Cross Reference

Examiner

235-145.R 82

March 15, 1938. E. BREITLING ET AL 2,110,903

CASH REGISTER, ACCOUNTING, AND THE LIKE MACHINE

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Fig. 1.

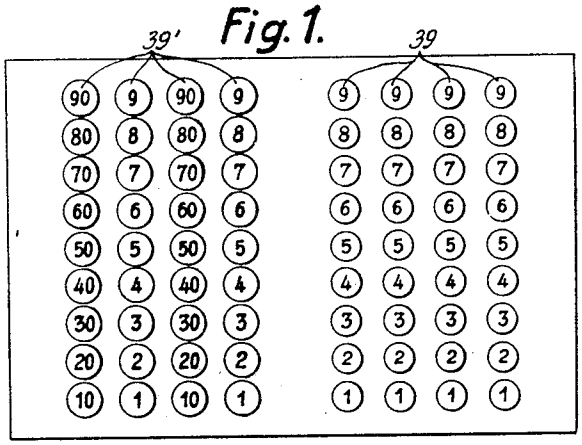
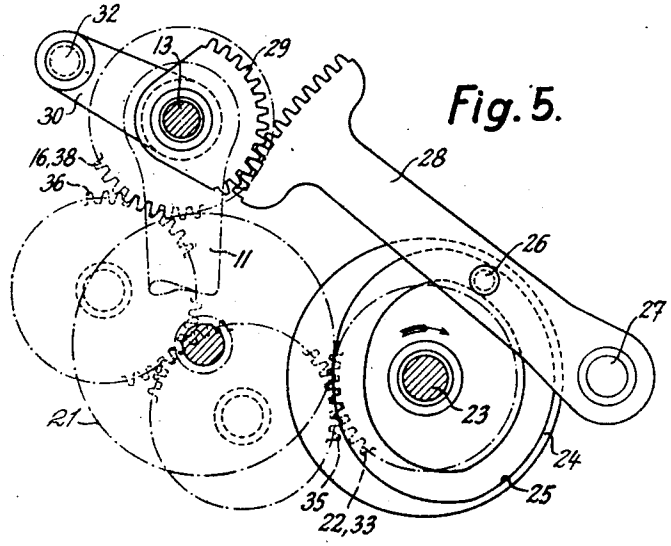


Fig. 5.



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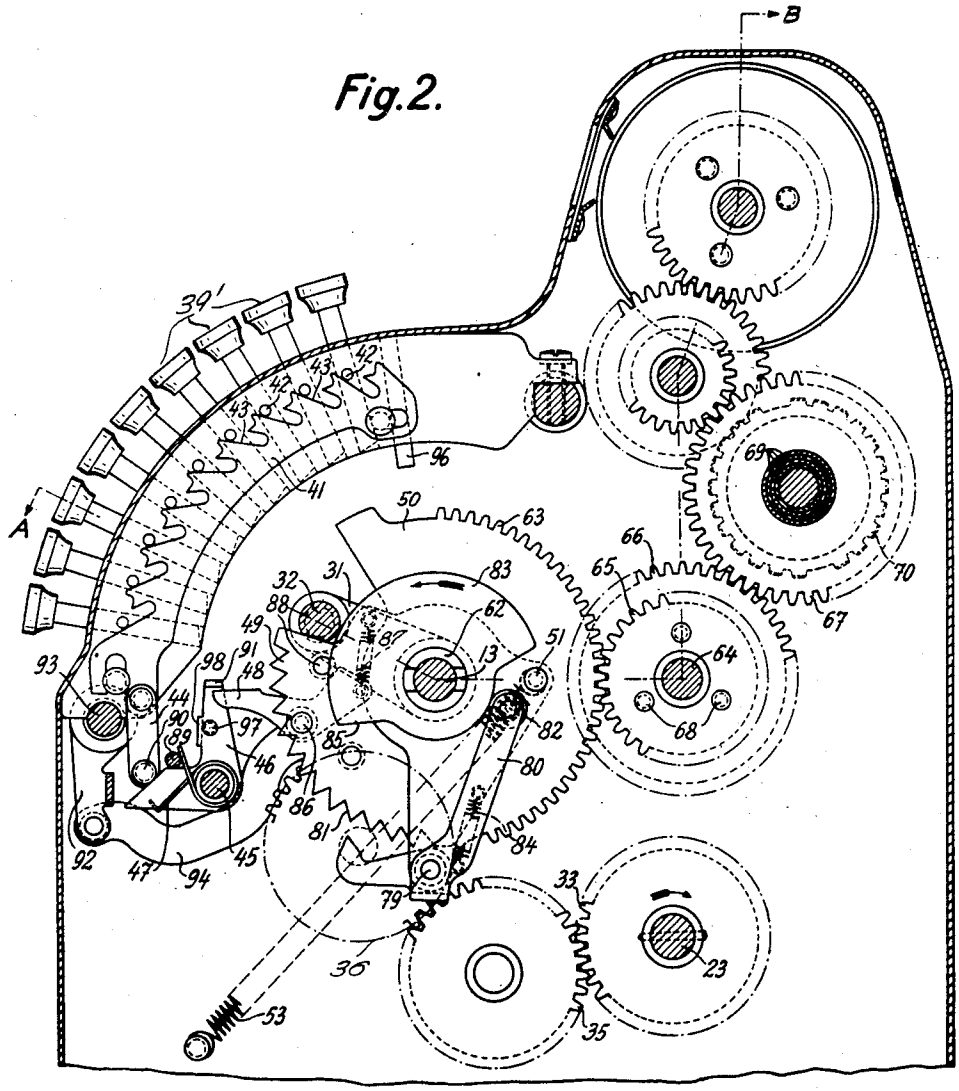
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Fig.2.



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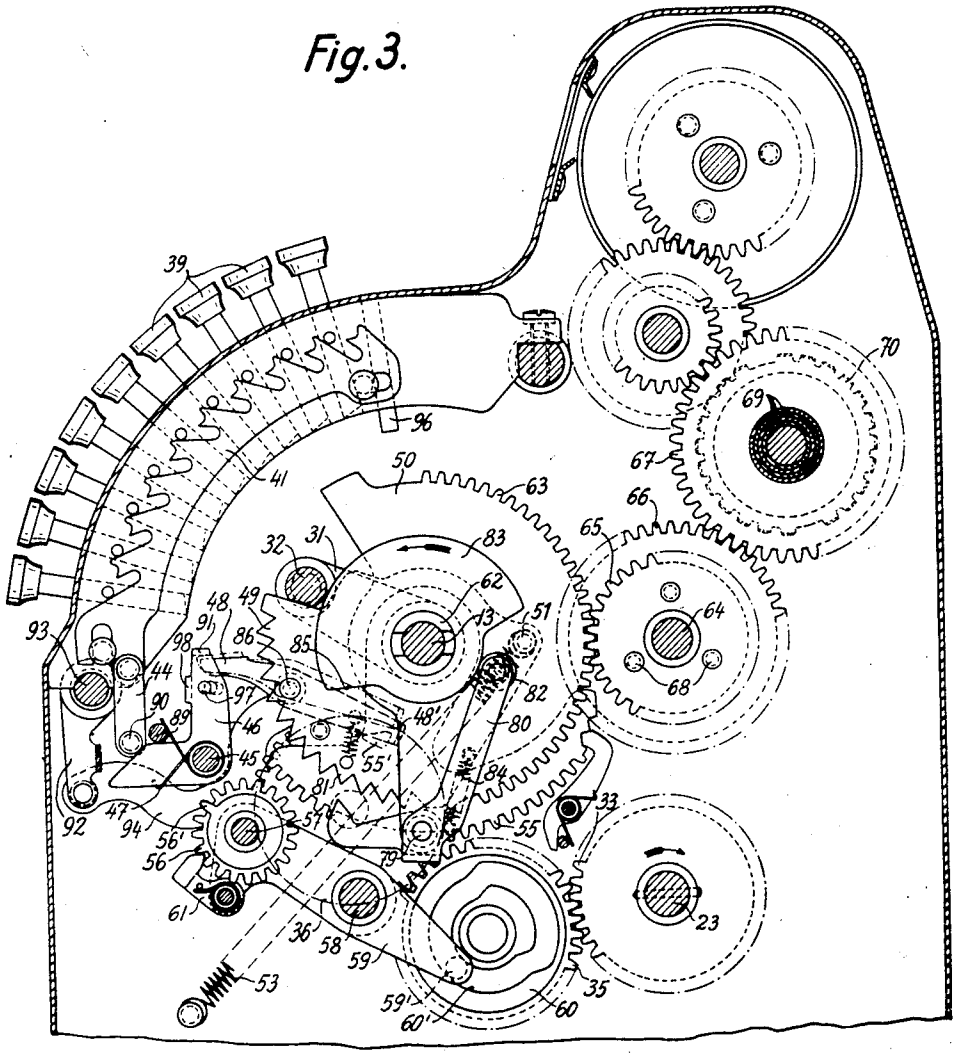
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Fig. 3.



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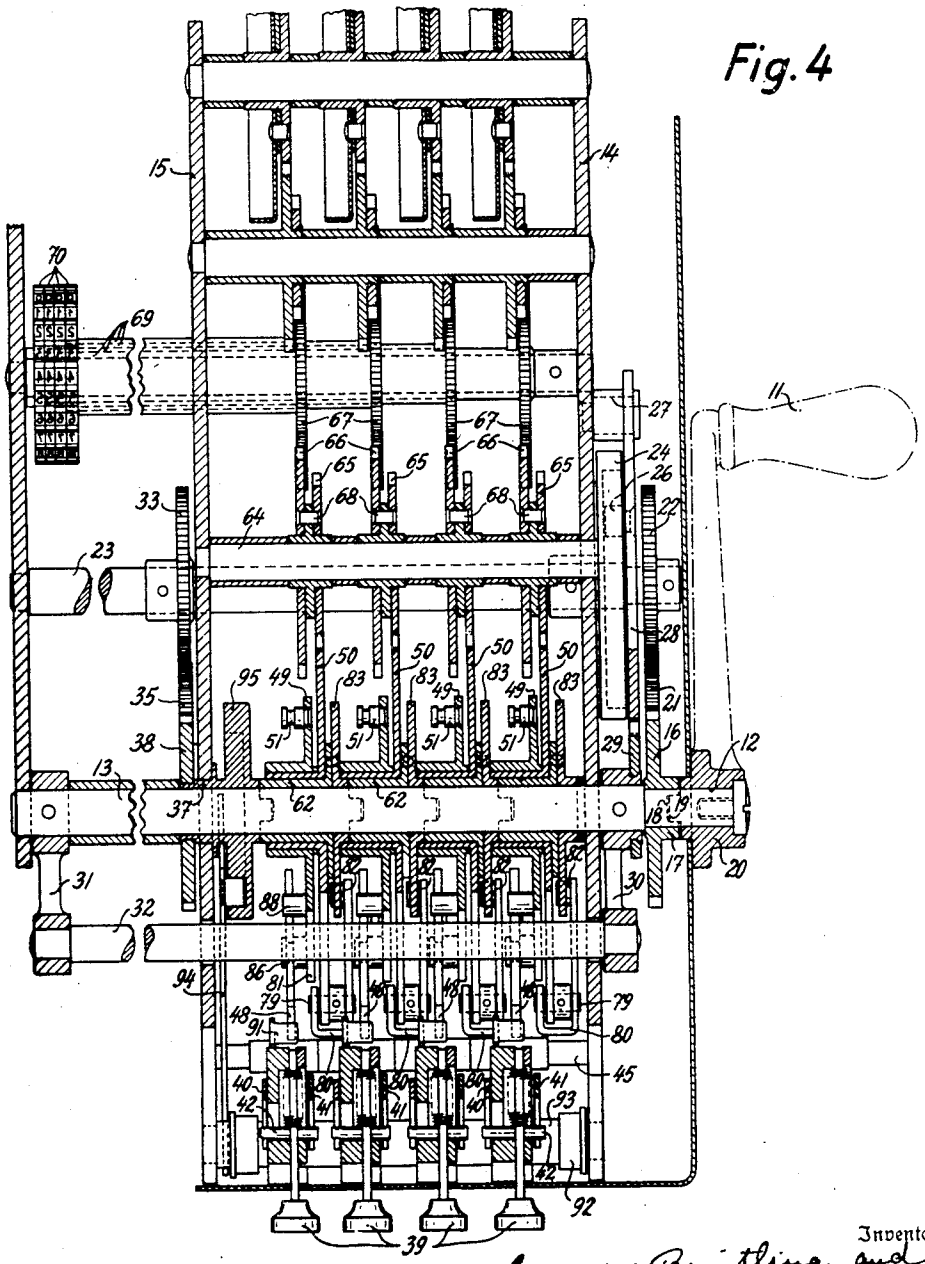
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Fig. 4



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CASH REGISTER, ACCOUNTING, AND THE LIKE MACHINE

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Fig. 6.

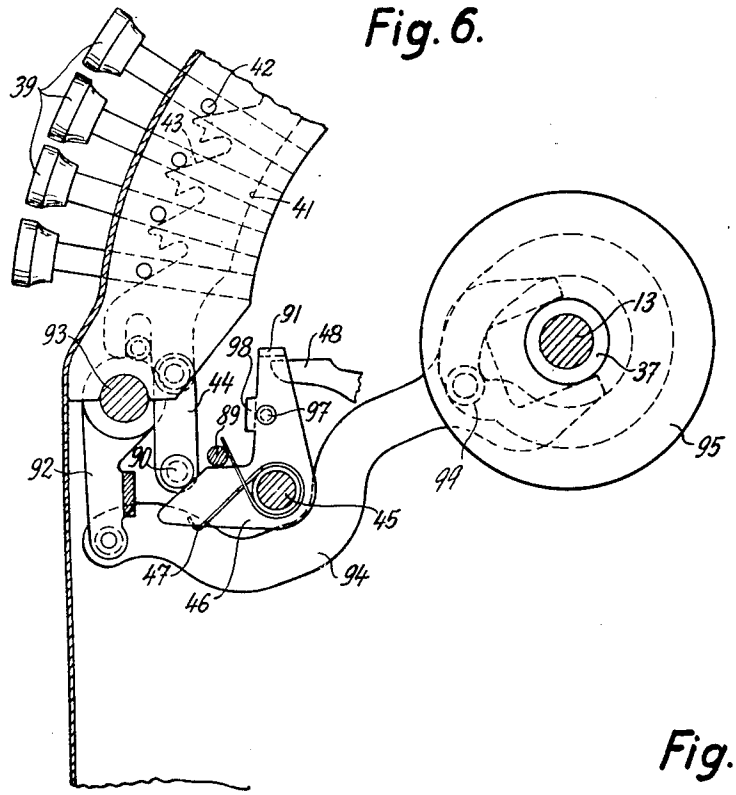


Fig. 7

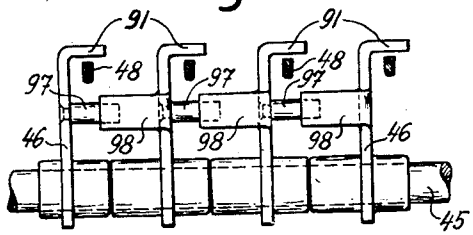
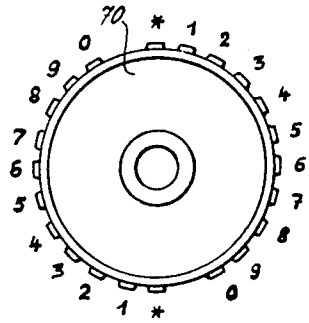


Fig. 8



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Patented Mar. 15, 1938

2,110,903

UNITED STATES PATENT OFFICE

2,110,903

CASH REGISTER, ACCOUNTING, AND THE LIKE MACHINE

Ernst Breitling, Berlin-Tempelhof, and Julius Patzelt, Berlin, Germany, assignors to The National Cash Register Company, Dayton, Ohio, a corporation of Maryland

Application June 12, 1935, Serial No. 26,114

3 Claims. (Cl. 101—93)

The invention relates to a class of differential devices for cash registers, accounting and the like machines, and more particularly to such devices in which certain elements return to normal position during the machine operation, while other elements, such as those which are connected with the indicating devices, and with the type wheels of the printer, remain in the set position at the end of a machine operation.

The main object of the invention is to adapt such a differential device, for use with key banks for setting up data not to be added, as for instance dates, ledger numbers and the like, for eliminating zeros and printing asterisks, letters or the like in denominational orders preceding the highest digit of any number.

Another object of the invention is to adapt the zero stop pawl for setting the type wheels to asterisk printing position.

Another object of the invention is to arrange the numerals of the indicator wheels and the types on the type wheels in a sequence best suited for printing asterisks or letters instead of zeros.

Further objects of the invention will be pointed out in the following detailed description with reference to the annexed drawings.

A preferred form of an embodiment of the invention is shown in the annexed drawings.

Of said drawings:

Fig. 1 is a top view of an amount key board and a number key board of a cash register,

Fig. 2 is a cross section of the machine alongside of a data key bank showing the differential device in a side view,

Fig. 3 is a cross section of the machine alongside of an amount key bank showing the differential device in a side view,

Fig. 4 is a transverse section of the machine along line A—B of Fig. 2, looking in the direction of the arrows,

Fig. 5 is a side view of the machine drive,

Fig. 6 is a side view of the means for moving the zero stop pawls into ineffective position,

Fig. 7 is a top view of the zero stop pawls of several denominational orders, and

Fig. 8 a side view of the type wheel.

Machine drive

The machine may be operated by means of a hand crank **11** (Figs. 4 and 5) rotatably mounted on a shouldered end **12** of a shaft **13**. The shaft **13** is rotatably supported in the side walls **14** and **15** of the machine frame. Further, on the shouldered end **12** of the shaft **13** is rotatably mounted a gear **16**, the hub **17** of which is provided with recesses **18** to be engaged by coupling tenons **19** of the crank hub **20**. The gear **16** is in engagement with a gear **22** on a shaft **23** by means of an intermediate pinion **21**, rotatably mounted on a stationary stud of the side wall **14**. The gears **22** and **16** are of like diameter, so that when the crank **11** is rotated through a full rotation, the shaft **23** is also rotated a full rotation.

The shaft **23**, rotatably supported in the side walls **14** and **15**, has secured thereto a cam disk **24** having a curved groove **25** (Fig. 5) engaged by a roller **26** of an arc-shaped toothed arm **28** pivoted on a stationary stud **27** of the side wall **14**. The teeth of the arm **28** mesh with a toothed segment **29** fast on the hub of a carrier **30** secured to the shaft **13**. During each machine operation, the cam disk **24** imparts to the arm **28**, first, a rotary movement in counter-clockwise direction and, thereafter, in clockwise direction. These two rocking movements are transmitted, through the toothed segment **29**, in the reversed sense to the shaft **13**, so that the latter during each machine operation, is rocked first in clockwise and thereupon in counter-clockwise direction. Besides the arm **30**, the shaft **13** has secured thereon an arm **31** (Fig. 2), both said arms supporting a cross rod **32**.

Further, the shaft **23** has mounted thereon a gear **33** being, through two intermediate pinions **35** and **36** rotatably mounted on stationary pins on wall **15**, in engagement with a gear **38** fast to a tube **37** (Fig. 4) surrounding the shaft **13** and rotated, during each machine operation, in the direction opposite to that of the crank.

Key banks

Associated with each bank of keys **39** and **39'** is a differential device having ten positions to which the differential can be positioned, that is, a zero position and one position for each key in the bank. The data key banks are illustrated herein with only nine keys, but if it is desired to set up any data requiring more than nine keys, the additional keys can be provided. For example, if it is desired to set up dates instead of ledger numbers, then twelve keys can be used in a bank, one for each month of the year. In this case the differential associated with such a bank would be constructed to have a range of movement upwardly three steps farther than that shown herein.

In each key bank, besides a detent **40** (Fig. 4) provided to keep any key in depressed position, a second detent or a slide **41** (Fig. 2) is mounted which is shifted downwardly by means of a pin

42 of the depressed key acting upon its respective oblique edge 43.

The slide 41 has connected thereto a link 44, the pin 90 of which contacts an oblique surface of a pawl 46 rotatably mounted on a shaft 45 which pawl normally bears against a stationary pin 89 by the action of a torsion spring 47 coiled about the shaft 45. When the said pawl is in normal position, a bent over portion 91 thereof extends over a latch 48 pivoted on the differential device 49 holding the differential device in zero position. When, however, a key 39 has been depressed, and by means of its pin 42 the slide 41 is shifted into its lower position, the pin 90 glides on the oblique surface of the pawl 46 downwardly and comes into the path of a bail 92 extending over the pawls 46 of all the key banks. The bail 92 is rockably mounted on a shaft 93, and connected thereto at its lower end is the forward end of a pitman 94. The pitman 94 has a roller 99 (Fig. 6), guided in a cam groove of cam disk 95 fixed to the tube 37 (Figs. 4 and 6).

When, during the machine operation, the pitman 94 is forced to the right by the cam disk 95, the bail 92 is rocked in a counter-clockwise direction. During such movement the bail 92 strikes the pins 90, of those key banks in which a key 39 is depressed, and moves them against the oblique surfaces of the zero stop pawls 46 to rock the pawls 46 until the flanges 91 are out of the path of the latches 48. By this means the latches 48 and their connected differential devices 49 are enabled to be rocked upwardly and to be arrested by the foot of the depressed keys 39.

Differential device

A differential device according to Fig. 3 is used in the amount bank. The amount differential device has associated therewith a toothed segment 55 adapted to be engaged by a totalizer 56. The latch 48 in the amount bank is provided with a flange 48' normally held in engagement with a lug 55' on the segment 55, thus the actuating member 49 and the setting segment 55 are normally moved in unison. In order to obtain the right timing of engagement and disengagement of the zero stop pawls 46 and the latch 48 as well as of the flange 48' and the lug 55' in the various denominational orders, pins 97, hereinafter described are arranged on the zero stop pawls in different planes in each order as shown in dotted lines in Fig. 3.

In order to prevent incorrect entries in the totalizers, the stop pawl 46 must remain in its effective position, when no key in its bank has been depressed, long enough to engage 48 and thus disengage 48' from 55', so that member 55, which meshes with the totalizer, will not advance to the extreme position with members 49, as it would otherwise do. In order to attain such operation, the pins 97 are set away from the flanges by such a distance that the lower order pawl will remain stationary long enough to cause 48' to release 55'. Any pawl 46 in a bank in which a key is depressed is moved directly by bail 92.

The amount differential and its special controls over the stop pawls 46 is not a part of the present invention, but is disclosed and illustrated in another application.

Each differential device for the data key bank 39' comprises a main setting member 49 (Fig. 2) rotatably supporting the latch 48, normally urged against a stop pin 88 by a spring 87, and rotatably mounted on the hub of a respective auxiliary setting member 50 (Fig. 4). Attached to a pin 51 of each of the setting members 49 is a spring 53 tending to rotate it clockwisely and, thus, to bear against the cross rod 32.

The auxiliary setting members 50 provided in each differential device, are rotatably mounted on tubes 62 mounted over the shaft 13 which tubes are interconnected with each other by tongues and grooves, and of which tubes the outermost left hand one as per Fig. 4 is connected in the same manner with the tube 37. The teeth 63 of each auxiliary setting member 50 are in mesh with a gear rotatably mounted on a shaft 64. Each gear 65 is fastened by pins 68, to a gear 66 meshing with a gear 67. The gears 67 are connected by means of nested tubes 69 to the type wheels 70 of the printer.

A stud 79 of each auxiliary setting member 50 has pivoted thereon a bail formed coupling member 80. The one arm of the bail is pointed to engage the teeth 81 of the respective setting member 49. The other arm of the coupling member 80 carries a roller 82 cooperating with a cam disk 83 rotatably mounted on the shaft 13 and connected to the respective tube 62. By means of a spring 84 tensioned between the coupling member 80 and the auxiliary setting member 50, the pointed arm is normally held disengaged from the teeth 81.

The device operates as follows:—

Assuming a key 39 has been depressed. During the machine operation effected by turning the crank 11 (Figs. 4 and 5), the shaft 23 is rotated clockwise by means of the gearing 16, 21 and 22. At the same time, the tube 37 is rotated counter-clockwise by shaft 23 and gearing 33, 35, 36, 38. The disk 95 is thus rotated counter-clockwise with the tube 37 and urges the pitman 94 (Fig. 6) to the right at the beginning of the machine operation, in order to remove the pawl 46 out of path of the latch 48.

As before mentioned, the main shaft 13 is rocked first in clockwise direction by gears 16, 21, and 22, cam 25, and segments 28 and 29. The cross rod 32 is moved thereby also in the same direction. The setting members 49 together with the toothed segments 55 partake in this clockwise rocking of the cross rod 32 under the action of their springs 53, till the latch 48 strikes the foot of the depressed key 39, whereby the setting member 49 is prevented from continuing its movement. Further, during its clockwise rotation the cross rod 32 meets the auxiliary setting member 50 and restores it as well as the type wheels 70 by means of the gearing 65 to 69 to zero position. When, thereafter, the auxiliary setting members 50 have returned to their zero positions, the oblique surfaces 85 of the cam disks 83 performing a full rotation during every machine operation in counter-clockwise direction, strike the rollers 82 and force the pointed arms of the coupling members 80 to engage, against the action of their springs 84, the tooth 81 of the main setting members 49 set in accordance with the depressed keys 39. Thereupon the shaft 13 starts its counter-clockwise rocking movement and the cross rod 32 restores the main setting members 49 to rest positions against the action of their springs 53. The auxiliary setting members 50 coupled with the setting members 49 by the coupling member 80 actuated by the cam disk 83, are rocked out of their zero positions at the same time by a number of steps corresponding to the value of the key 39 depressed. Due thereto, also the type wheels 70 are set to the like amount.

After the setting of the type wheels **70** is completed, the high part of the cam disks **83** leaves the rollers **82**, so that the coupling members **80** under the action of their springs **84** are disengaged from the teeth **81** of the main setting member **49**.

The keys **39** are not interlocked during the machine operation. Thus it is possible, also during the machine operation, to release the depressed key **39** by pressing another key of the same bank. However, when the setting member **49** is set according to the key depressed, and if, now, a key of lower value is depressed in the same bank, the differential device is not controlled by the latch **48** during its return movement. During such return movement, the pawl **48**, when striking the improperly depressed key, will by pass the key. This result is obtained since the pawl **48** is pivoted on the pin **86** of the setting member **49**, and as pointed out before, it is normally urged against a stop pin **88** of the setting member **49** under the action of a spring **87**. Thus, if the latch **48** meets the foot of a depressed key during its return movement, the said pawl is able to pass this key.

Zero printing device

In order to effect zero printing in the denominational orders lower than the digit of the lowest denominational value printed, when no key is depressed in the key banks corresponding to said lower orders, each pawl **46** except that of lowest denominational value, has provided on its right hand side a pin **97** (Fig. 6) engaged by a flange **98** of the pawl **46** of the next lower denominational order. Thus, when a pawl **46** is brought out of engagement, all the other pawls of the lower denominational orders are carried along by said pawl while the position of the pawls **46** of the higher denominational orders is not altered.

If, now, in this manner, a zero stop pawl **46**, in a key bank is disengaged, without a key being depressed, the appropriate setting element **49** performs its widest possible stroke until it is stopped by a stationary stop **96**. Thereby, however, the setting element **49** as well as the proper type wheel **70** is displaced by ten steps. Each type wheel **70** (Fig. 8) has provided thereon two sets of types to print in two printing positions. The asterisks and the zeros are distanced by ten steps from one another (Fig. 8). Thus, when the setting element **49** rocks up to the stationary stop **96**, the zero type of the appropriate type wheel is moved into printing position. Those differential devices, however, which are held by the pawls **46** left in effective positions, move the asterisks of the respective type wheels **70** (Fig. 8) into printing position.

It is easily understood that, although only a type wheel with the sequence of the numerals according to the invention is shown, also the numerals of the indicator wheels can be arranged in the same manner as well as the sequence of the numerals itself can be altered in that the zero is arranged on the lowest position and the asterisks on the highest one, without departing from the scope of the invention.

While the form of mechanism herein shown and described, is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the embodiments herein disclosed, for it is susceptible of embodiment in various other forms all coming within the scope of the claims which follow.

What is claimed as new is:

1. In a machine of the class described, the combination of a differential mechanism, a stop pawl to normally arrest the differential mechanism, a plurality of keys to control the differential movement of the differential mechanism, means operable during the machine operation to withdraw the pawl from its effective position so that the differential mechanism can be set according to the depressed key, and an element settable relatively to the means and the stop pawl upon depression of a key to render said means effective.

2. In a machine of the class described, the combination of a plurality of differential mechanisms, each adjustable to a plurality of positions including a normal and a zero position, keys to control the differential mechanisms, a pawl associated with each differential mechanism to normally control the differential mechanism to stop in its normal position, connections between the pawls whereby a next lower order pawl is actuated by the next higher order pawl when the latter is actuated, means operable during the machine operation, and an element movable into the path of said means and relatively to each pawl upon depression of an associated key prior to the machine operation, said means adapted to actuate the elements during the machine operation and through the elements actuate all pawls associated with the differential mechanism of lower denomination, whereby the differentials not controlled by keys are moved to zero position.

3. In a machine of the class described, the combination of a plurality of differentially settable devices, settable to a normal position, a zero position, and a plurality of datum setting positions between the normal position and the zero position, keys to control the setting of the devices to the datum setting positions, a pawl for each differential device normally in position to control its associated device whereby it remains in its normal position, means operable during the machine operation to move the pawls into ineffective position whereby the devices are moved out of normal position during the machine operation, an element associated with each device and operated upon depression of a key associated with the element and the associated device to render the means effective, and connections between each pawl of higher order and its adjacent lower order pawl whereby the lower order pawl is moved to release its associated device when the next higher order pawl is moved into ineffective position to release the next lower order device to move to its zero position when no key associated with the latter is depressed.

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