

MECCANO

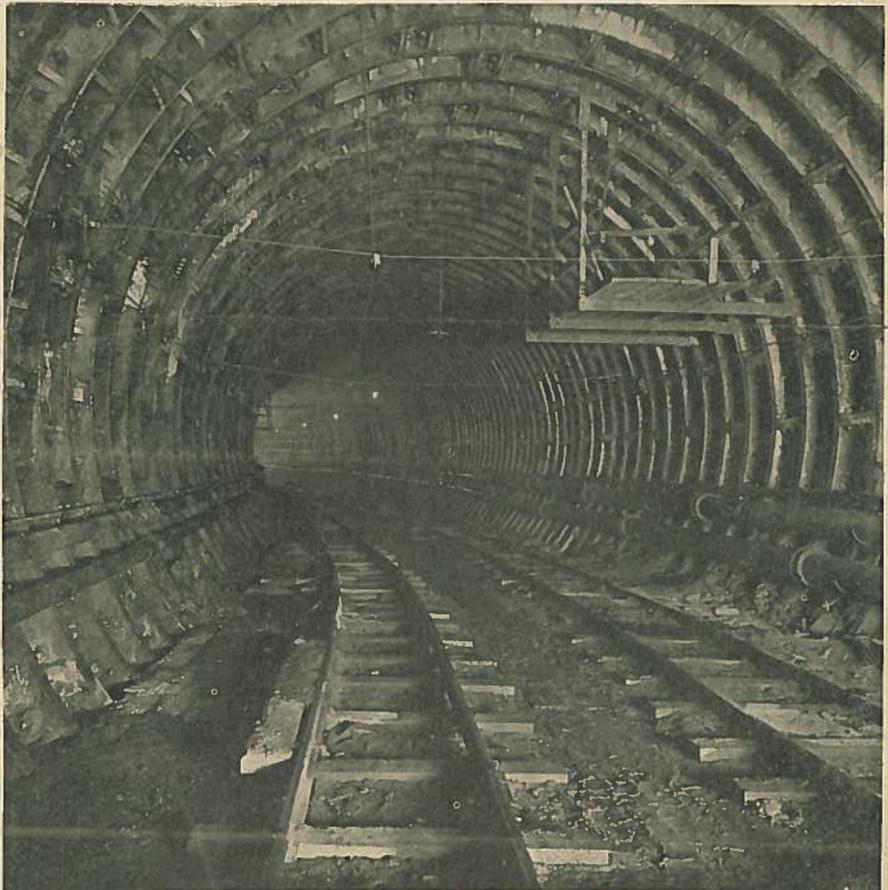
MAGAZINE

for Boys

Vol. VIII. No. 5

SEPTEMBER-OCTOBER, 1926

Price 5 Cents



Tunnelling under the Hudson
See page 67

The Editor's Own Page

Our Cover

For over five years a great tunnel under the majestic Hudson River has been in process of construction and day by day, through summer and winter, the merciless drills have been biting their way into the rock and earth under the river. Now the tunnel has been driven—the major portion of the great task is completed, and the new link between Manhattan Island (upon which New York is situated), and the mainland, will soon be opened. Our cover illustration shows the massive iron shell of this tunnel, photographed at the big bend that sweeps from under the river bed to the New York terminal.

For Automobiles and Teams

There have been other tunnels driven under the Hudson River at New York—several of them—but they have all been constructed for the use of electric trains. This new tunnel, however, will be used solely by automobile and horse-drawn trucks, which vehicles introduce several new problems with which the designers of the former tunnels did not have to contend. The most important of these is the removal of the poisonous exhaust gasses of the automobiles and the adequate supply of fresh air to provide proper ventilation. The other problem was that of properly lighting the tubes so that no sharp shadows should be thrown by the vehicles and also to provide plenty of light without glare. How these obstacles were met and overcome is told in the article commencing on the opposite page, in which the story of this latest engineering achievement is related.

The Story of Metals

For the past seven issues the story of iron and steel has been told in the "M.M." and with this number the series is brought to a close. The steel has now passed through all the necessary processes of purification and refinement and is now ready to be made up into Meccano parts. From the many letters that we have received it is evident that this series of articles has been followed with the closest interest by Meccano boys.

Our next story of metals will deal with the manufacture of Brass, another valuable metal especially familiar to the Meccano boy. This series will commence in the next issue, and will be one that no Meccano boy should miss.

Good News

We promised an important announcement in this issue—and our readers will find it on the back cover. Here is told the story of a new development in Meccano—the great improvement that makes it "the last word in construction toys."

This improvement has been in process of development for a long while. Many difficulties had to be overcome before success was achieved; not until every detail had been thoroughly tested and found satisfactory could a public announcement be made. We are glad to tell our readers that all is in readiness.

The New Multicolor Meccano opens up a great new opportunity for fun and joy in the realm of model-building.

It's Springtime in Meccanoland

This is the time of year when life in that wonderful country called Meccanoland enters upon its happiest and busiest season. All its inhabitants put their outfits in first class order and build and build, and never cease to build. They invent new models, improve upon those already published, compete for prizes, and write stern notes to the Editor calling upon him to hurry along with their next "M.M." Now for a busy season, boys. And what a happy season the new Meccano developments will bring to Meccano boys this year!

Our Next Issue will be a Special Christmas Number

Many fine features will be included in this special edition. Among these are:

How Jack Discovered the Perfect Toy

An interesting story of a boy who couldn't build good models until he—but read it yourself!

A Meccano Boy at the Sesqui

We sent a special representative to the big exhibition at Philadelphia. He tells of his visit there and what he saw.

The Story of Brass

The first in a series of interesting articles describing the production of this valuable metal.

More Models, Contests, Puzzles, etc.

The Hudson River Vehicle Tunnel

Realizing the great need for better facilities to handle the vast volume of vehicular traffic crossing the Hudson River between New York City and Jersey City, which traffic is now handled exclusively by a number of ferries, the Legislatures of the States of New York and New Jersey each appointed a Commission to make a study of this problem, with a view to building either a bridge or a tunnel to relieve congestion and expedite cross-river vehicular traffic in the metropolitan area.

Traffic studies indicated the peak of vehicular traffic crossing the Hudson River in the

which is known as the Holland Vehicular Tunnel. There are two tubes, one for eastbound traffic and one for westbound traffic. Each tube is 9,250 ft. long and is built of cast-iron segments bolted together, with a lining of concrete and an inner lining of white vitreous tile. The diameter of each tube is 29 ft. 6 ins. with a 20 ft. roadway and a headroom of 13 ft. 6 ins.

The tubes are wide enough to permit two large motor trucks to pass through two abreast, or three small cars. It is estimated that two lines of cars, each numbering 1,900



The "State Line" in the Holland Tunnel.

downtown section of New York City to be at Canal Street, and after a very exhaustive investigation into the merits of bridges and tunnels, the Commission adopted a plan calling for the construction of a tunnel from Canal Street, New York City, to a point opposite on the Jersey Shore.

On October 12, 1920, the first shovelful of dirt was dug on the New York side of the river on the noteworthy engineering project which is now rapidly nearing completion and

can pass through each tube in fifteen minutes. As the tunnels are one way passages, with no cross traffic, a fairly high rate of speed can be safely maintained. In each tube, there is a raised footpath, four feet above the floor level, from end to end, for guards to patrol.

The Ventilation

The tunnel will be artificially ventilated by the use of 84 fans, and every possible pre-

(Continued on page 71)



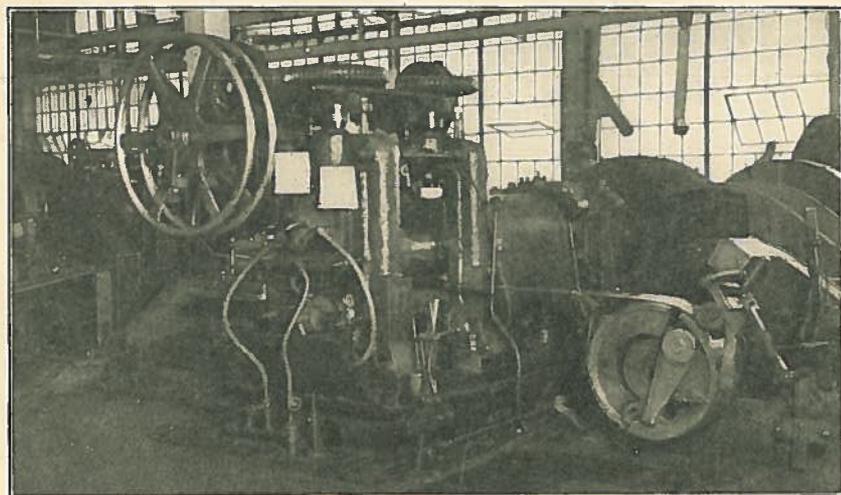
This is the last installment of this series of articles on the story of iron and steel. We have followed the progress of the ore from the mine to the rolling mill and now learn of the final process through which the steel must go before it is ready to be made into Meccano parts.

Cold Rolling Strip Steel

Cold rolling is the process of producing flat strips of steel of various dimensions from hot rolled strips or round drawn wire by passing between highly polished revolving rolls under pressure. The effects upon the steel are much the same as those found in wire drawing in

of heat treatment may also be applied and process annealing is much used.

At the hot mills the flats are wound into a loose or vibrated coil, similar to round wire, or into a tight ribbon clock spring coil. For easier and better cleaning the heavier gages



AMER. STEEL & WIRE CO

Cold Rolling Strip Steel.

that the thickness is reduced, the length of the strip is greatly increased, the surface is improved, the temper or hardness is changed and the desired edge is obtained.

The Preliminary Treatment

As in wire drawing certain preliminary treatments have to be applied to the hot rolled rods, as recoiling, cleaning and sometimes baking. For certain kinds of steel some form

and wide sizes are first sent to a recoiler which is a series of properly arranged power rolls that rewind the bundle or coil in the reverse directions and into a larger diameter. This operation aids in breaking and loosening the scale and makes for better cleaning.

Cleaning is a very important factor in producing good cold rolled products and the agent as in round wire is the hot dilute sulphuric acid solution. In all cases the rods are dipped

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How I Built My Workshop

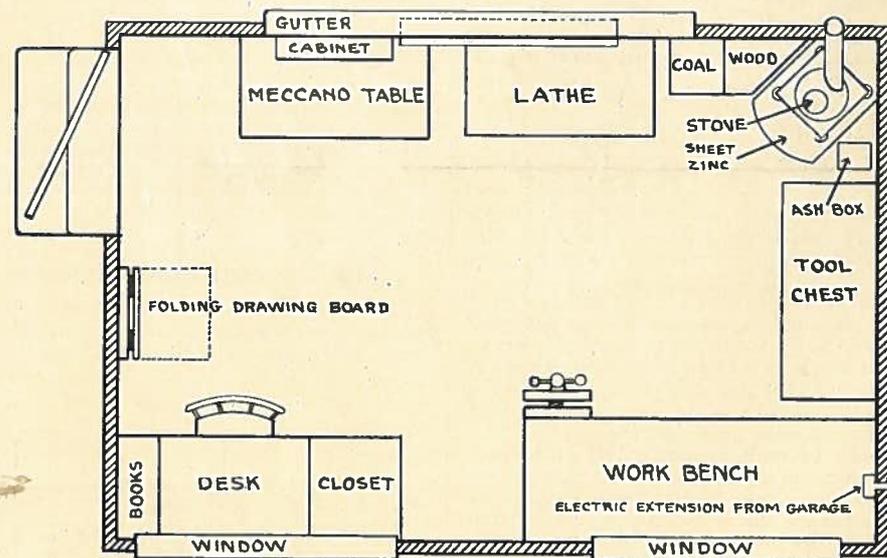
By WILSON G. WALTERS

In the August issue Master Walters told how he built his own private workshop. This month he describes the interior arrangement—and the Editor wishes he had so cozy and well-planned a workshop as Wilson's certainly seems to be.

II. The Interior Arrangement

Now to go to the interior which I think is the most interesting part of my shop. The first addition in the way of furnishings was of course my work bench, which I made from two large heavy planks solidly supported on legs, made from the remnants of the wood of the shop. The next part of the equipment to be made was a desk, as I didn't want my shop to be only a place to work in but also where I would have my general headquarters.

see from the diagram. For the Meccano parts I made a small cabinet in which I conveniently placed the various parts, then fastened the cabinet to the wall right above the table. By this time my shop was too cold to work in so with the money I received at Christmas I bought a small stove from a second hand dealer (for about \$3.00) and placed this in the corner on a sheet of zinc and surrounded it with a large piece of old tin; you see I



Floor Plan of Workshop.

I made this from the left-over scraps also, making one large center drawer and two others at the side fashioned from old boxes. I borrowed (?) an old chair from the house to go with the desk. I also made a small shelf for the few books which I possessed.

The Meccano Table

Next in order was my Meccano table which I made so as to fold down against the wall when I wasn't using it, for there was not too much room in my shop, as you can readily

didn't plan on burning down my "home" right away. The stove pipe was easily put up, and extends well above the roof to insure a good draft. With this additional equipment came the coal bin, made from an old box; the wood box, made from a large piece of tin; and then the "ash can"—an oil can with wooden handles fastened to the sides.

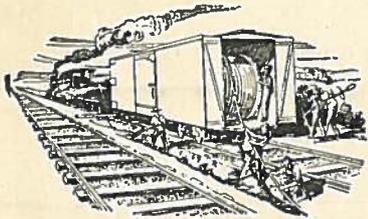
My Hinged Drawing Board

A drawing board of some sort seemed
(Continued on page 74)

The World behind your Telephone

IV. Underground Cables

As the use of the telephone increased it became necessary to increase the size and numbers of the poles carrying the various wires, until the streets in congested districts were buried under a network of wires. For example, a pole line in New York had poles 90 feet high, each with 30 cross-arms from which were supported 300 wires. The telephone engineers saw that it would be necessary to bury the wires if future progress was



not to be hampered, and as early as 1881 experimental cables were laid for a short distance along a railroad track in Massachusetts. This is illustrated in the drawing above.

But the placing of the wires underground was not as simple a solution of the overhead congestion as it would have seemed. Many technical obstacles had to be overcome, and it was not until 1905 that successful transmission by underground cable for even so short a distance as 20 miles was achieved.

One mile of underground cables cuts down the transmission as much as about 30 miles of open wire lines, and the telephone engineers soon discovered that this difference could not be made up by increasing the loudness of the

Running the Cable into the Underground Conduits through the Manhole.



transmitter or receiver. It was not until the loading coil, also known as the "Pupin Coil" was introduced in 1902 that the way was paved for the extensive use of cables. This coil is the invention of Prof. Pupin, and is one of the important factors in the development of long distance underground cable transmission.

As the result of a vast amount of experimental and research work, in 1911 an underground cable had been designed which was capable of giving satisfactory conversation between Boston and Washington. In the following year a section of this new cable was laid between Washington and Philadelphia and connected with the cable previously put in service between the latter city and New York.

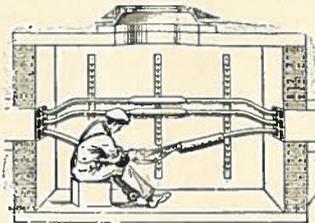
The Washington-Boston Cable

During 1913 another section of the new cable was laid between New Haven and Providence forming a link with the earlier type cables previously laid between New Haven and New York, and between Boston and Providence. Further advances in the art of loading and balancing underground circuits and great improvements in the telephone apparatus resulted in satisfactory talking between Washington and Boston by underground cable, 450 miles long—several times longer than any other underground line in the world.

The Underground Conduits

The cables are not merely buried in the ground, but are drawn through conduit or ducts which are carefully buried, and which

The Cable Splicer Connects the ends of the Underground Cables at the Manhole.



have openings at suitable distances along their length, known as manholes. At these manholes the cables are drawn into the ducts and the many wires in the two sections of a cable ending at the manhole are "spliced," or joined together.

The Cable Itself

In developing the underground cable many different kinds of insulating and protective material were experimented with. Today the

(Continued on next page)

The Hudson River Tunnel

(Continued from page 67)

caution has been taken to provide an adequate supply of fresh air, which will be forced through air ducts at the bottom of each tunnel. The ventilating provides for changing the air 42 times per hour and the total amount of fresh air to be supplied to the tunnel per minute is 3,761,000 cubic feet. Six independent sources of power are available for the lighting and ventilating of the tunnel, anyone of which is capable of providing sufficient power to operate the tunnel at full capacity. The air in the lower duct will be forced into the roadway itself through air flues and expansion chambers placed at intervals of fifteen feet along each side of the tunnel. This will force the vitiated air out through openings into the top duct, whence it will be drawn out and discharged through the caissons at the ends of the tunnels.

Lighting the Tunnel

The illumination of the tunnels presented an unusual problem in that it was necessary to get plenty of light without either glare or sharp shadows. Specially designed reflectors are to be set into iron boxes imbedded in the concrete of the tunnel, and diffusing glass will cover the lights to avoid glare from the lamps.

As the lighting units will be flush with the walls, and set near the ceiling at a downward angle of twenty degrees, there will be no lights visible to the motorist as he drives through the tunnel. Two thousand of these special lighting units will be required, spaced at intervals of twenty feet on each side of the tunnel. The results will be illumination about three times as bright as that of the average city street, so arranged that very little shadow will be cast by the cars as they move along. It will not be necessary for automobiles to use headlights.

The First Inspection

On August 21, 1926, Governor Smith of New York, and Governor Moore of New Jersey, made an official inspection of the tunnel. As guests of the Commissions, they were in the first car driven through the tunnel from New York to Jersey City, around the tunnel plaza in Jersey City and back again through the same tunnel to New York City.

Only some painting and minor finishing touches remain to be done in the tunnels, the main construction work being more than 90 per cent completed. It is expected that both tubes will be opened to the public in March, 1927.

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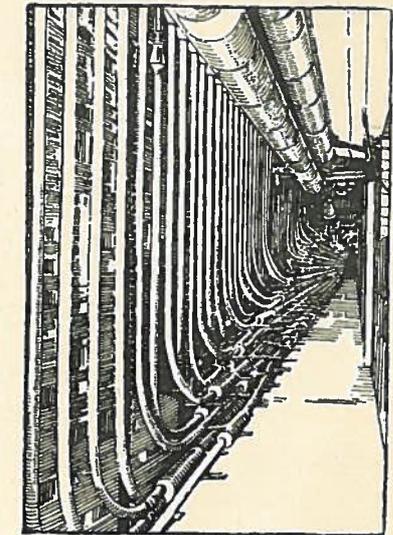
The World behind your Telephone

(Continued from preceding page)

"dry core" cable is in general use. In this type the telephone wires are loosely wrapped in manila paper insulating material, twisted into pairs, then again twisted into a cable and put through a drying process before being enclosed in a lead sheath. Developments in cable manufacture and telephone engineering have enabled the telephone engineers to use smaller gage wires and more circuits without increasing the size of the cable. The largest size cables now in use have a diameter of 2 5/8 inches and carry 2,424 wires, which is as many as 24 separate pole lines each with 10 cross-arms would carry.

The Cable Vaults

As all roads once led to Rome, so all the telephone circuits eventually reach the central office switchboards. At the central office the



The Cable Vault.

cables pass from the conduits into the cable vaults. Hanging on the walls like huge, sluggish snakes, they curve their gray bodies upward to the ceiling and disappear from view. When they reach the floor above the lead-covered cables end, and the telephone circuits begin some of the many twistings and twinings that the wires undergo on their way to the switchboard. The rooms where the cables end is known as the Terminal Room.

In this room is located the auxiliary appar-

(Continued on page 77)

How to Build Two Improved Meccano Models

The Punch Press

The Meccano Model Punch Press, which has been shown in the Manual of Instructions for a number of years, has recently been redesigned. The improved model is illustrated at the left and incorporates some of the newer parts introduced during the past several years.

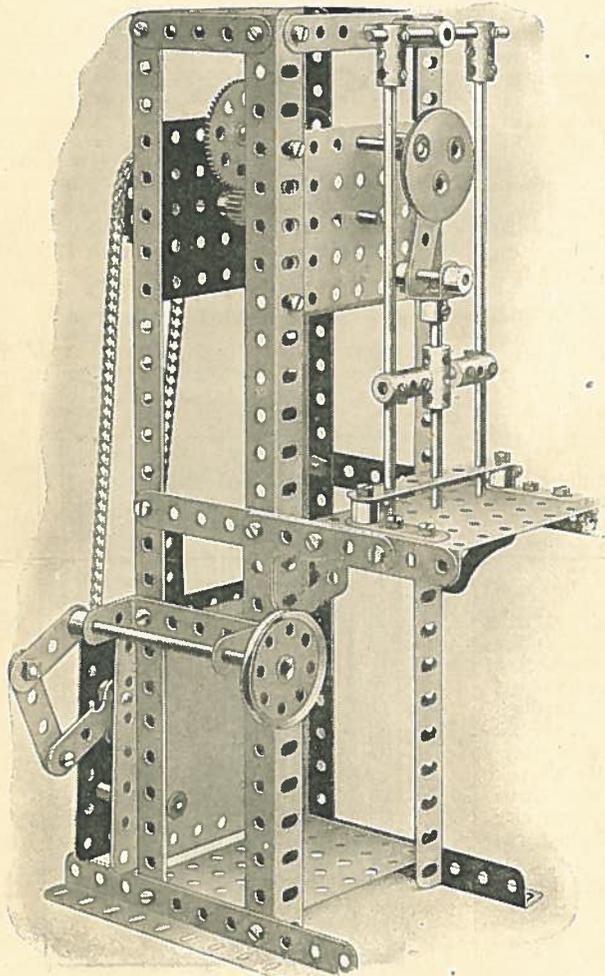
The action of the press is unchanged, however. The Clockwork Motor attached to the frame at the rear drives through a sprocket chain a sprocket wheel fixed to a rod. On this same rod is also fixed a pinion, which meshes with the 57 toothed gear, as shown in the illustration. On the rod with the gear is fixed a triple-throw eccentric, which has its strap-arm pivoted on a rod secured by couplings to a fork piece. The punch is secured to this fork piece and the up and down movement of the punch is guided by couplings riding on guide rods at the sides. The throw of the punch can be varied by means of the eccentric, which has three available throws; $\frac{1}{2}$ in., $\frac{3}{4}$ in. and 1 in.

The handwheel shown at the left of the table controls the movements of the motor.

The Beam Engine

In the model Beam Engine illustrated at the right the valve (E) is operated from a strip pivoted to the frame at (G) and connected at (F) to the beam by a short strip at the other end. The top of the valve rod (E) is pivotally connected to the strip by a coupling into which a bolt passing through a hole in this strip is screwed. The connections of the piston rod (D) and the connecting rods at (A) and (C) are clearly illustrated. The beam is pivoted on the rod (B).

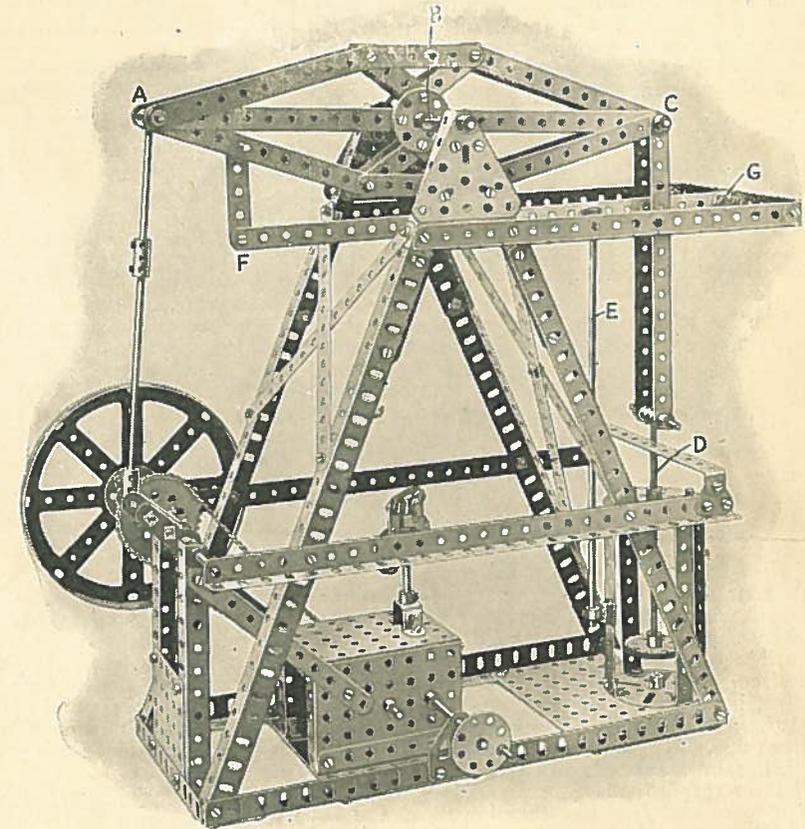
The model is operated by the hand-wheel shown in the lower center. A rod is fixed to this wheel and also carries within the box formed of plates two gear wheels. One of these is a $\frac{1}{2}$ " gear wheel which is in mesh with a $\frac{1}{2}$ " contrate gear fixed to the lower end of the governor rod; the other is a 57 toothed gear wheel which meshes with a $\frac{1}{2}$ " gear wheel fixed to another rod. This rod is journalled in the gear box and carries at one end a $\frac{3}{4}$ " sprocket wheel, which is connected by sprocket chain to a 2" sprocket wheel on the crankshaft. By rotating the hand-wheel the crankshaft is caused to revolve, oscillating the walking beam which in turn moves the piston up and down in the cylinder and also operates the valve rod. At the same time the governor rotates, the weights swinging farther and farther outward as the speed increases.



The Punch Press.

PARTS REQUIRED

2 of No. 2	1 of No. 17	6 of No. 59
3 " " 3	1 " " 18A	3 " " 62
2 " " 5	2 " " 18B	6 " " 63
1 " " 6	1 " " 21	1 " " 94
4 " " 8	1 " " 26	1 " " 95A
2 " " 9	1 " " 27A	1 " " 96
2 " " 14	42 " " 37	2 " " 108
2 " " 15A	1 " " 38	1 " " 116
2 " " 16	1 " " 46	1 " " 130
1 " " 16B	4 " " 53	Motor.



The Beam Engine.

PARTS REQUIRED

5 of No. 1	3 of No. 12	2 of No. 26	2 of No. 62
4 " " 1B	3 " " 14	1 " " 27A	6 " " 63
10 " " 2	3 " " 15	1 " " 29	1 " " 63B
1 " " 2A	2 " " 15A	120 " " 37	1 " " 72
4 " " 4	2 " " 16	6 " " 38	2 " " 76
1 " " 5	1 " " 16A	1 " " 45	2 " " 77
8 " " 6	2 " " 17	3 " " 48C	1 " " 95
5 " " 6A	2 " " 18A	2 " " 48D	1 " " 96A
8 " " 8	1 " " 18B	1 " " 50	2 " " 109
2 " " 8A	1 " " 21	2 " " 52A	1 " " 115
7 " " 9	2 " " 22A	3 " " 53	1 " " 118
2 " " 9B	4 " " 24	17 " " 59	1 " " 126A
4 " " 11			2 " " 133

How I Built My Workshop

(Continued from page 69)

necessary so I found a large board in the cellar and hinged it to a strip fastened to the wall so that it could swing down out of the way. My lathe is still in the making but I soon will have it ready to use. The positions of all of these things are clearly shown in the drawing on page 69.

Lighting the Workshop

Some means of lighting was also essential as the candles and kerosene lamps which I had previously used were not only impractical but also dangerous. At this time the garage, to which my workshop was attached, was being wired so I asked Dad to have an extension run over to my workshop, which he did.

The latest and most novel addition to the equipment of my shop is a signal arrangement whereby I can be called to the house when wanted. I wired a small bell to a dry cell in the shop and then ran two wires to a push button in the house. A system of signals was decided upon—two rings mean "Dinner is ready," three rings mean "You're wanted on the telephone," etc.

What the Shop Cost

Now as to the size, cost, materials, etc. In the case of my shop the size is 12 feet long, 8 feet wide and 8 feet high, and it is plenty large enough for most things that I want to do, but of course it could be made any size desired. I obtained all of the materials for mine, including wood, windows, tar-paper for roof, nails and all other hardware for not more than fifty dollars. This is an extremely small sum compared with the amounts most fellows spend foolishly, and I dare say I've had more real fun than they have had and I still have something to show for my money.

How Meccano Has Helped Me

The height of my ambition has now, of course, grown from the initial eight feet to a height that can't be measured in feet but in accomplishments, etc. As a result of my working in my shop and applying those general mechanical laws which I first learned through my contact with Meccano, I now have several inventions which I hope soon to have patented and which may pay for my shop many times over!

The Next Issue

will be a special Christmas number and will contain a number of fine new features. *Don't miss it!*

A Column of SUGGESTIONS By Our Readers

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.

Marcus T. Donahue, St. Louis, Mo.—A double helical gear like the one recently illustrated in the "M.M." would be very expensive to manufacture and would not be warranted. These gears are used only where great power is required and this type of gear in Meccano would not prove more efficient than our present ones. Your suggestion for a Meccano flag is interesting, and will be kept on file.

Preston Richmond, No. Middleboro, Mass.—Your suggestion for an auto headlight has the disadvantage of not being suitable for use in a number of ways. Parts to be included in the Meccano system must be capable of performing several functions.

Nathan Nadel, Bronx, N. Y.—Pulley blocks made as you suggest have the disadvantage referred to above—they can be used for only one specific purpose. In this connection we might mention that a very interesting section dealing with pulleys and pulley blocks is contained in the new manual "Meccano Standard Mechanisms." Have you seen it?

Herbert Caneday, Taylors Falls, Minn.—The type of gear that you propose is known as an internal gear, Herbert. We have not found that such a part is required in the Meccano system. Can you give us examples showing the need of such a gear, and in which the regular Meccano gears could not be used to obtain the same results? Internal gears are very costly to manufacture and would necessarily be high priced.

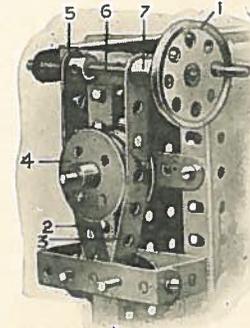
James O'Callaghan, Chicago, Ill.—Your suggestion for curved strips is one that has been made a number of times by our readers. The matter is being given our careful consideration.

Kenneth Eells, Stanford Univ., Calif.—There may be times when the rim such as you suggest on the sprocket wheel might be a hindrance rather than a help. We believe the present method of spacing the wheel away from the plate by means of washers is quite satisfactory.

"Meccano Standard Mechanisms"

The Ready-Reference Book For Meccano Model Builders

There are a number of Meccano movements that have to a certain extent become standardized; that is to say, they may be applied to more than one model—in most cases without any alteration, but in some few instances with only slight alterations to the original movement. These have been collected and classified and the entire collection, including the movements already published in the "M.M." during the past year, may now be obtained in the form of a new Manual entitled "Meccano Standard Mechanisms.



A screw-operated Double Band Brake. One of the many types of brakes illustrated in this book.

Over 140 Illustrations

This book contains over 140 illustrations in halftone and the various mechanisms are shown clearly and in great detail. The construction of each movement is explained in simple language and the functions of intricate mechanisms clearly described. The various movements have been arranged so that immediate reference may be made to any particular motion that it is desired to incorporate in a model.

Read What these Boys Think of It

"It is just the book that every Meccano boy needs and it is well worth its price."—R. B., Pasadena, Calif.

"I received the book and think it very fine. It is very clear and easily understood and well worth the price."—G. S., Alton, Ill.

"I am very much pleased with the book. I only hope every Meccano boy will get one as soon as possible."—D. N. S., Chardon, Ohio.

"It explains a lot of complicated mechanisms that I did not thoroughly understand. I think it is a fine book."—G. C., Washington, D. C.

"I have read every page with interest, and the descriptions of different forms of mechanisms are excellent."—R. J., New York City.

"It is worth twice the price, if not three times as much."—G. H. S., Wilmington, Del.

"I think it covers about everything a boy would want to make. I think it is fine."—B. A. C., Providence, R. I.

"There could be no clearer illustrations given to help the model-builder. The manual is worth twice its cost."—R. S., Paterson, N. J.

"It is easily understood and the illustrations are very clear. I wouldn't have minded paying twice as much for it."—R. S., Olean, N. Y.

"I think the pictures are so clear that a blind man could read them."—H. O., Cam-pello, Mass.

Order Your Copy Today

The price of this new manual is 50 cents, and a copy will be mailed, postpaid, to any address on receipt of this amount. Send for your copy!

MECCANO COMPANY, Inc.

ELIZABETH, NEW JERSEY

Our Contest Page

Does your Chum get the "M. M."?

Although there are thousands of boys who read the "M.M." regularly, there are countless others who have not heard of it. We are sure that most boys would want to get it regularly if only they knew about it, so in order to get our Magazine distributed among these boys we are announcing a new contest.

Our regular readers are merely to show their copies of the "M.M." to their friends who do not receive it regularly and to take subscriptions for it. For each subscription for one year (six issues) at 25 cents sent us, we will credit to the account of the sender the amount of five cents to apply on the purchase of any Meccano parts after the close of the contest. In addition to these awards, there will be a Grand Prize, as follows: We will *double* the amount of credit earned by the contestant who sends in the greatest number of new subscriptions during the contest.

Now go to it, boys! Here's a good chance to earn new Meccano parts. How many you earn depends entirely on how much effort you put into the contest. When you receive a subscription send it in at once with the 25 cents collected for it. Write the new subscriber's name and address *clearly* so there will be no chance for a mistake. Also write on the sheet: "This subscription sent in by—," adding your name and address, so that the subscription can be properly entered to your credit. Send all subscriptions to: Reader's Contest, Meccano Magazine, Elizabeth, N. J.

This contest closes on January 15th, 1927, and the awards will be made as soon thereafter as possible.

How many words are there in "M-E-C-C-A-N-O"?

Here is an entirely different type of contest from any that we have held heretofore and no doubt it will prove interesting to our readers. The object in this contest is to see how many words can be formed with the letters of the name Meccano. The letters are to be used only as often as they appear in the name, and only words that are to be found in an unabridged dictionary will be counted. Proper names must not be included.

Each entry should include a short essay, not exceeding 100 words, on the subject: "Why I like Contests," and the competitor's name,

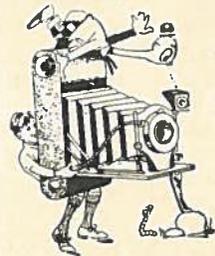
address and age should be written clearly on each sheet submitted.

Two prizes are offered, as follows:
1st Prize...Meccano goods to the value of \$5.00
2nd Prize...Meccano goods to the value of \$3.00

Any reader may enter—there are no fees or restrictions. Prizes will be awarded to the two competitors submitting the longest list of words and the best essays.

The contest closes on December 1, 1926; entries postmarked after that time will not be considered. The prize-winners will be announced in the "M.M." as soon after the contest closes as possible. Entries should be addressed to Word Contest, Meccano Magazine, Elizabeth, N. J.

Our Second Photographic Contest closes on Nov. 15



This contest seems quite popular among our readers, as many entries have already been received. There is still time for new contestants to enter photographs, and for these boys we are repeating the few rules governing the contest.

Any make or type of camera may be used and prints may be of any size or finish. They may be mounted or not, at the discretion of the competitor.

Photographs may be of any subject, but those of most general interest will be given preference in awarding the prizes. The photographs must be taken by the competitor, but the developing and printing may be done by others.

The prizes to be awarded are as follows:
First Prize.....Meccano goods, value \$5.00
Second Prize.....Meccano goods, value 3.00

The competitor's full name, address and age should be written on the back of each entry. Photographs should be addressed: Photograph Contest, Meccano Magazine, Elizabeth, New Jersey.

The 1926 Model-Building Contest

The 1926 Contest for new models closed on October 1st, and a large number of entries was received. These are now being examined and the list of prize-winners will be published in the "M.M." as soon as possible.

The Story of Iron and Steel

(Continued from page 68)

in hot boiling water after cleaning and rinsing as this acts as a drying agent (the heat imparted to the rod causing it to dry quickly) and prevents rust forming until it can be rolled. The smoother and cleaner the surface of the strip the better the finish that can be produced.

The cold rolling machine or unit consists of a pair of housings, brasses or chucks, rolls, screw downs, pinion housings and pinions, couplings and coupling boxes, drives, clutches, take-up block or blocks, reel box and other auxiliaries. All these are securely mounted and fastened to a very solid foundation.



Inspecting the Strips.

The rolls are made principally from special heat treated and hardened steel. To produce the highly polished surface the rolls are first ground on a surface grinder and are finished by lapping, using a lead faced wheel, fine emery dust and oil.

How the Machines Work

For rolling the machines may be worked single, tandem (two), triple (three), or as a train of any number of machines, arranged one ahead of the other. The path of the rod is from the reel box, through the rolls and onto the take-up block in single machine operation. The tandem, triple or train may be from one set of rolls directly into the next until the finishing pass where it is coiled, or may also be coiled between each set of rolls or after each pass. The principal items in the process of rolling are finishes, tempers and edges.

As we speak of temper here, we mean the degree of hardness obtained by cold work on low carbon steels to distinguish it from the tempering or heat treatment of high carbon steels. Four principal classifications and variations between each of these are produced, their nature depending upon any further work necessary by the customer in making a finished marketable article.

A slitting operation consists of passing the strip through a set of revolving cutters set at a definite or specified distance apart. Thus narrow widths may be secured by slitting wide strips into narrow strips of the desired size.

The Final Inspection

A very complete system of inspection, testing and packing is followed on the finished products to insure the customer getting satisfaction in any further processes he may put on the cold rolled strip. As there are fifty or more reasons why defective steel may result, it can readily be understood why exacting requirements during the process from the rod to the finished coils are necessary.

It is of cold rolled strip steel that the major portion of your Meccano parts are made.

THE END

The World behind your Telephone

(Continued from page 71)

atus that is so essential in the equipment of the modern switchboard. The wires pass to the "distributing frames," which bring the thousands of wires which enter the central office to their proper places on the switchboard. From these frames the wires reach a



Digging the trench for the first underground line.

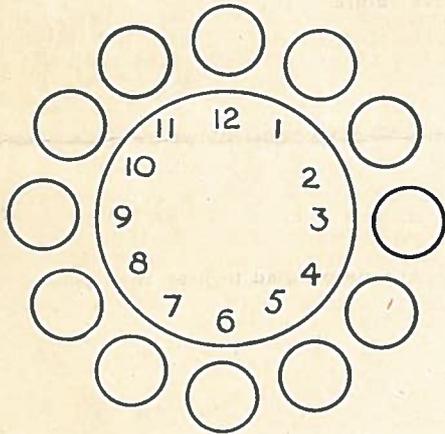
"relay rack" where electrically controlled switches turn on the light signals that appear on the switchboard when the subscribers lift the receivers from the hooks. These racks also put out the lights when the operators make the connections or the subscribers put the receivers back on the hooks.

In the Next Issue
The Automatic Telephone



Can You Do It?

Puzzle No. 51—Arrange twelve cents or counters in a circle as shown in the diagram below. Now take up one cent at a time, pass it over two cents and place it on the third cent. Take up another single cent and do the same thing, repeating the process until, after



six moves, the coins are arranged in six pairs in the positions 1, 2, 3, 4, 5, 6. You may travel in either direction round the circle at each move and the two cents jumped over may be either two separate coins on individual positions or a pair on one position.

No. 52—My first is in field, but not in grass
My second is in crystal and also in glass
My third is in good, but not in bad,
My fourth is in wise, but not in mad.
My fifth is in men, but not in girl.
My sixth is in stair, and also in whirl
My whole is a thing of gladness and cheer,
Most seen when the season of summer is here.

What am I?

No. 53—I am a boy's name of six letters. Transpose me and still I am a boy's name; transpose me once more and even yet I am the name of a boy.

* * *

No. 54—With slight changes in the order of the letters the following four lines may be made into a charming little ballad:

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

* * *

No. 55—A milkman went to the dairy for his usual morning supply of milk, four gallons. The dairyman told him that he was unable to supply four gallons because all his milk was in an eight-gallon can and he had only a three-gallon measure and a five-gallon measure. The milkman replied that he did not see any difficulty in the matter, and at once proceeded to measure accurately four gallons with the aid of the two measures. How did he do it?

* * *

No. 56—The following jumble of letters may be formed into a sentence by the addition at suitable points of a certain vowel, the same vowel being used throughout:

LDPRTFRMPRTGDFRRTHDXXFRDDNS.

Answers to Puzzles in Last Issue

- No. 45—66 direct circuits would be required.
No. 46—103 miles. The route is as follows: A to D, to C, to F, to G, to D, to F, to D, to B, to G, to E, to B, to A, to C, to A.
No. 47—(a) Rubber Ring, (b) Face Plate, (c) Rack Strip, (d) Eye Piece.
No. 48—Note—not.
No. 49—22 birds and four animals.
No. 50—Coffee, officer, office, offend, officials, send-off, Koff, offing.



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write for 50 Sets St. Nicholas Christmas Seals. Sell for 10c a set. When sold send us \$3.00 and keep \$2.00. No Work—Just Fun.
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The Hudson River Tunnel

(Continued from page 71)

In the boring of the tunnel half a million cubic yards of rock and earth were excavated. Some idea of what a vast amount of material this is may be obtained from the fact that it would provide a straight road a yard wide and a foot high from New York to San Francisco, a distance of 2,557 miles! The building operation required the use of 115,000 tons of cast-iron tunnel lining and 130,000 tons of concrete.

Cost—\$46,000,000

The cost of the construction and equipment of the tunnels is estimated at \$46,000,000.

The illustration on our cover this issue pictures the iron casing of one of the tunnels. The method of forming the great tube by bolting together the immense segments is clearly shown.

Clifford M. Holland, famous engineer who started the work on the tunnel, died October, 1924, after a nervous breakdown brought on by overwork in supervising the great engineering project. Since his death, the chief engineer in charge of the construction has been Mr. Ole Singstad, to whom our thanks are due for supplying the above data and photographs.

OUR MAIL BAG



In this column the Editor replies to letters from his readers, from whom he is always please 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.

Maynard Drury, Ossining, N. Y.—Many thanks for the pictures of the Bear Mountain bridge, Maynard. I hope to tell the story of this great new bridge in the "M.M." in the near future.

Berend Unck, Jr., Monrovia, Calif.—Your wish that the "M.M." appear every month has been voiced by a large number of our readers, Berend. You may rest assured that it will be published oftener just as soon as this is possible. Meanwhile, we are planning a number of improvements that will make the "M.M." bigger and better than ever.

Nathan Nadel, Bronx, N. Y.—Your letter is very complimentary, Nathan, and we certainly appreciate all the good things you write about Meccano and the "M.M." Write again; we are always glad to hear from you.

Rollin Bennett, Pasadena, Calif.—The article describing the construction of a switchboard is very interesting, and I will try to find room for it in the "M.M."

Marston Hamlin, Canajoharie, N. Y.—Sends the following:

"Charles Augustus Goodwin wasn't good for anything; He couldn't learn to read or write, or learn to draw or sing. But there was one thing that he knew; just this and nothing more— He did know how to play with his Meccano Number Four."

Charles is hardly a typical Meccano boy, is he, Marston; for most Meccano boys can do all the things that Charles couldn't learn to do. At least, he could play with his outfit anyway. But what boy couldn't?

Walter Bast, Jr., Mukwonago, Wisc.—Writes: "I am just a little Fan in this wide Meccano World. I wish all boys in the U. S. A. would have a Meccano set and the 'M.M.'" So do we, Walter, and we believe that all boys would get them if they knew of the fun and enjoyment that the "M.M." and Meccano can bring.

Now you can build Models *in Colors!*

Model Building with Meccano

build—you can have a new model every day in the year if you like, *and all Meccano models work.*

The finest thing about Meccano is that it brings the engineering wonders of the world into your own home. There is no limit to the number of models you can

Meccano Parts in Colors

bright colors. Thus, not only is it now possible for you accurately to reproduce big engineering structures in model form, but you can also satisfy your artistic taste and introduce color and sparkle into your Meccano models, making them more realistic than ever.

Meccano, already known as the greatest construction system in the world, has this year an added attraction—the plates, braced girders, etc., are beautifully enamelled in

Hundreds of Models in Colors

and this effect is gained without sacrificing any of the perfect engineering qualities of the Meccano system.

The new Meccano colored parts may be used in hundreds of models. To all they bring a delightful charm and enhance the appearance of even the simplest models,

The new Meccano Improves your Models

of their models. If nickelled parts are preferred they may still be obtained at the same prices as the colored parts.

The many thousands of boys who now have the old style Meccano Outfits may add the colored parts to their equipment, and thus be able to improve the appearance

A leaflet illustrating in full colors the New Multicolor Meccano Outfits and a number of models made with them is now being prepared. A copy will be mailed without charge to each subscriber of the "M.M." as soon as available.

THE NEW MULTICOLOR MECCANO

THE LAST WORD IN CONSTRUCTION TOYS