JANUARY 1924

MECCANO MAGAZINE

PRICE 2D.
VOL. IX
NO. 1

Published in the interests of Boys

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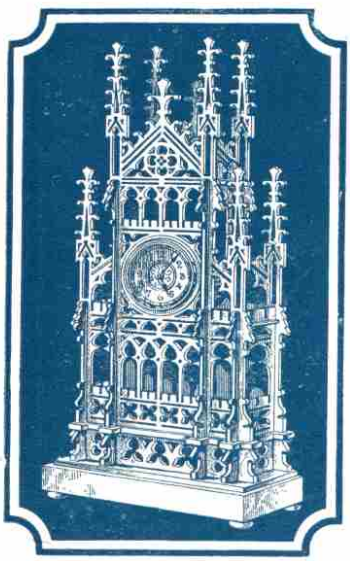

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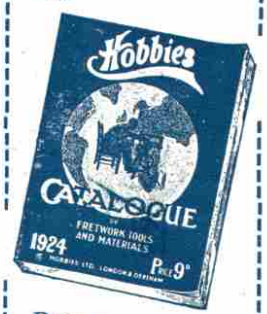

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EDITORIAL OFFICE
Binns Road,
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MECCANO MAGAZINE

PUBLISHED
IN THE INTERESTS
OF BOYS

MY first duty this month is to thank those hundreds of my readers who have sent me Christmas and New Year cards. It is very pleasing to me to receive these messages of good will, coming as they do from all classes of Meccano boys in every part of the world. Owing to the large number of greetings received, it is impossible for me to acknowledge them individually, and I hope the senders will accept this announcement as an acknowledgment. I should like to take this opportunity of wishing all my readers every good wish for the New Year—may it be for them a year of joy and fun, and a year of progress in their studies or in their work.

Good Wishes

During the past three months hundreds of Meccano boys have been disappointed! Having omitted to place a regular order for the "*M.M.*," they have relied on purchasing a copy from their dealer after publication date. To their sorrow they have found that their dealer has been "sold out." We have had hundreds of orders from dealers for extra copies after each issue has been published, but—as I have constantly explained in these columns—we print only sufficient copies of the "*M.M.*" to fill orders on our books and we have therefore been unable to supply these extra copies. I do not wish any Meccano boy to be disappointed, but the remedy is that you should place a regular order for the "*M.M.*," either with your Meccano dealer or with your local newsagent. The "*M.M.*" is now on the lists of the leading wholesalers (Messrs. W. H. Smith & Son and Messrs. Wyman, of London, Messrs. Menzies, of Glasgow, and Messrs. John Heywood, of Manchester), and your newsagent should have no difficulty in obtaining a regular copy for you from one or other of these firms. If any reader has difficulty in obtaining the "*M.M.*" he should write to me, giving full particulars, when I will take the matter up on his behalf.

Sold Out!

Our next issue will be ready on 5th February. It will contain a further instalment of the splendid article on Giant Steam Shovels, those wonderful machines that have made possible such a great engineering work as the Panama Canal, and many other great undertakings. In March I shall announce particulars of a special competition in connection with steam shovels, when a prize of £5 cash will be awarded by the builders of these giant steam shovels for the best Meccano model of their huge Dragline, a machine that will be fully described and illustrated in that issue. The February "*M.M.*" will also include the final instalment of "*A Remarkable Engineering Feat*"; details for the construction of a special body to fit the Meccano Chassis; Radio, Stamps, Puzzles, Guild News, New Patents, and many other interesting features.

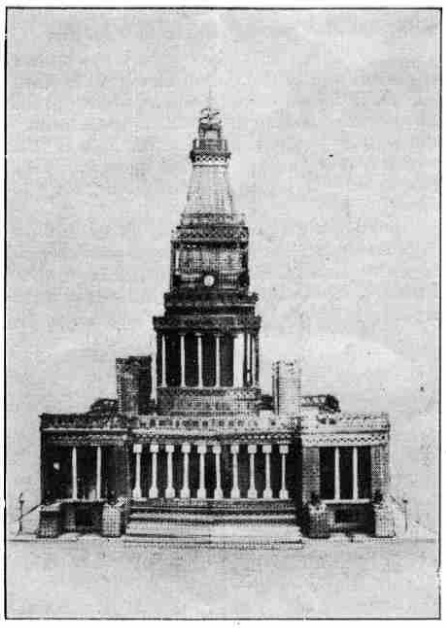
The Next "M.M."

We also hope to print the promised account of our interview with Mr. George Constantinesco, the inventor of the new Torque Converter for motor cars. It was originally intended to print this article in the present (January) issue, but owing to the illness of the inventor the article has had to be held over until next month. Mr. Constantinesco did splendid service for Britain during the war, one of his most successful inventions being the device that enables a machine gun to fire through the propeller of an aeroplane, without the bullets hitting the blades, notwithstanding the fact that the propeller is revolving at a terrific speed.

The entries for our first drawing competition are coming in well. The subject is "*The Editor of the 'M.M.' as I imagine him to be*," and, as I expected, the efforts on the part of "*M.M.*" artists are humorous, to say the least. It is quite understood, of course, that this competition is organised from a humorous point of view, and none of the entrants need fear that I shall feel upset or "put-out" at any of their caricatures of me! "Don't mind me!" I might say to you all—just let your pen, pencil, or brush depict whatever portrait your imagination suggests—the more the merrier—and don't forget that the best results will be published in the April "*M.M.*"! (Full particulars on page 12).

Our Drawing Competition

A Town Hall in Meccano



In our November issue we printed an illustration of a model of the Boston (U.S.A) Custom House, built by an American Meccano boy. Not to be outdone in this respect, an English Meccano boy has now sent a photograph of his model of the Leeds Town Hall. We are able to testify that this is a very accurate model of the building on which the design is based.

Although Meccano is generally used for building engineering structures, the above, and the model illustrated in our previous issue, are two examples showing how it may be applied to accurately reproducing buildings.

How to Obtain the "*M.M.*"

The "*Meccano Magazine*" may be ordered from your Meccano dealer, or from any newsagent or bookseller, price 2d. If you are not able to obtain the "*M.M.*" from these sources it may be obtained direct from this office, post free, six issues 1/6, 12 issues 3/–.

The next number of the "*M.M.*" will be ready on 5th February. As we print only sufficient copies to supply orders received, you should place a regular order with your dealer or newsagent, or direct with this office, to avoid disappointment.

"*Meccano Magazine*"
Binns Road, Liverpool.

GIANT STEAM SHOVELS

AMONG the many labour-saving devices available to present-day engineers, the steam-navvy (or steam-shovel as it is sometimes called), is one of the most useful. It has been said that if steam-navvies had not been invented, the Panama and the Manchester Ship Canals could never have been constructed. Whether or not this is a fact, it is certainly true that without these wonderful machines the canals could never have been completed in one-tenth the time actually taken.

Advantage of Machinery

We are better able to realise the truth of this statement when we learn that in one day a large steam-navvy moves as much material as could be excavated by over 2,000 men with picks and shovels! Just think of 2,000 men at work on a site. Imagine them wielding 2,000 picks and shovels. Think of the stoppages every few minutes to "take a breath," or to move from one point to another. Think of the dinner hour, when 2,000 baskets of food are opened and 2,000 cans of tea are made!

Then consider the mechanical equivalent—the steam-shovel that weighs, perhaps, 100 tons. It works from morning to night, with unvarying precision, and without stopping to "spit on its hands" or take a fresh grip on its spade. Fed on coal and water, it requires only three men to look after it. Working at, perhaps, four strokes to the minute, it not only digs out 6,000 yards of material in a working day, but loads it on to waiting railway wagons without as much as a grumble! When pay-day comes at the end of the week it does not ask for a "rise," nor does it threaten to go on strike!

80 Steam-Navvies equal 160,000 Men

No wonder then that contractors and engineers prefer the steam-navvy to human labour. Think for a moment of the great saving of labour in such a tremendous undertaking as the Panama Canal, in which over eighty steam-shovels were employed—*the equivalent of some 160,000 men!*

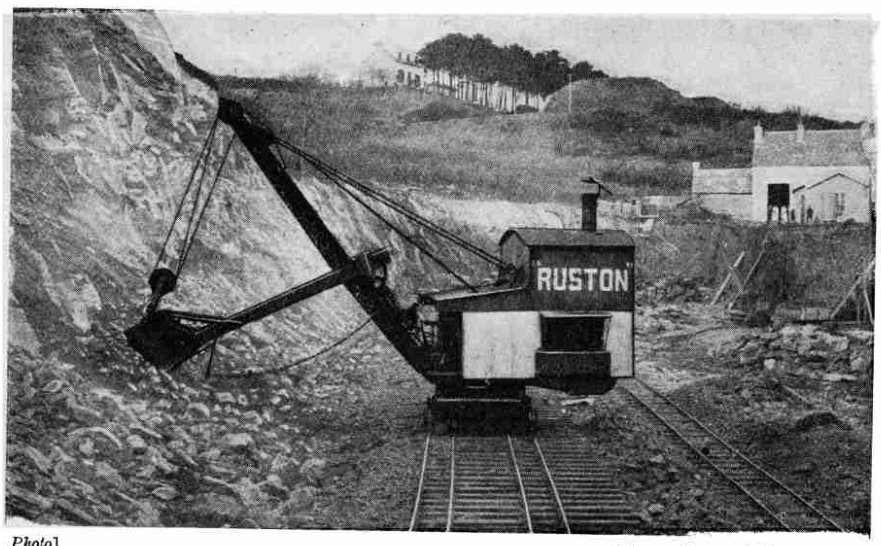
Apart altogether from the great saving in wages, it would have been impossible to have housed in that desert region of Panama, the vast army of labourers that would have been necessary had steam-navvies not been employed. Some day we hope to publish in the "*M.M.*" the wonderful story of the Panama Canal, when this and many other difficulties will be made clear.

Steam-navvies are used principally on contracts in which large quantities of earth have to be moved. This includes such works as the excavation of railway cuttings, or the construction of canals or docks. Steam-navvies are also used in open mines and quarries, and have been so employed more particularly in recent years because of labour difficulties.

Improvements in Modern Designs

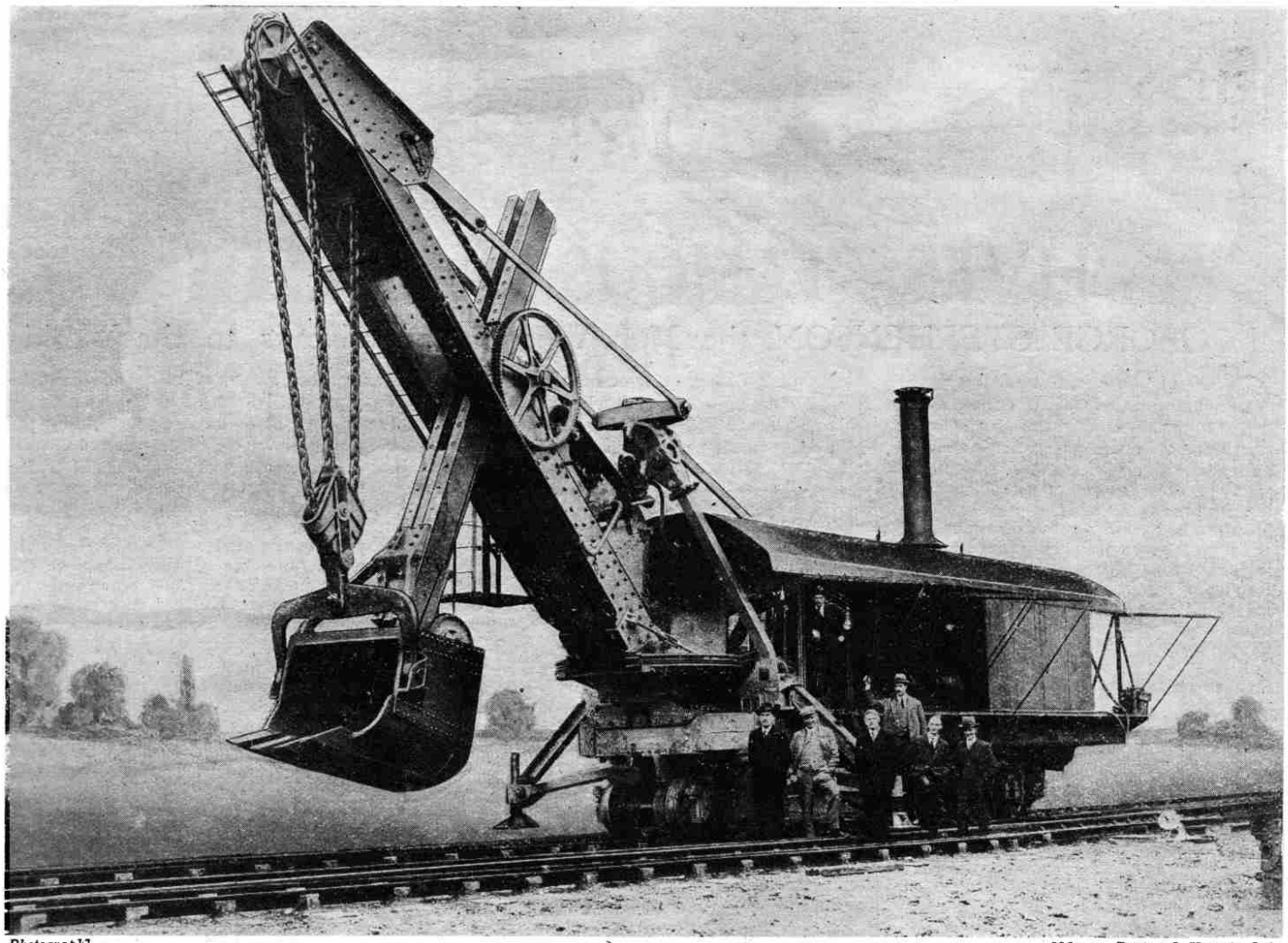
As is the case with every other machine, steam-navvies have been very considerably improved in recent years. The earliest types were only able to swing through little more than half a circle, but the more modern machines are able to complete a full circle. These machines are now made in several sizes. The size of machine employed on any particular work is governed by the output required and the nature of the material to be worked, which determines the "cutting effort" to be used. For instance, a machine weighing 4 to 6 tons is suitable for working earth or light clay. The heavier clays require machines of from 10 to 20 tons, whilst limestone and iron-ore requires machines of up to 30 tons, or more.

The output of the machine depends principally on the size of the bucket, which again is



Photo] *Messrs. Ruston & Hornsby Ltd.*

A Steam Shovel at Work in a Quarry



Photograph] *[Messrs. Ruston & Hornsby Ltd.*

This Giant Steam-Shovel forms a splendid subject for a Meccano Model

governed by the nature of the material to be excavated. A 6-ton machine is most efficient when fitted with a bucket of a capacity of about one cubic yard. The bucket of a 12-ton machine holds about twice as much, whilst a 20-ton machine will have a bucket of about 3 to 4 cubic yards capacity.

The Bucket Mechanism

The bucket is mounted at the end of a beam, known as the bucket-arm. This in turn is connected to the jib by long racks, meshing with gear wheels. The gearing is driven by a separate set of small, self-contained engines, mounted on the jib at the point where the arm joins it. This makes it possible to rack the bucket-arm in or out as desired, so as to vary the working radius.

A wire rope attached to the bucket, passes over a pulley at the top of the jib, and so to the winding drum, exactly as in the case of a crane. When the gear is thrown in, the drum winds and the bucket is pulled upwards, pivoting on the point at which the bucket-arm is fixed to the jib. The distance of the bucket from the jib is controlled by the rack and pinion motion already described.

One edge of the bucket is fitted with a cutting edge, known as the "lip," which is armed with a number of teeth. These are made of hard steel and they dig into the material to be excavated.

There are no more wonderful engineering mechanisms than the steam-navvies of the type described in this article. Next month we hope to show how these machines are controlled and to describe also a further type of steam-navvy that works in conjunction with a transporter.

In our succeeding issues we are to deal with the largest Drag-Line in the world—a veritable giant amongst machines. Messrs. Ruston & Hornsby Ltd., the makers of these giant machines, are offering a cash prize of £5 for the best model in Meccano of their giant drag-line. Full particulars of this competition will be announced in our March issue.

Constructive Details

The jib is attached to the main frame, which also carries the engine, boiler and gears for the digging and travelling motions. Here also is situated the machinery to give the slewing motion, which is usually driven direct from the main engines. In some machines, however, it is operated by a separate set of engines, which are a duplicate of those mounted on the jib. The revolving superstructure is mounted on an under-carriage and this runs on rails.

Sometimes two sets of travelling wheels are fitted, one set of standard gauge, so that the navvy may be moved on an ordinary railway track, and the other set of broad gauge, and adapted for carrying the machine on its own special track when excavating. The broad gauge track is necessary to preserve the stability of the machine when working cross-carriage.

The travelling motion is taken off the main engines, through a train of gearing connected to bevel gears at the top of the centre-post. The power is then transmitted by a vertical shaft through the centre-post, to the gearing under the main frame.

The Ruston No. 40 Steam-Navvy

The illustration on this page shows the Ruston No. 40 Steam-Navvy, which is one of three supplied to the order and under the instructions of the Crown Agents for the Colonies. These huge machines will be used on the Takoradi Harbour Contract in New Zealand. On this contract very heavy rock excavation has to be carried out, and the machines have been specially designed for the purpose. They weigh over 90 tons and are fitted with rock-loading buckets with a capacity of 3½ cubic yards. Their massive construction is clearly seen from our photograph, which we are reproducing specially large so that every detail may be clear to those of our readers who wish to construct a model of this wonderful engineering appliance in Meccano.

(To be continued)

I. GEORGE STEPHENSON, the Man Who Gave Railways to the World

ONE of the greatest of the world's engineers was George Stephenson, to whom is due the credit for the development of a practical locomotive, and also the construction of the first railway. The story of Stephenson's life is one that must appeal to all Meccano boys, for it is full of romance. It is a story of perseverance and industry that fires the imagination, for from being a cow-herd this remarkable man rose to be one of the cleverest and most respected men of his day.

Stephenson's Early Days

Stephenson was born on 9th June, 1781, at Wylam near Newcastle-on-Tyne, his parents being a respectable couple, careful and hard-working. His father, the fireman of the old pumping engine at Wylam Colliery, received a wage of only 12/- a week, and the family lived in one of the lower rooms of a small two-storeyed house near the colliery. Although at that time the value of money was certainly greater than is the case to-day, yet 12/- a week was not a very large amount to live on, even in those days. Not only did Stephenson's father live on his wage, however, but he also managed to maintain his wife and six children! In these modest circumstances the great engineer spent his childhood, little dreaming of the wonderful career that lay before him. He did not go to school—indeed there was but little left from his father's wage to pay for clothing, after rent and food had been paid for.

In his early days Stephenson was fully employed helping to nurse his younger brothers and sisters, but later he was promoted to his first situation. Here his duties were to keep the cows off the rail-road that ran from the colliery to the wharf, and to close the gates at night, after the last wagon had passed. For this work he received a wage of 2d. per day!

Whilst watching his cows he had plenty of time on hand and he spent it in looking for birds' nests, and in making whistles out of reeds and straws. He also spent a good deal of time in making working models of mills and in modelling engines in clay. He used hemlock stems for imaginary steam pipes and when he made a model of a winding machine he used hollow corks for corves (buckets). How he would have revelled in Meccano, had there been such an invention in his day. We may easily suppose that his name would have figured prominently in the list of Prize Winners in the Annual £250 Competition!

Becomes Colliery Engine-man

As he grew older Stephenson was set to harder work, ploughing the fields and hoeing turnips, at which he earned 4d. a day. He was not particularly interested in farm work, however, his great ambition being to work at the colliery. At last he went there as a "picker," in which his duties consisted of picking out stones and clinkers from the coal sent up from the mine below. The height of his ambition was reached when, at 14 years of age, he was appointed to assist his father in firing the engines, at—what seemed to him—the very princely wage of 1/- per day.

George Stephenson

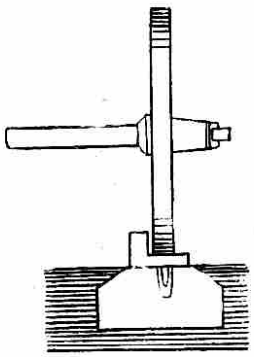


Fig. 1. Section of Early Rail-Road

Stephenson was very fond of trying feats of strength with his friends and had frequent trials of lifting heavy weights, throwing the hammer and putting the stone. Although he could not acquire the requisite knack in the last-named, he was unbeaten in throwing the hammer. He was successful, too, at weight lifting, and on one occasion lifted as much as sixty stones.

When fifteen years of age Stephenson's wages were raised to 12/- a week, and it is related that on coming out of the foreman's office that Saturday night on which he received the advance he announced the fact to a fellow-workman, adding triumphantly, "I am now a made man for life!"

On a new pit being opened at Newburn, Stephenson was appointed engineman, his father acting as fireman. He was then seventeen years of age, and was ahead of his father as a workman. His duty was to watch the engine and to see that it kept well to its work, and that the pumps were efficient in drawing water. When the water-level in the pit fell, so as to cause incomplete suction of the pumps, he had to descend the shaft and plug the tube so that the pump would continue to draw. If his engine stopped through some defect that he could not remedy, it was his duty to call in the chief engineer of the colliery to set the engine right.

Stephenson endeavoured to learn as much as he could regarding the working of his engine, however, and in this work we may imagine that he was in his element. He studied his engine from morning to night, until he knew exactly how it was constructed and exactly why it worked. His engine was his work and his hobby. He was never tired of inspecting and watching it. Indeed, when the colliery was closed at week-ends or at holiday-time he would even take the engine to pieces so as to be better able to understand its working parts. He must have felt very confident of himself to do this, for it would have been disastrous had he not been able to reconstruct the engine so as to have it working when the colliery re-opened. It would have meant, indeed, that the colliery would have been stopped, for the miners would not have been able to descend the pit shaft, and hundreds of men would have been thrown out of work. Stephenson did not make any mistakes, however, and this early example of his

confidence in himself prepared him for the more difficult tasks and greater responsibilities that lay ahead.

The Early Rail-Roads

About this time considerable attention was being paid to the question of inventing some form of mechanical traction for drawing wagons of coal from the pits to the wharves and quays, for loading the ships that were to carry the coal to London and other ports. In the early days of coal-mining the coal was carried in panniers or in sacks, on the backs of horses. Later, when the demand for coal increased, however, carts were used. As the roads were in such a terrible state flagstones were laid for their wheels to run on. Before long the carts were made larger and larger, and were mounted on four wheels instead of two, being then known as waggons.

Sometimes in place of flagstones, wooden rails were made with planks fastened to timber baulks. In some places these tracks ran for nine or ten miles, and they were the beginning of our modern railroads. Improvements were gradually made, the first being to nail thin iron plates to the tracks to protect them against wear; then, as wooden rails were found liable to rot, cast iron rails were tried. These

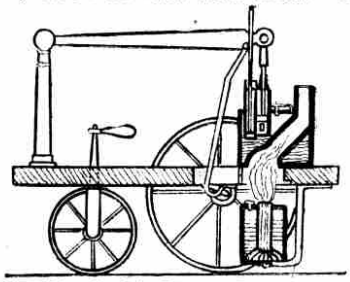


Fig. 3. Murdock's Steam Carriage (1786)

rails were cast in the form of plates, with a ledge to guide the wheel along the road (see Fig. 1).

Many inventors were endeavouring to apply steam power to the propulsion of the coal wagons along these railroad tracks, and when Stephenson commenced to study the subject a certain amount of work had already been done.

Cugnot's Steam Engine

In the article "*The Romance of the Petrol Engine*" in our September issue, we described how a Frenchman named Cugnot brought out a locomotive steam lorry in 1769. Cugnot's vehicle included an engine and a cumbersome boiler with a furnace inside it (Fig. 2). It had two single-acting brass cylinders, the pistons of which acted alternately, through cranks, on the single driving wheel. The vehicle, steered through suitable gearing, attained a speed of 2¼ miles per hour with four passengers. The supply of steam lasted only ten or fifteen minutes, however, when it was necessary for the passengers to dismount and wait until steam was again raised!

Cugnot's steam lorry opened up wonderful possibilities of locomotive traction, but unfortunately it did not meet

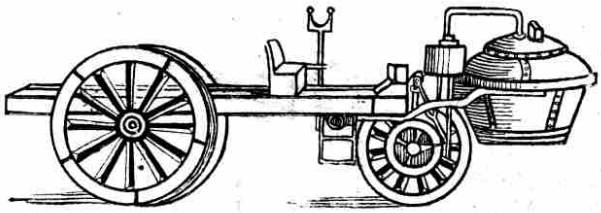


Fig. 2. Cugnot's Steam Engine (1770)

with the success it deserved. After several exciting trial trips in the streets of Paris it was considered a danger to the public safety, and was locked up in the Arsenal to prevent further mischief. It is now exhibited in the Museum of Arts and Crafts, Paris, and a model of it is to be seen in the South Kensington Museum, London.

Early Locomotives

Other inventions followed Cugnot's engine, among which the more important were the engines of William Murdock, a friend of Watt, and Richard Trevethick in Cornwall (Fig. 3). In 1812 an engine was successfully used for hauling coal wagons from the Middleton Collieries to Leeds, a distance of three or four miles. This engine was inspected by Stephenson, and on the occasion of his visit it hauled 16 wagons, weighing 70 tons, at a speed of three miles an hour.

There is little doubt but that it was from this locomotive that Stephenson obtained his great idea for a railway system. As a result of his labours he succeeded in accomplishing for the locomotive what James Watt had done for the steam engine. He combined, in a practical form, the separate plans of others, and included original inventions and adaptations of his own. In completing his work he encountered untold difficulties, not the least of which were the rough and clumsy tools in use in those days. Skilled mechanics were unknown and Stephenson had to work as best he could with such tools and men as he could command.

Stephenson Builds his First Loco

Stephenson's first locomotive, constructed at Killingworth in 1814, had a wrought-iron boiler and was named the "*Blucher*." It took ten months to build, and the motion of the pistons was transferred to the wheels by spur-gearing (Fig. 4). This loco was not entirely a success, and would probably have been condemned had not Stephenson made his great discovery of the steam blast, by which the exhaust steam was used to create a draught in the furnace. This invention gave the boiler an increased capacity for generating steam, and almost doubled the power of the engine. In 1815 a second engine was constructed with pistons connected directly to the wheels by cross bars and connecting rods. This was more successful and was employed for some time in hauling coal wagons.

The First Railway

In 1821 it was proposed to construct a railroad between Stockton and Darlington to carry coals from the Durham coalfield to the sea. The first suggestion was that horses should be used to haul the wagons, except on the heavy inclines, where fixed engines were to haul the trains up the hills by means of ropes. Stephenson managed to obtain an interview with the Directors of the Company and strongly advised them to use steam locomotives, pointing out that they would be more economical and more powerful. After some discussion it was agreed that the railway should have locomotive engines for the heavier work of hauling goods trains, but that a few carriages would be run for passenger service and they would be drawn by horses!

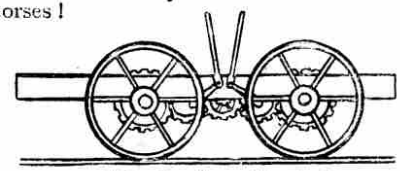
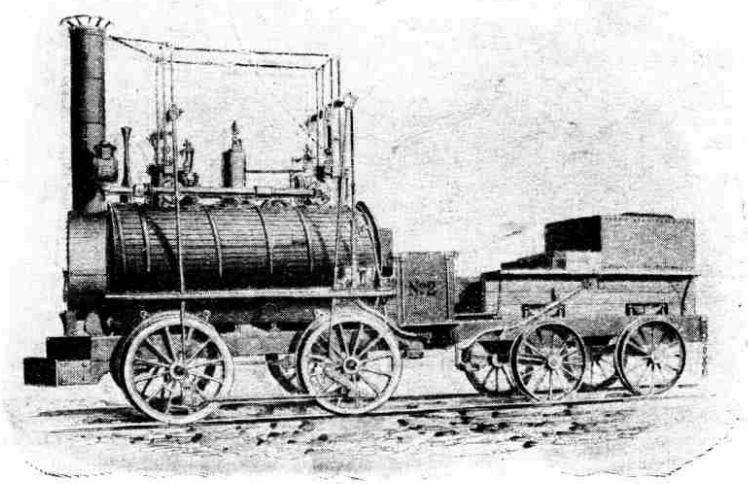


Fig. 4. Spur-Gearing

It seems strange to think of trains being hauled by horses, but it is easy to understand how the suggestion came about when we remember that originally the coal wagons were hauled along the early railroads in a similar manner. The early passenger coaches resembled bathing machines, and Stephenson built the first coach of which there is any record. He called this the "Experiment," and it was fitted with four flanged wheels. Later better passenger coaches were built and attached to the trains of merchandise.

It is interesting to remember that railways were first introduced with the idea of conveying goods only, and as a matter of fact regular passenger trains were not run for some years after the establishment of the Stockton and Darlington Railway. It no doubt came as a surprise to the Directors of the early railway companies to find what a great demand there was for passenger service, and in course of time this service grew to be of premier importance. To-day passenger traffic is regarded by the general public as being the most important, for it makes it possible to reach any part of the country in a comparatively short time, in comfort and safety.

(To be continued).



Stephenson's Second Locomotive

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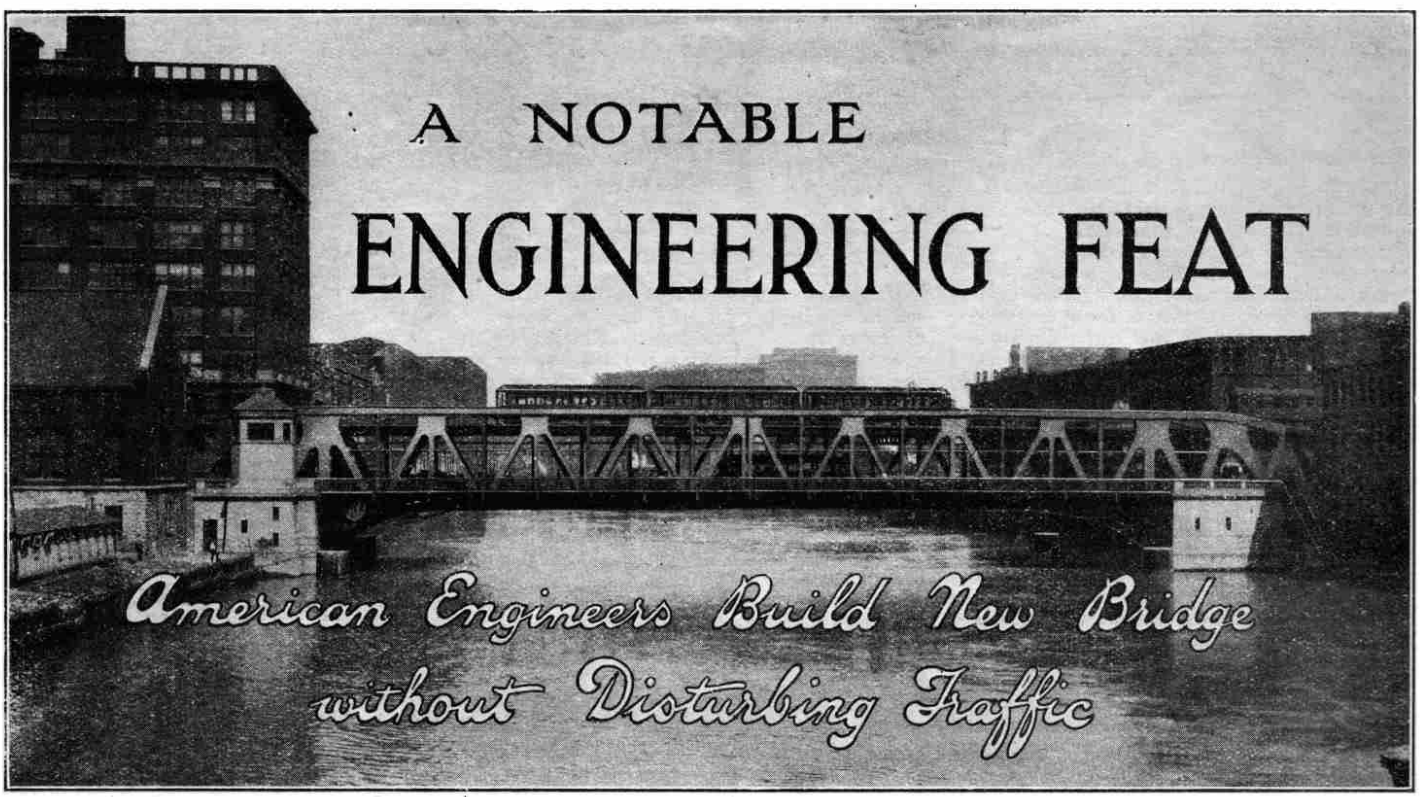


A NOTABLE ENGINEERING FEAT

American Engineers Build New Bridge without Disturbing Traffic

IN the olden days no castle was regarded as being complete without its moat and draw-bridge. To-day the busy world has no time for castles or moats—except, perhaps, as objects of historic interest. The draw-bridge of mediæval times still remains, however, although in its modern form it has been re-christened, and is now known by the high-sounding scientific name of "bascule bridge." Although changed both in name and appearance, and improved beyond imagination, the principle of the bascule bridge is still the same as that of its forerunner, the draw-bridge.

The modern bascule bridge consists simply of either one or two spans, or "leaves" as they are called, each hinged at one end. By these means they may be drawn up into an almost vertical position to allow shipping to pass up or down the river. Although there is no war-like use for the modern draw-bridge, it forms, instead, an important link in every-day life.

In the old days the draw-bridge was raised by men hauling on rusty chains. The modern bascule bridge has a powerful elevating mechanism, however, consisting of electric motors driving through gearing. This mechanism is never allowed to go rusty; it is well cared for, and kept clean and well-oiled.

This is the first instalment of our third article on famous bridges. Previous instalments have dealt with the Jack-Knife Bridge at Chicago and the proposed new bridge across the River Hudson at New York. In future numbers of the "*Meccano Magazine*" we shall illustrate some of the finest examples of the world's greatest bridges.

The Bascule Explained

Bascule bridges are of two types—single and double. The former consists of a single leaf extending from one bank to the other, and hinged at one end, where the elevating mechanism is placed. A double bascule consists of two leaves, each of which extends half-way across the river, to meet in the centre. Each leaf is pivoted horizontally at the river bank and, as separate elevating mechanisms are employed, each leaf may be raised individually, or both may be raised together.

The subject of this article, a fine example of a double bascule bridge, spans the river at Wells Street, one of the main thoroughfares in the business district of Chicago, U.S.A. This bridge has two decks, the lower of which carries two lines of electric cars, as well as road traffic and pedestrians. The upper deck carries an elevated railway, a form of transport that is common in America, but almost unheard of in this country.

Bridges at Wells Street, Chicago

The present Wells Street Bridge, built in 1921, took the place of an old steel swing bridge, operated by a steam engine. This swing bridge, constructed in 1888, was 220 ft. in length and 59 ft. in width, and replaced a hand-operated iron swing bridge. Previously there had been a wooden swing bridge here, but this had been destroyed by fire in 1871. Thirty years earlier there had been a floating bridge in existence at this point, but this was swept away by flood and ice in 1849.

Although there have been bridges at Wells Street for many years, the present double bascule bridge is undoubtedly the finest bridge that has ever been erected at this

(*Continued on next page*)

Photographs by courtesy of [*Bureau of Engineering, Chicago*

Our illustration shows a view of the lower deck of the new bridge, with its double set of car lines. The overhead railway lines are on the upper deck

BRIGHT IDEAS

These columns are reserved for dealing with suggestions sent in by Meccano users for new parts, new models and new ways of making Meccano model-building attractive. We are always pleased to hear from any Meccano boy who has an idea which he considers will be useful in the Meccano system.

H. Bradby (Reigate).—You have overlooked the torque displacement caused by the throwing out of the clutch, in your suggested clutch.

M. Vennetier (Gare De Souvans).—(1) Would not the threaded crank serve the same purpose as the threaded winged collar you suggest? (2) Higher ratios may be formed by employing the existing toothed wheels in trains.

Kevin Coonerty (Limerick).—We already list a dredger bucket (No. 131). Is this what you have in mind in your suggestion?

Cecil W. Kelsey (Burnbank).—We have a large base plate already under consideration.

Philip Mostyn (Chiswick).—One or two modifications to the threaded pin are now being considered.

Jack S. Smith (Liverpool).—We are continually adding to our list of rolling stock for the Hornby Trains. The "Crocodile" or boiler truck is a type which will be introduced shortly.

M. H. Knight (Lynton).—Thanks for your suggested generating plant, but we do not contemplate the manufacture of these articles at present.

P. and D. Peek (Johannesburg).—The difficulty in regard to curved sections is in determining the most suitable diameters.

Francis Hollister (Bristol).—We are at present at work on a suitable grab as an accessory.

Harold Carter (Liverpool).—We hope shortly to publish an illustrated leaflet of our model grandfather's clock, the pallet and escapement mechanism of which are made from Meccano parts.

Richard Ball (Rainford).—We do not contemplate at present the manufacture of parts for steam engines.

H. Oddie (Victoria).—Your list of suggested new parts is certainly varied, but you do not mention any uses for most of them. We shall be glad to hear from you again on the matter.

R. A. Hughes (Freshfield).—We are giving consideration to the introduction of a siding type of points.

Fred Williams (Romiley).—Your suggested double points appear to us to resemble two double symmetrical points joined together. Probably you have in mind siding points. See our reply to R. A. Hughes (above).

Jack Lawrence (Tulse Hill, S.W.).—So far our experience has shewn that one set screw in the fast wheels is quite adequate for ordinary construction.

P. G. Plummer (Guernsey).—We contemplate the introduction of a 3½" gear wheel shortly.

J. S. Lawrence (Edinburgh).—A flanged wheel of 2½" diameter may be obtained by attaching a flanged disc to a face plate.

Albert E. Bebb (Redditch).—We are experimenting with ball bearings for smoother swivelling actions.

M. Fageot (Montreuil).—What applications have you found for a coupling with an inclined hole?

Harry Hampton (Leith).—We already list a steel constructional lattice girder bridge as an accessory to the Hornby Trains.

H. S. James (London, S.W.).—From your sketch we are of the opinion that your suggested spring-threaded pin duplicates the function of the expansion spring. This latter exercises the necessary pull to ensure the trolley pole making good contact on the overhead wire.

W. D. Buller (Redditch).—The question of large wheel sections in varying diameters is exercising our attention.

Gilly Kowitz (Queensland).—As models of ginning and wool-carding machines have not been submitted in any of our competitions, we presume that they are perhaps a little beyond the capabilities of Meccano. We shall have to see whether any of our Lancashire friends have any information on the subject. (2) We have not yet contemplated manufacturing model boats, but they may form an item in our catalogue in time.

C. J. Salt (Lincoln).—(1) The question of helical gears is under consideration. (2) This suggestion is similar to that of H. Rutledge, our reply to which we refer you. (3) Your suggestion for dog clutches may hold some possibilities, but the method of attachment to other wheels, which you mention, appears to us to be unstable. We shall give this matter careful consideration.

Jack Mason (Pukekawa, Auckland, N.Z.).—A cantilever spring is illustrated in the Chassis Leaflet (price 4d. post free).

John Hatfield (Croydon, Surrey).—We shall go carefully into your suggested adjustable wire stay.

G. E. Kowitz (Dakey Cooyan Line, Australia).—We are considering the advisability of squaring the collar on the threaded pin.

D. V. Semple (Falmouth).—Why not utilise the propeller blades as sails on your windmill pump?

E. W. Goodman (London).—(1) As we now list electric rails, we have abandoned the manufacture of accessories for the conversion of ordinary rails into electrified rails. (2) We shall go into the matter of the 1 × ½" double angle strip you suggest.

P. Empsall (Upton).—We have placed on the market this year several new types of rolling stock, amongst which are the cattle trucks you mention.

R. N. Milton (Highgate, N.).—We do not think there would be any advantage to adding a permanent flange to the braced girder. Should this construction be required in an individual case, an angle girder may be secured to it in the ordinary way.

Eric Helsby (Birkenhead).—We are interested in your suggestions regarding the standardisation and protrusion of the second spindle of the spring motor, for the purpose of a slow and powerful drive. We shall explore its possibilities.

H. Brown (Altrincham).—We have added to our train accessories practically all of those suggested in your letter.

A. J. Riley (Leytonstone, E.).—Our present flanged wheel will serve the purpose of a loose pulley by simply permitting it to run loosely on the rod. A flanged wheel without a boss such as you suggest would not sit true on the rod.

E. Gardner (Broken Hill, N.S.W.).—A pulley block may be constructed from existing parts. See model No. 442 in the Complete Manual.

E. P. Whitely (Golcar).—A compression spring may be made from our existing tension spring, by extending the coils slightly. We do not as yet contemplate the manufacture of "ordnance pieces."

L. Lumb (Golcar).—The matter of circular plates is under consideration.

S. Lucas (Catford, London, S.E.).—The coupling of the Hornby loco wheels is a probable improvement that will be considered as soon as opportunity permits.

W. Summarsel (Brighton).—We are not in a position to give an opinion on your eye piece until we have had an opportunity of exploring its possibilities in general construction.

A Notable Engineering Feat—(*cont. from p.* 6)

point. It may also claim to be one of the most interesting of its kind in existence.

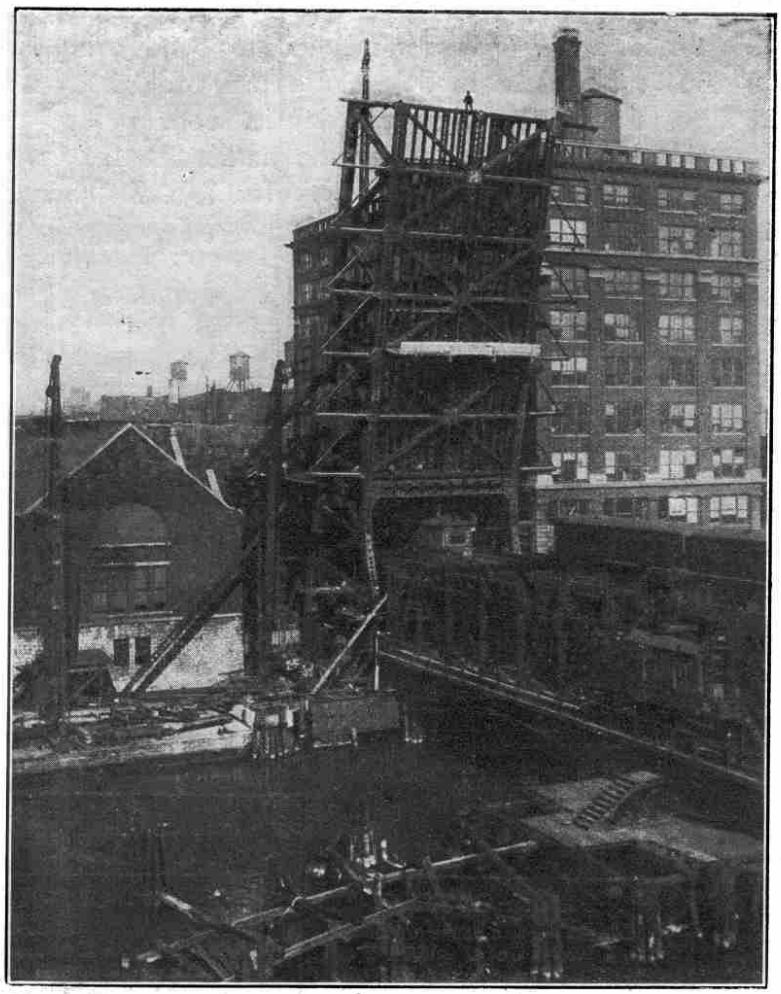
A Remarkable Achievement

The bridge is also notable for the fact that its construction was a notable engineering feat. It was built up around the old bridge, and traffic was continued across the river practically during the whole time. The dislocation of traffic and the consequent inconvenience to the public was thus reduced to a minimum.

To enable the new bridge to be built without interruption to the traffic on the old bridge, piles were driven into the bed of the river, outside the limits that the new bridge was to occupy. Cribbing was erected on these piles to support temporary steel girders and trusses, which in turn took the main weight of the structure.

Meanwhile the construction of the leaves of the bridge was put in hand. These leaves were built into place in a vertical position as shown in the accompanying photograph. Incidentally, this illustration also shows the gigantic size of the bridge, which may be gauged by comparing with the structure the size of the man standing on the top of the open leaf. So that the elevated trains on the upper deck and the electric cars on the lower deck, might continue to use the bridge, passage-ways in the vertical leaves were provided by omitting from the structure certain floor and bracing panels.

(*To be continued*)



Photograph by courtesy of [*Bureau of Engineering, Chicago*

The above photograph shows an overhead elevated train passing over the old bridge and through the opening left in the new structure. The piles on which the old bridge was dismantled are seen in the foreground

MECCANO

ACCESSORY OUTFITS

Make Your Outfit Bigger and Better

Once a boy has commenced to build with Meccano, he desires to build larger and more ambitious models. He may do so by adding an Accessory Outfit to his existing set, thereby greatly increasing its scope. The particulars below show how a boy who commences with one of the earlier Outfits may build up his equipment by easy stages, until he is the proud owner of a No. 7 Outfit.

PRICE LIST
Complete Outfits

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

PRICE LIST
Accessory Outfits

No. 00a	1/6
No. 0a	4/–
No. 1a	7/6
No. 2a	8/6
No. 3a	18/6
No. 4a	15/–
No. 5a (carton) ...	50/–
No. 5a (wood) ...	80/–
No. 6a	210/–

This illustration shows a No. 3a Outfit which converts a No. 3 into a No. 4 Outfit.

No. 00a OUTFIT
Costs 1/6, and converts No. 00 into a No. 0 Outfit. With it an additional 27 models may be built, making a total of 70 models in all.

No. 0a OUTFIT
Costs 4/-, and converts No. 0 into a No. 1 Outfit. With it an additional 36 models may be built, making a total of 106 models in all.

No. 1a OUTFIT
Costs 7/6, and converts No. 1 into a No. 2 Outfit. With it an additional 57 models may be built, making a total of 163 models in all.

No. 2a OUTFIT
Costs 8/6, and converts No. 2 into a No. 3 Outfit. With it an additional 43 models may be built, making a total of 206 models in all.

No. 3a OUTFIT
Costs 18/6, and converts No. 3 into a No. 4 Outfit. With it an additional 53 models may be built, making a total of 259 models in all.

No. 4a OUTFIT
Costs 15/-, and converts No. 4 into a No. 5 Outfit (carton). With it an additional 43 models may be built, making a total of 302 models in all.

No. 5a OUTFIT (Carton)
Costs 50/-, and converts No. 5 into a No. 6 Outfit (carton). With it an additional 51 models may be built, making a total of 353 models in all.

No. 5a OUTFIT (Wood)
Costs 80/-, and converts No. 5 into a No. 6 Outfit (wood). The parts are exactly the same as in the carton Outfit mentioned in the preceding panel, but the cabinet is in wood.

No. 6a OUTFIT
Costs 210/-, and converts No. 6 Outfit into a No. 7 Outfit (oak cabinet). This Outfit builds every one of the 393 models illustrated in the Complete Manual.

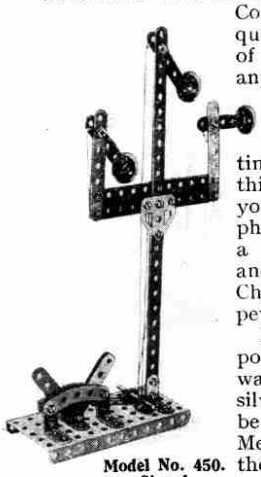
MECCANO LIMITED BINNS ROAD LIVERPOOL

Into the Land of Fun

by

"SPANNER."

JANUARY is the month for New Year resolutions and no doubt my readers have already made several. There is one resolution which every Meccano boy should make, however, and that is to enter the splendid Championship Contest for the best Meccano model. Some readers may think that this is a rather unnecessary resolution to make, as they enter every competition that is announced, whether it be solving a Puzzle, drawing my friend the Editor, or building a Meccano model. There are, however, many boys who have been followers of the Meccano hobby for years, but who have never yet entered the annual Model Building Contest! Many of them, I know, have built really clever new models, but they quite forget to enter them for the competition. The result is Meccano boys all over the world are deprived of the pleasure of building and enjoying these new models, because they have never been submitted to the Meccano Company, and consequently have no chance of being included in any of the Manuals. Make a New Year's resolution that next time you invent something new in Meccano, you will either take a photo of it, or make a sketch or diagram, and enter it in the Championship Competition.



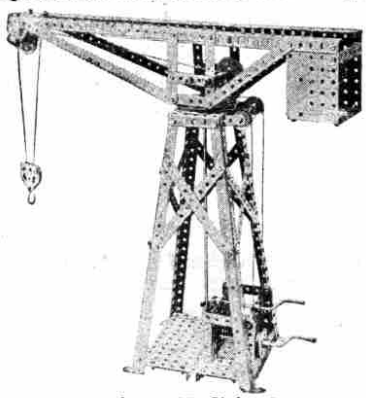
Model No. 450. Signal

I was over at Liverpool the other day and was shown the splendid silver cups that are to be awarded to the Meccano Champions for the year. My word! boys, you will be proud if you get one of these cups. They are just fine. They stand over nine inches in height, and are mounted on black plinths, which add another two or three inches to their height. I was also shown the splendid medals that are being specially made for other awards in this contest. All I can say is I wish you boys could see them—you'd get busy right away and put your thinking cap on!

Now for a few words about the interesting models illustrated on this page. First of all there is No. 407, the Girder Crane, a graceful-looking model that enables you to have many hours of fun lifting weights from the floor and loading them into a Hornby Train standing on the table, or *vice versa*.

My readers will no doubt have noticed that this Girder Crane is appearing prominently in the Meccano advertisements this year, with an illustration of a real crane. "Wouldn't you like to work this 10 ton Crane?" the advertisement asks. I am quite sure, however, that every owner of a No. 4 Outfit will obtain nearly as much pleasure in working his model as he could from working the real Crane—and he will have a good deal less responsibility in doing so!

This model is quite easy to build. The base of the main frame is composed of two large flanged plates with four $12\frac{1}{2}''$ vertical angle girders bolted to the outer corners of these plates. Eight $5\frac{1}{2}''$ perforated strips are used as cross-battens to strengthen



Model No. 407. Girder Crane

the framework. The jib construction is easily followed from the illustration in the new Meccano Manual of Instructions. Two flat plates, connected at the bottom by means of small perforated strips, take the place of the usual balance weight. The jib itself is swivelled from the lower of the two crank handles, a continuous cord being wound twice round the flanged wheel of this handle, against which is butted another bush wheel to make it into a double flange pulley. A cord passes round the two upper guide pulleys and then around the large 3" pulley wheel on which the crane jib is mounted. Then, by turning the lower crank handle the jib may be swivelled about this axis.

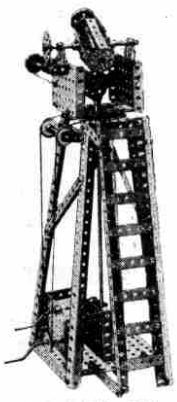
Another similar model of a crane, though slightly more complicated in construction, is the Elevated Jib Crane, Model No. 401. Although the base and supports are exactly the same as in the Girder Crane, the jib is different. It is made of $12\frac{1}{2}''$ strips held apart centrally by double brackets, and bolted together at the ends.

Model No. 401. Elevated Jib Crane

The balance weight at the back is composed of several flanged wheels, threaded on an axle and carried by two $5\frac{1}{2}''$ strips on either side. When lifting heavy weights I find it is usually advisable to add extra weight to act as a counterpoise. The gear box itself consists of two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ perforated flanged plates held apart by two $2\frac{1}{2}''$ perforated strips placed at the top of the box and two $2\frac{1}{2}''$ double angle strips at the bottom. The swivelling movement of the jib is obtained in precisely the same manner as that of the Girder Crane, that is, by means of the continuous cord passing round the pulley wheel bolted to the under surface of the upper gear-box.

A recent interesting improvement is the introduction of a ball-bearing mounting for the upper gear box of this crane model. These ball bearings greatly facilitate the swivelling movement of the jib. The balls (Part No. 117) are recent additions to the Meccano system and will be found of great use in numerous other models. I hope to give some further details of this new movement in a future article.

Model 450, Three-Arm Signal, has also been greatly improved, and will be found a very useful addition to a Hornby Train Set. Those who wish to do so, may control the signals from a distance, by fitting cords and mounting a separate set of levers.



Model No. 423. Searchlight Tower

The other model illustrated on this page is No. 423, the Searchlight Tower. Many boys who build this model do not get from it half as much enjoyment as they might. When the structure has been built, and the swivelling platform connected by pulleys to the handle, a small electric light bulb should be fixed to the holder. By means of a short length of flex or thin wire this is connected to the terminals of a flashlight battery, and in this way a very realistic model of a searchlight is obtained. For really effective results, of course, the room should be in darkness and the searchlight slowly revolved on its mounting.

If the electric-light bulb be mounted in a short tube of cardboard or metal, an even more realistic effect is obtained. A bull's-eye reflector, such as are supplied with flash-light torches, adds power to the beam. It is great fun directing the searchlight on to objects, and pretending they are hostile aircraft. Get your chum to make a Zeppelin in Meccano and to hold it in some part of the darkened room. Then try "spotting" it with your searchlight just as our anti-aircraft forces did during the war with Zeppelins and enemy 'planes. Many hours of fun may be obtained by games of this nature with the Searchlight Tower.

NEXT MONTH

Ball Bearings and Other Movements

SOMETIMES a Meccano boy feels he would like to read a book on some particular subject, but is at a loss to know the best book to buy. In cases of this kind I shall be very pleased to offer suggestions. I am a book-lover myself, and for many years I have kept in close touch with all boys' books. I regularly receive full particulars from publishers of all new books for boys. Thus I shall perhaps be able to help any boys whose choice would otherwise be dependent on the range of books shown in some particular shop-window. In this column we review books that we think will specially appeal to Meccano boys. It should be noted that we do not actually supply these books, which may be obtained either through a bookseller or direct from the publishers.

Toddy Scores Again

by Alfred Judd

(*Pub. by Nelson. Price* 5/- *net*).

The author of "*Toddy Scores Again*" is well known as a master of the art of writing boys' school stories, and his latest book is well up to his usual high standard. As may be gathered from the title, the book relates the adventures of a schoolboy named Toddy, a confirmed joker, at Priorswood College. Toddy, ever on the look-out for a chance of a really good "jape," usually manages to find it. The result is that the book is a series of laughs from the discovery of the priceless Jumbo Jorum to the final account of the Great K craze. Toddy is the most humorous schoolboy we have met for a long time.

Ships for All

by Frank C. Bowen

(*Pub. by Ward, Lock & Co. Ltd.* 6/- *net*).

This is a comprehensive and well-illustrated volume written by a late Captain of the Royal Marines and a well-known authority on merchant shipping. The book, which contains nearly 100 illustrations, deals with vessels of all types and of all services. Chapters are devoted to Canal and Coastal Craft, Sailing Ships, Life-boats and Life-saving. A chapter dealing with Sea Law-Breakers reminds us that there are as many rules and regulations at sea as on land, a fact that the average landsman sometimes forgets. Not the least useful part of the book is the glossary of seaman's terms. The book covers a wide ground and contains, in one volume, much useful and interesting information generally only found in specialised volumes of a more technical nature. It is a splendid book for all boys interested in the sea.

The Radio Amateur's Handbook

by A. Frederick Collins

(*Pub. by Harrap. Price* 7/6).

Any boy who has, or ever hopes to have, a wireless set, should read this very complete manual of both the theory and practice of Radio. There is nothing dull or technical in any of the 329 pages. The useful Glossary, and list of "don'ts," will solve many unaccountable mysteries.

Railway Picture Stamps

We have received from the Locomotive Publishing Company, 3, Amen Corner, London, E.C.4, a series of 72 coloured stamps. These show locomotives and trains of various Railway Companies throughout the world. The series costs 1/- and will particularly appeal to those boys who are interested in railways and locomotives.

The Boy Electrician

by Alfred P. Morgan

(*Pub. by Harrap. Price* 7/6).

Every page of this book is crammed with interest. We imagine that the series of really exciting experiments will appeal to all Meccano boys. All the experiments may be readily performed at home, without complicated or expensive apparatus. These include surprises for the Cat, Electrical Frog Ponds, Bells, Home Telephones, Shocking Coils, Transformers, Electric Motors, to mention only a very few. Radio is not forgotten, and forms one of the most interesting chapters in the book.

BOOKS RECEIVED

We have received copies of the undermentioned books during the past month, and these will be reviewed in this column in a future issue.

"THE BEGINNER IN WIRELESS" *by* E. Alexander (Dranes), 3/6
"HOW TO MAKE AND MEND" (Allan & Unwin Ltd.), 2/6
"THE A B C OF WIRELESS" *by* E. Alexander (Dranes), 1/6
"100 OBJECT LESSONS" *by* H. Pickering (Pike & Inglish), 2/-
"THE JOLLY TINKER" *by* F. M. Rich (Appleton & Co.), 3/6
"MY PICTURE BOOK OF RAILWAYS" (Ward Lock & Co. Ltd.), 1/6

Price **4s.** net.

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Dear Sirs, 16, Duncan Road, MANCHESTER.
The 100 ft. of your excellent cable arrived quite safely, for which many thanks. I might add that I removed my original aerial of 7/22 hard copper, and re-erected it with your cable and the results are much better and more stable. Will you please forward me a further 100 ft. of the same, for which I enclose P.O. for 1/8 as before.
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Boy Heroes of the Month

IN the October "*M.M.*" we published an article from a valued contributor, who brought to our notice a number of deeds of cleverness and bravery recently accomplished by boys. This interesting record formed a striking confirmation of a fact on which we have always laid stress in these columns. This is that boys who take themselves seriously, who strive after accomplishment, who follow their own natural chivalrous instincts and enthusiasm, may play a noble part in the strangely perplexing thing which we call "life." Since that article appeared, we have had many similar deeds of manliness reported to us, and we are happy to place them on record.

Francis Beken, a printer's machine boy, of 22, Gladstone Terrace, Battersea, was cycling home along the Thames Embankment when he heard cries from a boy of seven who had fallen in the water. Francis took off his coat and vest and dived from a height of ten feet into six feet of water. He swam to the boy, dived and clutched his feet, but lost his hold almost immediately. He repeated the dive, regained his hold and swam with his burden toward some steps. Here he became stuck in the mud, released the boy, extricated himself, swam out again to the poor little fellow and dragged him safely to the steps, although now in an exhausted condition. He then disappeared and it took three days to find him. He has just been presented with a silver watch by his old school-mates, £5 from the Carnegie Hero Fund, and the Royal Humane Society's medal. Good boy, Frank!

Harold Steinlechner, a schoolboy of Vienna, started out from home with Austrian crowns worth just 6/-. He worked his passage to Passau and Frankfort, where he entered the French occupied territory. Here the depreciated exchange helped him, and he went by train to Mainz, by steamer to Cologne, and then to Brussels, where he slept two nights in a railway truck. Then he crossed to Dover with just 2/- left in his pocket. He walked to London, where he arrived with 7d. and presented himself at the Salvation Army Shelter. He worked hard for a month, saw all the sights of London, then worked his passage to Hamburg, travelling home via Berlin and Munich. We wonder how many of our readers could make 6/- go as far! (*Note:* We do not suggest that our readers attempt to imitate this experiment—at any rate not until after they have left school!—*EDITOR*).

Jack Mimetoa, of London, age 14, recently rescued a five year old boy from Regent's Canal. The Mayor of Paddington presented him with the Royal Humane Society's Certificate, and Mr. W. J. Derring, M.P., found him a good job at one of his shops in Kilburn. We hope he is now on the high road to success and prosperity.

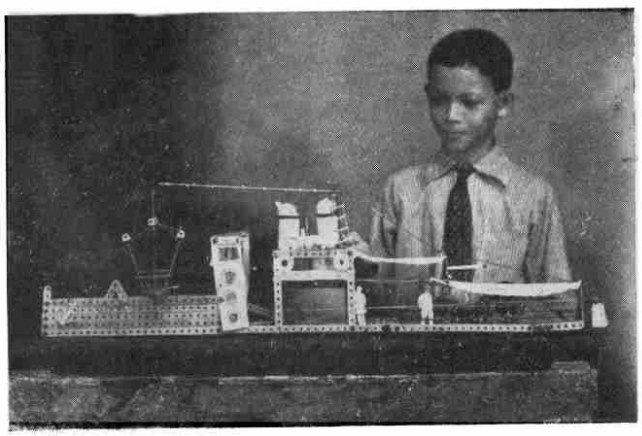
We have also heard of two boys, both aged 12, James Duffield, of Wells, Norfolk, and Tom Flayer, of Marylebone, who have received the Royal Humane Society's Certificate for rescuing boys from drowning.

And now for a feat of endurance. The s.s. "*Mylie*" foundered in the China Sea during a typhoon, on 23rd August. The lifeboat was hurriedly launched and six days later it was picked up by the steamship "*Sinkiang.*" The boat was nearly full of water and neither food nor drinking water was found in it. It contained the dead body of the "*Mylie's*" chief engineer, A. H. Green. About twenty minutes later a raft was sighted. At first it was thought that the sole occupant was dead, but he soon showed signs of life. He was the mess room boy of the "*Mylie.*" For six days he had been without food and during that time five who were with him had died or jumped overboard. Unfortunately, our correspondent omitted to send us the name of this hardy young hero.

Last comes a tale of devotion. Henry Clark, aged 75, was a lonely, jobbing upholsterer, who recently died in a tumble-down cottage in Clapham Road, London. His close friend was Henry Pople, age 11, of Dorset Road, Clapham, who brought Clark's wood and food for two years. The two were often seen shopping together, or taking 'bus rides and blackberrying. The old man taught Henry to work a wood-cutting machine, and other little things connected with his trade. Undoubtedly his last days were cheered, and probably prolonged, by the devotion of his faithful little attendant, who now mourns his loss.

We shall be happy to receive from our readers reports of clever or brave boys and to give these publicity.—EDITOR.

All the Way from Demerara



Master Cyril B. L. Asborn is an enthusiastic Meccano boy who lives in Demerara, British Guiana. Cyril is one of my regular correspondents, and he entered this model of a steamer in the £250 model-building Competition last year. The model is worked from the Captain's bridge, and is fitted with wireless apparatus. Reality is added to the model by the addition of cardboard sailors on the deck. I am sure readers of the "*M.M.*" will join me in congratulating Cyril on a very realistic model.

OUR MAIL BAG

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

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

W. H. Robson (Newcastle-on-Tyne).—We do not think that a serial story "that will make our readers' hair stand on end as they read it," would meet with the approval of most of our readers. Your suggestion that we have a "Notes on Nature" column, is more acceptable, and we may do something on these lines later.

J. Hobson (Northampton).—We are going very seriously into the matter of supplying Meccano jerseys for Meccano boys, as the call for these is very insistent. We may be able to make a further announcement shortly.

P. O'Sullivan (Gort, Galway).—"I went to market with £100, and I purchased cows, sheep and lambs, 100 altogether. I bought not less than one of each. Cows cost £5 each, sheep £1 each, and lambs 1/- each. How many of each did I buy?" It is rough on a worried Editor to have to puzzle out things of this kind. Perhaps readers will come to our rescue.

D. Shelton (Swansea).—Although we receive hundreds of letters from boys every day, we have missed your own cheery communications, and we are glad to hear from you again after such a long interval. We know your chum, John Gibbon, and we will post his Magazine, in future, to your address, as he wishes. The "*M.M.*" binder will comfortably hold a dozen or more magazines.

Cyril Horton (Stourbridge).—We are glad to welcome you as a reader and a member of the Meccano Guild, and we are pleased to hear that you are the happiest boy in the world.

T. G. Thomas (Llanelly).—We are very interested in hearing of your invention for saving lives of miners in pit cages. We are glad to know that it was entirely through Meccano that you were able to work out and perfect your invention. We wish you every success with it.

E. O'Grady (Ballarat).—Thank you for your letter in praise of the "*M.M.*" and for your promise to induce your friends to become subscribers. As you surmise, we receive letters from all countries, but we are always able to reply to each boy in his own language.

R. G. Moses (Calcutta).—We quite agree with you that engineering articles, lives of inventors, etc., are much more appropriate for the "*M.M.*" than serials, and although the two serials that we have already published met with a very good reception, we have so much wonderful engineering matter to publish, that it is doubtful if we shall have room for fiction for a long time to come.

A. Hardaker (Bacup).—We note that your pet hobby is "First Aid," and that you would welcome a column devoted to this topic in the "*M.M.*" We may consider your suggestion later.

J. Candler (Tulse Hill).—Neither yourself nor any of our readers should send articles of any kind to boys who write them from the west coast of Africa. Such letters should be altogether ignored. Thanks for your criticism on our Model Building competition. The new Championship Cups and Medals will undoubtedly result in keen competition.

A. Robinson (Penrith).—We were very interested in the details of your experiments, and were most pleased to know that your Hornby Train proved so much more efficient than the continental-made one. As you suggest, whilst the result is in a great measure due to the superiority of the loco, a good deal of the credit must be given to the superiority of the Meccano railway track.

H. R. Beard (Hale).—Your solution of the question "Can a man with a beard tell a bare-faced lie?" is certainly novel. If he happened to be in your company he could easily do it, of course.

V. A. Kirwan (Dublin).—We quite understand your desire that all available space in the "*M.M.*" should be devoted to engineering topics, but the demand for articles dealing with other subjects has been very insistent. Engineering will, however, always be the dominating feature of the "*M.M.*" and we believe you will be well satisfied with future issues.

L. C. Dennis (London)—and many others.—Your solution of the Meccano strip problem set by J. Miller in our October issue is quite correct.

P. Powell (Crosskeys).—We shall endeavour to give more space to Guild matters. This fine movement is growing rapidly and we shall do all in our power to cultivate it. Thanks for your very kind remarks.

Competition Corner

Competitions are now a strong and popular feature of the "M.M." Some splendid new ones are being prepared and will be announced in our future issues. On page 17, particulars are given of the £250 Championship Contest for the best models, which every reader of the "M.M." should enter.

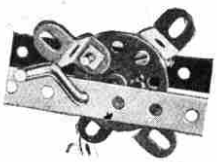
For Lynx-Eyed Readers

A New Series of Puzzle Pictures

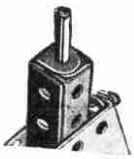
FIRST SET

No. 1 .....

No. 2 .....



No. 3 .....



No. 4 .....

No. 5 .....

No. 6 .....

WHAT YOU HAVE TO DO

Do you know your Meccano Manual? If you think you do, enter this fascinating new competition right away and solve the mystery of these Puzzle Pictures.

Each picture is a part of some model illustrated in the current 0-3 Manual of Instructions. What you have to do is to find from which model the Puzzle Picture has been taken. Write the number of the model against the number of the Puzzle Picture and when you have identified all the pictures in this page to your satisfaction keep your list carefully until the second and third sets of Puzzle Pictures appear in the next two issues of the "M.M." You will then be told how and when to send in your solutions.

FIRST PRIZE—Hornby No. 2 Passenger Set. SECOND PRIZE—Zulu Goods Set. THIRD PRIZE—Electric Motor. CONSOLATION PRIZES—12 Meccano Writing Pads, and 12 Complete Manuals.

If no competitor succeeds in numbering all the models correctly, the prize will be given to the reader who sends in the best attempt. The other prizes will be awarded in order of merit. In the event of a tie, the competitor's age and neatness of writing will be taken into consideration.

Order your February "M.M." now so that you will not miss the second instalment of Puzzle Pictures.

ESSAY COMPETITION for "M.M." STAMP COLLECTORS

This competition is open to all readers of the "M.M." who are also stamp collectors. The subject is "WHY I COLLECT STAMPS." Limit your essay to 500 words; write neatly on one side of the paper only, with name, address and age on back of each sheet. First prize: Packet of Stamps value 10/6 to be chosen by the winner, from any firm advertising in the pages of the "M.M." Make your choice when you send in your essay and give the necessary information, so that the stamps may be sent to you if you are the lucky winner. Closing date, 31st January. (Overseas, 31st May, 1924). Mark your envelope "Stamp Essay."

Sixth Photographic Competition for Guild Members

Prizes will be awarded for the best indoor photograph of a Guild member or members, building a Meccano model. There will be two classes (A) for members of 14 years of age and under, and (B) for members over 14 years of age. Closing date 29th February next. Prizes in each section, Meccano goods to the value of 10/6, to be chosen by the winners from the Meccano catalogue.

For Artist Readers

In response to numerous requests received from Meccano boys, I have pleasure in announcing a Drawing Competition. As mentioned in the November issue on page 141, the subject of this competition is to be: *"The Editor of the 'M.M.' as I imagine him to be."* In this competition the drawings may be of any size and the subject may be treated in any manner desired, i.e., it may be either in black and white, pencil, crayon or wash.

There are no restrictions, except that the drawing must, of course, be the unaided work of the competitor. The competition will be divided into two sections:—

(A) Boys under 12 years of age.

(B) Boys of 12 years of age and over.

A prize of a Hawk-Eye camera, manufactured by the Kodak Company, will be awarded in each section. The closing date is 29th February, 1924, in the United Kingdom, and for entries Overseas, 30th April, 1924. I hope to receive a large number of entries for this, our first drawing competition, which, if well supported, will be followed by other similar competitions. The winning drawings will be published in the April or May "M.M."

RESULT OF "Christmas Present" Competition

Thousands and thousands of post cards have been received from entrants in this Competition, and our Competition staff has had a difficult task in classifying them in time to send the Christmas gift to the winner as promised. The winner, whose list corresponded to the list of six articles voted by the entrants as being the most popular in our advertising pages in the December issue was Master T. C. Calthorpe, of 25, Onslow Road, Endcliffe, Sheffield, to whom a Hornby Pullman Set was delivered on Christmas morning.

RESULTS OF Photo Essay Competition

Several hundreds of entries were received for this popular contest, and Meccano boys have again proved themselves to be not only clever photographers but born essay-writers. The wide range of subjects covered, and the unfailing high standard attained, rendered difficult the task of judging these entries. The winner is Master G. B. Bentley, Park Street, Bridgend, with his essay "A Motor Holiday through Ross." Meccano goods to the value of £1 1s. 0d. are therefore being forwarded. The Second Prize of Meccano goods to the value of 10/6 goes to Master Dennis Salt for his "Holiday in North Wales," and the Third Prize of goods valued at 5/- to Master B. L. Simmonds, of Forest Hill, S.E. We hope to publish the winning Essay in a future number of the "M.M."

Essay Competition

This competition, for the best essay describing a holiday experience, was for those boys without cameras. Judging from the number of essays received there must be several thousands of Meccano boys who do not possess cameras! We are glad to be able to reduce this number by two, and Hawk-Eye Cameras (made by the Kodak Company) have been awarded as Prizes in each of the two sections. The winners are Master W. N. Taylor, Alston, Cumberland, and Master H. R. Smith, of Leicester.

Fourth Overseas Photographic Competition

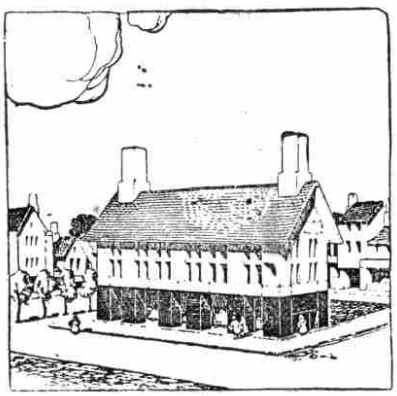
We have pleasure in announcing that the winner of this competition is Master Roberto Bandeira, of Florence. The photograph submitted by this competitor was an animal study of a goat with her kid, was exceptionally clear and was printed and developed by the competitor himself. The First Prize (Meccano Goods to the value of 10/6), has been sent to Master Bandeira, whom we congratulate on his success.

LOTT'S TOY BRICKS

OF ARTIFICIAL STONE

DESIGNED THROUGHOUT BY AN EMINENT ARCHITECT

More popular every year. Real miniature stone bricks for building real miniature Houses, Castles, Towers, Bridges, etc. Other models readily devised. Provides endless entertainment for young and old. Each box complete with plans, bricks, roofs, etc., etc.



Market Hall, Boxes 1 and 2 or 3 Series "B." Example after the Market Hall at Ross, Herefordshire.

PRICES AND CONTENTS OF BOXES

SERIES "B," COMPOSITE SETS. COMPLETE WITH PLANS, BRICKS, ROOFS, FENCES, TREES, Etc.

Box A.	Bungalow, Lych Gate, Barn, Bridge, Shelter, Pavilion ...	5/-
,, B.	Chalet, Market Cross, Hall, Gatehouse, Belfry, Factory	5/6
,, 1.	All above Models and Pair of Cottages, Garage, House, Tower, Chapel, Bridge ...	10/-
,, 2.	"Daily Mail" £500 Prize House, Cottages, Tower, Parish Hall, Garage, Library, and 12 other Designs ...	10/6
	NOT COMPOSITE.	
,, 3.	The whole of above Designs and six additional Buildings twice the size, as Market Hall, Country House, Abbey Church, Parish Church, Bridge. 49 Models in all	17/6
,, 6.	All Models stated above. Many larger and more important Buildings. 71 Models in all	35/-

TUDOR BLOCKS

Box 1. 6 Models 3/3 Box 2. 12 Models 7/6

GARDEN SETS

Small Size ... 4/- Larger Size ... 6/-

HAVE YOU ENTERED FOR OUR PRIZE COMPETITION?

See December Issue "Meccano Magazine"

Write for List

Lott's Bricks Ltd.

WATFORD ENGLAND

New Meccano Parts

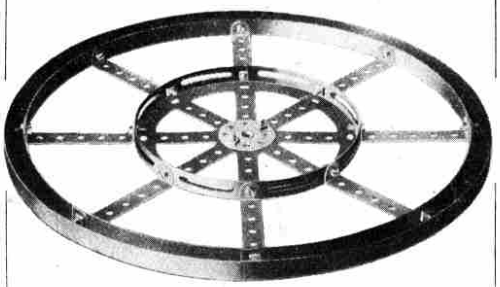
We have pleasure in announcing that the following new Meccano parts are now available :—

		Price.
No. 118	Large wheel hub, 5½"	each 1/-
No. 119	,, ,, segment	,, 4d.

No. 118

No. 119

The above parts are useful for building up large wheels, such as are used in models of beam engines, horizontal engines, etc. One method of using these parts is shown in the accompanying illustration. Eight of No. 119 are required to make a circle of 11½" diameter.



Example of how the new Meccano parts, Nos. 118 and 119, may be used.

Do Your Friends a Good Turn

THOSE of our readers who are able to do so, may help us very considerably in obtaining new subscribers, by telling their friends about the "*M.M.*" There must be over a million Meccano boys in this country, and yet only about one in twenty of this number takes the "*M.M.*" regularly. I want everyone of these boys to share in the pleasures of the *Meccano Magazine.*

Our circulation is growing steadily, but we wish to see it grow even more rapidly, so that we shall be able to still further increase the size of the "*M.M.*" Then we shall be able to print more and more of those hundreds of interesting subjects, for which competitors in our recent competition have made definite requests.

If every reader of the "*M.M.*" obtains only *one* new subscriber we shall double our circulation. Now, boys, will you try and find at least one new subscriber and so help me to make the "*M.M.*" even better, bigger, and brighter than it is at present?

If you know of a Meccano boy who is not a regular reader of the "*M.M.*" and will send me his name and address, together with 3d. in stamps, I will see that he has a copy of the next issue mailed to him.

The Editor

J. Knight (Croydon).—The Meccano Receiving Set No. 1 will receive messages on wave-lengths up to 1,000 metres. All the British broadcasting stations at present operating transmit on wave-lengths varying between 300 and 500 metres.

W. Jones (Carnarvon).—Telegraphy may be received with a Crystal Set up to distances of 100 miles. If you acquire a knowledge of the Morse code you will be able to spend many happy hours listening-in.

R. Williamson (Bradford).—Under ideal conditions telephony may be received with a Crystal Receiver up to a greater distance than that generally recognised (i.e., 20–25 miles). Broadcast from London has been received at Bridlington and Liverpool on Crystal Sets, while a Meccano Set regularly receives broadcast at 33 miles from Manchester.

J. McDonald (Manchester).—You could not ordinarily receive telephony from Paris with a Crystal Receiver. In order to do this it would be necessary for you to employ a valve set.

John Whitaker (Stratford-on-Avon).—(1) Ebonite is a compound of sulphur and rubber. (2) Some telephone receivers are known as the "watch" type simply because of a similarity in shape.

W. Robinson (Norwich).—The nearest broadcasting station to Norwich is Marconi House, London, which is outside the range of a Crystal Receiver.

W. Maddock (Chester).—Audio frequency is the term used for oscillations which are within the range of the human ear. Many thanks for your good wishes.

J. Robinson (London).—A crystal allows the passage of currents in one direction only. Several substances such as galena, silicon, and carborundum have this property. I am glad to know that you are deriving so much pleasure from your Meccano Receiver.

F. Wilkins (Peterborough).—An earth switch connects the aerial to earth when not in use. This is a precautionary measure which obviates any possible trouble from lightning.

R. Leech (York).—(1) There is no danger from burn or electrical shock to any person operating a Crystal Receiver. (2) I am afraid you are too far from the nearest broadcasting station to receive telephony with a Crystal Receiver.

E. Williamson (Ainsdale).—I am glad to know that your Meccano Receiver has been such a boon to you in helping to pass away the long hours of your convalescence. The constructing of the No. 2 Set will lend an added interest to the hobby and you will obtain even greater enjoyment from this set, the result of your own handiwork, than from your existing set.

R. Arnold (New Zealand).—Our agents for New Zealand (Messrs. Browning & Ifwersen, Ltd., P.O. Box 129, Auckland) will always be happy to help you, should you experience any difficulty in assembling your Radio Set.

H. C. Key (Calcutta).—I was very interested to hear of the Radio experiments recently carried out at your camp. Any further news in this connection will be much appreciated.

D. Parker (Newport).—(1) The terminal you require is the Meccano terminal (No. 306) and it is featured in the Radio parts list in your instruction leaflet. (2) The usual price of a 20 ft. aerial pole is from 7/6 to 10/-. This may be purchased from any timber yard in your town.

Joan Biggs (Bridgend).—(1) The "Ducon Plug" is no doubt a very efficient instrument when used with a valve set, but it cannot be used with a Crystal Receiver. (2) Providing you obtain the necessary permission from your landlord I cannot see what an Insurance Co. has to do with the erection of your proposed aerial.

M. Smith (Sharrow).—I am sorry to say that the instructions you require for building a two valve set would take up too much space at present. Numerous text books are published giving the information you require. I am glad to know that the series of articles entitled "The Men Who Gave Us Radio" has given you such enjoyment.

H. Atkins (Leatherhead).—I have examined your proposed circuit but I do not think that it will function, owing to the fact that it is always open, the interrupter being off the contact.

J. P. Cronin (Tralee).—I am glad to know you are such a radio enthusiast. From what I hear you will be able to enjoy the pleasure of listening-in before long just as do we in England.

John Gillam (London S.E.).—I am afraid your No. 2 circuit is not an improvement on your No. 1. For instance there is no need for a secondary coil with a variometer because the inner coil of the variometer serves as a secondary. Also you can dispense with the variable condenser as you will find that the tuning with the variometer is sufficiently sensitive and in fact preferable to the slider tuning.

Some Radio!!

That is what your friends will say if you build your sets of

"TELORADIO" PARTS

They are the cheapest and best components obtainable.

Own a wireless station to be proud of!

One that will put you top of your friends!

Special New Year Offer at Great Reduction of Price

Crystal Wireless Station

Complete Set of 21 parts to erect a "Teloradio" Super Crystal Station, with book of instructions. Range guaranteed 30 miles (but some of our friends have received over 100 miles). Contains parts for Cabinet already polished, Silver-plated Terminals, and Crystal Detector. Hertzite Crystal, Woods, Metal, Wire, Coil Former, Instrument Board, Knob, Contact Arm, Pointer Scales and Labels, all in box.

Recently 10/6 each. Now... ... ... **7/11** Post Free.

Can be assembled in 2 hours.

"Teloradio" Headphones

Complete set of parts to make a magnificent pair 4000 ohms Wireless Headphones, exceptionally sensitive and equal to any pair costing 25/- pair.

Parts consist of :— Aluminium Telephone Cups, Ebonite Earcaps, Diaphragms, Magnets, Head Wires, Swivel Pieces and Forks, 4 Bobbins wound to 4000 Ohms, Double Cords, Nuts, Screws, Bushes and Washers, Book of Instructions. All parts highly finished and heavily Silver-plated.

Box of parts for complete Double Headphones ... ... **10/-** ea.

Box of parts for Single Earpiece ... Post Free **4/9** ea.

Can be assembled in 1 hour.

COMPONENT PARTS at LOWEST PRICES

(All Post Paid)

7 Strand Copper Aerials, 100 feet lengths ...	2/6
Insulators	2d. ea.
Lead-in Tubes	1/9 ea.
Earth Clips...	4d. ea.
Nickel-plated Crystal Detector Parts	9d. ea.
Ditto, Glass Covered ...	1/6 ea.
Ditto, Ditto, Mounted on Ebonite Base with Terminals	1/11 ea.
Woods, Metal	3d. ea.
Crystals, Hertzite, Humanite, Platinite, All other kinds ...	6d. & 1/- per box.
Special selected "Teloradio" Crystal, marvellous results	1/3 ea.
Special Glass-covered Detector on Moulded Base, Detachable Cup ...	3/11 ea.
Ebonite, cut to your size	3/- per lb.
Variometers	2/9 ea.
Solid Ebonite ditto ...	4/6 ea.
The Famous "Teloradio" L.F. 4 to 1 Ratio Inter-valve Transformers, Mark I. pattern... ...	15/- ea.
Ditto, Mark II. pattern ...	10/- ea.
H.T. Batteries, Tapped 30 volt	5/9 ea.
60 volt	11/6 ea.
Valve Holders, Ebonite ...	9d. ea.
Fixed Condensers, all Capacities	1/- ea.
Variable Condensers, all Capacities, lowest prices	
Ebonite Knobs	3d. ea.
Filament Resistances	1/9, 2/3 & 2/9 ea.
Labels, any name	1d. ea.
Condenser Scales	3d. ea.

Every Purchase is a Bargain if it's "Teloradio" Goods.

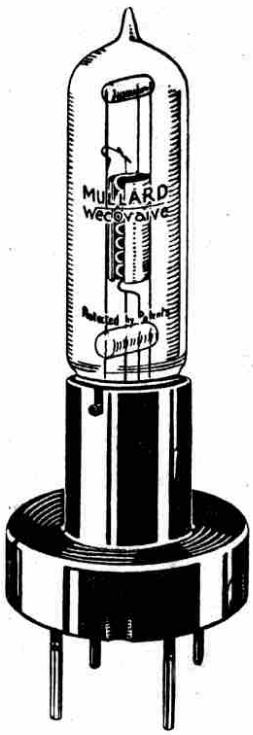
SEND FOR COMPLETE LISTS

THE TELE-RADIO CO.

Edgbaston Works, Gough Road, BIRMINGHAM

Our Goods are obtainable from most dealers. If not write us direct.

WIRELESS VALVES.



Mullard Wecovalves.

The Mullard Wecovalve, fitted with a standard 4-pin base, is the last word in Wireless Valves. It takes but a single dry cell to operate the filament, and a cell of normal size will last for months.

The cost of the valve is 30/- and its life is therefore of great importance compared with that of inexpensive dry cells.

In normal use, the Mullard Wecovalve filament will last for 4,000 hours, whilst mechanically it is unbreakable.

It is short and robust in construction and has in no way been attenuated in order to reduce current consumption.

The life of the valve is no longer than that of its filament.

Turn these points over and then order Mullard Wecovalves for your set.

MULLARD

Advt.: The Mullard Radio Valve Co. Ltd., Balham, S.W.12

(E.P.S. 85)

A Talk About Aerials

By the
Radio Editor

This is the concluding instalment of a serial article dealing with the erection of different types of aerials. In previous issues we have described a simple form of aerial and also featured the two popular types, the inverted L and T aerials, generally used by amateurs. On this page we deal with multiple wire aerials, indoor, and frame aerials. Having followed the remarks in these articles, any reader of the " M.M." should be able to erect his aerial and satisfactorily receive telephony and telegraphy.

AERIALS of two or three wires may be hung from chimney to chimney or from chimney to pole, or, failing this, from chimney to clothes-post, just in the same way as a single-wire aerial. It is almost impossible to say what results will be obtained with such aerials, however, as so much depends upon local surroundings and only actual experiment can decide.

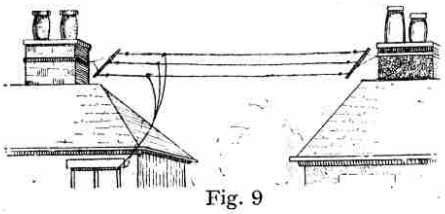


Fig. 9

Aerials with more than three wires may be employed, but are not generally used for reception. The most popular type of multiple-antennæ aerial is the cage type (Fig. 10) generally used for transmission by low and medium-power stations. The aerials of the Broadcasting Company are of this latter type.

VII.

Even if it is not possible to fasten the wire to the chimney, good results sometimes may be obtained with one end of the aerial fastened to the window frame of the highest window in the house, and the other end taken to a similar window of a neighbour's house (Fig. 12). If this is not possible the second end may be attached to a garden fence or to a pole in the garden, or to a " jury-mast " fixed to the clothes post.

It is always better to keep the aerial as high as possible, and if one end is attached to a chimney and the other taken to a chimney of a neighbour's house (Fig. 9), the aerial will give much more efficient results than would be the case if the second end were taken to the garden fence. If you have to choose between a short high wire, however, and a long low wire, you should select the latter, even if its height is only 15 or 20 ft.

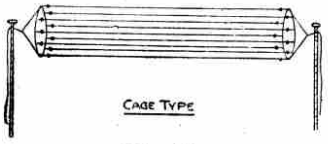


Fig. 10

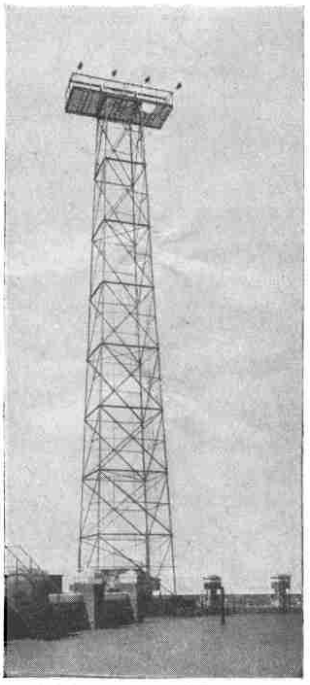
Sometimes a greater height may be obtained by using a pole to support the top end of the aerial (Fig. 11). In this case if the height of the pole does not exceed the limit allowed (which is unlikely in a dwelling-house), the lead-in wires should be fixed to the highest end of the aerial and not as shown in the sketch, for thus a greater length of wire will be in use, giving greater efficiency.

An important point to remember when erecting an aerial is to keep the wire free from " kinks "and twists. Once a kink occurs it is almost impossible to straighten the wire out again. A kink causes the strength of the wire to be considerably reduced, so that sooner or later it will snap.

The lead-in wire should not be so tight as to impose too great a strain on the aerial wire, which throughout its length will be subjected to severe strains on windy days.

VIII.

No aerial can be as efficient as a good outdoor aerial as high and of as great a length as the regulations permit. Those boys who live up to say 10 miles from a broadcasting station, and who are not able to put up an outdoor aerial in any form, might try the effect of an inside aerial. If the conditions are satisfactory this will give good results with a crystal receiver at distances of up to a few miles from the broadcasting station. In America a member of the Meccano staff has successfully used an indoor aerial with the Meccano Crystal Receiver, and although he is 15 miles from the broadcasting station at New York he obtained excellent results.



Photograph by] *[Western Electric Co.*

One of the Two Aerial Towers of "WBAY," a well-known U.S.A. Station

This tower, 100 ft. in height and situated on the summit of a high building, will withstand a wind pressure of 5,000 lbs. The platform enables men to work aloft with safety.

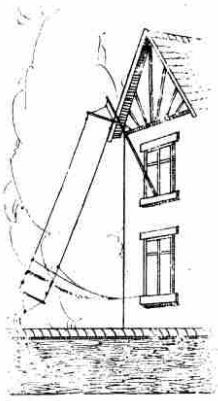


Fig. 11.

An indoor aerial must not be confused with another type, the frame aerial, also used indoors. An indoor aerial is made by simply stretching the ordinary aerial wire between the walls of an upper room. Sometimes satisfactory results may be obtained by stretching the aerial wire across the rafters in the " loft," or unoccupied space to be found immediately below the roof in most houses. The lead-in wire may be taken downstairs to the receiving instrument in the ordinary way if desired.

An indoor aerial of this type must, of course, be insulated and not touch the wall at any point. It may be suspended from insulators, which (in the case where the aerial is in a room) may be conveniently supported by means of picture hooks hanging from the picture-moulding. The lead-in wire, if taken out of the room, must be carefully insulated, so as not to " earth " the radio impulses from the aerial.

Loop or frame aerials cannot be used satisfactorily with crystal sets. Their use is confined to receiving sets that employ valves, as the impulses received by them are too minute to be rendered audible by a Crystal detector.

IX.

Whatever form of aerial is employed it is very important to have a good earth connection. The best connection that can be made is to solder or clip the earth wire to a water pipe, previously scraped clean from dirt or paint before the contact is made. Bind the wire tightly around the pipe a dozen times and make the connection permanent by clipping the

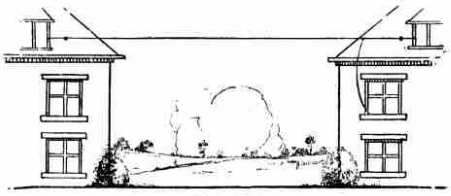


Fig. 12

two together with a Meccano or other metal strip. Earth connections should not be made to gas-pipes, as very often the conductivity of the pipe is broken by the red lead used in the joints.

For those who do not mind a little trouble a good earth connection may be formed by burying an old bucket or a piece of wire netting (about 6ft. square)

(*Continued on page 17*)

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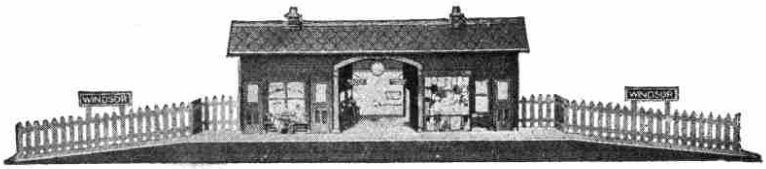

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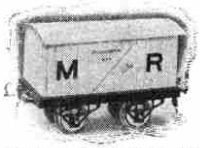

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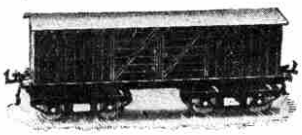

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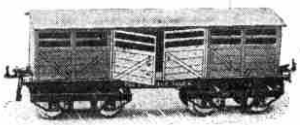

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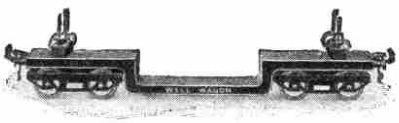

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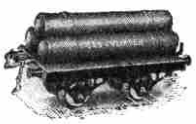

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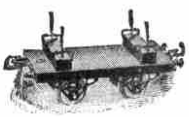

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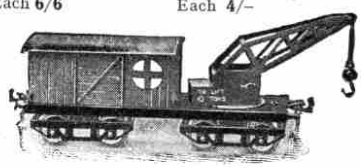

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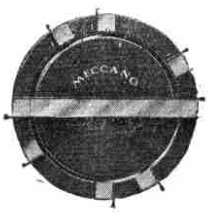

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Send for your Entry Form to-day. Post Free from Meccano Ltd., Liverpool.

A Talk about Aerials—(*cont. from page* 15)

2—4ft. below the ground, and soldering or clipping the earth wire to it. The wire netting should be laid flat in moist ground if possible, for it is due to the moisture in the earth that it is a conductor.

X.

As will be gathered, there is considerable scope for ingenuity in the erection of an aerial, and there is great fun to be obtained from experimenting with the various types.

It should be remembered that an aerial does not necessarily require to conform to the recognised standard type. For instance, before the war, I received time signals from the Eiffel Tower, Paris, using an ordinary bedstead as an aerial, well insulated from the floor by placing under the four legs glass supports sometimes used under pianos. Good Morse signals were also received on a wire stretched across a large lumber room at the top of the house, which wire, when not being employed for the reception of wireless signals, was used as an indoor clothes line. A Manchester friend of mine, with a four valve set, receives broadcast from the Manchester station using an ordinary kettle as an aerial!

(THE END).

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