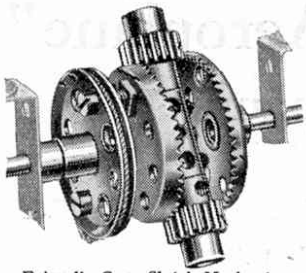
Epicyclic Gear Clutch Mechanism

Suggestions Section

Edited by "Spanner"

(100)—"Tatham" Transmission Dynamometer

(*G. S. Cunliffe, Fortis Green, London, N.*)

A DYNAMOMETER is a device by means of which the force or power of an engine, etc., may be measured. Any kind of brake may be used as a dynamometer, for the power of a rotating shaft can be measured by the force required to bring it to rest. A spring, capable either of extension or compression, forms the basis of a simple type of dynamometer used for measuring compressive or tensional forces. For finding the tractive effort of a locomotive, the pull is usually transmitted through a powerful spring balance, and the actual force exerted is indicated by the extent to which the spring is compressed.

Transmission dynamometers are specially designed so that they can be used to measure the force of an engine while transmitting the power without other loss than that caused by friction in the apparatus. Thus the power exerted by an engine can be noted throughout its period of motion.

Fig. 100 shows an interesting Meccano model of a "Tatham" transmission dynamometer, the operation of which will be readily understood when the model is constructed. The Meccano model may be used to ascertain the power of the Clockwork or Electric Motors, and with its aid a number of interesting and instructive experiments may be made.

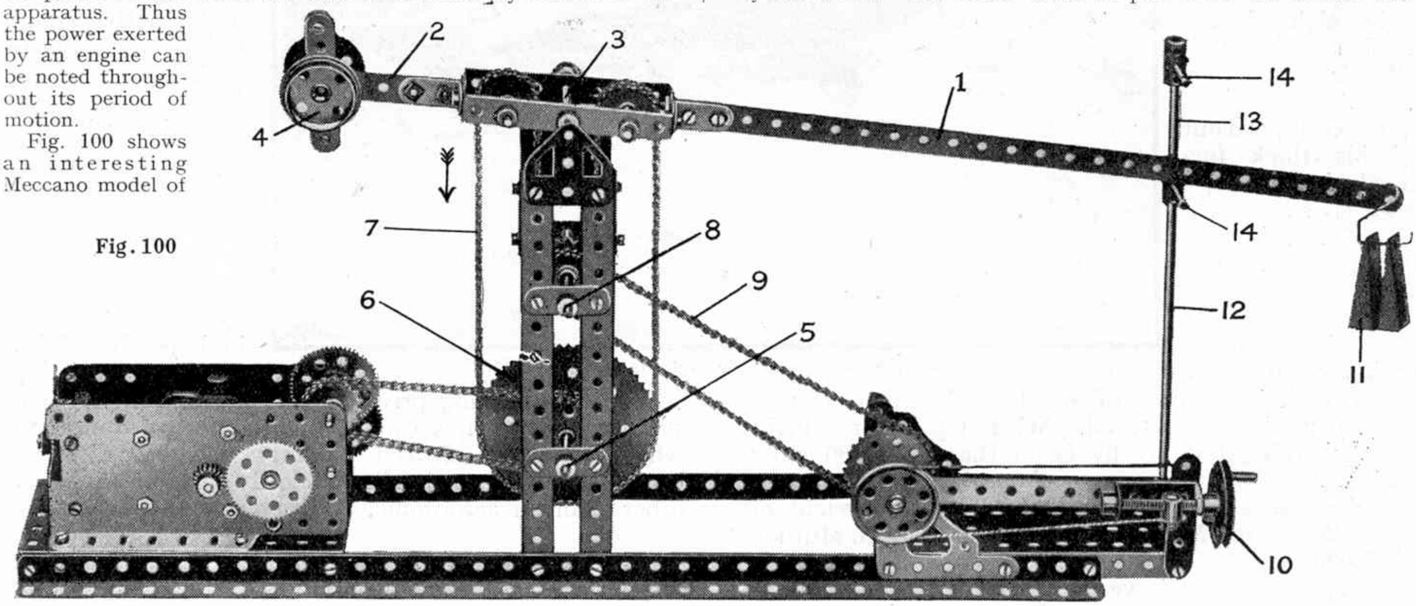

Fig. 100

Construction of the Meccano Model

The construction of the framework is quite simple. The base consists of two 18½″ Angle Girders and the upright is built up from four 7½″ Angle Girders connected near the top by two 2½″ Strips and two Flat Trunnions. The movable arm, or steelyard, 1 consists of a 12½″ Strip connected by means of two 1″×½″ Angle Brackets to two 3½″×½″ Double Angle Strips, and the other ends of the latter are connected by two further 1″×½″ Angle Brackets to a 2½″ Strip 2.

The arm pivots about a 3½″ Rod 3, and suitable weights should be added at 4 so that it is exactly balanced about this point. The balance weight shown in the illustration consists of a 1½″ Axle Rod carrying two Flanged Wheels and seven 2½″ Strips.

The drive from the Motor is led on to a 2″ Sprocket Wheel secured to a 3½″ Rod 5. The latter is journalled in 1½″ Strips secured to the upright and carries also a 3″ Sprocket Wheel 6. A length of Sprocket Chain 7 passes round this Sprocket Wheel 6, over two 1″ Sprocket Wheels secured to 2″ Rods journalled in the arm 1, one on each side of the fulcrum 3, and round a third 1″ Sprocket Wheel secured to another 3½″ Rod 8. The drive is finally transmitted to the machinery, etc., that the motor is required to operate by means of another length of Sprocket Chain 9, which passes over a second 1″ Sprocket Wheel on the Rod 8.

For testing purposes the Rod driven by the Chain 9 must have varying degrees of resistance, and the necessary adjustments are effected by a strap and screw brake 10, which is identical to Standard Mechanism No. 85. The Motor must be started in such a direction that the Chain 7 travels in the direction indicated by the arrow. The Chain tends to pull down the shorter end of the arm 1 and the power of the Motor is gauged by the extent of this pull, which may be ascertained by placing the weight 11 (two Meccano 50-gramme weights attached to a Scientific Hook) in different positions on the arm.

The movement of the arm 1 is kept within certain limits by the stops 14. These stops consist of 1½″ Rods secured in Couplings and supported by a 6½″ Rod 12, which is gripped in the boss of a Crank bolted to the base of the model. The 6½″ Rod is extended at the top by a 2″ Rod 13.

In order to test its power, the Motor should be started and the brake 10 adjusted, so that the mechanism only just rotates and the Chain 7 pulls the short end of the arm hard down. The weight 11 should then be moved along the arm and a note made of the position in which it must be placed to counteract the pull on the Chain and balance the arm about the fulcrum 3.

In the illustration it will be seen that the drive from the Motor is led through a train of reduction gears consisting of three ½″ Pinions and three 57-teeth Gear Wheels. It is then transmitted to the Rod 5 by means of a 1″ Sprocket Wheel and a Sprocket Chain driving on to a 2″ Sprocket Wheel. Hence the speed ratio between the motor armature and the Rod 5 is 1 : 54. (Particulars of different ratios obtainable by means of Meccano gearing will be found in Section 1 of the Standard Mechanisms Manual). With this ratio the pull of the Chain will be found to raise the 100-gramme weight 11 if the latter is placed about 14″ from the fulcrum 3.

Different speed ratios should be arranged by changing the gears on the Motor, and the variation in the pull of the Chain 7 should be ascertained for each ratio. By changing the final ½″ Pinion and 57-teeth Gear Wheel of the gear train shown in the illustration for a ¾″ Pinion and 50-teeth Gear Wheel, a ratio of 1:36 will be obtained. Again, if two 1″ Gear Wheels are used at this point the ratio will be 1 : 18. The following is a table of results obtained by using the three different ratios mentioned above :—

Weight= 100 grammes.

Ratio= 1 : 54 ; distance of weight from fulcrum = 14″.

Ratio= 1 : 36 ; distance of weight from fulcrum= 9½″.

Ratio= 1 : 18 ; distance of weight from fulcrum= 4½″.

Since the force exerted by the weight 11 varies according to its distance from the fulcrum 3, it will be seen that the pull on the Chain 7 increases more or less in proportion as the speed at which it is driven decreases.

The above figures should be regarded as approximate only, for it will be found that they will vary slightly with the individual Motor used. The slightest difference in the tension of the different chains, or in the friction created in the various bearings, etc., also will affect the results slightly.

The parts contained in the Meccano demonstration model illustrated on the preceding page are as follows :—

1 of No. 1	2 of No. 20	1 of No. 64
1 „ „ 2	3 „ „ 26	2 „ „ 66
11 „ „ 5	3 „ „ 27A	1 „ „ 81
4 „ „ 6A	46 „ „ 37	60″ „ „ 94
2 „ „ 7A	2 „ „ 37A	1 „ „ 95B
4 „ „ 8B	6 „ „ 38	2 „ „ 95
4 „ „ 12B	2 „ „ 48B	5 „ „ 96
1 „ „ 14	1 „ „ 48	2 „ „ 108
4 „ „ 16	2 „ „ 52	1 „ „ 111C
3 „ „ 16A	1 „ „ 57A	1 „ „ 115
1 „ „ 17	14 „ „ 59	2 „ „ 126A
5 „ „ 18A	1 „ „ 62	1 4-volt Motor
2 „ „ 21	2 „ „ 63	

A "Century" of Suggestions

With this issue the total number of Suggestions so far published in the "Suggestions Section" passes the three-figure mark. Since the appearance of the first "Suggestions Page" in the November 1925 "*M.M.*" it has been always our aim to publish as far as possible only those suggestions that may be incorporated with considerable advantage in numerous Meccano models or that contain some particularly ingenious uses for standard Meccano parts. How far we have succeeded in our aim we leave our readers to judge for themselves. We think they will agree, however, that the majority of the hundred and three suggestions that have now appeared establish not only a striking demonstration of the versatility of the Meccano system, but also bear testimony to the ingenuity of the average Meccano boy.

We thank all those readers who have helped to make the "Suggestions Section" a success by sending in original contributions.

(101)—Four-Wheel Bogie

(*P. D. Larkin, Wembley, and S. Johnson, Bristol*)

A simple but efficient four-wheel bogie of the type shown in Fig. 101 often is required when constructing Meccano locomotives, tram cars, and other vehicles that are designed to run on rails. The principal advantage of this bogie lies in the fact that the axles are mounted on equalising beams which are attached centrally to compression springs, thus allowing for independant vertical movement of all four wheels.

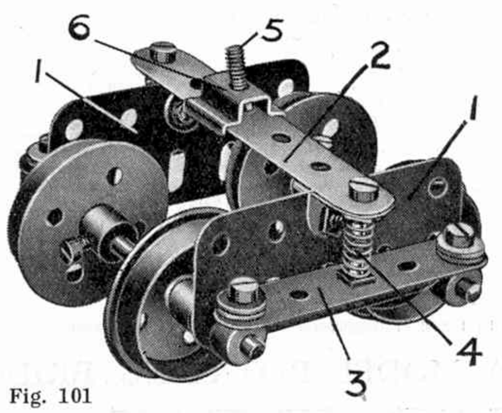

Fig. 101

The bogie frame is built up from two 2½″ Flat Girders 1 connected together by a 3″ Strip 2, which is bolted to each Flat Girder by an Angle Bracket. The axle boxes are represented by Collars, and each pair of Collars is connected by an equalising beam consisting of a 2½″ Strip 3. A ⅜″ Bolt secured in the centre hole of the latter enters the coil of a Compression Spring 4 (part No. 120b), which is retained in place by the shank of another ⅜″ Bolt that serves to secure the Strip 2 to the Angle Bracket.

The equalising beam 3 is secured to the Collars by set-screws, and it will be noted that two Washers are placed under the head of each screw to prevent its shank touching the axle, which must be quite free to turn in the Collars. The axles are journalled in the elongated holes of the Flat Girders and since the weight of the vehicle is taken by the Spring 4, attached to the centre of the equalising beam, each axle is able to move in a vertical direction simultaneously with, or independently of, the other axle.

The bogie should be attached to the frame of the vehicle by means of the bolt 5 inserted in the Eye Piece 6. The bolt should be secured by two nuts in such a way that the bogie is quite free to pivot about it (see Standard Mechanism No. 262). The lateral movement of the bogie caused by curves in the track is allowed for by the Eye Piece 6 sliding on the Strip 2.

As illustrated, the wheels are spaced to fit Gauge 0 rails. The bogie may easily be adapted to Gauge 1 rails by replacing the 3″ Strip 2 by a 3½″ Strip.

(102)—Safety Catch for Winding Gears

(*J. Hutter, Summertown, Oxford*)

The device shown in Fig. 102 is intended primarily for incorporation in hand-operated cranes or winches, and its object is to provide a means of arresting the load immediately the hand is removed from the winding shaft. Such a device may be adapted to practically every model that is operated by turning a shaft by hand, and its advantages will be obvious.

The parts required to construct the safety catch are two Collars, one Compression Spring (part No. 120b), a Washer, two bolts, and one nut. The spring 3 is mounted on the Crank Handle 1 between the Collar 4 and the Washer, the latter being placed against the plate through which the Crank Handle is journalled. The spring normally holds the Collar 2 against the inner side of the plate. It will be noted that the set-screw of the latter Collar has been replaced by a ⅜″ Bolt, and should the Crank Handle commence to rotate, the head of this bolt strikes against the stop 5 (a nut and bolt secured in the side plate) and thereby prevents any further movement of the Crank Handle.

Hence it will be seen that in order to operate the model it is necessary to push the Crank Handle inward slightly in order that the ⅜″ Bolt clears the stop 5. Immediately pressure is removed from the handle 1, the Collar 2 slips back to its normal position, and the ⅜″ Bolt strikes the stop. There is no fear of the load running down in a model crane to which the safety catch is fitted, even if the Crank Handle is released accidentally while the load is in mid-air.

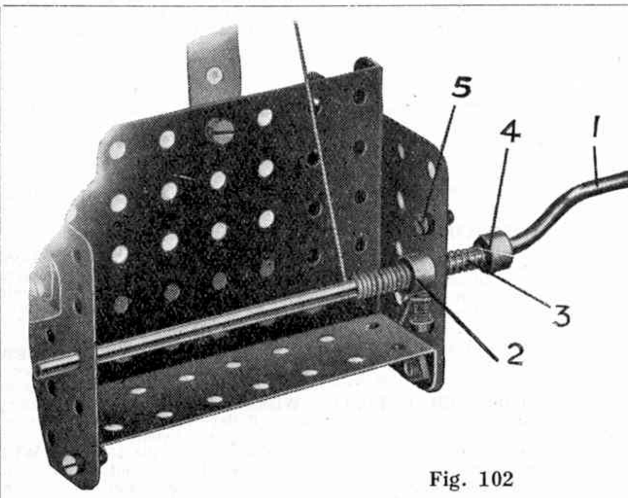

Fig. 102

The safety catch also proves of very great value if used as an automatic brake device for countershafts in models driven by any of the Meccano motors. For example, suppose the Rod 1 is a shaft operating the jib-hoisting movement in a model crane that is driven by an Electric Motor. By means of a suitable hand lever the Rod 1 may be arranged so that it is in engagement with the main driving shaft only while the spring 3 is depressed. On releasing the hand lever the Rod 1 is thrown out of gear and the jib is locked in position immediately.