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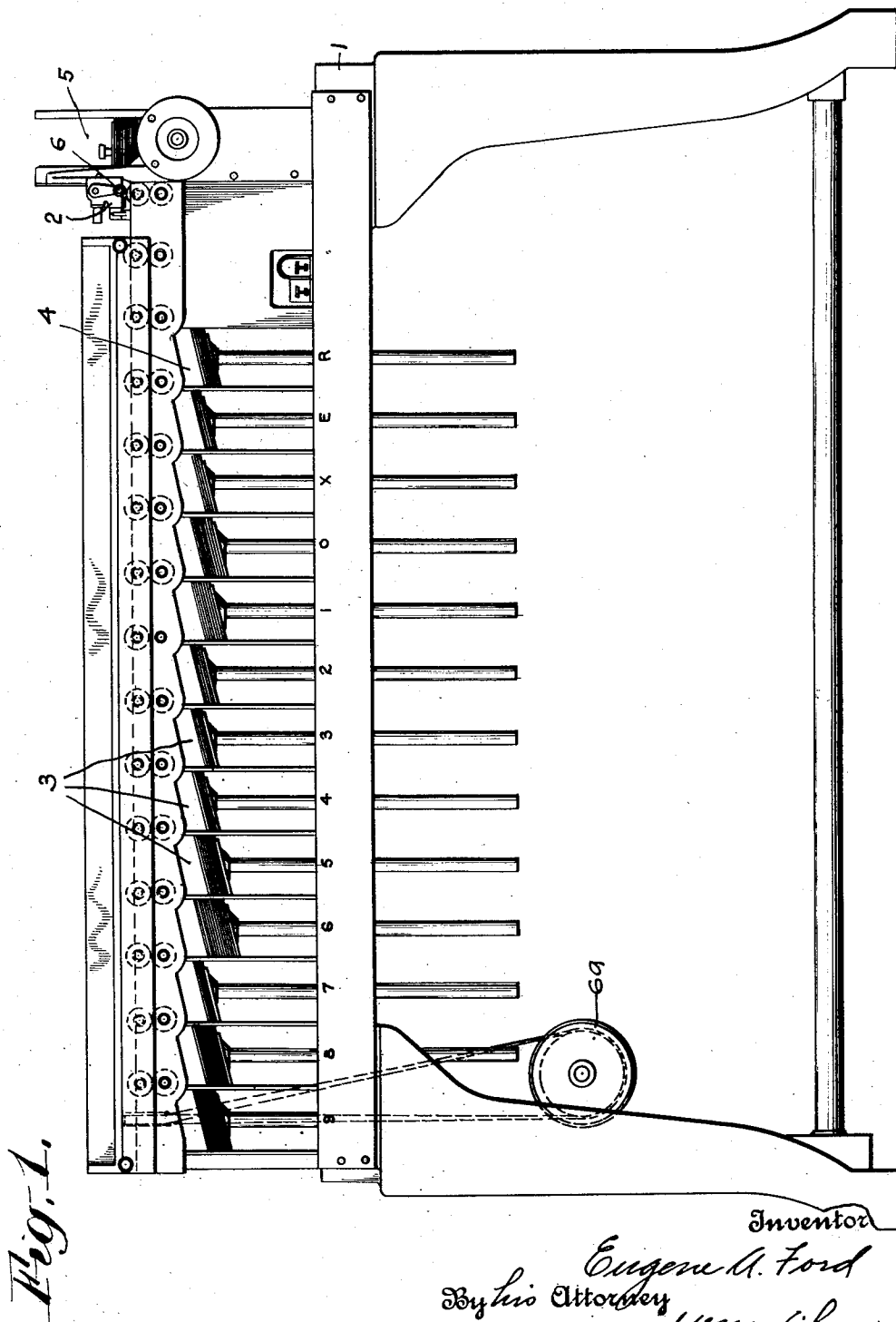
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1,830,756

COUNTING ATTACHMENT FOR ACCOUNTING MACHINES

Filed Jan. 25, 1927

5 Sheets-Sheet 1



Nov. 10, 1931.

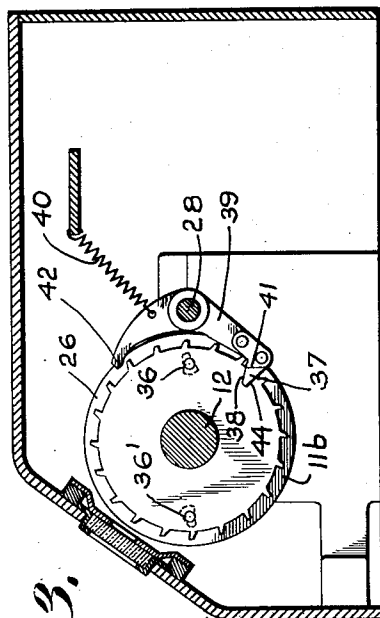
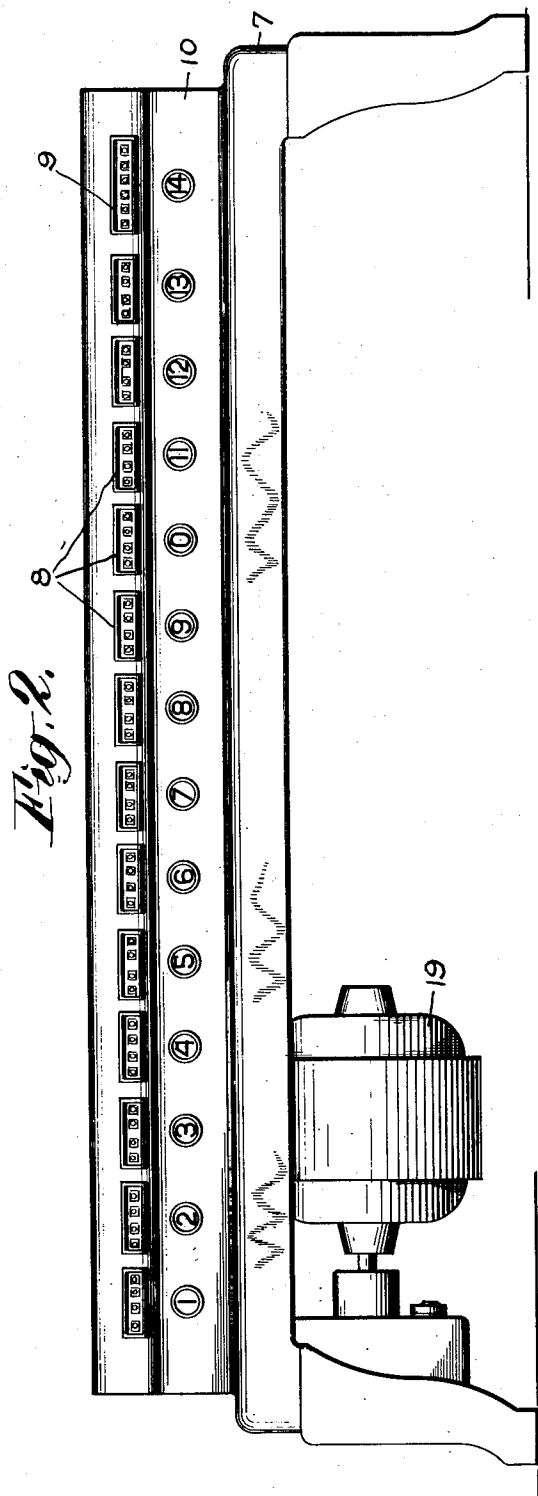
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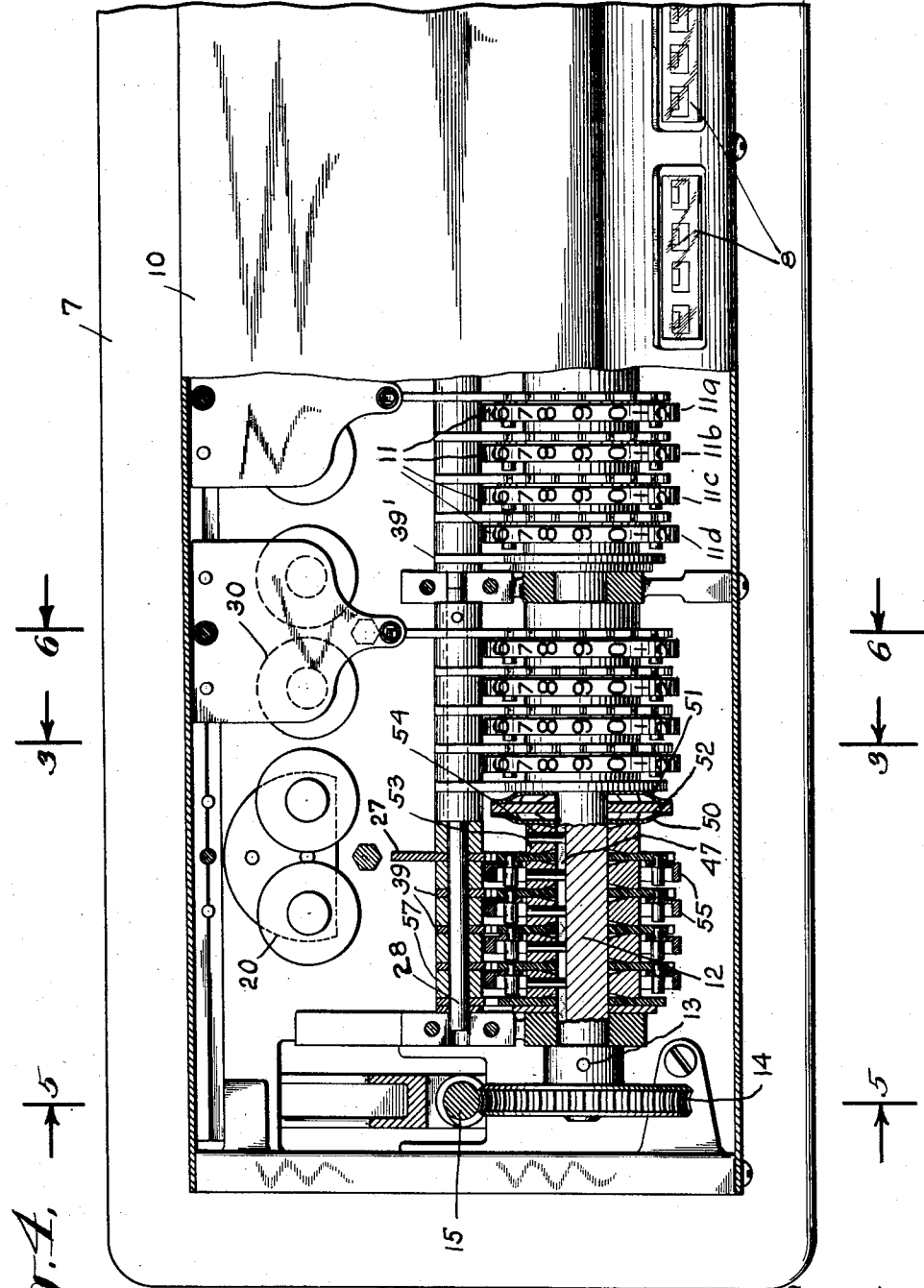


Fig. 4.

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Fig. 6.

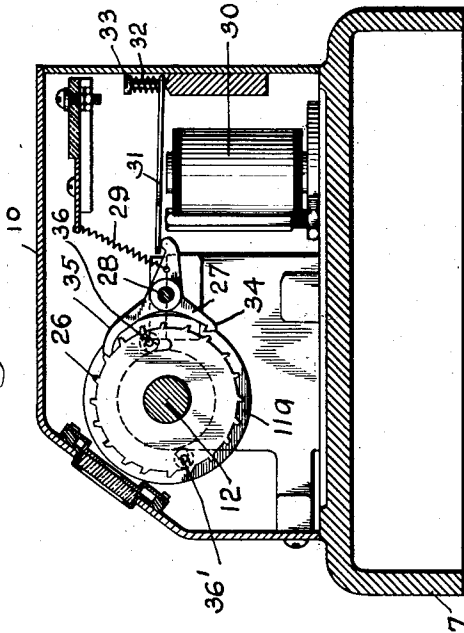


Fig. 7.

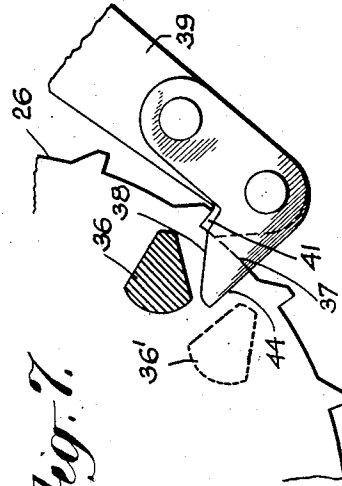
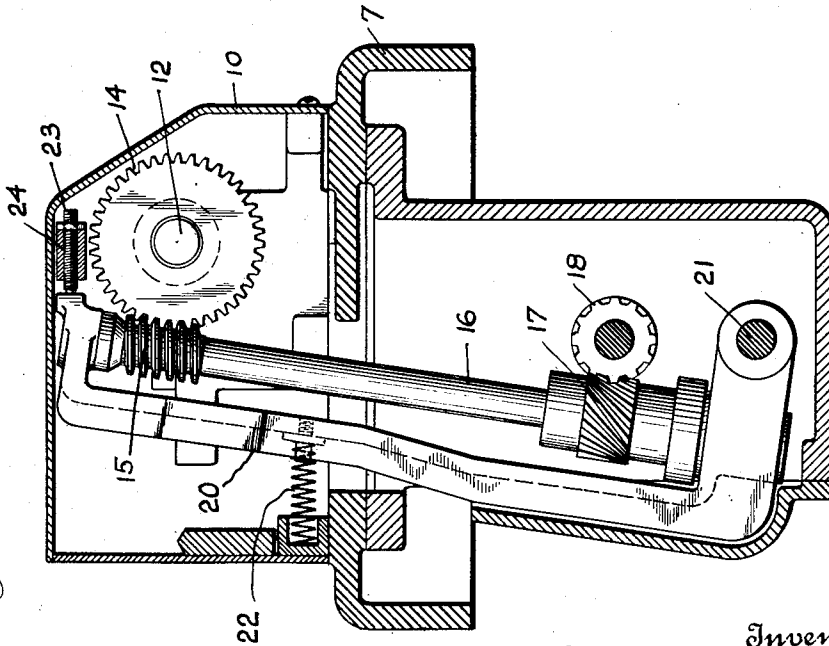


Fig. 5.



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5 Sheets-Sheet 5

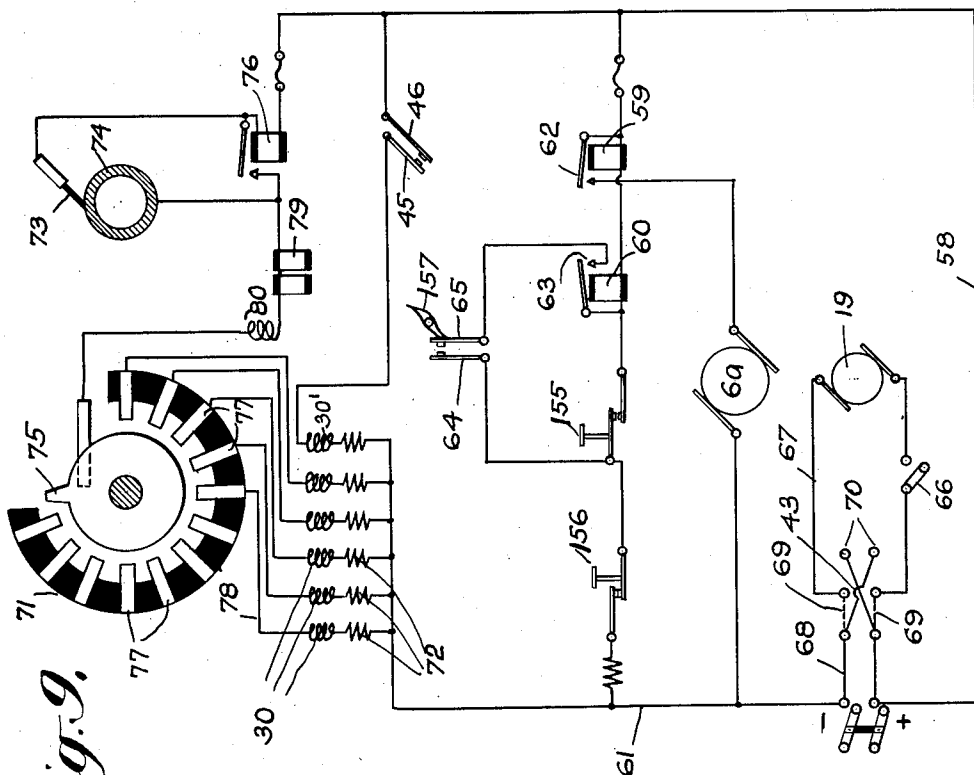


Fig. 9.

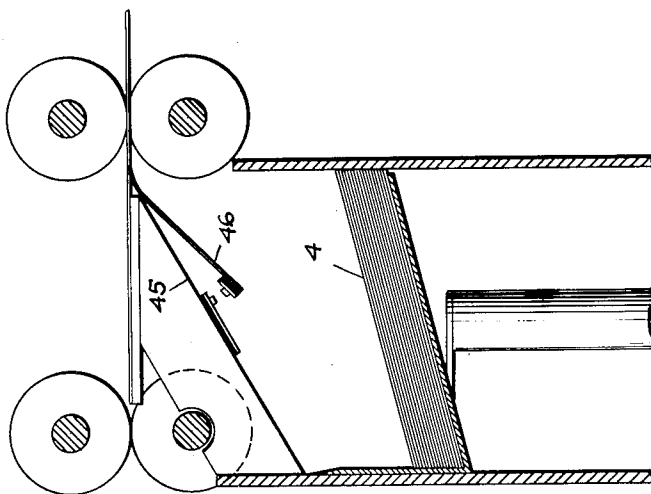


Fig. 8.

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UNITED STATES PATENT OFFICE

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COUNTING ATTACHMENT FOR ACCOUNTING MACHINES

Application filed January 25, 1927. Serial No. 163,333.

This invention relates to sorting machines and more particularly to a counting attachment which will automatically and accurately count the cards which pass through the analyzing mechanism.

For the purpose of clearly disclosing my invention it has been shown as applied to a sorter of the horizontal type disclosed in my copending application Serial No. 748,347, filed November 7, 1924.

The principal object is to provide a counter of improved construction for counting record cards operated on or fed through a machine which operates upon successive perforated cards.

An object of my invention is to provide an apparatus that will automatically and accurately record the number of cards entering each pocket and thus indicate the number of cards in each classification.

Another object is to provide a machine in which the counting is effected as the cards pass through the analyzing unit.

Another object is to provide a device of the character wherein a constantly operating part of the machine is caused to intermittently actuate a counting element whenever a card is fed.

Another and more specific object is to provide a counting device having a constantly rotating shaft and a plurality of counting wheels held against rotation which may be released to be frictionally actuated by the rotating shaft for operation.

Various other objects and advantages of my invention will be obvious from the following particular description of the mechanism embodying the invention and from an inspection of the accompanying drawings in which a practical embodiment of my invention is disclosed, but as such illustration is primarily for purposes of disclosure it will be understood that my invention may be modified in various respects without departure from the broad spirit and scope of the invention as hereinafter defined and claimed.

In the accompanying drawings I have shown for the purpose of illustration one form of mechanism embodying my invention in which:

Fig. 1 is a front elevational view of a sorting machine;

Fig. 2 is a front elevational view of my counting device for use in connection with such sorting machines;

Fig. 3 is a sectional view of one of the counting wheels taken on line 3—3 of Fig. 4;

Fig. 4 is a partial plan view with part of the casing broken away and parts in section to show the construction of the counters;

Fig. 5 is a sectional view of the counter driving means taken on line 5—5 of Fig. 4;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4 showing the electrical means for operating one of the unit counter wheels;

Fig. 7 is a detail of the transfer mechanism between the different counter wheels;

Fig. 8 is an elevational view of the reject pocket showing the contacts for counting cards entering this pocket; and

Fig. 9 is a circuit diagram of the sorting machine including the control of my counting device.

In Fig. 1, for the purpose of illustration I have shown a horizontal sorter comprising a casing 1, an analyzer unit 2, a plurality of card pockets 3 and 4 respectively, the latter designating a reject pocket.

In the operation of the sorter a stack of cards to be sorted are placed in the feed magazine 5. The operator by means of a crank 6 moves the analyzing brush so that it will traverse the desired index column on the cards as they pass under it. The machine is then started, being driven by a motor 6a and the cards are fed one by one from the bottom of the stack into the analyzer whence passage of each card is directed into one of the 13 receiving stations 3 and 4. As the operation of this sorter is fully described in my copending application it is therefore unnecessary to go into detail.

A counter mechanism according to the invention is illustrated in Fig. 2 and by way of example shows a device which may be used as an accessory in connection with sorting machines for automatically counting the cards entering the several pockets. The counter need not be a separate unit, however, as it is quite feasible to physically at-

tach it to the sorter or assemble it as an integral part thereof when the sorter is built.

As disclosed in Fig. 2, my counting device comprises a base 7 on which are mounted a plurality of individual counters 8; a grand total counter 9 and a covering or casing 10, the several counters being identified by suitable indicia marked on the casing.

Referring more particularly to Figs. 4, 5 and 6, the operation of my automatic counting device may be easily understood. In Fig. 4 an improved type of counter is disclosed having a plurality of counting wheels 11 freely mounted on a continually revolving shaft 12. The counting wheels are grouped in sets of four, each counter comprising from right to left a units wheel 11a, a tens wheel 11b, a hundreds wheel 11c and a thousands wheel 11d. Of course, it is obvious that the grand total counter 9 will contain more counting wheels. Although I have specified the counters as containing the above denominations I do not want to be confined to same as any number of counting wheels may be incorporated in each counter.

The counting wheels 11 as previously mentioned are freely mounted on the shaft 12 and arranged to be frictionally driven thereby, that is as the shaft rotates the wheels tend to rotate with it but may be held against rotation. Between adjacent wheels are placed friction discs 53 each of which has a pin 54 extending into a longitudinal groove 47 of the shaft 12. The discs are therefore free to slide longitudinally on the shaft but rotate with it. Between adjacent counters is mounted a disc or washer 52 against which spider springs 50 and 51 rest and force the friction discs into frictional engagement with the counter wheels. The friction between the sides of these discs and the counting wheels tends to rotate the latter with the shaft but permits them to be held stationary in spite of the rotation of shaft 12 when desired.

The counter wheels consist of a perforated flanged disc 55 to which is attached an escape wheel 26 (see Fig. 6).

Coacting with each escapement wheel is an escapement pawl indicated at 27 for the units wheel and at 39 for the remaining wheels. The escapement pawls are mounted on a rod 28 extending parallel to the shaft 12 and are suitably spaced by sleeves or bushings 57. The escapement pawl 27 is different in form from the pawls 39 as may be seen by comparing Figs. 6 and 3. The pawl 27 for the units wheel 11a (see Fig. 6) is actuated by a magnet 30 while the escapement pawls 39 for the wheels of the higher denominational orders are actuated only in response to a transferring operation.

Fast to the shaft 12 at 13 is a worm gear 14 (see Figs. 4 and 5) meshing with a worm 15 fixed on to the upper end of the shaft 16. A spiral gear 17 fixed on the lower end of

the shaft meshes with a gear 18 which is revolved by the motor 19 (see Fig. 2). The shaft 16 is journaled at its ends in a bracket 20 pivoted on a rod 21. The bracket 20 is biased by a spring 22 which tends to push the worm 15 against its coacting gear 14, to prevent lost motion between the parts. Also should it be desired to zeroize the counters manually this may be effected by moving the worm 15 out of mesh with the worm gear 14 and then manually turning the shaft 12 backward. While no handle is shown on the shaft for this purpose it is obvious that one may be readily provided. A set screw 23 mounted in a block 24 fixed to the frame of the counting device acts as a means for adjusting the pressure between the two coacting members 14 and 15.

Reference will now be had to Fig. 6 for a detailed explanation of the electrically controlled means for actuating the units counting wheel 11a to which is fixed the escape wheel 26 coacting with the units escapement pawl 27 pivoted at 28 and biased by a spring 29. The upper detent 35 of the pawl normally engages a tooth of the escape wheel 26 and holds it and the associated counter wheel against rotation, the friction discs 53 sliding against the sides of the escape wheel 26. When an index point on a card is sensed by the analyzing means a circuit is closed energizing magnet 30 which attracts its armature 31, pivoted to the frame of the counter by means of a spring 32 and a set screw 33, the set screw being merely for the purpose of adjusting the tension of the spring 32 on the armature 31. When the armature 31 is actuated it rocks the units escapement pawl 27 about its pivotal point 28 thereby removing the upper detent 35 from engagement with the tooth of the escape wheel 26. The friction between the discs 53 and the counter wheel then causes it to rotate with the shaft 12. The lower detent 34, owing to the rocking of pawl 27 moves into the path of an escape wheel tooth and stops the rotation of the wheel after it has moved a fraction of a tooth space. The energization of the magnet 30 is instantaneous and when the armature 31 is released the spring 29 pulls the lower pawl detent 34 out of engagement with the escape wheel 26 and the upper pawl detent 35 into engagement with the escape wheel permitting the wheel to be turned until the next tooth engages the upper detent 35. The counting wheel 11a during this operation will have turned one step and counted one.

One unit is entered on the units wheel for each card which is to be counted by a particular set of counters and when the number of cards exceeds nine transferring must be effected to the tens wheel 11b.

Similarly when the number of cards exceeds 99 one unit must be transferred to the hundreds wheel 11c. The pawls 39 between

the higher denominational orders differ from that between the units wheel 11a in that they are not operated by a magnet but merely in response to a transferring operation from the lower adjacent wheels. A wheel of a higher denominational order is shown in Fig. 3, the pawl for this wheel being provided with a cam piece 37 having a cam surface 38.

Carried by each escape wheel 26 is a lug 36 (see Figs. 3 and 7). This lug is, of course, carried in a circular path by the wheel. The cam piece 37 reaches into the path of the lug 36 on the escapement wheel of the next lower order and as the lower order wheel passes from its nine to its zero registering position the lug coacting with cam surface 38 rocks the pawl 39 of the adjacent counter wheel thereby entering one unit on this wheel, the operation of the pawl being exactly similar to that just explained for the units wheel. The operation of the hundreds and thousands wheels 11c and 11d are similar in every respect there being provided an escapement pawl for each counter constructed in the manner just described and shown in Fig. 3.

In order to employ a large counting wheel which would permit of making the parts bigger and with figures which could be easily read I have constructed a type of counting wheel containing two sets of figures from 0 to 9. Therefore one wheel turns one-half a revolution in counting from one to ten instead of a complete rotation as would be the case if the full circumference of the wheel were used for one set of figures. For this reason there is an additional lug 36' on each wheel the second one being diametrically opposite to the one shown in Fig. 7 and being associated with the second set of figures.

To clear or zeroize the counters the driving shaft 12 is rotated backward. This may be done by reversing the direction of rotation of the driving motor 19 by means of a switch 43 (see Fig. 9). This in turn through the worm 15 as heretofore described will effect backward rotation of shaft 12. As the counters are frictionally mounted on the shaft 12 they will also turn in a backward direction until either of the lugs 36 or 36' come into contact with the surface 44 of the cam piece 37 (see Fig. 7) whence they will be held into position until all the other counting wheels have been restored to zero. I have provided an escapement pawl for each counter wheel the thousands counter wheel having an escapement pawl merely for the zeroizing operation as there is no transfer from this counter wheel. When the counting wheels are thus stopped at zero the shaft continues to rotate in a counter-clockwise direction, slippage taking place between the friction discs mounted on shaft 12 and the counter wheels.

Fig. 9 is a circuit diagram showing the electrical control of the operation of the ma-

chine. Some of the circuits in this diagram are well known and need not be described in great detail in the present specification. For instance, the motor for operating the sorter is shown at 6a. The starting key for bringing this motor into operation is shown at 155. The stop key for stopping the machine at will is shown at 156. The card lever for maintaining the machine in operation as long as the cards are feeding properly is shown at 157. To start the machine the start key 155 is depressed and closes a circuit as follows: from the positive side of the line 58 through motor relay 59, through start relay 60, start key 155 now being depressed, stop key 156 normally closed and back to the negative side of line 61. This circuit energizes motor relay 59 closing contacts 62 and thus completes the circuit through the sorter motor 6a as follows: from the positive side of the line 58 through contact 62 through the sorter motor 6a thence back to the negative side of the line 61. This permits the contact 62 to open the circuit through the sorter motor 6a and the machine will stop. When the start key 155 is depressed causing a circuit through the start relay 60 energization of this relay causes closure of contact 63 so that the current is shunted around the start key 155, through card lever contacts 64 and 65 as soon as the first card comes into contact with the lever 157 to close the contacts 64 and 65. The operator may then release the start key and the circuit for maintaining the machine in operation is as follows: from the positive side of the line 58 through the motor relay 59 through start relay 60 through contact 63 through card lever contacts 64 and 65 through the stop key 156 back to the negative side of the line 61. If the operator wishes to stop the machine he depresses the stop key 156 opening the circuit through the sorter motor 6a and the machine will stop. Should there be an interruption in the feeding of the cards the card lever 157 closing contacts 64 and 65 will open breaking the circuit through the motor relay 59 permitting the contact 62 to open and thus opening the circuit to the sorter motor 6a and the machine will stop. The failure of current through start relay 60 will also permit contacts 63 to open, so that the machine cannot again be started except by depression of the start key. The motor 19 operating the counting device is connected to the positive side of the line 58 through a reversing switch 43 through the starting switch 66 to one side of the motor 19 and through line 67, reverse switch 43, line 68 back to the negative side of the source. This is adapted to drive the motor in one direction. By throwing the switch blades 69 over to the opposite switch poles 70 the direction of flow of the current may be reversed to cause the motor 19 to operate in

the opposite direction in order to zeroize the counters as already described. In my aforesaid copending application I have shown and described a distributor which is here illustrated at 71 each of the contact points 77 in this distributor being connected through a wire 78 to the negative side of the source through the counter magnets 30. Included in each of the circuits is shown a resistance 72. The analyzing brush of the sorting machine is shown at 73 and senses perforations in a card reaching therethrough and engaging common contact roller 74. Presuming a card to be passing under the analyzing brush 73 and having a perforation at the index point representing 5 it will be understood that the perforation will register with the brush 73 simultaneously with the registering of the common contact 75 with the contact point 77 representing the digit 5. This will close the contacts simultaneously and cause current to flow as follows: from the positive side of the line 58 through relay 76, through brush 73 to the common roller 74, sorter magnet 79 common contact 75, contact point 77, line 78, through the counter magnet 30 back to the negative side of the line 61. Thus the counter associated with the index point 5 or with the pocket receiving these cards will be actuated to count 1. The magnet 30 associated with each of the other index points or sorter pockets operates similarly. The sorter magnet 79 operates to cause the card to enter the proper pocket as disclosed in my aforesaid pending application. The reject pocket that receives all cards that are not sorted into any of the other pockets as shown in Figs. 8 and 9 has a separate set of contacts 45 and 46 which when closed by a card entering the pocket causes a circuit through a counting magnet 30' as follows: from the positive side of the line 58 through contacts 45 and 46, counting magnet 30' back to the negative side of the line 61. This operates the counter associated with the reject pockets. The grand total counter 9 may be connected so as to count all cards fed through the analyzer including cards fed to the reject pocket or it may be connected so as to only count the cards being fed into the regular sorting pockets. In the present diagram I show at 80 a magnet for counting the cards entering all the pockets except the reject pocket. In this position whenever any card is sensed by the brush 73 of the machine having a perforation associated with any of the regular sorting pockets closing a circuit through the sorting magnet 79 it also closes a circuit through some one of the counting magnets 30 and also through grand total counter magnet 80. Thus the magnet 80 of the grand total counter will operate whenever any of the counting magnets 30 function.

While I have shown and described and

pointed out the fundamental novel features of the invention as applied to a single modification it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. I intend to be limited therefore only as indicated by the scope of the following claims.

I claim:

1. In a machine for operating on a run of continuously moving record cards bearing designations; counters, each corresponding to a different designation, constantly running driving means for the counters, and card-controlled detents for the counters adapted to release said counters to be driven by said means one step at a time at a rate of speed independent of the rate of movement of the cards for counting the number of cards bearing the same designation.

2. In a machine for operating on a run of continuously moving record cards bearing designations in the form of index points differentially positioned on the card; counters, each corresponding to a different designation, and constantly running driving means for the counters controlled by the cards for operating said counters at a rate of speed independent of the rate of movement of the cards to count the number of cards bearing the same designation.

3. In a sorter for sorting a run of continuously moving record cards into groups in accordance with the card designations; counters, each corresponding to a different designation, a driving device constantly urging the counters for movement in a direction to count, and means normally restraining the driving device from moving the counters and controlled by the cards for causing the latter to actuate said counters one step at a time at a rate of speed independent of the rate of movement of the cards to count the number of cards in each sorted group.

4. In a machine for operating on a run of continuously moving record cards bearing designations in the form of index points differentially located on the cards; counters, each corresponding to a different designation, and a constantly running shaft on which the counters are mounted rendered effective by the cards for driving said counters one step at a time at a rate of speed independent of the rate of movement of the cards to count the number of cards bearing the same designation.

5. In a machine for operating on a run of continuously moving record cards bearing designations in the form of index points differentially located on the card; counters, each corresponding to a different designation, positive mechanical operating means controlled by the cards for driving said counters at a

rate of speed independent of the rate of movement of the cards to count the number of cards in the run bearing the same designation, and means for positively stopping a counter after it has been driven a single counting step.

6. In a machine for operating on a run of continuously moving cards bearing designations in the form of index point differentially located on the card; counters, each corresponding to a different designation, and motor-driven continuously running positive mechanical driving means for the counters controlled by the cards for operating said counters one step at a time at a rate of speed independent of the rate of movement of the cards to count the number of cards bearing the same designation.

In testimony whereof I hereto affix my signature.

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