

# Scientific Apparatus in Meccano

## Laboratory Apparatus made by Dr. Ernest Bade

Some time ago we described a few of the many practical uses that have been found for Meccano in the field of science. These included the following devices constructed by Dr. Ernest Bade: Apparatus for electrocuting microscopic aquatic animals (see "M.M." for November, 1928); photo-micrographic device and a slide projector (January, 1929); and a microtome for cutting sections of animal tissue two thousandths of an inch thick (February, 1929). This month we are able to reproduce various interesting apparatus which Dr. Bade has constructed for use in chemical experiments.

### IV.—USEFUL MECHANICAL EQUIPMENT FOR THE AMATEUR CHEMIST

CHEMISTRY offers many advantages for the amateur who makes it his hobby and there must be a very large number of Meccano model-building enthusiasts who also obtain interest and instruction by carrying out some of the simpler experiments in this wide and fascinating branch of science.

Most of the various chemical substances that are required can be obtained in small quantities quite cheaply, and with the addition of a Bunsen, or even a spirit lamp, and a few glass vessels, test tubes, etc., the experimenter has all the essentials that are needed to start his hobby.

But just as the addition of a larger variety and quantity of parts enables the Meccano boy to extend his model-building activities, so a more comprehensive equipment will allow the amateur chemist to carry out more complicated and fascinating experiments, but alas! laboratory apparatus, like all other specialised equipment, is expensive, and in most cases quite beyond the pocket of the young chemist.

It is the object of this article, therefore, to show how Meccano can be employed to meet the want of efficient and cheap apparatus for the amateur's laboratory. The great advantage obtained by using Meccano apparatus in place of manufactured equipment lies in the interchangeability of the parts. Suppose, for instance, the experimenter constructs the bottle shaker shown in Fig. 1 and after using it in carrying out a number of experiments, finds that it will not be required for some time. It will then be quite a simple matter for him to dismantle the shaker and build up some other piece of equipment that will fulfil his immediate needs. With manufactured apparatus this cannot be done, and when out of use it merely serves as a dust collector of the most expensive order!

#### Bottle Shaking Device

The bottle shaker (Fig. 1) is constructed entirely from Meccano parts. The framework consisting of  $12\frac{1}{2}$ " and  $5\frac{1}{2}$ " Angle Girders should first be assembled, and to it is bolted a Meccano Electric Motor and the pair of  $12\frac{1}{2}$ " Angle Girders that comprise the rails on which the carriage runs. It will be seen that a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate has been used as the base of the carriage carrying the bottle that is to be agitated, but the actual size of the carriage, will of course, be governed by the size of the bottle or flask. To the Flanged Plate four Trunnions are attached to form journals for two  $3\frac{1}{2}$ " Axle Rods carrying

the four Flanged Wheels, and to either side of the Plate a  $5\frac{1}{2}$ " Braced Girder is fastened, while the front of the carriage is enclosed by two Corner Brackets. In this way the bottle will be held quite securely even when the carriage is oscillated at a good speed.

The oscillating mechanism (see Fig. 3) consists of a  $5\frac{1}{2}$ " Strip

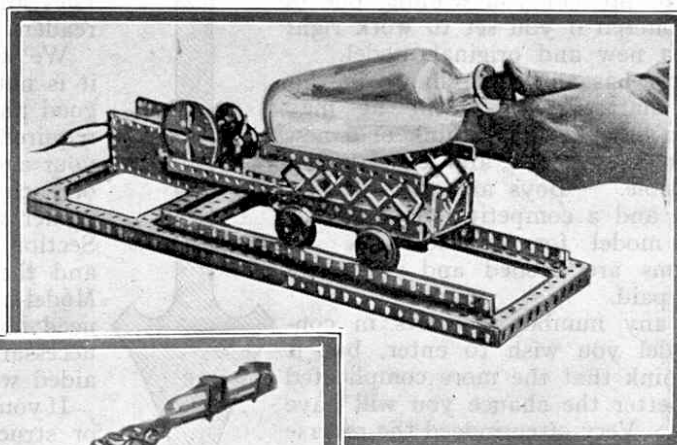
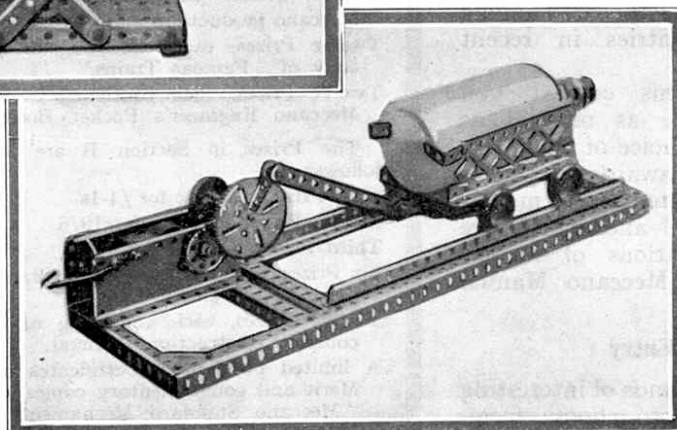
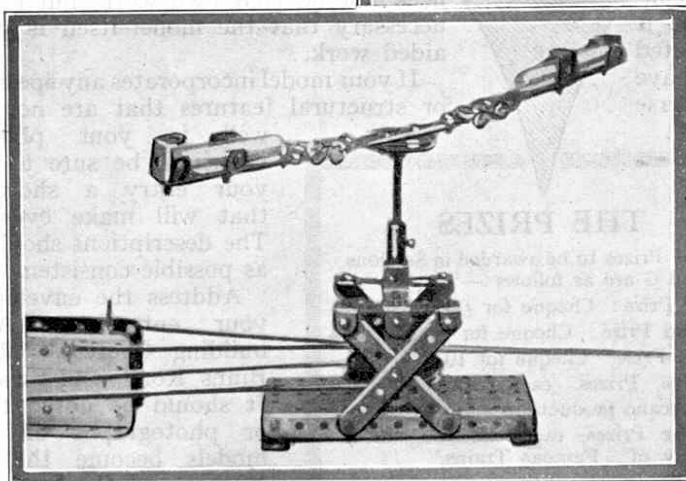


Fig. 1 (Above): Bottle Shaker with bottle in place. Fig. 2 (left): The Meccano Centrifuge in action. The test-tube holders have risen into a horizontal position owing to centrifugal force. Fig. 3 (below): Another view of the Bottle Shaker showing the oscillating gear.



pivotaly secured to a Single Bent Strip that in turn is fastened to the carriage. At its other end the Strip is secured by the means of a bolt and two lock-nuts to a  $2\frac{1}{2}$ " Strip bolted to a Face Plate, which is driven from the Electric Motor through reduction gearing consisting of two 57-teeth Gear Wheels and two  $\frac{1}{2}$ " Pinions. Upon setting the Motor in motion the Face Plate is

rotated and alternately pushes and pulls the carriage holding the bottle, so shaking the contents of the latter. The device will be of particular use when it is required to agitate a liquid for prolonged periods, as for example, when it is required to dissolve a substance that is only slightly soluble.

#### The Meccano Centrifuge

Another form of mixing device is the Centrifuge shown in Figs. 2 and 7. Two test tubes are placed in the holders of the apparatus and are then whirled round at high speed and the contents thoroughly mixed. The base of the Centrifuge consists of a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate over the centre of which is mounted a Double Bent

Strip on a framework consisting of  $2\frac{1}{2}$ " Double Angle Strips and ordinary Strips. The Double Bent Strip forms a reinforced journal bearing for a vertical Axle Rod that carries a Bush Wheel at its upper end and a 3" Pulley near its lower end.

The holders for the test tubes consist of  $5\frac{1}{2}$ " Strips to which are bolted Angle Brackets. At one end of each Strip a Double Bracket is secured, whilst a 1" Triangular Plate is fastened to the other extremity. To the Bush Wheel that is secured to the vertical Axle