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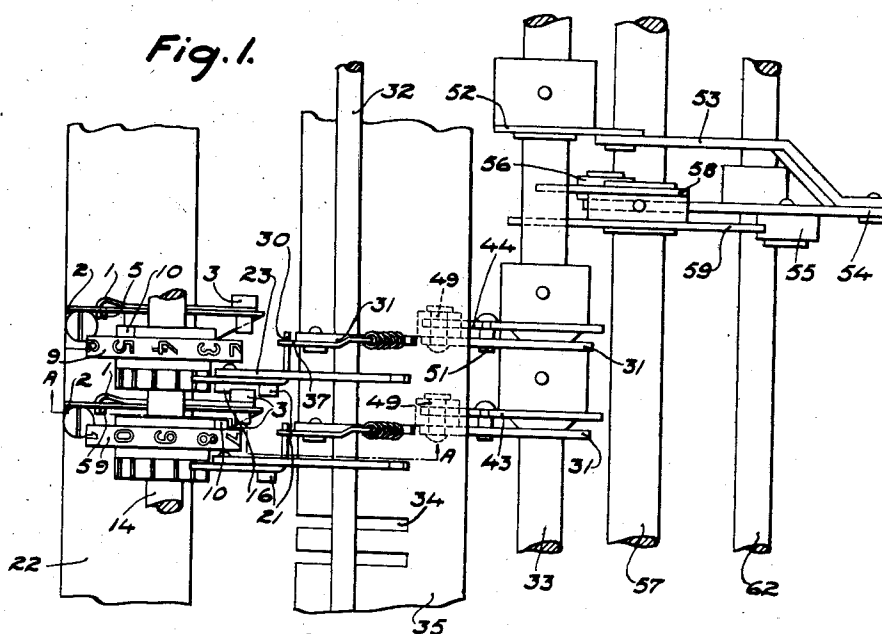
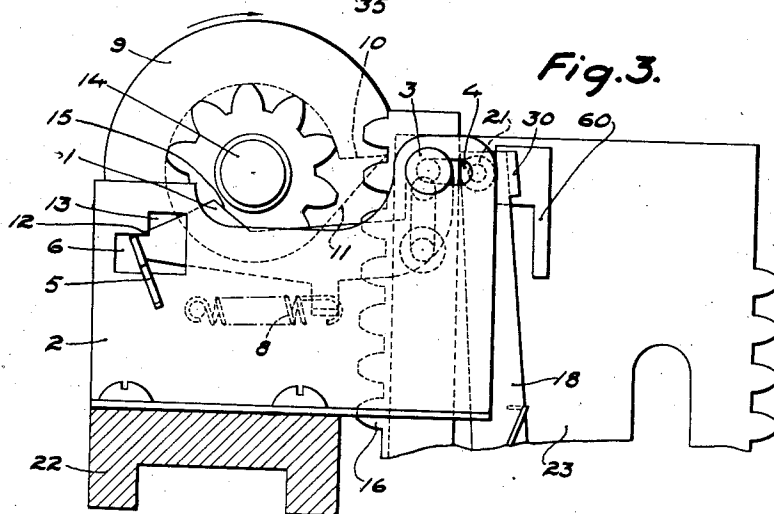
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2,091,758

TENS CARRYING MEANS

Filed June 15, 1933

3 Sheets-Sheet 1



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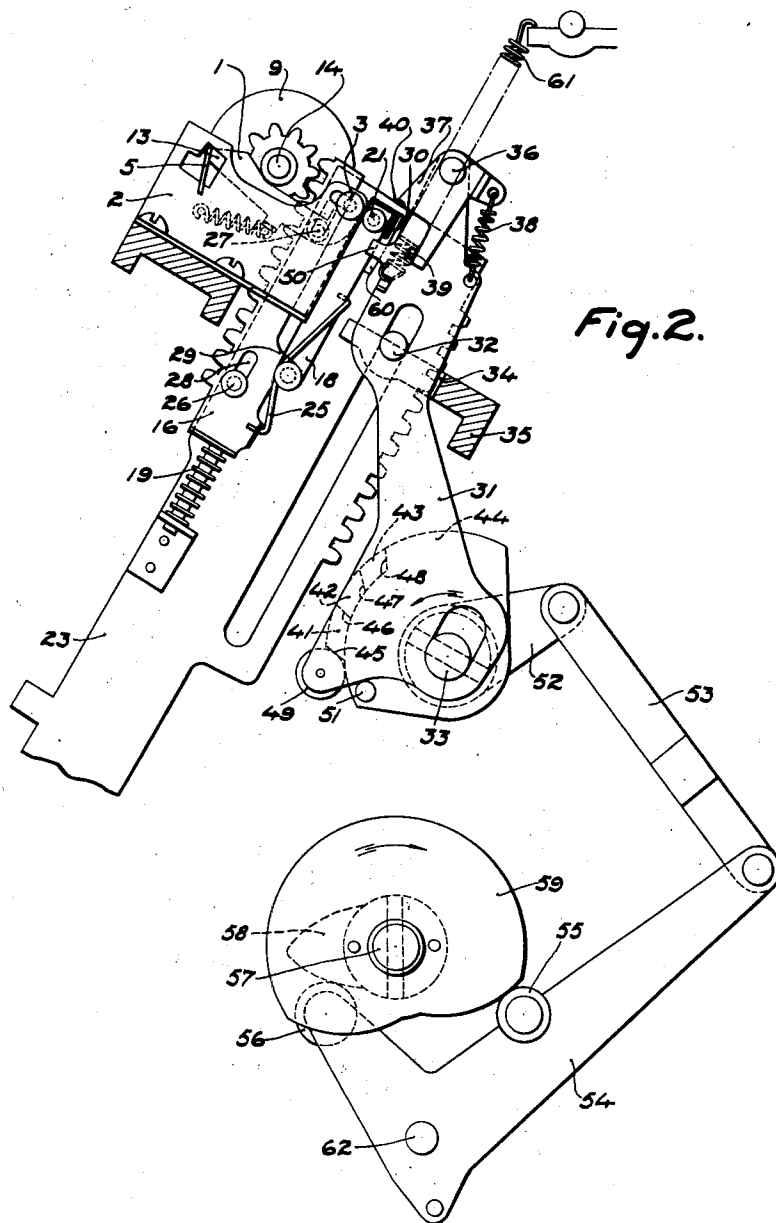
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TENS CARRYING MEANS

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3 Sheets-Sheet 2



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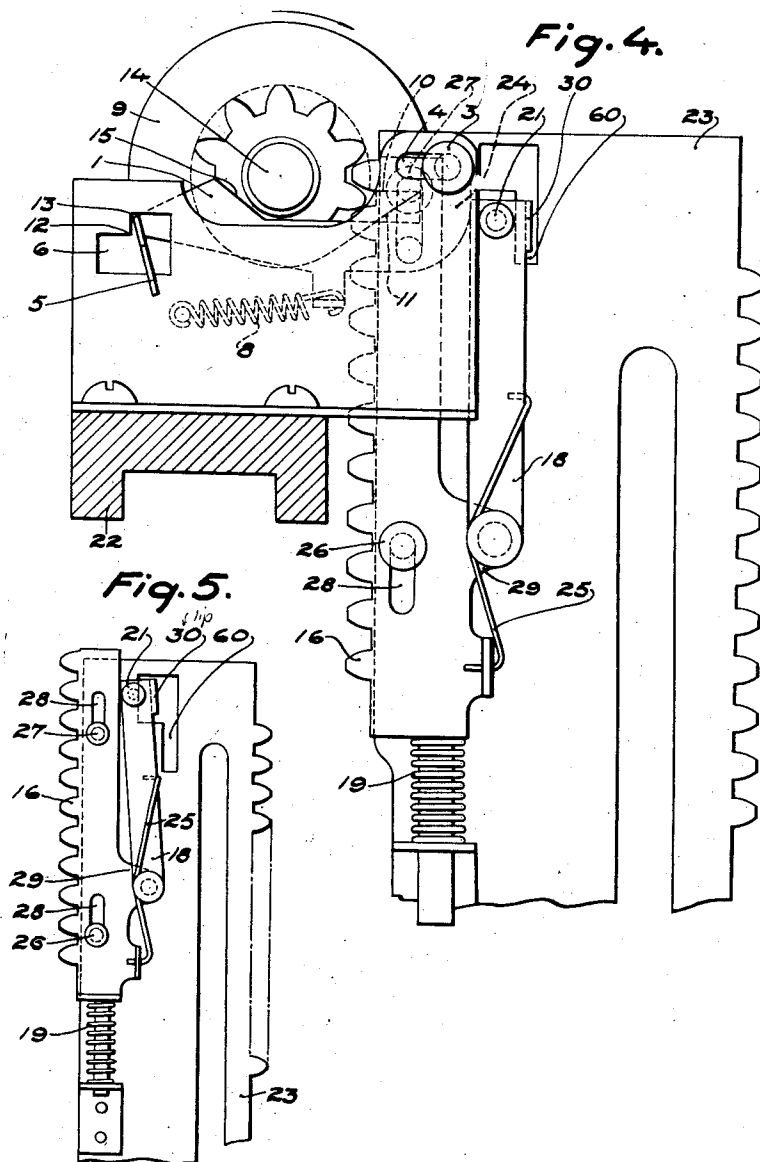
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TENS CARRYING MEANS

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3 Sheets-Sheet 3



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TENS CARRYING MEANS

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3 Claims. (Cl. 235—138)

This invention relates to a tens carrying means for calculating machines and cash registers, in which the numeral wheels are not in permanent engagement with the driving members, which rotate the numeral wheels and effect the calculating.

In calculating machines the tens carrying generally is effected by means of carrying members, which have a movement of ten pitches, the tenth being utilized only when a ten is to be carried. The carrying takes place while the counting wheels and the racks are connected with each other. In other instances the setting racks or segments move nine pitches, during which time the tens carrying is being prepared, in order to be accomplished after the numeral wheels and the carrying members have been disengaged from each other (see U. S. Patent No. 1,508,531). The former system is the most common in adding machines, and the latter is used practically without any exception in cash registers. However, this has great drawbacks. The former system cannot be used in cash registers, the cash registers being provided with amount indicating wheels, the movement of which from 0 to 9 takes place by means of the setting racks or segments, which thus are not allowed to move more than nine pitches, as no tens carrying is to take place on the amount indicating wheels.

This invention relates to tens carrying means, in which the carrying takes place, while the numeral wheels are in engagement with the setting members (racks or segments) which actuate the same, and in which these members do not move more than nine pitches so that the device may also be used in cash registers.

The invention is illustrated by way of example in the accompanying drawings.

Figure 1 is a top view of a pair of numeral wheels with associated tens releasing and tens carrying means.

Figure 2 is a section taken on line A—A of Figure 1.

Figures 3 and 4 show details of the totalizer when in a non-engaging position and working position respectively, and

Figure 5 is part of the setting rack with the tens rack bar.

The release slide 1 (Figs. 1-4) and the frame plate 2 which is secured to a beam 22 rigidly connected with the machine consist of plates located side by side. The release slide 1 is slidably secured to the frame plate 2 by a bolt 3, which moves in a slot 4 of the frame plate. Slide 1 is provided with an angularly bent lip 5, which

passes through the recess 6 of the frame plate 2, thus preventing the slide and frame plate from being separated. A spring 8 keeps the hook 5 pressed against the upper edge of the opening 6.

On the numeral wheel 9 there is provided a tooth 10 formed with an oblique surface 11. On the turning of the wheel 9 in the direction of the arrow (see Fig. 4), tooth 10 passes the small end of pin 3, and pushes the latter to the right (in Fig. 3) in the slot 4 until the hook 5 slips over a sharp edge 12 in the opening 6. On account of the spring 8 the hook 5 is pressed into the catch 13 where it is retained by the spring until the wheel returns into its non-operative position and the shaft 14 engages a cam 15 of the release slide 1, whereby the latter is pressed down and returned to the initial position again by the spring 8.

The tens rack bar 16 (Figure 5) is slidably secured to the setting rack 23 by pins 26 and 27, which engage corresponding slots 28 of the tens rack bar 16, and is pressed upwardly by a spring 19. The length of the slots 28 corresponds to the distance between the centers of two adjacent teeth. A carrying catch 18 is pivotally secured on a shoulder 29 of the tens rack bar 16 and pressed to the left by means of a spring 25. Moreover the said catch is provided with a pin 21 and a rectangularly bent lip 30. The pin 21 is secured to the catch 18 in such a manner that when the tens rack bar 16 is in its upward or normal position, pin 21 lies in the same horizontal plane (Figs. 2 and 3) in which the axis of the bolt 3 of the release slide 1 moves. With this arrangement, pin 21 is shifted to the right by pin 3 when the latter is shifted to the right by tooth 10.

When a ten is to be carried the release slide 1 is pushed to the right by the wheel 9, so that the hook 5 slips over the sharp edge 12 of the recess 6 and is pressed up into the notch 13 by the spring 8. If in the releasing moment the setting rack 23 is not moving (i. e. if no keys are depressed in the corresponding key bank) the bolt 3 pushes the pin 21 to the right, as shown in Fig. 2, where it is retained, until the totalizer returns to its non-operative position (see Fig. 3) (is pushed to the left) and the totalizer shaft 14 returns the release slide 1 to the rest position in the manner described above. However, if one of the nine keys of the corresponding key bank (not shown) is depressed, the setting rack 23 will move from the position shown in Fig. 3 a number of pitches upward, corresponding to the numeral, and will be moved downward again after the totalizer has been brought into a working posi-

tion. For instance, if the "nine" key is pressed, the rack 23 (with the rack 16 in the position shown in Fig. 5) will be moved upwardly nine spaces until the lowermost tooth on rack 16 is opposite the shaft 14. Before the rack 16 is lowered, the shaft 14 is shifted toward the racks 23 to bring the toothed wheels on shaft 14 into mesh with the teeth on racks 16. During the downward movement of the rack the corresponding numeral wheel 9 is turned. If during this turning a ten is released the release slide 1 is moved to the right, as described above, where it remains.

If the release slide 1 is moved to the right before rack 23 reaches its lowermost (rest) position, the pin 21 engages the pin 3 (as rack 23 approaches its lowermost position) and is displaced to the right by sliding over the pin 3. The displacement of pin 21 causes catch 18 to shift toward the right against the action of spring 25 to the position shown in Fig. 2.

If a key in one row is not pressed the corresponding rack 23 is not raised. However, if a ten is to be transferred to the corresponding numeral wheel 9 of this rack, the slide 1 of the next lower order is released and the pin 3 carried thereby will shift the pin 21 and the catch 18 of the slide in question to the right to the position shown in Fig. 2. Thus, regardless of whether the rack 23 is raised or not, its associated catch 18 will be shifted if a ten is to be transferred to its associated numeral wheel.

With catch 18 shifted to the position shown in Fig. 2, the lip 30 is in a position whereby it may be moved downwardly by a nose 37, as hereinafter described, into slot 60 and shift rack 16 downwardly relative to rack 23 to the position shown in Fig. 4.

The tens carrying means is adapted to work in the time between the time after the return of the setting racks 23 to their lowermost or rest position and before the disconnecting of the totalizer from the racks 16 and their movement into a non-operative position. For this purpose a tens actuator 31 (Fig. 2) is provided for each numeral wheel 9 except for the wheel of the lowest order, the said tens actuator being guided for instance vertically by shafts 32 and 33 and laterally by a beam 35 provided with corresponding grooves 34, the said beam being rigidly connected with the frame of the machine. Each tens actuator 31 is provided with a nose 37 adapted to be rotated about a pin 36 and which by means of a spring 38 is pressed against a catch, pin or the like 39 secured on the tens carrier. This nose lies with the lower edge 40 of its projection over the upper edge of the lip 30 on the carrying catch 18 when the latter is shifted to the right, as shown in Fig. 2. If during the downward movement of the setting rack 23 the lip 30 is moved to the right while above nose 37, the latter is also moved to the right by the lip 30 until in the lower position of the setting rack 23 the nose snaps over the lip 30 again by the action of the spring 38.

A cam disk 41, 42, 43 and 44 respectively is keyed on the shaft 33 for each of the tens actuators 31, each of the cam disks being provided with a shoulder 45, 46, 47 and 48 respectively. The said shoulders are displaced relatively to each other, so that at the turning of the shaft 33 in the direction of the arrow the shoulders successively strike against the rotatable roller 49 secured on each tens actuator, whereupon the tens actuators 31 are successively moved downward. The distance between the shoulders 45, 46,

47, 48 is so chosen that a tens actuator does not function until its neighbour of a lower order has made its whole stroke. If a ten is released and the slide 1 shifted to displace member 18, the lip 30 will be engaged by the nose 37 and on the downward movement of the tens carrier 31 the rack bar 16 will be moved down against the action of spring 19. The movement of the tens actuator 31 is so actuated by the cam disks that the tens rack bar 16 and consequently also the numeral wheel 9 receives a stroke, which is equal to the distance between adjacent teeth. In this lower position the tens rack bars 16 are held by the tens actuators 31 until the totalizer has returned to non-engaging position. When the tens actuators move upward again, the totalizer rack bars 16 are pushed upward by the springs 19, and the carrying catches 18 are moved to the left by the springs 25 to a non-operative position again. It is clear that, if at the downward movement of a rack bar 16 a ten on the numeral wheel of the immediately higher order would then be released, this can take place without anything further, because the corresponding tens actuator does not begin its work until the preceding one is ready.

As the tens rack bar 16 is held in its upper position only by the spring 19, there is, in order to prevent a failing of the upward pushing, for instance in case of a spring rupture, also an arrangement to give the tens rack bar 16 a positive motion. In accordance with this arrangement the tens actuator 31 is provided with a tongue 50 the upper edge of which lies under the lower edge of the lip 30 of the release catch 18, by which the tens actuator brings along the tens rack bar 16 on its upward movement, if for some reason the spring 19 would fail. Moreover the cam disks 41, 42, 43, 44 are each provided with a lug 51, which engages the lower edge of the tens carrier 31 adjacent the roller 49, and thus at the return of the cam disks 41, 42, 43 and 44 to their initial position positively moves the tens actuators upward, if for some reason the springs 51, which generally pull the tens actuators 31 upward, would not function.

By means of the arm 52, the bar 53 and the link 54 with the rollers 55 and 56, which is pivotable about the shaft 62, the shaft 33 is given a rocking motion from the cam disks 58 and 59 secured on the main shaft 57 of the machine.

In order to prevent a possible snapping out of the lip 30 of the grasp of the nose 37 the arrangement has been made that the catch 18 is guided by the setting rack 23, for instance thereby that the lip 30 is bent backward, and the setting rack 23 is provided with a slot 60 corresponding to the motion of the lip 30 (Fig. 5), the said slot being so narrow that it does not allow any lateral movement of the lip.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine of the character described, a setting rack, a toothed totalizer actuating rack longitudinally slidably mounted on said setting rack, a totalizer shaft, a toothed numeral wheel on said shaft adapted to be driven by said totalizer actuating rack, a numeral wheel of next lower order on said shaft provided with a tens cam, said shaft being laterally shiftable to bring the toothed numeral wheel into mesh with said actuating rack, means for locking said actuating rack at one limit of its travel on said setting rack, means actuated by said tens cam for releasing said locking means, a tens actuator and

a spring-actuated pawl mounted on the tens actuator for engaging the actuating rack locking means when in released position for sliding the actuating rack relative to the setting rack.

- 5 2. In a machine of the character described, a setting rack, a toothed totalizer actuating rack longitudinally slidably mounted on said setting rack, a totalizer shaft, a toothed numeral wheel on said shaft adapted to be driven by said total-
10 izer actuating rack, a numeral wheel of next lower order on said shaft provided with a tens cam, said shaft being laterally shiftable to bring the toothed numeral wheel into mesh with said
15 actuating rack, means for locking said actuating rack at one limit of its travel on said setting rack, resilient means urging said actuating rack to its normal position, means actuated by said tens cam for releasing said locking means, a tens actuator, and a spring-actuated pawl mounted on

the tens actuator for engaging the actuating rack locking means when in released position for sliding the actuating rack relative to the setting rack.

3. In a device of the character described, a 5 setting rack, a totalizer actuating rack slidably mounted thereon, means for locking the actuating rack at one limit of travel on said setting rack, a tens actuator, means operable when a ten is to
10 be carried for disengaging said locking means and shifting it into a position to engage the tens actuator, and a spring-pressed pawl on said tens actuator permitting movement of said locking
15 means past the same and operable for imparting a further movement to the locking means and actuating rack upon operation of the tens actuator.

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