

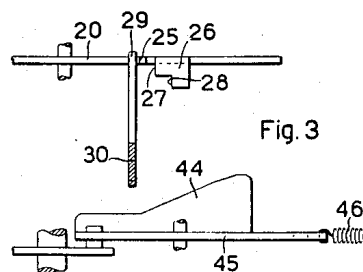
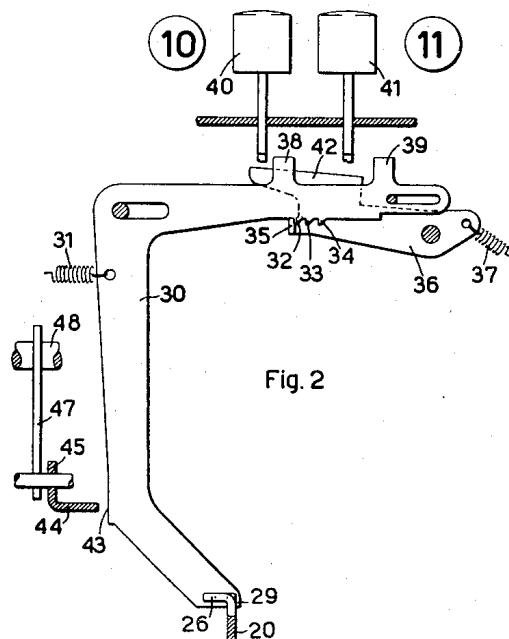
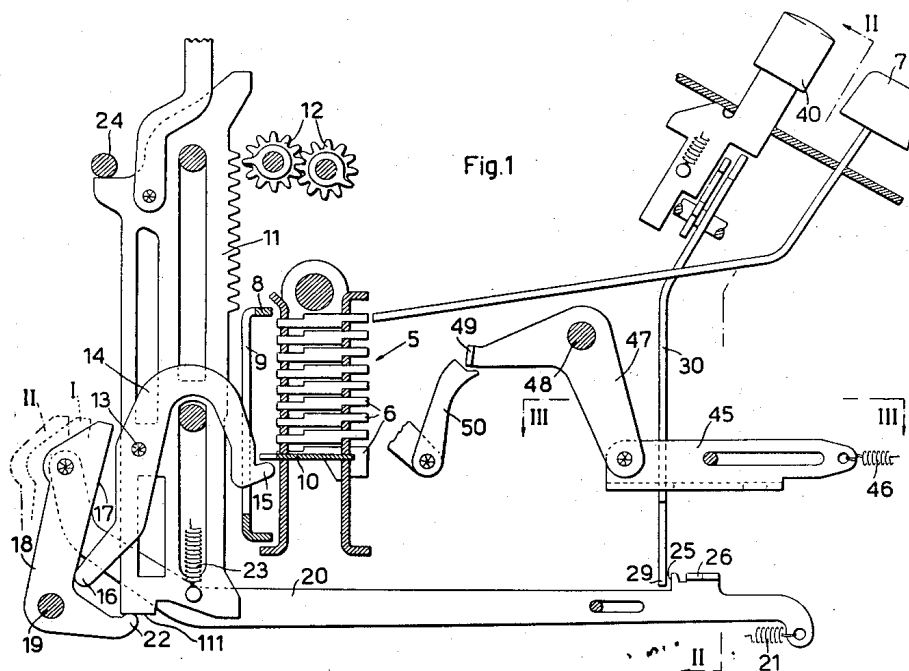
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ADDING MACHINE FOR NON-UNIFORM DECIMAL DENOMINATIONS

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ADDING MACHINE FOR NON-UNIFORM DECIMAL DENOMINATIONS

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The present invention relates to ten-key adding machines adapted for systems not having uniform decimal denominations like the British currency system.

In the adding machines of this type the pence wheel of the register carries twelve teeth and is operable by a special actuator. The travel of this actuator is usually controlled for the first nine steps by the stop pins of the conventional pin carriage, said stop pins being distanced apart a space which is uniform for all the denominational orders of said carriage, whereas the pence wheel has a diameter equal to that of the other register wheels, thus having a minor pitch. The transmission of motion from the pin carriage to the pence wheel requires, therefore, to insert a reducing device which is usually arranged between a first portion and a second portion of the pence actuator, suitably formed by two members.

In the adding machines known heretofore the motion reducing device was usually formed of a gear making the device intricate and expensive to be manufactured.

It is an object of the present invention to provide a special actuator for a non-decimal denomination, said actuator being formed of a single piece and being controlled by the conventional pin carriage.

Another object is to provide a motion reducing device for the special actuator which is simple to operate and inexpensive to manufacture.

In accordance with the invention we provide means pivotally mounted on said special actuator, an element associated with said means and adapted to be stopped by a set stop pin, and a member adapted to rotate said means during the movement of said actuator in order to alter the extent of travel of the actuator with respect to said set stop pin.

This and other features of the invention will become apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings in which:

Fig. 1 is a partial left-hand longitudinal sectional view through an adding machine embodying the invention and adapted for the British currency system;

Fig. 2 is a sectional view taken on line II—II of Fig. 1;

Fig. 3 is a sectional view taken on line III—III of Fig. 1;

With reference to Figure 1, the numeral 5 designates a conventional indexing mechanism such as a pin carriage provided with nine horizontal rows of stop pins 6 spaced according to a decimal denomination for arresting the usual actuators according to the digits from "zero" to "eight." These stop pins are settable by being shifted to the left upon depression of a selected one of a set of nine keys 7, one key only being shown in the drawings. The "nine" key, not shown in the drawings, sets no stop pin, however, during the machine cycle the corresponding actuator will be arrested by a bent-over lug 8 of a comb 9 as if a corresponding "nine" stop pin would have been set by the "nine" key. If no key at all has been depressed, during the machine cycle the actu-

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ators will be arrested in their "zero" position by the usual zero stop plate 10.

For calculating the pence amounts the machine is provided with a special actuator 11 which is engageable with either one of a pair of wheels 12, each one having twelve teeth. The pitch of the wheels 12 is equal to five-sixths of the pitch of the other register wheels, not shown in the drawings, and therefore of the vertical spacing of the stop pins 6.

Pivotaly mounted at 13 on the actuator 11 and adapted to be stopped by a set stop pin 6 is a means such as a two armed lever 14, of which one arm is formed with a projection 15 adapted to cooperate with said stop. The second arm of the lever 14 ends with a cam follower 16 engaging with a shiftable inclined member such as an edge 17 of a lever 18 pivoted on a fixed shaft 19. Pivotaly connected to the lever 18 is a link 20 urged leftwards by a spring 21, under the bias of which an arm 22 of the lever 18 normally rests upon the lower edge 111 of the actuator 11. Normally the usual universal bar 24 holds the actuator 11 in the lower position shown in Fig. 1, against the urge of a spring 23. Subject to the unbalanced weight of its rightward arm the lever 14 normally contacts the member 17 as in Fig. 1, whereby the projection 15 is held clear of the transversely movable zero stop plate 10.

The link 20 carries an abutment 25 and a bent-over lug 26 formed with two steps 27 and 28 (see Fig. 3). Normally facing the abutment 25 is a projection 29 of a transverse slide 30 (Figs. 1 and 2). This slide is urged leftwards (Fig. 2) by a spring 31 and is formed with three teeth 32, 33 and 34. A lug 35 of a lever 36 normally engages the tooth 32 of the slide 30 under the urge of a spring 37. This slide 30 is formed with two upper projections 38 and 39 adapted to be arrested by the stems of two keys 40 and 41, said keys being the "ten" and the "eleven" key, respectively. The two key stems may further cooperate with an appendage 42 of the lever 36.

The slide 30 is formed with a downward vertical edge 43 (Fig. 2) engageable by a tapered lug 44 (Fig. 3) of a longitudinal slide 45. The latter is urged rightwards (Fig. 1) by a spring 46 and is connected to an arm of a lever 47 pivoted on a fixed shaft 48. The other arm of the lever 47 carries a bent-over lug 49 engageable by a push rod 50, which upon completion of each machine cycle is lifted for restoring the pin carriage 5 and for clearing the indexed amount in a manner well known per se, as described for example in applicant's Italian patent specification No. 491,469 with reference to the push rod 192.

The mode of operation of the device is as follows:

If the pence digit to be indexed into the pin carriage is less than ten, the corresponding key 7 will be depressed and the slide 30 will remain in the position of rest shown in Fig. 2. When the universal bar 24 (Fig. 1) enables the actuator 11 to move upwards from its normal position shown in Fig. 1, the lower edge 111 of the actuator will be followed by the arm 22 of the lever 18 under the bias of the spring 21 urging the link 20 leftwards. However, the abutment 25 of the link 20 will be immediately arrested by the projection 29 of the slide 30, thus substantially preventing the lever 18 from rotating and leaving its edge 17 in its normal or first inclined position shown with a solid line in Fig. 1, wherein it remains stationary. During the upward movement of the actuator 11 the edge 17 will thus cam the cam follower 16 and cause the lever 14 to rotate counterclockwise and to move the projection 15 upwards with respect to the actuator 11, whereby the extent of travel of the actuator will be altered with respect to the distance of the

stop set by the key 7 from the normal position of the actuator.

More particularly, the travel of the actuator 11 ends when the projection 15 is arrested either by the set stop pin 6 or, for the "nine" digit, by the lug 8 of the comb 9. During said travel the lever 14 is so rocked about the pivot 13 as to reduce the extent of travel of the actuator 11 with respect to the initial distance of the projection 15 from the set stop according to a first ratio of said extent and said distance of five-sixths. During the return stroke of the machine cycle the register is meshed in a known manner with the actuators which are returned downwards by the universal bar 24, whereby the actuator 11 advances the wheel 12 a number of teeth equal to the digit indexed. For example, if the "six" key has been set, the projection 15 is lifted through six decimal steps according to the distance of the "six" stop pin 6 from the normal position of the actuator 11, whereas the actuator 11 moves through $\frac{5}{6} \times 6 = 5$ steps only, causing the pence wheel to advance $5 \times \frac{1}{10} = \frac{1}{2}$ teeth.

The actuator 11 returning to rest also restores the lever 18 together with the link 20.

It will thus be apparent that the projection 15, movable with the rotation of the lever 14 substantially in the vertical direction of motion of the actuator 11, is engageable with the set stop pin 6 during said motion to stop the actuator, and that the member 17 is concurrently engageable with the arm 16 for controlling the rotation of the lever 14 during said motion, the extent of travel of the actuator being altered with respect to the distance of said set stop pin from the normal position of the actuator according to the mutual displacement of the projection 15 and of the actuator 11 in said direction.

Suppose now that the pence digit is "ten."

Upon depressing the key 40 (Fig. 2) the corresponding key stem engages the projection 42, rocking the lever 36 and releasing the tooth 32 from the lug 35, and is moreover set into the path of the projection 38 of the slide 30. The spring 31 will thereupon cause the slide 30 to move to the left until its projection 38 will be arrested by the depressed key stem. On depressing the key 40 no stop pin 6 is set in the pin carriage. Upon releasing the key 40, the spring 37 returns the lever 36 to the position shown in Fig. 2 and the lug 35 latches the tooth 33 of the slide 30 which moves another little step to the left. As a result of these two steps of the slide 30 its projection 29 has been removed from the path of the abutment 25 and has been set into the path of the step 27 of the link 20 (Fig. 3).

When the universal bar 24 (Fig. 1) allows the actuator 11 to move upwards, the link 20 moves to the left until its step 27 will be arrested by the projection 29. The lever 18 is now rocked through a larger degree than in the preceding case and is set into the position I shown with broken lines in Fig. 1, whereby the edge 17 has been shifted from its normal position to a second position wherein it is less inclined than in its normal position. The edge 17 now rocks the lever 14 through a lesser angle than in the preceding case, whereby the extent of travel of the actuator 11 is reduced with respect to the initial distance of the projection 15 from the lug 8 according to a second ratio of said extent and said distance of about $\frac{5}{60}$. Therefore, as the projection 15 is arrested by the lug 8 the actuator 11 has been moved through such an extent as to advance the wheel 12 about $\frac{5}{60} \times 9 \times \frac{1}{10}$ ten teeth. The actuator 11 and the link 20 are thereupon restored by the universal bar 24 in the manner described above.

As upon completion of the cycle the push-rod 50 is lifted to restore the pin carriage, it pushes the lug 49 upwards, thus turning the lever 47 clockwise. The slide 45 will be moved to the left (Figs. 1 and 3) and its tapered lug 44 will return the slide 30 to its position of rest shown in Fig. 2.

If the pence digit is "eleven," the key 41 will be de-

pressed, thus releasing the slide 30 from the lever 36 in a manner similar to the preceding case. The slide 30 will now be arrested through its projection 39 by the stem of the key 41 and will be relatched by the lug 35 through the tooth 34, moving thus through a longer extent. Therefore, the slide 30 will place its projection 29 into the path of the stop 28, thus enabling the lever 18 to move to the position II shown with dot-and-dash lines in Fig. 1. When the projection 15 will be arrested by the lug 8, the actuator 11 will now have been moved through such an extent as to advance the wheel 12 eleven teeth. The restoration of the link 20 and of the slide 30 will therethrough be made in a manner identical to the preceding case.

From the foregoing description it will be seen that the lever 14 and the inclined member 17 form an advantageous and simple means for altering the travel of the actuator 11 with respect to the spacing of the stop pins 6. Furthermore, since the restoration of the slide 30 is controlled by the carriage restoring push rod 50, it will be clear that in repeat calculations, wherein the push rod 50 is disabled, the slide 30 remains in the set position and the ratio conditioned by the last depressed pence key remains unaltered.

It will furthermore be understood that many changes may be made in the above construction, and different embodiments of the invention could be made without departing from the scope thereof. It is, therefore, intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

What we claim is:

1. In an adding machine for non-uniform decimal denominational amounts comprising an indexing mechanism having settable stop pins spaced according to a decimal notation, and a special differentially movable actuator for at least one non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination comprising means pivotally mounted on said actuator and adapted to be stopped by said set stop pin, and an adjustable member adapted to rotate said means during the movement of said actuator in order to alter the extent of travel of said actuator with respect to the distance of said set stop pin from said normal position, said member being stationary during said movement.

2. In an adding machine for non-uniform decimal denominational amounts comprising an indexing mechanism having settable stop pins spaced according to a decimal notation, and a special differentially movable actuator for at least one non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination comprising a two armed lever pivotally mounted on said actuator, one arm of said lever being adapted to be stopped by said set stop pin, and an adjustable member engaging the second arm of said lever during the movement of said actuator to rotate said lever in order to alter the extent of travel of said actuator with respect to the distance of said set stop pin from said normal position, said member being stationary during said movement.

3. In an adding machine for non-uniform decimal denominational amounts comprising an indexing mechanism having settable stop pins spaced according to a decimal notation, and a special differentially movable actuator for at least one non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination of means pivotally mounted on said actuator, and adapted to be stopped by said set stop pin, a shiftable member adapted in a first position to rotate said means during the movement of said actuator in order to alter the extent of travel of said actuator with respect to the distance of said set stop pin from said normal position according to a first ratio of said extent and said distance, and manual

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means operable to shift said member from said first position to a second position to enable said member to alter said extent according to a second ratio.

4. In an adding machine for non-uniform decimal denominational amounts comprising an indexing mechanism having settable stop pins spaced according to a decimal notation, and a special differentially movable actuator for a non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination of a lever pivotally mounted on said actuator and adapted to be controlled by said set stop pin, a shiftable inclined member adapted in a first position to rotate said lever during the movement of said actuator in order to alter the extent of travel of said actuator with respect to the distance of said set stop pin from said normal position according to a first ratio of said extent and said distance, spring means adapted to shift said member from said first position to a differential position to vary said ratio according to the inclination of said member in said differential position, stop means conditionable for selectively arresting said member in said differential position, and a set of depressible keys for differentially conditioning said stop means.

5. In an adding machine for non-uniform decimal denominational amounts comprising an indexing mechanism having settable stop pins spaced according to a decimal notation, and a special differentially movable actuator for at least one non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination of means pivotally mounted on said actuator and adapted to be stopped by said set stop pin, a shiftable member adapted in a first position to rotate said means during the movement of said actuator in order to alter the extent of travel of said actuator with respect to the distance of said set stop pin from said normal position according to a first ratio of said extent and said distance and manual means operable to shift said member from said first position to a second position to enable said member to alter said extent according to a second ratio, said actuator including an element engageable with said member for restoring same into said first position.

6. In an adding machine for non-uniform decimal denominational amounts comprising a travelling pin carriage having settable stop pins spaced according to a decimal notation, and a special differentially movable

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actuator for a non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination of a lever pivotally mounted on said actuator and adapted to be controlled by said set stop pin, a shiftable inclined member adapted in a first position to rotate said lever during the movement of said actuator in order to alter the extent of travel of said actuator with respect to the distance of said set stop pin from said normal position according to a first ratio of said extent and said distance, spring means adapted to shift said member from said first position to a differential position to vary said ratio according to the inclination of said member in said differential position, stop means conditionable for selectively arresting said member in said differential position, a set of depressible keys for conditioning said stop means, means for restoring said pin carriage, and an element operable by said restoring means for restoring the stop means so conditioned.

7. In an adding machine for non-uniform decimal denominational amounts comprising an indexing mechanism having settable stop pins spaced according to a decimal notation, and a special differentially movable actuator for at least one non-decimal denominational order, the travel of said actuator from a normal position being controlled by a set stop pin, the combination comprising a two armed lever pivotally mounted on said actuator, one arm of said lever having an element movable with the rotation thereof substantially in the direction of motion of the actuator and engageable with said set stop pin during said motion to stop said actuator, and a member concurrently engageable with the second arm of said lever for controlling the rotation thereof during said motion, the extent of travel of said actuator being altered with respect to the distance of said set stop pin from said normal position according to the mutual displacement of said element and said actuator in said direction.

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