MODEL OF THE MONTH

Adding Machine

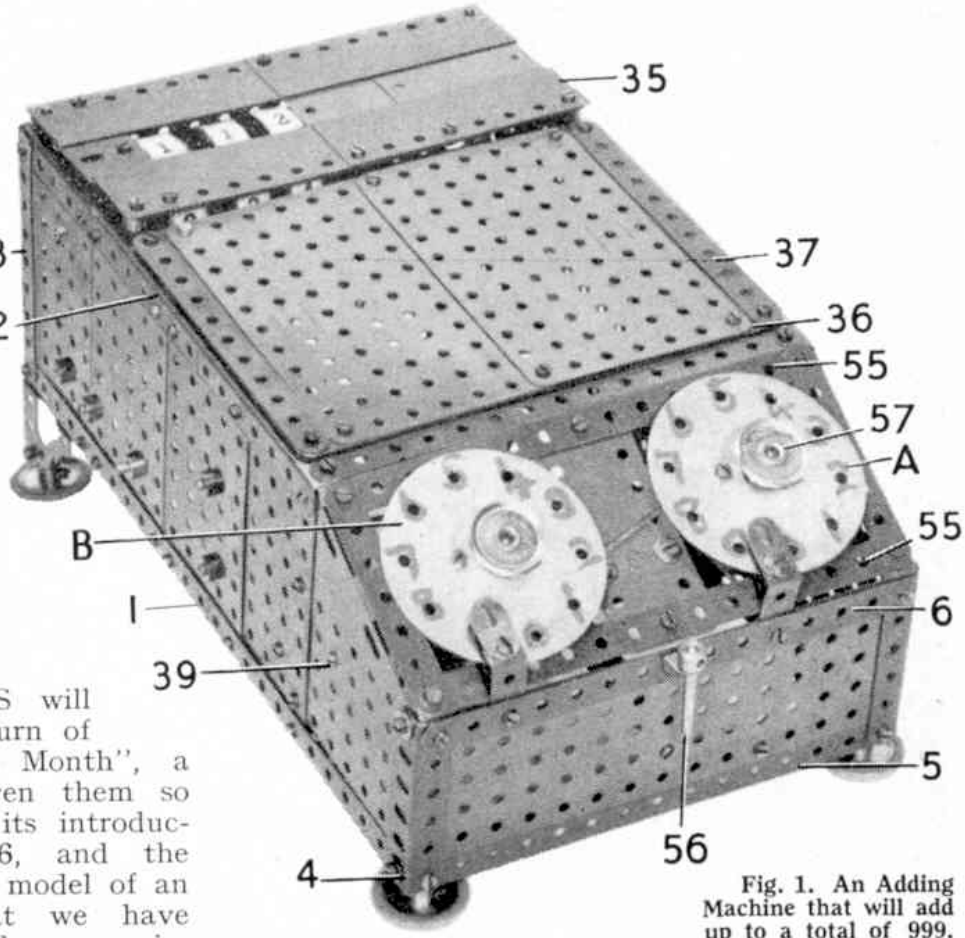

Fig. 1. An Adding Machine that will add up to a total of 999.

MODEL-BUILDERS will welcome the return of the "Model of the Month", a feature that has given them so much pleasure since its introduction in March 1956, and the splendid and unusual model of an adding machine that we have chosen as the first of the new series will be of outstanding interest. This is fully illustrated in the accompanying pictures.

As usual, constructional details for building the model, together with a list of the parts required are available for readers, free of charge apart from postage. To get them just write to the Editor, *Meccano Magazine*, Binns Road, Liverpool 13, enclosing a 2d. stamp. Readers living in

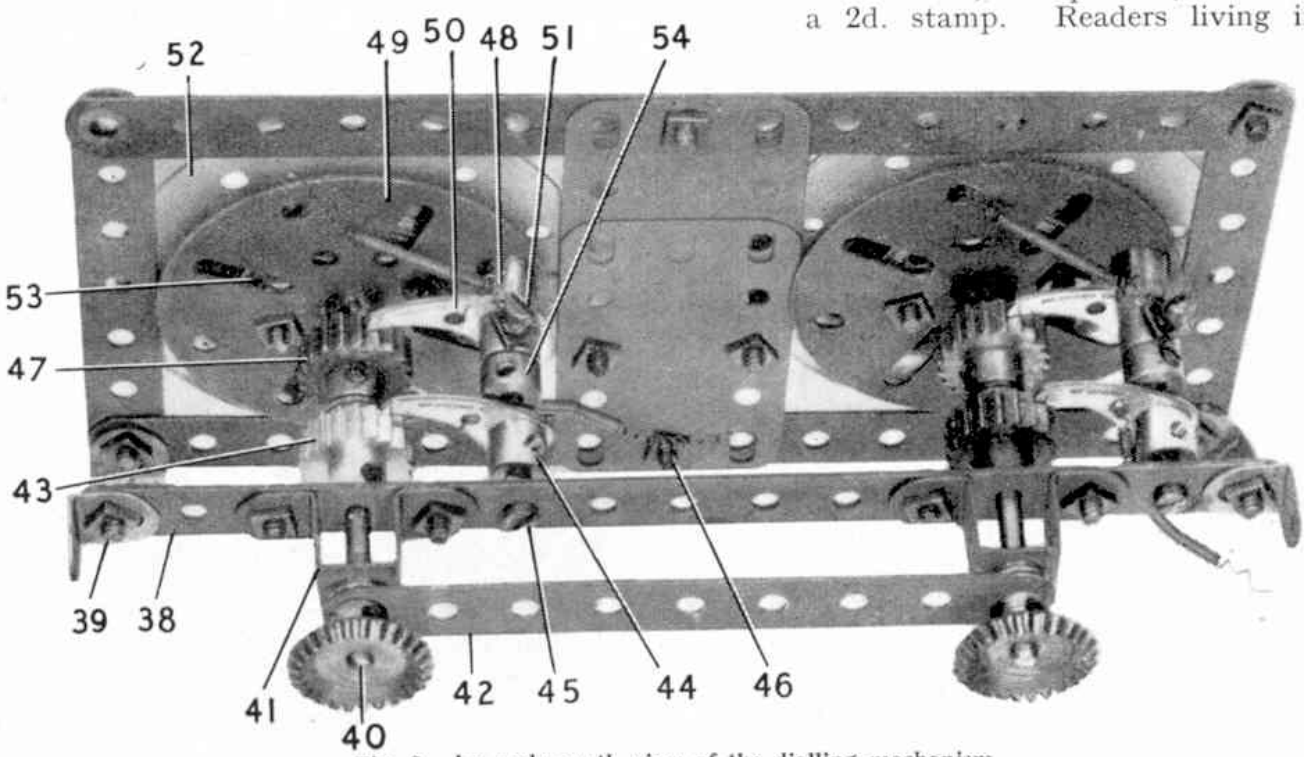

Fig. 2. An underneath view of the dialling mechanism.

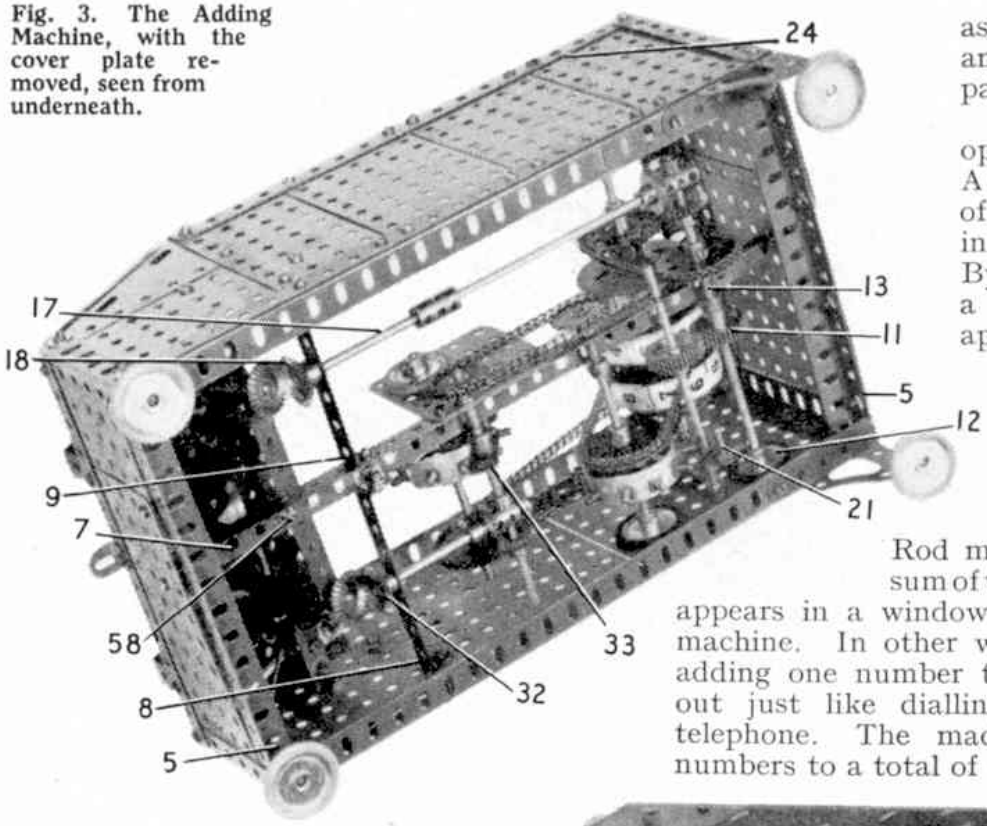

Fig. 3. The Adding Machine, with the cover plate removed, seen from underneath.

assortment of gears and other mechanical parts.

The machine has two operating dials, marked A and B in Fig. 1. Each of these has ten holes in it, numbered 0 to 9. By placing the end of a short Rod in the appropriate hole, first in the right-hand dial, and then in the left-hand one, and in each case pulling the dials around until the Rod meets a dial stop, the sum of the numbers "dialled" appears in a window at the head of the machine. In other words, the process of adding one number to another is carried out just like dialling on an automatic telephone. The machine will add any numbers to a total of 999.

Canada, Australia, New Zealand, South Africa, Ceylon, Italy, Rhodesia and the United States of America, should write to our main agents in those countries for their copies of the current Model of the Month instructions, also, of course, enclosing suitable stamps for postage. Write at once and make sure of your copies.

For the information of new readers, the Model of the Month series deals with models of a more advanced and elaborate type. Several large sectional illustrations are needed to show their construction clearly, and as the space available does not permit us to include both illustrations and constructional details of the model, the latter are published separately.

The Adding Machine that forms the subject for this month's model represents a very interesting aspect of model-building and should appeal strongly to those model-builders who possess a good

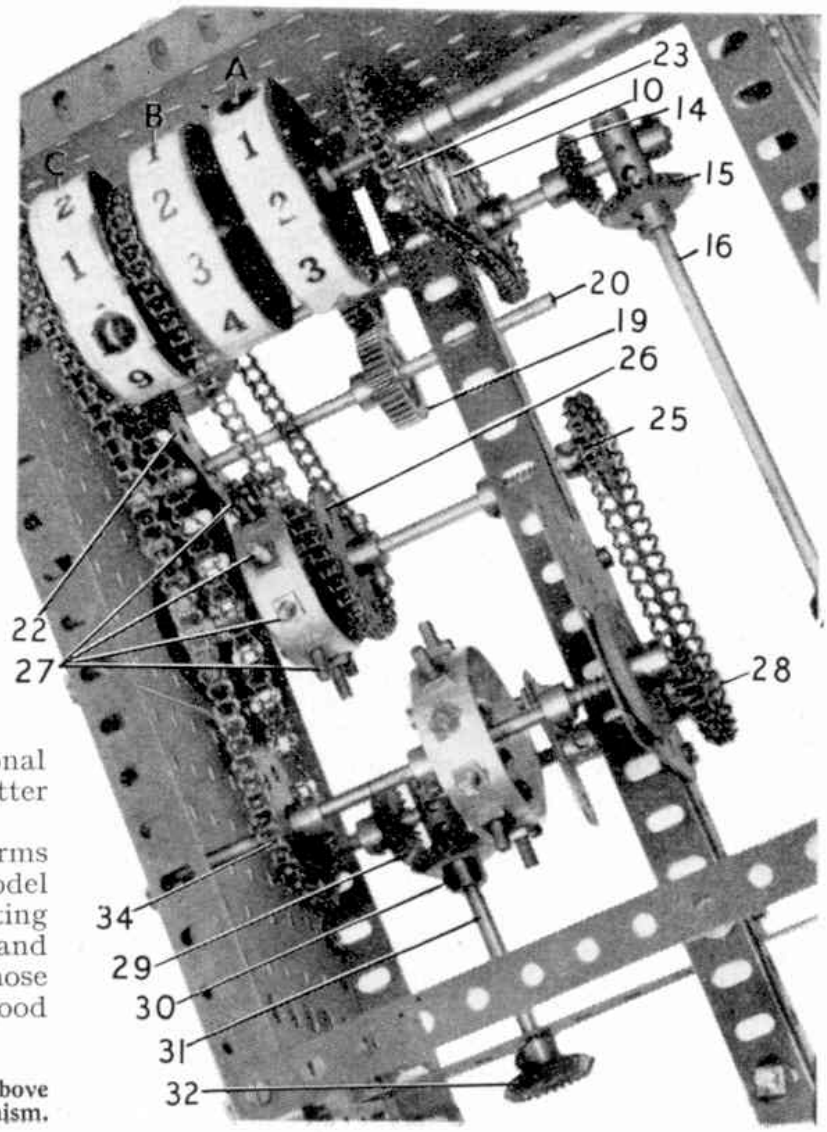

Fig. 4. The Adding Machine seen from above after removal of the dialling mechanism.

MODEL OF THE MONTH

ADDING MACHINE

Illustrated in the Meccano Magazine, 1958. (November)

The Casing

Build two similar sides, each consisting of one 12½" (1) one 9½" (2), one 4½" (3), and one 3" Angle Girder, filled in with five 4½" x 2½" Flat Plates, and a 3" x 2" Flexible Triangular Plate. The two sides are then joined together with three 7½" Angle Girders 5, and a 7½" Strip 6. 4½" x 2½" Flat Plates fill in the back, whilst two 5½" x 2½" Flat Plates are bolted to the front. Bolt a 12½" Angle Girder 7 to the end Flat Plates by Angle Brackets and two 3½" x ½" Double Angle Strips 8 and 9 to the Angle Girder and side Plates. Four 1" Pulley Wheels with Rubber Rings, are attached to the base with ⅜" Bolts and Flanged Brackets.

The Adding Mechanism.

On a 6½" Rod secure a 1½" Sprocket Wheel 10, a 1" Gear Wheel 11 and a 1" Pulley Wheel with Rubber Ring 12. The Rubber Ring should press lightly against the Flat Plate, with a Compression Spring and Collar 13, acting as a brake. A Bevel Wheel 14 drives another Bevel Wheel 15 mounted on a 5" Rod 16 coupled to a 2½" Rod 17 on which is secured a Bevel Wheel 18. The 1" Gear Wheel 11 drives a similar Wheel 19 on a 5" Rod 20. Fasten a Threaded Pin 21 in the elongated hole of a Double Arm Crank secured to Rod 20.

On the rims of three Boiler Ends marked "A", "B", and "C" in the illustrations, stick a 6½" x ½" strip of white paper, marked into ten equal divisions, each approx. 6/10" in length. Obtain from an old calendar the numbers 0 to 10, and stick one in each space. Cover with a length of transparent cellotape.

Two ¾" Bolts, with three Nuts hold each Boiler End to a 1½" Sprocket Wheel one of which is seen at 23 placed loosely on an 8" Rod 24, Collars being used to keep it in position. The Sprocket Wheels 10 and 23 are connected by a Chain.

Two more Boiler Ends are treated similarly, and placed on Rod 24, and spaced apart with Collars. It should be noted that the numbers on Boiler End "C" run the opposite way to those on Boiler Ends "A" and "B". The next thing is to build up two units as follows:- Take a 5½" Strip and bend it into a circle overlapping the ends one hole, around a 1½" diameter broom handle. At the joint and also diagonally opposite, a ½" Bolt with a Washer secures an Angle Bracket, to which is bolted a Bush Wheel. In the remaining holes in the Strip, six ⅜" Bolts are placed, with the edges of the Nuts square with the edges of the Strip. Place one of these units on a 5" Rod 25, together with a 1½" Sprocket Wheel 26, a 1" Pulley

with Rubber Ring, a Compression Spring and Collar. Connect the Sprocket Wheel 26 to the Sprocket Wheel on Boiler End "B" which must be set so that the Threaded Pin 21 strikes one of the Bolts 27 as the number from 9 to 0 is changing on Boiler End "A". A 1" Sprocket Wheel is fixed on a 5" Rod 28, on which is also fastened a Double Arm Crank 33 fitted with a Threaded Pin, and a Bevel Wheel 29. A Bevel Wheel 30 on a 2½" Rod 31 engages with Bevel Wheel 29.

The intermittent drive from the Double Arm Crank 33 to the built-up unit is similar to the drive on shaft 20 and 25. The 1½" Sprocket Wheel 34 is connected by Sprocket Chain with the Sprocket of Boiler End "C".

The Operating Dial Units

A 7½" Strip 38 is attached to the sides of the casing by Angle Brackets and ¾" Bolts 39 on each side. Two Double Bent Strips are bolted to the 7½" Strip 38 and a ½" Bolt 58 holds a 4½" Strip 42.

The operating dials are similar to each other so that a description of one of them will suffice. Each is constructed by securing a Bevel Wheel to a 3½" Rod 40, placed through the Double Bent Strip 41, the 4½" Strip 42 and two Washers. A Ratchet Wheel 43 is fixed to the Rod. A Pawl 44 is pivoted on a ¾" Bolt 45 and a piece of Spring Cord keeps it engaged with the Ratchet Wheel. Another Ratchet Wheel 47 is fastened in position, four Washers being used to space it from the Ratchet Wheel 43. A disc. 3" diameter, cut from stout cardboard or sheet tin has ten equi-distant 3/16" holes pierced in it 1¼" from the centre, and two holes ½" from the centre, diagonally opposite. The centre hole is ⅜" diameter.

The disc 52 is bolted to the Face Plate 49 with the 1½" Pulley 53 between them, care being taken not to damage the elastic band with the rim of the Pulley Wheel. To the 1½" Pulley Wheel, tie a piece of thin elastic (A Driving Band will do) through one of its outside holes, nearest the centre of the machine, to the 1½" Pulley Wheel on the other dial. The rubber band should keep in the groove when the dial is turned, and pull it back to the stop bolt 45. Bolt an Adaptor for Screwed Rod 48 to a Face Plate 49. Fix a Pawl 50 in position with a Collar. A nut and bolt 51 has a piece of Spring Cord attached, the other end being anchored to the Face Plate.

The number "0" on the dial should be arranged to be in the front centre position when the Collar 54 is against the stop bolt 45. The Face Plate is free on the shaft 40, the Pawl 50 transmitting the movement to the shaft. The Pawl 50 should move two teeth over the Ratchet Wheel 47 for every single number movement of the dial (e.g. over four teeth when number 2

is dialled and over 14 teeth when number 7 is dialled) The Pawl 44 locks the Ratchet Wheel 43 immediately behind the tooth.

A frame formed by 7½" Strips 55 and two 3½" Strips is attached to the main casing with Obtuse Angle Brackets. Two 2½" x 1½" Flexible Plates are joined together across the Strips 55. Dial Stops, each consisting of a Fishplate bolted to a 1" x ½" Angle Bracket are attached to the 7½" Strip 6.

Dialling is done by placing the end of a short Rod in the appropriate numbered hole in the dials and pulling the dial around until the rod hits the dial stop, just like dialling on an automatic telephone.

A 1½" Rod fitted with a Collar for a knob, makes a suitable dialling tone and can be kept in a holder at the front of the machine as shown at 56 in the general view illustration of the model.

A 1" Pulley Wheel 57, fixed to Rod 40 can be used to turn the Boiler End "A" back to zero. NOTE. Should the Boiler End "A" be in 8, 9, 0, position the dial operating Boiler End "B" must not be turned. For example, if the number 138 is registered on the Boiler Ends and 26 is required to be added on, the 6 must be dialled first on "A", followed by the 2 on "B".

The Casing Covers.

A cover Plate 35 (see general view illustration) is built by bolting two pairs of Windmill Sails to two 7½" Strips. These are joined together with two 3½" x 2½" Flexible Plates and a 3½" Flat Girder. Four Collars space the cover from the 9½" Angle Girders 2 of the Casing.

A rectangle frame is made from two 7½" Strips 36 and two 5½" Strips 37, using ⅜" Bolts. Two 5½" x 3½" Flat Plates are bolted between the Strips 36 to form a detachable cover plate.

Parts required to build the Adding Machine.

9	of	No.	1b	9	of	No.	22	2 of No. 96
4	"	"	2	2	"	"	24	1 " " 103d
1	"	"	2a	8	"	"	30	2 " " 109
2	"	"	3	2	"	"	31	4 " " 111
3	"	"	8	154	"	"	37a	7 " " 111a
2	"	"	8a	111	"	"	37b	34 " " 111c
3	"	"	8b	46	"	"	38	2 " " 115
2	"	"	9a	2	"	"	45	3 " " 120b
2	"	"	9c	2	"	"	48b	1 " " 139a
2	"	"	10	2	"	"	52a	1 " " 139b
12	"	"	12	13	"	"	53a	4 " " 147a
2	"	"	12b	6	"	"	58	4 " " 148
4	"	"	12c	24	"	"	59	7 " " 155
1	"	"	13a	4	"	"	61	3 " " 162a
1	"	"	14	2	"	"	62b	2 " " 173a
5	"	"	15	3	"	"	63	2 " " 188
2	"	"	16	2	"	"	70	2 " " 190a
2	"	"	16a	1	"	"	72	2 " " 225
1	"	"	18a	2	"	"	94	1 E20R(S) Motor
2	"	"	21	6	"	"	95a	1 Length of Elastic

Two tin or cardboard discs.