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MECCANO MAGAZINE

for Boys

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Telephoning From New York to London—*See Story on Page 99*

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The Editor's Own Page

New Year's Greetings To You All

EVERY good wish for the New Year to all my readers! I hope it will be for each of you a year of joy and fun, and a year of progress in your studies or in your work, as the case may be.

I should like to take this opportunity of thanking my many readers for the wonderful array of Christmas and New Year cards that have reached me from all parts of the country, together with the hearty good wishes that accompany them. So many messages of good will from Meccano boys in almost every state, and the innumerable letters I receive every day are most encouraging, whilst the suggestions sent to me are very helpful.

The Larger M.M.

What a welcome greeted the improved and bigger "M. M." There was scarcely a subscriber who did not write at once to express his pleasure and thanks, and your editor and his staff felt well repaid for their efforts. But we must not rest where we are; we have a long way to go before we attain the place that we have set for ourselves in the world of boys' magazines. Now this is where I want your help. Tell your friends about the "M. M.," show them your copy, and in this way you will help to increase our circulation and make possible the addition of new features.

Our Cover

This remarkable view of New York was taken from the air and shows clearly the well known Singer and Woolworth buildings. In the front on the left may be seen the new headquarters of the American Telephone and Telegraph Company to whom we are indebted for the use of this photograph and for the information in the story on radio-telephony.

The first view of New York, with its towering structures is a most impressive sight and visitors from overseas are amazed at the beauty of the sky-line. Nowhere else in the world can anything of the kind be seen, and it stands as a signal monument to the greatness of American commerce right on the threshhold of our country.

Telephoning Across the Atlantic

January 7, 1927, will go down in history as the day on which the radio-telephone service to England was opened to the public. What a marvel it is to be able to send the human voice through the air more than 3,000 miles and to talk from America to England with the same ease that we call up our friends at home. On the opposite page you will find an interesting account of the first official "call" from New York to London and this will be followed in our next issue with further particulars and some interesting pictures of the marvelous instruments that are used.

Hudson River Bridge

Truly we live in an age of progress and the world's record of to-day is beaten tomorrow. On page 102 is the story of the projected mammoth suspension bridge across the Hudson River. It is but a few months ago that we were amazed at the completion of the Philadelphia-Camden Bridge, an account of which appeared in the "M. M." of September and October 1925, and already plans are made for this new bridge that will be half as big again.

Drawing Brass Rod

We continue the story of Brass which is being read so eagerly and in the installment commencing on page 100 the making of brass rod is explained. It is a fascinating process with a particular appeal to Meccano boys who know that their pinions, collars, bevelled gears, etc., are all turned out of the solid brass rod.

Lab Apparatus

In the December number of "Science & Invention" there appeared a most interesting article on Laboratory Apparatus made with Meccano, and through the courtesy of the publishers we are reprinting it on pages 101 and 106. I heartily recommend it to my readers.

Our Photographic Contest

The results are announced on page 108. From the very large number of entries in this contest, it is quite evident that photography is a hobby of many of our readers. I should be very glad to introduce a page or column of photographic notes and hints in each issue if readers would like this. Perhaps readers will write to me regarding this and say whether they favor it or not.

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Transatlantic Telephone Service

Between New York and London

ON January 7, 1927, Radio-Telephone service between New York and London was inaugurated, and thus telephone connection across the Atlantic was established as a regular means of communication.

As is frequently the case with great events, the inauguration of this service was marked by extreme simplicity. A group of officials of the American Telephone and Telegraph Company were seated around the table in the Directors' room on the top floor of 195 Broadway, New York City. With the exception of President Gifford, who was seated at the head of the table, each man wore a head piece with a single earphone and the scene was one more reminiscent of the early days of radio broadcasting parties. President Gifford picked up the telephone in front of him and in a calm matter of fact voice, as if making an ordinary telephone call, spoke to the operator:

"Please connect me with Sir Evelyn Murray in London."

Instantly the others seated around the table clutched the head 'phone tighter to their ears, and their tense expressions were the only indication of the supprssed excitement that must have been felt by all.

The First Conversation

After a few minutes a voice came distinctly over the 'phone, "Hello, is that you Mr. Gifford?"

It was Sir Evelyn Murray talking from his office in London. The gap between the old world and the new had been bridged. Mr. Gifford looked up with a triumphant smile at his fellow-directors, and in his expression was a note of tremendous pride and satisfaction.

"Yes, this is Mr. Gifford," he replied.

Then the voice of Sir Evelyn Murray could be heard, but static interfered and prevented his words being clearly understood.

"I beg pardon," called Mr. Gifford.

"Just coming over now," came the reply.

Do you hear me all right sir?" asked Mr. Gifford.

"Yes," answered the British official.

The two officials then conversed for some time. "No one", said Mr. Gifford, "can foresee the ultimate significance of this latest achievement." Continuing, he dwelt on its immediate significance to the two nations of America and Great Britain, and he concluded by congratulating the British officials and extending the good wishes of the American Telephone and Telegraph Company to them all. Sir Evelyn Murray reciprocated these sentiments and declared the service formally opened. It was then turned over to the waiting subscribers and in the first day, 31 calls were put through.

A Wonderful Achievement

It was but a few years ago that Marconi's first message consisting of a few dots and dashes was transmitted through the air, and now as the result of great strides in the development of radio and telephony and combining the two, communication across over 3,000 miles of water had been established as a regular commercial service. It formed an occasion that will go down in history and will be recorded as one more victory of man in the great struggle for freer world communication. Truly, as Mr. Gifford said, no one can foresee the ultimate significance of this achievement.

This was not the first time that the human voice had travelled across the ocean, for as long ago as 1915 a few words uttered in America had been caught in Europe. On October 12, 1915, an American telephone operator sat in Paris with head phones clamped tightly to his ears, listen-

(*Continued on page* 107)

President Gifford opening Trans-Atlantic service.

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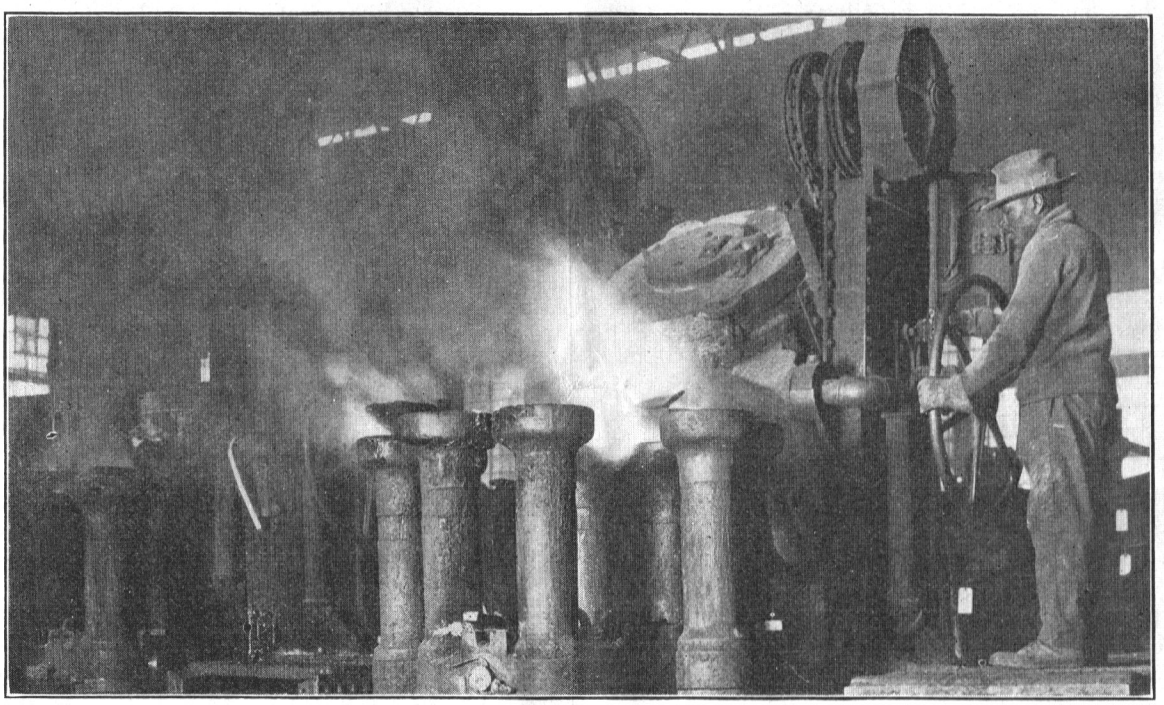
The Story of Brass

Part II

Brass Rod

IN THE early days of the industry, brass rods were made by two methods, the one chosen depending upon the finished size of the rod. Rods larger than ½ in. were made from cylindrical castings about 1-½ in. in diameter which were drawn to size through a series of dies, by means of chain-driven draw benches. After each reduction, the rod was annealed before further reduction was undertaken. In this way, successive reductions were made until the finished size was reached, or at least until the diameter was such that further reductions could be made by means of a suitably constructed wire-drawing block.

Both of these methods were slow and expensive, and were gradually superseded by a method which consisted in cold rolling a cylindrical casting or billet, by means of grooved rolls to a size small enough to be handled on a wire block.



Pouring Brass Billets.

Small Rods

The second method was used for rod of sizes smaller than ½ in. in diameter. It consisted of rolling a flat bar four or five inches wide to a thickness of from ⅜ in. to ½ in. This bar was then run through a powerful slitting machine and cut into longitudinal strips of a width equal to the thickness of the bar. These square strips were then coiled and later drawn on wiredrawing blocks to the required finished size, after which they were straightened and cut to length.

Extrusion Process

During the latter part of the last century a greatly improved process of making brass rod was introduced. It was called the extrusion process and consisted of introducing a red hot cylindrical billet into a cylinder, one end of which was fitted with a die, and forcing it through the die by means of a plunger. In the beginning this process was limited to mixtures containing very low percentages of copper, which greatly restricted its application. However, the invention of alloy steels permitted the construction of dies that greatly extended the use of the extrusion machine.

Free Running Brass

For making Meccano parts, such as pinions, couplings, pummels of wheels, etc., and wherever brass is required to

(*Continued on page* 103)

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Laboratory Apparatus Made with Meccano

By Dr. Ernest Bade

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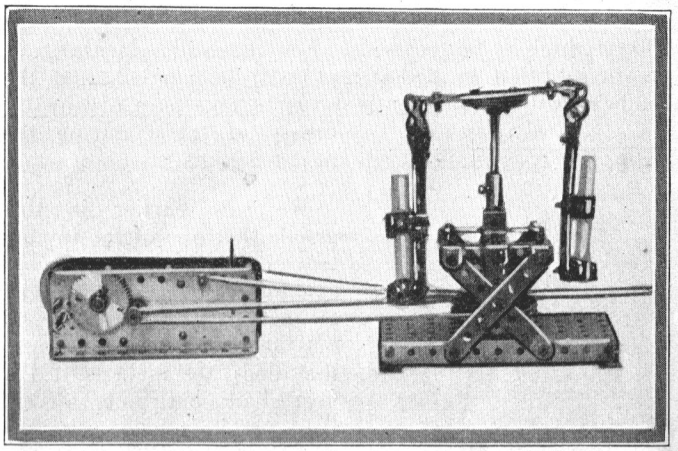
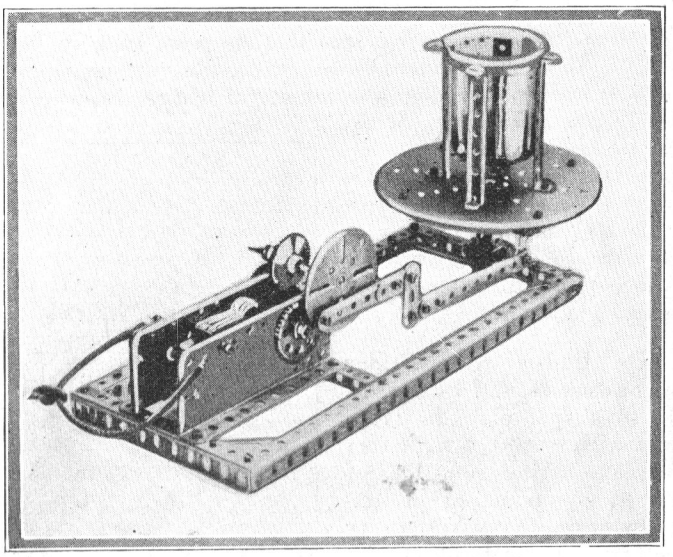
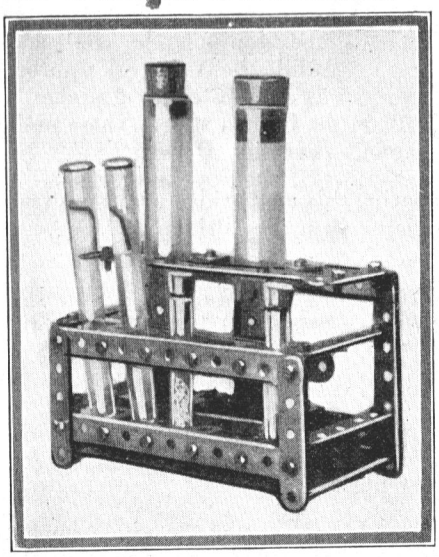


General view of centrifuge and electric motor for rotating it as built by Dr. Bade from toy constructor parts. If good parts are used and properly arranged, the device makes a practical addition to the chemist's laboratory.



Rotary motion is given to beaker by motor-driven device shown.

THE better grades of toy construction sets on the market today which are made with precision instruments and incorporate all of the important mechanical devices for reproducing movements can be used for the building of the most complicated structures. Since all of the parts are standards in miniature, they are all interchangeable among themselves and thus make possible the reproduction of model machines, with all the complexity of the original as well as the new devices and new movements.



Toy constructor parts are useful in making test tube rack at left.

The child may play with such construction sets and he may even build the most elaborate mechanical devices with all their intricate movements but still it is only a toy. But when he is older and begins to experiment on a more serious scale, these same construction toys are of inestimable value for him. By childhood experience he has realized that all possible mechanical movements may be made with them, that any structure may be exceedingly strong by the application of sound enginering principles and he will carry out the things he has learned while building what were virtually toys, in constructing instruments and devices which he expects to use in his laboratory.

In the electric motor he has a device that saves him much labor and time in carrying out his experiments and since a powerful motor usually accompanies a toy construction set and since it may be attached in any desired position, he is enabled to build an apparatus which, if he bought it, would cost him so much money, especially if his means are limited, that he would far rather do without it. But still, if he is fortunate enough to have one of these construction sets, he can build the machine or device that he needs most at any given time and, when the need for it has passed, he can take it apart and build an entirely different device. This is a thing impossible with a bought machine. When the use for it has passed, the machine becomes a dust collector of the first order, until it is again pressed into service many weeks, and often, months later.

One of the simplest devices to make from a toy construction set is a centrifuge and when made with a Meccano set, which contains strong steel strips and brass machine cut, not

(*Continued on page* 106)

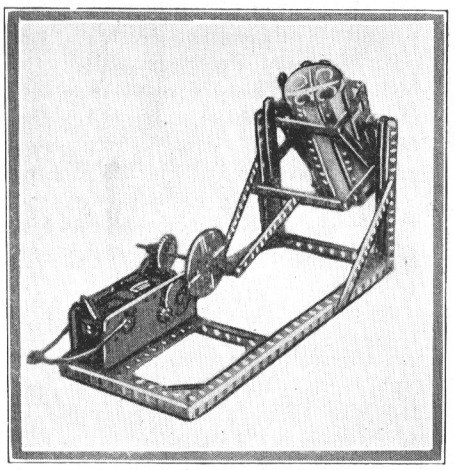


Photo above shows a test tube shaker comprising an oscillating carrier which is moved back and forth by crank connected to a disk on the electric motor.

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The Hudson River Bridge

A Suspension Bridge with a Span of 3,500 Feet, Just Twice the Size of the Recently Completed Delaware River Bridge, which at Present Holds the Record of the World.

IT is a little over a year ago that we were told, in the M. M. of September-October 1925, how the ingenuity of man had accomplished the wonderful feat of throwing a steel span 1,750 feet across the Delaware from Philadelphia to Camden. But this giant is soon to become "just ordinary", at any rate in comparison to his big brother who is going to be suspended across the Hudson.

The Hudson River Bridge will swing from Fort Lee, N. J., to a spot close to 179th Street, New York City. Every Meccano fan has some idea of the great amount of preliminary work that is necessary before even the location of a bridge can be decided upon. Convenience, cost, approaches, street connections and many other points have to be thoroughly considered.

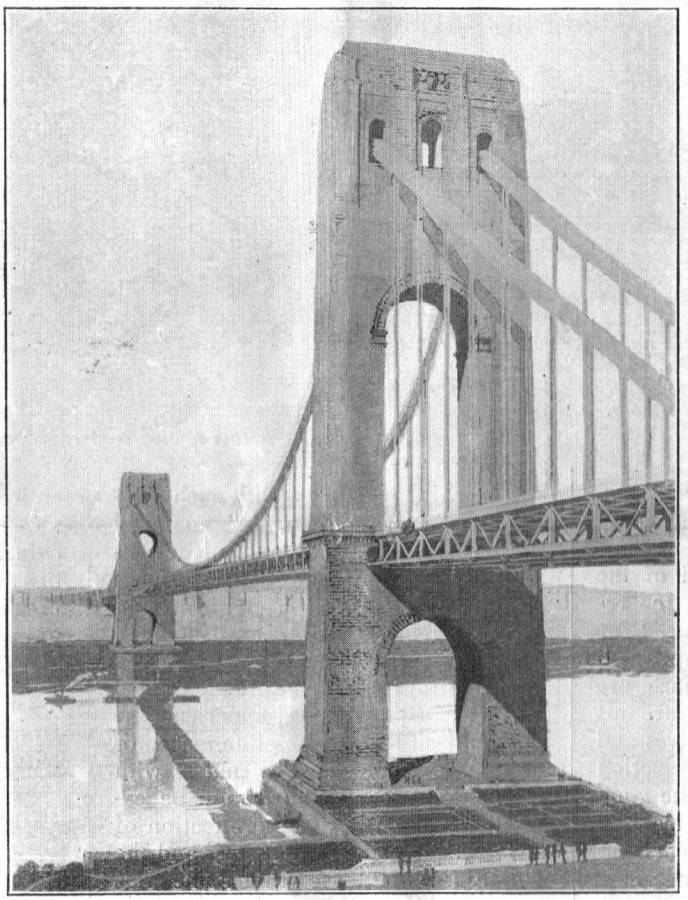
Huge Towers

The main thing to do was to find suitable locations for the massive towers from which the bridge would be suspended. On the New Jersey side the best position was found to be about 650 feet west of the cliffs of the Palisades where the anchorage could be placed. The tower on the opposite side of the river will be a similar distance from its anchorage on the rocky point of Fort Washington, thus giving the necessary symmetry to the bridge.

Both towers will be made of a combination of steel and concrete with a granite facing, their measurements being 220′ in the north and south dimensions, 75′ on the east and west, with a height above high water mark of no less than 650 feet.

The Roadway

Two cables of thousands of individual steel wires or of high grade steel eyebars will support the roadway. Starting from their anchorage on the side of the Palisades on the New Jersey bank these cables will pass over the 650 foot tower and then swing right across to the tower on the New York side, a distance of well over half a mile. The roadway itself will cross the river at a height of 235 feet above water mark passing through the towers under an archway 230 feet high by 95 feet wide. Four lanes of vehicular traffic, in addition to pedestrians, will be carried, and the roadway will be sufficiently large to take care of any increase of traffic during the next ten years.



The Proposed Bridge.

We saw earlier in this article that one of the important points that had to be considered was that of cost. The estimate for this bridge is $50,000,000. At first sight that does not look as if the cost had been considered. And yet it is also estimated that the tolls will be sufficient to pay the expenses even from the first year; and in 20 years, the entire cost will have been paid off.

Appearance

Appearance is another point that has to be taken into consideration in planning the construction of this new marvel. The immense granite-faced piers harmonize well with the towering Palisades, and the approach on either side has been beautifully planned. On the New Jersey side, there is a cut in the rock spanned by a great arch and carrying a foot-walk along the top of the Palisades; while the New York approach is a series of great arches, 70 to 80 feet high and built in the Roman style. These arches will cross over the famous Riverside Drive.

A few figures comparing this new bridge with the present "World's largest" and the Brooklyn Bridge will be of interest:

	Brooklyn	Delaware	Hudson
Towers	278 ft.	350 ft.	650 ft.
Central Span	1,595½ ft.	1,750 ft.	3,500
Cost	$17,900,000	$29,000,000	$50,000,000

These figures give some idea of the great step forward that is being taken, but who can say how long the new bridge will retain first place?

We are living in a wonderful age and the whole romance of engineering is more useful and more fascinating than all the wonders of the Arabian Nights.

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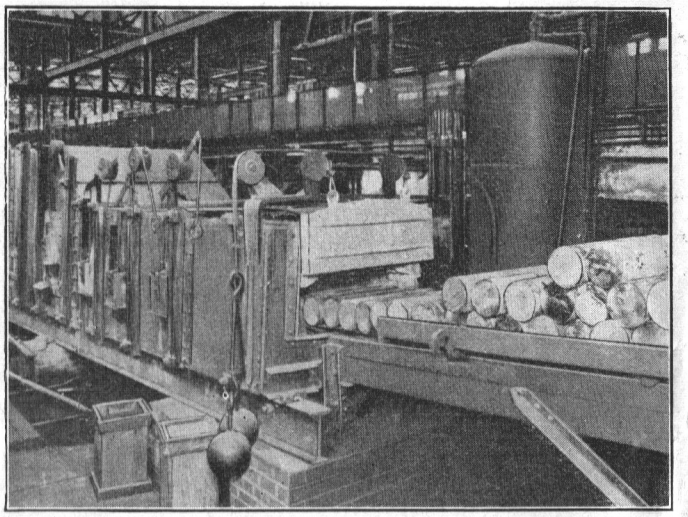
The Story of Brass

(*Continued from page* 100)

be worked on automatic screw machines it is essential that the metal have the quality known as free-cutting. Lead is the element which added to copper and zinc renders brass free-cutting. The free-cutting qualities of brass increase with the lead content, but due to the effect of lead on other properties of the brass, such as tensile strength, ductility, etc., it is not desirable to increase the lead indefinitely. The maximum amount of lead that can be used advantageously depends largely upon the process of melting, casting and working. For instance, a higher percentage of lead can be used successfully in extruded brass than in brass that is to be cold rolled.



Brass billets on their way from the saw to the heating furnace of the extrusion machine.

Brass Scrap

Free-cutting brass consists of copper, spelter or zinc, lead and scrap. The word scrap may be misleading to those not familiar with brass-mill practice. Therefore, it should be noted that scrap used in the manufacture of brass designates brass cuttings made from previously fabricated material.

Crucibles Hold 300 lbs.

Usually these materials are melted in crucibles holding about 300 lbs. each, from which the mixture is cast into iron molds producing cylindrical billets about 7 in. in diameter. The billets from the casting shop are then delivered to a powerful saw where the tops or gates are cut off and the unsound metal removed. They are now ready to be heated for the extrusion operation.

Extrusion Machine

The extrusion machine, a cross-section of which is shown in Figure 5, consists of an hydraulic press so constructed that a hot billet of plastic brass can be pressed through a suitable die. The billet is placed in a thick-walled hollow cylinder called a "container", the inside dimensions of which are approximately equal to those of the billet. This container is equipped with a loosely fitting ram operated by an hydraulic cylinder. The opposite end of the container is closed with a die. When the red hot billet is taken from the furnace and inserted into the container, the plunger advances and pushes the plastic billet through the die, thus forming it into a rod. If the reduction in size is considerable, more than one rod is extruded from the same billet at the same time. This is accomplished by making a corresponding number of holes in the same die.

After the plunger has completed its stroke, the die holding mechanism is unlocked and the die, together with the unextruded portion of the billet, withdrawn. This unextruded stump is then severed from the rod, the plunger withdrawn and the die replaced after which the machine is ready for the next cycle.

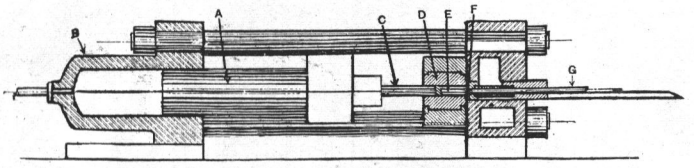


Fig. 5—Cross-sectional diagram of extrusion.

Cross-sectional diagram of extrusion machine. The red hot billet, E, is inserted in the container, D, and forced by the ram, C, through the die F. The pressure is applied by the hydraulic press, cylinder, B, through the plunger, A, and the rod issued from the other end of the machine as shown at G.

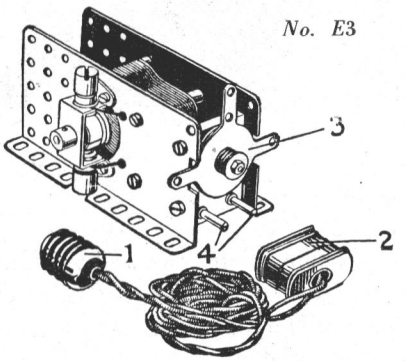
As is evident, the extrusion process makes it possible to produce irregular sections, simply by employing a die with an opening of the desired contour.

(*To Be Continued*)

The New 110 Volt

Meccano Electric Motor

No. E3



This motor is designed to operate on 100-120 volts, either direct or alternating current, without the need of a transformer or reducer.

The plug 1 is screwed into any available lamp socket and the terminal block 2 is pushed as far as it will go over the connection pins 4. By turning on the key in the socket the motor is ready to operate. It has a reversing switch 3 to control the direction of rotation. Price $9 50.

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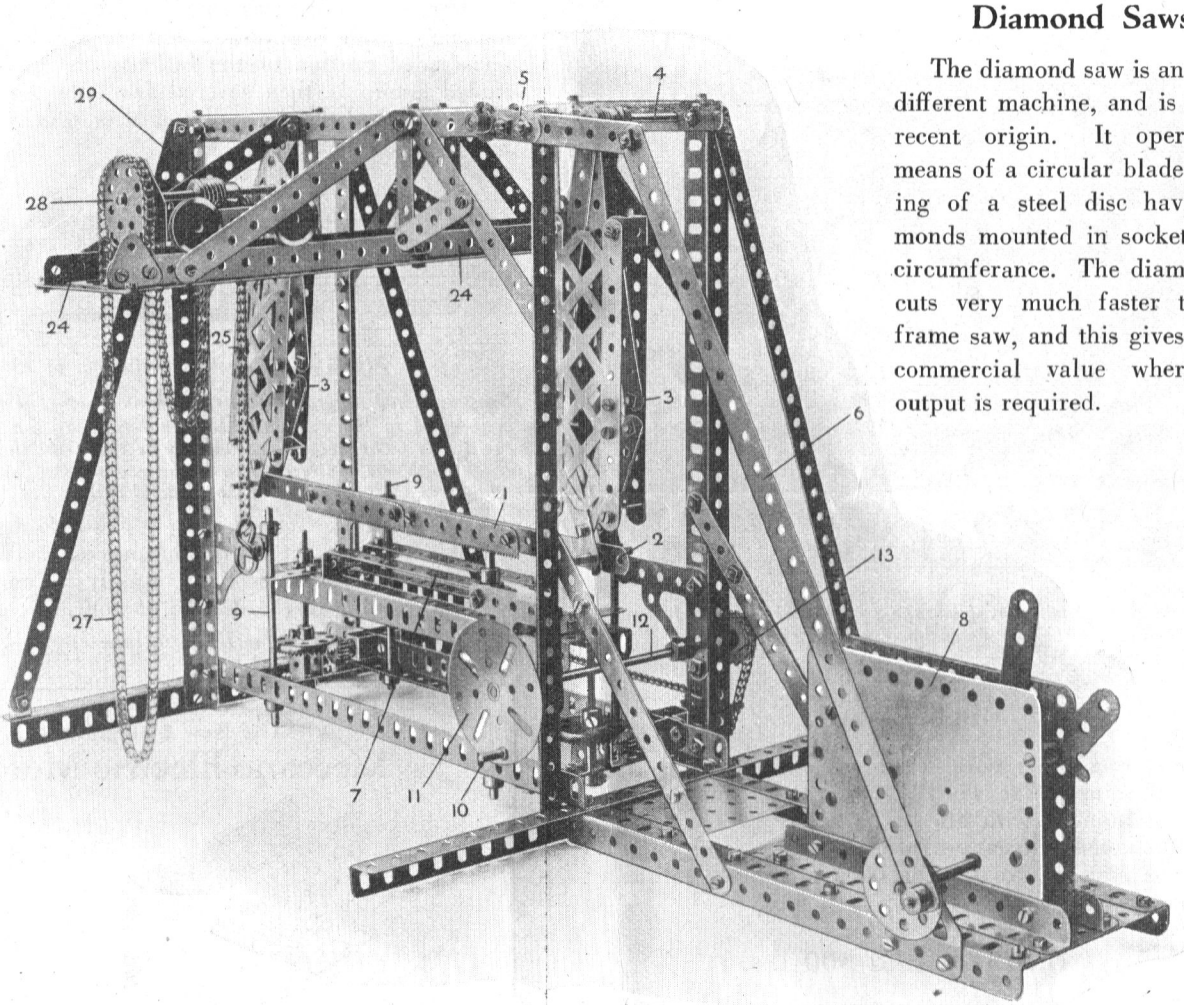
A New Model Ston

THE cutting and dressing of stone is one of the oldest industries in the world, but the use of machinery in this industry is a comparatively recent development. It is difficult to imagine how the ancient engineers were able to cut and dress the stone for their great buildings and monuments. Indeed, this subject presents many interesting problems, and some of the achievements of the ancient craftsmen are remarkable. Some day we hope to publish a series of articles on Ancient Engineering, when the subject of stone-cutting and stone-dressing in early days will be dealt with in greater detail.

Frame Saws

In modern stone-yards the most important work done by machinery is the actual cutting or sawing of the stone, and for this purpose two main types of saws are used. These are the Diamond Saw and Frame Saw.

The new Meccano model illustrated on this page demonstrates the working of the frame type of saw. This consists of an upright frame supporting a swinging carriage, which is given an oscillating motion from a driving crankshaft. The cutting blades are fixed to this carriage. An ample quantity of water and sawing grit is supplied to the blades, and by driving this grit backward and forward the blades cut their way into the stone.



Diamond Saws

The diamond saw is an entirely different machine, and is of more recent origin. It operates by means of a circular blade consisting of a steel disc having diamonds mounted in sockets on its circumferance. The diamond saw cuts very much faster than the frame saw, and this gives it great commercial value where large output is required.

For some purpose the steel disc and its diamonds are replaced by a wheel having a steel center and a rim of carborundum. The carborundum wheel gives a very smooth cut with sharp edges, and is largely used in working marble. It takes more power, however, and its cutting rate is slower. In the case of a very soft stone—such as Bath stone, for example—a steeltoothed wheel is often used.

Preliminary rough sawing of large blocks of marble or stone is frequently performed in quarries or yards by a wire running over the surface of the stone. This wire cuts in a similar manner to the frame saw, by means of an abrasive such as sand and water.

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ne Sawing Machine

The Meccano Model

The construction of this model is not difficult to follow from the illustrations, and there is little to be said to supplement them.

The sawing strip (1) consists of two Rack Strips bolted to a 12½" Strip (2) connected by 1" Rods to the ends of the swinging frames (3). One of these is loosely pivoted on one of the Rods carried in the frame, the other being secured by a Crank to the Rod (4). The swinging frames (3) are oscillated from the Crank (5) and connecting rod (6) driven by the Clockwork Motor (8).

The support frame (7), on which the stone blocks to be sawn are raised and lowered is guided on the vertical Rods (9) and raised and lowered by the operation of the Threaded Pin (10) forming a handle on the Face Plate (11). This Face Plate is mounted on a Rod (12) carrying a 1" Sprocket Wheel (13) connected by a chain to another 1" Sprocket Wheel (14, Fig. B) on a Rod (15). A third 1" Sprocket (16) on the same rod is coupled to a fourth 1" Sprocket Wheel (17) at the end of the machine.

The Rods (15 and 18) carry ½" Pinions (19) driving Contrate Wheels (20) secured on Screwed Rod (21) and engaging Threaded Cranks (22) secured to the frame (7) by 1½" Strips (23).

The trolley (Fig. A) runs on gantry rails (24) and the load chain (25) passes over a ¾" Sprocket Wheel on the Rod (26), to be secured at one end of the trolley frame.

The chain (25) is raised or lowered by the operation of a Sprocket Chain (27) passing over a 1½" Sprocket Wheel (28). This is mounted on a Rod carrying a Worm (29) which engages a ½" Pinion on another Rod (26) carrying a Sprocket Wheel (30) over which the load chain (25) passes.

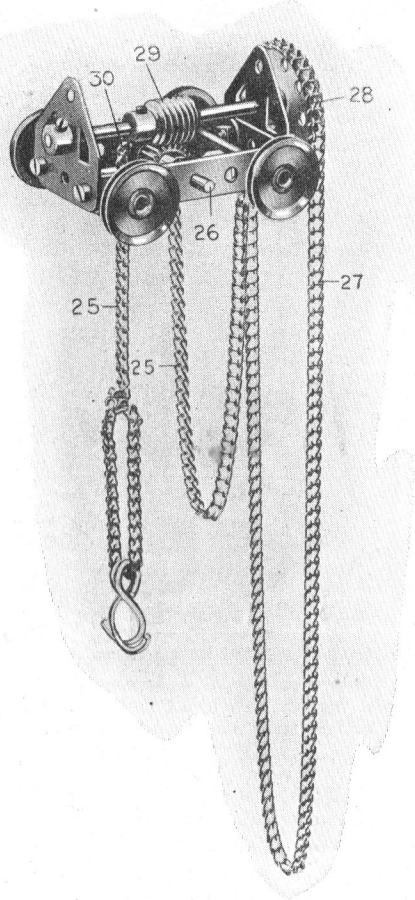

Fig. A.

Parts Required

5	of No. 1	12	of No. 35
19	" " 2	4	" " 37
1	" " 2A	181	" " 37A
11	" " 3	32	" " 38
4	" " 4	6	" " 45
8	" " 5	1	" " 47
2	" " 6A	5	" " 48A
12	" " 7	3	" " 53
4	" " 8A	2	" " 57
2	" " 9	15	" " 59
1	" " 10	2	" " 62
8	" " 11	2	" " 62A
15	" " 12	2	" " 80A
1	" " 14	2	" " 76
1	" " 15	40"	" " 94
5	" " 15A	1	" " 95A
3	" " 16	1	" " 96A
2	" " 16A	4	" " 100
1	" " 17	4	" " 108
2	" " 18A	1	" " 109
4	" " 22	2	" " 110
1	" " 24	180	" " 111B
3	" " 26	2	" " 115
2	" " 28	4	" " 125
1	" " 32	3	" " 126A

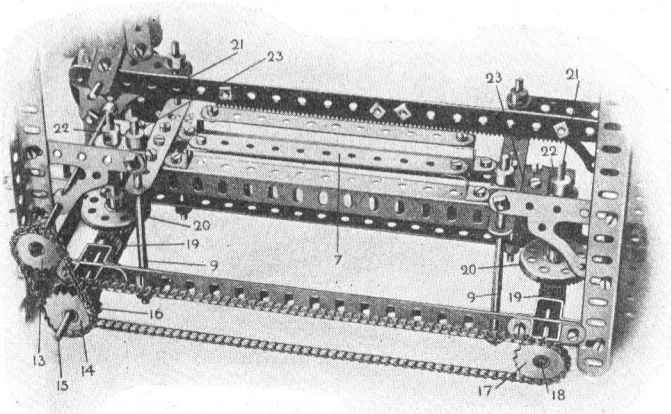

Fig. B.

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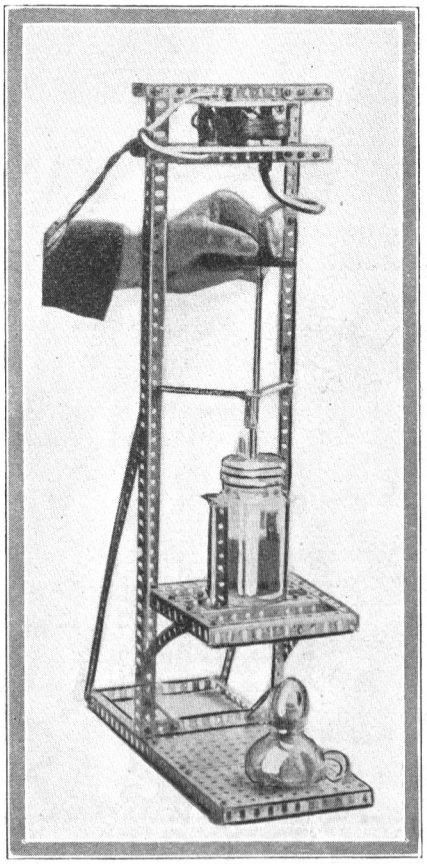
Laboratory Apparatus Made With Meccano



One of the most useful apparatus for the chemical laboratory and also the home is the motor-driven stirrer shown above.

(*Continued from page* 101)

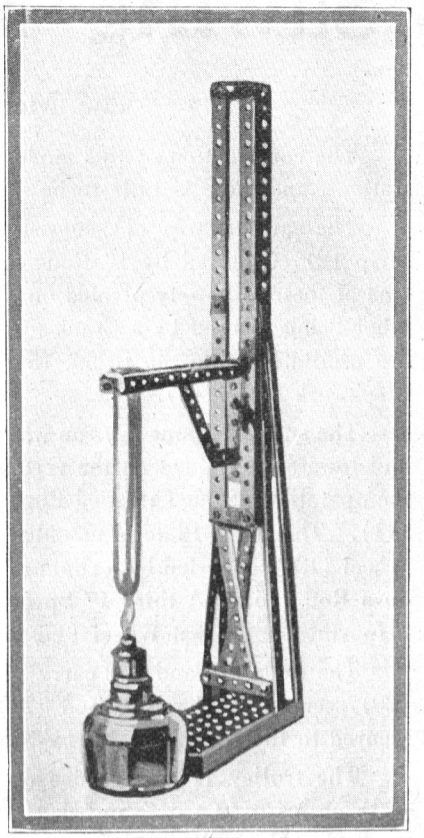
stamped, gears which mesh accurately, little vibration is produced. Since the electric motor can be used for many devices, it is mounted to one side so that it may be removed easily and used for other purposes. For ordinary work two test tube holders are usually sufficient although more may be provided. Some of the many uses to which it can be put are rapid settling of fine precipitates, the separation of oils from water, and at times the breaking up of emulsions.

The construction is very simple. It consists of a base and a pair of uprights supporting a comparatively long shaft, near the lower end of which there is a pully wheel, while the upper end carries hinged test tube holders, the hinges being made with bent wires.

Slightly more different is the bottle churn for the violent agitation of liquids and the production of emulsions. This device is nothing more than a small wagon running on a track. The wagon, which must be of sufficient size to hold the bottle firmly, is directly connected to an eccentric or the outer rim of a large wheel by means of a strip or shaft. Then, when this wheel is turned, the shaft is carried back and forth, rapidly throwing the wagon with the bottle first in one direction and then in the other. This keeps the contents of the bottle violently agitated. An electric motor is, naturally, the motive power.

A similar principle is employed for a test tube shaker. Here the test tube can be left open if the contents do not rise more than 2/3rds above the bottom. This keeps the tubes gently agitated. The principle employed is that of the swing, and the gentle sway, although quite fast, will prevent the settling of even the heavier precipitates. This shaker is especially adapted for some organic work.

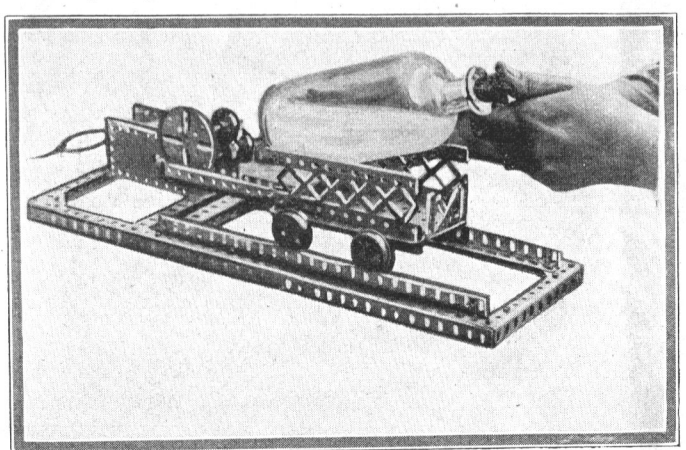
An oscillating rotary movement to a beaker to keep its contents stirred up without spilling is obtained by attaching an arm to a large rotating wheel, an eccentric, and fastening the other end to the outer rim of a horizontal plate. Then, when the motor is running, the arm oscillates back and forth, pulling and pushing the plate for a distance of about ⅓ of its circumferance about its axis. If now a beaker is placed in a holder attached to the plate the contents of the vessel will be thrown first in one direction and then in the other.



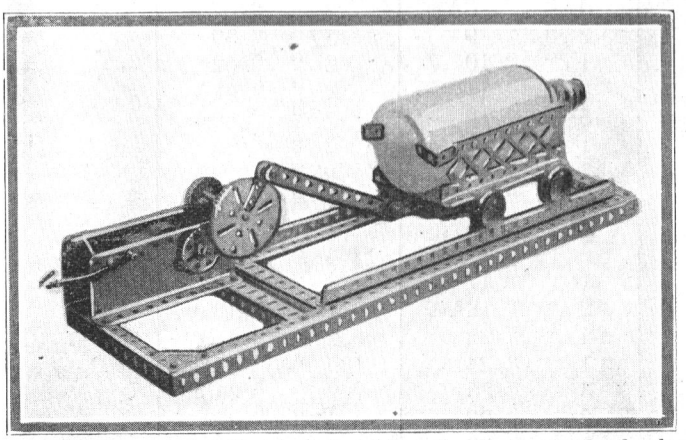
Test tube holder made from toy constructor parts, alcohol flame being used to heat contents of tube.

Probably one of the simplest of all devices used in the chemical laboratory is the stirrer. The stirrer itself is a closed glass tube or solid glass rod, bent on its lower end back upon

(*Continued on page* 109)



A very useful bottle churn which the amateur chemist can make with very little trouble from toy constructor parts, plus electric motor.



Another view of the electric motor-driven bottle churn, the bottle holder moving back and forth rapidly as the motor turns the crank.

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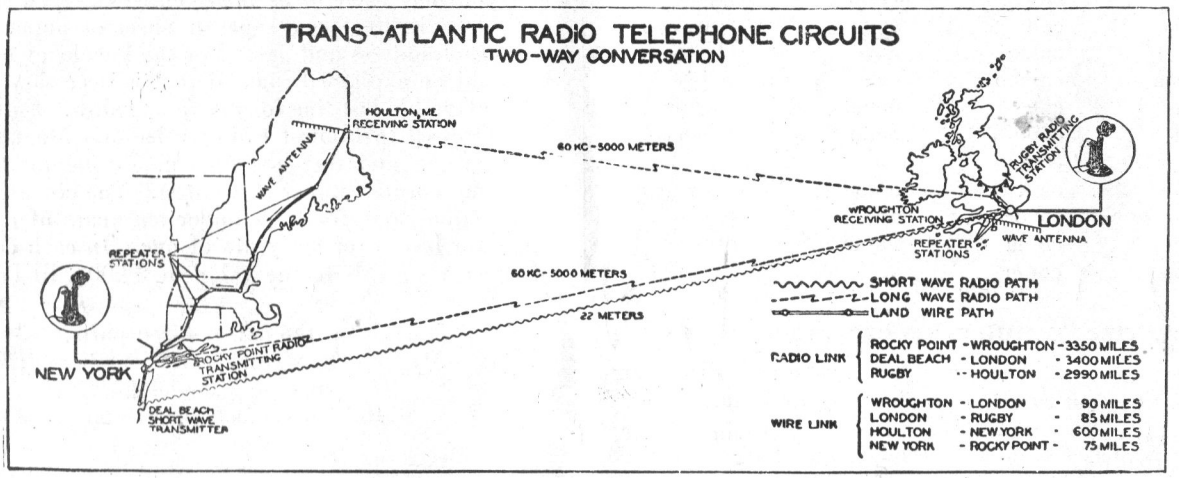
Transatlantic Telephone Service

(*Continued from page* 99)

ing eagerly. Experiments had been conducted for some weeks and for ten minute periods each night, engineers of the American Telephone and Telegraph Company had been given the use of the great antennae on top of the Eiffel Tower. Night after night, this man had listened, but without avail until the night of October 21st, when just as he was about to give up once more, the operator heard his colleague's voice from Arlington, Va.

"And—now—good—night."

This was the first time that the human voice had been transmitted across the Atlantic, and some time elapsed before this experiment was repeated, notwithstanding many attempts. It was only very occasionally that words could be heard and then transmission was only possible one way at a time and it required years of painstaking experiment, coupled with great scientific development, to bring transmission to such a point that a commercial service could be inaugurated. It was of particular interest that on January 7th, the day of the opening, the same operator who in 1915 had caught the first message across the ocean, sat in London, once more with head 'phones on his ears, once more an actor in the romance of radio-telephonic communication. Again he was waiting and listening, but this time he did not strain to catch the message. He received it clearly, word for word just as it was uttered in New York. Nearly eleven years had elapsed since this man, the Bell System's representative in London during the official opening of the regular service, first heard a voice speaking across the Atlantic.



The route your voice travels.

How To Call London

You can now telephone London or the provinces of England from anywhere in New Jersey or New York State. You do not require any particular apparatus but simply pick up your own telephone, ask the operator for long distance and give the name of the party, of better still, the telephone number of the party to whom you wish to speak in England. The long distance operator will then talk over the land wires to the transmitting stations at Rocky Point, L. I. and Deal Beach, New Jersey. Her voice is then transferred from the land wires, is amplified two million times and is broadcasted through the air across the ocean. The voice is broadcasted from both Rocky Point and Deal Beach, the former sending it out in a long wavelength, the latter on a short wave. The use of two wavelengths helps to overcome the interference of static and enables the operator to select the one that can be received with the greatest clearness at the time.

In England the receiving station at Wroughton picks up the call, amplifies it and sends it by wire to the London operator who makes the connection with the desired party. Coming from England to America, the voice is transmitted by wire to the station at Rugby, where it is amplified and broadcast to America. On this side the station at Houlton, Maine, picks up the message, amplifies it and transmits it over the landwires to your operator who then plugs it into your telephone. The diagram shown on this page traces clearly the course taken by messages in each direction. The area in which calls may be made to the other side contains approximately two and a half million telephones, anyone of which may be connected with anyone of the 800,000 telephones in the British connected area.

The charge for this service is based on the length of the time you talk. The charge for a three minute conversation either person to person, or station to station is $75, and $25 for each additional minute or fraction thereof. If the telephone in England is reached but not the particular person you require, there is a report charge of $10. When one considers the advantage of telephonic communication over such a great distance and the fact that in order to effect this communication, machinery and instruments costing more than five million dollars are required, the use of which is monopolized by the parties speaking during the period of their conversation, it will be seen that the charge is relatively cheap. Even in the first day of operation, it was reported that business deals, involving substantial sums of money, were completed over the telephone and negotiations were conducted verbally that otherwise would have been handicapped by the limitations of cable messages each way. (*To be Continued*)

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Our Contest Page

How Many Words Are There in MECCANO?

MANY excellent essays were received in this contest and in compiling the list of words that could be made from Meccano many boys did not hesitate to depart from the dictionary and invent words of their own. It was surprising how many sent in words that required a letter not included in the word "Meccano". Many used the same word several times over, specifying a different meaning to each, but they were disqualified; likewise some boys entered prefixes such as co, or ae, Latin diphthongs, but these were not words. A full list of words received is given below.

ma	em	con	no
mace	en	cone	Nome
man	eon	coca	neo
me	came	a	O
Mecca	cameo	ace	oca
men	can	acme	ocean
moa	cane	acne	omen
moan	canoe	am	on
mane	cam	amen	once
mean	caco	an	one
Macon	coma	name	om
Mona	come		

The Prize Winners Were As Follows

First Prize — Paul M. Brubaker, 23 E. Chestnut Street, Ephrata, Pa.

Second Prize — William Werner, 361 Broadway, Huntington Park, Cal.

Both of these boys entered 42 words so that the contest had to be decided on the essays.

Second Photographic Contest

From the large number of entries in this contest it is evident that photography is a hobby with the majority of Meccano boys. Many excellent photographs were submitted and we shall have another contest in the near future. A number of entries were disqualified because they failed to state that the photographs were taken by the entrant. This was quite an important point for of course it would be very unfair to permit a photograph that had been taken professionally to compete with boys' own work. Prizes were awarded as follows:

First Prize — John H. Robinson, 1623 Farwell Avenue, Chicago, Ill.

Grand Trunk Railway Bridge across Niagara River.

Second Prize — Billy Walmsley. P. O. Box 93, Stratford, Calif.

Drilling for Water.

The entries of Philip A. Bregy, Overbrook, Pa., Dwight Crater, Roselle Park N. J., and Maynard Drury, Ossining, N. Y., called for special mention and the judges were very much impressed by the night photographs sent in by Philip A. Bregy. We hope to see more of these boys' work in future contests.

New Subscriber's Contest

Quite a large number of readers entered the contest, although the majority of entries were only for one or two new subscriptions. James A. Parton, of Allentown, Penna., and Leonard Wood, of 541 Providence St., Albany, N. Y., tied for first place and to them, as well as those whose entries were received prior to January 15th, credit memos for the appropriate value in Meccano parts have been sent out.

The New Limerick Contest

It is quite some little time since we had any Limerick Contests, and we have had a great many requests from readers for more of them. We have decided, therefore, to have another one, and the limerick is given below. The contest is open to all, there are no restrictions of any kind, and you may send in as many entries as you like. Each should be written on a separate sheet of paper with your name and address and age. For the benefit of new readers it would be explained that all that is necessary is to compose a suitable last line for the verse below. Entries should be addressed to Contest Editor, Meccano Magazine, Elizabeth, N. J., and the envelope should be marked in the left hand corner "Limerick Contest." The contest will be in two sections, one for boys under ten years of age and the other for boys over ten years of age. In each case a prize of Meccano goods to the value of $3.00 will be awarded. This is the Limerick:

Hurrah for the new colored parts,
My, how they've captured our hearts;
They make old models new,
And look much better too,

.....

The contest closes on March 31st, 1927.

If I Were Editor

A Chance For Our Critics:

Every year we receive many hundreds of suggestions from readers who believe that the adoption of their proposals would improve the "M. M." We are always glad to receive these suggestions, and each one is considered carefully with a view to its possible adoption sooner or later. Many of the most popular features of the "M. M." have been developed from the suggestions of readers and now that the size of the Magazine has been increased we shall have a better opportunity of adopting new schemes.

This month therefore we are announcing a contest entitled "If I Were Editor of the M. M." Each competitor is required to state clearly but briefly what changes he would make, what features he would drop and what new ones he would introduce, if he were editor. This contest will be judged on the practical value of the suggestions put forward and not upon the excellence of the composition.

Essays should not exceed 500 words in length. They must be written on one side of the paper only and each sheet used must bear the competitor's name and address and age. Prizes of Meccano goods to the value of $5.00 and $3.00 respectively will be awarded to the two best essays.

Closing date March 25th. Replies should be addressed to Critic's Contest, Meccano Magazine, Elizabeth, N. J.

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BRIGHT IDEAS

This column is 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.

Dustin Cowle, Painesville, O.—suggests flanged wheels in a larger size, perhaps 2½" in diameter. He claims advantages for them as locomotive wheels. For large locomotive wheels we use a circular plate with circular girders but this gives a wheel twice the size of your suggested one.

Lynn Peterson, Salt Lake City, Utah—suggests the inclusion of a pair of pliers and 'chain-spreader' for opening the links of sprocket chain with a leather case to hold them. This sounds rather luxurious.

R. Melvin Quinn, Reading, Pa.—wants a gyroscope arranged so that it could be fastened in a Meccano car to be run on one rail. We hardly think this would be of sufficient general interest to justify its introduction.

Ray Qually—we note your suggestion for a curved braced girder—this matter is under consideration.

Herbert Caneday, Taylors Falls, Minn.—We should like to hear from you as to the application of your suggested "flanged gear with the teeth on the inside of the flange."

Frank Willey, Cincinnati, O.—The architrave, part No. 108, is admirable for joining strips at right angles. Write again if you have any further suggestions.

Albert G. Ross, San Jose, Cal.—For what purpose would you use "a curved strip with teeth on the inside to mesh with gears," and also the "octagonal collar." We should like to hear from you.

J. O'Collaghan, Chicago, Ill.—see answer to Roy Qually above.

Robert Cushman, St. Paul, Minn.—Acute and obtuse angle brackets have been considered but there does not appear to be any very general demand for them.

Alvan Hayden—A ball bearing auto wheel such as you describe and sketch would be quite a costly part to produce. You are to be complimented on your excellent sketching.

R. L. Pagel—we have under consideration the introduction of a new cabinet for storing Meccano parts.

Donald Helman, St. Bernice, Ind.—suggests curved plates that could be joined together to make a smoke stack, boiler, cement mixer, tank car, steam rollers, fire engines, etc. This suggestion has been turned over to our experimental department.

Wendell S. Kershner—see reply to Donald Helman, above.

Iver W. Johnson, E. Cleveland, O.—see reply to R. L. Pagel, above, regarding wooden cabinets.

Billy Linn, Portland, Ore.—see answer to Donald Helman re boilers.

Gordon Elliott—suggests a bit to fit in couplings for use in model drills, etc. This would have a very limited use.

Fred Hetherington, St. Louis, Mo.—the new pawl and ratchet wheel, parts Nos. 147 and 148, will answer the same purpose as your suggestion.

110 Story Skyscraper

Interest was aroused recently, by the announcement in New York newspapers, that a new building was being planned that would reach the unheard of height of 110 stories. Many expressed a doubt as to the practicability of such a giant, which would be twice the height of the Woolworth Building. It would house the population of quite a respectable sized town.

Many interesting speculations have been made as to how such a great number of people in one building could be taken up and down to their offices at approximately the same hours morning and evening. It has been predicted that the emptying of such a building at five o'clock in the evening would result in serious traffic jams, to say nothing of the problem of providing adequate elevator service.

So far, the whole proposal is in the realm of discussion, and there are many who predict that it will never get beyond that stage.

In Our Next Issue

Every day we enjoy the excellent programs that are broadcast over the radio, but we give little thought to the organization that is required to send out these concerts and the costly instruments that are used in broadcasting. In our next issue we shall publish an article on one of the most up to date stations, and it will be illustrated by some very interesting photographs.

There will be another installment of the Story of Brass, and we will continue the story of the outstanding marvel of the day, Radio-Telephony across the Atlantic.

Our next issue will be full of interest—don't miss it. If you have not already done so, make sure of your copy by subscribing now. Just mail 25c to the Editor, Meccano Magazine, Elizabeth, N. J.

Oil on Troubled Waters

Most of our readers know the old proverb dealing with the pouring of oil on troubled waters, but probably few know that the origin of the saying can be traced back to St. Aidan, the Celtic apostle. It is related by Bede, the famous Northumbrian scholar, that St. Aidan once gave a cruse of oil to a young monk who was commencing a voyage, and instructed him in its use in the event of a storm arising. In the course of the monk's voyage a gale sprang up, but by carrying out his master's instructions and pouring the oil upon the sea he was able to still the waves and save his craft. Today the practice is followed by ocean-going vessels in rough weather, and during storms large quantities of oil are pumped overboard, especially astern, to avoid the danger arising from following seas.

Power from the Sea

The oil supply of the United States is reported to be within six years of exhaustion and we are often warned that the end of the world's coal supply is almost within sight, so that any new source of power would be welcome. The latest idea for such a source is one for utilizing temperature differences in the ocean, and has been put forward by two French scientists, M. Claude and M. Boucheret.

These scientists propose to construct a turbine that will work with steam at a pressure of only three-hundredths of atmospheric pressure. This steam is merely the vapor given off by the surface water of the sea, while at the other side of the blades of the turbine will be a vacuum, which is to be maintained by cold water pumped up from greater depths.

The conditions required are met with in tropical seas. There the surface water is warm, while polar currents bring in cold water at great depths, the difference in temperature between water at the surface and water at a depth of 1,000 yards being from 20 degrees to 25 degrees C. In some tropical sea, then, the turbine would be set and it is anticipated that it would make 5,000 revolutions a minute instead of the 30,000 that it would make under normal steam pressure.

The practical success of the scheme is doubtful, however. A large proportion of the energy produced would be used up in pumping and other ways, and the question arises as to whether there would be any energy left over after the demands of the machine itself were satisfied. A further point is that there are not many places in the tropics where large amounts of energy are required, and the transfer of energy over long distances cannot easily be made economically.

If these difficulties can be overcome, however, the scheme will provide a splendid means of utilizing a power that will be available as long as the sun and the sea exist.

A Scoop for the M.M.

At the convention of the Society of Automotive Engineers, held in Detroit in January, one of the principal features was a paper by Mr. R. K. Jack on the Constantinesco Torque Converter. This remarkable inventor has created a great stir in Europe and Mr. Jack's paper was for the purpose of explaining it to the Detroit engineers. Several newspapers commented on it as great news, but it was not news for M.M. readers. For as long ago as March, 1925, Constantinesco's invention was described in the *M.M.* and in our issue of May, 1925, a Meccano model of the Torque Converter was illustrated and described.

Lab Apparatus

(*Continued from page* 106)

itself a number of times. The upper end of the tube or rod is provided with a flywheel to make its rotation smoother and it is attached to the motor by means of a piece of heavy rubber tubing extending between glass rod and the hub of the wheel. The rubber permits the stirrer to be lifted up out of the vessel. If desired, the vessel may be placed on a shelf and below it a small flame may be placed to give the contents of the container the benefit of the hot air bath whenever heat becomes a necessity.

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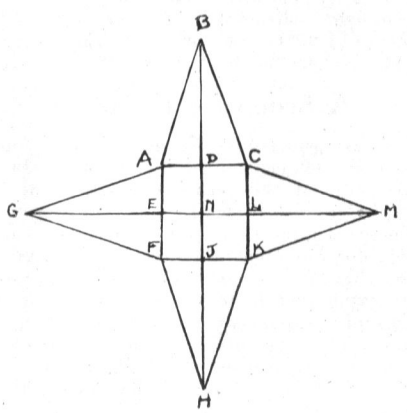
Puzzles for You to Solve

Puzzle No. 63—The following combination of letters represents an ordinary long division sum. which is to be converted into figures. Certain clues to the identities of the numbers are hidden in the sum, and careful observation will reveal them. To an ordinary observing person who applies the ordinary rules of arithmetic, it should not be necessary to take more than 10 minutes to solve the puzzle.

```
B T) K D N G (S T P
    P K
    ---
      F N
      T N
      ---
      B G G
        N B
        -----
            N
```

An Ancient Town

Puzzle No. 64—The diagram below represents a plan of the main streets of an ancient town. In showing a visitor around, which would be the quickest route to take to cover every street but not to traverse any more than once? For the convenience of description various points are lettered.



You do not have to speak French to translate these

Puzzle No. 65—It is true, no knowledge of French is necessary.

Qui n' a beau dit mit a beau dit,
Comment trou le raille;
Qui n' a beau dit qui sait beau dit,
Nid a beau dit craille?

Pas d' elle yeux Rhône que nous.

Puzzle No. 66—Here is a square divided into 16 small squares, each of which bears a number. Can you cut the square into four parts and put it together again in a different way so that the vertical rows, the horizontal rows and the diagonals, when added up separately come to 34?

1	15	5	12
8	10	4	9
11	6	16	2
14	3	13	7

Missing Words Puzzle

Puzzle No. 67—The problem is to fill in the blanks in the following sentences with names of Meccano parts. In one or two instances, where the name of a part consists of more than one word, only one of these words has been used, but in each case sufficient is given to enable the particular part to be identified.

Dick was only a ..... of a lad, and he thought his ..... was an ..... old ..... Dicks wages scarcely enabled him to buy sufficient ....., let alone his favorite ..... Even a ..... will turn, however, and presently Dick became convinced that he could ..... out of the old ..... an increase in wage. Without any beating about the ..... he ..... his ..... and ..... himself for the attempt. He took no chances however. There was some risk that his employer would ..... and ..... him, and therefore, Dick held himself ready to ..... round on his ....., ... through the door and ..... for his life.

Puzzle No. 68—The name of a flower is hidden in each of the following sentences, the letters occurring consecutively in the correct order.

1—Shall I put this stamp in Kate's album?

2—What lovely hair! I should like mine to curl like that.

3—If that man is insane, money should not be given to him.

4—My cousin Ada is your sister-in-law.

5—My brother has traveled in Japan, Syria and India.

6—Do you hear how Tom and Sarah are bellowing in the nursery?

7—Will Mr. Carlo be liable for the damage?

8—I read to that poor negro several times a week.

9—This case is urgent. I anticipate serious results.

Answers to Puzzles in Last Issue

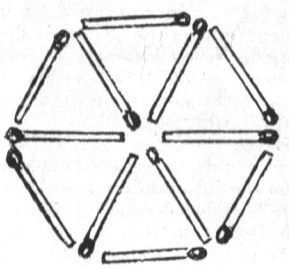
No. 57—The number was 9819.

No. 58—The various arrangements of the volumes were as follows:

$\frac{6729}{13458}$-1/2; $\frac{5832}{17496}$-1/3; $\frac{4392}{17568}$-1/4; $\frac{2769}{13845}$-1/5

$\frac{2943}{17658}$-1/6; $\frac{2394}{16758}$-1/7; $\frac{3187}{25496}$-1/8; $\frac{6381}{57429}$-1/9

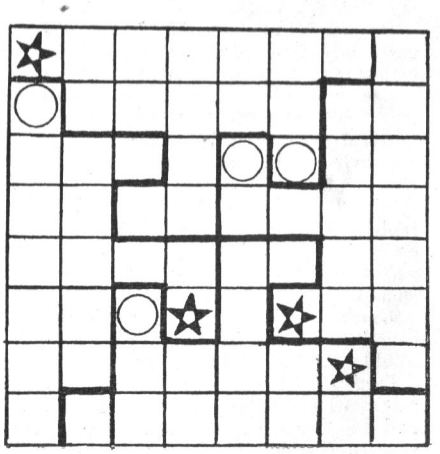
No. 59—The solution is shown in the folowing diagram:



No. 60—A river.

No. 61—Tom's fish was 72 inches long.
Head 9 inches
Back 36 inches
Tail 27 inches

No. 62—The figure is divided as shown below:



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Our Mail Bag

In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives a great many letters each day, and correspondents will help him if they will write neatly and on one side of the paper only.

Allan Bromley, Jr., Sawtelle, Cal.—"I have taken the *M.M.* for one year, and am well into my second year with another year's subscription. I think the new *M.M.* is very much better than the old one and enjoy it very much." Thank you, Allan; the improved *M.M.* with its increased size has been welcomed by all.

Gilbert Small—We don't know where you live, Gilbert, for you failed to put your address on your letter. Letters are always welcome but we cannot correspond about competitions. "If at first you don't succeed, try again." Congratulations on winning a prize for garden work.

Milton Laucik, Chicago, Ill.—"I think the increased size of the *M.M.* is a great improvement." Thanks, Milton, there are more improvements in store yet!

Emil Reiss, Jr.—is another boy who did not put his address on his letter. Emil writes that he is in High School and makes models with Meccano which help him greatly in his solid Geometry studies. We wish you every success Emil—write again.

Walter R. Whitcome, Albany, Wisc.—"Of all the contests you have held and I have entered, I never seem lucky." We cannot all be winners, Walter, but we can and should try hard. Most successful men of today had numerous obstacles and difficulties to overcome but they refused to be discouraged, persevered and won. It isn't luck that wins, Walter, but rather pluck.

Ralph Fisher, Summit, N. J.—saw a copy of the December *M.M.* and immediately subscribed. He finds the articles very interesting and likes the contest page and suggests an essay contest on "How Meccano has benefited me." What do other readers think?

Hall Kirkman, Winston-Salem, N. C.—writes, "I want to congratulate you on your good transformers. Nine years ago I received a Meccano set and transformer and ever since then I have been using my transformer, and I have also loaned it out to other boys and it is just as good as new." That is a good record, Hall—can any of our readers beat it?

John W. Gillings, Port Orford, Ore.—Thank you for writing, John, but we could not quite follow the description of your model. Perhaps you will write again.

Fran T. Kadowski, Camden, N. J.—"I have a No. 00 and 0; they are small sets but I am satisfied with it more than I would be with another toy. One boy has a $15.00 . . . set but I think my Meccano better than his set." Of course it is, Fran. We commend your good judgment.

Lawrence McCready, Pelham Manor, N. Y.—is one of our new subscribers and writes: "I have a friend who showed me his December issue of the *M.M.* In it there was a picture of the giant Hammerhead crane at Philadelphia and I made a model of it. I ran it with my Meccano motor. It works perfectly and I may send you a photograph of it." Splendid, Lawrence!—Hurry that photograph along; your fellow M.M. readers would like to see it.

Mrs. James Graham, Bronx, N. Y.—"I would like to increase my boy's Meccano set for we all agree that it is the most instructive toy that we ever were able to purchase." Thank you, Mrs. Graham. To combine sound instruction with amusement is our constant aim. The parts list you asked for has been sent to you.

Norbert Albers, Cincinnati, O.—writes to say that his brother has a No. 4 Meccano and he has a No. 1. "My parents, my brother and I all prefer Meccano to———— (another construction toy)." Thanks, Norbert—so do we.

Edward Muth, Passaic, N. J.—"As soon as I received my *M.M.* and found out the new and better Meccano, I had my father get me a No. 3x Multicolor set." You are a lucky boy, Edward; your request for a new model building contest has been noted.

Richard Clayton, Bound Brook, N. J.—won a prize in the last model building contest and writes: "This is the second prize I have won in a model building contest; the first prize I won in England." We congratulate you heartily on your success, Richard.

Wm. M. Steiner, Brooklyn, N. Y.—"I just want to tell you how happy I am. I received a No. 3a and some extra parts for Christmas. The new colored parts are dandy and the whole outfit is fine." Many thanks for your enthusiastic letter. We note with interest that you are a junior degree member of the league of Curtis salesmen—an organization of live-wire boys.

Elroy Maier, St. Louis, Mo.—thought the December *M.M.* very interesting, especially "The Story of Brass" and "At the Sesquicentennial." He writes "I became a Meccano boy on December 25th, 1926. Before that for about five years I have been for the other 'well-known' construction set but now . . ." Welcome to Meccanoland, Elroy—you have all the fervour of a true convert. No wonder your health is improving!

Robert Bonin, Milwaukee, Wisc.—renews his subscription and tells us that he finds the *M.M.* helpful in school. He mentions particularly the stories of Steel, Brass and Cement; and judging by his interesting and well-written letter, we surmise that Robert must be one of the leaders of his class.

Wilmot L. Walker, Jellico, Tenn.—suggests that readers send in jokes to be published in the *M.M.* All right, Wilmot, send some along and we will be glad to consider them.

Richard T. Fisher, Jr., Weston, Mass.—"Double the price if necessary but make the *M.M.* come every month. Its bad enough to have to wait one month, but two is awful." Your editor will need to increase his staff before that can be done, Richard, but we look forward to bringing out the *M.M.* monthly in the not too distant future.

Revel Freeman, Glendale, Cal.—see reply to Richard T. Fisher above.

Arthur Smith, Detroit, Mich.—"I have built three signals and four telegraph poles for my electric train with Meccano. What are threaded pins for?" See models 305, 308, 312, 313 in the manual.

Robert Hanson, Green River, Wyo.—writes to say how surprised and delighted he was with the increased size of the *M.M.* and adds that he has been getting a number of his boy friends interested in Meccano. Excellent work, Robert—you are doing your friends a good turn for which they will be grateful once they sample Meccano fun.

Meccano Magazine

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CHANGE OF ADDRESS—Subscribers should notify the Editor at once of any change of address. Send a postcard,—*giving both old and new addresses*,—so that our records can be kept up-to-date.

Meccano Parts in Colors

The New Multicolor Meccano outfits have received a very enthusiastic welcome by boys all over the country and many of them have written in asking for particulars of the Meccano parts which are now colored. We give below a list of the regular Meccano parts which are available in the new colors.

PARTS IN RED

No.	Description	Price
41	Propeller Blades ..... per pair	$ .15
52	Perforated Flanged Plates 5½" x 2½" ..... each	.25
52A	Flat Plates 5½" x 3½" ..... each	.15
53	Perforated Flanged Plates 3½" x 2½" ..... each	.20
53A	Flat Plates 4½" x 2½" ..... each	.12
54	Perforated Sector Plates ..... each	.20
61	Windmill Sails ..... each	.10
70	Flat Plates 5½" x 2½" ..... each	.15
72	Flat Plates 2½" x 2½" ..... each	.10
76	Triangular Plates 2½" ..... each	.05
77	Triangular Plates 1" ..... each	.04
108	Architraves ..... each	.09
109	Face Plates 2½" ..... each	.20
118	Hub Discs 5½" ..... each	.50
119	Channel Segments ..... each	.15
126	Trunnions ..... each	.10
126A	Flat Trunnions ..... each	.06
131	Dredger Buckets ..... each	.15
133	Corner Brackets ..... each	.10
139	Flanged Brackets (right) .... each	.10
139A	Flanged Brackets (left) ..... each	.10
143	Circular Girders 5½" ..... each	.55
145	Circular Strip 7" ..... each	.50
146	Circular Plates 6" ..... each	.60

PARTS IN GREEN

90A	Curved Strips 2½" (small radius) ..... half doz.	25
97	Braced Girders 3½" ..... half doz.	.20
98	Braced Girders 2½" ..... half doz.	.15
99	Braced Girders 12½" .... half doz.	.75
99A	Braced Girders 9½" ..... half doz.	.60
100	Braced Girders 5½" ..... half doz.	.50

There is no difference in the prices of colored or nickeled parts but when colored ones are required the letter "X" should be added to the catalog number shown in this list, thus "99X." If nickeled parts are required the regular catalog number only is to be used, as heretofore. In cases where parts already have a letter, such as "No. 99A" nickeled parts still go under this number and colored parts will be designated by adding "X" after the letter, as "No. 99AX."

meccanoindex.co.uk

"Let's see the colors!"

THESE boys are all aglow with excitement over the New Multicolor Meccano Outfits. The Plates enameled in red, Braced Girders in green, in combination with the shining steel Strips and bright brass Gear and Pulley-Wheels, give a wonderful appearance to Meccano Bridges, Towers, Cranes and the hundreds of other real engineering models that only Meccano can build.

The principle of the Meccano system is the same as before—just as fascinating and ingenious—but the new colors are a fine improvement.

Meccano Price List

Complete Outfits

No. 00	Outfit	$1.00
" 0	"	2.00
" 1	"	3.00
" 1X*	"	5.00
" 2	"	6.00
" 2X*	"	7.50
" 3	"	9.00
" 3X*	"	10.00
" 4*	"	15.00
" 5*	"	25.00
" 6*	"	45.00

*Has electric motor.

Accessory Outfits

No. 0A (converts a No. 0 into a No. 1)	$1.25
No. 1A (converts a No. 1 into a No. 2)	3.00
No. 2A (converts a No. 2 into a No. 3)	3.00
No. 3A (converts a No. 3 into a No. 4*)	6.00
No. 4A (converts a No. 4 into a No. 5†)	7.50
No. 5A (converts a No. 5 into a No. 6)	20.00

*Except motor.
†Except transformer.

Meccano Motors

E 1	Electric (one-way)	$3.50	E 3	Electric (reversing)	$9.50
E 2	Electric (reversing)	4.50	S 1	Clockwork motor	3.00

Meccano Transformer for 110 Volts, 60 cy. A. C. $2.50

Meccano Company, Inc.
Elizabeth, N. J.

THE NEW MULTICOLOR MECCANO

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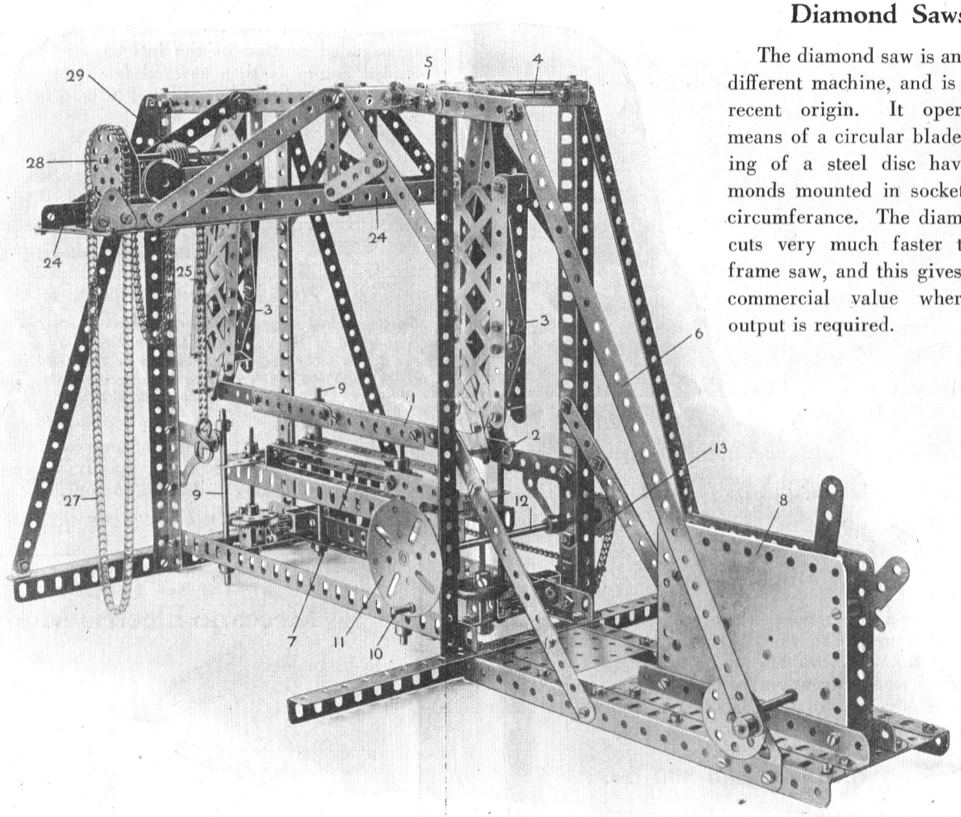
A New Model Stone Sawing Machine

THE cutting and dressing of stone is one of the oldest industries in the world, but the use of machinery in this industry is a comparatively recent development. It is difficult to imagine how the ancient engineers were able to cut and dress the stone for their great buildings and monuments. Indeed, this subject presents many interesting problems, and some of the achievements of the ancient craftsmen are remarkable. Some day we hope to publish a series of articles on Ancient Engineering, when the subject of stone-cutting and stone-dressing in early days will be dealt with in greater detail.



Frame Saws

In modern stone-yards the most important work done by machinery is the actual cutting or sawing of the stone, and for this purpose two main types of saws are used. These are the Diamond Saw and Frame Saw.

The new Meccano model illustrated on this page demonstrates the working of the frame type of saw. This consists of an upright frame supporting a swinging carriage, which is given an oscillating motion from a driving crankshaft. The cutting blades are fixed to this carriage. An ample quantity of water and sawing grit is supplied to the blades, and by driving this grit backward and forward the blades cut their way into the stone.

Diamond Saws

The diamond saw is an entirely different machine, and is of more recent origin. It operates by means of a circular blade consisting of a steel disc having diamonds mounted in sockets on its circumferance. The diamond saw cuts very much faster than the frame saw, and this gives it great commercial value where large output is required.

For some purpose the steel disc and its diamonds are replaced by a wheel having a steel center and a rim of carborundum. The carborundum wheel gives a very smooth cut with sharp edges, and is largely used in working marble. It takes more power, however, and its cutting rate is slower. In the case of a very soft stone—such as Bath stone, for example—a steeltoothed wheel is often used.

Preliminary rough sawing of large blocks of marble or stone is frequently performed in quarries or yards by a wire running over the surface of the stone. This wire cuts in a similar manner to the frame saw, by means of an abrasive such as sand and water.

The Meccano Model

The construction of this model is not difficult to follow from the illustrations, and there is little to be said to supplement them.

The sawing strip (1) consists of two Rack Strips bolted to a 12½″ Strip (2) connected by 1″ Rods to the ends of the swinging frames (3). One of these is loosely pivoted on one of the Rods carried in the frame, the other being secured by a Crank to the Rod (4). The swinging frames (3) are oscillated from the Crank (5) and connecting rod (6) driven by the Clockwork Motor (8).

The support frame (7), on which the stone blocks to be sawn are raised and lowered is guided on the vertical Rods (9) and raised and lowered by the operation of the Threaded Pin (10) forming a handle on the Face Plate (11). This Face Plate is mounted on a Rod (12) carrying a 1″ Sprocket Wheel (13) connected by a chain to another 1″ Sprocket Wheel (14, Fig. B) on a Rod (15). A third 1″ Sprocket (16) on the same rod is coupled to a fourth 1″ Sprocket Wheel (17) at the end of the machine.

The Rods (15 and 18) carry ½″ Pinions (19) driving Contrate Wheels (20) secured on Screwed Rod (21) and engaging Threaded Cranks (22) secured to the frame (7) by 1½″ Strips (23).

The trolley (Fig. A) runs on gantry rails (24) and the load chain (25) passes over a ¾″ Sprocket Wheel on the Rod (26), to be secured at one end of the trolley frame.

The chain (25) is raised or lowered by the operation of a Sprocket Chain (27) passing over a 1½″ Sprocket Wheel (28). This is mounted on a Rod carrying a Worm (29) which engages a ½″ Pinion on another Rod (26) carrying a Sprocket Wheel (30) over which the load chain (25) passes.

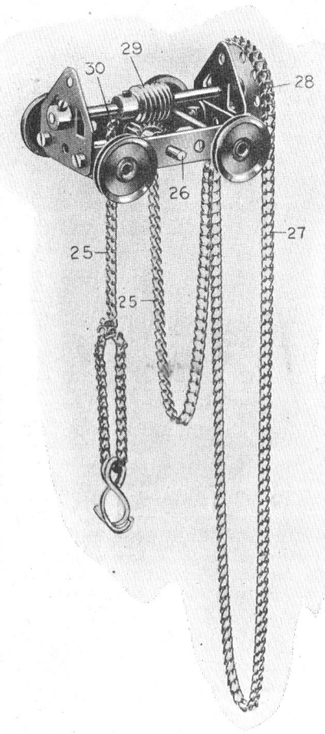


Fig. A.

Parts Required

5	of No. 1	12	of No. 35
19	" " 2	4	" " 37
1	" " 2A	181	" " 37A
11	" " 3	32	" " 38
4	" " 4	6	" " 45
8	" " 5	1	" " 47
2	" " 6A	5	" " 48A
12	" " 7	3	" " 53
4	" " 8A	2	" " 57
2	" " 9	15	" " 59
1	" " 10	2	" " 62
8	" " 11	2	" " 62A
15	" " 12	2	" " 80A
1	" " 14	2	" " 76
1	" " 15	40″	" " 94
5	" " 15A	1	" " 95A
3	" " 16	1	" " 96A
2	" " 16A	4	" " 100
1	" " 17	4	" " 108
2	" " 18A	1	" " 109
4	" " 22	2	" " 110
1	" " 24	180	" " 111B
3	" " 26	2	" " 115
2	" " 28	4	" " 125
1	" " 32	3	" " 126A

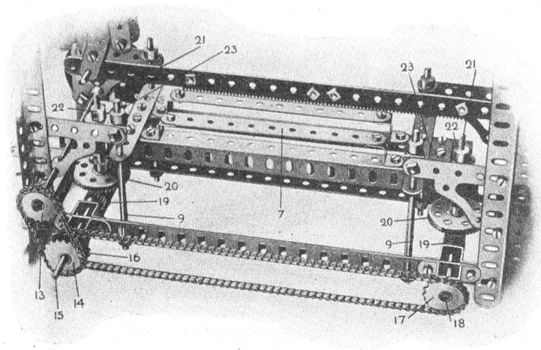


Fig. B.