

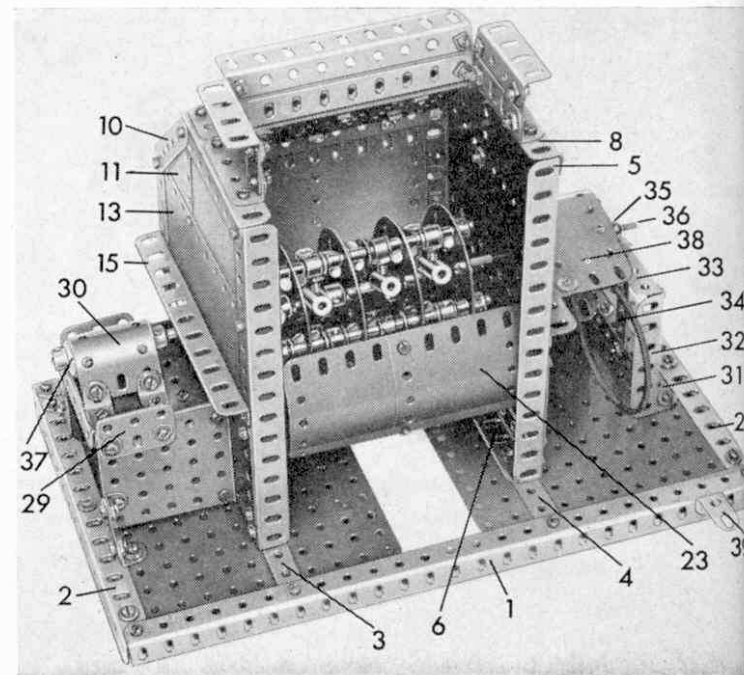
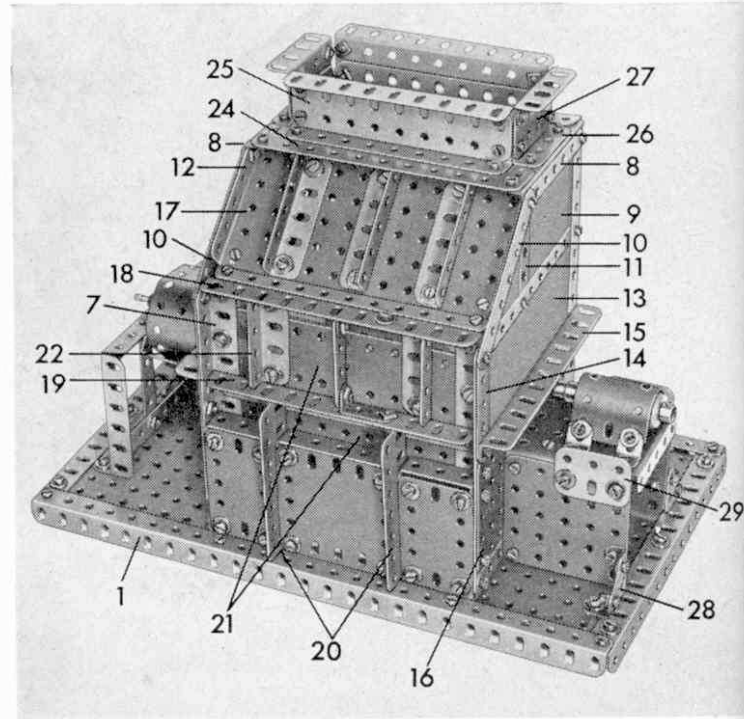
# Build yourself a model

OVER THE years, we have featured an immense variety of models, but never, to the best of my knowledge, has a stone crusher been numbered among those covered—until now. The model described here is based on an actual machine produced by Frank Mansfield and Co, of Birkenhead, and although it does not actually crush stones it clearly illustrates the action of the prototype.

Granulators, as these machines are sometimes called, work on a straightforward idea. Basically they consist of a strong casing covering a crushing compartment, in which there is a hammer arrangement known as a 'rotor'. Interchangeable grids form the floor of the compartment, and the top and back are fitted with tough corrugated lining plates. The material to be broken is fed in at the top, and, once inside, is struck by the hammers, which shatter it, and it is then thrown against the corrugated plates, breaking further with the impact. This action is repeated until the particles are small enough to filter through the grids at the bottom.

The base or bed of the model is built up from two  $12\frac{1}{2}$  in Angle Girders 1, and two  $7\frac{1}{2}$  in Angle Girders 2, arranged in a rectangle, with two  $7\frac{1}{2}$  in Strips 3 and 4 being used as strengtheners. Four  $5\frac{1}{2}$  in by  $3\frac{1}{2}$  in Flat Plates are bolted to Girders 2, as shown, but they are not, yet, fixed to Strips 3 and 4, although this will be done later. It is best to construct the main casing separately before fixing it to the base. Each side is built in a similar way, as follows:—A  $7\frac{1}{2}$  in Angle Girder 5 is fixed to one end of a  $5\frac{1}{2}$  in Angle Girder 6 and a further  $5\frac{1}{2}$  in Angle Girder 7 is fixed to the other end. To the top of Girder 5, a  $3\frac{1}{2}$  in Angle Girder 8 is bolted, the same bolt also holding a  $3\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flexible Plate 9 in position. Girders 7 and 8 are connected by a  $3\frac{1}{2}$  in Strip 10, the top Bolt also holding a  $2\frac{1}{2}$  in by 2 in Triangular Flexible Plate 11, and a  $2\frac{1}{2}$  in Angle Girder 12 in place. The lower Bolt, in addition, holds a  $5\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flexible Plate 13 and a  $2\frac{1}{2}$  in Strip 14. A  $5\frac{1}{2}$  in Angle Girder 15 is bolted in place and the remaining gap in each side is filled in by a  $5\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flat Plate 16.

Although rather complex in appearance, the front of the casing is really quite easy to build. A  $5\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flat Plate 17, carrying three  $2\frac{1}{2}$  in Angle Girders, is bolted to Angle Girders 12 and a further two  $5\frac{1}{2}$  in Angle Girders 18 and 19 are fixed between Girders 7. The space between Plate 17 and Girder 18 is filled by a  $5\frac{1}{2}$  in Narrow Strip attached to the Plate by Obtuse Angle Brackets. Two  $3\frac{1}{2}$  in Flat Girders 20, one  $2\frac{1}{2}$  in by  $\frac{1}{2}$  in and two  $1\frac{1}{2}$  in by  $\frac{1}{2}$  in Double Angle Strips are also bolted as shown, between Girders 7. Another  $2\frac{1}{2}$  in by  $\frac{1}{2}$  in



# stone crusher

Double Angle Strip is bolted to the lower ends of Flat Girders 20, and at the same time two  $2\frac{1}{2}$  in Angle Girders are fixed, with the Flat Girders, to the lugs of both these Double Angle Strips. All remaining spaces are covered by two  $5\frac{1}{2}$  in by  $1\frac{1}{2}$  in Flexible Plates 21, two  $2\frac{1}{2}$  in by  $1\frac{1}{2}$  in and one  $2\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flexible Plate. Girders 18 and 19 are connected by a 2 in Strip fixed to the Girders by two 1 in by  $\frac{1}{2}$  in Angle Brackets, and two 2 in Angle Girders 22 are finally bolted in position.

Four  $5\frac{1}{2}$  in by  $2\frac{1}{2}$  in and two  $4\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flexible Plates, built up into a  $13\frac{1}{2}$  in by  $4\frac{1}{2}$  in compound plate 23, form the actual crushing chamber. In the illustration opposite the two  $4\frac{1}{2}$  in by  $2\frac{1}{2}$  in Plates have been removed to show the hammers. The front end of the compound plate is only wedged between Plate 21 and the lower flange of Girder 18, but is held in position at its lowest point by a  $5\frac{1}{2}$  in by  $\frac{1}{2}$  in Double Angle Strip bolted through Flat Plates 16. The lugs of the Angle Strip are spaced from the Plates by Washers. The rear end of the plate is fixed to a  $5\frac{1}{2}$  in Angle Girder bolted through the adjacent end holes of Girders 5 and 8 on each side of the model. This Girder also has been removed in the opposite illustration.

A  $5\frac{1}{2}$  in Flat Girder 24 is attached to Angle Girders 8, and a  $4\frac{1}{2}$  in Angle Girder 25, extended by a  $4\frac{1}{2}$  in Flat Girder, is bolted to it. Another  $5\frac{1}{2}$  in Angle Girder similarly extended is bolted to the  $5\frac{1}{2}$  in Angle Girder mentioned above, which is bolted to Girders 5 and 8. To each of the Girders 8 and a 2 in Angle Girder 26, extended by a 2 in Flat Girder 27, is bolted and then two further  $5\frac{1}{2}$  in and two 2 in Angle Girders are fitted in position, as shown, to form a lip.

This completes the main casing and it is now fixed in position on the base. A bearing bed is built-up from three  $2\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flat Plates, bolted to three  $2\frac{1}{2}$  in Angle Girders. This arrangement is then attached to Flat Plates 16 by bolts with another two  $2\frac{1}{2}$  in Angle Girders being used as brackets. In addition, the bed is held by two 1 in Corner Brackets 28 connected to the  $2\frac{1}{2}$  in side Plates and the base by Angle Brackets, as can

be seen. Each side Plate is extended by a  $1\frac{1}{2}$  in Flat Girder 29. Four Obtuse Angle Brackets are fixed to the top  $2\frac{1}{2}$  in by  $2\frac{1}{2}$  in Flat Plate, and a  $2\frac{1}{2}$  in by  $1\frac{1}{2}$  in Flexible Plate 30, curved as shown, is bolted to these. At the other side of the model a second bearing bed is formed from a  $3\frac{1}{2}$  in Angle Girder 31, fixed to the base and carrying a 3 in Angle Girder 32 at each end. These Girders are joined at the top by another  $3\frac{1}{2}$  in Angle Girder 33 and a 3 in Strip 34 is bolted through the centre holes of this Girder and Girder 31 for strengthening purposes. A Handrail Support 35, with the Grub Screw removed, is firmly fixed through the centre hole in the top flange of Girder 33.

The crushing mechanism, or rotor, consists of five Face Plates each fixed approximately 1 in from the next on an  $11\frac{1}{2}$  in Rod 36. Each hammer is a Coupling, through the centre transverse tapped bore of which a  $\frac{3}{4}$  in Bolt, fitted with a Nut, is screwed. The Bolt is then screwed into a Collar, care being taken that the Nut prevents it from entering too far, as the Collar must be completely free to turn on a Rod.

Four 5 in Rods are fitted through the outer circular holes in the Face Plates and four hammers are placed on each Rod, one hammer between every two Plates. Spring Clips and Washers hold the hammers in place, the order of fitting being as follows:—Face Plate, Spring Clip, Washer, hammer, Washer, Spring Clip, Face Plate. The hammers *must* be perfectly loose on the Rods which are held in the Face Plates by Collars. The  $11\frac{1}{2}$  in Rod forming the axle of the rotor is journalled in the Handrail Support 35 and in the centre holes of Angle Girders 15, Collars adjoining the Girders holding the Rod in place.

An imitation large bearing is built-up on one end of the axle from a Sleeve Piece holding a Chimney Adaptor 37 at each end. The resulting cylinder is held on the axle by Collars.

At the opposite end of the Rod, between the casing and the bearing bed, a Cone Pulley is fixed. A  $5\frac{1}{2}$  in by  $1\frac{1}{2}$  in Flexible Plate 38, attached to Girder 15 by a Fishplate and to Strip 34 by a 1 in by  $\frac{1}{2}$  in Angle Bracket, is bent around the Pulley to act as a guard. Drive to the Pulley is taken through a Driving Band from a motor which can be bolted to the base and the 1 in by  $\frac{1}{2}$  in Angle Bracket 39 is placed there for this purpose.

**Parts required.**—2 of No. 1b; 1 of No. 2; 2 of No. 3; 1 of No. 4; 2 of No. 5; 1 of No. 6; 2 of No. 8; 4 of No. 8b; 9 of No. 9; 4 of No. 9a; 4 of No. 9b; 2 of No. 9c; 12 of No. 9d; 6 of No. 9e; 1 of No. 10; 10 of No. 12; 4 of No. 12b; 6 of No. 12c; 1 of No. 13; 4 of No. 15; 32 of No. 35; 180 of No. 37a; 165 of No. 37b; 102 of No. 38; 2 of No. 48; 2 of No. 48a; 1 of No. 48d; 4 of No. 52a; 28 of No. 59; 16 of No. 63; 3 of No. 70; 3 of No. 72; 1 of No. 103; 2 of No. 103c; 2 of No. 103d; 2 of No. 103g; 2 of No. 103h; 5 of No. 109; 16 of No. 111; 1 of No. 111a; 1 of No. 111c; 1 of No. 123; 2 of No. 133a; 1 of No. 136; 1 of No. 163; 2 of No. 164; 1 of No. 186c; 3 of No. 188; 3 of No. 189; 1 of No. 190; 2 of No. 190a; 2 of No. 191; 6 of No. 192; 2 of No. 222; 1 of No. 235f.

*Top:* The Meccano model Stone Crusher described in this article closely follows the lines of an actual machine, which is produced by a well-known manufacturer in the North-West of England.

*Bottom:* A rear view of the Stone Crusher with the back removed to show the rotor, or crushing mechanism.