HAVE YOU SHARP EYES?—A CHALLENGE TO MECCANO BOYS—see page 3

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MONTHLY

EDITORIAL

IN this issue I am making a departure from my usual talk with my readers, and propose saying a few words about the "*M.M.*" and its future policy.

A Successful Competition

For some weeks past I have been following very closely the course of our "Improving the '*M.M.*'" Competition, and I have been gratified by the splendid response from my readers. The large number of communications received shows the great interest taken in our contests. Large, however, as the number of entries is, they do not represent half of those who read the "*M.M.*" regularly.

Those readers who have not written to me in connection with this competition are keen enough to buy and read the "*Meccano Magazine*," and they fall into one of three classes. Either (1) they are too lazy to write to me, or (2) they are perfectly satisfied with the "*M.M.*" in its present form, or (3) they have no ideas to give or criticisms to make, and are content to take whatever comes.

Brainy Suggestions Appreciated

I must say I appreciate more those thousands of readers who have shown sufficient keenness and enthusiasm to give me the benefit of their assistance, in accordance with my original request. Their views are cordially welcomed, and will be reflected in future issues of the "*M.M.*" which will continue to show improvement.

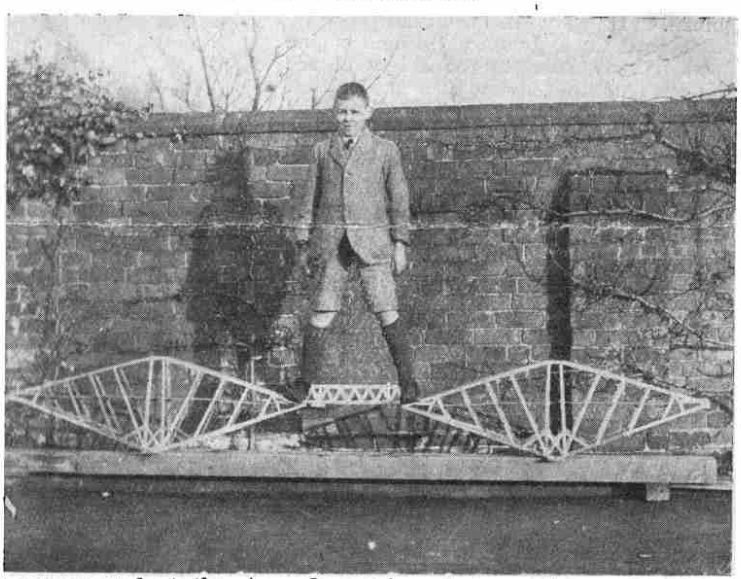
I am not able to say a great deal in this issue regarding the results of the competition, for the replies are now in process of classification. I may say, however, that I am strongly impressed by the insistent demands for "more Meccano models" that have run through almost all the letters received. I shall have occasion to refer to this important feature again in future issues, but in the meantime

An Important New Feature

I have pleasure in making the preliminary announcement that arrangements are being made to commence a series of articles on Meccano models and model-building immediately. The subjects dealt with will be special models that are not already described in our existing Manuals of Instructions for building. The issues in which these models are described will not only form a very valuable supplement to our regular Manuals but will also give additional attraction and enjoyment to the Meccano hobby.

A Firm Foot-hold

Our illustration shows a model of the Forth Bridge, built by Master J. C. Ward of Ilkeston, which, incidentally, pays a remarkable tribute to the strength of Meccano, for it is supporting unaided the weight of this happy Meccano boy.



As most of our readers know, the Forth Bridge is built on the cantilever principle, the triangular trusses resting upon columns sunk in the river. The meaning of cantilever is "a projecting beam unsupported at the outer end," and it is this principle that is used in many of the world's largest bridges. It is interesting to note that the Chinese used the cantilever hundreds of years ago, anchoring the beams of their bridges in masonry towers and spanning the gap across a stream or river by placing a long beam on the anchored beams.

In our issue last month we referred to the effect of temperature on the Crystal Palace and the Eiffel Tower, which causes these structures to expand in summer and contract in winter. It is interesting to note that in the case of the Forth Bridge the contraction and expansion allowed for, due to the changes in temperature of the atmosphere, is about 7 ft.

Special Articles in this Issue :

144 Miles an Hour in a Giant Bomber
Have You Sharp Eyes ? A Challenge to Meccano Boys
Serial Story "A Night at the Pool"
The Meccano Crystal Receiving Set No. 2 (Constructive Type)
The Men Who Gave Us Radio
Guild Notes and News
The Passing of the "*Faraday*"

144 Miles an Hour in Giant Bomber:

The Most Powerful Aero-Engine in the World

AN extraordinarily powerful aero-engine has recently been produced by Messrs. D. Napier and Sons Ltd., a firm well-known as manufacturers of aero-engines of high grade.

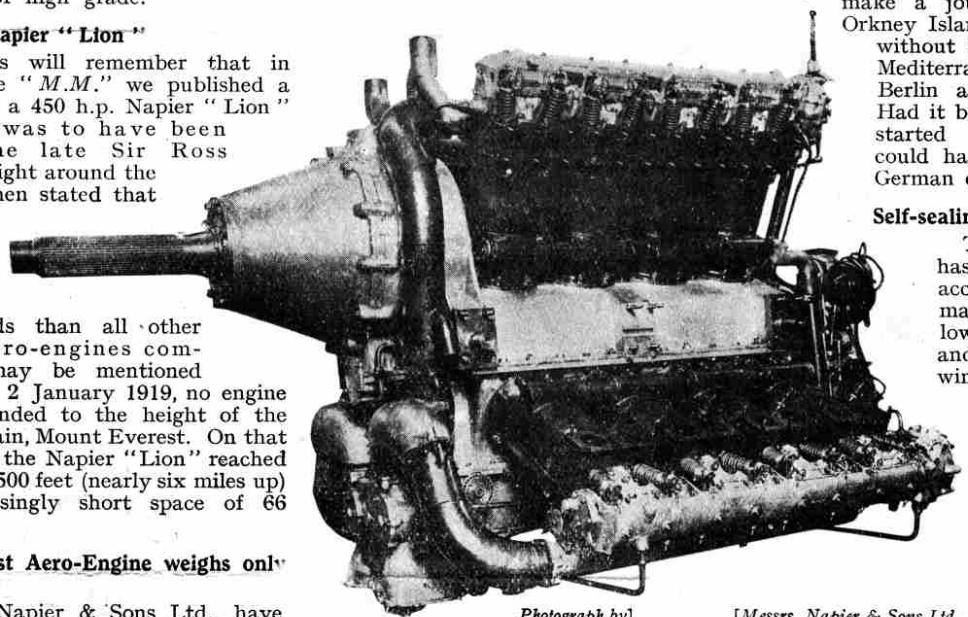
The Famous Napier "Lion"

Our readers will remember that in No. 29 of the "*M.M.*" we published a photograph of a 450 h.p. Napier "Lion" engine that was to have been used by the late Sir Ross Smith in his flight around the world. We then stated that the Napier "Lion" engine is claimed to hold more British records than all other makes of aero-engines combined. It may be mentioned that until the 2 January 1919, no engine had ever ascended to the height of the highest mountain, Mount Everest. On that date, however, the Napier "Lion" reached a height of 30,500 feet (nearly six miles up) in the surprisingly short space of 66 mins. 15 secs.

World's Largest Aero-Engine weighs only 2 lbs. per h.p.

Messrs. D. Napier & Sons Ltd., have not rested content with this and the many other records of height, speed and reliability that stand to their credit. They have now "gone one better" and built the largest aero-engine in the world, the subject of our illustration.

Although this engine develops over 1,000 h.p., it is remarkable that its complete weight is only just over 2,000 lbs. In the accompanying photograph we show an interesting comparison of the 1,000 h.p. Napier Aero-engine alongside a locomotive. Although the latter develops approximately the same horse-power, yet it weighs 147,840 lbs.!



Photograph by] [*Messrs. Napier & Sons Ltd.*

The Most Powerful Aeroplane Engine in the World: The 1,000 h.p. Napier "Cub"

The Massive Propeller

It is not permitted to disclose detailed information in regard to this new Napier monster, but it may be stated that it is built on the X-principle, and has 16 cylinders. It is fitted with an enormous four-bladed air-screw, or propeller, which is a fearsome object.

The designing and developing of such an engine as the 1,000 h.p. Napier "Cub" is a task involving considerable thought and foresight and one that occupies a great deal of time. It is interesting to learn that although the firm commenced to design the "Cub" in the early part of 1919, the engine was not delivered until two years later.

A Monster of Great Destructive Power

This enormous engine has recently been built into an Avro metal aeroplane, which has the distinction of being the largest single-engined bomber in the world. The machine has been specially built for the British Air Ministry and is of a new type. It has been designed to give a very wide range of action and in service will carry several tons of bombs. In addition there will be a crew of three, each of whom will be able to change places whilst the aeroplane is in flight.

From London to Norway and back, non-stop!

The giant bomber will be capable of non-stop out-and-return flights of 1,000 miles. The machine could therefore make a journey from London to the Orkney Islands, or to Norway, and back without landing. It could fly to the Mediterranean and could nearly reach Berlin and return, without landing. Had it been used in the war and been started from France, it certainly could have reached and bombed the German capital with ease.

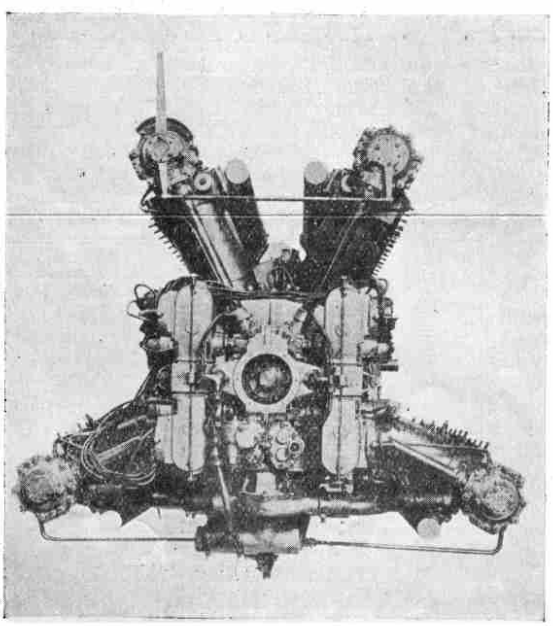
Self-sealing Fuel Tanks

The hull of this giant bomber has two decks. The uppermost accommodates the pilot and the machine-gunner, whilst on the lower deck is the bomb-sighting and bomb-dropping gear. The wings are designed to fold back so that the aeroplane will not occupy a great deal of space, and can thus be accommodated in a comparatively small hangar. The fuel tanks are self-sealing, so that should they be pierced by enemy bullets they will not leak. The aeroplane may be controlled from two points, and electrical heating apparatus is installed.

The engine is started by a small two-cylinder petrol engine, operated from the pilot's cock-pit.

We hope to give an illustration of the giant bombing aeroplane in our next issue.

(To be continued)



Photograph by] [*Messrs. Napier & Sons Ltd.*

End-on view of the 1,000 h.p. Napier Aero-Engine

Photograph by] [*Messrs. Napier & Sons Ltd.*

Dignity and Impudence

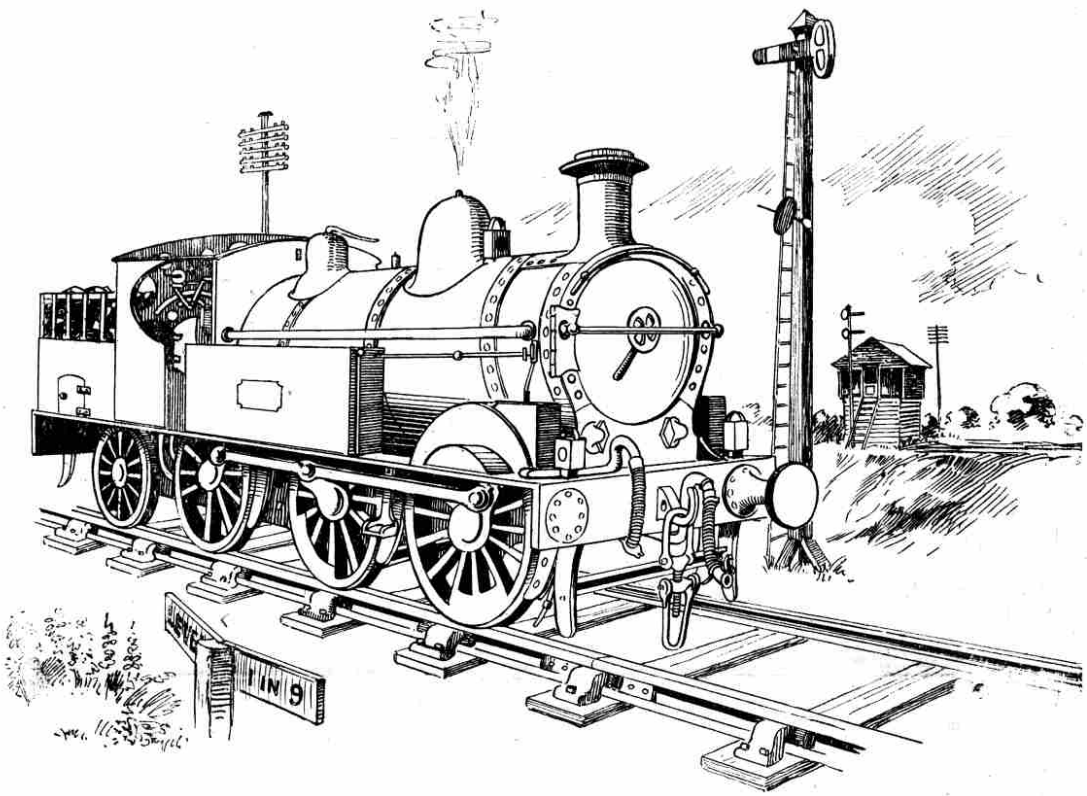
The 1,000 h.p. Napier Aero-Engine alongside a locomotive that develops approximately the same power

A CHALLENGE TO MECCANO BOYS

Have You Sharp Eyes?

AS I told my readers in the last number of the "*M.M.*", I have always maintained that among Meccano boys are to be found the sharpest and most intelligent boys in the world. You can imagine my feelings, therefore, when some little time ago a gentleman expressed it as his opinion that Meccano boys had no more intelligence than any other kind of boys! He claimed, moreover, that he could submit a test that would demonstrate the truth of his statement, and on behalf of the readers of the "*M.M.*" I at once accepted his challenge.

Some weeks elapsed before I heard from him again and I concluded that the matter had fallen through. One morning, however, I received from him an extraordinary drawing, and then I understood the reason for the delay. It happens that this gentleman is an artist, and it is evident that he had spent a busy three weeks in designing a locomotive of such a peculiar type as had never been seen on any railway under the sun! Look at the drawing reproduced on this page and I warrant you will be puzzled. Nothing seems right, except that there is no doubt it really is intended to be a representation of a locomotive.



The artist writes that he is prepared to give a handsome prize to the Meccano boy who will specify every mistake that he has made in his drawing. If every error is not pointed out, the prize will go to the boy who points out the greatest number of mistakes. I shall supplement this gift by giving a prize to the second and third lists, in order of merit.

Now boys, here is a test of your powers of observation. Those of you who have followed the articles on "Super-Locomotives" that have appeared recently in the "*M.M.*" will be able to see several errors immediately. Others, who are not familiar with locomotive construction, will probably make their way to the nearest railway station and spend some time in a minute examination of the locomotives to be seen there!

Entries must be received by the 30th June next (Abroad 31st August). Each error pointed out should be numbered, and the total given at the foot of the list. The mistakes should be described as briefly as possible. Do not write a long treatise on locomotive construction, as we feel sure that the gentleman who put forward this challenge is too busy to give such entries consideration! He will have quite enough to do as it is, to read through the thousands of replies that we feel sure will be sent in. We have no hesitation in saying that every Meccano boy worthy of the name will respond to this challenge, so that the reputation of a million Meccano boys for intelligence and sharpness will be vindicated.

Bright Ideas

Bernard F. Bell (Balham).—Your suggested spring point is on the lines of the catch point. Whether it can be applied in a practical way to the Hornby trains we do not quite know, but we shall carefully consider the idea.

M. Progent (Toulouse).—(1) A flexible joint such as is employed in our model Chassis may be constructed from existing Meccano parts. (2) As we do not advocate the use of Meccano parts for making railway tracks, we regret we are unable to consider your idea.

Alec Issigorins (Malta).—Your suggested forked rod for operating the shift gear is on the lines of automobile practice. We think there may be uses for your suggested dogs or claws, but in a modified form.

Norman F. Keith (Geelong, Victoria).—Your ideas for threaded rods with holes at either end for handles, and threaded collars to be fitted to a short length strip will be considered if you will state to what particular uses these two items are applicable.

M. Langendorff (Paris).—We endeavour to adapt all Meccano parts to general use, and your suggested wheel to represent a grindstone in a mill would serve no practical use apart from the instances mentioned.

G. E. Farr (Bristol).—We illustrate an electro magnet in our Electrical Manual. This is practically the same as the circular magnet you suggest, the difference being merely in the shape.

Leonard Winter (Eltham, S.E.).—We are continually adding to the accessories for the Hornby Train, and no doubt we shall introduce turntables and signal boxes in due course.

M. Flonches (La Fleche).—The use of the Meccano Clockwork Motor as motive power in the Hornby Loco would make the construction too bulky for use with Gauge 0 rails.

E. Newton (Sheffield).—(1) A connecting rod may be made from existing parts, i.e., a rod and two couplings. This adaptability is one of the great features of Meccano. (2) The whole question of curved sections will shortly be under review.

K. J. Watson (Wigton).—The four ideas you send are already receiving careful consideration.

A. Thuanet (Blois).—Good representation of a boiler or cylinder can be constructed from two face plates, joined together by double angle strips of the desired length.

H. Richardson (Northwich).—Your sketch of a circular saw is designed on the lines of a clock escapement wheel. We think perhaps it might serve the dual purpose, and we shall give it consideration.

F. Shaw (Gt. Ouseburn).—There may be possibilities in your suggested sliding point. We shall consider it and see how it fits in with our present radii.

P. S. Evetts (Streatham, S.W.).—(1) We have in view a large variety of new additions to the Hornby Train rolling stock. The milk-van and turntable are already on our list. (2) The crank handle may be extended to any size by adding a rod of requisite length, making the connection by means of the coupling.

A. Dubois (Paris).—The wheels used in the model motor chassis are our standard 3" wheels (No. 19b).

L. Nash (Uxbridge).—We are introducing a crane-truck shortly. Your sketch apparently represents a following-truck, supporting the jib. The Hornby crane truck will be a complete unit.

R. J. Warr (Manchester).—We are introducing a bolster or boiler truck very shortly. We heartily reciprocate your good wishes.

F. Jarvis (Brethersden).—(1) The slight projection of the boss on one of the sides of the bush wheel is caused by pinching the boss into the wheel. One or two washers between your connecting strip and the wheel will prevent the boss interfering with its free action. (2) Regarding your suggestion for a piston, see our model No. 307 (Oscillating Steam Engine), for the method we have adopted.

A NIGHT AT THE POOL

BY

Bernard Sexton

SYNOPSIS

Red Hawk and Wolverene, two young Mohawk Indians, were returning from a hazardous expedition. Encamped on a sacred Indian mound, they were in great danger, for they had been followed for several days by three hostile warriors. Leaving Wolverene by the camp fire, Red Hawk had slain one of these hostile warriors by his Indian subtlety. Carrying the body to the camp fire, he set it up against a tree, so that the remaining enemy warriors would think it was the Mohawk himself, asleep. Red Hawk then disappeared in the forest to track down his second enemy. After waiting behind a great hemlock for over an hour he heard a minute sound, which he knew was caused by the approach of one of his pursuers.

V.

AN hour later, the form of Red Hawk had not perceptibly changed its position. He still stared with penetrating vision down the forest aisles. Now and then he closed his eyes so that he might see more clearly in the dusky air.

After an hour and a half had passed he thought he saw a stone lying between two of the trees, where hitherto his watchful eyes had seen nothing. He stared at that stone, putting forth all his powers of perception. About the same time there came to his ears the minutest of sounds, an infinitely slight vibration of matter, similar perhaps to the crunch of a soft paw on the soft hemlock leaves. . . . But Red Hawk knew this tiny sound was not caused by a paw.

The creature passed in front of the hemlock behind which Red Hawk was crouching. It moved with infinite care, and so well did it simulate the shape of a wild beast that it was with difficulty that the young Mowhawk made out its true form. At last, however, he saw that this creature was indeed a warrior, advancing on hands and knees towards the camp. When he moved he lifted leg and hand with infinite caution. They hovered in the air and descended softly as a snowflake. Then he waited with tireless patience, studying the man who sat against the tree by the fire to see if he exhibited any trace of alarm.

As he went by, Red Hawk shifted his position to the other side of the tree. The creeping warrior seemed now as near to the camp fire as he wished to be, and remained motionless for a long time. But this was only in seeming. He was really rising to his feet, but so slowly that he seemed more like the stump of a tree that has been struck by lightning than anything human. As he rose to his feet so did Red Hawk. He saw that the warrior had a bow in his hand and that he was fitting an arrow to the string. Slowly the archer took position. From where he stood a faint red glow of the fire still illumined the shape that leaned against the tree.

He fired a perfect shot. The arrow hummed the air and struck home. It quivered in the breast of the dead. The archer having shot his bolt remained frozen to an attitude of attention while he watched the outcome of his act. No doubt he expected an instant outcry. He must have thought that the stricken man would stagger to his feet, and perhaps call aloud in his death agony. Nothing happened, however, and the man by the fire with an arrow projecting from his breast remained as quiet as before. . .

Behind the archer as he fired crouched the tense figure of Red Hawk. He saw the arrow strike home. For a moment he permitted the archer to stand in that attitude of frozen surprise. The man was about to turn, to flee from an adventure which bore such incredible results, when a strong hand seized him by the throat and he was dragged violently back. In silence he received the knife into his heart. He became limp and sank in the arms of Red Hawk.

The young Mohawk crossed the brook in silence, carrying the body. He laid it by the fire opposite the other so that it seemed a sleeping man. Then again he stepped back in to the shadow.

"Two," he said softly. "Put wood on the fire. Cover him."

"Two," answered a voice from the bushes.

Wolverene crept close behind the dead man in such a way that he was indistinguishable from him. He thrust out an arm that seemed the arm of the dead and put wood on the fire.

The arrow hummed the air . . . . .

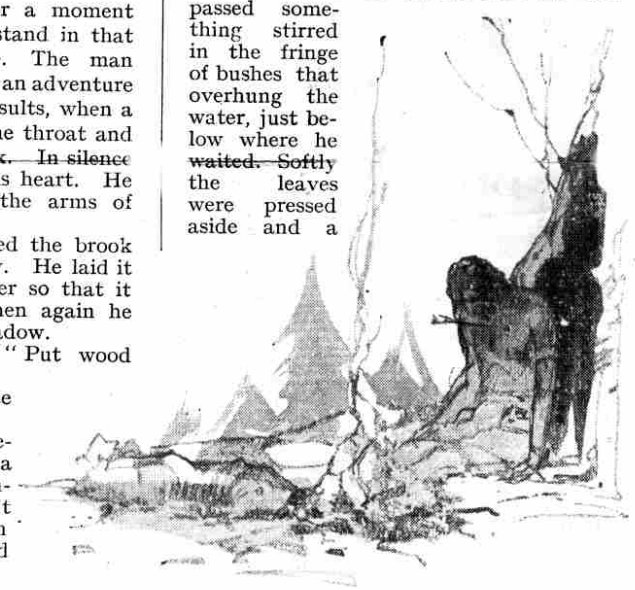
VI.

The fire blazed up after a minute or two of smouldering and revealed a man sitting against a tree. His head stooped on his breast like a watcher who is drowsy, while across the fire a sleeper lay sprawling.

Red Hawk crouched in the shadow listening. It was now the middle of the night. The woods were more silent than before. His ears drank in the soft murmuring of the brook, and the splash of a musk-rat working downstream. From the hill that blocked the eastern sky came the faint and mournful cry of an owl. Red Hawk paid a tribute to the ghostliness of that sound by a slight tremor of the body. Like all the Mohawks he was fierce, implacable, utterly without the manifestation of fear when dealing with a living enemy. But there were hours of the night when, with the hooting of the owl, he remembered for a brief moment the fears of his childhood. Then he experienced that terror of darkness from which few brave men are immune.

Nearly an hour passed as he listened without changing his position. Then as softly as the drift of thistle-down he moved around the camp in the darkness. Passing between it and the hill, he moved down stream. Fifty paces away he paused. At this point the stream ran between high banks, and from the edge of the take-off to the surface of the water there was a distance equal to the height of a man. Here the water ran smooth and deep. There was no noise of stones or gravel. The place was steeped in silence.

Above this stretch of water Red Hawk crouched waiting, his eyes fixed on the shrubbery downstream. He had not long to wait this time. Before half an hour passed something stirred in the fringe of bushes that overhung the water, just below where he waited. Softly the leaves were pressed aside and a



and struck home . . . . .

A Night at the Pool—*(cont.)*

lithe figure emerged. Stepping in the centre of the stream it moved slowly towards the watcher. At every step the man in the brook lifted his head and held his senses suspended.

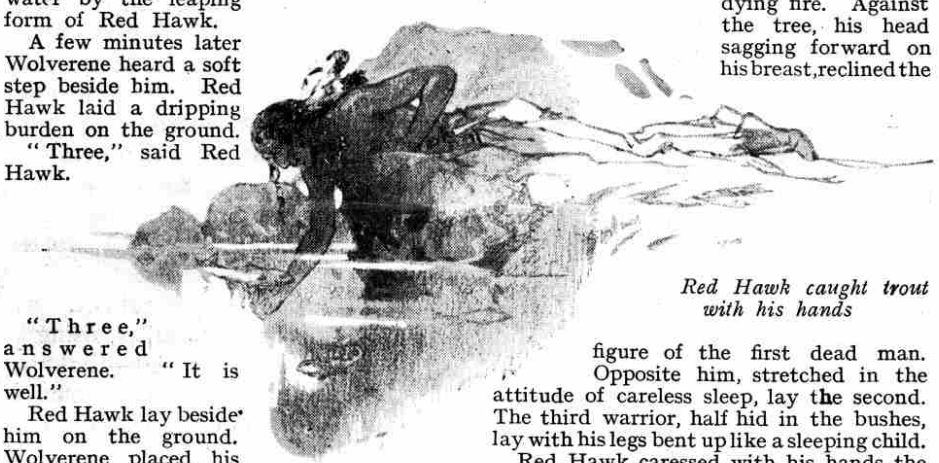
A dead twig fell from a tree just above the Mohawk, and he saw the figure in the water stiffen and remain motionless for a long time, until convinced that the sound conveyed no menace. At last he moved on and arrived just below Red Hawk, who peered down at him from a tangle of shrubbery that would make him invisible except to the keenest eyes. The Mohawk remained perfectly motionless. His enemy was now only the length of a man away and Red Hawk was nerving his muscles for a spring. At this moment, however, he must have made some trifling noise which, barely perceptible as it was, betrayed to the savage below that somehow he was in peril. The first sign he showed of his knowledge was to crouch still closer to the water. He turned his head slowly from side to side, gazing around in every direction, seeking to penetrate the mask of night.

At last his eyes rested on the very spot from which the face of Red Hawk peered forth. The youth remained motionless. Now was the supreme test of his nerve. He must absolutely trust the concealment offered by his own stillness and the confusion created by the crossing of a few twigs before his face. For a long time neither of the men stirred. Each one stared into the face of the other, but while Red Hawk was sure of his man the other was uncertain as to what he saw.

His uncertainty did not lessen his caution, however, and he slowly began to edge towards the other side of the stream. As he moved his feet through the water, he was impelled to believe that he discerned a slight movement in the bushes that he had just been watching. He reached the bank and was putting one foot slowly up the bank to find a hold, when there was a swift motion. He ducked just as a tomahawk whizzed by his topknot, and a moment later he was thrown into the stream and crushed under the water by the leaping form of Red Hawk.

A few minutes later Wolverene heard a soft step beside him. Red Hawk laid a dripping burden on the ground.

"Three," said Red Hawk.



Red Hawk caught trout with his hands

"Three," answered Wolverene. "It is well."

Red Hawk lay beside him on the ground. Wolverene placed his hand on the hand of his comrade. His voice was full of wonder.

"You are a great warrior," he said. "In one night you have slain three armed enemies. Truly the Long House will ring with your praise."

"I expected three," answered Red Hawk, "and it is easy to kill when you know that the enemy is coming to seek you. I knew that none would come from the Hill. Now I will sleep, for morning comes soon and we must be on the way."

"I will watch while you sleep."

VII.

Wolverene sat and watched the woods. Patient, motionless, he waited by the side of his comrade for the coming of dawn. The fire had gone down to smouldering ashes, but in the starlight he could still see the dead man sitting by the fire, his head fallen forward on his chest, and the other lying as if asleep where he had been laid. The third man was stretched at the feet of Wolverene.

When the dawn came the two young men rose and built up the fire. Again Red Hawk caught trout with his hands, while Wolverene tended the fire and cooked. Before eating they stripped off their buckskin shirts, took off mocassins and hunting trousers, and bathed themselves in the pool. Before the sun rose over the hill to the east they had finished. Then they quenched the fire with handfuls of water, and stood for a space looking down at their camp before leaving. A moment later they were on their way through the woods, skirting the sacred mound—on their journey homeward to the fires of the Mohawks.

Before they were entirely out of sight of camp, by a common impulse they turned to look back. A faint steam rose from the dying fire. Against the tree, his head sagging forward on his breast, reclined the figure of the first dead man. Opposite him, stretched in the attitude of careless sleep, lay the second. The third warrior, half hid in the bushes, lay with his legs bent up like a sleeping child.

Red Hawk caressed with his hands the three scalps that hung at his belt.

"Ho!" he said softly, turning his handsome boyish face to Wolverene "They were brave men. I will be glad to meet them when I go to the land of spirits."

He turned with light and certain steps towards the west, towards home.

THE END.

A strong hand seized him by the throat and dragged him violently back

Our New Serial

This is Jack Bulmer, the hero of our New Serial

From the forests of North America to the playing fields of St. Winifred's is, indeed, a big change. But so successful has been our first serial story that I feel compelled to respond to the request of the large number of my readers who have asked for a school story.

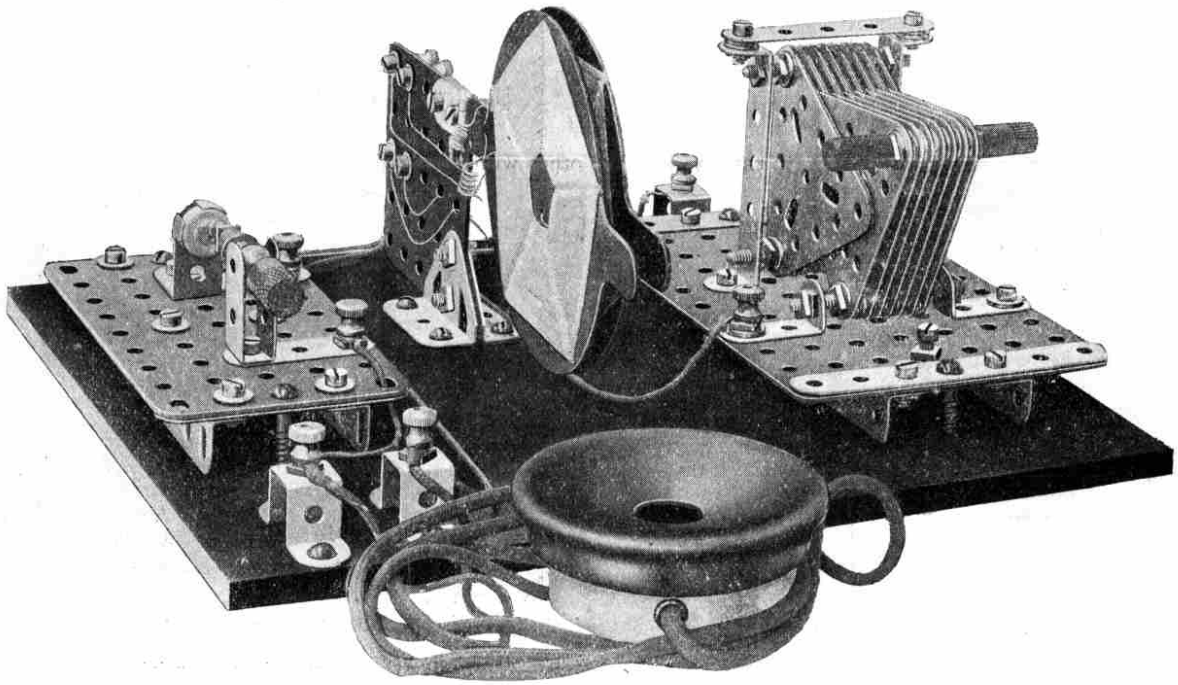
I have pleasure in announcing, therefore, that I have arranged to publish a short serial story entitled "*Bulmer's Father.*"

The story, which will be illustrated, will commence in our next issue and will run through the following two issues. Do not miss this splendid story of school life—but order your copy of the "*M.M.*" *NOW*, either from your dealer or direct from this office. The price is the same in either case, 6d. for six issues, 1/– for twelve

Editorial Office: Binns Road, Liverpool.

The Meccano Crystal Receiving Set No. 2

CONSTRUCTIVE TYPE



The Meccano Crystal Receiver No. 2

In the next issue of the "*M.M.*" we shall commence a series of illustrated articles giving full particulars for the assembling of this set, so that any intelligent boy may construct it. Those who wish to proceed immediately with the construction of this set should send for the complete illustrated instruction leaflet, price 4d. (post free).

OUR illustration shows a Crystal Receiving apparatus made from Meccano parts. The full set of parts may be purchased complete in strong carton, price 40/- Those boys who already have a number of the parts, may purchase separately any additional parts necessary to complete the set.

How to Build the Set

We are very desirous that all Meccano boys shall be able to participate in the joys of Radio, and that they may keep in close touch with the developments of this wonderful science. We therefore announce the Meccano Receiver No. 2, which is of great simplicity in design, and may be assembled in one evening.

Experimental Licence Necessary

This set cannot be used under the ordinary broadcasting licence. Negotiations are now taking place with the Postmaster and with the British Broadcasting Company, however, so that a special licence may be issued for home-constructed sets such as this. If this special licence is available it will be possible to use the Meccano Crystal Set No. 2 under it. Full particulars of the new licence will be announced in the "*M.M.*" as soon as they are available. In the meantime the Meccano Receiver No. 2 may only be used with an Experimental licence.

Those who possess a broadcast licence should use the Meccano Receiver No. 1, full particulars of which are announced elsewhere in these pages. The Meccano Receiver No. 1 has been fully approved by the Postmaster General for use under the Broadcast licence. Although of different design to No. 2 Set, it gives results equal to those obtained with the latter.

The Meccano Receiver No. 1 receives on wave lengths from zero to approximately 1,000 metres.

Of Proved Efficiency

Both No. 1 and No. 2 Sets have been tested thoroughly in London, Paris, New York and in many other cities. In each case excellent reception has been obtained from broadcasting stations within a radius of 20—30 miles. In London, broadcast from 2 L O has been received with great clearness. In New York, the set has proved to be as efficient as the more costly and elaborate instruments in use there. In Paris we have heard with perfect clarity, concerts broadcast from the Eiffel Tower. In Liverpool broadcast from the Manchester station is satisfactorily received at distances of up to 33 miles, using a standard P.M.G. aerial—that is, an aerial that does not exceed 100 ft. in combined height and length.

The Meccano Crystal Set No. 2 is suitable for receiving telephony or Morse signals on wave lengths of from 300—400 metres. Reception on higher wave-lengths is possible by adding additional inductance discs.

The Men Who Gave Us Radio:

III. STEINHEIL, MORSE, LINDSAY, Etc.

Previous articles in this connection have dealt with the work of Gilbert, Galvani, Volta, Ampère, Oersted, Faraday and Henry. A special article on Professor Morse and the code that he invented appeared in No. 29 of the "M.M.", a few copies of which are still available.

In this series of articles we are outlining the development of Radio by briefly describing the researches of those scientists who, before Marconi's time, laid the foundation of communication without wires. As will be seen from these articles, the invention of wireless telegraphy was not solely due to Marconi, although he was the first to put into operation a practical system. Many boys are surprised to find that Radio is the result of researches that extend over the past century. Progress may be traced by studying the lives of those men who devoted themselves to the science. The manner in which they overcame difficulties and step by step gained the desired end, is a splendid object lesson for every Meccano boy.

Steinheil

IN 1838, a further step forward was made when Steinheil, of Munich, a pioneer of the electric telegraph, accidentally discovered that the earth itself was conductive, just as Sommering had found was the case with water. Steinheil used the earth instead of a second wire in his telegraph systems, thus effecting a considerable economy both in wire and labour. Steinheil wrote that the conductive nature of the earth may be classed among the most extraordinary phenomena that science has revealed to us. He pointed out, however, that "it only holds good for short distances, and it must be left to the future to decide whether we shall ever succeed in telegraphing to long distances entirely without metallic connection."

Steinheil ultimately came to the conclusion that the amount of power that would be required for communication without wires would be so great as to render it impracticable. He showed that even the most powerful electrical means produced only small effects at distances as short as only 50 feet.

"Had we the means that could stand in the same relation to electricity that the eye stands to light" he wrote, "nothing would prevent our telegraphing through the earth without conducting wires, but it is not probable that we shall ever attain this end." Little did Steinheil think that in the short space of some seventy years, wireless telegraphy across continents and oceans would become an accomplished fact.

Morse

In 1832 Professor Morse conceived the idea of an electro-magnetic telegraph. He worked on his system and gave a demonstration of it in 1837. He developed the Morse Code for use in connection with this system of telegraphy, and it is upon this code that our modern system of telegraphy both with and without wires, has been built up. He laid a mile of insulated wire across the river at New York to demonstrate his new system of cable telegraphy. A passing ship fouled one of his wires, however, and cut it in two.

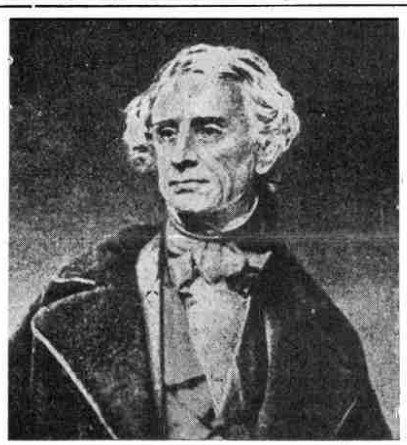
This annoying occurrence turned out to be a happy accident, for it suggested to Morse that he might avoid such accidents by arranging his wires along the banks of the river and using the water itself to conduct the electricity across. He experimented successfully with wires laid in this way on the banks of the canal at Washington, at a point where it was 80 feet in width. He stretched a wire along each bank of the river, connecting one wire with the transmitter and with a battery, and the other with a receiver, both wires being fastened to copper plates sunk in the river. The water, acting as a connecting medium between the two plates, enabled signals to be transmitted from one river bank to the other.

Morse found that the strength of the current passing from bank to bank depended on the size of the plates sunk in the water, and on the distance of the plates on each river bank from each other. Using this method, two of Morse's assistants were able to communicate successfully over a distance of nearly a mile.

Lindsay

About this time a linen-weaver named Lindsay was experimenting at Dundee. Lindsay, who is described as having been a man of profound learning and untiring scientific research, studied the electric telegraph as early as 1830. In 1843 he suggested telegraphing across the Atlantic by principles similar to those of Steinheil and Morse. Lindsay's idea was ridiculed at the time, but until the time of his death (1862) he believed that trans-Atlantic wireless would become possible. In order to fully appreciate Lindsay's work we must remember that at the time of his suggestion the electric telegraph had scarcely come into general use, whilst cable-laying was but a dream.

Lindsay carried out several experiments across the River Tay, and succeeded in signalling by conduction without wires over three-quarters of a mile. In 1854 he submitted his method to the Electric Telegraph Company, who instructed W. H. Preece to report on the matter. Subsequently Preece himself became a worker in wireless, and some forty years later greatly assisted Marconi in his early experiments. Lindsay's work played an important part in interesting Preece in the subject.



MORSE

S. F. B. Morse graduated at the University of Yale in 1810. He visited England to study painting with Benjamin West, and returning to New York in 1813 become a Professor at New York University. He devoted considerable time to electrical experiments, and was the first to communicate without wires across a river, by means of conduction. He invented a system of telegraphy and developed the Morse Code which is used to-day throughout the world in practically its original form. Morse was born on 27th April 1791 at Charleston, Mass., U.S.A., and died at New York on 2nd April, 1872.

Highton

About 1852 Henry Highton installed an instrument in his house on the banks of the Thames, and without connecting wires succeeded in receiving signals from a boat down-stream. His method was similar in detail to that introduced by Morse, and in 1872 he thought it "possible, by erecting a very thick line-wire from the Hebrides to Cornwall, to transmit a current that would be sensibly perceived in a similar line of very thick wire on the other side of the Atlantic." He pointed out, however, that "the trouble and expense would probably be much greater than that of laying a cable across the ocean."

Bonelli, Gintl and others

In the meantime investigators in other countries were also at work. Bonelli in Italy, Gintl (the inventor of a duplex telegraph) in Austria, and Bouchotte and Douat in France. There were also many other workers in the same field in Britain during the nineteenth century, but as their work does not show any advance on that of Morse and Lindsay we must pass it over.

NEXT MONTH.

WILLOUGHBY SMITH, PREECE, HUGHES, and HERTZ

M. Thomkinson (Wakefield).—(1) As you are well beyond the 25-mile radius, you could not receivebroadcast from Manchester with a Crystal Receiver. (2) Signals in the Morse Code may be received on a Crystal Set up to about 100 miles of the transmitting station. If you learn the Morse Code, a knowledge of which is not very difficult to acquire, you will be able to understand the messages received in this way.

Roger R. Webb (Plymouth).—We hear that a Broadcasting Station is shortly to be established at Plymouth. You will then have no difficulty in receiving broadcast with a Crystal Set.

Jack A. Batcup (Swansea).—A new powerful valve has been invented by the General Electric Company of New York. The filament is coated with oxide of thorium. We hope shortly to publish an illustrated article dealing with this new valve.

Matthew S. Briggs (Stoke-on-Trent).—The regulations governing the erection of an aerial are that the combined height and length shall not exceed 100 ft. As many wires as desired may be used for the antennæ, providing that the length between the two supports, plus their height from the ground, does not exceed the limit mentioned.

Thomas Stokes (Liverpool).—The instruction leaflet for building the Meccano Crystal Receiving Set is now ready. (Price 4d. post free).

T. F. Storey (Newark-on-Trent).—You are too far from a Broadcasting Station to receive telephony with a Crystal Set.

Peter Parker (London, E.C.).—Radio transmissions are not sent in one certain direction, but travel everywhere. A message broadcast by a station in London, for instance, may be picked up with suitable apparatus in any part of any room in any house, in any part of the country.

D. M. Montgomery (Chepstow).—You are well within the 25-mile radius of the Cardiff Broadcasting Station and will therefore be able to "listen-in" with a Crystal Receiving Set quite successfully.

Bernard Dooley (St. Leonards-on-Sea).—(1) You are outside the London broadcast radius, which is on the average limited to 20—30 miles for a Crystal Receiver. (2) You should have no difficulty in hearing Morse signals from ships in the Channel.

Q. Y. (Chester-le-Street).—The Postmaster-General will not allow the Meccano Receiving Set No. 2 to be used under a Broadcasting Licence because it is particularly adaptable to further experiments. The Set in question can, however, be used with Experimental Licence, and we hope soon to be able to announce that a special licence will be issued to allow its use.

Ronald Carslake (Stratford).—The specimen wire you send is cotton-covered copper wire of a very small gauge and cannot be used to advantage in a Radio Set.

T. J. Grice (Settle).—You are beyond the 25-mile radius from Manchester and therefore could not "listen-in" with a Crystal Receiver.

E. W. Willett (Cardiff).—Your detector made from Meccano is good, but a little too elaborate.

M. F. Davies (Marcross).—Your friend at Pontypool should be able to receive broadcast perfectly with a Crystal Set, as he is within the 25-mile radius from the Cardiff Station.

L. Constantine (London, N. 2).—(1) Licences are granted only to persons over 21 years of age. You should therefore ask your father or elder brother to obtain one. (2) The Broadcast Licence entitles you to use any Crystal or Valve Receiver stamped "B.B.C." To use a home-constructed Crystal Set you will require an Experimental Licence. This costs 10/–, the same fee as that charged for the Broadcast Licence.

Basil Conway (Mold).—The resistance of a conductor is directly proportional to its length, and inversely to its cross-sectional area.

M. J. Turner (Holyhead).—The use of Radio Sets is not permitted in South Ireland at present.

E. R. Jamieson (Hull).—(1) A Receiving Set constructed to your own design, even if used solely for broadcast reception, may be used only under an Experimental Licence. (2) A Broadcasting Licence covers the use of apparatus made by Companies who have previously obtained the Postmaster's approval of their Sets, which sets are stamped "B.B.C."

L. Evans (Durham).—The Meccano Radio booklet is sent to any reader post free on request.

F. C. Carlton (Hastings).—The Inductance Coil of the Meccano No. Receiver consists of 38 yards of enamelled copper wire wound on a former 5½" × 3¾". This gives a range of wave-lengths from zero to 1,000.

N. Delamere (London, E. 2).—(1) Broadcast from Marconi House may be heard every evening until 10 p.m. (2) The price of the complete Meccano Detector and Crystal, in dust-proof glass case, is 6/6.

"LISTEN-IN"

GUARANTEED

THE
MECCANO
RADIO RECEIVER No 1
For Broadcast and Morse Reception

The Meccano Crystal Receiving Set is a piece of scientific apparatus with which anyone may spend hours of delight and enjoyment "listening in" to broadcasting stations and other telephony transmissions.

It has been thoroughly tested and has received with great clearness music and speech in London, Birmingham, Manchester, and elsewhere, up to distances of 33 miles from the broadcasting station.

Low in cost and complete in itself, ready to be connected to any aerial, the Meccano Radio Receiving Set will provide hours of fun and entertainment.

PRICES:

MECCANO No. 1 CRYSTAL RECEIVING SET, complete **55/–**

MECCANO AERIAL SET (including antenna, lead-in and aerial wires and insulators) **12/6**

A splendid booklet, "The Meccano Crystal Receiving Set," explaining how easy it is to receive broadcasting, will be mailed free on application.

Address; Department R1, MECCANO LTD., BINNS RD., LIVERPOOL.

C. I. Lamb (Presteign).—Bare copper wire would not be suitable for winding a tuning inductance, which consists of wire covered with either silk or cotton, or preferably, enamel.

D. Bushell (Wallasey).—If you will send fourpence to the Radio Department, full instructions for building the No. 2 Crystal Receiving Set, including prices of parts required, will be sent.

R. Stansfield (Middleton).—A grid leak is a high resistance that dissipates the charges acquired by a condenser connected to the grid lead of a valve circuit.

E. Moore (Bradford).—A variable condenser consists of stationary and movable brass, steel, or alluminium plates, insulated from one another and so arranged that the movable slide between the stationary plates. It enables very fine tuning to be obtained, and the point of greatest signal strength located.

H. Hills (Leicester).—The ohm is the unit of resistance. A circuit is said to have one ohm resistance when a pressure of one volt is required to send a current of one ampere through it.

B. Bland (Langport).—(1) A single aerial is generally regarded as being more efficient than a twin aerial. I hope soon to publish an illustrated article in the "*M.M.*" explaining the various types of aerial at present in use. (2) Permission will have to be obtained from the City Engineer before an aerial may be erected across a street.

T. Richardson (Short Heath).—The fact that you are only a few yards from the telegraph wires is not likely to prove detrimental unless they run parallel with your aerial.

J. Batcup (Swansea).—(1) The minimum and maximum wave-lengths of a coil such as you describe is 200 and 2,500 metres respectively. (2) Ordinary electric light bulbs might be adapted so as to be used as valves, but the results would not be satisfactory. (3) There is a vacuum inside an ordinary flash lamp bulb. (4) We fear it will not be possible for you to receive concerts from the Hague with your Crystal Set, even if you use a H.F. Valve with reaction.

G. H. Smith (Waterloo).—The approximate range of the Meccano Receiving Set No. 1 is from zero to 1,000 metres. The sliding of the pointer along the inductance coil enables "tuning-in" to be accomplished.

R. Roberts (Southport).—It is impossible to judge the exact wave-length of the coils you have made without the employment of a wave-metre, which is a somewhat expensive instrument.

J. Brown (Halifax).—Effective insulators for lead-in wires of Receiving Sets may be made from pieces of rubber tubing.

Dennis Hausford (Hockley).—A crystal does not wear away in the sense that it gets smaller. By constant use it gradually loses its power of detection, or in technical terms, its sensitiveness.

THE PASSING OF THE "*FARADAY*"

A SHIP THAT LAID 50,000 MILES OF CABLE

EVEN though dozens of high-power radio stations are continuously flashing their messages across continents and oceans, communication by means of cable is not by any means obsolete. On the contrary, new cables are being laid in many parts of the world, and Messrs. Siemens Bros. & Co. Ltd., of Woolwich, have such confidence in the future of cable telegraphy that they have actually built a new cable-ship.

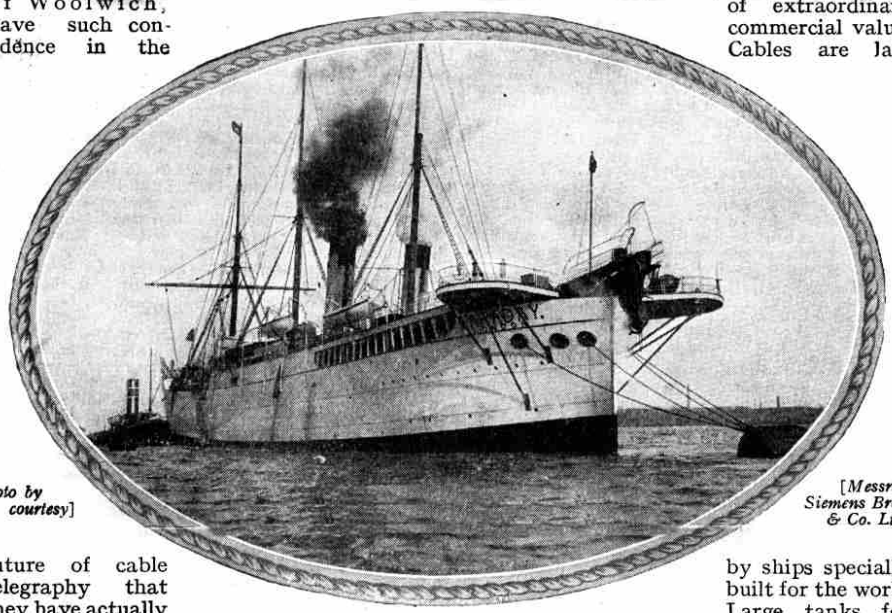


Photo by courtesy] [*Messrs. Siemens Bros. & Co. Ltd.*

The Famous Cable Ship "*Faraday*"

The First Atlantic Cable

R. M. Ballantyne, whose books are first favourite with all boys, wrote an interesting story around the laying of the Atlantic cable. The first attempt was a failure, for when the cable-laying ship was 330 miles out, the cable broke. On a second attempt the cable parted and the ship again returned home. When the cable was finally laid in 1859 it was a dismal failure from a financial point of view. From an engineering standpoint, however, it was a great success, for it demonstrated beyond doubt that submarine telegraphy was thoroughly practical.

Many cables have been laid from this country, not only to our Colonies and Dominions overseas, but also to almost every country of importance in the world. These cables have linked together widely-separated parts of the world, made possible speedy communication, and have proved of extraordinary commercial value. Cables are laid by ships specially built for the work. Large tanks for the storage of the cable take the place of the holds usually found on other vessels. Machinery for paying out the cable is installed, and there is special apparatus for testing the cable during the whole time it is being laid.

A Famous Cable Ship

Our illustration shows one of these special vessels, the cable ship "*Faraday*," named after Michael Faraday, the brilliant British scientist. This ship, which was specially built for cable-laying, has completed nearly half-a-century's arduous work in laying and repairing submarine cables in all parts of the world.

The first cable laid by the "*Faraday*" was in 1874 across the Atlantic, and the last cable laid was in 1921 from Cuba to Puerto Rico. Altogether she has laid some 50,000 miles of submarine cable, including eight cables across the Atlantic. She has also been employed in repairing cables, in which connection she has sometimes worked in water as deep as 3,000 fathoms.

The "*Faraday*," launched in 1874, is 360 ft. in length and 52 ft. in breadth, and has a gross tonnage of just over 5,000. She is propelled by twin screws, each driven by a compound engine of 500 h.p.

The Latest Cable Ship

Although still sea-worthy, the "*Faraday*" has become obsolete in many ways, and has now been replaced by a new cable ship, 380 ft. in length and 48 ft. 3 ins. in width, the gross tonnage of which is 5,370. The new vessel is equipped with triple expansion engines, driving twin screws, and her boilers are oil-fired. She carries sufficient oil fuel to give a steaming range of 10,000 miles, and her four cable tanks are capable of carrying approximately 4,500 tons of cable.

This vessel, built at Palmer's Shipyard on the Tyne, has been designed on the most modern lines and is complete in every respect. Every refinement that experience can suggest has been included, and no doubt she will play her part in establishing and maintaining communication even more satisfactorily than did her predecessor.

We hope to be able to publish a photograph of this new cable ship in the next issue of the "*M.M.*"

Are you Absent-Minded?

Every week I receive hundreds of letters from Meccano boys in all parts of the world. Some of these letters I am unable to answer because the addresses are totally, or partially omitted. Of course, there are some cases in which I can trace the correspondent's address in my files, but naturally this is only possible with my regular correspondents. In any case this entails considerable extra work and causes delay, both of which are avoided when the address is given.

I would therefore impress upon my correspondents the necessity for giving their full postal addresses to ensure a prompt reply.

If the boys whose names are given below will forward their addresses, I shall be pleased to answer their letters.

Henry Kutner,	Hackney Road.	?
F. Moore,	——	?
B. Gooday,	——	?
R. Chick,	Av. National 3571.	?
N. Stephen,	——	?
John Rimington,	Venner Road,	?
Terence Gilmore,	Richmond Row,	?
Frank Fryer,	——	Dunbridge.
Allan E. Smith,	Amerson Ave.,	?
Royce Cox,	South Street,	?
Mr. L. Braithwaite,	——	?
J. McIntyre,	Golborne Road,	?
L. G. Truman,	——	Mansfield.
E. E. Ledger,	——	?
Arthur Banks,	Redstone Road,	?
R. Greenhorn,	——	?

IMPORTANT NOTICE.

We are constantly asked to supply back numbers of the "*M.M.*" We print only sufficient copies to fill our regular orders, and back numbers cannot therefore be supplied. In order to prevent disappointment our readers are advised to place a regular order, either with a Meccano dealer or direct with us.

Successful Meccano Competition

A very successful model-building Competition was held recently by Mr. Arber, of Roman Road, Bow, London. The Competition was divided into three classes, and many interesting models were submitted, the entries being judged by our London representative. The following boys won first prizes:—

Class A. A. Cornell. Beam Engine.
Class B. L. Stubbings. Aerial Roundabout.
Class C. G. Higgins. Hoist.
Girls (Special Prize). Miss M. Botley. Lift.

The standard of work submitted was high, and well up to that of previous years, and Mr. Arber is to be complimented upon organising a very successful Competition.

The Secretary's Notes

Reviewing the work of the past two sessions I am pleased to find that our Clubs have not only made greater progress than ever, but also that many new features have been added to the programme. These include Gymnastics, Ambulance Classes, Radio, Stamp-collecting, Dramatic Sections and Minstrel Troupes. Evenings devoted to reading part of a favourite book have also been inaugurated by several clubs with marked success. All these suggestions have helped to provide the Club members with busy and enjoyable Winter sessions.

The Close of the Winter Sessions

The majority of Clubs intend to carry-on during the Summer months, and many and varied are the programmes that are being arranged. Instead of the usual indoor meetings some Clubs are devoting one evening a week to exercises out of doors, to keep the members fit. Others are organising Cycling and Rambling Clubs, and intend to take to the road, with Cricket, Tennis or Swimming as alternative attractions. All such arrangements are fascinating and the pursuits healthy, and I am confident that they will be greatly enjoyed by the members who are so fortunately placed as to be able to participate in them.

Summer Activities

From time to time Club Leaders send me group photographs of their Clubs. Often I notice that some of the members are not wearing their badges. I want every member of the Guild to constantly wear his badge, for this is not only the badge that marks the movement, but it is the sign by which one Guild member may recognise another. If a member loses his badge he should make a point of purchasing another, for it is very desirable that a member should always be in possession of the official badge.

Wear Your Badges

Inter-Club Competition

The Inter-Club Model Competition for 1922-3 has now closed, and I have pleasure in announcing below the names of the successful Clubs. It has again proved very difficult to adjudicate between the various models that have been submitted, and it was finally thought advisable to combine the two prizes of £5 and £3 and to divide it between five Clubs who submitted models of equal merit.

(Continued at foot of next column)

CLUB NOTES

1st Belfast M.C.—During the past Session this Club has made speedy progress in every direction. Many interesting Lectures have been delivered to the members, and the Club has a successful Football team. Mr. Lowry, a local gentleman, has taken a great interest in the Club work. Master E. Moorhead, one of the members, has been awarded a Special Merit Medallion. *Secretary:* John Sinclair, 39, Oakland Avenue, Bloomfield, Belfast.

Model Engineering (Edinburgh) M.C.—The present membership of the Club is twenty-five, and the members are very keen on model-building. Papers are an important feature of the programme, and are followed by discussions. *Secretary:* W. M. Gemmell, "Glenbourne," 6, So. Oswald Road, Edinburgh.

Cobham M.C.—The Meccano Lecture "*Lives of Inventors*" was received with great enthusiasm. Swedish Drill has been included in the regular programme, and the Club in general is making excellent progress. *Secretary:* Wm. Phillips, The Fox and Hounds, Cobham, Surrey.

Small Heath M.C.—Programme for the last Session included Table Games, Lectures and Model Building, in addition to Football. A Cycling Club is being formed. *Secretary:* Master W. Edge, 131, Whitehall Road, Smallheath, Birmingham.

St. Paul's (Hammersmith) M.C.—A successful Session has been held and included two interesting Lectures, on "Literature" by the Club Leader, and "Electricity" by Master R. A. T. Atkinson, for which he has been awarded a Special Merit Medallion. Master R. Mason was awarded the other Medallion for his all-round good work. *Secretary:* Mr. V. J. Scott Warrell, 41, Bridge Road, London, W. 6.

Meccano Club Leaders

No. 2. Mr. R. BAILEY

(Princes Risborough M.C.)

Mr. R. Bailey is the enthusiastic Club Leader of the Princes Risborough Meccano Club, which has been in existence since April 1921. As in the case of the Leamington Meccano Club, this Club has a troupe of Meccano Minstrels, which is of great assistance to the financial side of affairs. Mr. Bailey introduced a Handiwork Section into the Club programme during the first Winter Session, and he personally supervises all Club activities. The Club has also a strong Football Team.

Inter-Club Competition—(*cont.*)

The prize-winning Clubs are:—"Kilmarnock (Academy) Meccano Club," who submitted a model of a novel Engine; "Leamington Meccano Club," who constructed a model Railway Station; "Chard Meccano Club" also for a model Railway Station; "Knutsford Lecture Hall Meccano Club," a Mining Village, and "Kilmarnock (Riccarton) Meccano Club," a Transporter Bridge.

These models are all perfectly constructed, and I regret that lack of space only prevents me from publishing illustrations of them in these columns.

Central Secondary School (Sheffield) M.C.—The Session included evenings devoted to indoor games, in addition to Model Building. Towards the end of the Session a very interesting Electrical Demonstration was given. *Secretary:* Master A. S. Taylor, Fern Lea Villas, 19, Roach Road, Eccleshall, Sheffield.

St. Mary with St. Gabriel (London) M.C.—This Club has been in existence since 1920 and has made rapid progress. When first inaugurated it had a membership of nine, and at the beginning of this year there were 90 members on roll. Radio, Fretwork and Photography have been introduced into the Club, and in March last a Magazine was started. The last Session has been particularly busy and enjoyable. *Secretary:* Mr. C. Curle 37 Pullen's Buildings, Peacock Street, London, S.E.

Chard M.C.—Interesting Lectures have been given by Mr. Miller and Mr. Wheaton and several of the members. Master Frank Poole won a Special Merit Medallion for a Lecture he rendered entitled "Gas and Gas Lighting," Master Frank Macey was awarded the Medallion at the end of the Second Winter Session for his Lecture on "Ships." *Secretary:* Master Frank Macey, 17, Ashfield, Chard, Somerset.

Garstang and District M.C.—Table Tennis and Table Football have proved very popular during the last Session, Masters R. Sayer and H. O. Irwin winning the respective handicaps. During the latter part of the Session a Radio Concert was greatly enjoyed by all the members. It is hoped to organise a Cricket Club for the summer months. *Secretary:* Master H. O. Thomas, Sunny Bank, Garstang.

St. Cedds (London) M.C.—The Second Winter Session has been very busy and successfully concluded with a Social. *Secretary:* Master S. F. Elliott, 142, Beckton Road, Canning Town, London, E. 16.

Southall M.C.—A splendid Concert was given at the end of the last Session by the members, in aid of the Club funds. The Club is making rapid progress, and every week new members are enrolled. *Secretary:* Master K. Watson, 2, Waltham Road, Southall.

Sparkbrook M.C.—Towards the end of last Session an Exhibition and Concert was arranged and was an unqualified success. The division of the Club into four sections has promoted a spirit of healthy rivalry, each section endeavouring to excel in its display of models. Several members of the Club wore fancy costumes, which gave a bright touch to the evening. Models of the Chassis and Forth Bridge were loaned from Headquarters. *Secretary:* Master Francis J. Hubball, 71, Turner Street, Sparkbrook, Birmingham.

Special Merit Medallions

RECENT AWARDS.

Special Merit Medallions are awarded each session to the member of each Club who (1) gives the best lecture, and (2) does efficient work for the Club. The Medallions, which are here illustrated, are beautiful both in design and finish.

They have been specially produced by a well-known firm, and on each is engraved the winner's name.

I give below a list of the boys, followed by the names of their Clubs, who have recently been awarded Special Merit Medallions:—

LECTURES:

J. L. Hills (Leamington), R. Bloore (West View), C. Gunnell (Malvern, S.A.), A. Osborne (Sparkbrook), C. Curle (St. Mary-with-St. Gabriel), L. Clements (Dudley).

GOOD WORK:

A. Billiald (West View), S. Pagani (Malvern, S.A.), J. Hinks (Sparkbrook), J. Hart (St. Mary-with-St. Gabriel), W. G. Barrett and T. Macquhae (Observatory), J. Feast (Holy Trinity), J. W. Whitworth (Hanson, Bradford), S. Knight (Knutsford Lecture Hall), F. S. Hart (St. John the Baptist), H. Kerridge (Woodville, Thornton Heath), H. Jepson (Holy Trinity, Blackburn), W. Humby (Luton), C. Boden (Dudley), D. Tilt (Bromsgrove), E. Cornell (Cobham), L. Sutton (Thornton Heath), E. Moorhead (1st Belfast), S. Bridle (Parkstone Congregational), E. Chapman (Mount Gould), R. Green (Swaffhan), R. D. Millar (Kelvinside), F. C. Miles (Leamington).

MECCANO
ACCESSORY OUTFITS

Each Meccano Outfit from No. 0 to 6 may be converted into the one next higher by the addition of an Accessory Outfit. Thus, if a No. 2 is the first Outfit bought, it may be converted into a No. 3 by adding to it a No. 2a. A No. 3a would then convert it into a No. 4 and so on up to No. 7. In this way, no matter with what Outfit you commence, you may build it up by degrees to a No. 7 and so be able to make all the many hundreds of models shown in the Books of Instructions. Our illustration shows one of the Meccano Accessory Outfits.

PRICES OF ACCESSORY OUTFITS

No. 0a	converting No. 0 into No. 1	4/–
„ 1a	„ „ 1 „ „ 2	7/6
„ 2a	„ „ 2 „ „ 3	8/6
„ 3a	„ „ 3 „ „ 4	18/6
„ 4a	„ „ 4 „ „ 5	15/–
„ 5a*	„ „ 5 „ „ 6	50/–
„ 5a†	„ „ 5 „ „ 6	80/–
„ 6a	„ „ 6 „ „ 7	210/–

* Carton. † Wood.

ELECTRICAL OUTFITS

X2 ELECTRICAL OUTFIT.

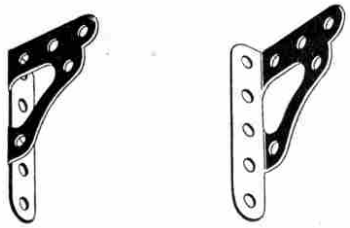
The application of Electricity to the Meccano system adds a further and wonderful charm. The joys of model-building are now increased by the fascinating pastime of carrying out delightful electrical experiments.

THE MECCANO ELECTRICAL OUTFITS contain a number of specially designed electrical accessory parts, and, used in conjunction with any of the regular Outfits, enable the user to construct models for making interesting and instructive experiments. These include the Electric Railway, Morse Key, Tapper Key, Buzzer, Electric Lamps, Electric Crane, Induction Coil, Electric Iron, Motor-Starter, etc.

PRICES.

X1 (containing electrical parts, without motor or accumulator) ...	**12/6**
X2 (containing Meccano motor, 4-volt accumulator and electrical parts)	**42/–**

New Meccano Parts



	(Right).	(Left).	
139	Flanged Brackets	(Right)	each 2d.
139a	„ „	(Left)	„ 2d.

A Useful Tool

Our illustration shows a type of screwdriver useful for reaching bolts in inaccessible places on models. For this reason the blade has been made so that it may be passed through the standard Meccano hole to reach bolts so placed. We are disposing of these screwdrivers whilst our stock lasts, at the special price of 10d. each, post free.

The Meccano Manuals

There are three Manuals, the 0 Manual for simple models built with the 0 Outfit, the 0–3 Manual comprising models built with any of the Outfits from 0–3 and the Complete Manual, which comprises a selection of models that may be built with every Outfit from 0–7. This latter Manual is a very fine publication and should be in the hands of every Meccano boy. It includes instructions for building most of the models shown in the present No. 3 Manual. A limited supply of the No. 3 Manual is still available.

PRICES OF MANUALS:	s.	d.
0 Manual ... ... post free ...	0	6
0–3 „ ... ... „ ...	1	2
Complete Manual ... „ ...	2	10
No. 3 Manual ... ... „ ...	1	4½

Storage Boxes

We have in stock a limited number of boxes, suitable for holding Meccano parts. These boxes are in polished oak, fitted with partitions, and hinged lids. They fasten with lock and key, and are provided with two drawers, also with locks and keys.

The dimensions of the boxes are 17″ × 15″ depth 9¼″, and the price is each 70/–, carriage forward.

As our stock is only small we advise those of our readers who are interested to take immediate advantage of this opportunity for securing a strong and serviceable box for storage of their Accessory Parts.

Improving the "*M.M.*"

This Competition has been extraordinarily successful and we have been inundated with entries. These are now being scrutinised and we hope to announce the result of the Competition in our next issue.

Sale and Exchange

Small advertisements are inserted in these columns at 1/- per line (average seven words to the line), or 10/- per inch (average 12 lines to the inch). Cash with order. Rates for larger space quoted on application. Address your letter to Advertisement Manager, "Meccano Magazine," Binns Road, Liverpool.

FOUNTAIN PENS complete with filler and box marked 10/6. Our price 1/9 post free. Box No. 21, c/o "*Meccano Magazine*," Liverpool.

NEW COLONIALS. ALL MINT.

AUSTRALIA, King George, 1½d. green,	2d.
BERMUDA, ½d. & 1d. Script, the pair,	2½d.
CYPRUS, 30 paras green, Script,	1½d.
IRELAND, ½d. green (Sword of Light),	1d.
MAURITIUS. 1 cent, black, Script,	½d.
MONTSERRAT, Scripts, ½d., 1d., & 1½d., the three	4d.
SARAWAK, 2 cent purple,	1½d.

POSTAGE EXTRA. ASK FOR PRICE LIST.
ALEC KRISTICH (Member N.R.P., No. 279), 82, Marchmont Street, Russell Square, London, W.C. 1.

A SPLENDID WATCH FREE to every boy who sells twelve 10/6 Fountains Pens at 1/9 each. Send for full particulars. Box No. 41, c/o "*Meccano Magazine*," Liverpool.

Free Pictorials Free
GRAND PACKET OF PICTORIALS, including Nyassa and Mozambique, absolutely free to applicants for my bargain approvals. Send postcard to-day.
L. C. Jones, 13, North Road, Bourne, Lincs.

MECCANO ELECTRIC LOCO in working order. Cost over £2, price 20/-. Sixteen Electric Rails for same, cost 16/-, price 7/6. Covered Luggage Van, 2/6. Box No. 22, c/o "*Meccano Magazine*," Liverpool.

WANTED. Articles and photographs of general interest, suitable for publication in the "*Meccano Magazine.*" Accepted contributions will be paid for at our usual rates and will be returned if unaccepted, if stamped addressed envelope is enclosed. Although every care will be taken of same, no responsibility can be accepted for lost or mislaid manuscripts.
THE EDITOR, "*Meccano Magazine*," BINNS ROAD, LIVERPOOL.

100 DIFFERENT STAMPS (Catalogued over 10/-) 6d. Kraus & Co., 137, Cheapside, London, E.C. 2.

ELECTRIC RAILWAY SET PIECE by Jubb & Co., Sheffield, as exhibited at Industrial Fair, White City, in 1922. Size 13' 9"×7', gauge 1 made in five sections, bolted together continuous circuit, with high and low levels, bridge, tunnels, complete with Railway Stations, Engine Shed, Signal Boxes, Foot-Bridge, Signals, etc. A great attraction for Xmas Bazaar, worth £100, will accept £40 for quick sale.
Messrs. Cross Bros. Ltd., 2 & 4, St. Mary St., Cardiff.

STAMP COLLECTORS. Sell your duplicates by advertising them in the "Sale and Exchange" column of the "*Meccano Magazine.*"

POWERFUL STEAM ENGINE (reversible), nearly new, 15/-, cost double.
2, Sea Breeze Cottage, Prinsted, Emsworth

50 STAMPS, catalogue value 17/6. Price 7½d. post free. Lewis, 362, Wavertree Nook Road, Liverpool.

WE BUY STAMPS FOR CASH, both loose and in albums. Good prices given.
Lewis, 362, Wavertree Nook Road, Liverpool.

SIXTY DIFFERENT STAMPS FREE to applicants for approvals. All ½d. each. Send postage.
Cox, 135, Cambridge Road, Seven Kings.

FREE ! *10 LARGE RUSSIAN PICTORIALS, to purchasers of one of the following: Every stamp different. 100 Austria, 9d.; 100 Hungary, 1/-; 32 Finland, 9d.; 25 Turkey Pictorials, 1/-; 30 Jugo-Slavia, 1/-; *25 Austrian Fieldpost, 1/-; *62 Austria (1922), 1/-; 50 Roumania, 1/-; 50 Bulgaria and Thrace, 1/9; 50 Czecho-Slovakia, 1/-; 25 Luxemburg, 1/-; 100 Poland, 2/-; *25 Fiume, 2/-; 100 different, 5d.; 500 for 2/9; 1000 for 7/6. * Denotes mint. Postage extra. Selections on approval willingly to responsible applicants.
H. Llewellyn, 41, Dereham Road, Norwich (Member J.P.S.).

100,000 FREE ! ! !
THE FIRST 100 APPLICANTS for my famous approvals will receive 1,000 best quality Stamp Mounts and a Set of Good Austrian Stamps. Send at once and enclose a 2d. stamp to cover cost of postage.
N. M. Paterson, 19, Dorset Avenue, Rusholme, Manchester.

FOR SALE. Meccano Vertical Steam Engine in perfect working order. Price £1 1s. 0d. H. Robinson, Church Avenue, Holywood, Co. Down.

FREE ! 125 ALL DIFFERENT.
Including **British Colonials,** and long mint sets, and pictorials, war issues, obsolete and new issues, etc., sent **FREE** to genuine applicants enclosing 1½d. postage, and requesting bargain discount approvals. Abroad 6d. Send satisfactory reference, or if under 21 the written consent of a parent should be sent.
Fine approval selections in book and sheets for beginners, medium, and advanced collection at low prices. **Best Quality Stamp Mounts** 6d. 1000 post free.
R. Alcock, Stamp Dealer, "Bangrove," Ewlyn Road, Cheltenham.

AUSTRALIA AND N.Z. PACKETS (stamps); 70 varieties, 3/-; 50 varieties, 2/-; 5% Reduction £1 orders, Australian unused, 5% above face value, Cash with Order, sure and prompt reply. C. A. Brown, 30, Mary Street, Sidcombe, Sydney, N.S.W.

CLOCKWORK MOTOR, 7/6. Rowland, c/o Wilkinson, Llantwit-Major, Cardiff.

SPECIAL OFFER.
LEVER WATCHES.
Post 5/6 Free.
Every Watch thoroughly Tested and Guaranteed.
Address: **J. W. BAILEY, Watchmaker, 271, HIGH STREET, WEST BROMWICH.**

Photographers!
Send for this FREE Book

"RIGHT METHOD IN PHOTOGRAPHY" contains information which no photographer should be without. Put your name and address on a post card and send off at once to
BURROUGHS WELLCOME & CO.
19, Snow Hill Buildings, LONDON, E.C. 1
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BARGAINS

Useful Pocket Knives,	excellent steel, 4d. each, postage 2d.
Metal Cash Boxes,	4", fitted lock & key, 4d. each, postage 2d.
Solid Oak Bowls,	7". Invaluable for holding screws, nuts, and small parts, 9d. each, postage 9d.

The 3 articles together, 2/- post free.

Electric Motors for driving Meccano sets and models, 1/100th h.p., d. or c. current, solidly constructed by experts. State voltage. 17/6, postage 2/-
CORBETT & CO., 7, Hart Street, London, E.C. 3.

CATALOGUE FREE
Watches, Jewellery, Rings, Boots, Suits, Costumes, Raincoats, Clocks, etc., Cash discount or monthly payments. Write for Catalogue. All you require on easy terms. Foreign applications invited. Special C.O.D. terms abroad. Write for our free catalogue to-day.
Masters Ltd., 55, Hope Stores, Rye, England.

DYNAMOS 5/- Post 6d. (inland)
Make your own Electric Light
These wonderful machines light brilliantly a 4/6-volt lamp and take very little power to drive. Lamps to suit 3d. each.

GREENS Dept. N., 85, New Oxford St., London

36,000 STAMPS SOLD, send now for 1,000 assorted, 1/-. North Bros., 37, Bostock Avenue, Abingdon.

UNUSED STAMPS of colonies and foreign countries at face value. Assorted stamps to value will be sent on receipt of remittance for 6d. or over, 1½d. should be added for postage, orders for over 2/6 sent post free. Box No. 27, c/o "*Meccano Magazine*," Binns Road, Liverpool.

NO REASONABLE OFFER REFUSED for Electric Motor, Outfits 5, 2, 1 Inventor's A, and many extra parts. R. Burston, Old Bank, Tiverton, Devon.

SPLENDIFEROSUSH ! See last month's advertisement. Next month something special for Radio boys. G. Hare, 36, Willes Road, Leamington.

500 STAMPS, unsorted, collector's duplicates, 7½d. post free. Powell, 73, Bond Road, Surbiton, Surrey.

BOYS You are not alive if you do not know what can be done with SECCOTINE. Make your models. Mend your books. Affix tyres to bicycles with it.

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