

# Scientific Apparatus in Meccano

## Laboratory Accessories Constructed from Standard Parts

*This article is the fifth of a series in which we describe various uses that have been found for Meccano in the field of science. In previous articles we have described an instrument for electrocuting small aquatic animals (see "M.M." for November, 1928); a photo-micrographic device and a microscopic slide projector (January, 1929); and a microtome for cutting sections of plant and animal tissue (February, 1929). In the fourth article in the series we dealt with various apparatus for use in chemical experimental work, and this month we describe several additional pieces of equipment for the chemist.*

### V.—FURTHER USEFUL EQUIPMENT FOR THE AMATEUR CHEMIST

IN the previous article in this series, in the April 1930 "M.M.", we described a number of mechanical appliances constructed from Meccano parts, for use in the chemist's laboratory. These included a bottle-shaking device, apparatus for agitating the contents of a beaker, test-tube shakers, and several other articles of use to the chemical experimenter. This month we describe further devices for use in the laboratory, including a tripod, a vertical holder for test-tubes, etc., and a motor-driven stirrer that will be found useful on occasions when it is necessary to keep the contents of a flask or beaker in continual motion for a considerable period.

#### A Meccano Tripod

A tripod stand is a simple but important piece of laboratory equipment. A tripod is used for supporting a beaker, flask or other vessel in such a manner that heat from a Bunsen burner or spirit lamp may be applied to it from below. Stands of this type may be purchased cheaply, but sometimes several are required for a single experiment, and often it is uneconomical to purchase the number required, as most of them will be of little use subsequently to the experimenter. Excellent tripods can be built up as required from standard Meccano parts, and thus the problem may be solved most satisfactorily, the stands that are not required afterwards being dismantled and the parts used again for other purposes.

A simple pattern of tripod constructed from Meccano parts is shown in Fig. 1. The triangular frame of the stand consists of three  $4\frac{1}{2}$ " Strips, and six Cranks are bolted to these as shown in the illustration. The legs of the stand consist of  $6\frac{1}{2}$ " Axle Rods, and these are pushed into the bosses of the Cranks and nipped securely by the Set-screws of the latter. The stand shown in Fig. 1 is a good average size that will be found generally suitable. One of the great advantages of building these stands from Meccano, however, is that different sizes and patterns can be built up by using additional parts.

The experimenter can thus devise stands that will be specially adapted to his own particular requirements.

#### Vertical Holder

A vertical holder for test-tubes, lengths of glass tubing, etc., will be found very useful in the laboratory, and a holder of this type constructed from Meccano parts is shown in Fig. 2.

The base of the holder consists of a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate, to which four  $12\frac{1}{2}$ " Strips are secured. These Strips support a frame composed of two  $12\frac{1}{2}$ " Angle Girders spaced apart at top and bottom by  $1\frac{1}{2}$ " Strips. A sliding carriage is mounted on this frame. This carriage consists of a  $3\frac{1}{2}$ " Strip having two  $1\frac{1}{2}$ " Strips secured at each end, the  $1\frac{1}{2}$ " Strips being placed on either side of the flanges of the  $12\frac{1}{2}$ " Girders so that the carriage is retained in position in the frame, while capable of being moved up and down when

the holder is required to be adjusted. The carriage is normally held in position by means of a bolt passed through the perforations in one pair of  $1\frac{1}{2}$ " Strips, and through the flange of one of the vertical Angle Girders.

A Double Bracket is secured to the sliding carriage and two  $4\frac{1}{2}$ " Strips are attached to the Bracket, so that they form an arm in which the test tube may be gripped. This arm is held in a horizontal position by means of a strut consisting of a  $3\frac{1}{2}$ " Strip attached to the lower part of the carriage by means of an Angle Bracket. Angle Brackets should be bolted to the free end of the horizontal arm so that a test-tube may be held securely in position.

#### Mechanical Stirrer

Every amateur chemist who has experienced the tedium of stirring liquids

by hand for long periods, will welcome the mechanical stirrer shown in Fig. 3.

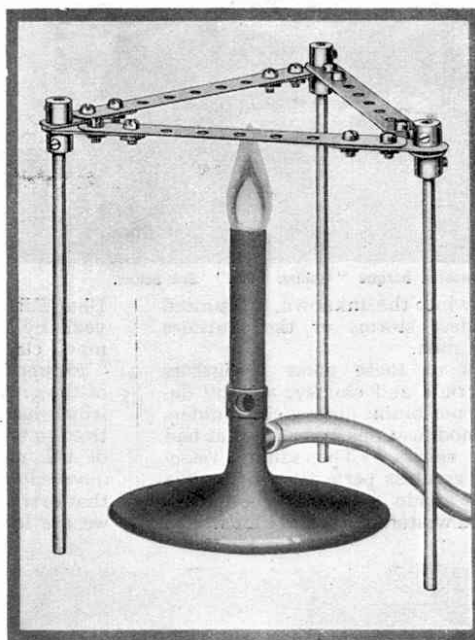
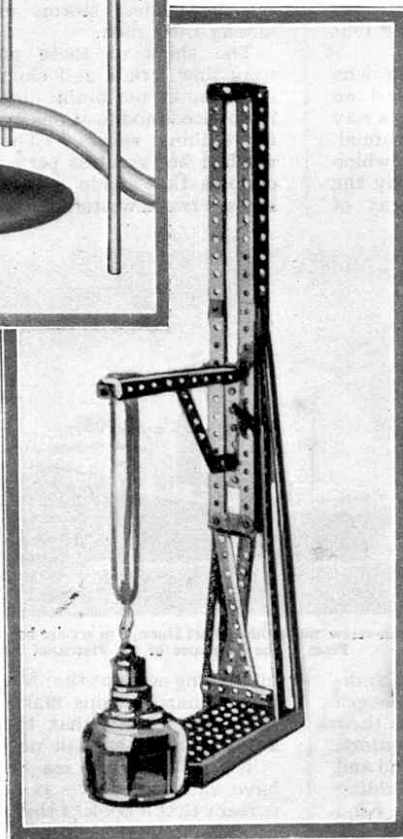


Fig. 1 (above). The Meccano tripod stand used in conjunction with a Bunsen burner. Fig. 2 (right). A useful vertical holder for test-tubes, etc.



# Scientific Apparatus in Meccano

## Laboratory Accessories Constructed from Standard Parts

*This article is the fifth of a series in which we describe various uses that have been found for Meccano in the field of science. In previous articles we have described an instrument for electrocuting small aquatic animals (see "M.M." for November, 1928); a photo-micrographic device and a microscopic slide projector (January, 1929); and a microtome for cutting sections of plant and animal tissue (February, 1929). In the fourth article in the series we dealt with various apparatus for use in chemical experimental work, and this month we describe several additional pieces of equipment for the chemist.*

### V.—FURTHER USEFUL EQUIPMENT FOR THE AMATEUR CHEMIST

IN the previous article in this series, in the April 1930 "M.M.", we described a number of mechanical appliances constructed from Meccano parts, for use in the chemist's laboratory. These included a bottle-shaking device, apparatus for agitating the contents of a beaker, test-tube shakers, and several other articles of use to the chemical experimenter. This month we describe further devices for use in the laboratory, including a tripod, a vertical holder for test-tubes, etc., and a motor-driven stirrer that will be found useful on occasions when it is necessary to keep the contents of a flask or beaker in continual motion for a considerable period.

#### A Meccano Tripod

A tripod stand is a simple but important piece of laboratory equipment. A tripod is used for supporting a beaker, flask or other vessel in such a manner that heat from a Bunsen burner or spirit lamp may be applied to it from below. Stands of this type may be purchased cheaply, but sometimes several are required for a single experiment, and often it is uneconomical to purchase the number required, as most of them will be of little use subsequently to the experimenter. Excellent tripods can be built up as required from standard Meccano parts, and thus the problem may be solved most satisfactorily, the stands that are not required afterwards being dismantled and the parts used again for other purposes.

A simple pattern of tripod constructed from Meccano parts is shown in Fig. 1. The triangular frame of the stand consists of three  $4\frac{1}{2}$ " Strips, and six Cranks are bolted to these as shown in the illustration. The legs of the stand consist of  $6\frac{1}{2}$ " Axle Rods, and these are pushed into the bosses of the Cranks and nipped securely by the Set-screws of the latter. The stand shown in Fig. 1 is a good average size that will be found generally suitable. One of the great advantages of building these stands from Meccano, however, is that different sizes and patterns can be built up by using additional parts.

The experimenter can thus devise stands that will be specially adapted to his own particular requirements.

#### Vertical Holder

A vertical holder for test-tubes, lengths of glass tubing, etc., will be found very useful in the laboratory, and a holder of this type constructed from Meccano parts is shown in Fig. 2.

The base of the holder consists of a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate, to which four  $12\frac{1}{2}$ " Strips are secured. These Strips support a frame composed of two  $12\frac{1}{2}$ " Angle Girders spaced apart at top and bottom by  $1\frac{1}{2}$ " Strips. A sliding carriage is mounted on this frame. This carriage consists of a  $3\frac{1}{2}$ " Strip having two  $1\frac{1}{2}$ " Strips secured at each end, the  $1\frac{1}{2}$ " Strips being placed on either side of the flanges of the  $12\frac{1}{2}$ " Girders so that the carriage is retained in position in the frame, while capable of being moved up and down when

the holder is required to be adjusted. The carriage is normally held in position by means of a bolt passed through the perforations in one pair of  $1\frac{1}{2}$ " Strips, and through the flange of one of the vertical Angle Girders.

A Double Bracket is secured to the sliding carriage and two  $4\frac{1}{2}$ " Strips are attached to the Bracket, so that they form an arm in which the test tube may be gripped. This arm is held in a horizontal position by means of a strut consisting of a  $3\frac{1}{2}$ " Strip attached to the lower part of the carriage by means of an Angle Bracket. Angle Brackets should be bolted to the free end of the horizontal arm so that a test-tube may be held securely in position.

#### Mechanical Stirrer

Every amateur chemist who has experienced the tedium of stirring liquids

by hand for long periods, will welcome the mechanical stirrer shown in Fig. 3.

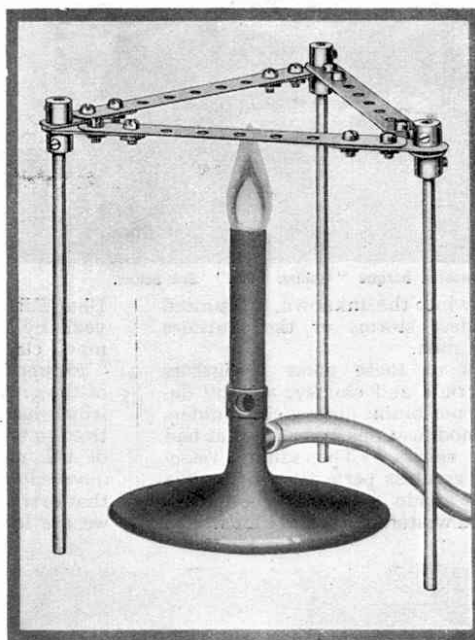
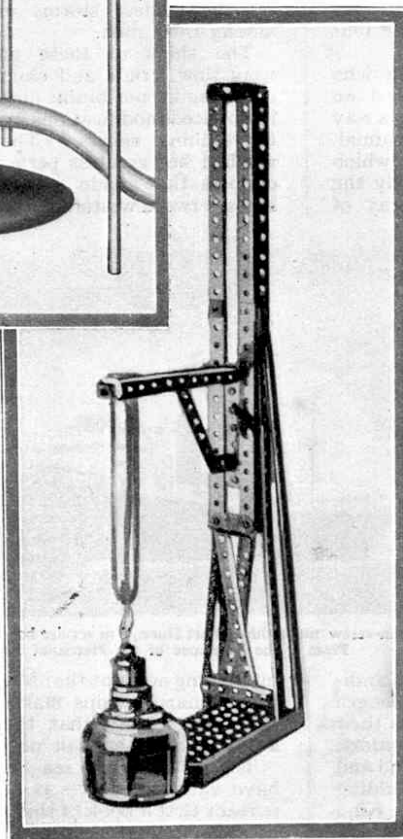


Fig. 1 (above). The Meccano tripod stand used in conjunction with a Bunsen burner. Fig. 2 (right). A useful vertical holder for test-tubes, etc.



The device consists of a combined stand and motor-driven stirrer, that enables the contents of a beaker or similar vessel to be agitated continuously and at uniform speed merely by switching on the Meccano Electric Motor. The base frame of the model is built up from two  $5\frac{1}{2}$ " and two  $12\frac{1}{2}$ " Angle Girders, and two  $5\frac{1}{2} \times 3\frac{1}{2}$ " Flat Plates are secured to these Girders to form a platform on which a spirit lamp or Bunsen burner may rest. The upright frame consists of two  $24\frac{1}{2}$ " Angle Girders spaced apart at top and bottom by  $5\frac{1}{2}$ " Angle Girders, the lower  $5\frac{1}{2}$ " Girders being bolted to the base framework. The upright frame is braced by means of two  $12\frac{1}{2}$ " Strips, the lower ends of which are attached to the base.

A platform for supporting the beaker is next attached to the upright frame. This platform is composed of four  $5\frac{1}{2}$ " Angle Girders, which form a rectangular frame; and two additional  $5\frac{1}{2}$ " Girders are secured between them to form a "grid" on which a beaker or other vessel may be placed. The open construction of the platform enables heat to be applied to the vessel from below. The platform should be braced to the vertical frame by means of Strips.

In the illustration, a glass preserve jar, fitted with screw lid, has been used to hold the liquid to be stirred. This type of jar is excellent for the purpose, providing that a waxed cardboard cap washer is used so that the liquid being stirred does not come into contact with the metal of the lid. A hole must of course be bored in the metal lid, so that the stirrer rod may be passed through into the jar. A beaker or wide-mouthed flask can of course be employed equally well with the device, but care should be taken to see that the stirrer does not run too fast, or a certain amount of liquid will be lost through splashing. A Meccano Electric Motor supplies the power for the stirrer, and it should be secured by means of its flanges to the top of the vertical frame. In

the model a Meccano No. 6 type Motor has been used, but a No. E1 Motor could be employed if slight modifications are made.

The stirrer unit consists of a glass rod, about  $3/16$ " diameter, bent backward and forward in zig-zag formation at one end to form the actual stirrer. The bending process can be carried out by heating the glass rod in a Bunsen flame, and forming the plastic glass to the required shape with fine-nosed pliers.

The straight portion of the glass rod is secured in the bore of a Coupling and an Axle Rod is also held in the Coupling. The Axle Rod is passed through the end holes of two short Strips that are attached to the side Girders of the vertical frame to act as a guide for the stirrer rod.

The upper end of the Axle Rod is connected to the armature shaft of the Electric Motor by a novel form of drive transmission. This consists of a length of  $1/4$ " rubber tubing, one end of which is pushed over a Coupling mounted on the armature shaft while the other end is slipped over the boss of a 2" Pulley attached to the top end of the Axle Rod. The 2" Pulley acts as a flywheel and helps to keep the speed of the stirrer constant. This system of drive transmission greatly increases the adaptability of the device, as the stirring rod can be driven freely even when it is not in alignment with the armature shaft. The lower bearing should consequently be made adjustable so that the stirrer can be used in various positions.

The flexible drive is also useful when open-mouthed vessels, such as beakers, are employed, as it enables the complete stirrer unit to be drawn out of the beaker so that the latter may be removed from the platform. This movement is shown in Fig. 3, but of course it is necessary to disconnect the glass rod from the Coupling when a covered vessel is employed.

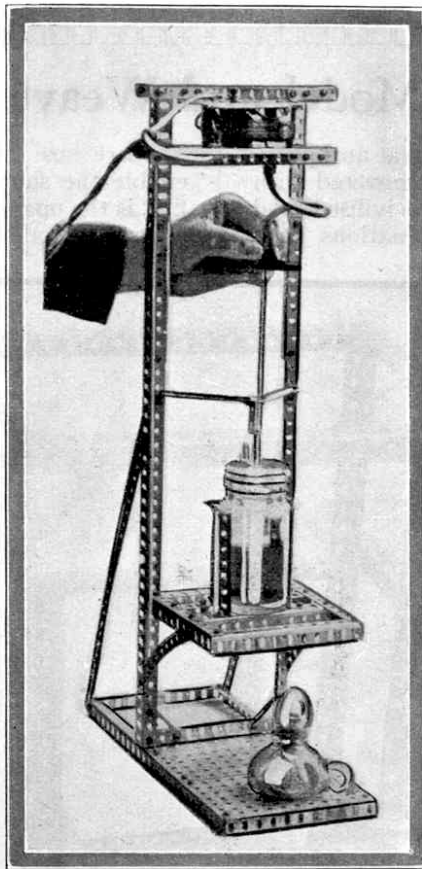


Fig. 3. Meccano mechanical stirrer and beaker stand.

#### New Meccano Models—(Continued from page 213)

is supported at its upper end in the centre hole of a  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip, while its lower portion passes through the  $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate. One end of a length of cord is secured to one end of the  $2\frac{1}{2}$ " Strip of the front road axle assembly, and the cord is then passed several times round the projecting end of the steering rod. The remaining end of the cord is finally tied to the other extremity of the  $2\frac{1}{2}$ " Double Angle Strip. A Spring Clip should be placed on the end of the steering column in order to keep the cord in position, while a Bush Wheel is mounted on the upper end to form the steering wheel. A 1" Fast Pulley is mounted on the driving Spindle of the Clockwork Motor and is connected to one of the 3" Pulleys that form the rear road wheels by means of an endless length of cord.

The sides of the trailer are composed of  $12\frac{1}{2}$ " and  $5\frac{1}{2}$ " Braced Girders. A  $12\frac{1}{2}$ " Angle Girder is secured to each of the  $12\frac{1}{2}$ " Braced Girders and a sheet of thick card-

board is bolted to the flanges of the Girders to form the base of the trailer. The front pair of road wheels is mounted on an Axle Rod supported in  $1 \times 1$ " Angle Brackets that are bolted to the cardboard base. The trailer is coupled to the tractor by means of two  $5\frac{1}{2}$ " Strips held to the trailer by Angle Brackets. The  $5\frac{1}{2}$ " Strips are held to the  $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate of the tractor by means of a lock-nutted bolt.

The rear road axle is mounted in Trunnions which are also secured to the cardboard base by means of bolts. The tractor and trailer contain the following parts:— 8 of No. 2; 2 of No. 3; 12 of No. 5; 2 of No. 8; 4 of No. 10; 2 of No. 11; 10 of No. 12; 2 of No. 12a; 2 of No. 15; 1 of No. 15a; 4 of No. 16; 1 of No. 18a; 2 of No. 19b; 4 of No. 20b; 2 of No. 22; 2 of No. 22a; 1 of No. 24; 7 of No. 35; 60 of No. 37; 6 of No. 37a; 7 of No. 38; 1 of No. 40; 1 of No. 45; 8 of No. 48a; 1 of No. 52; 1 of No. 54; 1 of No. 57; 1 of No. 62; 2 of No. 99; 2 of No. 100; 6 of No. 111c; 4 of No. 125; 2 of No. 126; 2 of No. 126a; 1 No. 1 Clockwork Motor.

#### Model Railway Club Exhibition

The annual exhibition of the Model Railway Club will be held in the Central Hall, Westminster, from Tuesday, 29th March, to Saturday, 2nd April, both days inclusive. This exhibition, which was so keenly appreciated by some 6,000 people last year, will fully maintain its high standard of models of all gauges, from the smallest electric railway to the passenger-carrying steam train that provides such joy to old and young alike. There will be delicate coachwork models, many and varied types of locomotives, and elaborate working layouts completely signalled and controlled from their own signal cabins, and all lighted electrically. We strongly advise all readers who are able to visit this exhibition, for they are certain to find there much that will interest them.

#### For Sutton (Surrey) Readers

An interesting Model-building Competition was held at Sutton, Surrey, recently by William Pile Ltd., and the entries were judged by a representative of Meccano Ltd. The first prize in the class for boys from five to eight years was won by G. Rowley with an excellent model of a Paddle Boat, and the second prize by M. Parker with a model of a Crane. In the class for boys of from nine to 12 years, A. P. Smallman carried off first prize with a well-designed model Stiff-Leg Derrick, and E. P. Gawne obtained second prize for a Motor Car. In the senior section, 13 to 15 years, first prize was awarded to J. C. Bulstrode for an interesting Travelling Crane, and A. C. Greene gained second prize for a good model of a Traction Engine.