AMONG THE MODEL-BUILDERS

with 'Spanner'

MR Bert Halliday is no stranger to the pages of Meccano Magazine, and his latest contribution concerns the description of two alternative units, usable in conjunction with the Counting Device featured in the April 1978 M.M. These units are of particular value in indicating the number of revolutions of a Meccanograph designing table.

Counting Device Units

'THE Counting Device as orginally described in the April 1978 M.M., has one slight drawback in that it has to be re-set after the completion of a specified number of revs. However, there are two alternative methods of obtaining equally-spaced pointers, or 'trips', so that the following one registers the same number of revs. as its predecessor. To those fortunate enough to possess the now obsolete 56T. Gear Wheel, it is possible to indicate, either, 7; 14; 21; 35; 42 and 49 revs, without re-setting the indicating pointer, or 'trip', each time.

If you should require only, 14; 28 or 42 revs, then to an 8-hole Wheel Disc, bolt two Threaded Bosses by their longitudinal bores, diametrically opposite, and with the transverse bores in line. Into these bores, a Bolt can be screwed as required, to act as a pointer, or 'trip'. Bolt this arrangement to the 56T Gear Wheel; spacing it by Washers for Bolt head clearance, using two more Threaded Bosses as 'nuts', and arranging their transverse bores in line as previously described, and so you have four Threaded Bosses spaced one hole apart, round the Wheel Disc.

You then have four equally-spaced pointers, or 'trips' with the following pointer indicating the same number of revs as its predecessor. One pointer indicates 14 revs., two successive ones, 28 revs., and three, 42 revs. With eight pointers, or 'trips', fitted to the Wheel Disc, each will indicate 7 revs—an arrangement that might be useful to Meccano clock makers, to indicate the passing of a week. The 56T. Gear Wheel will mesh with the Worm at standard spacing, but the 8-hole Wheel Disc must be used for anchoring the pointers, as the Gear Wheel itself was endowed with only two diametrically opposite holes, in the original designing.

To obtain a continuous indication for 20 revs. bolt three Threaded Bosses one hole apart, to a 6-hole Wheel Disc, and bolt this to a 60T. Gear Wheel, in the manner already described in respect of the 56T. ditto. The 60T. Gear Wheel can be arranged to be driven from the Worm, without any alteration to the setting-up of the original mechanism, by setting this Gear Wheel offset to the centre-line of the Worm, and this will be found to work quite efficiently. To Meccano clock makers, a compact striking mechanism is possible, by fitting four pointers, or 'trips' to the Gear Wheel itself; so providing for the four quarters.

With the appropriate number of pointers, or 'trips', fitted to either a 6-hole Wheel Disc, or the Gear Wheel itself, this unit can be made to indicate, either, 10; 15; 20; 30; 40; 45 and 50 intermediate revs.

Finally, as the 60T. Gear Wheel used in this manner, is offset to the Worm's centre-line, it includes the slightly mind-boggling possibility, of arranging no fewer than four such Gear Wheels, so they are driven from a single Worm! And they could all be on separate shafts, to boot!'

MR. Brian W. Smith of Beacon Hill, Surrey, has designed this unusual three speed automatic gearbox, especially suitable for use in Meccano models of Vehicles, various types of small chassis etc. In my experience, gearboxes capable of changing gear automatically are far less common than the standard 'manual' type, as far as Meccano modelling is concerned, and are therefore of potentially greater interest.

MECCANO THREE SPEED 'AUTOMATIC' GEARBOX

THIS gear-box has been designed, (writes Mr. Smith), to work with constant speed electronic motors rather than relying upon centrifugal forces of varying speed input, it is therefore most suitable for use with the currently available 12 volt six gear electric motor.

FRAMEWORK

The simple framwork is made up from two Perforated Strips, (or the Chassis of a vehicle construction) at least 9½" long, connected in a parallel manner by four 3½" x ½" Double Angle Strips at the first, tenth, sixteenth and nineteenth holes. On to the first and third holes of one of the Strips, a Double Bent Strip is bolted on the inside of the frame. A Fishplate in sandwiched between the Double Bent Strip and the frame Strip at the third hole to act as a spacer and thus ensure that the Double Bent Strip is kept in parallel alignment with the frame.

INPUT AND TORQUE SENSING SHAFT

A 19t Pinion and a 50t Contrate Gear are fitted at each end of two Socket Couplings taking great care to line the Grub Screw holes up with the recess in the Socket Coupling, this will allow subsequent oiling, necessary because these assemblies are free to turn on the Axle Rod and carry some significant loads. Two 19t Pinions are connected to a 5" Axle Rod by Pivot Bolts screwed firmly into a Collar, the Pinions being free to rotate on the Pivot Bolts.

The two Socket Coupling assemblies are now placed on the 5" Axle Rod with the Contrates meshing with the foregoing Pinions. Place a Washer at each end of the Rod. Next, fit a Collar on to the forward end of the Rod, placed so that it holds the Socket Coupling assembly Contrate in mesh with the Pinions. The rear Socket Coupling assembly is held in mesh by passing the Axle Rod through the centre hole of crossmember 'B'.

A further Collar is fitted to the front end of the 5" Rod, followed by a Washer and a further 19t Pinion free to turn, another Washer, and the front end of the Rod is inserted through the centre hole of crossmember 'A'.

LAY SHAFT

The lay shaft is a 4" Axle Rod carrying 15t, 19t and 25t Pinions. This is fitted to the third holes from the left of crossmembers 'B' and 'C', the exact positioning of the Pinions is adjusted later. A further 19t Pinion with the bush forward, plus a Washer, are fitted to the Rod forward of crossmember 'B'. The layshaft is retained in position by a Washer and Collar to the rear of crossmember 'C'.

TORQUE TRANSFER SHAFT

This is a 1½" Axle Rod passed through the frame and Double Bent Strip, to the inside end of which are fitted a Washer, a Crank and a 50t Contrate Grear. The crank is fixed so that it holds the 50t Contrate in mesh with the two 19t Pinions at the forward end of the input and torque sensing shaft.

A 2½" Narrow Strip, pivotted through an end hole by a Bolt lock-nutted to the slot of the Crank, has it's other end hole pivotted to an End Bearing, which in turn is fitted to a 2" Axle Rod inserted into the second hole from the right of crossmember 'B'. The other end of the 2" Rod carries a Coupling in transverse position through on of it's end holes and this forms the sliding link to the sliding shaft.

SLIDING SHAFT

This is a 5" Axle Rod, fitted in the following sequence; third hole from right of crossmember 'B', fixed-Collar, Washer, other end of sliding link Coupling, Washer, 60t Gear, 57t Gear, 50t Gear, (bush to rear), 3 spacing Washers, third hole from right of crossmember 'C', Washer, Compression Spring, Washer, Compression Spring, Washer, and 19t Pinion. The position of this 19t Pinion provides adjustment for the gear changes by adding to or reducing, the tension of the Springs.

The position of the Gears, together with the Pinions on the lay shaft, is critical. The principle being that normally third gear is engaged, (25t Pinion and 50t Gear), but by sliding the shaft forward, second gear must just engage third gear disengages, and similarly first gear just prior to second disengagement.

OUTPUT SHAFT

This is a 3" Axle Rod journalled through the centre holes of crossmembers 'C' and 'D' and held in position by Washers and Collars fitted inside the crossmembers. This Axle Rod carries a 3/4" face 19t Pinion, positioned so that it remains in mesh with the 19t Pinion at the end of the sliding shaft regardless of the gear ratio selected. At the rear end a suitable power take-off, i.e. a Universal Coupling, is provided.

OPERATION

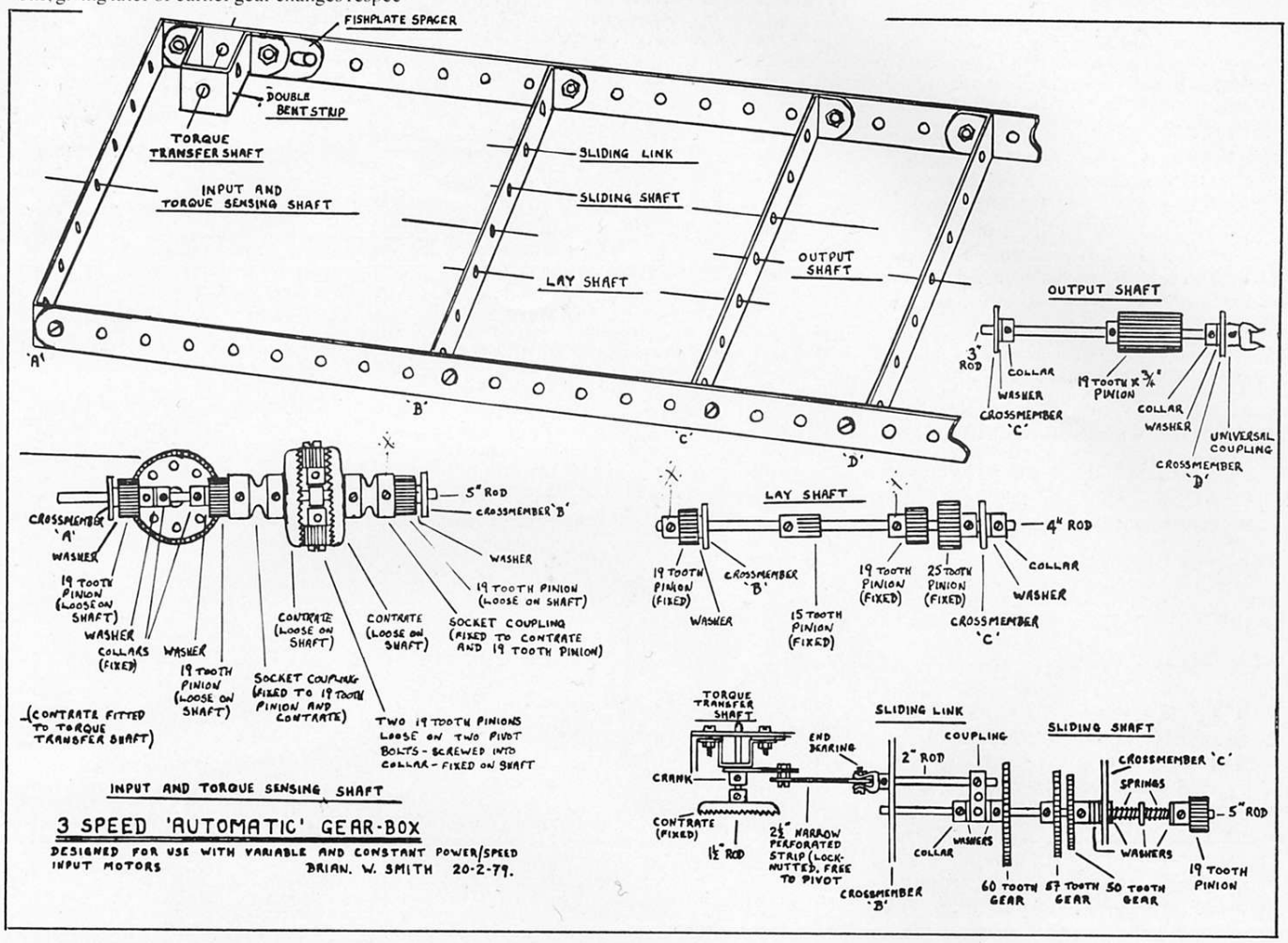
When power is applied through the input shaft, the transverse 19t Pinions on the Pivot Bolts transfer the energy to both 50t Contrates equally. However, the forward Contrate assembly is not free to rotate, being held in position by the tension of the Compression Springs via the sliding shaft and the torque transfer shaft, thus all the energy is transmitted to the rearward Contrate assembly and from there through the lay shaft, sliding shaft and finally the output shaft.

However, if the output shaft experiences any resistance, i.e. the vehicle encounters an upward slope, some of the input shaft energy is diverted to the forward Contrate assembly and thus to the torque transfer shaft which operates by turning and pulling the sliding link forward. This engages the next gear in line, and the next, until the spring tension equals the resistance being experienced by the output shaft. As load on the output shaft decreases the tension of the Compression Springs will return the sliding shaft to a higher gear ratio.

Several adjustments are available apart from

spring tension. These are: the position of the lock-nutted Bolt on the Crank slot, the substitution of the Crank by a Double Arm Crank, this will give earlier gear changes. The two 19t Pinions on the forward end of the input shaft can be replaced by either larger or smaller Pinions, giving later or earlier gear changes respectively. The Compression Springs can be added to, and the power take off can be geared. Any of these modifications or combinations of them will enable the basic design to be satisfactoriy installed to suit most models, particularly where power rather than speed is required'.

To complete these notes on constructing the gearbox, Mr. Smith points out that all Grub Scews marked 'X' in his diagram need to be flush with their bosses and not protruding. The Meccano 7/64th' Grub Screw Part 69c will be found suitable for this purpose.



BENNETT MECHANISM, OR SKEW ISOGRAM

'A mechanism for which no application can be found'. That is the astounding claim made by Steve Tonkin of Bristol, in referring to his model of Bennett's Mechanism. Can an application be found? Construct it for yourself and see! The description below has been supplied by Mr. Tonkin, with photographs kindly supplied by Alan Partridge.

'When I was a schoolboy, more years ago than I care to remember, we had a lecture one evening on 'three-dimensional mechanisms'. Very intrigued by one item described I afterwards made up what I thought it was from Meccano, and showed it to the lecturer. He pointed out that I had got it all wrong, and mutilated the parts with a pair of pliers, after which it worked very smoothly indeed. The experience was a little traumatic but the mechanism was imprinted on my memory and I resolved to make use of it in later life if I could.

In thirty years of working on aircraft, missiles & spacecraft I have never seen it used, or been able to use it myself, although a colleague thought he once saw it in the steering gear of a toy steam roller. It looks as though there ought to be a use for it in control runs in aircraft, but aircraft draughtsmen are understandably cautious and difficult to convince'.

Construction of the demonstration mechanism, (writes 'Spanner'), is probably the easiest

Fig 1: A general view of the mechanism described by Mr. Tonkin. It was originally published in an article by G.T. Bennett in 'Engineering' magazine for the 4th December 1903.

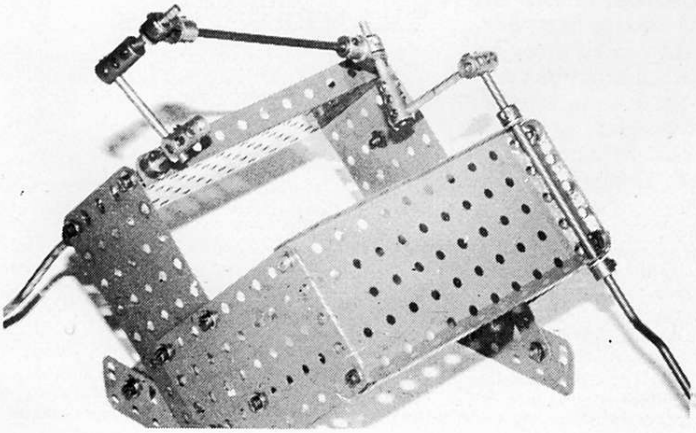
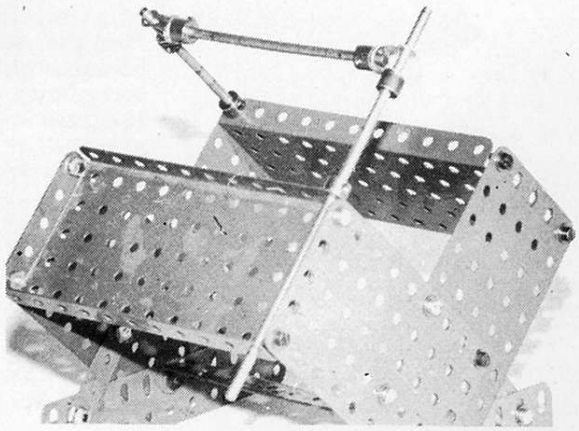



Fig. 2: Recommended method of adjusting the link-rod.