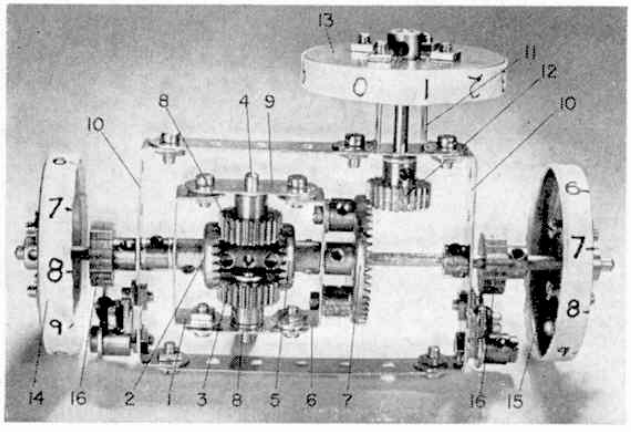


Generally regarded as a motor chassis mechanism, the common differential can be put to other uses—such as to form the simple Adding Machine shown here !

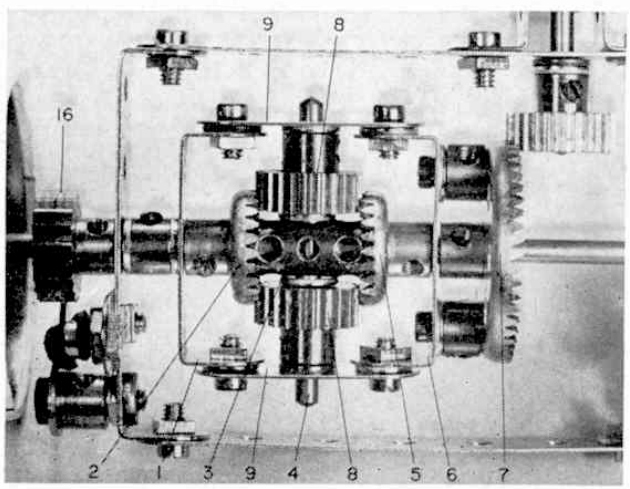
AMONG THE MODEL BUILDERS

with 'Spanner'

SIMPLE ADDING MACHINE

WORKING ON THE ASSOCIATION of ideas principle, if I was to say, "Differential", I feel quite sure that just about every Meccano modeller in earshot would answer, "Motor Chassis", and this would be perfectly understandable. The differential, after all, is generally looked on as being a motor chassis mechanism. Such is not its *only* use, however, and in fact, Bob Hauton of Lincoln has put a standard differential to an entirely different and, I might add, an extremely novel use—as a simple Adding Machine. This is described below, and the amazing thing about it is that the diff. is not just a component part of a complicated machine—it is, itself, practically the whole machine !

Construction varies little from a typical Meccano differential. A $2\frac{1}{2}$ in. Rod, fitted with a $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 1 and a fixed $\frac{3}{4}$ in. Contrate Wheel 2, is inserted, free, part-way into the longitudinal bore of a Coupling 3, in the centre transverse bore of which a 2 in. Rod 4 is secured. Mounted, free, in the remaining part of the longitudinal bore of the Coupling is a 4 in. Rod, this also being fitted with a fixed $\frac{3}{4}$ in. Contrate Wheel 5 and a $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 6. Attached to this Double Angle Strip, but spaced from it by a Washer and a Collar on the shank of each securing $\frac{1}{2}$ in. Bolt, is a $1\frac{1}{2}$ in. Contrate Wheel 7. Mounted loose, one on each end of Rod 4, are two $\frac{3}{4}$ in. Pinions 8, each being spaced from Coupling 3 by a Washer, and both meshing with Contrates 2 and 5. Another Washer spaces each Pinion from a $1\frac{1}{2}$ in. Strip 9 bolted between the nearby lugs of Double Angle Strips 1 and 6, but spaced from the lugs by a Washer on the shank of each securing Bolt.



A close-up view of the actual differential mechanism included in the Adding Machine, showing its straightforward construction.

The complete assembly is now held by Collars in a simple framework supplied by two $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 10, connected by two $3\frac{1}{2}$ in. Strips, one of the securing Bolts helping to fix a Double Bent Strip 11 to one of the $3\frac{1}{2}$ in. Strips. Journalled in this Double Bent Strip and in the $3\frac{1}{2}$ in. Strip is a 2 in. Rod held in place by a Collar and a $\frac{3}{4}$ in. Pinion 12, the latter spaced from the Strip by two Washers. Fixed on the outside end of the Rod is an 8-hole Bush Wheel, to which a Wheel Flange 13 is bolted. Another two Bush Wheel/Wheel Flange arrangements 14 and 15 are also mounted, one on the $2\frac{1}{2}$ in. Rod and one on the 4 in. Rod, both these Rods first being fitted with a Ratchet Wheel 16. Engaging with each of these Ratchets is a Pawl on a Pivot Bolt held by Nuts in respective Double Angle Strip 10. The Pawl is held against the Ratchet by a $2\frac{1}{2}$ in. Driving Band, looped over a Bolt fixed in the free hole of a Fishplate bolted to the Double Angle Strip.

All that now remains to be done is to stick strips of tape or paper to the flange of each Wheel Flange 13, 14 and 15 and to mark them up with numbers. (I marked my examples from 0 to 9.) The sum of any two correspondingly-placed numbers on Wheel Flanges 14 and 15 should be shown on Wheel Flange 13, there-

fore Wheel Flange 13 should be marked last and the best way of calibrating it is to first set Flanges 14 and 15 at "O" and to mark "O" on Flange 13. Then, holding Flange 14 stationary, all the time, turn Flange 15 to "1" and mark "1" on Flange 13, then turn Flange 15 to "2" and mark "2" and so on, until all the numbers have been dealt with. When the machine is being used only one Wheel Flange 14 or 15 should be moved at a time, the other being held stationary while this is being done.

The machine is, of course, extremely basic in design, but it is nonetheless ideal for youngsters, keeping them amused for hours—if Mr. Hauton's two children are anything to go by. Consequently, it should appeal particularly to harassed parents!

PARTS REQUIRED

2—3	3—24	25—37b	1—63
2—6a	3—25	9—38	2—64
1—15b	1—28	1—45	1—63
2—17	2—29	2—48a	3—137
2—10	31—37a	5—59	2—147c
			2—148
			2—186

Two Quickies

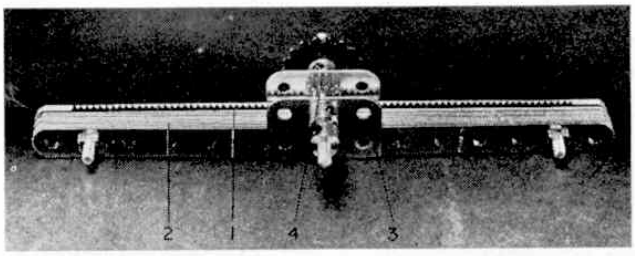
Moving on quickly, now, Pat Lewis of Formby, Lancs, has supplied me with a couple of small, but very efficient mechanisms which could prove particularly useful under appropriate circumstances—a Rack and Pinion Unit and a Safety Clutch. The former is extremely robust and ideal for heavy-duty use, consisting of a Rack Strip 1 packed between the second and third Strips in a "block" of ten 7½ in. Strips 2, firmly bolted together. Sliding on this block is a Channel Bearing 3, in the upper centre hole of which a 2½ in. Rod is journalled, this Rod carrying a $\frac{7}{16}$ in. Pinion 4 between the flanges of the Bearing to engage with the teeth of the Rack Strip. The Pinion is secured by a 7/64 in. Grub Screw. In the demonstration unit illustrated, the Rod is held in place by a 1 in. Sprocket Wheel and a Collar, the Sprocket receiving the movement drive, but under operating conditions, the drive would, of course, depend on the requirements of the parent model.

PARTS REQUIRED

10—1b	1—26c	1—59	1—110a
1—16a	2—37a	1—96	2—111
			1—160

In the case of the Safety Clutch, a demonstration mounting is built up from a 2½ × 1½ in. Flanged Plate, to the flanges of which two Flat Trunnions are bolted. Journalled in the apex holes of these Flat Trunnions is a 3 in. Rod, held in place by Collars and carrying a 57-teeth Gear Wheel 1, a Socket Coupling 2, a Cord Anchoring Spring 3 and another Collar 4. Gear Wheel 1 is free on the Rod, but is fixed in one end of the Socket Coupling, while the Cord Anchoring Spring is positioned in the other end of the Socket Coupling, being arranged so that the "eye" of the Spring projects into the large slot in that end of the Coupling. Collar 4 is positioned against the Cord Anchoring Spring to hold it in place on the Rod. A ½ in. Pinion 5 is fixed on the end of the Rod to transmit the drive, Gear Wheel 1 serving as the input point.

With the mechanism built up, its operation becomes



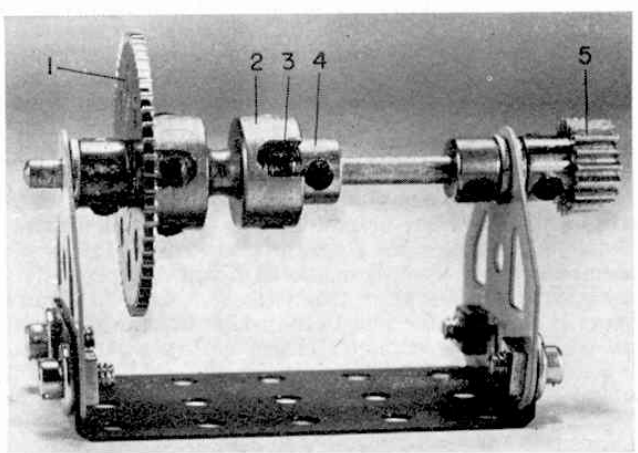
A positive-acting Rack and Pinion mechanism ideal for heavy-duty work, designed by Pat Lewis of Formby, Lancs.

evident. When a Cord Anchoring Spring on a Rod is turned in one direction, its coils will tend to tighten on the Rod, gripping the Rod hard to prevent slip, but when it is turned in the opposite direction, the coils will tend to unwind, loosening the Spring's grip on the Rod and allowing it to slip. Applying this to the mechanism, when Gear Wheel 1 is turned, the Slot in Socket Coupling 2 catches the eye of Cord Anchoring Spring 3, causing the Rod to turn. Provided the movement is in the appropriate direction, therefore, the spring will tend to unwind, and slip, when sufficient friction is placed on the Rod, thus acting as a safety device to prevent damage from unloading. It is important to remember, though, that the movement must be in the right direction, as, if in the wrong direction, the Spring will tend to tighten on the Rod, preventing the "clutch" from slipping. This does away with the safety clutch characteristics, but instead turns the unit into a form of ratchet mechanism which will grip when turned in one direction and slip when turned in the other. Whether used as a clutch or a ratchet, however, the friction required to cause slip is fairly substantial, therefore, the mechanism can be used with reasonably heavy loads before slip will occur. Another useful point is that the mechanism is reversible, i.e., Gear Wheel 1 can be used either for input or output purposes, making the mechanism an extremely versatile unit, indeed.

continued on page 466

PARTS REQUIRED

1—16a	4—37a	1—51	1—171
1—26	4—37b	3—59	1—176
1—27a	7—38	2—126a	



Another of Pat Lewis's ideas—and one which we believe to be completely new—is this Safety Clutch which will also double-up as a ratchet-type mechanism.