

American Invention for Seeing by Wireless

Mr. C. Francis Jenkins, an American, claims to have invented an instrument by which moving objects several miles away may be seen by wireless. Successful tests were recently carried out in the presence of Mr. Wilburn, Secretary of the Navy, and other high Government officials. By means of the instrument light is converted into electrical modulations, broadcast on a wave-length of 546 metres, and at the receiving station these are re-converted to light. Mr. Jenkins expects to put his machine on the market during the next twelve months.

Watt's Workshop

The contents of the attic workshop in which James Watt worked, together with all his tools, will shortly be exhibited at South Kensington Museum. Everything will be shown in the position he left it at the time of his death in 1819. The actual windows, door, etc., will be used for the exhibit, which will be found close to the Boulton and Watt engines at present in the Museum.

Sharp Eyes Win £10

Noticing something floating in the sea, a labourer's wife at Weymouth, stopped to take a more careful look. The "something" proved to be a 21-inch Whitehead torpedo, which had been discharged during practice by the light cruiser Cleopatra. Finders of discharged torpedoes receive a reward of £10 from the Admiralty, the torpedoes being worth about £1,500 each.

For Experts only

Schutzengrabenvermichterungsautomobile is the German word for Tank and *Hochdruck-kondensationsdampflokomotive* means High Pressure Condensing Steam Locomotive. What fun it must be working out a German cross-word puzzle!

Corrugated Motor Ship Launched

Messrs. David and William Henderson & Co. Ltd., recently launched from their Clydeside Works a new corrugated ship with a gross tonnage of 5,200, built to the order of Messrs. Peterson & Co., of London, who already own several steamships of this type.

The new vessel, which has been named the "*River Ottawa*," is of the shelter deck type, and has a length between perpendiculars of 400 ft., a breadth moulded of 55 ft. 6 in., and a depth moulded to shelter deck of 37 ft. 9 in. She will be fitted with a Harland and Wolff-Burmeister and Wain Marine oil engine developing 1,850 brake horse power at 90 r.p.m.

New London Dry Dock

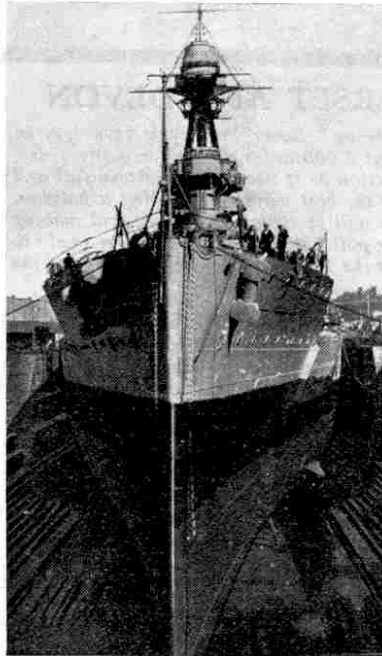
The Port of London Authority recently sanctioned an expenditure of £715,000 for the construction at Tilbury of a new dry dock 750 ft. in length, 110 ft. in width and 37 ft. 6 in. in depth at Trinity High Water Mark. The dock will be built to the east of the existing docks and will be capable of accommodating the largest vessels at present using the Port of London, as well as the largest likely to use the Port for some considerable time.

Rugby High-Power Station

Of the twelve 820 ft. masts for the new high-power station which is being erected near Rugby to take the place of 5XX, eight are now complete, and it is expected that the station will be ready for work in November.

New Gates for Birkenhead Dock

The Mersey Docks and Harbour Board have awarded a contract to Sir W. G. Armstrong Whitworth & Co. Ltd., Newcastle-on-Tyne, for three pairs of steel gates for the river entrance of the Alfred Dock, Birkenhead, the work to be completed within a period of 22 months. The dock entrance is 80 ft. in width.

In Dry Dock at Malta

W. H. Cockman of Malta sends the above photograph, showing H.M.S. "*Valiant*" in dry dock at Malta. The vessel, built at Glasgow and launched in August 1914, is of 27,500 tons displacement, 660 ft. in length and 99 ft. 6 in. in width. She is propelled by four turbines, which are supplied with steam by twenty-four boilers. Her armament consists of eight 15-in. guns, twelve 6-in. guns, two 4-in. guns, two 3-in. guns and two 3-pounder guns. She is also fitted with four 21-in. torpedo tubes. Her three anchors weigh 7 tons 10 cwts.

Siamese Gunboat

On 21st April Messrs. Sir W. G. Armstrong Whitworth & Co., launched from their yard at Newcastle-on-Tyne, a gunboat built to the order of the Siamese Navy. The first vessel constructed in Great Britain for any foreign navy since the war, the "*Ratanakosindor*," as the ship will be called, was laid down in December last and is due to be completed next month. She will be 160 ft. in length between perpendiculars 37 ft. beam and will have a normal draught of 10 ft. 9 in. Her displacement will be 1,000 tons.

The vessel will have twin screws, driven by triple expansion engines developing 850 indicated horse power at 150 revolutions per minute, and giving a speed of 12 knots.

Her armament will consist of two 6 in. quick-firing guns, one forward and one aft, and four 3 in. anti-aircraft guns.

Japan's Largest Submarine

A new submarine, the I. 53, has recently been completed for the Japanese Navy. This is the largest submarine yet constructed for Japan. The new vessel is of 1,700 tons displacement, or some 200 tons more than that of their present largest submarine, the I. 51, and is capable of a return trip across the Pacific. The I. 53 is not so large as either the British submarine X1—which displaces 2,780 tons, and was described in our April issue—or the American V. 1. of 2,164 tons.

The new submarine is one of seven being built for the Japanese Navy, and was laid down in 1924, taking only twelve months to complete.

New "Beam" Station for Empire Radio

The Post Office anticipate little difficulty in completing the transaction or the purchase of a site at Winthorpe, near Skegness, on which the Marconi Company will erect and equip a station for "beam" transmission of messages to Australia and India. The work will occupy nine months from the date when the site is handed over.

It is hoped that by the time the station is ready those at Bodmin and Bridgwater will also be in communication by the "beam" with Canada and South Africa. None of these three stations will be connected with the high-power Imperial wireless station at Rugby, the "beam" system being worked quite independently.

Similar stations are to be erected in the Dominions concerned, so that within twelve months the distant parts of the Empire should be in close wireless connection by "beam."

Huge Water-Pipe Bursts

The Vyrnwy supply pipe, which burst recently in the district of Llanrhaeadr, is now repaired. Thanks to the immediate action taken by the Liverpool Corporation Waterworks employees in the district no damage of any consequence was done. Soon after the burst occurred the Water Office was inundated with anxious inquiries, but the reservoirs at Oswestry and Prescot and balancing reservoirs en route make it impossible for a shortage to be felt in Liverpool under a week.

London Reservoir for 7,000 Million Gallons

The King recently opened at Littleton near Staines a reservoir covering 7,000 acres and costing over £2,000,000. The new lake which has been created during the last ten years will be called the Queen Mary Reservoir and will add 7,000,000 gallons to London's available water supply.

When the King arrived, part of the bottom of the reservoir was covered with water, but this was a very small portion of the total amount that will take a month to find its way from the Thames. The water is pumped unfiltered into the reservoir on the first stage of its journey of about eighteen miles to London. It passes through filter beds of pumping stations en route.

It is interesting to learn that the quantity of water for which the Metropolitan Water Board is responsible is sufficient to supply every inhabitant of the globe with one gallon a day for a week! The new reservoir will make a water shortage in London impossible.



A TOUR THROUGH SOMERSET AND DEVON

(The reader is to imagine that he is accompanying "Rover" on a few days' tour in Somerset and Devon. "Rover," who has averaged 5,000 miles a year for many years, will endeavour to give him such advice and instruction as is necessary to obtain full and complete enjoyment from what is perhaps one of the best ways of spending a holiday. It is intended to make for the South Coast, which will be struck at Seaton, and moving westward as far as Torquay, return to the starting point at Bristol by the main road via Exeter and Taunton, etc. The meeting place is at the Tramway Centre, Bristol, and the imaginary time of starting is 9 a.m. on a Saturday.—EDITOR).

HERE you are! and pleased I am to see you, looking so spic and span!

Evidently you have profited by my recent advice in preparing for a tour! Quite right—there's nothing like a good start and having made sure our machines are quite "O.K." our chief concern now is the care of ourselves, and that will take up most of our time, I assure you, with all the motors and other traffic on the roads these days. But I see you are impatient to start, and so we will get away at once, for we can talk just as well as we ride along.

The Clifton Suspension Bridge

I might have mentioned how appropriate was our starting point. There is a tablet in the wall, near where you were standing, that tells us that it was from "This port John Cabot and his son Sebastian sailed in the ship "Matthew," and discovered the Continent of America.

Our tour will also be a kind of voyage of discovery, too—not perhaps so much in the fact that it is a new country through which you are travelling, but rather because you will discover new possibilities in yourself. One of these is the ability to get, without the help of train or charabanc, to places that are as yet merely names on the map. Perhaps, also, you will realise for the first time the delight of a long day spent on the "open road," where every turn of the pedal brings to notice something of fresh interest. Finally there is the joy of achievement—but I'm getting too far ahead, so come along we will make a move in real earnest.

Our first place of call will be Wells, which is 20 miles from here due south, and as the wind is N.W. we are favoured for once in having it behind us. The best way out of the town to avoid the traffic will take us past Bristol Cathedral

and the Cabot Tower, and will also enable us to get a splendid view of the famous Clifton Suspension Bridge, about which we read recently in the "Life of Brunel" in the "M.M."

I think it a good plan at the beginning of a ride to take certain positions. You will perhaps ride inside, and as I am a more experienced rider I will take the outside. You will soon appreciate this arrangement as we proceed through the town.

Ah! there's the famous Suspension Bridge. There's no need for me to say much about it, I'm sure, except to remind you that it connects the counties of Gloucester and Somerset. How closely it compares with Brunel's original

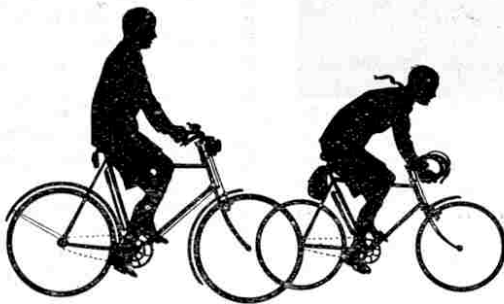
drawing. It is a fine structure!

Test Your Brakes

Here we reach our road and may now say "goodbye" to the tramlines for a few days, at any rate. That Church Tower straight ahead on top of the ridge is called Dundry Tower and is a famous landmark in these parts. Our road runs straight up over the hill—some 600 ft. in height and the view from the top is immense—as you will presently see for yourself.

This road we are on is one of two that run from Bristol to Wells, and I have chosen it for special reasons. It often happens that you have the choice of two roads, a fact that in some cases is barely indicated by the map, because the alternative road is shown as a second class road. Often these second class roads are quite good and they suit us even better than the recognised main road. By making enquiries—say from a local cyclist—you can soon satisfy yourself which makes the stronger appeal to you.

In this particular instance the advantage



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of the road we are taking is that it is one mile shorter, and also has less traffic on it. The surface is quite as good, and the hills occur in two groups, instead of in an endless procession of long "ups and downs" that are very tiring.

As we free wheel down this gentle slope, just try your brakes—one at a time of course. We have some "stiffish" hills to descend and it is well to make sure, by a practical test at the start of our run, that they will not fail at a time when they are wanted most. I usually try mine at every hill—before getting to a point where the machine bounds forward. You do this instinctively, if you make it a habit from the start.

Don't Use all your Energy

We are now about to climb the first of the two hills I spoke of just now, and as this is far too steep and long to tempt us to ride up, we will dismount here. I see you are admiring those pretty white flowers in the hedge—they are flowers of the garlic, and are in all the slopes hereabouts. I shouldn't pick them if I were you, for the smell is—well, not what you would expect from a decent English flower!

As we are walking this hill I want to say a few words regarding your position in the saddle. You may possibly think it a small matter, but it is really as important as anything, for a wrong seat can easily result in spoiling the whole ride.

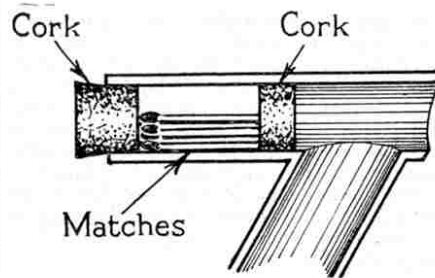
You should sit as though you really were part of the saddle itself. That is to say, the action of your legs in pedalling should not interfere with, or produce any movement in, your body.

If you were to make a Meccano model of a bicycle and rider—quite easy, I assure you—I don't think you would allow the action of the cyclist's legs to throw him from side to side in a manner similar to that in which I often see some boys riding. If the rider in your model did this, you would soon bolt him down, I expect!

This is the idea that you should get hold of—to sit firmly in the saddle and give *straight* strokes with the legs, thereby getting the maximum of power with the minimum of effort. The movement is entirely mechanical.

About the power, I shall have something more to say later, but let me say now, however, that no cyclist should expend all his energy at once. Remember that it has to be spread over the whole day and, as a veteran cyclist of my acquaintance used to say:—"It is better to have some of to-day's supply left over, than to draw on to-morrow's"—and there is a good deal of truth in that!

Carrying Matches



The above illustration shows an ingenious method of ensuring that you always have matches with you when on a cycling tour or night ride. A small cork is pushed far enough into the saddle tube to allow sufficient room for the length of the matches, which are then inserted and held in position by another cork at the end of the tube. This idea is not confined to matches, of course, as other articles—such as a small tube of rubber solution for instance—can be carried in this manner.

An Easy Riding Position

One other point, while we're on the saddle question. The saddle should be adjusted so that you are able to "sit up and take notice" of things, without having to rely on your handlebars for support. Handlebars were intended chiefly for steering purposes, a function that should be made as easy as possible and not hampered by your weight. Much the same remark applies to the pedals in their relation to the saddle. It should not be necessary to *stand* on them in order to maintain your position.

These apparently insignificant matters become most important on a long ride, and many a stiff neck, wrists, back, and many sore places will be avoided by attention to these details. It is so easy to develop slip-shod habits, which always take their toll generally in a most unpleasant manner! The more naturally and easily you sit, the easier it is to obtain *good balance*, and this has a great deal to do with the pleasure of a day's ride.

The Joys of "Coasting" Downhill

Well, here we are at the top of the hill, and I am pretty well out of breath after all that talking. Look back and see how we have risen in the world! We could almost take a geography lesson from here, for there is a variety of geographical features to be seen in the panorama before us. We also get a very good idea of the "lie" of Bristol, with the Avon running through it almost east to west. That clump of trees on the hill away to the right is called Kelston Round Top and is a notable landmark near Bath.

To the north are the Cotswolds, on the near slopes of which we can pick out many interesting places. Tyndales' Monument at Nibley is fairly prominent, and that is roughly 30 miles distant. We can follow the course of the Severn as far as Berkely quite easily, and even where we can't actually see it, its "silver" reflection shows very plainly. I think it is always very fascinating to stand at the top of a hill and pick out the various landmarks, most of which we previously knew only from a closer acquaintance.

Well, we've had a good "breather" now and as this is only an incident in our day's programme, we'll get on again by enjoying one of the greatest pleasures that the bicycle can give us—a fast but safe "coast."

Don't let her fly away all at once. Wait until you can see all is clear on the hill and then take a firmer grip of your handles. Now! . . . (mere dots are very inadequate, Mr. Printer). Well! What do you think of that? Never experienced such a fine run before, you say! No, I daresay not, but you will have plenty more.

That exhilarating rush through the air gives us some little idea of what it feels like to be in an aeroplane. It is a glorious sensation and acts as a tonic, especially on a hot day. Early in the morning, whilst the air is fresh and the dew still on the fields, the rapid descent of a hill with the country stretching out before you like a beautifully coloured picture, is something that will remain in your memory for many a day to come.

The Little Things Count

Our surroundings are becoming more rustic the further we get from the town. Look at that hedge! Did you ever see such a show of wild flowers. Those Red Campions with the "Scrumyan" and the long coloured grasses intermingled, would make a splendid picture. I was over this road two months ago, and then there was quite a different colour scheme—bluebells and primroses predominated in this same spot. In the field beyond, was a carpet of cowslips and the hedges covered with hawthorne blossom—a very different view to that one gets from the window of a railway carriage.

It is getting somewhat late in the season to hear or see the cuckoo, but there it is! Doesn't that square looking tail, so stiffly poised, remind you of an aeroplane in flight.

It is really splendid going now and it feels good to be alive. That milestone says we have come nine miles, but we scarcely seem to have started. Hello! What's up here! Somebody in trouble by the look of it. Drop off a moment, while I see what's wrong. . . . "Have I a piece of valve rubber? Yes, and of course I can spare you some. . . . Is that enough? Oh, don't thank me, please. I'm only too glad to have been of service to you, Good morning!"

You see, it's not only ourselves we have to think of when we make our preparations and it is always "the little things that count"—an inch of valve-rubber made all the difference to that cyclist—it means he will be able to ride instead of having to walk a good few miles.

Yes, perhaps it was thoughtless of him to set off without some spare, but you may be as careful as you like, yet that sort of thing will happen to you someday. Then you will be jolly glad when a good Samaritan comes along!

(To be continued)

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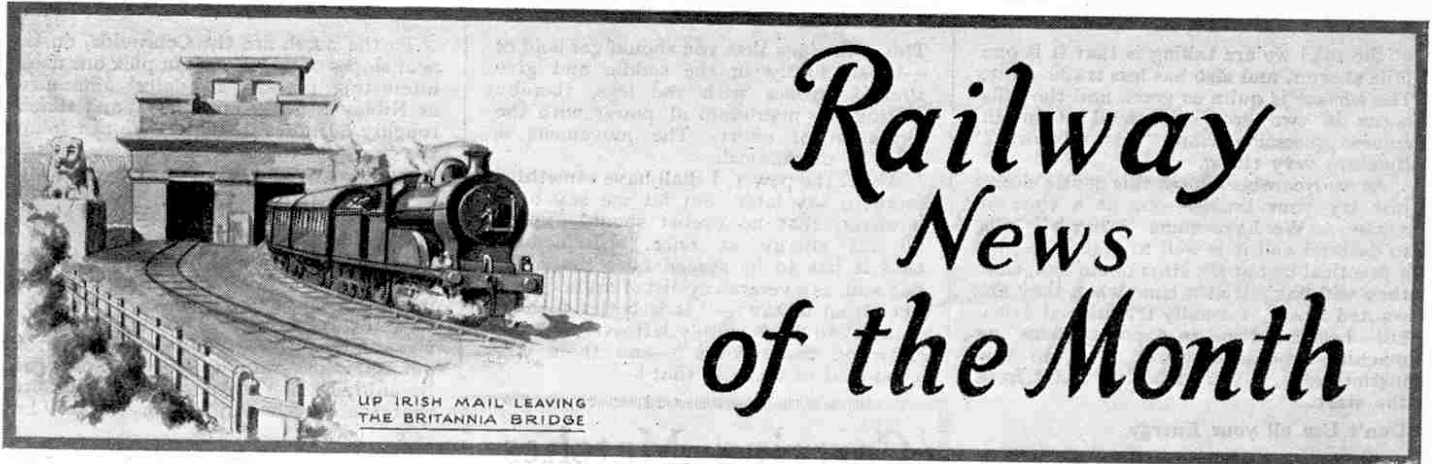


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Railway News of the Month

Grouping Developments

Three passenger locos of the former Highland Railway (Nos. 121, "Loch Erich," 130, "Loch Fannich," and 131, "Loch Shin") have been rebuilt with new boilers of Caledonian type from St. Rollox Works, Glasgow. These locos formerly had the peculiar "louvre" or slotted chimneys so distinctive in former Highland Railway design.

* * * *

On the L.N.E.R. the majority of important trains on the Edinburgh and Perth services are worked by large 4-4-0 "Director" type locos of former Great Central design, while on the Liverpool and Manchester expresses (Cheshire Lines) the work is shared by G.C. type 4-4-0's of small size, rebuilt with North British-type funnel and small dome, and the graceful Pollitt single-wheelers of the erstwhile G.C.R.

* * * *

The busy Gobowen-Oswestry branch of the G.W.R. is worked by miscellaneous G.W.R. side-tank locos of older types, including the neat little 2-4-0 "Lady Margaret," formerly of the Liskeard and Looe Railway.

* * * *

New Locomotives

For the Belfast and County Down Railway, Messrs. Beyer, Peacock & Co. Ltd., have recently built two handsome 4-4-2 type passenger tank engines. With 18 in. x 26 in. cylinders and 5 ft. 6 in. driving wheels, these engines are dealing capably with the Belfast suburban trains for which they were designed.

* * * *

A remarkably powerful series of goods locos of 4-8-2 wheel arrangement has been built by the Vulcan Foundry Ltd., for working heavy trains conveying machinery and stores for the mines in Gold Coast Colony. Although the gauge of the Gold Coast Government Railway is only 3 ft. 6 in., these new engines, complete with tender, weigh no less than 106.4 tons, and have an overall length of 55 ft. 8½ in.

* * * *

Automatic Gates on Tube Railways

Questions have recently been addressed to the Minister of Transport suggesting that the pneumatically operated doors on the London "tubes" are dangerous. These doors, which close and are pneumatically locked by the guard from his compartment, cannot be locked until they

are shut. As the train cannot start until the doors are locked, no one can enter or leave the train until the doors have been unlocked by the guard. By this means the number of men engaged in working the trains is considerably reduced and it has been suggested that this is a possible reason for the complaints of "danger" being made. The Ministry of Transport have had these doors under observation for some time, and are quite satisfied that they are not dangerous.

Railway Mileage of the World

The following figures, showing the mileage of the world's railways in 1922 and published in the German *Archiv für Eisenbahnwesen* for July and August, 1924, has been issued by the Bureau of Railway Economics, Washington, U.S.A. :—

America	371,741
Asia ...	77,961
Africa ...	33,629
Australia	29,203
Europe	228,641

Grand total 741,175

During the next five months we shall give on this page the railway mileage in the various continents.

Furness Railway Exhibit at Wembley

The Furness Railway Company are exhibiting at Wembley their old engine "Coppernob" which was built in 1846. After 60 years' service the loco was placed in a glass house at Barrow-in-Furness station, from where it has been temporarily removed for the Exhibition.

* * * *

G.W. & L.N.E.R. Excursions

With a view to popularising rail travel from London and certain provincial towns to the seaside resorts, the Great Western and London and North Eastern railway companies are introducing half-day non-stop excursion trains at fares ranging from 5/- to 10/- for the return journey. Several of these trains will be run during the summer.

Big Locomotive Order

The L.N.E.R. directors have approved an order for 20 passenger tank locomotives from Messrs. Robert Stephenson & Co., Darlington. It is interesting to note that 100 years ago the same firm were entrusted with the construction of "Locomotion No. 1," the first engine of the first public railway in the world.

Signalling and Train Control

On single lines where a simple staff system is employed, block telegraph communication between signal boxes is not necessary. Otherwise signalmen on single lines communicate with one another by bell codes as in the manner used in working double lines. The usual "distant," "home," and "starting" signals are provided on single lines working on the train staff and ticket or electric train staff and ticket systems.

From time to time it becomes necessary to close temporarily one line of a double track, either for repairing or re-laying or as the result of some accident. The remaining line is then worked as a single line under the control of a pilotman, no train being allowed to enter the section unless the pilotman is present and either rides on the loco or gives the driver permission to proceed.

* * * *

New Loco Development

A new and very powerful articulated locomotive of highly advanced design is now being built for the L. & N.E.R. and will probably be completed by the time this announcement appears in print. The new loco is designed on the Garratt system of articulation, and locos of this design, which has been described from time to time in these pages, have achieved considerable success on overseas railways. The new L. & N.E.R. loco will have six cylinders and will be the first of such locos to be placed in regular service.

Other developments promised in the near future are—turbo-locomotives, constructed on the Ljungstam principle for use on British Railways and very heavy goods locos, of the 2-8-2 type, with three cylinders. We shall keep our readers well informed on these and other similar railway matters.

* * * *

Big Spanish Railway Scheme

A scheme is at present under consideration by the Spanish Directory for the construction of a further 6,000 miles of railway, at a total cost of approximately 5,000,000,000 pesetas (about £152,000,000). Before contracts are signed, the scheme will have to go before the General Staff of the Army and the Council of Public Works for final approval. The actual construction will take 20 years. Another scheme now being outlined by the Railway Council allows for the reconstruction and improvement of the present Spanish Railways.

Locomotive Contracts

Two powerful locos of the Garratt type, each of 25,000 lb. tractive effort, are to be built for the Madagascar State Railways (metre gauge). They have been ordered from a Belgian firm and will be constructed under licence from Beyer, Peacock & Co. Ltd.

An order for eight additional Garratt locomotives, making a total of twelve, has been placed with Beyer, Peacock & Co. Ltd., by the Beira, Mashonaland, and Rhodesia Railways. These locos will be of the 2-6-2: 2-6-2 type and will weigh about 120 tons with cylinders 16 inches diameter by 24 in. stroke, coupled wheels 4 ft. diameter, and a boiler pressure of 180 lbs. per sq. inch. The firebox will be of copper and the boiler fitted with a superheater. Seven tons of coal and 4,350 gallons of water will be carried, and in view of the particularly sandy nature of the country through which these railways pass, the motion will be boxed in. The gauge is the standard of South Africa (3 ft. 6 in.) and the rails weigh 60 lbs. per yard. Sharp curves abound and there are gradients of 1 in 50.

* * *

Branch Line Working Experiment

The L.M.S. branch lines in the Derby district are being used for testing a Sentinel-Cammell steam coach which is 80% lighter than an ordinary branch line train of tank loco and two carriages, and its coal consumption less by 75%. The new train weighs only 16 tons unloaded but can accommodate 56 passengers with luggage and can be driven from either end.

* * *

Reconstructed 2-6-0 Locomotives

Of the 2-6-0 (S.E. & C.R. design) locos constructed at Woolwich after the war, several were purchased for service in Ireland, necessitating their conversion to suit the broader gauge (5 ft. 6 in.). These locos are now working on the Midland Great Western section of the Great Southern Railways, Ireland. They have cylinders 19 in. x 28 in., coupled wheels 5 ft. 6 in. diameter, a working pressure of 200 lbs. per sq. in. and, with tenders, weigh exactly 100 tons.

* * *

Building a Broad Gauge Engine at Swindon

It is understood that copies of the original drawings are to be used in the building at Swindon of an exact replica of the famous old broad-gauge express engine "North Star." This full-scale model will be exhibited in connection with the celebration of the Centenary of the Railways at Darlington this summer, and will be kept for various exhibition purposes. If only "North Star" herself had been preserved from the scrap-heap!

Boats Race Train!

The news comes from America of a novel speed contest in which fast motor-boats raced a famous express train. The scene of this encounter was the New York-Albany line, which closely follows the course of the River Hudson, and thousands of spectators lined the banks of the river. Two motor-boats of considerable engine power took part, and although one broke

New Locos

On the Java State Railways (3 ft. 6 in. gauge) 10 additional Mallet type locos were put into service during 1924. Built at the Hanover Locomotive Works, these machines are 4-cylinder compounds of the 2-8-8-0 type, and are fitted with up-to-date accessories, including air and steam brakes, superheater, and automatic couplers. * * *

A new series of locos, 4-8-0 tender type, has recently been delivered to the Madras and Southern Mahratta Rly. (India). These locos are built for the metre gauge, and have two outside cylinders 17 in. diameter by 22 in. stroke, the valve motion being of Walschaert's pattern. An eight-wheeled non-bogie tender accompanies each of these powerful locos.

* * *

A Long Way Round

In connection with the recent loco. trials (when a G.W.R. "Castle" type engine and a L.N.E.R. "Pacific" type were exchanged) it is interesting to note that the transfer of the rival locomotives between King's Cross Sheds (L.N.E.R.) and Old Oak Common Sheds (G.W.R.) was made by way of Retford, Nottingham and the former Great Central main line to Ashendon Junction and vice versa.

* * *

L.M.S. Loco Tests, Preston-Carlisle

The series of tests carried out recently on the difficult Preston-Carlisle section of the L.M.S. main line to Scotland were between four different types of modern express locomotives. Of the Crewe-built L.N.W. type, a 4-cylinder 4-6-0 "Claughton" and a 2-cylinder 4-6-0 "Prince of Wales" took part, while a 4-cylinder 4-6-0 (class 8) Lancashire and Yorkshire Rly. type and a 4-4-0 Midland 3-cylinder Smith compound participated as well.

We are informed that the most successful running was made by the L. & Y. 4-cylinder 4-6-0 No. 10460, which arrived 4 minutes ahead of schedule time with a load of 404 tons (15 bogie carriages). The maximum speed attained was 72 m.p.h., so that the virtue of the run must have been in the first-class work up heavy gradients such as Shap (5 miles at 1 in 75) and Grayrigg (average 1 in 120) Banks.

* * *

102-Years-Old Locomotive

A locomotive built by George Stephenson in 1823 has been sent from Hetton Colliery, Durham, to the Darlington shops of the L.N.E.R.

The locomotive recently ran a trial under its own steam from Darlington to Shildon, seven miles, and attained a speed of six miles an hour. The loco will take part in the forthcoming Railway Centenary celebrations.

The Loco of the Future

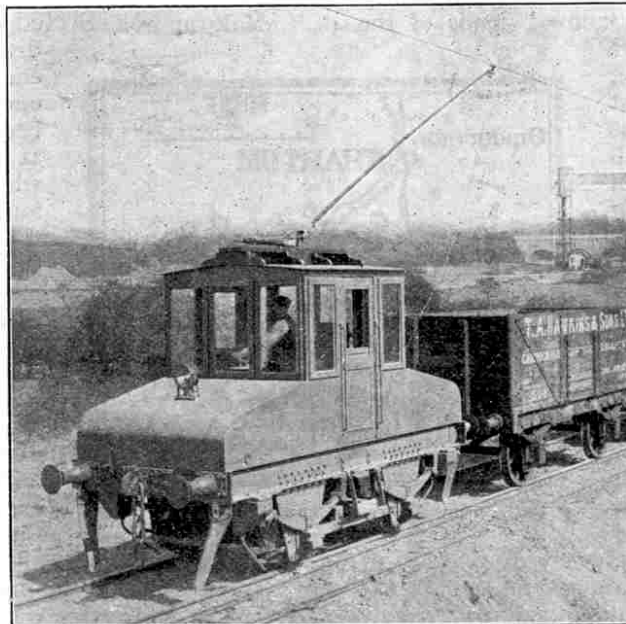


Photo courtesy]

[Messrs. B.T.H. Ltd.

The electric loco is said to be the loco of the future. We illustrate a small loco of this type, which is found very useful for shunting and making up trains

down the other completed the course in 165 minutes, or 25 minutes less than the time of the "Twentieth Century Limited" express.

Although the race was followed by aeroplanes from which its progress was broadcasted, the Railway Company assert that the famous American flyer was "not really trying." Anyhow, a train cannot have much of a chance in such an unequal contest.

Level Crossings Superseded

A scheme has been outlined for abolishing no less than thirteen level crossings in the Hull district of the L.N.E.R. It is stated that at five of these crossings in the city no less than 35,000 vehicles are held up daily. The cost of the scheme will be over a million sterling, of which the railway company have agreed to pay one-tenth and the Ministry of Transport is expected to be responsible for £800,000.

Punctuality on the L.N.E.R.

From recent official records over a period of one month on the L.N.E.R., 206,023 trains were run and the average lateness was less than 2 minutes.

The King's Cross to Edinburgh trains, and those from Leeds and York to Glasgow, averaged less than one minute late.

THE SENNAR DAM:

Two Miles Across the Nile

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

A NATION'S RACE WITH NATURE

AWAY in the Sudan, literally in the heart of the desert, British engineers have won a great victory over the forces of nature. Recently they pitted their cunning against the annual floods of the Nile, and won. As a result there will arise across the Blue Nile, south of Khartum, the greatest dam in the world. It will be nearly two miles in length, will contain over a million tons of masonry and, with its system of canals, will cost over £8,000,000.

Irrigation for Cotton-Growing

The undertaking is not without its political significance. Egypt has control of the Nile from its source, and some of the inhabitants in that country have been using this argument as a pretext for their claim to the Sudan. But the claim does not bear investigation, for more than sufficient water comes down the great river to supply the needs of Egypt, as well as those of the Sudan, several times over. Furthermore, the Sudan will be taking water when it is not required by Egypt, and which would only run away as waste to the sea.

The new dam is called after Sennar, a town near by, and its site is Makwar, formerly an insignificant little village on the banks of the Blue Nile, some 170 miles south of Khartum. As may be seen from the accompanying diagram, the latter city stands at the junction of the White and the Blue Niles. In the fork formed by these two rivers is the Gezira Plain, and the object of the undertaking is to bring a portion of it under irrigation for the

cultivation of cotton for the mills of Lancashire.

Foundations 40 ft. down

Makwar was selected because at this spot the river is divided by a small island which enables the engineers to deal with one channel at a time, while the bed of the stream is also crossed at this point by a ridge of rock, which was seized upon for the foundations.

The smaller or western arm of the stream was dealt with first. Sudds or earthen embankments were thrown across the channel, both above and below the stream, when the water was pumped out, and work on the site commenced. Along the site of the dam a temporary wooden platform or gantry was built for the cranes that raised the excavated material and lowered the stones for the erection of

the great retaining wall.

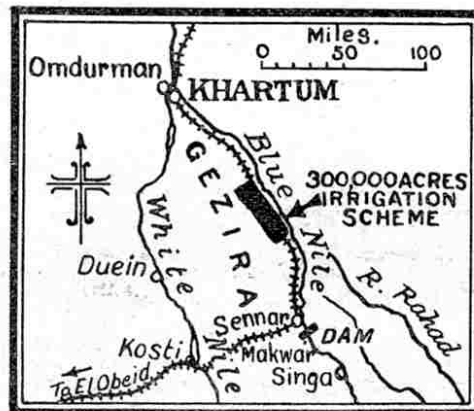
The foundations go down in some places to a depth of forty feet below what was originally the bed of the stream.

The stone of which the dam is being built comes from quarries thirty miles distant.

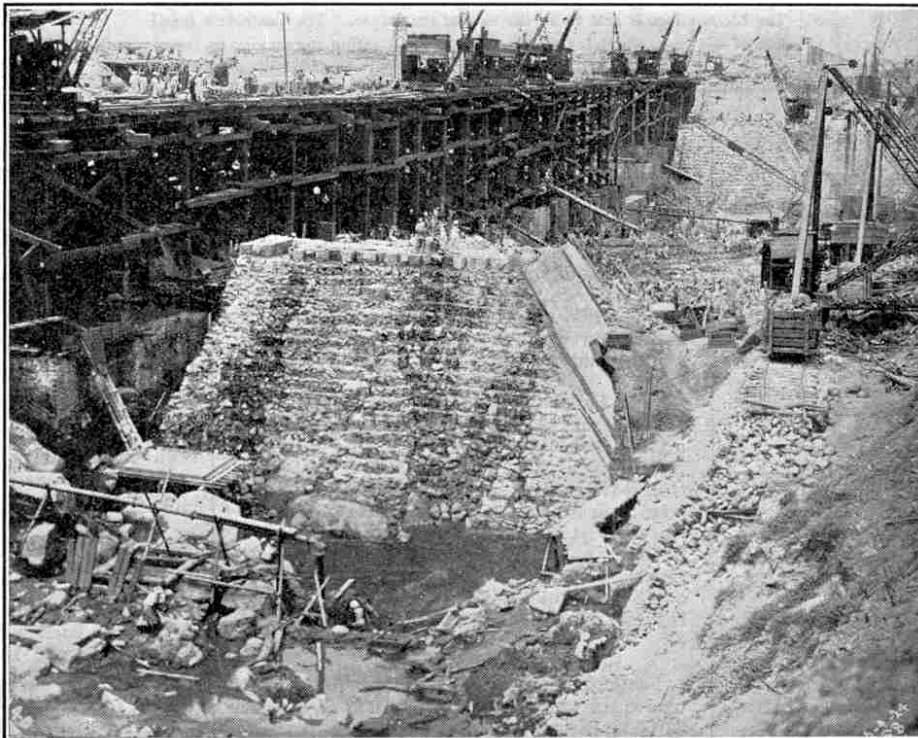
Eighty Huge Sluices

The great barrage will have a total length of 9,925 feet—nearly two miles. The maximum height from foundations will be over 120 feet. At its base the dam will have a width of some 90 ft., gradually tapering to 23 ft. at the top, along which the railway will run.

The total weight of the finished structure will be over a million tons. The flow of the stream will be controlled by



Map showing Sennar Dam



The Deep Channel Part of the Sennar Dam under construction

Note the Gantry from which the retaining wall was built. The timbers are carried on brick and masonry bases and support a platform on which a number of heavy cranes work

means of eighty sluice gates, 27 ft. in height and 7 ft. in width.

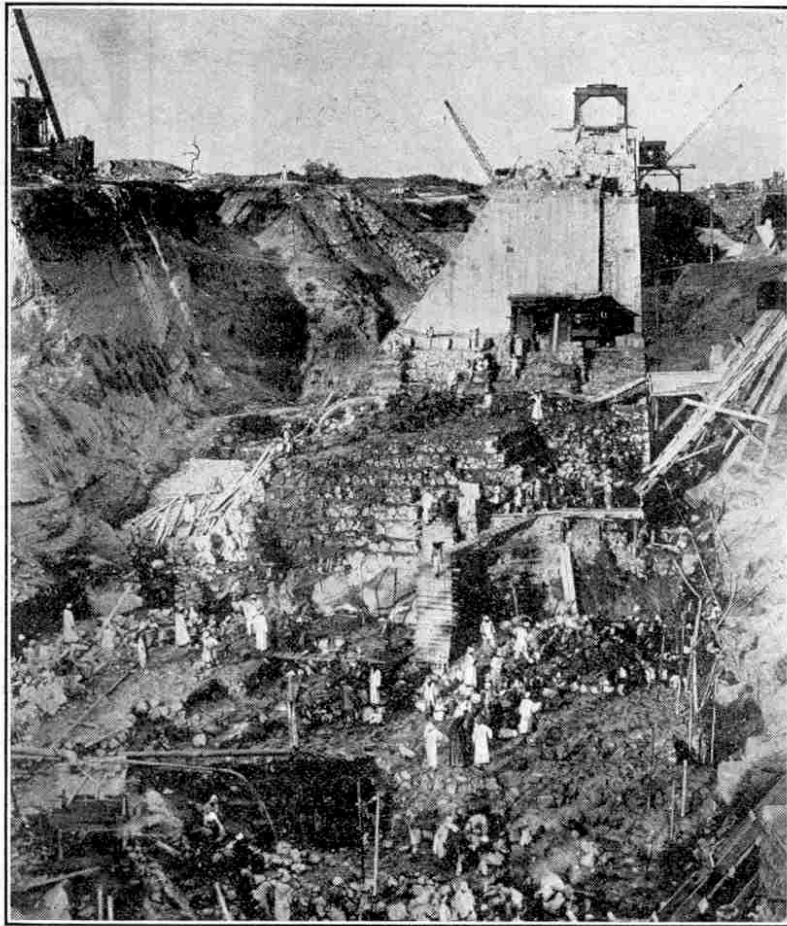
After the western section of the dam had been erected up to a certain height above the sluices, work was begun on the eastern channel. This section of the river is not only wider but much deeper than the other.

It was the desire of the engineers to prevent if possible the re-sudding of the channel again another season.

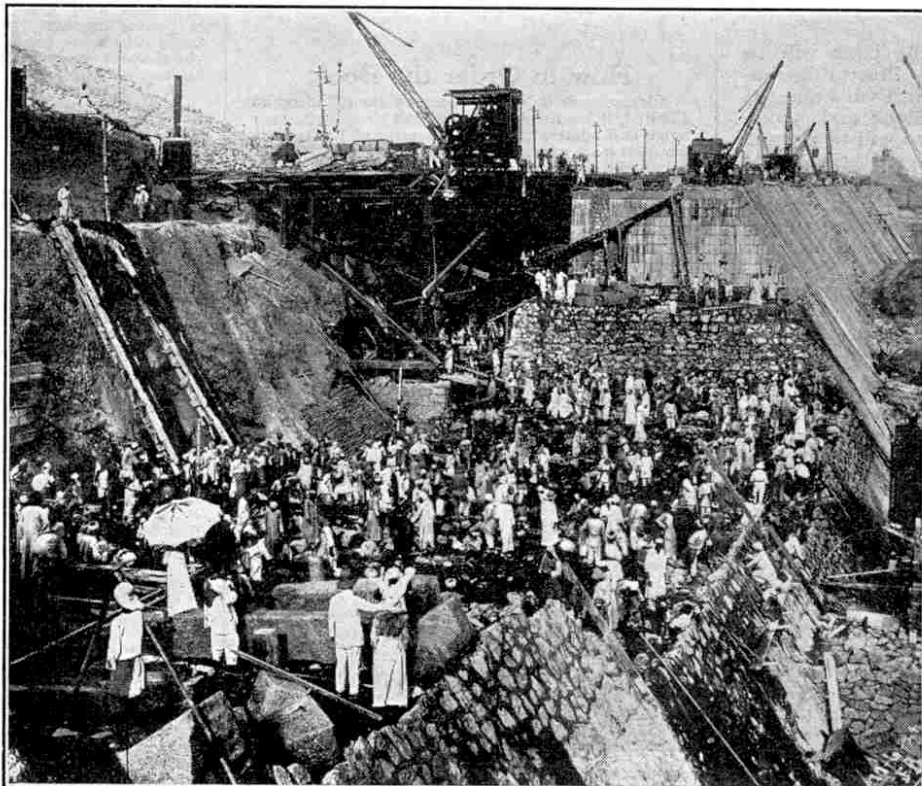
This meant that they had to divert the flow of the stream back again to the western channel, excavate the bed of the stream for foundations, and build up the great retaining wall sufficiently high to allow the remaining work to be continued with the river flowing through the sluices. They had only nine months in which to carry out all this work before the coming of the annual floods, and the question was—could it be done?

A Race with Nature

The engineers made their calculations and declared that it could be accomplished, but it was an anxious time. No one could tell to a week or two when the floods would come, while unexpected little obstacles kept cropping up and delaying the work. But it was pushed on day and night by an army of between 19,000 and 20,000 men and slowly the great wall arose. It had scarcely reached the desired height when the waters commenced to rise, but



Securing the Foundation in deep channel in the eastern section of the stream



The central portion of the river section of the Sennar Dam under construction. The full height of the Dam is seen on the right

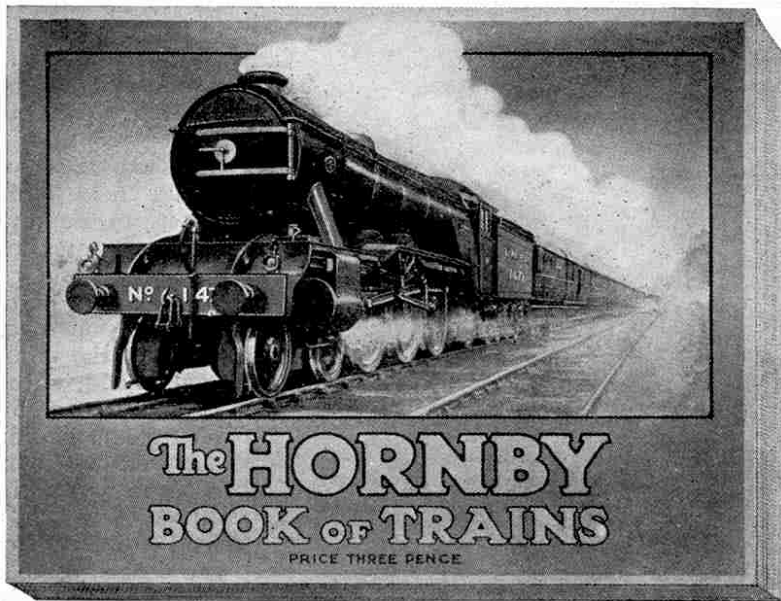
the engineers had won!

The dam will result in the formation of a lake 50 miles in length, two miles in width, with an average depth of 50 ft. The lake thus formed would hold sufficient water to supply the needs of Greater London for two years.

By means of canals spreading out over the land like the veins of a man's hand, water will be carried on to the semi-parched land. The main canal will be 62 miles in length, in addition to which there are 900 miles of ordinary canals, 3,125 miles of irrigation canals and 5,625 miles of field channels.

If the excavated soil from these canals alone was converted into bricks it would suffice for the construction of a wall five feet in height and one foot in thickness around the earth at the Equator.

As a result of these thousands of miles of channels, some 300,000 acres of what is now virtually desert land will be brought under cultivation, 100,000 acres of which will be immediately devoted to the growing of cotton. From this area 80,000 bales, or 40,000,000 lb. of cotton could be obtained annually. But the cultivated area is capable of great extension, as sufficient water will be held up to irrigate, if need be, three million acres. It should certainly result in the Sudan developing into a great cotton-producing country, and the cry that the Empire should produce its own cotton will have been answered.



The Finest Catalogue in the World

To celebrate this year's Centenary of the locomotive we now have in active preparation a special publication, "The Hornby Book of Trains." It will be a splendid production in every way, and will consist of 40 pages, the measurements being 11 in. x 8½ in.

The first half of the book will contain an account of the story of the railway from before the time of the opening of the Stockton and Darlington line down to our present-day giant locomotives. Detailed particulars will be given of the leading locomotive types, such as the L.N.E.R. "Pacifics" and the Great Western "Castles."

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. 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

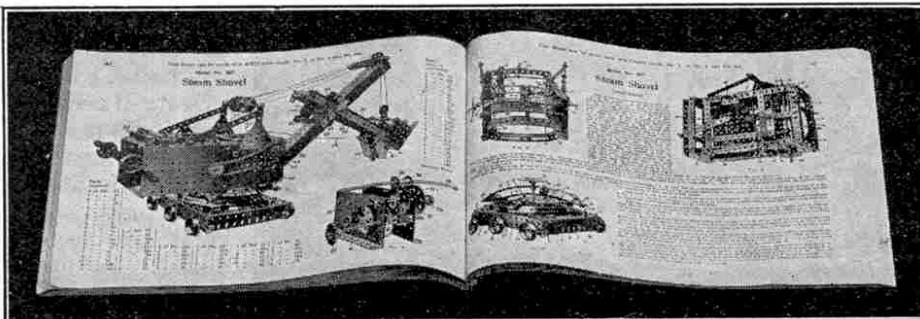
printed will be limited, and orders will be executed in strict rotation. It will be a case of "first come—first served."

The Hornby Book of Trains will be ready for delivery in September and orders may be placed now. The book will be featured in our advertising later in the year if the supply has not previously been exhausted. It is certain that the demand for this book will be very great, and the purpose of this announcement is to give readers of the "Meccano Magazine" an opportunity of "getting in first" with their orders. *Every reader is advised to book an order at once for despatch on the 1st October.*

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. (Overseas price 6d. Overseas orders to be addressed to our overseas agencies, addresses of which are given in column 3, page 376). There is no reduction if more than one copy is ordered. Orders will not be acknowledged. We hope to have the book ready for despatch on the Centenary Anniversary of the Opening of the Stockton and Darlington Railway (27th September). Orders will be entered and executed in the rotation received on this date, or as soon after as possible.

The Meccano Manuals



There are three Meccano Manuals, the 0 Manual for simple models built with the 00 and 0 Outfits, the 0-3 Manual comprising models built with any of the Outfits up to and including No. 3, and the Complete Manual, which comprises a selection of models that may be built with every Outfit up to a No. 7.

Prices of Manuals (Postage Free).—0 Manual, U.K. 5d.; Overseas, 7d. 0-3 Manual, U.K., 1/1½; Overseas, 1/7½. Complete Manual, U.K., 2/10; Overseas, 3/10.



This column is reserved for dealing with suggestions for new parts, new models, and new ways of making Meccano model-building attractive.

W. Frith (Marlow).—One or two of the items you mention are already on the market and we suggest you obtain a copy of our latest list.

E. A. Cryer (Putney, S.W.).—A leaf spring such as you suggest would not serve the dual purpose of road spring and brake band. For use as a brake band it would have to be of very fine flexibility and for this reason it would be unsuitable as a road spring.

L. Corlett (Dalton-in-Furness).—Two couplings and a rod would give a good representation of a connecting rod.

M. Cuffin (Chadwell Heath, Essex).—We realise that a boiler element would be of value in the Meccano system and expect to communicate some information on this subject shortly.

H. W. Marsh (Sale).—The subject of circular elements presents the difficulty of determining diameters which have a general application. This is the reason for the seeming protracted delay in introducing them.

Eric W. Bastin (Teddington).—There are occasions when the braced girder does not require a flange—in fact the use of a flange on this particular part is rather the exception. Should an occasion arise at any time where a flange is necessary, this may easily be added by employing an angle girder.

R. Manger (St. Peter-Port, Guernsey).—Should a flange be required on any of the flat plates, it is only necessary to add angle girders of the requisite length. Our present eccentric serves the purpose of a single throw eccentric you suggest, and has the further advantage of providing a selection of centres.

Fred. Lunt (Sunderland).—We keep adding accessories to the Hornby Train series. Many of the items you mention are already in course of preparation.

N. Ward (Wakefield).—We have already introduced a complete universal joint element to take the place of the one constructed from Meccano parts.

J. John (Milford Haven).—We already list a 1½" x ½" double angle strip. Would not this serve the same purpose as your suggested 1" x ½" strip?

T. R. Lake (Yelverton).—(1) We have recently introduced a 3½" gear wheel. (2) A 4-6-0 type loco is getting amongst the larger and more elaborate types, which are generally too big for 0 gauge. At the moment we do not contemplate making anything larger than our present No. 2 loco.

D. J. Woollett (Edgworth).—Rather than introduce an expensive and intricate big-end connection for the crank shaft, we advocate the type of crank built up of existing parts, such as is used on the model horizontal engine, No. 631.

John Watts (Leeds).—Reversed Angle Girders may be constructed by bolting together two standard Girders. The connection between these two pieces is perfectly rigid, which would not be the case with two Angle Brackets forming a reversed bracket, hence its introduction as a single unit.

Fred Greenfield (Barnham, Sussex).—We list a Dog Clutch serving the purpose of your idea.

N. N. Witton (Leeds).—We are at the moment preparing a Double Cross-over Point, which should be ready shortly.

R. A. Col (West Ham).—A cone clutch would be rather a complicated and expensive element made on so small a scale. Two circles composed of 8 Channel Segments in each, together with flanged wheels on a loose frame, demonstrate the wheel race. See the model Pontoon Crane illustrated in our March issue.

Leonard Ison (Northcote, Vic., Australia).—We are surprised to hear that you cannot obtain separate brake rails and suggest you apply direct to the Meccano depot in Sydney. Regret we cannot consider the braced piece you suggest.

Robert Lovelock (Chelsea, S.W.).—We had in mind a worm wheel of a wider pitch, but on examining the subject a little closer we find that it would not mesh with the existing tooth standard of the other wheels.

F. Salter Chapman (Chiswick, W.).—We are of opinion that a leather or rubber faced wheel for use as a friction drive would not be positive enough for Meccano purposes.

Ronald Stacey-Marks (Eastbourne).—(1) There are several parts in the Meccano system that would serve the purpose of the stay you suggest—for example, the ordinary Strip applied at the side, with corner brackets or architraves. (2) A variety of bevel gears would duplicate the functions of the existing Contrate and Pinion Wheels. We introduced the present bevel wheels simply to give a right angle drive in a 1/1 ratio. (3) Perforated strips of greater length than 12½" are very seldom called for. (4) We do not see any advantage in the belt drive over the present cord and sprocket chain.

New Rolling Stock for L.N.E.R.

Quintuple Articulated Units for Great Eastern Section

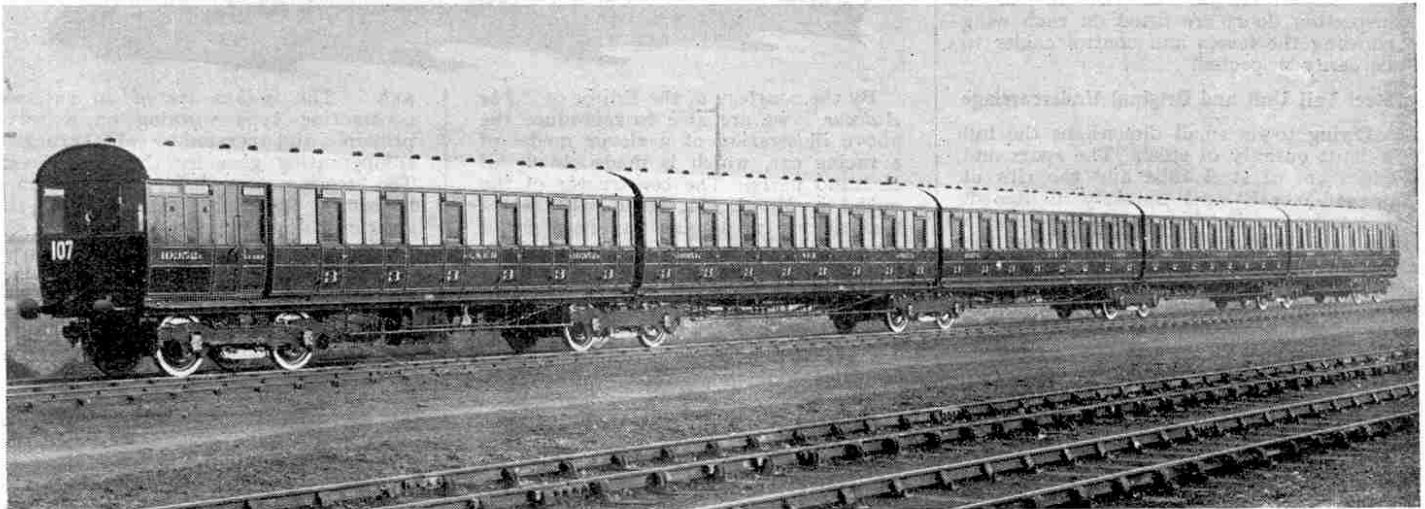


Photo courtesy]

[Messrs. Clayton Wagons Ltd.

First of 58 L.N.E.R. Quintuple Trains

TWENTY-NINE complete suburban trains, each of ten coaches and each capable of carrying 872 passengers, have been ordered by the London and North Eastern Railway Company. The contract is estimated to involve an expenditure of approximately £660,000 and the work has been distributed amongst the principal carriage builders of this country. Messrs. Clayton Wagons Ltd. by whose courtesy we reproduce the two accompanying photographs, have received an order for six trains, or a total of sixty coaches.

The Articulated System

Each of the new L.N.E.R. trains consists of two separate units of five coaches, each unit being built on the articulated system. This system, which was described a short time ago in these pages, has been applied with great success to the trains running on the L.N.E.R. services between London (King's Cross) and Edinburgh (Waverley). It is an extension of the principle evolved by Mr. H. N. Gresley, Chief Mechanical Engineer of the L.N.E.R., and was successfully adopted in the quintuple dining car trains used in the Great Northern services between King's Cross and Leeds. The system is also employed in the new train sets used on the suburban services to and from the former station.

Carrying Capacity

The new rolling stock is intended for service on the Great Eastern section of the L.N.E.R. Each unit of the two-unit train consists of one third class brake, one third class, one second and third class composite, one second class, and one first and second class composite.

The train consists of eight first class compartments, each with accommodation for ten passengers; thirty second class, with capacity for twelve passengers; and

thirty-six third class, also accommodating twelve passengers. The total for the train is thus 80 first class, 360 second class, and 432 third class, an aggregate of 872 passengers.

The total length of each unit is 224 ft. 11½ in., or 449 ft. 10½ in. for the whole train. The total weight of each unit is 104 tons 14 cwt. 3 qr.

The leading dimensions of each carriage are as follows:—

Length over body	...	43 ft. 6 in.
Width over cornice	...	8 ft. 11½ in.
Width over side commode handles	...	9 ft. 3 in.
Width over brake compartment at waist	...	8 ft. 6 in.
Height over ventilators	...	12 ft. 8½ in.
Bogie wheelbase	...	8 ft. 6 in.
Diameter of wheels on tread	...	3 ft. 7 in.
Size of journals	...	10 in. by 5 in. dia.

The bogies are of the "Duplex" bolster type standardised for carriage stock on the Great Northern section of the L.N.E.R.

Rolled Steel Underframe

The underframe of each coach is built up of British standard rolled steel sections, strongly jointed by knees and gussets and stiffened by cross bracing. The solebars are of 10 in. by 3½ in. by ½ in. bulb angle, and the longitudinals of 9 in. by 3 in. by ¾ in. channel.

The bogie bolsters on the outer carriages are of 10 in. by 3½ in. by ½ in. channel, and the outer headstocks are of 10 in. by 3½ in. by ½ in. channel. The inner headstocks are of 11 in. by 4 in. by ½ in. channel. An adjustable trussrod is provided beneath each solebar and longitudinal.

The buffing spring on the outer carriage consists of a nest of eleven Spencers' No. 430 indiarubber springs, and the draw-spring of a nest of three Spencers' No. 400 indiarubber springs.

Braking and Lighting

The carriages are fitted with the Westinghouse steam heating system, Westing-

house brake and Stone's system of electric lighting. A hand brake is also fitted in the guard's compartment. There are three 14 in. by 8 in. brake cylinders to each unit.

The electric lighting equipment of each quintuple unit consists of two double-battery equipments, mechanically regulated, and each consisting of two batteries of 200 amps. capacity, and a dynamo of 65 amps. output.

Each coach is fitted at one end with magnetic switch and hand control, and the guard's compartment is equipped with control for operating the magnetic switch throughout to "lights on" and "lights off" positions.

Each first class compartment has three 16 c.p. lamps, each in one enclosed fitting in the centre of the ceiling, while the second and third class compartments have two lamps of 16 c.p. in one enclosed fitting. One lamp in each fitting is controlled by a tumbler switch in the guard's compartment independent of the main switch. Three single tail lamps are provided for each brake end, and are controlled by two tumbler switches independently of the main switch.

The Bodywork of the Trains

The body framing, with the exception of the cantrails, is of thoroughly seasoned teak. The cantrails are of pitch pine. The floorboards are of white deal, 1¼ in. thick and laid transversely. The partition doors are of red deal 1½ in. thick, tongued and grooved. The roof boards are of red deal ¾ in. thick, all tongued and grooved.

The roof is covered with raw roofing canvas, bedded in white lead and boiled oil. The doors are fitted with drop lights, and are provided with a wearing plate on the right-hand side of the inside of the light frame to engage with a steel

(Continued on page 363)

The Conquest of the Air—*(Continued from page 337)*

aileron control in monoplanes is almost always due to lack of torsional stiffness in the wing.

The bracing struts and pins by means of which the wings are attached are easily removed, allowing the wings to be quickly and easily folded alongside the fuselage. When this is done the overall width is only 9 ft. so that the machine may thus be easily stored or transported. Hinged inspection doors are fitted on each wing allowing the levers and control cables to be easily inspected.

Steel Tail Unit and Original Undercarriage

Owing to its small dimensions the tail is built entirely of steel. The spars and edges are of steel tube and the ribs of pressed sheet steel suitably lightened. The tail plane is triangular in shape, with the apex forward. It hinges on the fuselage transom to provide tail plane angles. The elevators extend across the whole span of the fixed tail. After disconnecting the operating rods it is only necessary to unscrew two set screws to remove the elevators.

A distinctive and original feature of the machine is the undercarriage. The legs look something like two Pogo sticks and contain compression rubber blocks which are used with a double acting oleo cylinder. Springing is thus obtained from the combined deflection of the tyres, axle, and shock absorber legs.

The tail skid is a straight piece of cane of circular section, fitted with a shoe at its lower end and fixed to the fuselage top member fitting.

The Engine Mounting

The engine mounting is an entirely separate unit from the fuselage, allowing different types of engines to be used. Made of tubular steel with swaged rod cross bracing, it has been specially designed to withstand the shock of persistent misfiring.

Various types of engines may be fitted to the "Pixie" including the 1070 c.c. flat-twin Bristol Cherub, direct drive or geared; the Anzani inverted V twin; the 3 cyl. Radial Blackburne or the A.B.C. engine.

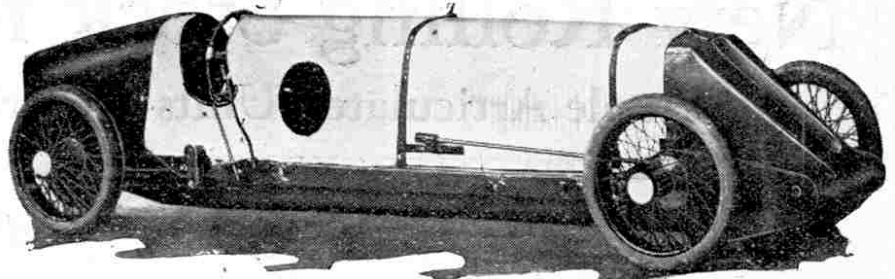
A five-gallon petrol tank is provided and this is fitted with a petrol level indicator, whilst the oil tank holds three quarters of a gallon. The engines are oiled by mechanically-driven pumps.

Convertible to Biplane

The machine is readily converted to a biplane for the use of beginners by the addition of top planes and interplane struts. All "Pixie" machines are very easily handled by means of only a finger and thumb on the joystick, and it is claimed that the machine will fly hands off in all but really bad weather.

The machine can climb to 4,000 ft. in 15 minutes and has been "stunted" quite a lot. She loops, rolls, and spins very well.

It will be seen that the Parnall Pixie III. is thus an ideal machine for the use of light plane clubs.

NEXT MONTH:—**DE HAVILAND "MOTH."****Another Racing Car in Meccano**

By the courtesy of the Editor of "The Autocar" we are able to reproduce the above illustration of a clever model of a racing car, which is made chiefly of Meccano parts. The constructor of the model is Mr. D. M. Dent, who states that as yet no engine has been fitted although the small electric motor has run the car very successfully.

The drive is taken through a plate clutch to a three-speed and reverse constant-mesh gear-box, fitted with gate-change, thence by a universally-jointed propeller-shaft to a differentialless back

axle. The brakes are of an external contracting type working on a servo principle, and operated by cable through a compensating gear by the hand lever. The steering drop lever is placed in a horizontal position, thus giving the steering column a pronounced rake.

The main body and fairings are made of thin gauge sheet zinc, while the tail is hammered out of sheet copper. The tail, chassis, undershield, and cowl are painted bright green, while the bonnet and scuttle are white. The wheelbase is 26 in. and track 10 in.

Swiss, French and English Railways Compared—(cont. from page 325)

only 2 in. The tunnel, which was not actually ready for traffic until early in 1882, cost £2,300,000.

The Simplon Tunnel

The cutting of the Simplon Tunnel was a bigger undertaking than that of the St. Gothard, but the lessons learned in constructing the latter tunnel enabled the engineers to adopt various improvements in order to render the work easier.

During the construction of the St. Gothard Tunnel no less than 800 of the workmen died, mainly through the lack of proper ventilation and means of keeping down dust. In the Simplon Tunnel the ventilation arrangements were all that could be desired—in fact we are told that the current of air was strong enough to blow a man's hat off! The clouds of dust that arose after the firing of each of the blasting charges were laid by opening a valve immediately after each discharge, and thus allowing five jets of water to play upon the splintered rock. The great improvement effected by these means may be judged from the fact that, during the whole period of construction, only 60 lives were lost from all causes.

Triumph of the Engineers

Work on the Simplon Tunnel was commenced in November 1898. For some time all went well, but in 1901 the workmen cutting from the Italian side reached a very soft stratum in which the rock appeared to be alive. The movement, of course, was caused by the enormous pressure imposed by the weight of the mountain above. The strongest baulks of wood were crushed like matchwood and solid iron supports were bent in all directions and finally collapsed. As a last resource the space between the beams was filled with quick-setting concrete, which withstood the strain sufficiently long to enable a thick masonry lining to be built strong enough to resist all pressure.

Another and even more serious trouble was encountered by the Swiss workers. While the Italians were being delayed on account of rock pressure, the Swiss workers

got well ahead and reached the centre point first. They then decided to drive galleries down-hill in order to meet the Italian party, but unfortunately they encountered springs of extremely hot water, which ultimately compelled them to abandon the work after erecting heavy iron doors to keep back the water.

By this time the Italian engineers had overcome their own particular difficulties and were pushing on, and shortly they too met the hot springs that had held up the Swiss. In spite of all efforts to keep the temperature within reasonable limits by mixing cold water with the hot streams, work in the main tunnel was impossible. The engineers were far from beaten, however, and by means of gallery and cross-cut they were able to circumvent the springs and push on with the work. Finally on 24th February 1905, the last section of rock was pierced.

Accuracy of Cutting

The remarkable accuracy with which the cutting of the Simplon Tunnel was carried out is shown by the fact that in the total length of over 12 miles the headings were out of alignment only 8 in. laterally and 3½ in. vertically, while the estimate of the total length of the tunnel was only 31 in. less than the actual length. The tunnel cost £3,000,000 or about £150 per yard.

It is interesting to note that the Simplon Tunnel was opened almost exactly 100 years after the completion of Napoleon's military road over the Simplon Pass.

Circular tunnels are also frequent on the lines through the Alps. The Gothard line has seven of these tunnels, and the Albula line of the Rhaetian Railway has five between Bergun and Preda, a distance of only about eight miles.

Bridges and viaducts in Switzerland are generally graceful and imposing and cross valleys and gorges at a dizzy height. The Wiesen viaduct, for instance, on the Rhaetian Railway, is 288 ft. in height and 688 ft. in length, and it crosses the Albula river by a single centre span 180 ft. in width. On the Swiss Federal Railways the Grandfey bridge near Fribourg is 250 ft. in height and 1,252 ft. in length.

(To be continued)



FROM OUR READERS

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs

or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for this page are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

The Prince of Wales' Train, S.A.R.

A Saloon of special design has recently been constructed in the Pretoria Railway Workshops for the use of the Governor-General. This magnificent carriage was placed at the disposal of H.R.H. the Prince of Wales during his tour of the Union of South Africa.

In addition to the Royal saloon is another special carriage fitted up for the use of the Prince's staff, the two together forming a single unit unsurpassed for luxurious furnishings.

The Royal Saloon, entered by moveable steps, includes a lounge, replete with settee, easy chairs and tables, and fitted with electric fans, telephone, and communication-bells. The windows have either blinds or curtains, and the floor is laid with brown cork linoleum with carpet on top, and all fittings are gold plated. Passing through the lounge one enters the study, equipped with writing-desk, book-case, etc.; the metal fittings being of oxidised bronze. The bedroom and bathroom come next in order, and are furnished with great taste and thoroughness of detail, while the remaining apartment of the Royal Saloon is a boxroom fitted with sleeping bunk for a valet.

Coach "B" consists of four staterooms, entered through doorways leading off the corridor and fitted throughout with bunks, folding washbasins, wardrobes, mirrors, chairs, tables, and carpet. As in the Royal carriage, electrical fittings include ceiling fans, telephone, and bells, while the finish is white enamel and metal fittings are bronze with brass relief. There is a well-fitted bathroom, and beyond that the stoveroom with a "Duplex" boiler and all necessary apparatus for supplying hot and cold water to both carriages.

The train took six months to complete and is claimed to be the finest of its kind in the world. The exterior lines are somewhat in uniformity with S.A.R. standard main line coaches, and it is finished with cream enamel paint with the Royal coat-of-arms affixed to the body sides.

When it is remembered that the standard gauge of the S.A.R. is only 3 ft. 6 in., the triumph of the designers and builders of these splendid carriages will be more readily appreciated.

The two coaches are carried on three bogies, being thus somewhat similar to the latest articulated trains of the L.N.E.R.

The carriages were exhibited at Pretoria Station for an afternoon and evening and six thousand five hundred people inspected them.

ALLAN WATSON (Pretoria).

Carnival at Trinidad

The two carnival days at Trinidad, the 23rd and 24th of February, provide the merriest time of the whole year. During these days the inhabitants of this beautiful island enjoy themselves to their utmost. From early morning until late at night the streets are patrolled by innumerable bands of merry-makers, who seem quite indifferent to the scorching heat of the sun even at midday.

pence, which the "doctor" gladly accepts and departs to seek out other victims.

So the carnival goes on, the fun becoming more and more hilarious, until the evening of the second day arrives and the masqueraders, utterly worn out, go home to rest their weary bones.

RALPH GARCIA,
(San Juan, Trinidad, B.W.I.)

Running Your Own Magazine

Some time ago the Editor of the "M.M." published particulars of a successful little journal written and published by a Meccano boy. There is a saying that "what one man can do another can accomplish," and this applies just as much to the efforts of boys as to the work of older people. At any rate, even if we cannot achieve large circulations for the magazines we produce, we can obtain a great deal of fun and instruction from them.

Amateur magazines may not always be successful, but they can at least be made interesting to the casual person who takes them up out of curiosity, and certainly they are interesting to those who publish them. The production of a magazine particularly appeals to those who belong to a Meccano Club. The Club comprises a group of boys having similar interests and ambitions, and here is an editorial staff in embryo. The suggestion of a Club magazine is almost always welcomed with enthusiasm, and then the first step is to appoint an editor.

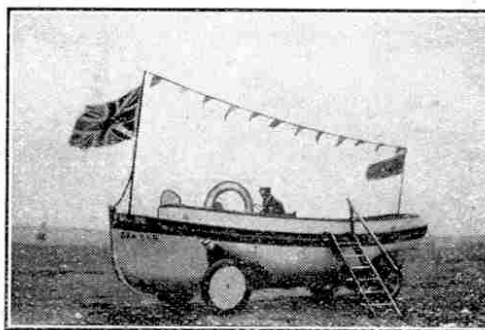
In making the choice it is well to remember that the best writer does not always make the best editor. Whoever occupies the editorial chair must have a sense of leadership, and must also have good judgment and a considerable amount of commonsense.

One of the first important points to be decided is the method by which the magazine is to be produced, that is to say whether the copies are to be duplicated or hand-written. The majority of amateur magazines are duplicated. There is no difficulty about this, for there are several cheap duplicators to be bought, and good results can be obtained from them with very little practice. The "make-up" of the paper, the type of articles to be published and the features to be undertaken by special contributors are all matters requiring careful thought, and it is here that the editor has an opportunity of proving his ability.

Last of all comes the subscription list. It is necessary to sound all friends and tell them of the magazine—or better still publish a number of specimen copies to show them—and ask them to become regular subscribers. Unless it is desired to keep the paper for private circulation only, it will be necessary to have a small advertising department.

FRED WALKER (Sankey, nr. Warrington).

A Mechanical Amphibian



A seaside novelty—the "Sea-Car"—A motor car that runs on land and equally well in the sea as a motor boat. Photo by a reader of the "M.M.," T. Bennett, of Middlesbro'.

From a suitable point of view such as a high balcony one sees bands of "dragons"—men wearing masks horrible enough to terrify any child—performing hair-raising stunts. Then there are bands of weird-looking "Indians," red, blue, black and even white! These Indians provide plenty of excitement, for whenever two different tribes meet a realistic fight ensues. In the distance may be seen a band of "robbers" "plundering" a spectator in the most business-like manner, and presently round a corner there comes a band of "devils" who perform the most unearthly antics that it is possible to imagine.

Lurking among the crowd are all kinds of curious individuals who style themselves "doctors," "nurses," "tailors," etc. The "doctor" wears a moth-eaten coat and a pair of alarmingly baggy trousers, and carries an old handbag which contains his instruments. Selecting what he considers to be a suitable individual in the crowd, he goes up to him, produces some instrument from his bag, examines his "patient" and in solemn tones pronounces him consumptive or afflicted with some other terrible disease, and thereupon demands £2 as his fee! The "patient" probably tries to dodge, but finally offers to surrender two-

G.W.R. and L.N.E.R. Loco Trials

Some Interesting Facts about the Recent Trials

LAST month we published an illustrated article on the locomotive exchange between the London and North Eastern and the Great Western Railways. Particulars and leading dimensions of the locos concerned, together with information as to the conditions of the tests and the expresses allotted to each engine while on "foreign" rails, were also given. At the time of going to press the rival locomotives were then undergoing one week's preliminary working in the opposite company's service. It may be well, however, briefly to recall the circumstances of this very interesting event.

Particulars of the Rival Locos

Representing two distinct but most up-to-date designs of express locomotives, the Great Western "*Caerphilly Castle*" and the L.N.E.R. "*Flying Scotsman*" stood almost side to side at Wembley Exhibition last year. The latter was stated to be the most powerful loco in the kingdom and it was very natural that keen curiosity was aroused as to which of the two locos could put up the better performance.

The Great Western loco is of the 4-6-0 type, simple with 4-cylinders, comparatively moderate dimensions, but extremely high boiler pressure of 220 lbs. per sq. inch. Its rival is one of the famous L.N.E.R. Pacifics, the wheel arrangement of this type of loco being 4-6-2. It also has three simple cylinders taking steam at the very moderate pressure of 180 lbs. per sq. inch.

In the matter of boiler dimensions and heating surface, the Pacific is much the larger machine, however, for her boiler is 28½ ft. in length with 2,930 sq. ft. of heating service, against 25 ft. length and 2,050 sq. ft. of heating surface.

The respective weights are, Pacific 149 tons, and Castle 120 tons, both including tenders.

The Trials Commence

For the purpose of the trials, the L.N.E.R. Pacific 4474 worked important G.W.R. expresses including

the celebrated "*Cornish Riviera*" and was paired for alternate working with the home company's loco 4074 "*Caldicott Castle*." On the L.N.E.R. (the old Great Northern) main line, Great Western loco 4079 "*Pendennis Castle*" was set to work fast and heavy trains, including the "*Flying Scotsman*," as far as Doncaster, her stable companion being the L.N.E. "*Pacific*" No. 4475. After a week's preliminary running of the locos over

the new ground, the actual trials commenced on Monday, 27th April and continued throughout the week.

To the general public the trials were simply a relative test of strength and speed between the rivals but to the engineer it was apparent that such magnificent machines would be capable of performing any task likely to be set them. For one thing, the value of the trials lay in the matter of relative coal and water consumption. As it was



Photo courtesy]

[G.W. Rly. Magazine

The G.W. loco "*Pendennis Castle*" leaving King's Cross with the L.N.E.R. train

the business of the drivers to run to schedule times as closely as possible, there is in many quarters an erroneous idea that the result of the contest taken all round was a draw!

Early Breakdowns

Through the courtesy of the Great Western Railway we are able to give extracts from the detailed official notes made by expert observers who rode behind the respective engines undergoing trial. Unfortunately the corresponding official statements from L.N.E.R. headquarters are not yet available.

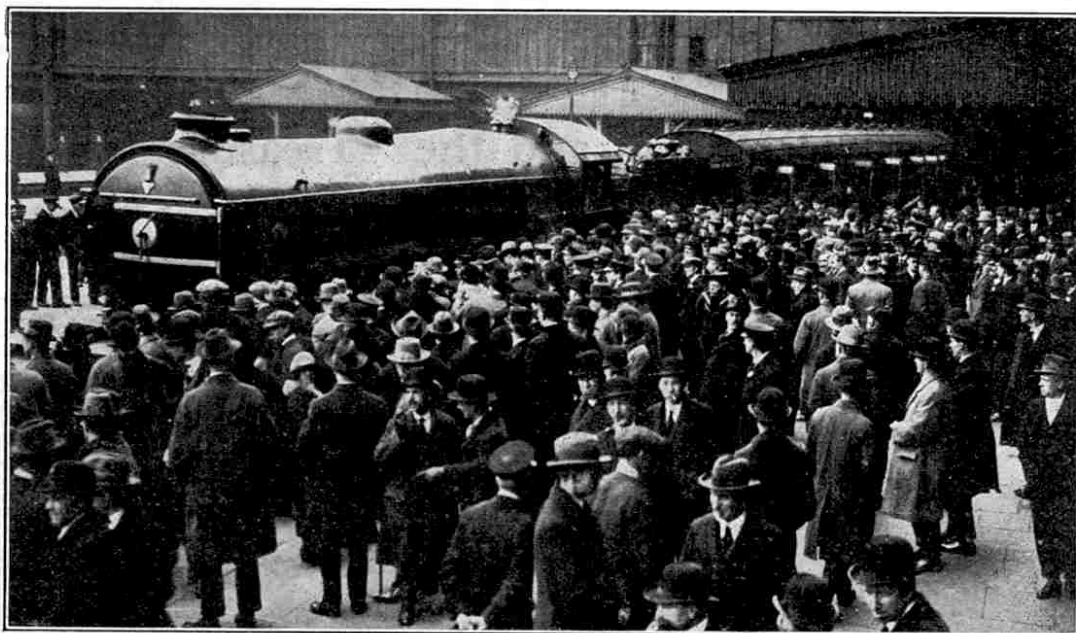
On the L.N.E.R. "*Pendennis Castle*" worked the following trains:—

	M. Ch.	
10.10 a.m. King's Cross to Grantham	} 210 72	{ Mon., Wed., Fri., April 27, 29, and May 1.
3.7 p.m. Grantham to King's Cross.		
1.30 p.m. King's Cross to Doncaster.	} 311 74	{ Tues., Thurs., and Sat., April 28, 30, and May 2.
6.21 p.m. Doncaster to King's Cross.		

"*Pendennis Castle*" put up some very fine per-

The L.N.E.R. loco at Paddington before commencing its First Preliminary Run on the Great Western Railway

[Photo courtesy G.W.Rly. Magazine]



performances on the L.N.E.R. expresses and on the first day arrived at King's Cross 1 minute early. Unfortunately her Pacific rival broke down owing to an axle running hot, so the first day's test was not counted.

On the second day, despite delays totalling 10 mins. between Peterborough and King's Cross, the arrival was only 1 min. late, showing a clear 9 mins. made up by the loco. The L.N.E.R. contestant on this day was temporarily No. 2545, but on the down run her steam sanding apparatus failed and she lost 16¼ mins., while on the up journey King's Cross was reached 5¼ mins. late.

The Final Day's Run

On Wednesday, 29th April, No. 4475 resumed and on the down journey reached Doncaster 1 min. early, but on the return to London was 17½ mins. late owing to a 15½ mins. late start from Doncaster. A bad side wind affected the running of both locos, and "*Pendennis Castle*" gained only 1 minute on the down journey and on the up trip was 1½ mins. before time.

On Thursday both locos gained 1 min. on the up journey, and in the opposite direction the G.W.R. loco gained 1 minute and the L.N.E.R. loco lost 1¼ mins.

On Friday the Castle reached King's Cross 4 mins. early despite being 1 minute behind at Stoke Summit, while No. 4475 was in ¼ min. early after being 1½ mins. late at the same point.

The final day's running found "*Pendennis Castle*" at King's Cross 2½ mins. before time, while No. 4475, after being 4 mins. behind time starting from Grantham lost a further minute and was 5 mins. late at the terminus.

Splendid Running of the Rival Locos

The chief feature of the trial runs on the Great Western main line was the wonderful running of the "*Caldicott Castle*." Despite a serious slack owing to bridge repairs which made both the G.W. and the L.N.E. engine late through Brent on all runs, No. 4074 arrived at Paddington on her three up journeys 14½ mins., 4 mins. and 7 mins. (after starting from Exeter 1 min. late) before booked time. On the down runs of the

other three days, the arrivals at Plymouth were 5, 3, and 15 mins. early respectively. In the case of the last-mentioned trips, the average weight of the trains was 495 tons.

The L.N.E.R. Pacific No. 4474 also put up a splendid record. Her arrivals at Paddington on the up expresses were 1 min., 2 min. and ½ min. early and in the other direction two runs were strictly to schedule. On the remaining run Plymouth was reached ½ min. early.

It will thus be seen that on the L.N.E.R. the Castle was consistently better than the Pacific which was running against it on alternate days. On the G.W.R. the 4-6-2 loco did splendid work in regard to time-keeping and consistent running, which performance must not be minimised by the brilliance of the work of the "*Caldicott Castle*."

Curves Cause Disadvantage to Giant Pacific

The L.N.E.R. engineers assert that their loco, of greater length and wheel base, was at a great disadvantage on the curve-infested line west of Plymouth, and had to gain time in hand on the long uphill sections.

Other interesting claims made in connection with the running of the rival locos may be briefly mentioned.

"*Pendennis Castle*" made a practice of negotiating the awkward start up the hill from King's Cross without fuss or slipping, and achieved really wonderful times out to Finsbury Park—records never excelled nor equalled by Great Northern-type Atlantics or Pacifics. On the last day of the test week, while travelling eastward the Pacific ran over Dainton Summit at a minimum speed of 31½ m.p.h. with 310 tons, establishing a record for the Great Western main line.

The Castles More Economical

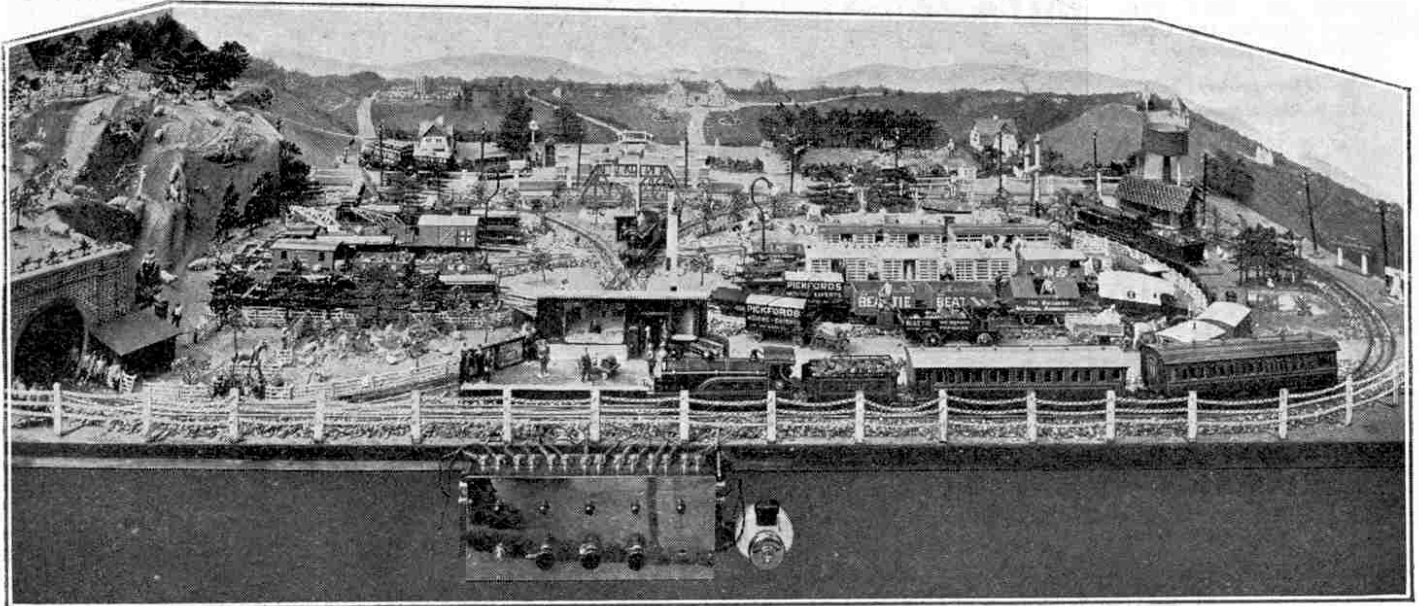
Taking into account the coal consumption, the results show that the G.W. design is more economical with both Welsh coal, as used on its own line, or the Yorkshire coal of the L.N.E.R. The average consumption of the G.W. loco for the trips on the G.W. line was 6 lb. of coal per mile less, and on the L.N.E.R. trips 3.7 lb. per mile less than that consumed by the corresponding L.N.E.R. loco.

(Continued on page 360)

New Wonders of Wembley

Model Railways and the "Treasure Island" Pirates

By a Meccano Boy



Messrs. Pickford's Ltd. fine display model, representing "Modern Transport," in which Hornby Trains and Accessories are used.

"MIND the train please!"

Two gaudily-dressed pirates, one of whom had pronounced the warning, confronted me. I jumped perceptibly, I fear, for pirates are quite new to me. When they grinned, as they did when they saw me jump, however, their ferocious appearance lessened somewhat, possibly because they perceived that I had not attempted to evade paying my sixpence entrance fee! Feeling reassured therefore, I passed between them and entered Treasure Island—giving due heed to their warning, nevertheless.

I had heard of the miniature railway running round the island, and wondered whether the pirates were afraid that I might step upon it accidentally, unless they cautioned me. I soon saw, however, that there was no fear of that. I was standing at a "level-crossing," and just then there came into view "Alice"—a powerful little 0-4-4 Tank Loco.

Shades of the Buccaneers

Puffing and hissing with almost as much fuss as her grown-up sisters on our big railways make, "Alice" rattled past, pulling a load of twenty passengers as easily as a Hornby Loco hauls its train of Pullman cars. As I watched her disappear into the depths of the "Rockies," I determined to discover her terminus and have a ride in the train if possible. Glancing round, I noticed a sign

"This way to Banff Station"

and crossing a bridge as directed, I was soon on Treasure Island proper. Here were more pirates, besides famous per-

sonages from all the best books. I looked eagerly for Long John Silver, Captain Hook, and the rest of Robert Louis Stevenson's immortal characters, and although I was unable to find them all, I feel sure they must have been there.

Anxious to obtain another glimpse of the railway, I passed round the miniature mountain—with its alluring caves and strange inhabitants—without waiting to discover if there really was any treasure buried there, and so regained the "mainland" by way of a little footbridge.

A Busy Spot

A real seaside scene stretches all round the "coast," opposite the island. The beach, consisting of the "Golden Sands from Mablethorpe," was covered with a small army of happy castle-builders, while here and there some tired but contented "Wemblers" were resting from their rapid travels round India, Hong-Kong, Canada, and all the other parts of our vast Empire.

As I carefully threaded my way along the beach and between innumerable sandy structures there arose from all sides the sounds of strenuous labour. *Thwack! plop!! thump!!!* came from a hundred spades, as one after another, castles and houses of all descriptions were miraculously beaten out of the sand.

Although every available inch of the beach was more or less occupied, everybody seemed quite happy. A deeply-engrossed castle-builder on my right stepped back to admire his handiwork, to the utter ruin, I am sorry to say, of his neighbour's gorgeous chateau of sand. A toiler a few paces away delivered such

a resounding blow that his spade, rebounding, swept away the towers and battlements of yet another feudal Manor. True, there was a slight argument and a few loud cries, but everyone soon returned to the business of construction, only to repeat the whole cycle of operations. Surely Wembley's "Treasure Island" is a veritable children's paradise!

Through the "Rockies"

Having safely negotiated this wondrous beach, I arrived at the railway, which I now found to be the "Canadian Pacific." I forbore to enquire how Banff Station came to be situated on the C.P.R., or why a L.N.E.R. Atlantic tender engine constituted an important part of its locomotive rolling-stock. However, there it was, with all the appropriate scenery. Taking my place in the queue outside the station, I soon gained access to the platform, and had scarcely taken my seat in one of the coaches of the train before "Alice" started off on her circuitous route with a shriek of her tiny whistle.

It appeared to me that the railway was even more popular with the grown-ups than it was with the children, for the majority of the passengers were fathers and mothers who seemed to be taking a brief respite while the youngsters indulged in the far more serious and energetic work of delving in the Golden Sands! This is not surprising, for the "Treasure Island" railway is one of the finest examples of miniature engineering that I have ever seen, and I noticed more than one solemn City man deep in a discussion as to the rival merits of the two locomotives.

Past the engine-sheds and station

sidings we flew behind "Alice;" past the coaling yard, over level-crossings and through cuttings. As we rattled along, to the admiration of a large crowd of onlookers, I caught sight of the pirates' old wooden sailing-ship anchored off the island. Then quite suddenly we plunged through a tunnel in the heart of the Rocky Mountains, and on emerging found ourselves at the end of our amazing trip, for we were back at Banff Station!

A Fine Railway Exhibit

This experience reminded me that I had not yet seen the locomotives exhibited in the Palace of Housing and Transport, and reluctantly leaving Treasure Island, I directed my steps to that building.

It was with slightly downcast feelings, perhaps, that I once again entered the portals of what used to be the Palace of Engineering. How many Meccano boys (I wondered), would find the inspection of model houses, ideal homes, furniture, or the latest in luxurious cooking devices, as fascinating as studying turbines, motors, generators, radio apparatus, guns, armaments, and all the other wonderful engineering exhibits of last year. Once within, however, I soon found that there was a great deal to be seen in the Transport Section which occupied quite a large proportion of the available space.

A little crowd had collected round one of the exhibits. On making my way to this, I found the object of interest to be a realistic working model railway—a very elaborate affair. It included two stations, "up" and "down" main lines, and a complicated network of sidings. The whole was controlled by a perfect system of signalling, accurately modelled from present-day railway practice, and some very fine demonstrations were given at frequent intervals during the day.

All the signals, points, crossings, etc., were controlled from levers in miniature signal-boxes, and the trains, which were operated by electricity, moved quite slowly so that it was possible to follow every detail in the signalling while they were in motion. I spent some considerable time at the exhibit, and could not help noticing the large amount of skill necessary to control correctly this model railway; it certainly gives one a very good impression of the tremendous amount of work and ingenuity that must be called into play before a train can traverse even a mile of track.

Whenever I travel by rail, I am now able to imagine the hundred-and-one

devices that are in constant operation just ahead, as the telegraph flashes the movements of our train from signal-box to signal-box. Only the precision and accuracy of the apparatus enables us to travel for mile after mile at tremendous speed and with perfect safety.

engines, together with a very fine Pullman car.

Veteran Locos to Arrive Shortly

Amongst some famous old railway relics that I found were the 0-4-0 Bury tender engine, "Copper Nob"—so named from its dome-like firebox top; the Canterbury and Whitstable Railway's loco "Invicta," and several examples of early permanent way, signals, etc.

A splendid 1,200 horse-power electric loco is exhibited by the Metropolitan Railway and the close-up view of this latest type of locomotive enables the interior arrangements to be easily examined, for the panels on one side have been completely removed.

Hornby Trains at Wembley

I learnt, by the way, that on the conclusion of the Railway Centenary celebrations at Darlington, which are taking place on the 2nd and 3rd July, some of the "relics" will be brought down to Wembley to complete the Centenary exhibit

there. Amongst the locos to be transferred are Stephenson's "Locomotion No. 1" and, I believe, Hedley's "Puffing Billy."

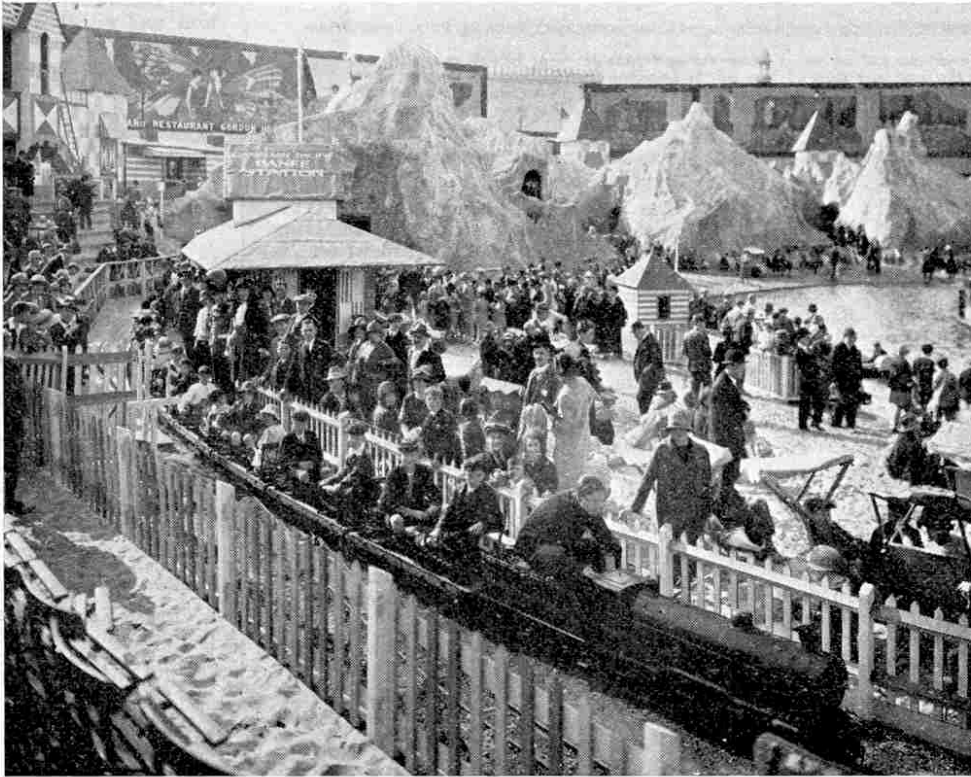
Included in the Transport Section, and situated not far from the "Flying Scotsman," is a very interesting stand belonging to Messrs. Pickfords Ltd., the well-known carriers. A special display, which takes the form of a splendid model of present-day methods of transport, is of special interest, in view of the fact that Hornby Trains and Accessories have been used to a considerable extent in its construction.

No less than five No. 1 and three No. 2 Hornby locos are used in addition to wagons, trucks, a Hornby Viaduct and Water Tank, and numerous other accessories. Amongst the various methods of conveyance represented, in addition to railways, is a realistic little model of one of Messrs. Pickford's heavy motor lorries, complete with trailer, as well as one of their horse-drawn vehicles; also a steam traction-engine and a very smart limousine.

Bird's-Nest Soup, Crocodiles, and Frogs

Needless to say, I spent many hours in all the other parts of this great Empire Exhibition. There were a number of additions and improvements over last year, and it seemed that every pavilion and kiosk, every country or firm exhibiting, had exerted their utmost efforts to better or eclipse their display of 1924. The Indian, Canadian, and Australian buildings I can only describe as gorgeous;

(Continued on page 363)



"Peter Pan," the Atlantic loco of the Treasure Island Railway, with a load of happy young "Wemblers."

Two famous locos, which must be familiar—if only by name—to every Meccano boy, are included amongst the railway exhibits. They are the "Flying Scotsman" and the "Pendennis Castle" belonging, of course, to the London & North Eastern and Great Western Railways respectively. These two locos commanded no little attention from the sight-seers, in view of the fame that they achieved during the recent locomotive trials, as described in last month's "M.M." [See also page 350 of this issue—EDITOR.]

The rival locos are in spotless condition, and certainly do not show any sign of the exhausting tests to which they have been subjected. The "Scotsman" is jacked an inch or so from the rails so that the wheels may be rotated by means of an electric motor placed beneath the loco. As I watched the 6 ft. 8 in. driving wheels slowly revolving with their massive connecting links and piston rods, a sense of extraordinary power seemed to radiate from this superb piece of machinery. Standing alongside the iron giant, one feels quite dwarfed, for a much better idea of its size is obtained from this position than from the more usual viewpoint of a raised platform.

The L.M.S. Railway's exhibit includes one of that Company's latest "Baltic" tank locos, which type of loco was described in the April issue of the "M.M." On the Southern Railway's stand I saw one of their "810" class 2-6-0 tender

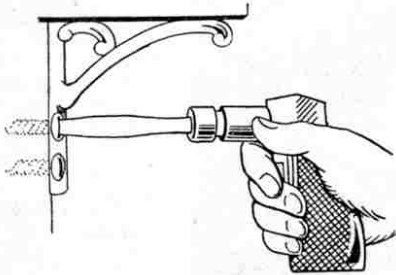
OUR BUSY INVENTORS

RECENT INTERESTING PATENTS

Every day new inventions and ingenious labour-saving devices are being brought into existence. From time to time the most interesting of these will be described and illustrated in these columns. Readers are invited to send particulars (accompanied if possible with photos, sketches, or cuttings) of any interesting inventions or devices that may come to their notice. Payment at our usual rates will be made for any contributions used.

Screwdriver "Pistol"

The great advantage of the screwdriver illustrated below is that the pistol-shaped butt permits a very much firmer grip than



the ordinary form of handle. In consequence, even the most obstinate screws may be driven into place with ease. Different-sized blades may also be fitted into the butt as desired.

Power from the Wind

A machine called the "Aerodynamo" has recently been invented in Germany for developing power from the wind. If the tests now being carried out prove satisfactory, it will be possible to use electricity in many places where there is at present no other power supply. The machine is really a dynamo mounted on a concrete mast and wind-driven by means of a four-bladed propeller geared directly to it. The current generated by the dynamo is led to a storage battery for use when there is little or no wind. The generator and gearing are enclosed in a stream-lined hood, to protect them from the weather.

From tip to tip, the propeller measures 28 ft. and is designed to run at a normal speed of 1,200 r.p.m. The blades of the propeller are fitted with an ingenious arrangement of brakes by means of which the speed of the propeller is controlled. At normal speeds these lie flat against the blades but should too high a speed be obtained, they are flung out by centrifugal force so that they offer a direct resistance to the wind. The propeller is thus prevented from revolving at an excessive speed. Another brake is provided on the propeller shaft to enable the machine to be stopped altogether if necessary.

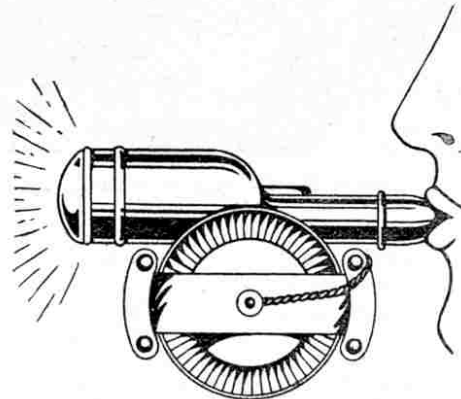
Radio Types from Plane

Experts of the Navy Department, experimenting at Anacostia Naval Air Station, Washington, D.C. recently succeeded in transmitting by radio, typewriting from an aeroplane in the clouds. The aeroplane typewriter controlled the keyboard of a receiver on the ground many miles distant and the typewritten characters were repeated as the keys were struck in the clouds.

The instrument, known as the teletype, consists of transmitting and receiving apparatus. The sending typewriter is mounted on a standard type of navy plane and in general appearance resembles the commercial typewriter. It is equipped with key-board, letters, and other conventional symbols and is operated by hand. There is little to distinguish it from an ordinary typewriter except that every key is connected to the radio transmitter, with which the ground receiver is tuned, wherein lies the secret of the whole apparatus.

Novel Lamp for Cyclists

A French inventor has recently introduced a novel electric lamp for cyclists. This is worked by blowing, the lamp being



carried in the mouth when in use. The *Lampe à Bouche*, as it is appropriately called, comprises a tiny turbo-generator that is made to revolve at 3,000 r.p.m. by blowing into the mouth-piece. The lamp gives a good light at 2.5 volts with only .05 amperes. It is provided with a special tungsten-thorium filament, the amazing fineness of which may be gathered from the fact that a yard of it only weighs 1½ milligrammes. The tiny turbo-generator runs so easily that after blowing into it the turbine will continue to revolve for a full minute, in spite of the braking effect caused by the production of current.

The one disadvantage about this unique lamp seems to be the blowing part, as most cyclists find they require all their breath for pedalling! The makers distinctly state, however, that the exercise has a very beneficial effect upon the lungs!

Mechanical Guide to London

An electrically-illuminated guide to London, similar to one now in use in Los Angeles, California, is to be erected as an experiment, in the tramway shelter near Waterloo Bridge. All that is necessary to find one's destination is to turn an

indicator to the name of the place required and press a button, when the place is shown by means of illumination on the map, together with the nearest route to it. The number of the appropriate tram route will also be shown.

On pressing a button, an alternative machine of the same type will illuminate several alternative routes to one's destination, and will thus show the various means of getting there.

Instead of having a pointer and one button the machine in Los Angeles has a different button for each place, the names of which are arranged in alphabetical order in columns down each side of the map.

Automatic Pliers

A wrench recently invented automatically locks its grip after securing a hold. The device consists of a combination of pliers



and a ratchet arm attached to one handle that engages the lower side of the opposing jaw. To free the mechanism, the clamping device is pushed aside and the jaw is able to adjust itself to any "nip" within the range of the tool.

Sanitary Cover for Telephone Earpieces

Considering the number of different people who use public telephone boxes each day, it is not surprising that the ear and mouthpieces often carry infection, and with this fact in mind a sanitary cover for the earpieces has been invented. This is made of strong paraffined paper, crimped and pressed into the form of a cup so as to fit easily over the end of the earpiece. As the covers can be produced at almost negligible cost the idea would be to have a supply in each telephone box so that every subscriber could use one and then throw it away.

Cushion Grip for Motor Cyclists

A new cushion grip for motor cyclists and cyclists has just been put on the market. The grip is extremely useful, and handsome in appearance, the ends being of celluloid and the centre of rubber, grooved and shaped to give a comfortable grip. The foundation is coated inside with a special substance which only requires to be moistened and then slipped on to the handlebar to make a firm joint.

The grip is made in two sizes—for 1" and 7/8" handlebars and a cyclists' model is 1" shorter than that made for motor cyclists.

Automatic Burglar Alarm for Motor Cars

A device has recently been patented to give instant warning should the car be touched when the owner is not there. This is accomplished by means of a wheel being released by the slightest jar on the car, notches in it making an electric contact as it revolves, thus causing a series of blasts on the horn. The driver has merely to set a switch before leaving the car, and as the position of it need be known only to him, it cannot be put out of order without first touching the car.

The device may also be fitted to doorways and windows and in fact to almost anything that requires to be guarded from burglars, provided of course, that an electric current is at hand to work it.

THE ITALIAN NAVY

Three New Flotilla Leaders

THREE new flotilla leaders have been completed during the past few months for the Italian Navy. They are the "*Lion*," "*Tiger*," and "*Panther*," and these three ships, which mark an important development in naval ship-building, recently visited Liverpool. While the crews were entertained by the City authorities, visitors were allowed on board, and no doubt many of our readers who are fortunate enough to live in the district, took advantage of this opportunity to inspect the vessels. Tens of thousands of people inspected the boats during the three days they were on view.

The "Swift's" Record of 36 Knots

The new scouts are interesting because for some years past the leading navies of the world have been paying marked attention to the development of this type of vessel. This is known as the "Flotilla Leader," and these three new Italian scouts show the latest vessels of this type.

One of the first flotilla leaders was H.M.S. "*Swift*," laid down nearly 20 years ago. She was 345 ft. in length and had a displacement of 1,800 tons. Fitted with quadruple turbine engines, her speed was 36 knots. She was a famous boat in her time and became the object of considerable attention when she broke H.M.S. "*Tartar's*" record. H.M.S. "*Tartar*" built by Messrs. John I. Thornycroft and launched in 1907, broke all records by travelling at 35.67 knots, but this was subsequently beaten by H.M.S. "*Swift*" which put up a speed of 36 knots.

The flotilla leader type of boat is simply a large type of the destroyer. In later years, so far as our navy is concerned, the size of the original boats has been reduced for reasons of economy.

The French "Jaguar"

During the war Germany built a number of 2,300 ton boats of this type. They had a very high speed and were armed with four 5.9 in. guns. After the Armistice one of these vessels was allotted to France and it served as a model for the latest French flotilla leaders of the "Jaguar" class, which have been built on similar lines. They are a shade heavier, however, being of 2,359 tons and their speed is just over 35 knots and armament five 5.1 in. guns.

Four Turbines for New Scouts

Several fine boats have recently been built on the same lines for the Italian Navy, and the three now being dealt with are part of an order for five, two of which, the "*Leopard*" and "*Lynx*" are not being proceeded with. The "*Lion*," "*Tiger*" and "*Panther*" were built by Messrs. Gio. Ansaldo & Co., of Sestri Ponente. They are 359 ft. 6 in. in length, 33 ft. 6 in. in breadth, and 11 ft. 6 in. draught, and the normal displacement of each is 2,165 tons.

Each vessel is fitted with four sets of Parsons turbines, geared down and operating twin-screws. Steam is supplied by four Yarrow boilers burning oil fuel, for 400 tons of which carrying capacity is provided, although 200 tons is a normal supply. The boats have a straight stem and the forecastle deck is carried well aft.

The Armament of the Vessels

All the boats of the Italian Navy have very powerful armament in comparison with their displacements, and this practice is carried out in the case of the new

(Continued on page 361)

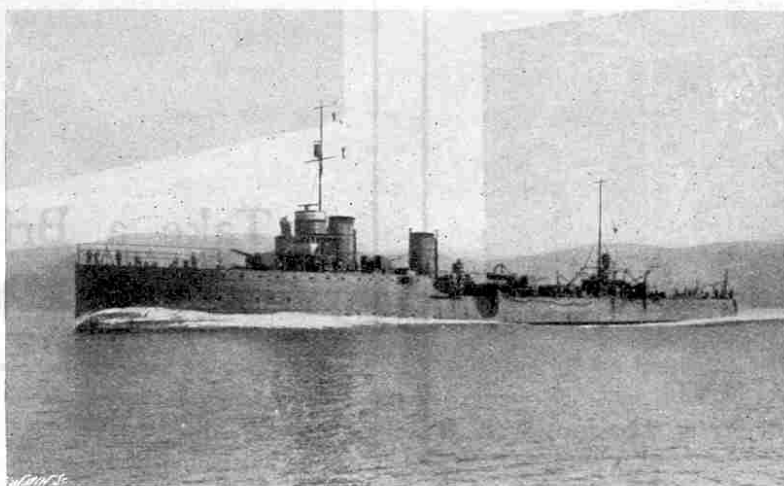


Photo courtesy]

["The Engineer"

The "Lion"

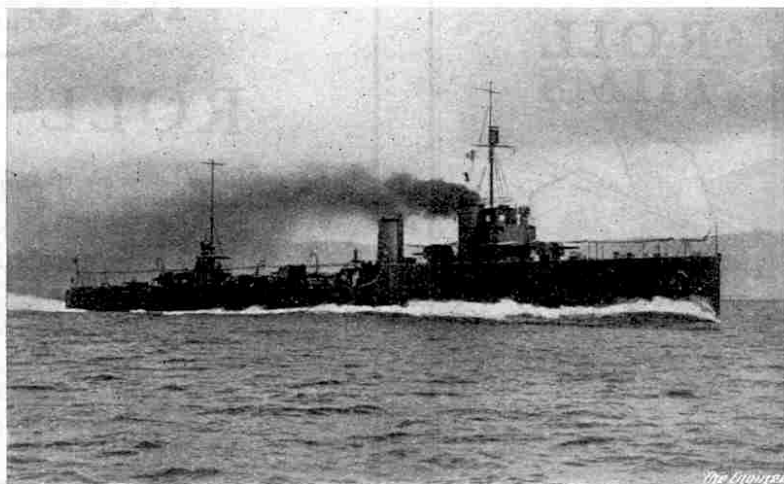


Photo courtesy]

["The Engineer"

The "Tiger"

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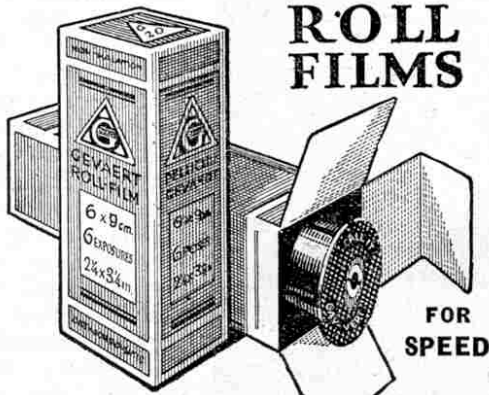
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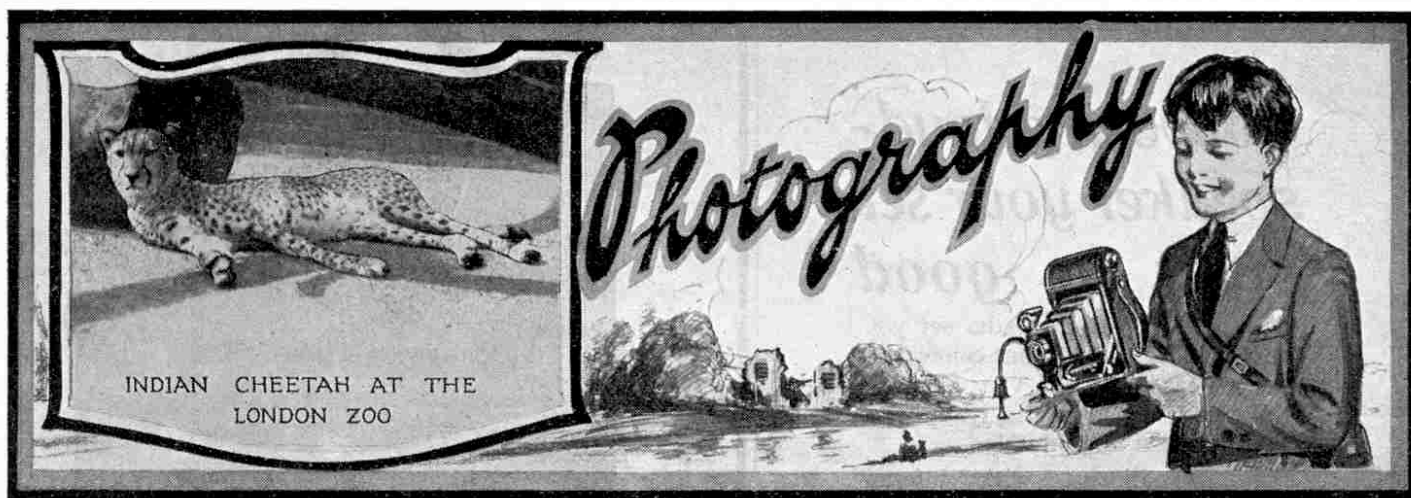
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IV. TAKING THE PHOTOGRAPH

LAST month we dealt with four important points to be considered in calculating the correct exposure of a photograph, namely, the strength of the light, the aperture of the lens, the speed of the plate or film and the nature of the subject to be photographed. We now come to the fifth and last point, the movement (if any) of the subject.

Exposures for Moving Objects

In photographing any moving object it is clear that the exposure must be brief enough to outline the movement sharply and avoid a blurred result. The permissible exposure, of course, varies greatly according to the speed of movement. For instance, an ordinary street group in which there is no rapid motion of any kind can be sharply snapped with an exposure as long as $1/5$ th of a second, whereas in order to snap a man diving from a pier into the sea we might have to cut down the exposure to $1/600$ sec., and even this brief period would be too long for a successful snapshot of a galloping horse at close quarters!

The beginner is strongly advised to experiment at first with ordinary views containing no moving objects at all, and certainly not to attempt anything beyond a snap of people or animals moving at a slow walking pace. The shutters fitted to the cheaper kinds of cameras are never marked to give a shorter exposure than $1/100$ sec., and as a matter of fact this $1/100$ is usually considerably nearer $1/25$. In order to take a snapshot of a man walking at the rate of four miles an hour, and moving obliquely towards or away from the camera, an exposure of at least $1/100$ sec. is required when using a $\frac{1}{4}$ -plate camera at a distance of 25 ft. From this example it will be seen that the amount of photography of moving objects at close quarters that can be done with a cheap camera is very limited indeed.

With better-class cameras having faster shutters the scope is enormously increased, and we shall deal in a later article with the intensely interesting problem of

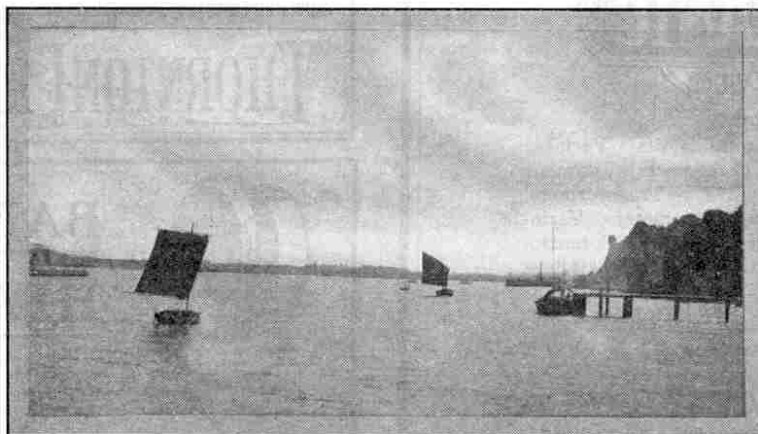
photographing such rapidly-moving objects as motor cars, trains or aeroplanes.

In the meantime we may add that, if the exposure for a certain moving object is $1/100$ sec. with a camera 25 ft. away, a similar result may be obtained by moving the camera 50 ft. away and giving $1/50$ sec. In this manner, even with a comparatively slow shutter, quite good

Methods of Focussing

Most folding cameras, however, are fitted with a "focussing scale." This is a scale marked off in distances, feet or yards, and fixed at one side of the camera base below the lens. The front of the camera in which the lens is fixed may be moved in or out by means of a rack and pinion, and when it is desired to focus upon any particular distance the controlling screw is turned until a small pointer attached to the camera front is exactly over the figure indicating the desired number of feet or yards.

There is also another type of camera in which the body of the instrument is fixed and focussing is carried out by revolving the lens, thereby causing it to travel in or out as required. The various distances are marked off on the lens mount and when any particular figure is brought opposite a certain fixed mark the camera is then focussed sharply for that distance.



Chan S. Fong, of Singapore, sent us this snap for the Tenth Photo Contest. It was awarded Second Prize (Section B).

snapshots of moving objects may be obtained. Of course the resulting photographs will be very small, but they should be sufficiently sharp to allow of considerable enlargement.

Taking the Photograph

We now come to the actual taking of the photograph, and having decided on our subject, the first matter to be considered is focussing. If the camera is of the ordinary box form type fitted with a single lens working at F.11 it will not be provided with any means of focussing. Such instruments are known as "fixed focus" cameras, and although they are perfectly successful for landscapes, they cannot be used for near objects unless what is known as a "portrait attachment" is placed in front of the lens, thus bringing objects a few feet away into sharp focus.

Using a fixed focus camera of $\frac{1}{4}$ -plate size fitted with a lens of about 5 in. focus, objects 15 ft. or more away may be regarded as being in reasonably sharp focus.

Judging Distances

It is obvious that in using either of the two foregoing types of camera the distance of the object to be photographed must be known with fair accuracy. Whenever possible this distance should be measured by pacing it out. This is not always possible, however, and therefore every opportunity should be taken of practising judging distances. This practice may be made an interesting and amusing pastime if carried out by one or two friends during a long walk, and it will be found curious how greatly people's estimates of distance vary!

Folding cameras may also be focussed by means of a ground glass screen which is placed in the position of the plate. The image of the subject as it will appear on the plate is then seen and may be sharply focussed. In order to see an image on a ground glass screen clearly, it is necessary to have some kind of shade to cut off unwanted light. With hand cameras this shade is generally provided by a short

(Continued on page 359)

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