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Index at Acceptance :—**Class 106(i)**, B2e2b2c.

COMPLETE SPECIFICATION.

Calculating Machine.

I, CURT HERZSTARK, an Austrian Citizen, of Mauren, Liechtenstein, formerly of Linke Wieyeile 274, Vienna XIII, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

The invention relates to a calculating machine for all four arithmetical rules, having a small size, in which the numeral drums and the associated transmission members of the result totalising mechanism and of the revolution counting mechanism are arranged in a circle around a common driving member (for example a stepped tooth drum).

It is an object of the invention to house the members of the totalising and revolution-counting mechanisms so as to occupy the minimum space, thereby providing a machine which can be carried in the pocket. Preferably it is of circular form and the structural components are as simple as possible and occupy the minimum space and moreover they may be easily assembled.

In order to attain these objects, the numeral drums and associated actuating mechanism appertaining both to the totalising counter and to the revolution counter, are arranged in circles around a driving element common to them, and the arrangement is characterised in that the numeral drums and the actuating elements of the totalising counter are arranged in one group and the numeral drums and actuating elements of the revolution counter are arranged in another group, the groups being separated by angular gaps, so that the number shown by the totalising counter and that shown by the revolution counter appear in respective separate areas in the reading plane.

In the accompanying drawings a form of embodiment of the calculating machine according to the invention is shown on an enlarged scale by way of example, the figures showing only those components which are required for an understanding of the invention.

[*Price* 2/-]

Fig. 1 shows a vertical section through a pocket size calculating machine, only part of which is represented, with the counting mechanisms engaged, whereas

Fig. 2 shows the same with the totalising and revolution counting mechanisms disengaged.

Figs. 3 and 4 shows diagrammatically the totalising and revolution counting mechanisms in plan view in their normal position, and in a position moved out of the normal position by several decades, respectively.

Figs. 5, 6, 7 and 8 diagrammatically represent some details of the pocket size calculating machine, relevant to the invention.

On a vertical shaft 2 journalled in the machine body 1 a driving element is arranged which consists of stepped tooth drum W the teeth Z_1, of which are disposed in echelon on its circumference. Off-set at 180° thereto is a further tooth Z_2 (Fig. 11) the purpose of which will be apparent hereinafter. The teeth Z_1 act on the entering members 3 of the result totalising counter R, and the tooth Z_2 acts primarily on the first entering member 4 actuating the revolution counter U ; like entering members 4 may be provided in the other digit positions for operating the revolution counter for a purpose not relevant to the present invention. Both counters R and U are equipped for the normal number of digits and include decade transfer mechanism throughout each counter.

The numeral drums 9^1 and transmission pinions 8^1 of the revolution counter U are, as shown in Figs. 3 and 4 arranged in the sector of a carrier not occupied by the numeral drums 9 and transmission pinions 8 of the result totalising counter R and on the same circle as the latter with an angular gap between the two groups. The counters U and R are mounted in a circular carrier the central boss 5^1 of which encloses a bush 5 slidable on a sleeve-shaped projection 6 of the machine body 1 so as to be capable both of being rotated and being shifted axially.

To effect denominational shift the carrier can be lifted against the bias of the compression spring 7 so far that the transmission pinions 8 for the numeral drums 9 of the totalising counter and the transmission pinions 8^1 for the numeral drums 9^1 of the revolution counter come out of engagement with the actuating elements comprising the transmission wheels 10, 11 of the entering members 3, 4 after which the carrier can be rotated through one or more positions according to the shift required. As will be seen from Figs. 1 and 2, the spring 7 bears with its one end against a flange 5^{11} of the bush 5 and with its other end against a ring 27 held on the sleeve 6 by a circlip 26.

On the shaft 2 there is moreover the operating crank 29 secured for rotation by a pin 28. By turning said crank, the shaft 2 and the stepped drum W connected therewith are set in rotary motion. As already explained by lifting the carrier as shown in Fig. 2 of the drawings denominational shift is imparted to the machine. The arresting of the carrier in its different positions is effected for example by a pin 12 inserted into the machine body 1 and engaging a recess 13 of a rest rim 30 of the carrier for the counters (Figs. 1, 2 and 7). The rest rim 30 has recesses 13 which serve for the housing of the axles 14 of the numeral drums 9, 9^1 and of the transmission pinions 8, 8^1 of the totalising counter and of the revolution counter, respectively, and still leave a space free sufficient for the pin 12 to be capable to engage the recess for the purpose of arresting the carrier for the counters. The radially projecting axles 14 may be screwed to the rest rim 30 by means of screws 31, as shown in Figs. 1 and 2, or alternatively cast into the counter carrier counters when the carrier is made by injection moulding.

The numeral drums 9, 9^1 and the transmission pinions 8, 8^1 integral with them are pushed over the axles 14 from outside, and are loosely rotatable on them.

Because of the relatively very small diameter of the machine, only very small gaps remain between the totalising counter and the revolution counter and moreover the angular distances between the individual numeral drums are very small. Accordingly, when performing a denominational shift the numeral drums of the totalising counter move to positions in the zone otherwise occupied by the numeral drums of the revolution counter and conversely. However to prevent the transmission pinions 8 of the totalising counter coming into mesh with the transmission pinions 11 for the revolution counter in such shifted positions, the numeral drums comprising the totalising counter R are off-set angularly with respect to the corresponding drums of the revolution counter U by e.g. $t/_2$ where "t" represents the angular pitch (Figs. 3 and 4). The angular distance of the first numeral drum of the totalising counter R from the last numeral drum of the revolution counter U and, conversely, of the last drum of the result counter from the first drum of the revolution counter, amounts to $1\frac{1}{2}\ t$. In the same way the transmission pinions 11 (Fig. 4, group u) of the revolution counter are off-set with respect to the transmission pinions 10 (Fig. 4, group r) of the totalising counter R. In the position of the totalising counter as shown in Fig. 4, the latter is displaced for example by three places from the normal position so that three of the toothed members and numeral drums 8, 9 and 8^1, 9^1, respectively, of the totalising and revolution counter are located between the transmission pinions 11 and 10, respectively, and are accordingly out of mesh with them (compare Fig. 6).

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is :—

1. A small size calculating machine in which the numeral drums and the actuating elements, both of the totalising counter and of the revolution counter, are arranged in circles around a driving element common to them, characterised in that the numeral drums and the actuating elements of the totalising counter are arranged in one group and the numeral drums and actuating elements of the revolution counter are arranged in another group, the groups being separated by angular gaps, so that the number shown by the totalising counter and that shown by the revolution counter appear in respective separate areas in the reading plane.

2. A small size calculating machine according to Claim 1 characterised in that the numeral drums and actuating elements, both of the revolution counter and of the totalising counter, are each mutually spaced by the same amount, while those of the former counter are offset by one half pitch relatively to those of the latter counter, so that, by denominational shift of the counting mechanism as a whole, produced by rotation of the carrier for the numeral drums, the drums of the one counter which come into the zone of the actuating elements of the other counter, are not in operative engagement therewith.

3. A small size calculating machine according to Claim 1 and 2 characterised in that the driving element comprises a stepped tooth drum operating on the actuating elements of the totalising counter and having an independent tooth operating on the first actuating element of the revolution counter.

4. A small size calculating machine according to Claim 1 characterised in that the carrier includes spaces for accommodating

the spindles of the numeral drums, which spaces also serve for co-operation with a locking element for retaining the carrier in its different positions.

5. A small size calculating machine according to Claim 1 or 4 characterised in that the spindles of the numeral drums of both counters project outwardly from the carrier like the spokes of a wheel.

6. A pocket-size calculating machine substantially as described with reference to the accompanying drawings.

Dated this 31st day of December, 1947.

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This Drawing is a reproduction of the Original on a reduced scale

Fig. 1

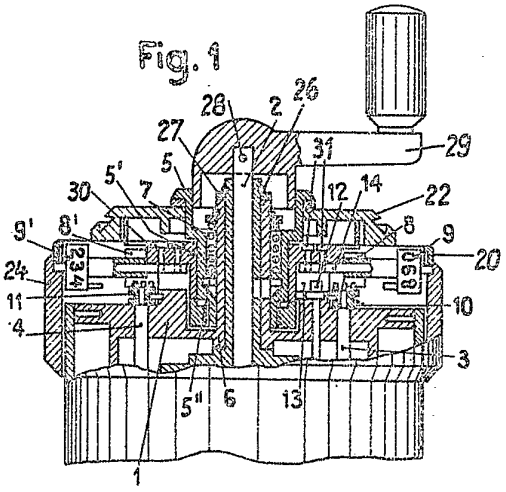


Fig. 2

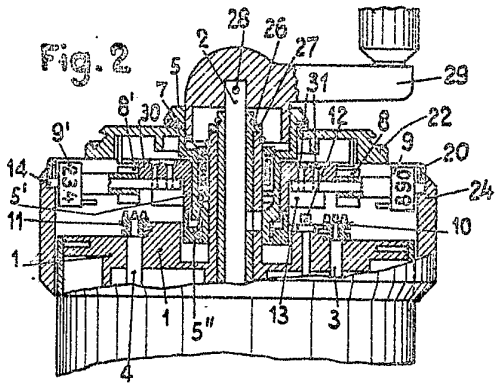


Fig. 3

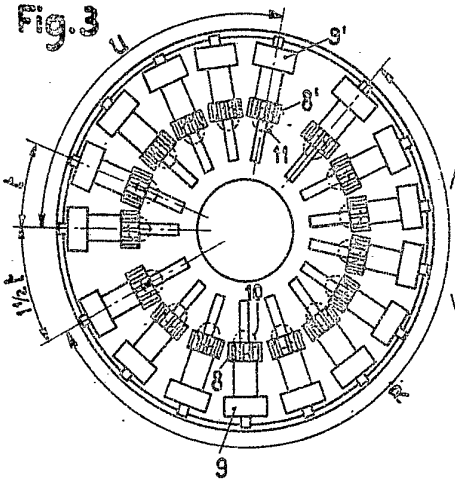


Fig. 4

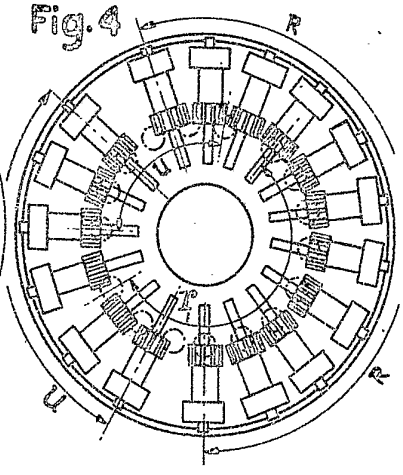


Fig. 7

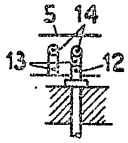


Fig. 8

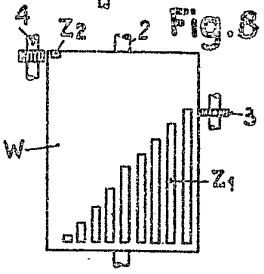


Fig. 5

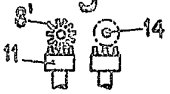
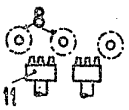


Fig. 6



H.M.S.O. (M.F.P.)