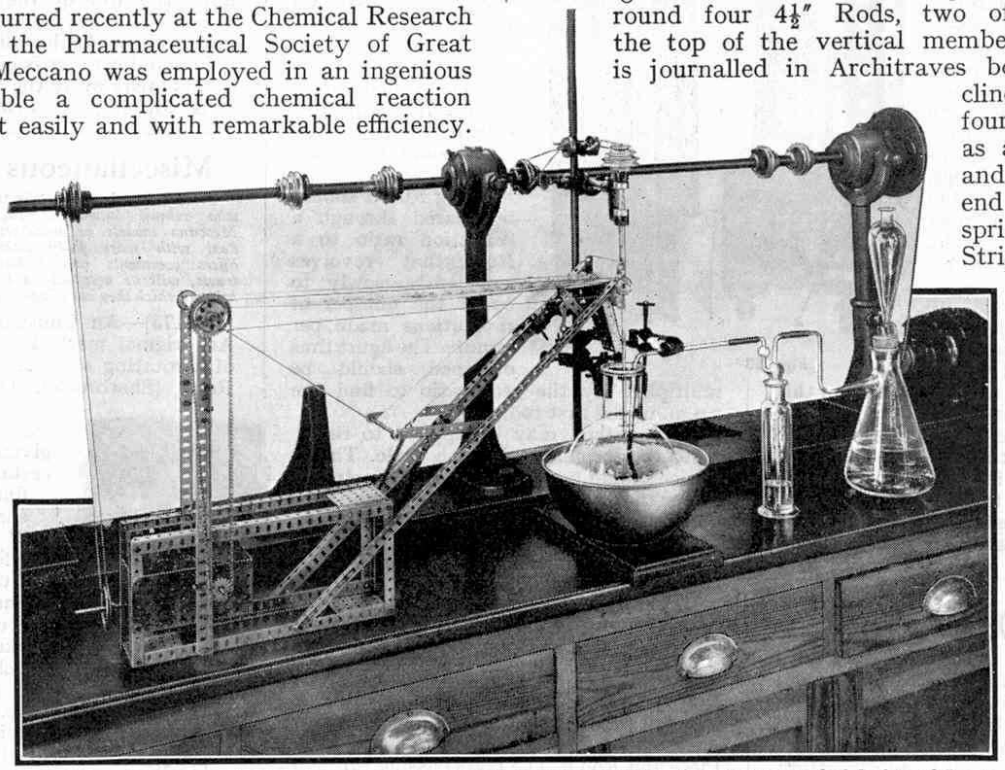
Meccano Aids Chemical Research

An Interesting Laboratory Mechanism

DURING recent years Meccano has been used more and more frequently by workers in almost every branch of science. On account of its simplicity and its extraordinary adaptability, it forms unique constructional material from which can be rapidly built almost any device called for by the needs of the moment. We have described and illustrated in the "*M.M.*" from time to time many scientific applications of Meccano. The latest instance of this kind to come to our notice occurred recently at the Chemical Research Laboratories of the Pharmaceutical Society of Great Britain, where Meccano was employed in an ingenious manner to enable a complicated chemical reaction to be carried out easily and with remarkable efficiency.

The reaction concerned in this interesting application of Meccano was of a type, familiar to chemists, in which a complex organic substance in the form of a finely-powdered solid is added to a liquid, in this case nitric acid. The powder cannot usually be poured directly into the liquid without producing a rise in temperature that causes waste of material and the production of impurities. In order to avoid these drawbacks a trial was made of an apparatus built of Meccano parts and consisting of a rigid framework supporting an endless moving belt, designed to carry the powdered solid towards the flask in which the reaction is carried out. From the belt the chemical falls continuously and in minute quantities on to a chute that directs it into the flask, where it is stirred mechanically into the mixture.



An ingenious Meccano mechanism in use at the Chemical Research Laboratories of the Pharmaceutical Society of Great Britain. Photograph by courtesy of the Editor of "The Pharmaceutical Journal."

The device works perfectly, no perceptible rise in temperature being caused by the gradual addition of the solid. Larger yields and purer products therefore can be obtained with its aid than when the work is carried out by hand, for then each addition gives rise to local heating. The action also is automatic and those concerned are relieved of the tedious tasks of repeatedly adding small quantities of the solid reagent and of keeping careful watch on the temperature of the mixture.

The construction of this interesting apparatus is very simple. The base of the frame consists of four $12\frac{1}{2}$" Angle Girders secured together in the form of an oblong by means of four $5\frac{1}{2}$" Angle Girders and three $3\frac{1}{2}" \times 2\frac{1}{2}$" Flanged Plates. This base supports the two main members that carry the bearings of the endless belt, the vertical member being constructed from two $12\frac{1}{2}$" and two $5\frac{1}{2}$" Angle Girders, and the inclined member from two $24\frac{1}{2}$" Angle Girders. The belt is a strip of mackintosh sheeting with the ends sewn together. It is passed round four $4\frac{1}{2}$" Rods, two of which are at the top of the vertical member and the third is journalled in Architraves bolted to the inclined member. The fourth Rod functions as a belt tightener, and is carried in the end holes of two spring-loaded $5\frac{1}{2}$" Strips pivoted by locknutted Bolts to the centre of the inclined member.

The chute consists of a Sector Plate lined with rubber. To prevent wastage of the powdered material fed into the flask, a $3\frac{1}{2}" \times 2\frac{1}{2}$" Flanged Plate, also lined with rubber, is fitted as shown in the illustration.

The gear-box is built up from two $5\frac{1}{2}" \times 2\frac{1}{2}$" Flat Plates and two $3\frac{1}{2}" \times 2\frac{1}{2}$" Flanged Plates, and the gear trains consist of a primary reduction of 57 : 1 and a secondary reduction of 27 : 1. This latter gear train may be adjusted so that the endless belt travels at speeds varying from 1 ft. in 20 min. to 1 ft. in two hours. The drive is taken by Sprocket Chain from a $\frac{3}{4}$" Sprocket Wheel on the driven shaft of the gear-box, to a $1\frac{1}{2}$" Sprocket Wheel on one of the Rods supporting the belt. A secondary drive, by cord, is taken from this Rod to the opposite end of the belt.

The apparatus was driven from an "overhead" shaft by means of an endless cord that passed over a $1\frac{1}{2}$" Pulley on the primary shaft of the gear-box. This shaft also operates the stirrer in the reaction flask.

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