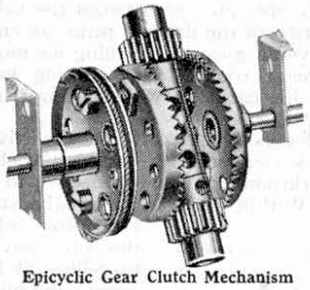

Epicyclic Gear Clutch Mechanism

Suggestions Section

Edited by "Spanner"

(97)—Demonstration Model of Joy's Valve Gear

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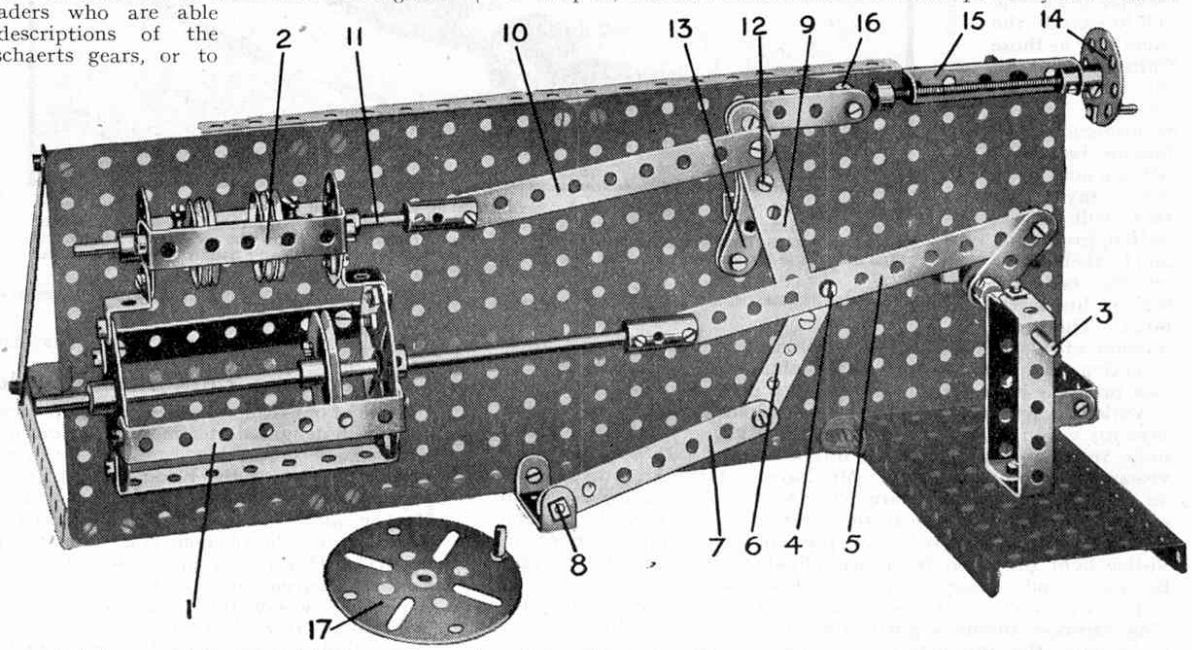
ON previous occasions we have dealt with two of the most important types of locomotive valve gears, namely, Walschaerts' (see Standard Mechanism No. 277) and Stephenson's (Suggestion No. 58, October, 1926, "*M.M.*"), and we are able now to describe a Meccano demonstration model of Joy's valve gear. Joy's gear, although not so widely used as the two others mentioned, was extremely popular until quite recent times. It is of the type known as "radial valve gears," in which the valve movement is derived from the motion of the connecting rod and transmitted to the valve by means of levers. The chief advantage of the gear is the fact that no eccentrics are required and therefore more room is available for lengthening the journals of inside cylinder engines. The principles and functions of locomotive valve gears will be clear to readers who are able to refer to our descriptions of the Stephenson and Walschaerts gears, or to the article in the 1926 Hornby Book of Trains.



The operation of Joy's valve gear may be followed in the Meccano model (Fig. 97). The cylinder of the locomotive is represented at 1 by means of two Face Plates connected together by $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, one of which is bolted to the demonstration frame. The steam chest 2 consists of two Bush Wheels connected by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, and is attached to the cylinder by means of two $\frac{1}{2}''$ Reversed Angle Brackets. The crankshaft, or driving axle of the engine, is built up from two Cranks mounted on the end of short Rods 3 and rigidly secured together at their outer ends by a $\frac{1}{2}''$ Bolt, on the shank of which the connecting rod 5 is pivoted. A $1\frac{1}{2}''$ Pulley takes the place of the piston and the 8" Rod to which it is secured forms the piston rod. The crosshead consists of a Strip Coupling.

The motion is derived from a point 4 in the connecting rod 5, at which point the connecting link 6 is attached pivotally by a bolt and two nuts (see Standard Mechanism No. 262). The lower end of the connecting link 6 is pivoted by the same means to an anchor link 7, which, in turn, pivots about a fixed point 8. It may be noted that the point 8 is the only fixed point in the gear. The valve lever 9 (a 3" Strip) is pivoted to a point in the link 6 just below the bolt 4, and at its upper end is bolted pivotally to the valve rod 10. One end of the latter is connected to the valve spindle 11 by means of a Strip Coupling. The piston valves are represented by two pairs of 1" Pulley Wheels butted together and secured to the valve spindle in the positions shown. A bolt 12 passed through the lever 9 is secured rigidly by means of two nuts to an Eye Piece representing the quadrant block, or die, which slides in a curved guide, or quadrant, consisting of two $2\frac{1}{2}''$ large radius Curved Strips 13. These Strips are secured at top and bottom by $\frac{3}{8}''$ bolts and are spaced apart by two Washers on each bolt to allow room for the Eye Piece to slide freely on the outer Curved Strip. The centre hole of the inner Curved Strip of the quadrant is attached pivotally by bolt and nuts to the centre of a Double Bent Strip secured to the supporting framework.

The quadrant may be rocked about its pivot on operation of the reversing handle 14. The latter is secured to a $4\frac{1}{2}''$ Threaded Rod that is journalled in the Double Angle Strip 15 and carries near its other end a Threaded Boss, in the transverse bore of which the shank of a bolt is free to turn. This bolt is fastened rigidly in the end of a 2" Strip 16, the other end of which is attached pivotally to the shank of the $\frac{3}{8}''$ bolt at the top of the quadrant. Collars are secured to the Threaded Rod to prevent the Threaded Boss being moved too far in either direction on rotation of the handle 14.

In our illustration the gear is in mid-position, with the quadrant 13 placed vertically. In this position a minimum movement of the valve takes place and each port of the cylinder is opened by an amount equal to the lead of the valve.

In order to place the engine into full fore-gear the reversing handle is rotated so that the Threaded Boss 16 moves towards the cylinders, thereby inclining the quadrant 13 in the same direction. The engine will now run forward and the valves will be opened to their fullest extent, admitting a maximum amount of steam for each stroke of the piston. Any intermediate position between these two may be used and the "cut-off" thereby varied, i.e., the amount of steam supplied for each movement of the piston diminished or increased. To reverse the engine, the handle 14 is turned in the opposite direction and the quadrant 13 inclined backward. This has the effect of reversing the order in which the valves are opened. The hand wheel 17 may be secured to the end of the crankshaft 3 and used to operate the model.