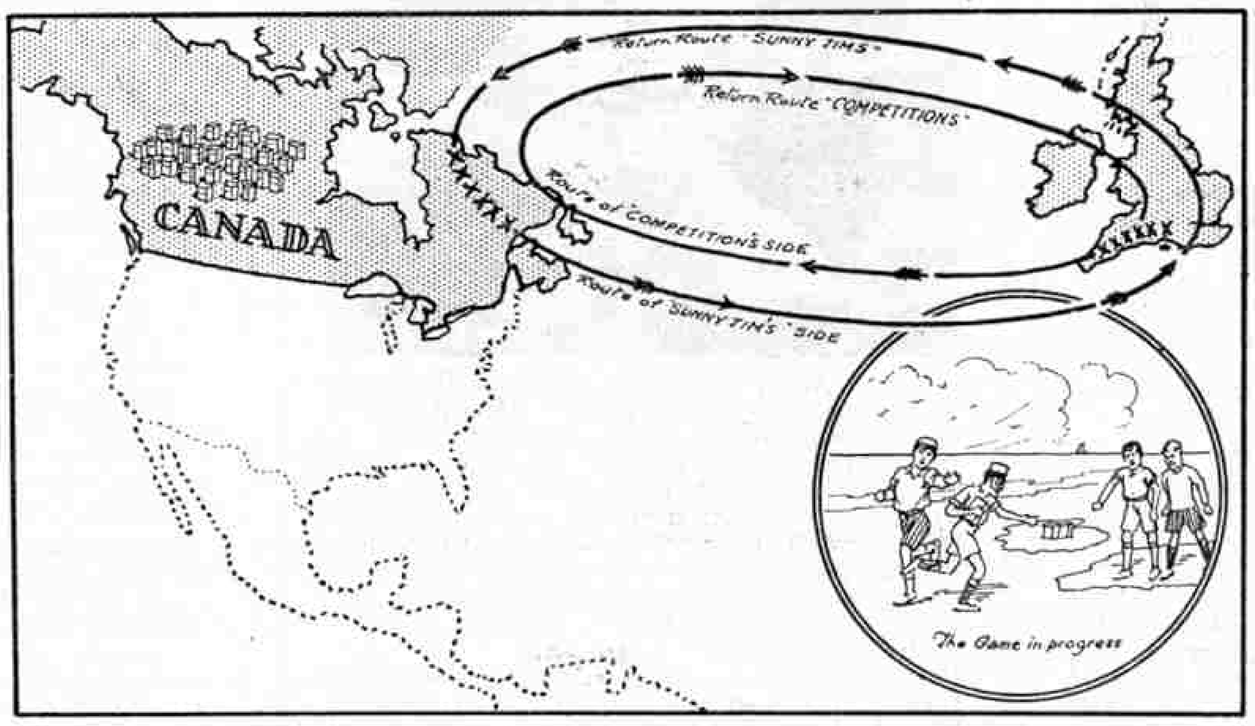
Divide up into equal sides. One side is "Sunny Jim's" side. The other side is known as "Competition."

Everyone on "Sunny Jim's" side wears a Sunny Jim mask (you and all your chums can get one each for nothing if you follow the instructions given at foot of this page.

"Competition" side is not allowed to dress up, until they win, and then *they* become "Sunny Jim's" and the "Sunny Jim's" have to change over and be "Competition's." Line up the "Sunny Jim's" in Canada and the "Competition's" in England.

Fixing the mask

The game starts by one of the "Sunny Jim's" running from "Canada" towards "England" (in the direction of the arrow shown on the plan) and taking with him one of the empty "FORCE" packets. As soon as he starts *one* on the "Competition" side runs out to meet him. As they pass, the "Sunny Jim" boy must endeavour to dodge the "Competition's" boy and get to England without being "Tipped." As much "dodging" as you like is allowed, but once the "Sunny Jim" boy has passed the "Competition" boy, "Competition" is not allowed to turn round and chase him, but must run on, touch "Canada," and come back as shown by the route on the diagram.



Plan for marking out "Sunny Jim's" Game

The "Sunny Jim" boy, if he successfully dodges "Competition," leaves his empty "FORCE" packet in England and returns to Canada, as shown on the diagram. If he is "Tipped" however, he gives up his "FORCE" packet to "Competition" who carries it with him and puts it in "Ireland" on *his* way back, and the "Sunny Jim" boy completes his circle back to Canada and more "FORCE" packets.

The game is kept going by "Sunny Jim" boys leaving "Canada" one after another, each with a "FORCE" packet in his hand. Whenever a "Sunny Jim" boy leaves Canada a "Competition" boy must also leave "England."

This is where the game gets exciting because both Canada and England must never be without at least *one* of its side at "home." If he is alone, the last man must not leave until the first, or another on his side, has been right round and is ready to take his place at the "base."

After a few minutes' play all the "FORCE" packets will have been taken from "Canada" and will be somewhere in the British Isles. If there are more in England than in Ireland the "Sunny Jim's" have won. If there are more in Ireland than in England the "Competition's" have won.

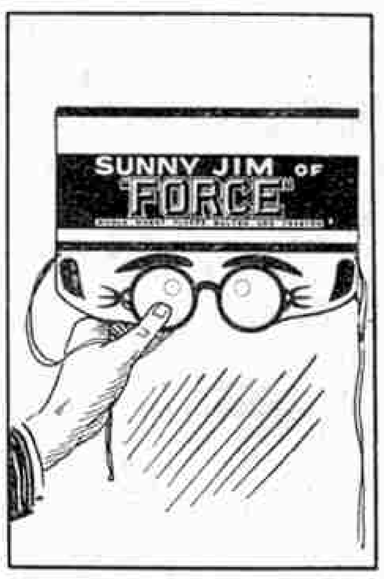
When the "Competition's" win it is their turn to be "Sunny Jim's."

Don't forget boys, that "Sunny Jim's" game is rollicking good fun, and that "FORCE" is the best health and strength giving food to "train on."

Always start your day with a good helping of "FORCE." You will like it with fruit, with custard, or with milk. Ask for it—save your empty packets for "Sunny Jim's" game—save your packet tops for the free "Sunny Jim" mask.

Sunny Jim

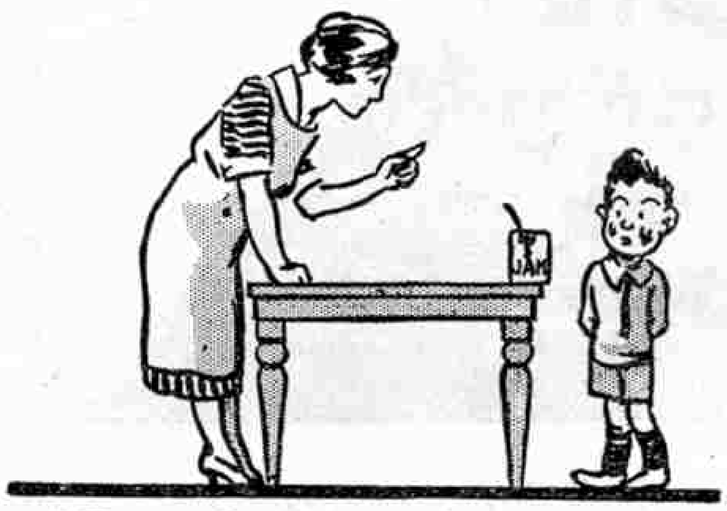
THIS "SUNNY JIM" MASK IS FREE!



The Free "Sunny Jim" Mask

Here's the mask for you and your chums to wear. You can all have one each, if each one of you sends, with his name and address, a top from a "FORCE" packet. SEND NOW. Mark your envelopes "MASK" and post to "Sunny Jim," 197, Gt. Portland St., London, W.1.

VERY FUNNY!



"Tommy," said his mother, reprovingly, "What did I say I would do to you if I caught you stealing jam again?"

Tommy thoughtfully scratched his head with his sticky fingers. "Why, that's funny, Ma, that you should forget. I can't remember, either."

* * * *

Customer: "This watch you sold me is always slow."

Jeweller: "Well, you asked for the latest kind, didn't you?"

* * * *

Curiosity leads to some peculiar actions. For instance, it leads to turning this page upside down.

* * * *

HE KNEW!

Teacher (trying to explain the meaning of "perseverance"): "What is it that carries a man along rough roads and smooth roads, up mountains and down dales, through jungles, swamps and raging torrents?"

Small Boy (whose father keeps a motor garage): "Please teacher, there ain't no such car!"

* * * *

Teacher: "Is there any connecting link between the animal and the vegetable worlds?"

Tommy: "Yes teacher, hash."

* * * *

A sleeper is one who sleeps.

A sleeper is the railway carriage in which a sleeper sleeps.

A sleeper is that on which a sleeper runs while a sleeper sleeps. Therefore, while the sleeper sleeps in the sleeper the sleeper carries the sleeper over the sleeper under the sleeper.

* * * *

Black: "Have you ever had that pain before?"

White: "Don't be silly, it's in my back."

This Month's Short Story

Mary has a swarm of bees
And they, to save their lives,
Must go wherever Mary goes,
For Mary has the hives.

* * * *

A country doctor arriving home from his rounds found a note awaiting him.

The note read: "Dear Doctor, My wife's mother is at death's door. Please come at once and see if you can pull her through!"

* * * *

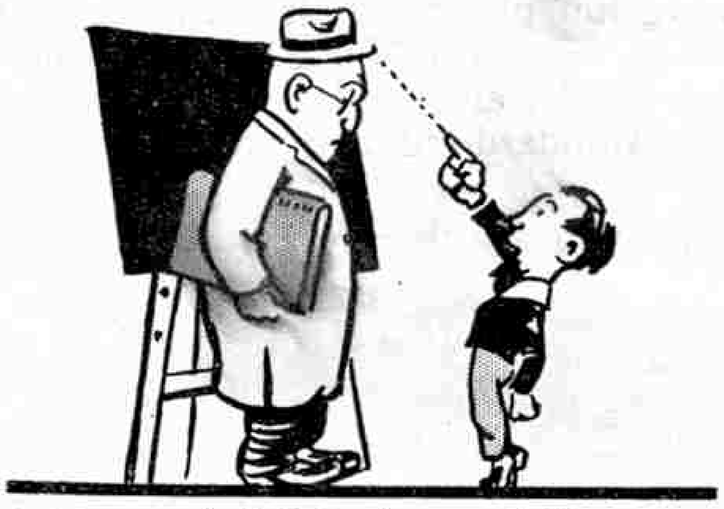
Willie: "Mother, isn't it lunch time yet?"

Mother: "No, not for another hour."

Willie: "Then my tummy must be fast!"

* * * *

A NARROW ESCAPE!



Absent-minded Professor: "Have you seen my hat anywhere?"

Student: "It is on your head, sir."

Absent-minded Professor: "Thank you so much. But for you I should have gone off without it!"

* * * *

"What is your occupation?"

"I used to be an organist."

"Why did you give it up?"

"The monkey died."

* * * *

TOO RISKY!

Life Insurance Agent: "One moment, sir, before I fill in your application. What make of car do you drive."

Client: "I don't drive any car at all."

Agent: "I'm sorry, but our company no longer insures pedestrians."

* * * *

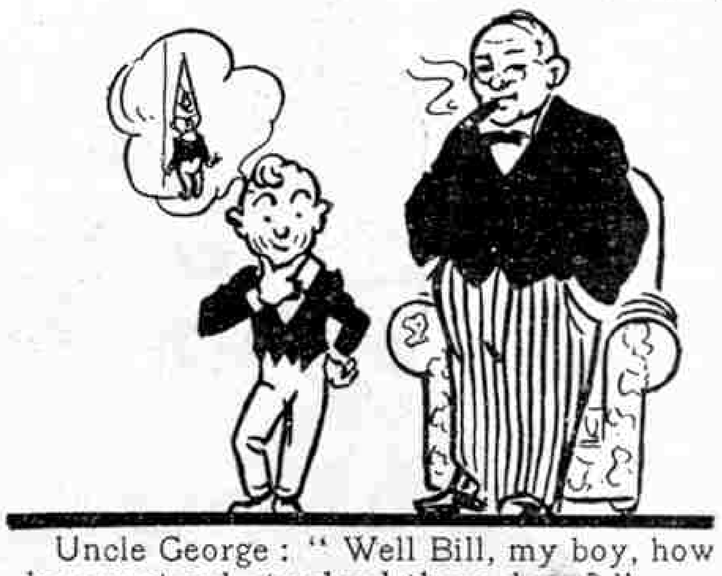
So large was the hat of Miss Gill,
That in it she looked almost nil.
Said her pa with a snigger,
Let's see something bigger,
But he sobbed when they showed him the bill.

* * * *

Old Sailor: "Yes my lad, I've been to every corner of the globe."

Small boy: "How do you make that out? The globe is round and has no corners."

NOT WHAT UNCLE EXPECTED!



Uncle George: "Well Bill, my boy, how do you stand at school these days?"

Bill: "In the corner mostly."

* * * *

Bright Boy: "Father, I'm the smartest boy in my class."

Father: "What makes you say that, my son?"

Bright Boy: "I answered a question to-day that nobody else could."

Father: "Splendid, my son. What was the question?"

Bright Boy: "Teacher asked who put the gum in her ink pot!"

* * * *

Infuriated Chemist (called up at 2 a.m.): "What do you mean by calling me up at this hour for two pennyworth of bi-carbonate of soda for indigestion, when a tumbler of hot water would have been just as good?"

Scotsman: "Weel, thank ye for the advice, I'll no bother ye after all."

* * * *

Jim: "Isn't it funny, the day breaks without falling."

Tim: "Yes, and the night falls without breaking."

* * * *

WELL, WELL!

Old Gentleman: "Remember, my man, hard work is the thing. Begin at the bottom and work up."

Pat: "It can't be done in my business sir, I'm a well digger!"

* * * *

John: "Professor Smith has given me a ticket for a lecture and I don't quite know what he means by it."

Charles: "Why, what is the trouble?"

John: "The lecture is on 'Fools,' and on the ticket it says 'Admit one!'"

* * * *

She: "Will you get my watch? It's upstairs."

He: "Wait a little while, it will run down."

She: "No it won't, ours is a winding staircase."

* * * *

Teacher: "You have spelled 'apartment' with two 'P's.'"

Pupil: "Which one shall I take out?"

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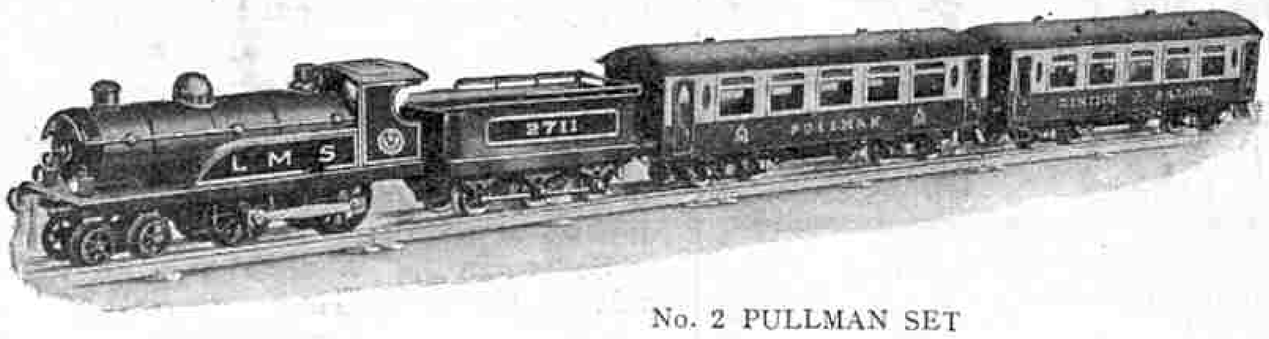
THE TRAINS WITH THE GUARANTEE

YOU can have any amount of fun playing with a Hornby Train. Shunting, coupling-up the rolling stock and making up trains will give you hours of pleasure. Hornby Trains are beautifully finished, strongly made, and will last for ever. One of their most valuable features is that all the parts are standardised, and any lost or damaged part may be replaced with a new one.

Every train is guaranteed, and you are therefore sure of satisfaction if you buy a Hornby.



No. 2 PULLMAN SET

No. 2 Pullman Set

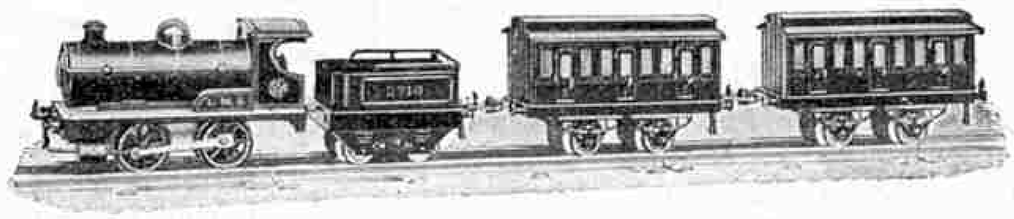
The No. 2 Loco with Tender measures 17 in. in length. The Loco is fitted with superior mechanism and the accurately-cut gears ensure smooth running. Loco, Tender and Coaches are superb in appearance and finish, enamelled in colours and stoved at a high temperature to ensure durability. The Loco is fitted with reversing gear, brake and governor.

Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling-stock. Each set contains Loco, Tender and two Coaches, with set of rails to form a circle of 4 ft. diameter. Price 60/-.

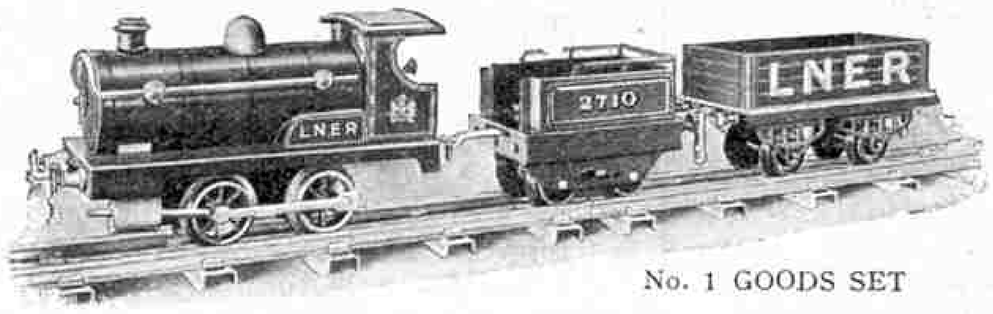
No. 1 Passenger Set

The Loco is fitted with reversing gear, brake and governor. Loco, Tender and Coaches are superb in appearance and finish, enamelled in colour and stoved at a high temperature to ensure durability. The doors of the Coaches open.

Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling-stock. Each set contains Loco, Tender, two passenger coaches and set of rails consisting of two straights and curves to form a circle of 2 ft. diameter. Price 30/-



No. 1 PASSENGER SET



No. 1 GOODS SET

No. 1 Goods Set

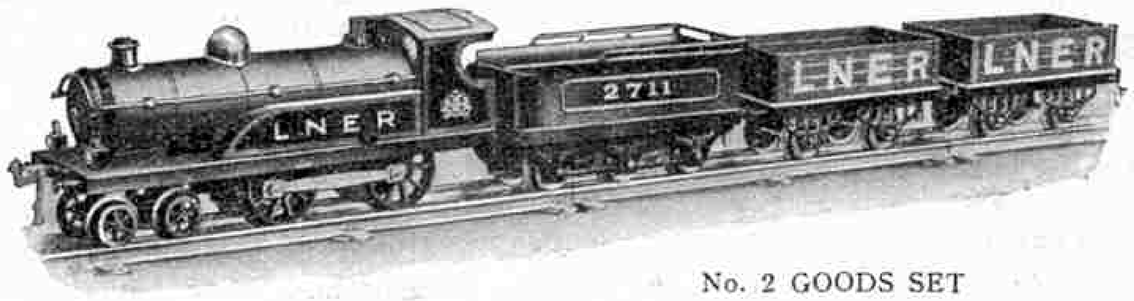
Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling-stock. Each Loco is fitted with reversing gear, brake and governor. Each set comprises Loco, Tender, one Wagon, and set of rails as in the No. 1 Passenger Set. Price 22/6

No. 1 Hornby Loco	Price 15/-	Hornby Passenger Coach	Price 5/-
" " Tender	" 2/6	No. 1 Hornby Wagon	" 2/6

No. 2 Goods Set

Gauge 0 in colours to represent the L.M.S. or L.N.E.R. Companies' rolling stock. This set contains Loco, Tender and Rails as in the No. 2 Pullman Set, and two Wagons. Loco fitted with reversing gear, brake and governor. Price 37/6

No. 2 Hornby Loco ...	Price 22/6	Hornby Pullman or Dining Car ...	Price 15/-
" " Tender	" 3/6	No. 2 Hornby Wagon	" 2/6



No. 2 GOODS SET

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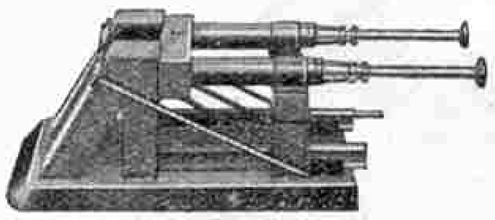
MECCANO LTD., BINNS ROAD, LIVERPOOL

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.*"

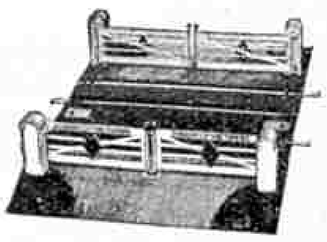
All Hornby Rolling Stock and Accessories are built in correct proportion to the size, gauge, method of coupling, etc., of the Hornby Trains and all have the uniformly beautiful finish that is the great feature of the Hornby series. With these accessories you can build up a most realistic railway system, and the splendid range of rails, points, and crossings make possible endless variety in rail layout. Hornby Trains are British made, and your dealer will be able to show you specimens of the new products.



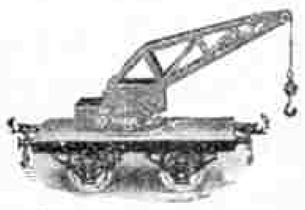
HYDRAULIC BUFFER STOP
Price **5/-**

SECCOTINE VAN
Price **4/-**

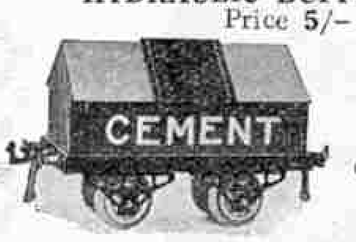
SIGNAL CABIN
Dimensions: height 6½ in., width 3½ in., length 6½ in. Finished in colour and lettered "Windsor." Roof and back open to allow signal levers to be fitted inside cabin if desired. Price **6/6**



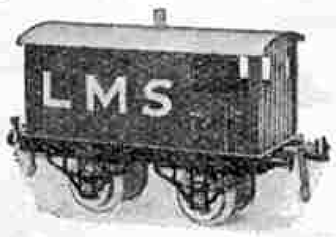
LEVEL CROSSING
Beautifully designed in colour. Measures 11½ × 7½ in. with Gauge 0 rails in position.
Price **6/6**



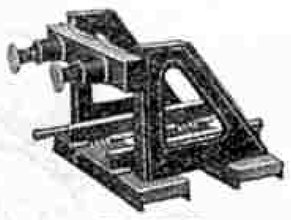
CRANE TRUCK
Working model. Finished in colours.
Price **4/6**



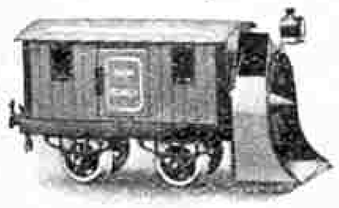
CEMENT WAGON
Finished in grey and black. Price **4/-**



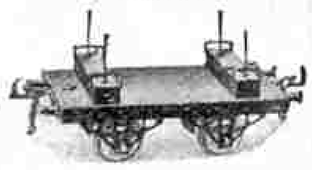
BRAKE VAN
Finished in colour.
Price **4/-**



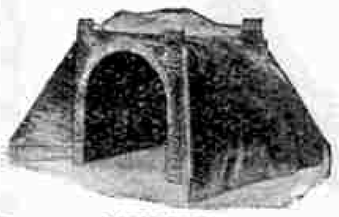
SPRING BUFFER STOP
Price **1/6**



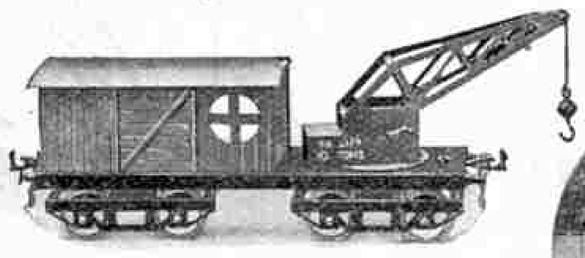
SNOW PLOUGH
Finished in grey, with revolving cutter driven from front axle.
Price **5/6**



No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Price **2/-**

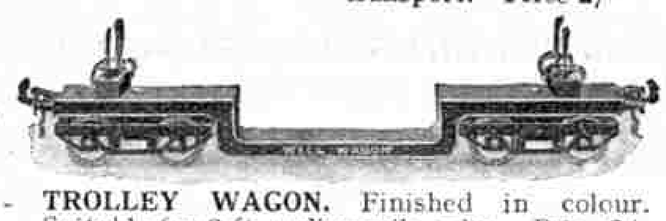


TUNNEL
Price **7/6**

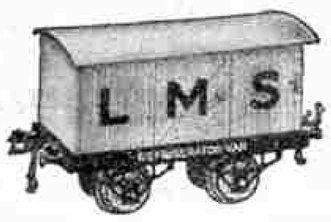


BREAKDOWN VAN AND CRANE
Excellent finish. Beautifully coloured. Suitable for 2 ft. radius rails only. Price **7/-**

TURNTABLE
Price **5/-**

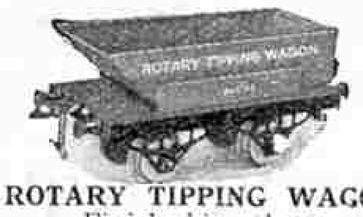


TROLLEY WAGON. Finished in colour. Suitable for 2 ft. radius rails only. Price **6/-**



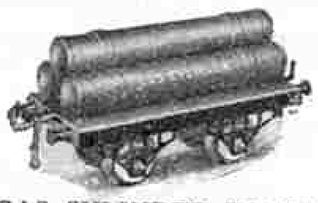
REFRIGERATOR VAN
Enamelled in white, lettered black. Price **4/-**

No. 1 TIMBER WAGON
Beautifully enamelled in colour and stoved. Price **2/-**

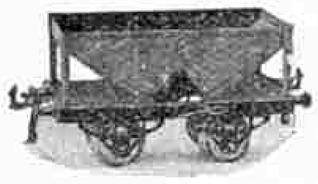


ROTARY TIPPING WAGON
Finished in colour.
Price **4/-**

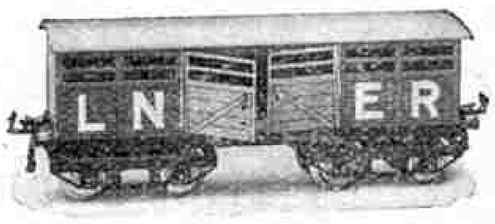
SIDE TIPPING WAGON
Excellent design and finish.
Price **3/6**



GAS CYLINDER WAGON
Finished in red, lettered gold.
Price **3/-**

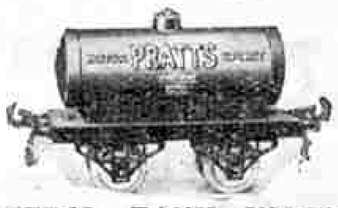


HOPPER WAGON
Mechanically unloaded. Finished in colour. Price **4/-**

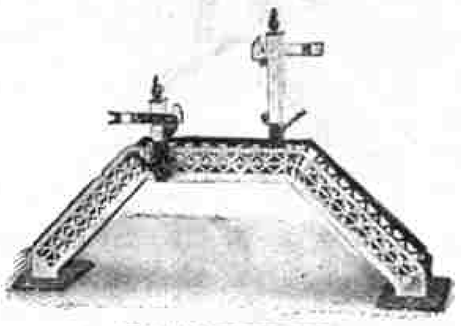


No. 2 CATTLE TRUCK
Splendid model fitted with double doors. Suitable for 2 ft. radius rails only. Price **6/6**

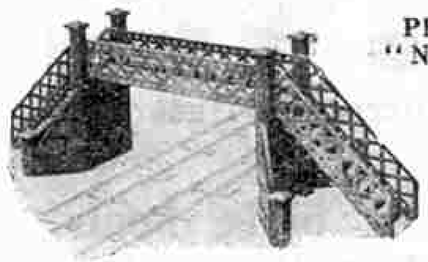
PETROL TANK WAGON "NATIONAL BENZOLE"
Finished in yellow.
Price **3/-**



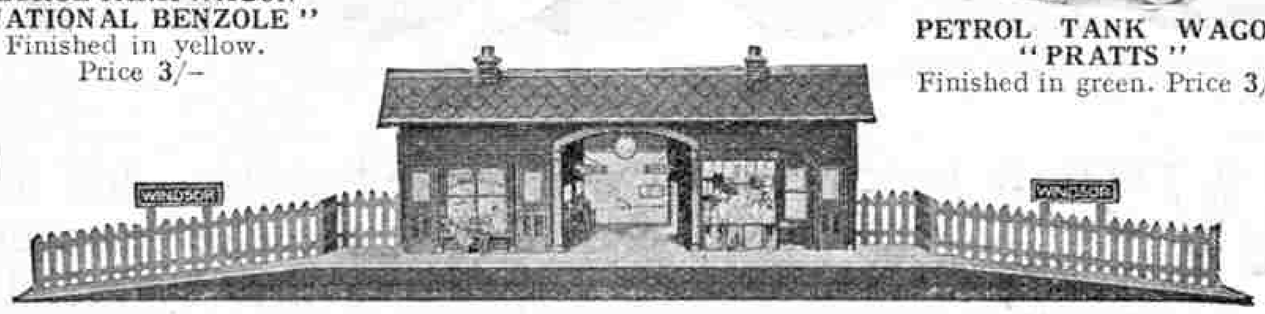
PETROL TANK WAGON "PRATTS"
Finished in green. Price **3/-**



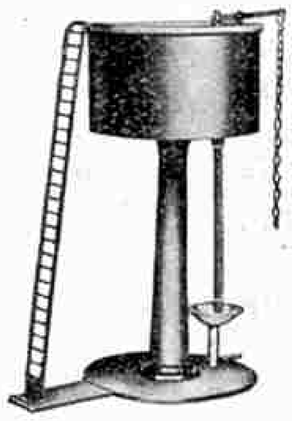
FOOT-BRIDGE
No. 1. With detachable signals. Price **6/-**
No. 2. Without signals. Price **3/6**
Signals, per pair **2/9**



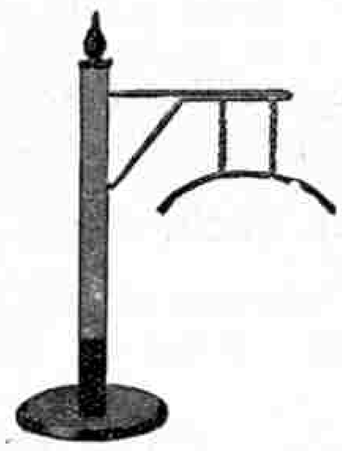
LATTICE GIRDER BRIDGE
This bridge is of the constructional type, strong and well proportioned. Price **10/6**



RAILWAY STATION. Excellent model, beautifully designed and finished. Dimensions: Length 2-ft. 9-in., breadth 6-in., height 7-in. Price **12/6**



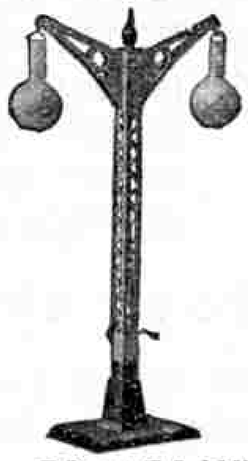
WATER TANK
Brightly coloured in red, yellow and black, 8½ in. in height, with flexible tube and pump lever.
Price **6/6**



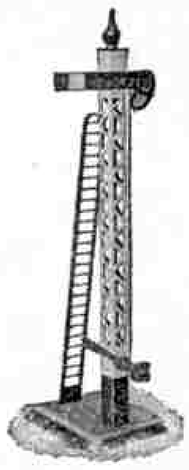
LOADING GAUGE
Price **1/9**

SINGLE LAMP STANDARD
A 4-volt bulb may be fitted into the globe. Price **3/-**

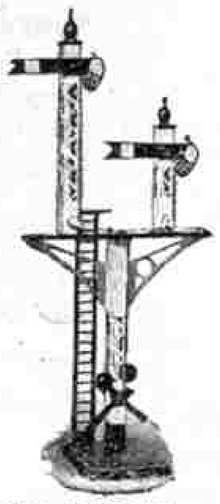
TELEGRAPH POLE
Price **2/6**



DOUBLE LAMP STANDARD
Four-volt bulbs may be fitted into the globes.
Price **4/-**



SIGNAL
Price **2/6**



JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14 in. in height. Price **5/6**

ASK YOUR DEALER TO SHOW YOU SAMPLES

JAEGER
Pure Wool

A Jaeger "Meccano" Jersey is made in the special "Meccano" pattern. It wears splendidly and prevents the frequent 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 and happiness of children.

24"	26"	28"	30" Chest
8/3	9/–	9/9	10/6

Light Fawn/Brown. Navy/Saxe. Brown/Light Fawn.
French Grey/Mole. Mid Grey/White.

Three-quarter Hose, Turnover Tops to match

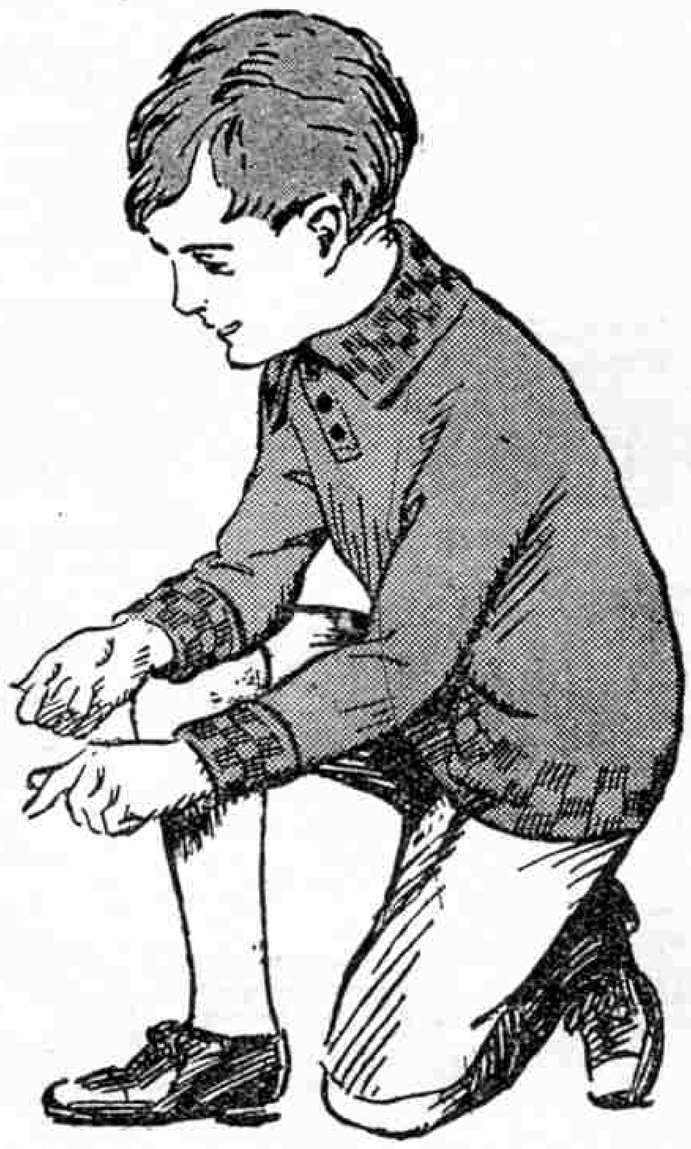
3, 4	5, 6, 7	8, 9, 10
2/9	3/3	3/9

There is Jaeger Underwear for Children of all ages. For particulars of Children's Wear see Special Booklet.

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** OF STONE

FOR MODEL RAILWAY BUILDERS

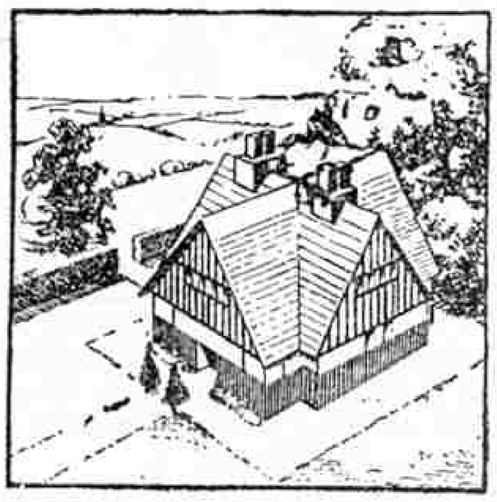
Model Signal Cabin from Box OA

There is just as much fun in building with Lott's Bricks as there is in building models with Meccano. Lott's Bricks are designed by a leading architect and when you are building model houses, churches, etc., you are building on correct principles.

Meccano boys can obtain a great deal of extra pleasure from model-building by using Lott's Bricks with Meccano when building models of bridges, viaducts, stations, etc. Bridges of any style may be constructed, and when built are so strong that they will carry the heaviest type of model locomotive.

Owners of Hornby Trains can add to the realism of their model railways by building stations, signal-cabins, villas alongside the railway line, and other buildings.

A splendid new model-building competition for Meccano boys will be announced shortly.



A Model from Box 2 Tudor Blocks

SERIES "B."			PRICE
Box O	(builds	6 Models)	2/-
Box OA	,,	12 ,,	3/3
Box A	,,	12 ,,	5/-
Box 1	,,	18 ,,	10/-
Box 3	,,	49 ,,	17/6
Box 6	,,	71 ,,	37/6

SOME PROVINCIAL STOCKISTS

BRIGHTON – Staffords Ltd.
BEDFORD – – Hebblethwaite & Co. Ltd.
BANBURY – – Brummitt & Son.
CLACTON-ON-SEA H. D. Simmonds.
DERBY – – S. J. Potts.
HEREFORD – Greenlands Ltd.
IPSWICH – – Cowell & Co. Ltd.
LEICESTER – Robothams Ltd.
LEAMINGTON – Burgis & Colbourne Ltd.
LOWESTOFT – Spashett & Co.
NOTTINGHAM – Pearson & Pearson.
,, – Beecroft & Son.
SOUTHAMPTON – G. Maggs.
SWINDON – – S. Goldsmith.
TAUNTON – – W. J. Coles.
TUNBRIDGE WELLS – – Porter's.
WORCESTER – E. Bayliss & Son Ltd.

"TUDOR BLOCKS"			PRICE
Box 1	(builds	6 Models)	3/6
Box 2	,,	12 ,,	7/6
Box 3	,,	12 ,,	17/6

COMPETITION

Awards in our recent Bridge Contest will be announced next month.

WRITE FOR ILLUSTRATED LIST AND NAME OF NEAREST AGENT

LOTT'S BRICKS LTD., WATFORD, England

Electricity—(*continued from page* 387)

In northern waters, icebergs grounding on shoals often grind the cable flat, thus exposing the conductor or severing the cable entirely. On one occasion a repair ship hauled up the dead body of a whale entangled in loop after loop of cable. Thus was disclosed a tragedy of the deep which had ended, as might be expected, in the parting of the cable during the huge animal's death struggle. At another time a shark, evidently thinking he had found something new to eat, was sufficiently venturesome as to attack a cable. He took a good bite, only to find that the gutta-percha insulation held his teeth in so firm a grip that he was compelled to leave one of them behind! Although the shark escaped with only the loss of a tooth, his bite had been sufficiently severe to allow the water to reach the conductor, and cost the owners of the cable several hundred pounds to effect the necessary repair.

Finding the Position of a Break

When a break occurs in a cable, either in the process of laying or after it is in operation, it is possible to tell from the shore exactly how far from either end the fault occurs. The exact electrical resistance per mile of each cable is definitely known. By means of an artificial resistance in the cable terminal office, which can be accurately measured, an electrical balance is established between the part of the cable between the fault and the terminal, and the artificial resistance. If, for instance, the resistance of the cable is 2 ohms per mile, and the artificial resistance establishes a balance at 2,730 ohms, it is certain that the break will be found somewhere in the 1,365th mile out. A cable repair ship is then hurried to that spot, which is clearly indicated by the chart made when the cable was laid or last repaired.

On arriving at the point where the cable is to be picked up, the repair ship puts an anchored buoy overboard to mark the point of departure, and then steams backward and forward across the line of the cable dragging a grapnel over the sea floor. Once the cable has been hooked and brought to the surface, it is a comparatively simple matter to splice on a new section and then haul up the other end and splice that on.

Cable Ships

In the early days of cable-laying an ordinary steamer was chartered and temporarily altered, but to-day there exists a fleet of over forty vessels in various parts of the world, designed exclusively for submarine cable work. The "Faraday," owned by Messrs. Siemens Bros. and Co. Ltd., illustrated in last month's issue, is a typical vessel of this kind. A description of this ship was given in the "*Meccano Magazine*" for June, 1923. Another fine cable ship is the "Colonia," owned by the Telegraph Construction and Maintenance Company, of Greenwich, the oldest company engaged in the manufacture of deep-sea cables. This ship was built in 1902 by Messrs. Swan, Hunter, Wigham Richardson & Co., at Newcastle-on-Tyne. She is 487 ft. in length and 56 ft. in breadth, and her gross tonnage is 7981. She is equipped with reciprocating engines of 5,000 I.H.P. and her normal speed is 14 knots. She has four tanks capable of holding 4,000 nautical miles of deep-sea cable.

Cable-Breaking during the War

During the war the opposite to cable repairing took place, for the cable ships were employed in the very unusual task of cable-breaking.

Germany was entirely deprived of direct telegraphic communication with the United States within four hours of the declaration of war. Two cables at that time ran from Emden (Germany) to New York via the Azores, and these were cut by a British cruiser in the Channel, one being taken to Penzance and the other to Brest. In 1917 these cables were cut about 600 miles from New York and one was diverted to Halifax, Nova Scotia. We thus gained a trans-Atlantic cable that is still working for us. In all, 20,000 miles of German cables were captured during the war.

The enemy was not so successful in cutting the cables belonging to the Allies. The German ship "*Emden*" attempted to cut the cable belonging to the Eastern Associated Telegraph Co., near the Cocos Islands. The officials had been warned, however, and had prepared a dummy cable from a length of spare cable in their possession. The German ship very conveniently cut this dummy, leaving the real cable unharmed! Shortly afterwards, it will be remembered, the "*Emden*" met her doom.

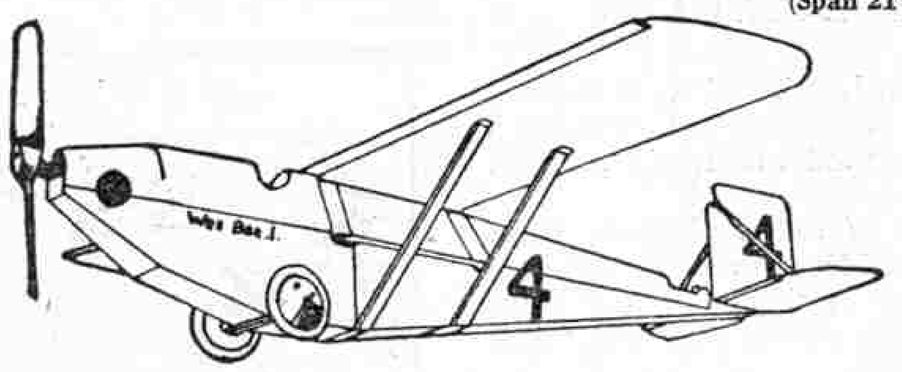
NEXT MONTH:—

Lord Kelvin and Cable Working

Model of the

"Wee Bee I" Light Aeroplane

(Span 21")



A MODEL of the remarkable Beadmore light monoplane which took part in the Air Ministry trials at Lympne, the original is fitted with a Bristol "Cherub" two-cylinder air-cooled engine.

The model is a splendid flier and looks very neat.

Specification.

POWER. An elastic motor is fitted. Six strands of "Para" rubber are used together with brass bearing and hooks.
CONSTRUCTION. Patent hollow spar construction with wooden struts.
FINISH. All the components are lithographed in colours.
CHASSIS. The wheels and axle of the under-carriage are sprung with elastic shock absorbers.
RUDDER. Double surfaced rudder with correct rib construction.

Complete Set of Parts and Materials with Book of Instructions,

Price 1/6 Postage and packing 6d. extra.

OTHER MODELS.

Model Biplane Glider. Length 13". Span 12". Complete set of parts with instructions, 1/-. Postage 4d. extra.
Model Locomotive. These parts make a fine model of the "Flying Scotsman." Length 13". Complete set of parts with instructions, 1/-. Postage 4d. extra.
Orders for two or more sets of parts Post Free. Postage abroad 9d. per set.

Patentees and Manufacturers:

WILLIAM E. APPLEBY (N/C) & CO.

(Dept. K.) 79, Rosebery Crescent, Newcastle-on-Tyne.

The Meccano Double Headphones are British-made and of the highest quality procurable. They give loud, clear, undistorted reception, and will add greatly to the efficiency of any receiver. Comfortable to wear and easily adjusted. 4,000 ohms resistance. PRICE (post free), 15/6.

Meccano Ltd., Binns Road, Liverpool

Swiss, French and English Railways

(*Continued from page* 379)

"halts," consisting of two gravel platforms and a wooden shed.

Electrified Lines

The only important electrified lines in France are the local lines of the Paris-Orleans railway round Paris, and a section of its main line worked by American and Swiss-built locos, the latter being of the 2–8–2 type and the most powerful locos in Europe using continuous current. The Midi railway has electrified several lines in the Pyrenees, single-phase current at 12,000 volts being used.

Electrification plays a more important part in the railway system of Switzerland than in that of any other country in Europe. Having practically no coal without importing it, but having almost unlimited water-power at her disposal, Switzerland naturally has turned to electricity as the most economical source of power for her railways.

Many lines have had electric traction from the first, as for example the Loetschberg Railway and most of the narrow-gauge lines.

The Swiss Federal Railways, with a network of over 1,800 miles, had a particularly serious problem to consider when, in 1916, they decided to electrify the whole of their lines. First of all it had to be decided what system of current should be used, and after long consideration single-phase alternating current at 15,000 volts was determined upon. Previous to this, however, the line through the Simplon tunnel, from Brigue to Iselle, had been electrified with three-phase current at 3,000 volts, and this system was subsequently extended to Sion on the Lausanne line. After a good deal of discussion it was decided to leave this line as it was for the time being, and to electrify all other lines on the newer system.

An extensive programme of work was drawn up and immediately taken in hand, and to-day the following lines are operated by electricity:—Basel-Lucerne-Gothard-Chiasso, Zurich-Lucerne, Zurich-Arth-Goldau, Zurich-Olten, Berne-Thoune and the continuation by the lines of the Loetschberg Railway to Brigue and Interlaken, Lausanne-Sion-Brigue-Iselle, Lausanne-Yverdon and Lausanne-Vallorbe.

Work is in hand on the Geneva-Lausanne line and on the Berne line as far as Palézieux, and these sections will be completed by the end of this year. Work is also in progress on the Berne-Olten and Zurich-Coire lines and others will follow in due course. In addition, the whole of the lines of the Rhaetian Railway have been converted to electric traction.

Thus the three great international railway routes through the Alps are now worked electrically, and it will not be many years before our old friend the steam locomotive has become extinct in Switzerland.

Furka Line Nearing Completion

The Swiss metre-gauge Furka railway was begun many years ago, but the war intervened and only the section from Brigue to Gletsch was opened for traffic. Work has now been resumed, and it is expected that the whole line, passing through the Furka and Oberalp Passes to connect Brigue with Disentis, will be complete by next summer.

How Iron Wire is Made—(*cont. from p.* 405).

the wire, after having been steeped in acid, is passed through a spelter vat and the coating thus obtained is evened out by passing the wire through a heap of sand before coiling again. Tinning is done similarly with block tin, the only difference being that the surface is made smooth by passing the wire through compressed rubber instead of sand. Japanned wire is merely dipped into vats of hot Japanning liquid.

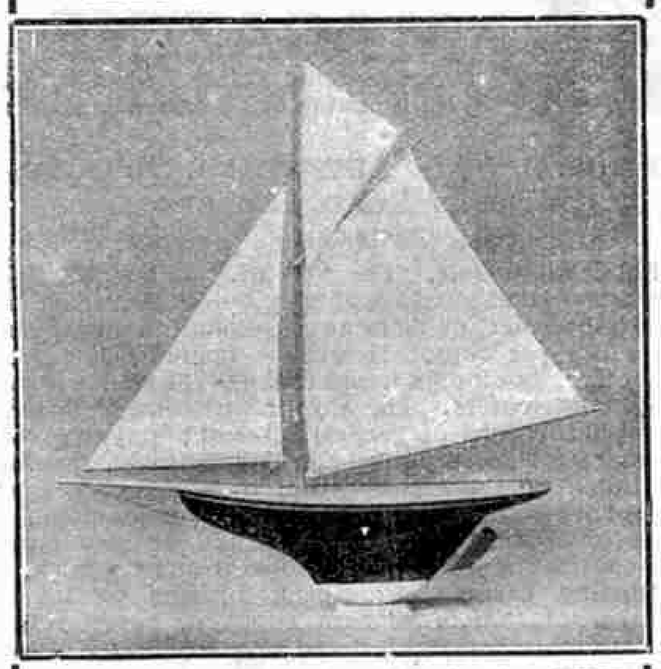
For the purpose of making springs, steel wire is used, but the process of drawing remains the same.

Packing the Wire for Delivery

The methods of packing coils of the finished wire vary according to the gauge of the wire and whether it is intended for export or for the home trade. Coils of large gauge wire for export are tied up into 1 cwt. lots, after which those of 16 in. diameter are placed inside those of 24 in. diameter and the two are tied together in one bundle, two of these bundles making a final bale which is sewn in sacking, five bales to the ton. For home trade the 1 cwt. lots are packed in paper, no further packing being necessary. All the packing that Japanned wire receives consists of tying it into bundles of 2 cwt. for export or 1 cwt. for home trade.

Smaller gauge wire requires more packing. For export, 28 lb. coils are covered with waterproof paper and packed in casks specially constructed for the purpose, whereas for home trade the coils are wrapped in ordinary brown paper and then sewn up in bags each containing 1 cwt.

Three Famous Lines



Our Racing Yacht, 21″ hull 19/6
Other Yachts from 2/9 to £3/19/6
Miss America Launch ... 12/6
Clockwork Motor Boat ... 35/–

Local Agents for
Hobbies Ltd., Meccano Ltd.,
Bassett Lowke Ltd.

C. LUCAS

Hobbies Famous Depot
35, MANCHESTER ST.,
LIVERPOOL

THE GENUINE SYSTEM.

BE TALLER!

Results Speak for Themselves.

THE ROSS SYSTEM OF HEIGHT INCREASE

Has increased my own height to 6 ft. 3¾ ins.
FIRST IN 1907. FIRST TO-DAY.
No appliances, no drugs, no dieting.
ROSS SYSTEM NEVER FAILS.
Fee :—ONE GUINEA complete.
A Client, aged 37, reports : "I have increased my height nearly an inch, and I have not been a full month yet!"
A Lady writes (after 5 weeks) : "I have grown two inches, and feel much better. Thanking you for your Treatment, which I found a wonderful success."
Further particulars, if desired, 1½d. stamp.
(N.) Malcolm Ross, Height Specialist
40, Victoria Rd., Scarborough, Eng.

Be sure and read

"ELECTRICITY"

every Friday. TWOPENCE.

A helpful serial on the mathematics of Wireless will appear during the summer.

ASK YOUR NEWSAGENT FOR IT.

MODEL SHIPS' FITTINGS
Send 6d. for Scale Drawing of Splendid Ocean Liner and List of Realistic Fittings. **A. Rodway, 102, Long Street, Birmingham.**

The Conquest of the Air—

(*Continued from page* 397)

Normal Useful Load ... ... 190 lbs.

* Weight with Normal Full Load 1,240 lbs.

Dimensions.

Length	...23 ft. 6 ins.
Span, Folded	... 9 ft. 8 ins.
Span, Open	...29 ft. 0 ins.
Height	... 8 ft. 6 ins.

* The Certificate of Airworthiness will allow of a maximum permissible fully loaded weight of 1,350 lbs.

ROLLER SKATING BOOM

Fine Weather, Fine Roads, & Fine Quality Skates at the **lowest prices** in the trade, have all combined to create a **record demand** for **ROLLER SKATES.**

They provide **ideal outdoor exercise** for growing **boys** and **girls,** and to use the words of one of our delighted customers.

"They are a joy to own and a pleasure to use."

No. 3 with Threaded Clamps and Case-hardened Steel Wheels are only 5/– pair
No. 5 with best Ball-bearing Wheels, 10/– ,,
No. 6 ,, ,, and Block Heels, as illustrated" 11/– ,,
Postage and Packing 9d. per pair extra.

Send at once to
Bateson's Sports Depôt, Blackpool

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
RODWAY, 102, Long St., Birmingham
Mention "Meccano."

Eswey Watches

Gent.'s Solid Nickel Silver Pocket Watches.
THE "BRITON" LEVER.
Interchangeable Keyless Movement. Smart Dustproof Cases.
The only Watch with a **guaranteed Main Spring.**
2 Years' written warranty.
Satisfaction or cash refunded after 7 days' trial.
ESWEY WATCH CO., 17, Cobbett Road, London, S.E.9. **7/6** Post Free

MAKE GRAMOPHONES.
Our 64 page Catalogue tells you for **3d. how to do it** and what accessories to choose. **Motors** in 25 sizes, from **12/–**; Tone arms, **4/6**; Speakers, **2/6**; Headphones, **10/6** pair; Cabinets from **9/–**. Gramophones from **33/–**. Carr. paid.
The Regent Fittings Co., D.78
120, Old St., London, E.C.1.
Established 21 years. Telephone : Clerkenwell 2923.

FOR THE HOLIDAYS

New 15 Shot Pea Repeating Pistol... ...	**1/3**
The 25 Shot Pea Repeating Pistol ...	**2/–**
Plate Camera, with plates and developing materials, full instructions, Pictures 3½ × 2½ in.	**1/3**
Miniature Ice Cream Freezer. Makes real Ice Cream. Full instructions	**2/6**

Postage on each of above 3d.
Postal Orders or 1½d. Stamps accepted.
HERBERTS', 27, Adys Road, Peckham, London, S.E.15.

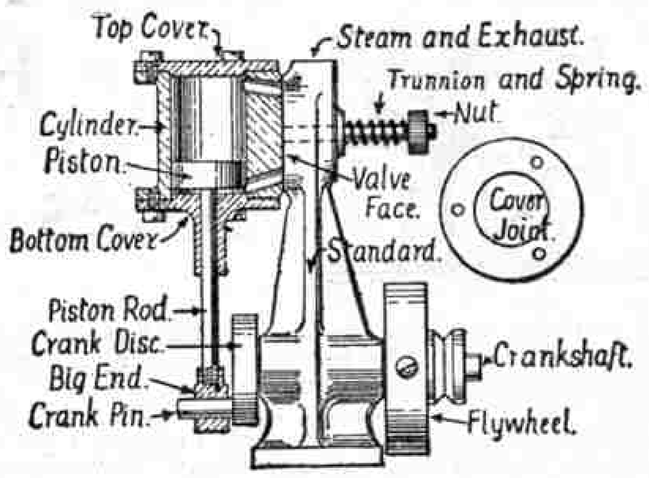
THE AUTOMATIC PEA REPEATER
Price **2/3** post free.
Still the most reliable pistol on the market, and wonderful value at the reduced prices. Takes 25 shots at one loading, best black finish, each in box with instructions and supply of ammunition.
Foreign and Colonial postage 1/– extra.
R. DILNOT, 125, Chiswick High Rd., London, W. 4.

WONDERFUL ELECTRICITY

Make Your Own Electric Light

With these marvellous Dynamos it is possible to light brilliantly 4-6 volt lamps and perform many interesting experiments, etc. Price only **5/6**
List free. (Post abroad 1/6).

GREENS **(Dept. N.), 65, Long Acre, London, W.C.2.**



The only Engine in the world you can build yourself and absolutely guaranteed to work perfectly.
This is due to first-class materials and extremely accurate machining.
The engine has therefore plenty of power.

A customer writes :—
"Thank you for sending the S.T. Boiler. The engine, bought at Wembley, was soon coupled up and ran perfectly. My little boy was so pleased to see that it was powerful enough to drive a Meccano Crane."

S.T. Engine Parts ... 5/- } *Post Free*
Finished Boiler 8/- }

Send stamp for list 12M or 6d. for complete "Engine" catalogue, 80 pages.

Stuart Turner Ltd.

HENLEY-ON-THAMES

TENTS FOR ALL PURPOSES
Also Sleeping Bags as supplied to Mount Everest Expedition.
Send 3d. Stamp for List.
LIGHTWEIGHT TENT CO.,
(Dept. M.M.),
70, High Holborn, LONDON, W.C.1.

SPECIAL OFFER OF BLOW-LAMPS.
Strongly made, size 4 × 3¾. Gives powerful flame, removes paint, etc., solders without iron. Simple, safe, economical. Worth 3/6. Satisfaction guaranteed or money back. 1/6 each, 3 for 4/–, post free.
POST FREE **1/6**
WILKINSON & SON,
24, North Road, Clapham, S.W.

How to obtain the "*M.M.*"

The "*M.M.*" may be ordered from any Meccano dealer, or from any newsagent or bookstall, price 3d. per copy. It will be sent (post free) direct from this office, 2/– for six issues and 4/– for twelve issues. As a rule, back numbers cannot be supplied, because we print only sufficient copies to fill our standing orders. To prevent disappointment, therefore, place a regular order either with your dealer, newsagent, or direct with this office.

Meccano Magazine,
BINNS ROAD LIVERPOOL

Readers' Sales and Wants

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 catalogues cannot be accepted.

READERS' SALES

(*Rate: 1d. per word, min. 1/-*).

Primus Chemistry Outfit cost 15/-, unused, 7/6.—Fussell, 11a, Theodore Road, Lewisham, South East 13, London.

550 Cigarette Cards, 1/- per 100. Excellent condition.—Gerald Kiddle, Marclecote, Ross, Herefordshire.

Small bookcase, 1/-. Attache Case (24" × 16" × 5") 9/-. Meat Safe, 13/-. Album with 220 Cigarette Cards, 3/-.—Watson, Drove Road, Biggleswade.

Sporting Champion's Photos, glazed, 70 large, 56 small, clean. Also Album. What offers.—L. Wood, 11, Falding Street, Rotherham.

Small assortment of Cinema Films for sale. Send stamp for list.—32, Davies Lane, Leytonstone.

For Sale. Crystal Set. Never been used. Cost 25/6. Sell 21/-.—Cordery, College St., Petersfield.

Complete 18 parts of "Railways of the World," cost 21/-, also parts 1 to 12 part bound, 13 to 33 separate of, "Animals of all Countries," cost 40/-. Will exchange or sell, what offers.—Edward Newby, 40, Haunchwood Road, Nuneaton.

No. 00 Table Railway, makes Figure 8, 5/6 entertained. Model Grindstone 1/-. Variometer Panel and Terminals 3/6.—Ward, Ravenscroft, Faircombe, Surrey.

Fellow readers! Owing to moving, all my private possessions are offered at ridiculous prices for quick sale. Musical, Electrical, Books, Cinema Films, etc. I must clear everything. Send postcard for list.—John Appleby, 59, Fairmount Road, Brixton, London.

Cigarette Album containing 562 cards, nearly new (all in sets), 10/6.—Buxton, Wydra House, Fewston, Harrogate.

Stamps on approval. Breaking collection. Free gifts.—L. Critchley, Muirfield Road, Inverness.

For Sale. Model Clockwork Railway.—Apply King, 109, Church Road, St. Annes-on-Sea.

SMALL ADVERTISEMENTS

(*Rate: 1/- per line*).

SALE—32 copies of "*M.M.*"—state offers.—William Walker, 8, Linden Gardens, Tunbridge Wells.

Model Loco Blue Prints. Lists 3d. "King Arthur." 0 gauge 1/3.—Pealling, 108, Forest Rd., Dalston, London.

CINEMA FILMS, 100 ft. 1/-, 1,000 ft. 6/-, delivered.—Phillips, 64, Ewart Street, Brighton.

MONEY EASILY EARNED by selling Rubber Stamps in spare or full time. Particulars free.—Richfords Ltd., Snowhill, London.

CINEMATOGRAPHS fitted rewind and acetylene. Film library. Second-hand bargains.—Pictures, 109, Kenlor Road, Tooting.

Patents, Trade Marks, Inventions. Advice Handbook and Consultations free.—B. T. King, Regd. Patent Agent, 146a, Qn. Victoria St., London, E.C.4.

THE WIRELESS INSTITUTE holds examinations and awards certificates and medals to wireless amateurs. Write—Dept. M, 74, Hendford, Yeovil.

ENJOY YOUR HOLIDAYS. A Postcard brings our List free to you.—Bateson's Sports Depôt, Blackpool.

TOOLS. Stamp brings our bargain tool list.—Walsh & Calverley, 81, Station Road, Finchley, N.3.

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. **Lever Self-Filling Model with Safety Cap, 2/- extra.**

SMALL ADVERTISEMENTS (*cont.*)

This Space is set to ½ inch s.c. and costs 5/- per month. This sum is the 64th of £16, the price of a whole page advertisement. Over 50,000 copies of the July number were distributed all over the world. You therefore reach this exclusive public for about one penny a thousand.

FREE. Handsome Albert with every Dustproof Railway Timekeeper. Bargain Price 6/11, post free. Satisfaction guaranteed.—Morton's, 18, Moor Lane, Clitheroe.

DAVENTRY (55X) Coils, 3/6. Instructions and post free, fitted with plug 9d. extra.—H. Ray, Sandy Lane, Tettenhall, Wolverhampton.

BEST HARD-WEARING WATCH. The "Simplex" never gives trouble. Unaffected by climate. Every boy should have one, 7/6. Bargain lists free.—Ratson (M), Copple House, Fazakerley, Liverpool.

SELLING IN THOUSANDS. Models of the leading 17/6 Pens. Complete with Pocket Clip. 5/- each, Post 2d. State Fine, Medium or Broad Nib.—Bateson's Sports Depôt, Blackpool.

25/-

Guaranteed for 12 Months.

The Baby Loud Speaker with the Grown-up Voice

In this little fellow you get mellow, pure, undistorted reproduction—no shrillness, no overtones—just crystal clear broadcast. 12½ ins. high. Bell, 7 ins. diameter. Handsome crystalline finish. At all reputed Dealers. If unable to obtain, write direct.

The CABLE ACCESSORIES CO. LTD., Tividale, Tipton, Staffs.

"Revo"

"The Name for Perfect Radio"

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 "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 3d. per copy. It will be mailed direct from this office, 2/- for six issues and 4/- for twelve issues.

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 size, and 6d. (post free) smaller size.

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 3d. per copy, or mailed (post free) direct from Liverpool, 2/- for six issues, or 4/- 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, Ifwerson Ltd., P.O. Box 129, Auckland.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

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Wonderful Hours of Healthy Exercise

The COMET

This natty little racing model is the very thing for the youngsters. It is built for sturdy boys and girls, and will stand any amount of rough wear. The double crank movement makes it very speedy. For ages 2½–5 yrs.

Only 27/- each

with wired-on rubber tyres. Many other models up to enclosed Saloons with ball-bearing pedals and balloon size tyres.

The FAIRYKAR

Regd. Trade Mark.

Baby will love this Pedal Fairykar. There is nothing to beat it. It is beautifully painted a bright red with nickel-plated handle bar and stem, rubber pedals, etc. A splendid health-giving toy.

Size 4, 15/- Size 5, 22/6

The FAIRYCYCLE

Regd. Trade Mark.

If only you had a Fairycycle just think what fun you could have, and what splendid exercise you would get in riding it. The Fairycycle is a real Cycle—not a make-believe. It is beautifully constructed, and runs with remarkable ease, and is SAFE because the low riding position makes it easy to control, and it is BRITISH.

BE SURE YOU RIDE A FAIRYCYCLE

49/6

Usual Standard Model also with ⅞" Ribbed Cushion Tyred Ball-bearing Tangent Spoke Wheels, De Luxe Model, 61/6.

British Toys for Girls & Boys

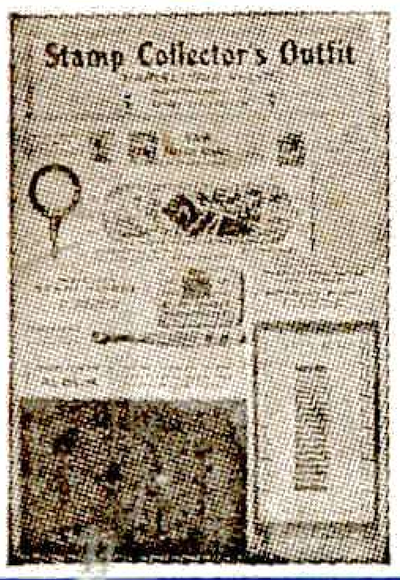
Look for the Triangle Trade Mark. It is your only guarantee!

L. BROS. LTD. LONDON BROS ENGLAND

OBTAINABLE FROM ALL GOOD TOY SHOPS

Sole Manufacturers:

LINES BROS. LTD., 9, Fore Street, LONDON, E.C.2.



Everything for Stamp Collecting at Gamages

Stamp Collectors' every need—Albums, Stamp Mounts or Dampers—is of better quality if it comes from Gamages—and at no extra cost to you.

Stamp Collector's Outfit

Packet of 100 Stamps, all different. Pocket Book for surplus stamps. Watermark Detector Tray. 500 Tasteless Stamp Hinges. Tweezers, nickelled steel. Perforation Gauge. Approval Book for holding spare stamps. All packed in small box. Post 2d. **2/6**

If you are starting Collecting you MUST get one of these.

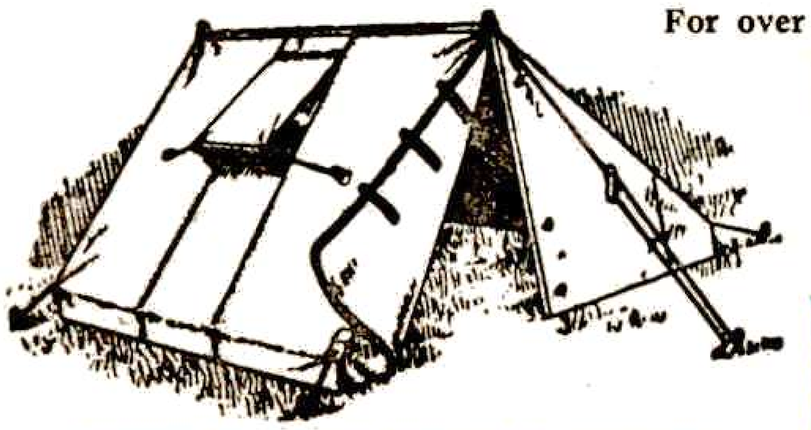
This Fine Album

The "Champion" Stamp Album, absolutely the finest album of its kind, bound in stout artistic cover. Size 8 × 6½ inches, it contains 100 pages with spaces for over 2,200 stamps. With nearly 700 fine illustrations (including the "Wembley Exhibition" Stamp) Price **1/-** Post 3d.

Gamages of Holborn

The World's Big Stores for Boys

For over 50 years Gamages have specialized in supplying Boys of all ages with what they need. Games, Sports' Kit, Hobbies, Clothes, nothing comes amiss to Gamages, and whatever they sell is the best obtainable. You can spend many a happy hour in the splendid Holborn Showrooms—for what Meccano Boy would not be interested in the splendid models which we display?

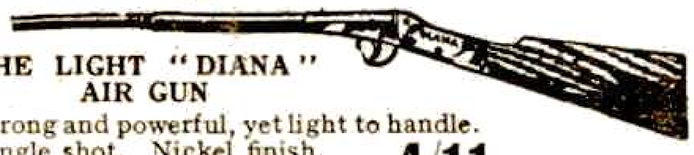


CYCLE CAMPING TENT

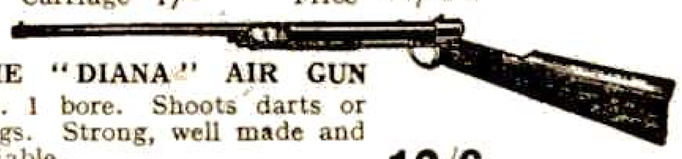
To hold two fellows. Made of light green rotproof material and designed to pack into two bundles, each weighing 4½ lbs., and measuring 15½ × 4". Size erected 7′ × 6′ 6″ × 4′ 3″ with 12″ walls. Packs into two small valises. Price **75/-**

Every fellow wants a pocket knife—here's one at the right price. Fine quality pocket knife in White, Stag or Imitation Pearl Handles, 4 blades (3 ordinary and 1 nail), brass lined, capped ends. Length 3½ in. Post free, Price **2/3**

Gamages Air Guns



THE LIGHT "DIANA" AIR GUN
Strong and powerful, yet light to handle. Single shot. Nickel finish.
Carriage 1/- Price **4/11**



THE "DIANA" AIR GUN
No. 1 bore. Shoots darts or slugs. Strong, well made and reliable.
Carriage 1/- Price **12/6**

THE "MILLITA" AIR GUN
No. 1 bore. Very accurate.
Carriage paid. Price **27/6**

"GEM" AIR GUN
No. 1 bore only. Beautifully made and finished.
Carriage paid. Price **27/6**

PHOTO PRINTING SET

1/- Post free

Contains large Bundle of real film negatives, photographic sensitive paper, printing frame. Neatly packed in neat cardboard box. Post free 1/-
If you want some real fun, get one of these.

FINE FUN WITH THIS BOOMERANG

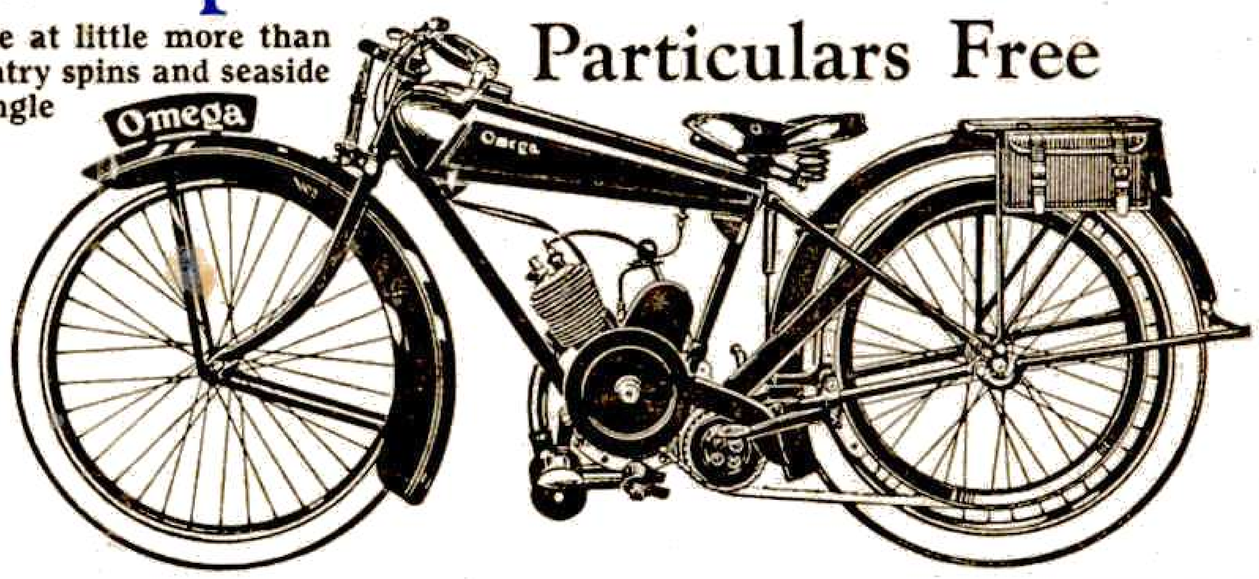
The real article as used by the natives of Australia. With practise you can throw this and make it return to you.

Just think of the sport you can have with one. Price **5/6**

£5 Down Secures A Splendid Motor Bike

Don't miss this splendid opportunity of getting a motor-bike at little more than the price of an ordinary Bike. Think of all the glorious country spins and seaside runs. Book your model now, so that you may not miss a single hour of the bright sunshine and long evenings.

Particulars Free



OMEGA 1.7 MODEL

Omega 170 c.c. two-stroke engine, M.L. magneto, B. & B 1 lever carburetter, 26 by 2¼ Clincher Tyres, improved design tank, finished in black and gold, 2-speed, Kick-start Model. Price **£25** Carriage paid

EASY PAYMENTS
£6 5s. down, followed by 12 payments of 32/10

As above, but with single speed and without Kick-start. Price **£20** Carriage paid

EASY PAYMENTS
£5 down, followed by 12 payments of 26/3

AS WE FINANCE ALL INSTALMENT PURCHASE BUSINESS, EACH TRANSACTION IS STRICTLY CONFIDENTIAL.

A. W. GAMAGE LTD., HOLBORN, LONDON, E.C. 1.

City Branch: BENETFINKS, CHEAPSIDE, E.C. 2.

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