June 11, 1935. E. P. SCHNEIDER 2,004,835

MONEY COUNTING MACHINE

Filed May 15, 1933 2 Sheets-Sheet 1

Fig. 1.

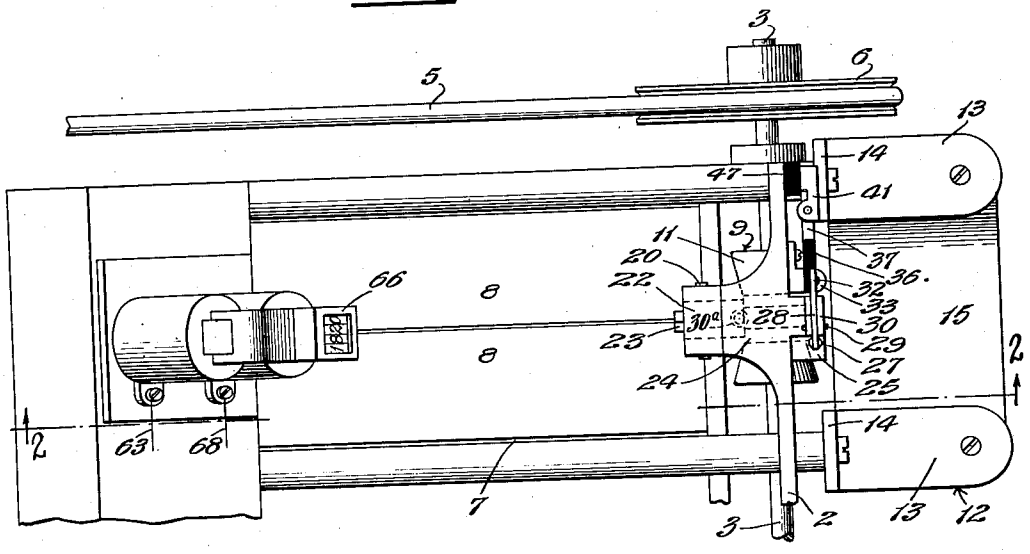
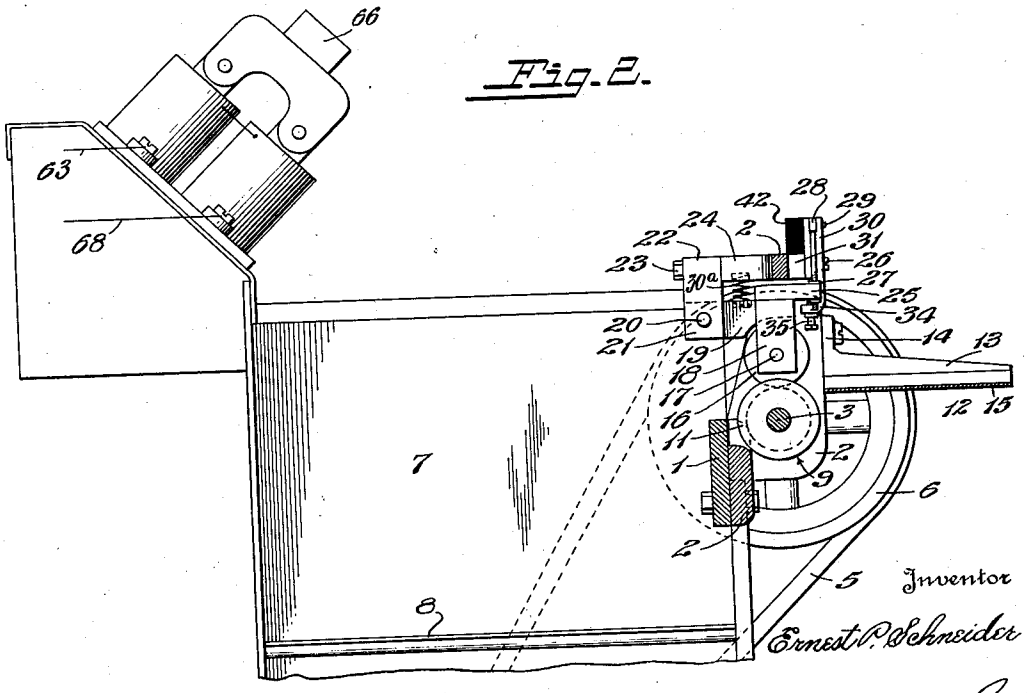


Fig. 2.



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Fig. 3.

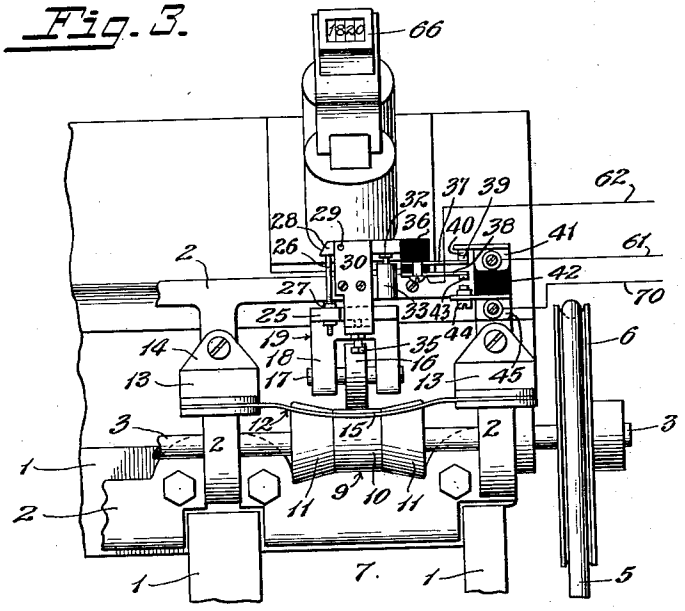
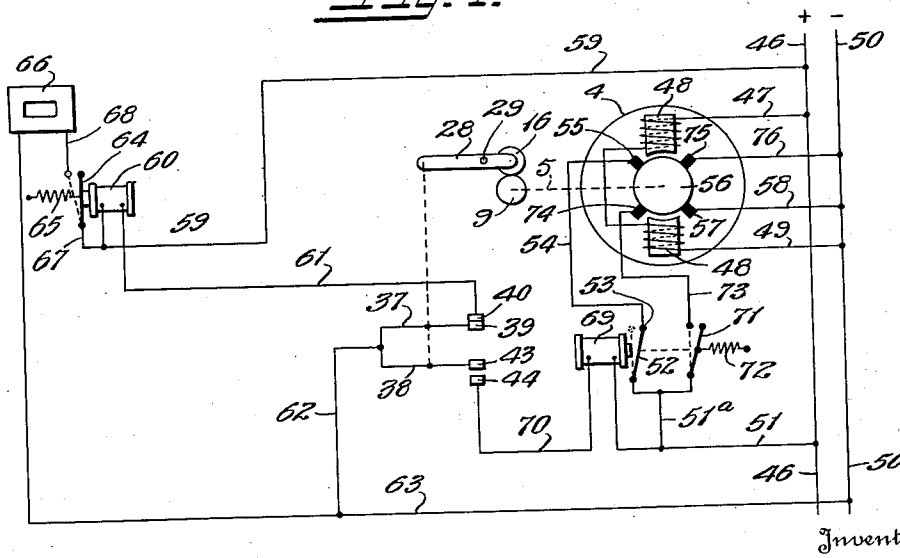


Fig. 4.



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MONEY COUNTING MACHINE

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Application May 15, 1933, Serial No. 671,263

15 Claims. (Cl. 271—57)

The invention relates to money counting machines and has for its objects to provide certain new and useful improvements in machines for counting bills or paper currency.

An important object of the invention is to provide positive means for insuring against the reception of more than one bill at a time by the feeding mechanism which latter in turn actuates the counting mechanism of the machine.

By this invention an unintentional or attempted insertion of more than one bill at a time to the feeding mechanism results in a reversal of the feed in such manner as to return the plurality of bills to the operator and thus preclude their passage to the receiving receptacle.

A further and important object resides in the provision of means for materially reducing wear in the accurately ground feeding rolls, with attendant prolongation of useful service without adjustment or repair, as well as greatly minimizing if not entirely eliminating the objectionable noise of operation heretofore incident to machines of this character.

A further and important object is the installation of a properly located cut-out whereby a bill having a hole or damp spot near its center is prevented from registering twice, the damp spot being caused by the operator wetting his fingers on a sponge in the customary way of money counters. This difficulty has been present in former machines in which the bill interrupted an electric circuit normally established between the feed rolls, for the purpose of registering the passage of the bill.

In money counting machines of the general nature to which the present improvements are directed, as shown for example in U. S. Patents 1,328,263, 1,803,624 and 1,839,973, a pair of contacting positively driven feed rollers are positioned to receive the bills or currency to be counted and carry the same successively to a suitable receptacle located below and in the rear of the feed rollers. In their passage through the feeding mechanism each bill breaks the circuit and actuates electrical means such as a relay which in turn actuates a counting device positioned on the machine within convenient view of the operator. In these machines it has been the practice to position the upper and lower feed rollers normally in contact with one another and when the motor is energized there results objectionable noise in operation and undesirable wear on the delicately ground feed rollers when no currency is being counted by the machine. It has further been the practice to provide means for automatically stopping the machine when two or more superimposed bills are fed to the rollers. The adjustment has been such as to close an electrical circuit and immediately stop the machine, preferably by means of a brake under such inadvertence on the part of the operator. Furthermore, in machines of the character stated the counting device is actuated by a relay suitably placed in circuit with the driving motor which relay operates when the circuit is broken to actuate the counting device for a single operation. The normally closed circuit has been heretofore obtained by means of a spring or brush normally bearing against the lower feed roll, on each side of the upper feed roll, which normal contact of the brushes is broken by the insertion of the bill between the feed rollers. This manner of operation is objectionable because arcing occurs at the feed roller when the current is broken to actuate the relay and counting device. This arcing in time corrodes and pits the finely ground and delicately adjusted lower feed roller with consequent deleterious effects in successful operation of the machine. By this invention any possibility of objectionable arcing between the feeding rollers is completely eliminated.

The present invention completely obviates and removes all of the above described disadvantages and objectionable features heretofore found inherent in machines of this character, and a positively accurate and operable machine is obtained which is admirably suited for present day needs, as in banks or the like, where there is occasion for the sorting and counting of paper currency.

With such objects in view, as well as other advantages which may be incident to the use of the improvements, the invention consists in the use of the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportions and arrangement without departing from the nature and scope of the invention.

In order to make the invention more clearly understood there are shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements, in their useful applications, to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In said drawings:

Fig. 1 is a plan view of a portion of a machine embodying the invention.

Fig. 2 is a vertical section on line 2—2 of Fig. 1.

Fig. 3 is a front elevation of the structure illustrated in Fig. 1.

Fig. 4 is a wiring diagram illustrating the several electrical circuits embodied in the machine and automatically actuated control devices therefor.

Referring to the drawings, 1 indicates the

frame of the machine having journaled therein as by brackets 2, a shaft 3 extending transversely of the frame at the front portion thereof. The shaft 3 is driven by an electric motor 4 (Fig. 4) suitably attached to the machine and directly driving said shaft through the medium of a belt 5 engaging a pulley 6 secured to the shaft 3.

The frame 1 is provided with a plurality of aligned compartments 7 designed for the reception of sorted paper currency or bills of various kinds or denominations and each compartment is provided with a hinged bottom 8 and a separate feeding and counting mechanism constructed, arranged and operated in accordance with the present invention. Since the mechanism is identical in construction and operation for each compartment, only one of said compartments and the mechanism associated therewith has been illustrated and will be described. The money is received by the compartment 7 after the same has passed through the feeding mechanism and is recorded by the counting device. Suitable means (not shown) are provided on the machine for dumping the compartment after a certain number of counted bills is received therein.

The feeding mechanism for each compartment of the machine includes a lower feed roller 9 fixed on the shaft 3 to rotate therewith, said feed roller having a central portion 10 of accurately ground tool steel or the like and outwardly tapered end sections 11 preferably constructed of aluminum. Such construction imparts a U shape to the bill and insures proper stacking of same when fed longitudinally to the feeding mechanism. A feed table 12 including end supports 13 is mounted as by integral lugs 14 on the bracket 2. An intermediate sheet or plate of celluloid 15 or other material with antifrictional properties having a downwardly flexed or concave central portion, is carried by or secured between the end supports 13 of the feed table 12 for receiving and supporting currency to be fed to the machine.

An upper feed roller 16 is fixed on a shaft 17, the ends of said shaft being journaled in depending bracket members 18 of a roller supporting member or lever 19 pivotally mounted at its rear end at 20 between ears 21 of a depending bracket member 22 in turn secured as by screws 23 to a rearwardly extending lug 24 of the bracket member 2. The upper feed roller 16 with its supporting lever 19 is mounted for slight pivotal movement on the bracket member 22 and the supporting lever has secured thereto at its forward end a projecting plate 25. A vertically extending pin 26 projects through an aperture in the plate and is adjustably mounted relative thereto by means of upper and lower set screws 27—27. The upper end of the pin 26 normally contacts with one end of a substantially horizontal lever 28 pivotally mounted at 29 between ears of a bracket 30 which is secured to a forwardly extending lug 31 of the bracket 2. The opposite end of the lever 28 is normally urged upwardly by means of an adjustable spring pressed pin 32 slidably retained in a housing 33 secured to the bracket 2. The tendency of the spring pressed pin 32 is to maintain contact between the opposite end of pivoted lever 28 and the vertically extending adjustable pin 26 carried by the plate 25. The lever 19 and the roll 16 carried thereby normally tend to swing downwardly toward the lower feed roller 9 and means are provided for obtaining an adjustable spacing of these rollers and to prevent their contact with one another at any time. The normal tendency of the lever 19 and roll 16 to swing downwardly may be by the influence of gravity or if desired a suitably disposed spring 30a may be provided for the purpose. This spaced relation of the rolls is the intended and normal arrangement of the mechanism. To this end I provide a downward and inwardly extending ear 34 on the lower end of the bracket member 30, which ear carries a vertically disposed set screw 35 secured in adjusted position by means of a lock nut. This set screw is engaged by the forwardly projecting plate 25 of pivoted lever 19 and limits downward movement of said lever on its pivot relative to the lower feed roller 9. By adjusting the said set screw any desired spacing between the feed rollers 9 and 16 may be obtained. Since the opposed faces of the upper and lower feed rollers are constructed of accurately machined and ground tool steel, I have found that prolonged successful operation of the machine is obtained by maintaining a normal spacing between said rollers of one-thousanth of an inch. Since the thickness of the average bill is about three and one-half thousandths, the insertion of a bill between the rollers will result in the upper roller being displaced upwardly about the pivot 20, and sufficiently by reason of the location of said pivot, to actuate the relay and counting mechanism to be described.

One outer end of the horizontally pivoted lever 28 has secured thereto a block of insulating material 36 which supports at its lower end a pair of electrically connected substantially parallel and horizontally disposed upper and lower spring contact members or leaves 37 and 38. A contact member 39 provided on the upper leaf 37 is adapted to normally engage an upper contact member 40 carried by a plate member 41 secured to the forward bracket member 2 and insulated therefrom by a block 42. A contact member 43 is also provided on the lower leaf member 38 and is normally spaced from a lower contact 44 adjustably mounted in a plate member 45 also secured to the forward frame member 2 and insulated therefrom by said insulating block or member 42.

With particular reference to Fig. 4, when the machine is in operation and when no bills or currency are being fed to the feeding mechanism, the shaft 3 and the lower feed roll 9 are rapidly rotated at a speed of approximately 700 R. P. M. by the electric motor 4. Under these conditions the motor 4 is energized by means of an electric current passing from the positive side of a source of direct current, such as a line wire 46, through wire 47, series connected field windings 48 and wire 49 back to the negative sides of said source, such as a line wire 50. Also, the armature winding is energized by virtue of an electric current passing from the positive line wire 46 through wires 51, 51, switch arm 52, contact 53, wire 54, brush 55 of motor 4, winding of armature 56, brush 57 and wire 58 back to negative lead wire 50.

An electric circuit is also established which passes from positive lead wire 46, through wire 59, winding of counter relay 60, wire 61, upper contact 40, lower contact 39, arm 37 and wires 62 and 63 to negative lead wire 50.

Under these conditions the motor 4 rotates in a direction to rotate the lower feed roll 9 to feed bills to the machine and also the counter relay 60 is energized to maintain a counter relay switch

64 open against the action of a spring 65, thereby maintaining the magnetically operated counter 66 in a de-energized condition.

When a single bill is inserted between the feed rolls the upper roll is forced upwardly to rock horizontally pivoted lever 28 downwardly a sufficient distance to open the normally closed upper contact members 39 and 40 but insufficiently to close the normally open lower contact members 43 and 44. The insertion of a single bill thus opens the circuit hereinbefore traced of the counter relay 60 and permits the switch 64 to close under the action of the spring 65. This completes a circuit for the magnetically operated counter mechanism, passing from positive lead wire 46 through wires 59 and 67, switch 64, wire 68, winding of magnetically actuated counter 66 and wire 63 to negative lead wire 50 which energizes the counter and to register a single bill. As soon as the bill passes rearwardly from between the feed rolls 9 and 16 the spring pressed plunger 32 (Fig. 3) swings the lever 28 upwardly and closes the upper contacts 39 and 40 thus re-establishing the circuit for the counter relay 60 and opening the switch 64.

The insertion of a plurality of bills between the upper and lower feed rolls, results in the former roll being moved upwardly as during normal operation thus opening the upper contacts 39 and 40, but the increased thickness of said bills moves the upper feed roll a greater distance, thereby obtaining an increased throw of the horizontally pivoted lever sufficiently to close the lower contact members 43 and 44. This closing of the lower contact members occurs as soon as the ends of a plurality of bills are inserted simultaneously between the feed rolls and brings into play the relay mechanism for reversing the motor.

When the lower contact members 43 and 44 are thus closed an electric circuit is established passing from positive lead wire 46 (Fig. 4) through wires 51, 51a, switch 52, winding of motor relay 69, wire 70, lower contact 44, lower movable contact 43, arm 38 and wires 62 and 63 to negative lead wire 50. This energizes the motor relay 69 and causes it to open to dotted position the switch 52 and to close a switch 71 against the action of a spring 72 as indicated by dotted lines. The opening of switch 52 interrupts the circuit previously traced for the winding of armature 56 but re-energizes this winding by a current of reverse polarity which traverses a circuit passing from positive lead wire 46, wires 51, 51a, switch 71, wire 73, brush 74, winding of armature 56, brush 75 and wire 76 to negative lead wire 50. The reversal of the polarity of the winding of armature 56 reverses the direction of rotation of motor 4 to cause the lower feed roll 9 in turn to reverse its direction of rotation to immediately and forcibly eject the plurality of bills from the machine toward the operator.

As soon as the bills are thus ejected from the machine the upper roll 16 resumes its normal position, thereby re-establishing the circuits hereinbefore described so as to again reverse the direction of rotation of motor 4 to that of normal operating conditions, i. e. motor and lower feed roll rotating in a direction to again feed bills between rolls 9 and 16. It will be noted that when a plurality of bills are introduced between the feed roll 9 and 16 as above described, the opening of the upper contacts 39 and 40 will actuate the magnetically operated counter 66 to register a single bill, notwithstanding the fact that no bill is introduced to the machine. To compensate for such undesired actuation the operator deposits one bill in the compartment behind the feed rolls and proceeds as before to feed the bills one at a time and as rapidly as desired to the feeding mechanism. The automatic rejection of two bills inadvertently inserted returns the switch contacts to normal position, i. e. upper switch closes and lower switch opens, which de-energizes the motor relay with consequent reversal of polarity in the motor armature circuit, thus obtaining the consequent reversal of the motor to rotate the lower main feed roll of the shaft in the desired direction as under normal operating conditions. The relay mechanism is capable of adjustment to permit the insertion of the bills one immediately following another so that the operator does not have to purposely feed the bills at a moderate speed to prevent error. The adjustment of the electrically operated relay devices is such as to insure accurate actuation of the mechanism by the insertion of each bill no matter how fast said bills are fed to the machine.

In the illustrated and described embodiment of the invention a reversible D. C. motor has been used. It will be obvious however, that other motors which are capable of being reversed may be used with necessary variations in circuit wiring, without departing from the invention as hereinafter claimed.

What is claimed is:

1. In a machine of the character described the combination of a bodily movable roll for feeding paper money to the machine, means for rotating said roll, and means actuated by the bodily movement of said roll caused by the insertion of a plurality of bills of paper money for reversing the direction of rotation of said roll to reject the said bills from the machine.

2. In a machine of the character described, the combination of a bodily movable roll for feeding bills to the machine, means for rotating said roll, and means actuated by the bodily movement of said roll when a plurality of bills are partially inserted, for reversing the direction of rotation of said roll rotating means to reject said bills from contact with said roll.

3. In a machine of the character described, the combination of a bodily movable roll for feeding bills to the machine, a motor for rotating said roll, and means actuated by the bodily movement of said roll occasioned by the partial insertion of a plurality of bills, for reversing the direction of rotation of said motor and said roll to reject said bills from the machine.

4. In a machine of the character described the combination of a pair of radially spaced rolls for feeding bills to the machine, one of said rolls being bodily movable, a reversible motor for rotating one of said rolls, and electrical means actuated by said movable roll upon the insertion of a plurality of bills for reversing the direction of rotation of said motor to obtain a reverse rotation of said roll to prevent the entry of said bills to the machine.

5. In a money counting machine, wherein an electrically operated counting device is combined with a pair of rolls adapted to feed bills to be registered by said counting device, one of said rolls being bodily movable to actuate said counting device: the combination of an electric circuit, a reversible motor in said circuit for rotating one of said feeding rolls, and an electric relay device in said circuit adapted to be energized by the movement of said bodily movable roll for reversing the normal direction of rotation of said mo-

tor to prevent the entry of a plurality of bills to the machine.

6. In a machine of the character described wherein, a roll for feeding bills to the machine is combined with a counting device for registering the number of bills delivered to said roll and a motor for rotating said roll: the combination of means actuated by the partial insertion of a plurality of bills for both actuating said counting device and reversing the direction of rotation of said motor and said roll to reject said plurality of bills from feeding contact with said roll.

7. In an electrically operated machine for counting paper currency wherein a roll for feeding bills to the machine and a motor for rotating said roll is combined with a counting device: the combination of means actuated by a bodily displacement of said roll for actuating said counting device, and means actuated by a greater bodily displacement of said roll for reversing the direction of rotation of said motor, whereby a reverse rotation of said roll is obtained to reject a plurality of bills from feeding engagement therewith.

8. In an electrically operated machine for counting paper currency wherein a pair of feeding rolls and a magnetic counting device are electrically connected together: the combination of adjustable means for spacing said rolls from one another to prevent wear and friction thereon, a reversible motor connected to the lower of said feed rolls and an electric relay device in circuit with said motor, said relay device being energized by a bodily movement of the upper of said

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paper bill to the machine, said movable roll being returnable by gravity to normal position after passage of each paper bill to out of contact therewith, to close said switch and re-energize said relay device to again hold said counting device from operation when no paper bill is fed to said rolls.

11. In a machine for counting paper currency wherein an electrically operated counting device is combined with a pair of rolls adapted to feed currency bills to be registered by said counting device: the combination of an electric circuit, a motor in said circuit connected to one of said feeding rolls for rotating the latter, an electric relay device in said circuit adapted to permit the actuation of said counting device, and a switch in said circuit operatively connected to one of said rolls, said switch being automatically actuated by a bodily movement of one of said rolls upon the insertion of a currency bill between said rolls, to actuate said relay device and said counting device to register the entry of said currency bill to the machine.

12. In a machine of the character described the combination of normally spaced rolls for feeding bills to the machine, said rolls being spaced apart a predetermined distance less than the thickness of a bill to be passed therebetween to eliminate wear of the rolls occasioned by frictional contact therebetween, means for rotating one of said rolls, and means actuated by the simultaneous insertion of a plurality of bills for controlling the movement of said rotating roll to prevent the passage of said plurality of bills

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