Compact Pre-Selector Gear-Box

PICK OF THE "POPS"

By "Spanner"

I FEEL sure present day Meccanoites will be interested in a pre-selector gear mechanism that first appeared in one of my *Suggestions Section* articles before the war. It is based on a mechanism devised by B. Rees, of Cardiff, and is suitable for use in a motor car chassis. It provides four forward speeds and reverse and any one of these can be pre-selected and brought into operation when required merely by depressing a foot pedal.

The driven shaft of the gear-box is marked 4 in Fig. 1 and is a 3½" Rod that carries at its inner end a Coupling 5. A 57-teeth Gear and a 50-teeth Gear are placed on the Rod between a 1"×1" Angle Bracket and the 3½"×½" Double Angle Strip 1 of the casing, and a ½" Pinion that forms a unit of the reverse gear, also is fastened on the Rod, but outside the framework. A second ½" Pinion is mounted on a Pivot Bolt passed through the centre hole of the Double Angle Strip 1, and is in constant mesh with the ½" Pinion on the driven shaft.

Favourite Models From The Meccano Files

The driving shaft carries between the Angle Bracket and the Double Angle Strip, a Collar, a ¾" Pinion and a ½"×½" Pinion. Between the two 1"×1" Angle Brackets the Rod passes through the elongated hole of the Crank 7, and a built-up dog clutch is fitted to the end of the Rod. The clutch consists of a Collar 6 fixed to the Rod by two Bolts, which also pass through the elongated holes of two Fishplates. A second Collar is spaced from Collar 7 by half a Compression Spring, and the Fishplates are secured to it by two Set Screws. The layshaft is a compound rod formed by joining together a 2" Rod and a 5" Rod by a Coupling. The 2" member of the Rod carries a 50-teeth Gear, and the 5" member carries a 57-teeth Gear, Crank 7, a Collar, Crank 8, six Washers, a ½" Pinion 10 and finally a ¾" Pinion. Crank 7 is free on the layshaft, and Crank 8 is held between the Collar and ½" Pinion.

The gear-changing mechanism is very simple both in construction and operation.

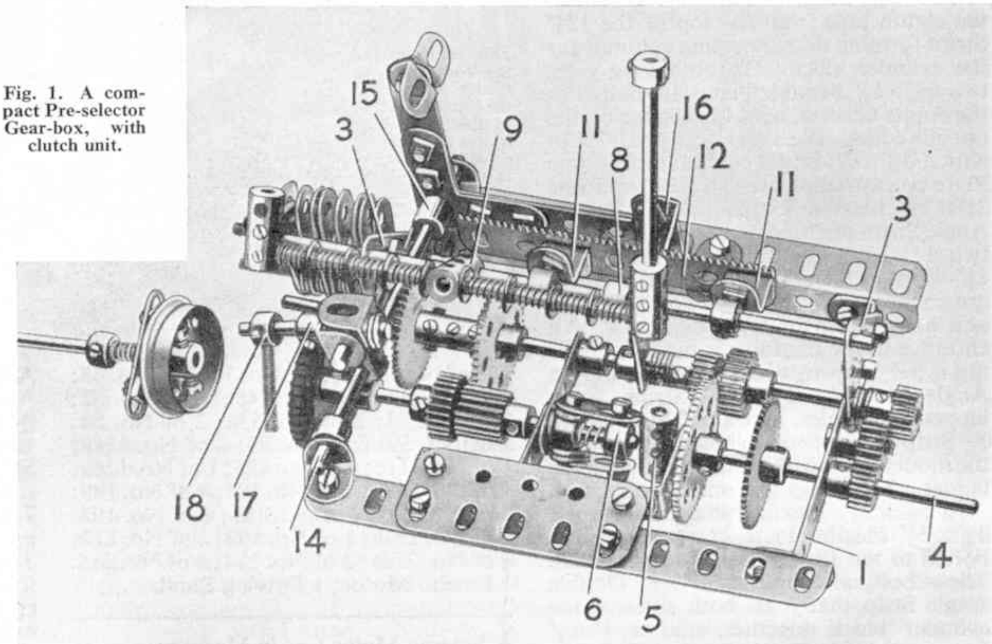

Fig. 1. A compact Pre-selector Gear-box, with clutch unit.

A 6½" Rod is journalled in the upper holes of the 1½" Corner Brackets 3, and it carries Coupling 9, a Collar, Crank 8 and a second Collar. A 3½" Rack Strip 12 has two Reversed Angle Brackets 11 bolted to it, and these are secured in the threaded holes of the Collars by bolts, the securing nuts being tightened up against the Brackets to hold them in place. A Fishplate 13 acts as a support for the Rack Strip.

Reference to Fig. 1 will make clear the construction of the selector. A 4½" Rod 14 carries a Bell Crank 15, which forms the operating pedal. A 3" Strip is fastened to the horizontal arm of the Crank 15, and at its free end it carries 1"×½" Angle Bracket 21 (Fig. 2) arranged so that the shorter arm of the Bracket acts as a stop by making contact with the side member of the gear-box. A ½"×½" Angle Bracket 16 is bolted to the 1"×½" Angle Bracket 21.

The gate is built up on two 2" Screwed Rods fastened one above the other to the left-hand Corner Bracket 3, and 1½" Strips are placed on the Rods and spaced by Washers so that their positions coincide with those of the gears. A large Fork Piece 17 is pivoted on a 1" Rod held in the top hole of a Coupling fixed on Rod 14. An Angle Bracket is fixed to the Coupling by a Bolt and Washers so that it prevents excessive upward movement of the large Fork Piece.

The complete clutch is shown in Fig. 1, and the construction of its components can be seen in Fig. 2.

The operation of the gear-box is as follows. The desired gear is selected by moving the gear lever, when the Compression Springs on one side of the Coupling 9 are compressed. In order to change gear, the foot pedal is depressed so that the Flanged Wheel is withdrawn by the fork 18, thus bringing the ½" Bolts 19 out of engagement with the Bolts on Collar 20. At the same time the Angle Bracket 16 is raised out of engagement with Rack Strip 12, which together with the layshaft slides under the action of the Compression Springs.

Reverse gear is taken through the ½"×½" Pinion and 57-teeth Gear and the three ½" Pinions outside the frame of the

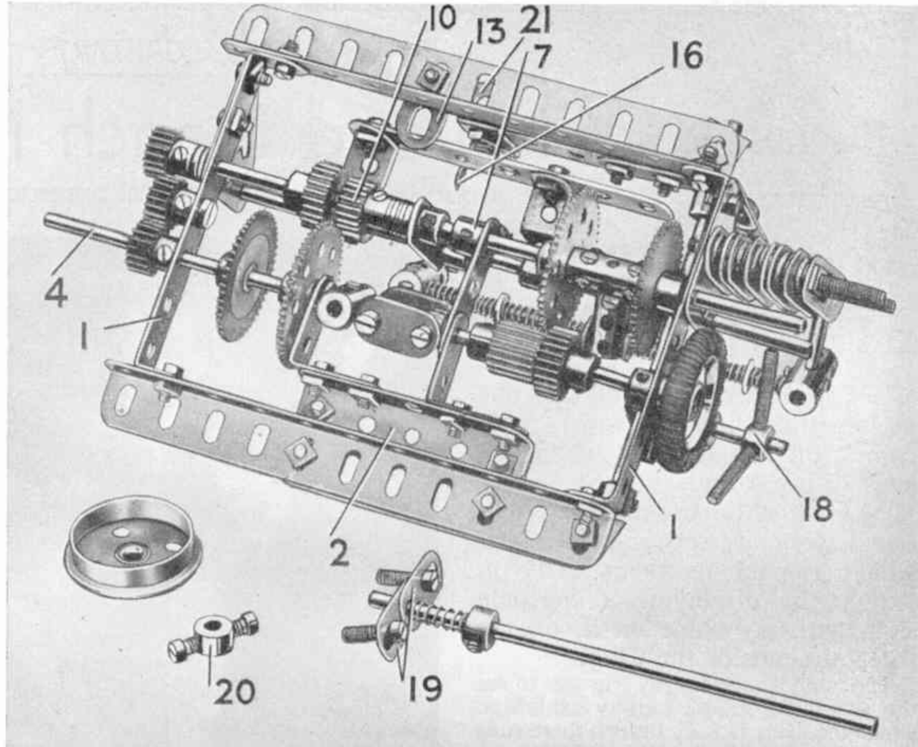

Fig. 2. The Pre-selector Gear-box seen from the underside, with the clutch unit dis-assembled.

gear-box. Bottom gear is provided by the ½″ × ½″ Pinion, 57-teeth Gear, ½″ Pinion 10 and the other 57-teeth gear on Rod 4. Second gear is obtained by meshing the ½″ × ½″ Pinion with the 57-teeth Gear on the layshaft, and the ¾″ Pinion on the layshaft with the 50-teeth Gear on Rod 4. The two sets of ¾″ Pinions and 50-teeth Gears are brought into operation for third gear, and top gear is a direct drive through the dog clutch unit.

The dog clutch unit is brought into operation by Crank 7, which is moved by the 57-teeth Gear fixed on the same shaft when the layshaft is placed in top gear position. When the other gears are in operation the Crank does not come into contact with the 57-teeth Gear.

In order to ensure efficient operation of the gear-box, all moving shafts should be well oiled so that they revolve and slide freely in their bearings. If the layshaft is properly lubricated no trouble will be experienced in operating the various gears, but if the Crank 7 binds on the layshaft the following simple device may be incorporated to overcome the difficulty. An Angle Bracket is fastened to the upper side-member of the gear-box in the fifth hole from the right (Fig. 380a). A 2″ Strip is pivoted to the Angle Bracket by means of a lock-nutted Bolt in its second hole. The longer arm of this Strip is also attached by a Set Screw to the boss of Crank 7, and a nut is screwed up against the boss so that the Set Screw is prevented from locking the Crank to the layshaft. An elastic band is attached to the shorter arm of the Strip and to the bolt holding Fishplate 13.

The Swindon "Kings"—

(Continued from page 387)

Regional locomotive exchange trials of 1948, but only to a limited extent, as loading gauge restrictions precluded its running over L.M.R. and S.R. main lines.

In the meantime, in view of the changed operating conditions as compared with those of the 'thirties, experiments in the form of a departure from the traditionally moderate degree of superheat applied to Swindon designs had been made. In the modified Hall class 4–6–0s of 1944, and in the new Castles of 1946, a greater superheating surface was incorporated and this was followed by an extension of the experiments to include an engine of the King class. A four-row superheater was applied to No. 6022 *King Edward III* and trials against a standard engine of the class were carried out. On the last down journey a train of 14 coaches, or over 500 tons, was taken through to Exeter.

At Swindon, home of these magnificent "Kings", there had for many years, prior to the opening in 1948 of the B.R. establishment at Rugby, been a locomotive-testing plant. Such plants as these provide a ready means for investigation into many points of locomotive design and performance in ideal "laboratory" conditions, and the Swindon plant—still in existence, by the way—has in its time certainly been used to fullest advantage in regard to G.W.R. locomotive design.

This testing equipment had been modernised by the time of the superheater experiments referred to previously. The Swindon authorities felt that stationary plant results should be confirmed by trials on the line, with its varying gradients and weather conditions, and so over the years they developed and perfected the principle and practice of controlled road testing, involving the maintenance of a constant rate of evaporation of water in the boiler of the locomotive. On the Swindon testing plant, boiler and cylinder performance could be established and in road tests these could be associated with running. Data thus obtained formed a sound basis for the preparation of running times.

800-ton test train

After experiments with smoke-box layouts, No. 6017 *King Edward IV* was fitted with modified draughting arrangements in 1952. Previous standard practice at Swindon had incorporated what was known as a jumper ring at the top of the blast pipe. This ring lifted at a pre-determined exhaust pressure and so avoided excessive draught and coal consumption, at the same time placing a limit on the maximum steaming capacity. This was quite in order in the days when first-class coal was readily available, but in view of the indifferent coal liable to be encountered in post-war conditions a plain blast pipe was applied, the idea being to increase maximum steaming capacity.

This series of experiments culminated in the haulage in controlled road test conditions between Reading and Stoke Gifford of a 25-coach train of nearly 800 tons by No. 6001 *King Edward VII* incorporating the modified draughting arrangements. This locomotive appears in our picture on page 387. Boilers incorporating the additional superheating surface and improved draughting became standard for the Kings and, by degrees, double chimneys were added between 1955 and the end of 1958. It is in this form that the Kings illustrated are shown. The double chimney of their later days does not impair their appearance too much, being finished with the traditional copper cap and maintaining a pleasing outline in keeping with the rest of the engine.

The end of an era

In spite of the King's well-proved capacity, the advent of main line diesels was bound to affect a steam class numerically small by Swindon standards, and one of restricted route availability. So, as I conclude, I have to record that by mid-1962 some of the Kings had been condemned. Although these monarchs of the rail are now disappearing from active service, we can be cheered by the fact that the pioneer of the class, a distinguished engine individually, will remain in being as a fitting example of the final expression of Great Western four-cylinder 4–6–0 design.