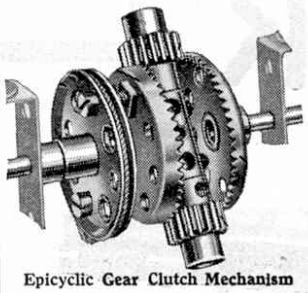

Epicyclic Gear Clutch Mechanism

Suggestions Section

Edited by "Spanner"

(105)—Meccano Testing Machine

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IN all engineering work it is of the utmost importance that the strength or durability of various materials should be known.

In bridge-building, for example, it would be impossible to determine the proper size of the bridge and the quantity of material necessary for its support unless it was known how much stress or strain each individual member of the bridge could be expected to withstand with safety. A tie or strut used in any engineering structure must be of a certain shape in order to best resist the stresses to which it is subjected. Thus a girder designed to withstand a tensile stress may be of an entirely different shape to one intended to oppose only a compressive force.

Machines used to determine the strength of materials are known as testing machines, and with their aid metals or timbers, etc., may be subjected to compressive, tensile, or bending stresses. The hardness or strength of the specimen is gauged by the force that must be exerted by the machine before signs of compression or rupture appear. The force is measured by sliding a weight along a steelyard that is connected to the testing mechanism by a system of compound levers, or it may be indicated by means of a suitable dial and pointer. It is usually expressed of course in pounds or tons per square inch. The enormous power required in large testing machines is obtained by a hydraulic ram.

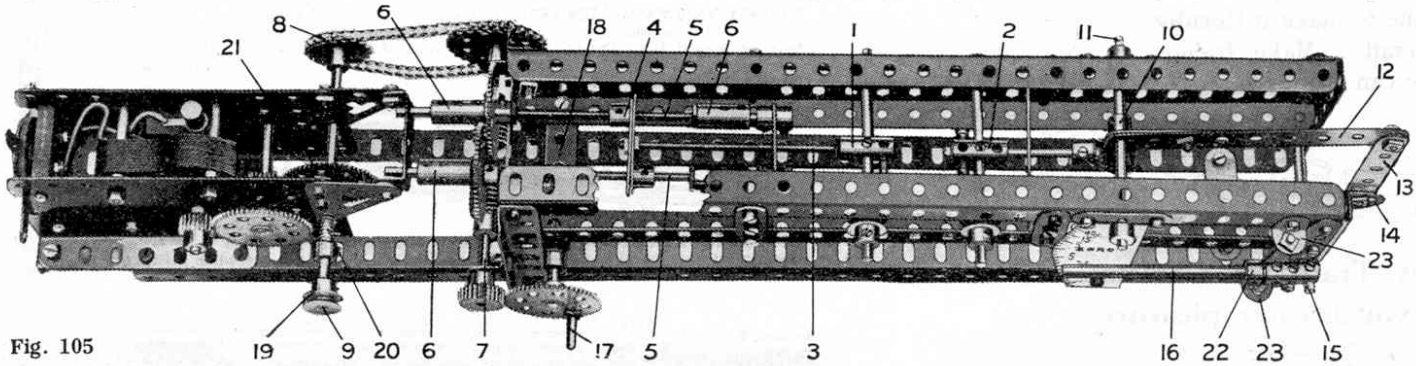

Fig. 105

The Meccano model testing machine shown in Fig. 105 should prove particularly interesting to Meccano boys in view of the fact that actual tests may be made with its aid. It is sufficiently powerful to crush matches or to break threads and thin wires, and some interesting experiments can be carried out by noting in each case the readings on the indicating dial. In addition, the model forms a very interesting demonstration of the power of a Meccano 4-volt Electric Motor.

The jaws of the machine, which grip the specimen to be tested, are represented in the model by a Threaded Coupling 1 and an ordinary Coupling 2 secured at their centre transverse holes to 3½" Rods. These Rods carry at each end a ½" loose Pulley mounted between two Collars, and the Pulleys are guided between the edges of two parallel 12½" Angle Girders. Care should be taken in adjusting the Girders so that the Pulleys are quite free to turn. The Coupling 1 is securely fastened to the end of a 3½" Threaded Rod 3, and this in turn is gripped by means of two nuts in the centre holes of two Threaded Cranks 4. The Cranks 4 are mounted on two parallel 3½" Threaded Rods 5, which are inserted at each end in Threaded Couplings 6 and rigidly secured by means of nuts screwed tight against the Couplings. Two pairs of 1" Rods inserted in the other ends of the Couplings 6 form the journals on which the Threaded Rods 5 turn; they are mounted in suitable bearings formed from Double Angle Strips.

The parallel Threaded Rods 5 are rotated simultaneously and in the same direction by means of two Worm Wheels secured to a 3½" Rod 7. The latter Rod is journalled in a 3½" × ½" Double Angle Strip bolted to the rear upright 3½" Angle Girders of the frame, and it is rotated by means of the Sprocket Chain drive 8 from a shaft 9 journalled in the side plates of the 4-volt Electric Motor, which supplies the necessary power. The Rod 9 is driven from the Motor armature through a gear train consisting of two ½" Pinions and two 57-teeth Gear Wheels.

The other jaw 2 of the machine is secured to a 1½" Axle Rod sliding in the centre hole of a 2½" × ½" Double Angle Strip secured transversely in the framework of the model, and an End Bearing secured to this Rod is attached pivotally to the second hole of a Boss Bell Crank 10. This Crank pivots on the Rod 11 and its other arm is extended by a 4½" Strip 12. The latter is connected pivotally by means of a bolt and two nuts (see Standard Mechanism No. 262) to a 2½" Strip 13, the other end of which is attached by a similar method to the end of a Crank 14 secured to the 3½" Rod 15. The Rod 15 carries a Coupling, and a 3½" Rod 16 secured in this forms a pointer to record the force exerted by the machine.

The jaws 1 and 2 are provided with ordinary bolts by means of which the specimens to be tested are gripped. The preliminary adjustment of the jaws is effected by a hand wheel 17, consisting of a 57-teeth Gear Wheel secured to a 3½" Axle Rod journalled in the 2½" × ½" Double Angle Strip 18. This Gear Wheel engages with a ¾" Pinion on the Rod 7. Before the hand wheel can be operated, the Rod 9 must be thrown out of engagement with the Motor. For this purpose a knob 19 is provided, and on pressing this the Rod 9 may be moved longitudinally in its bearings, thereby compressing the Spring 20 (part No. 120b) and throwing the Gear Wheel 21 out of engagement with its Pinion.

The movement of the pointer 16 is controlled by two short lengths of Spring Cord, each secured at one end to the pointer between the Coupling and the Collar 22 and at the other end to a ½" Bolt inserted in Angle Brackets 23.

Parts Required :—

1 of No.	2A	6 of No.	16	8 of No.	38	9" of No.	94
2 " "	3	1 " "	17	1 " "	48	1 " "	95A
1 " "	5	1 " "	18A	3 " "	48A	1 " "	96
1 " "	6	4 " "	18B	1 " "	48B	2 " "	111A
6 " "	6A	5 " "	23A	2 " "	58	1 " "	115
2 " "	7A	1 " "	25	19 " "	59	1 " "	120B
4 " "	8	2 " "	26	1 " "	62	1 " "	128
4 " "	9B	5 " "	27A	2 " "	62A	2 " "	133
1 " "	9D	2 " "	32	2 " "	63	1 " "	166
2 " "	12	71 " "	37A	5 " "	63C	1 4-Volt Electric Motor	
2 " "	15A	60 " "	37B	3 " "	80A		