Feb. 14, 1961

T. E. HAYES

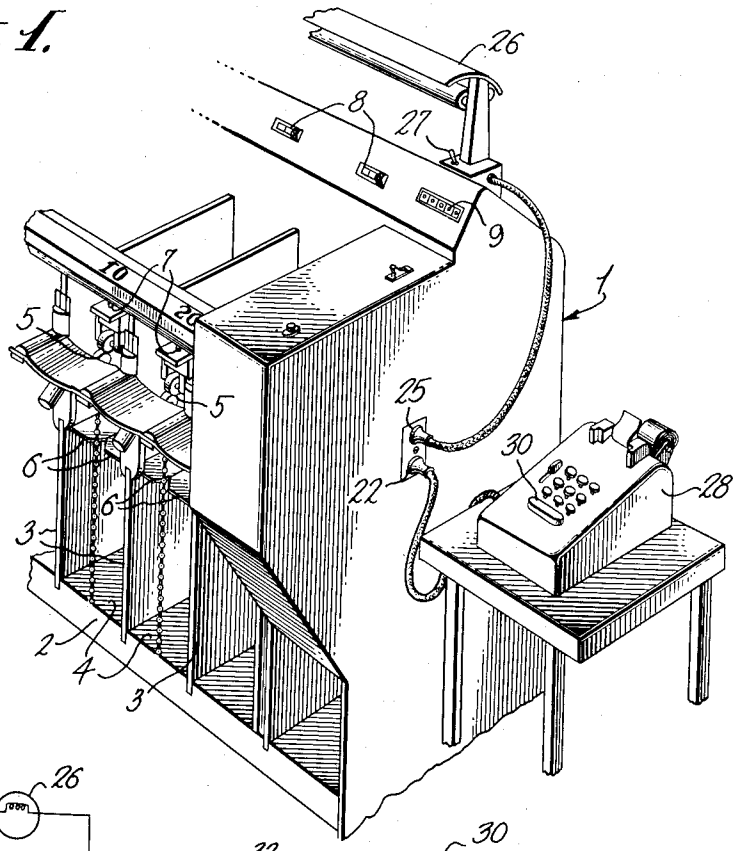
2,971,694

MONEY COUNTING MACHINE

Filed Aug. 2, 1957

2 Sheets-Sheet 1

Fig. 1.



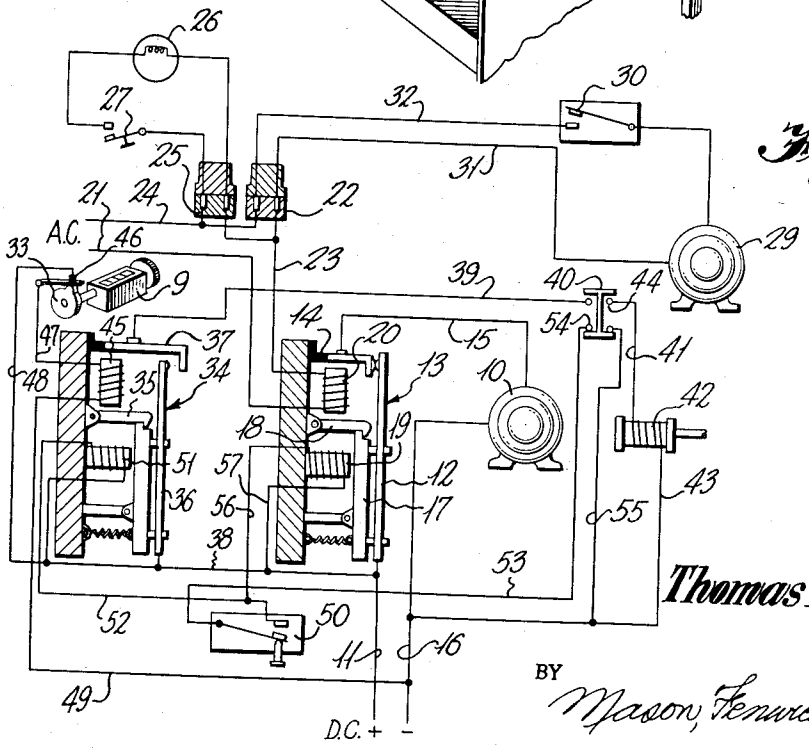


Fig. 2.

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Fig. 3.

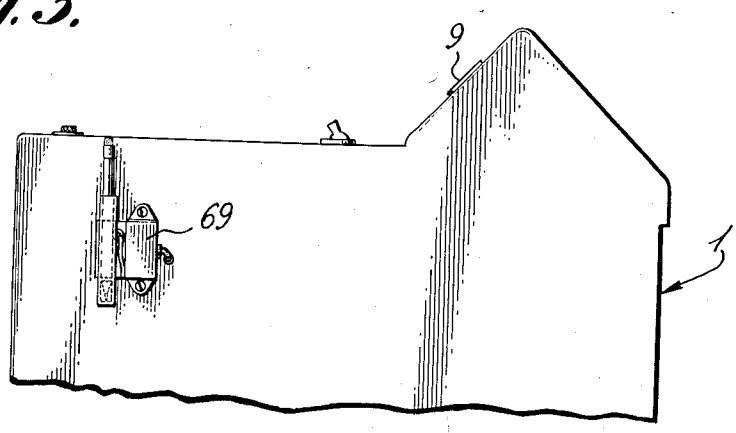
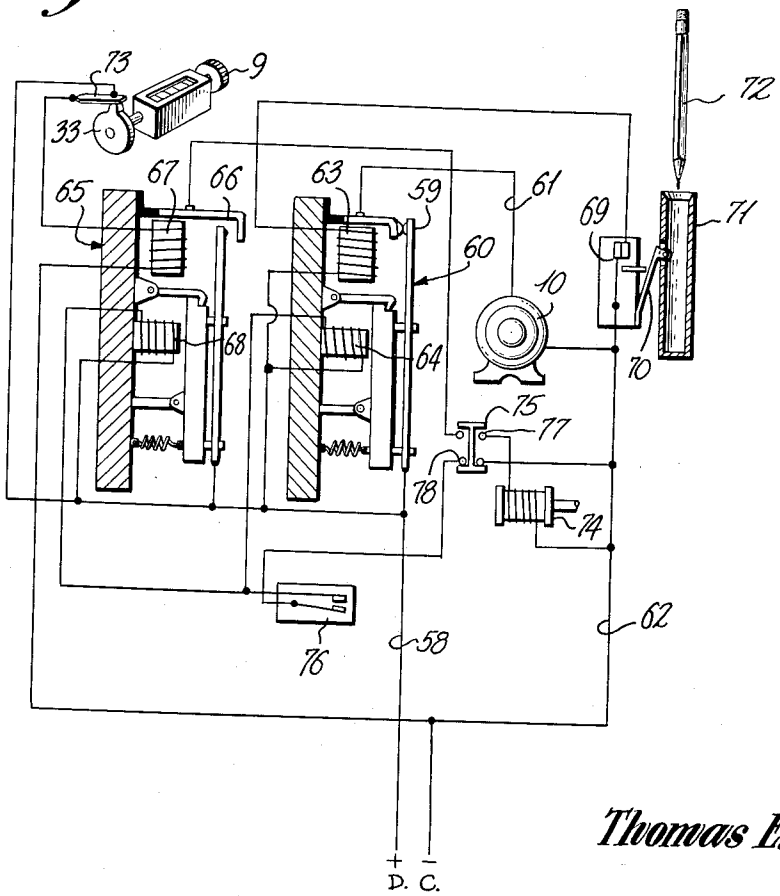


Fig. 4.



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MONEY COUNTING MACHINE

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4 Claims. (Cl. 235—92)

This invention relates to money counting machines and particularly to such machines used in the sorting and counting of paper currency. The invention is an improvement on the machine disclosed in my prior Patents No. 2,425,318, issued April 12, 1947, and No. 2,429,159, issued October 14, 1947.

The machine disclosed in Patent No. 2,425,318 consists of a cabinet divided into a plurality of compartments each designated for the receipt of paper bills of specific denomination. The bills are presented to feed roller couples at the entrances to the compartments, and passage of a bill through a feed couple causes separation of the rollers and closing of a micro-switch to initiate action of a piece counter, associated with the compartment into which the bill is fed to count the piece, and a totalizer, to add the value of the bill to the dollar total and activated by entrance of a bill into any compartment. When the bills drop into the compartments, they fall upon shelves which bridge the compartments above the bottom and support bills of a specific lot being counted. When the lot count is completed and verified, the shelves are dumped to deposit the bills into the lower sections of the compartments.

By this means the bills of a lot being counted are kept separated from other bills until the total count of the lot has been verified, so that if the count does not tally the bills may be removed from the shelves and recounted. It is essential, however, that the shelves be dumped and the totalizer reset to zero after each lot count to prevent inaccurate counts and mixing of the bills of several lots. Occasionally, however, an operator will forget to reset the totalizer and dump the flaps. Thus, the old total goes into the new count and the figures for the day will not balance.

In Patent No. 2,429,159 a machine is shown for sorting and counting bills of a single denomination where the total lot count is known. It was possible with this structure to have the machine automatically stop when the predetermined lot count had been reached. The machine disclosed could not be restarted until the flaps had been dropped and it was impossible to get consecutive bill lots mixed.

With the so-called mixed money machine of Patent No. 2,425,318 this was not possible, as the totalizer registered dollar value and there was no predetermined count upon which the machine could be automatically stopped.

It has become customary in operating the mixed money machine to use an adding machine to record the lot totals, to add in odd denomination bills for which no compartments are provided on the machine, and to obtain the total of all of the lots. It is also customary in some procedures for the operator to initial, or check, slips accompanying each bill lot when the total shown thereon has been verified by the machine.

The object of the present invention is to provide a money counting machine of the kind mentioned having means to which an adding machine, or a pencil, may be coupled to preclude the operation of the money counting machine after a bill lot count is completed without first resetting the totalizer and dropping the flaps.

A more specific object is to provide means which will break the counting machine motor circuit upon actuation of the adding machine, or removal of a pencil from a holder, with the circuit being closable only upon dumping of the shelf flaps.

Another object is the provision of a machine of this character wherein the flaps cannot be dropped until after the totalizer has been reset to zero.

Other objects of the invention will become apparent from the following description of practical embodiments thereof when taken in conjunction with the drawings which accompany, and form part of, this specification.

In the drawings:

Figure 1 is a perspective view of a portion of a money sorting and counting machine of the type contemplated by the present invention, showing an adding machine connected thereto;

Figure 2 is a diagrammatic view of the electric circuit for operating and controlling the motor of the machine;

Figure 3 is a partial side elevation of the machine showing a pencil holder thereon; and

Figure 4 is a diagrammatic view of an electric circuit for operating and controlling the machine motor wherein the pencil holder forms a part of the control.

Referring to the drawings in detail, and first to that form of the invention shown in Figures 1 and 2, there is shown a money counting machine of the general type shown in Patent No. 2,425,318, which includes a cabinet **1** divided by a horizontal partition **2** and vertical partitions **3** into a plurality of compartments **4**, for the receipt of paper bills of different denomination. At the upper front of each compartment, there is a feed-roller couple **5** which draws the bills presented to it into the respective compartments. When the bills enter the compartments they fall upon pairs of pivoted, and normally horizontal, shelves, or flaps **6**, where they are retained during the counting of a particular bill lot. As bills pass between the rollers of the feed couples, the upper roller is lifted and actuates a micro-switch **7** which, through circuits clearly shown and described in Patent No. 2,425,318, causes actuation of piece-counters **8**, associated with each compartment, and in turn a totalizer **9** which registers the dollar value for the particular compartment into which the bill is inserted. At the end of a count, the operator, after noting the total money value, should cancel the totalizer so that it will be set for zero for the next count and dump the shelves **6** so that the bills upon the shelves will drop into the lower portions of the compartments **4** for storage. The feed rollers of the machine are operated by a motor in a manner clearly disclosed in my prior patents and shown diagrammatically at **10** in Figure 2, and it is the control of this motor with which the present application is concerned.

Referring particularly to Figure 2, it will be seen that the motor **10** is in a circuit which includes the line wire **11**, movable contact arm **12** of a motor control relay **13**, fixed contact arm **14** of that relay, line **15**, motor **10**, and line wire **16**. Whenever contacts **12** and **14** are closed the circuit will be completed to the motor and the motor will drive the machine feed-rollers. Relay **13** is of the latch type, and contact arm **12** is carried by the armature **17** of the relay. Latch **18** is designed to hook over the end of armature **17** and hold the switch contact arms in closed position. Thus, the motor will operate as long as the relay is in latched position. The relay includes the coil **19** to draw up the armature to close the contacts and the latch coil **20** to lift the latch and permit the contacts to break. Current supplied to the motor through the line wires **11** and **16** is direct current.

Latch coil **20** of relay **13** is connected to one side **21**

of a source of alternating current, and to one side of an outlet socket 22 by means of a wire 23. The other side of the A.C. line 24 is connected to the outlet socket 22. The outlet may conveniently be a double socket, including the outlet 25, and be fixed upon the side of the money counting machine. Any suitable lamp 26, having an operating switch 27, may be mounted upon the machine and plugged into the outlet 25. Relay 13 has its latch coil 20 so designed that it will not function to retract the latch unless a predetermined minimum amount of current is drawn on the line and this minimum is set above that required to operate a lighting fixture. Thus, the lamp 26 can be plugged into the outlet and switch 27 closed completing a circuit from the A.C. supply through the lamp and also through the coil 20 but, due to the low wattage drawn, it will have no operative effect upon the coil 20.

The outlet 22 is adapted to receive an electric cord of an adding machine 28, which is to be used in conjunction with the money counting machine. In sofar as this application is concerned, it is only necessary to refer to the adding machine motor 29 (see Figure 2) and any one of the keys 30, such as the add, sub-total, or subtract keys which, upon depression, cause operation of the motor 29. The motor and one of these keys is shown diagrammatically in Figure 2, with the line 31 leading from the socket 22 to the motor, and line 32 from the motor to the socket 22, with key switch 30 being interposed in the latter line. It will be clear from Figure 2, that upon closing switch 30, a circuit will be completed which includes motor 29 and latch coil 20 of the relay 13. Motor 29 will draw more than the minimum wattage requirement for operation of coil 20, and each time the key 30 is depressed coil 20 will be energized, lifting latch 18 and permitting the relay contacts to separate and break the circuit to motor 10. Thus, each time the adding machine is operated to obtain a total, relay 13 will be tripped and the money counting machine will stop operation. The operation cannot be started until the relay is reset.

Means are provided to reset relay 13 only after the totalizer 9 has been cleared and the flaps 6 have been dumped. In order to accomplish this, a cam 33 is fixed upon the shaft of totalizer 9, so that when the totalizer is reset to zero position the cam will operate a switch to close a gap in a circuit adapted to cause dumping operation of the flaps upon manual operation of another switch. The dumping of the shelves, in turn, closes another switch similar to that shown in Patent No. 2,429,159 which closes a circuit through the relay coil 19 to draw up the armature of that relay and complete the circuit to the money counting machine motor 10.

To accomplish this sequence of control of the relay 13 and thereby the motor 10, another relay 34 is used.

This relay is also a latch relay, and its latch 35 operates to normally hold the switch contacts 36 and 37 open. Movable contact 36 is connected by wire 38 to the direct current line wire 11, and the fixed contact 37 is connected by the wire 39 to a shelf dumping switch 40, and from that switch by wire 41 to the shelf operating solenoid 42. Line 43 leads from the solenoid 42 to line wire 16. Thus, when the contacts 36 and 37 are closed, operation of switch 40 to close its contacts 44 will energize solenoid 42 to dump the flaps 6.

Contacts 36 and 37 are closed when latch coil 45 is energized. Coil 45 is connected to a switch 46 by means of wire 47 which is closed by cam 33 on the shaft of the totalizer 9. The switch is connected by wires 48 and 38 to the D.C. line wire 11. The opposite side of coil 45 is connected to the D.C. line wire 16 by wire 49. Thus, when the totalizer is reset to zero, cam 33 will close switch 46 completing the circuit through the latch coil 45. The latch will be lifted and relay contacts 36 and 37 will close. This will set up the circuit through the flap dumping solenoid 42 as described, and when the switch 40 is operated the flaps will be caused to dump.

During the dumping operation, a part of the flap-dumping mechanism will contact and close a switch 50 in the manner disclosed in Patent No. 2,429,159. In the present application, the switch 50 is included in a circuit through a reset coil 51 of the relay 34. This circuit includes line wire 11, line 38, coil 51, wire 52, switch 50, wire 53, contacts 54 of switch 40 and line 55 to line wire 16. As mentioned above, switch 40 is operated to close contacts 44 to energize the shelf-dumping operation. When the shelves are dumped, they will have closed switch 50, but at that time contacts 54 of the switch 40 are open so that the circuit through reset coil 51 is not complete. As soon as the operator releases switch 40, contacts 54 will close, completing the circuit through the coil 51. There will be sufficient mechanical lag in the return movement of the flaps from dumped position to hold switch 50 closed for a brief period which will be all that is necessary to reset relay 34. Switch 50 is also included in a circuit through reset coil 19 of the releay 13 so that both coils 19 and 51 will be energized simultaneously and both of the relays will be reset. This last mentioned circuit includes wire 56 from switch 50 to coil 19 and wire 57 from coil 19 to wire 38.

In use, an adding machine will be set up beside the money counting machine and its cord plugged into the outlet 22. The adding machine will be operated to indicate the first bill lot which is to be counted, and the money will be sorted and fed into the various compartments of the machine in accordance with the denominations of the bills. During the sorting and counting, odd denomination bills, that is, those infrequently encountered, such $2's, $50's, etc., which may be in the lot are put aside and their values registered on the adding machine. This same practice is followed if a torn bill, or other bill which would not feed through the rollers properly, should be in the lot. At the end of the count the total shown on the totalizer is put into the adding machine and the add key is pressed to secure a notation of the total value of the bills in the lot counted. When the add key 30 is pressed, the motor 29 of the adding machine is caused to operate drawing sufficient current on the line to energize the latch coil 20 of the relay 13, lifting the latch 18 permitting the relay contacts 12 and 14 to separate, breaking the circuit to the money counting machine motor 10 and stopping its operation. If the total shown on the adding machine tape is in agreement with the notation which accompanied the bill lot, the count has been verified. Before the next lot can be counted, however, the money counting machine must be started and this can be done only by resetting the totalizer to zero and thereby closing switch 46 to actuate coil 45 of latch relay 34 to set up the flap-dumping circuit. Switch 40 is then pressed and the flaps are dumped. In dumping, the flaps close switch 50 which sets up a circuit through the reset coils 19 and 51 of the relays 13 and 34, so that upon release of the switch button 40 these coils will be energized and the relays reset. Motor 10 will again start its operation. This cycle of operation may be continued through as many bill lots as may be desired. It will be evident with this particular structure that whenever the bill-counting operation is completed, the adding machine can be unplugged from the bill counting machine and moved elsewhere for other use.

As mentioned in the beginning of this specification, in some of the counting operations the operator initials a slip which accompanies a bill lot to indicate that the count has been verified. In these cases an adding machine is not necessarily used and, therefore, it is proposed that means be provided to hold a pencil used for initialing the slips, and to render the machine inoperative when the pencil has been removed from its holder. After insertion of the pencil in the holder the machine totalizer must be cleared and the flaps dropped in order to start the machine motor. This arrangement is shown in Figures 3 and 4 of the drawing.

In this form of the invention, the circuit to the motor includes line wire **58**, the normally closed contacts **59** of the relay **60**, wire **61**, and return wire **62**. Relay **60** is identical with the relay **13** of the form previously described and has a latch coil **63** and a reset coil **64**. A relay **65** is also used, similar to the relay **34** of the previous form. This relay has the normally open contacts **66**, latch coil **67** and reset coil **68**.

Latch coil **63** of relay **60** is included in the circuit with a normally closed switch **69** having its switch-operating arm **70** projecting into a tubular pencil holder **71**, so as to lie in the path of a pencil **72** being inserted in the holder. When the pencil is in the holder, it contacts the switch arm **70** and opens the switch points. When the pencil is removed, the switch points close. Thus, it will be seen that whenever the pencil is removed from the holder switch **69** will be closed and latch coil **63** energized to lift the latch of relay **60** and allow the contacts to separate breaking the motor circuit. When the pencil is inserted in the holder, latch coil **63** is de-energized.

As in the form previously described, the motor of the money counting machine can be restarted after interruption only by resetting the totalizer and dropping the flaps, therefore, the latch coil of relay **65** is included in the circuit with the switch **73** operated by the cam **33** of the totalizer **9**. This closes the circuit through the latch coil **67** and permits the contacts **66** to close, setting up a circuit through flap-dropping solenoid **74** upon closing of the switch **75**. When the flaps drop, they close switch **76**, so that when switch **75** is released opening the contacts **77** contacts **78** will close and complete circuits through the reset coils **64** and **68** of the respective relays, remaking the motor circuit and breaking the circuit through the flap-dropping solenoid.

With this form of the invention, the machine will stop when the operator removes the pencil to initial the slip accompanying a bill lot and, of course, the machine cannot be restarted without the clearing operations. The only way that a second lot can be counted without clearing, would be for the operator to neglect to initial a sheet. Thus, if there is an oversight, the uninitialed sheet will be a check on the operator's work.

The two embodiments of the invention which are disclosed herein each require the operator to follow a certain procedure with each bill lot that is counted. This procedure will cause the money counting machine to stop and it cannot be restarted without resetting the totalizer and dropping the flaps to let the bills upon the flaps fall into the lower portions of the compartments. Thus, the chance for human error is substantially eliminated.

While in the above practical embodiments of the invention have been disclosed, it will be understood that the precise structure shown and described is merely by way of illustration and the invention may take other forms within the scope of the appended claims.

What is claimed is:

1. In a machine for sorting and counting paper money having a plurality of bill-receiving compartments each divided depthwise by horizontally positioned downwardly swingable flap shelves into upper and lower chambers, bill-feeding means associated with each compartment to feed bills into the upper chambers to fall upon the flap shelves, a motor to operate said bill-feeding means, and a totalizing counter common to all compartments, in combination; an operating circuit for said motor including a latch relay having normally closed contacts, said relay having a latch coil and a reset coil, an adding machine having an operating key and a switch included in a circuit with said latch coil positioned so as to be closed when said key is depressed, whereby operation of the adding machine key will energize the latch coil to separate the relay contacts and stop said motor, means for causing downward swinging movement of said shelf flaps, a second latch relay having normally open contacts included in circuit with the shelf swinging means, a cam

associated with said totalizing counter, a switch in circuit with the latch coil of said second relay positioned to be closed by said cam when said totalizing counter is in zero position, whereby setting said totalizing counter to zero will cause energization of the second relay latch coil and closing of the normally open contacts to set up a circuit through the shelf-swinging means, and a switch operable by downward swinging movement of the shelf flaps in circuit with the reset coils of the respective relays, whereby said totalizing counter must be set at zero and the shelf flaps dumped to restore the circuit to said motor.

2. In a machine for sorting and counting paper money having a plurality of bill-receiving compartments each divided depthwise by horizontally positioned downwardly swingable flap shelves into upper and lower chambers, bill-feeding means associated with each compartment to feed bills into the upper chambers to fall upon the flap shelves, a motor to operate said bill-feeding means, and a totalizing counter common to all compartments, in combination; an operating circuit for said motor including a latch relay having normally closed contacts, said relay having a latch coil and a reset coil, a pencil holder mounted on said machine, a switch included in a circuit with said latch coil and mounted adjacent said holder and having an arm projecting into said holder, a pencil in said holder contacting said switch arm normally holding the switch open, whereby removal of the pencil will permit closing of the switch and energization of the latch coil to separate the relay contacts and stop said motor, means for causing downward swinging movement of said shelf flaps, a second latch relay having normally open contacts included in circuit with the shelf swinging means, a cam associated with said totalizing counter, a switch in circuit with the latch coil of said second relay positioned to be closed by said cam when said totalizing counter is in zero position, whereby setting said totalizing counter to zero will cause energization of the second relay latch coil and closing of the normally open contacts to set up a circuit through the shelf-swinging means, and a switch operable by downward swinging movement of the shelf flaps in circuit with the reset coils of the respective relays, whereby said totalizing counter must be set at zero and the shelf flaps dumped to restore the circuit to said motor.

3. In a machine for sorting and counting paper money having a plurality of bill-receiving compartments each divided depthwise by horizontally positioned downwardly swingable flap shelves into upper and lower chambers, bill-feeding means associated with each compartment to feed bills into the upper chambers to fall upon the flap shelves, a motor to operate said bill-feeding means, and a totalizing counter common to all compartments, in combination; an operating circuit for said motor, and an accessory for use with said machine including a switch, said accessory having a movable part adjacent said switch, said switch being operable by movement of said accessory part and forming part of said motor operating circuit, whereby said motor operation may be stopped by movement of said accessory part, means to cause downward swinging movement of said flap shelves including a switch operable to closed position by resetting said totalizing counter to zero, and a switch operable to closed position by downward swinging movement of said shelf flaps included in said motor circuit, whereby after said motor has been stopped by movement of said accessory part the totalizer must be set to zero and the shelf flaps swung downwardly before the motor can be restarted.

4. In a machine for sorting and counting paper money having a plurality of bill-receiving compartments each divided depthwise by horizontally positioned downwardly swingable flap shelves into upper and lower chambers, bill-feeding means associated with each compartment to feed bills into the upper chambers to fall upon the flap shelves, a motor to operate said bill-feeding means, and

a totalizing counter common to all compartments, in combination; an operating circuit for said motor including a latch relay having normally closed contacts, said relay having a latch coil and a reset coil, an accessory for use with said machine including a switch, said accessory having a movable part adjacent said switch, said switch being closeable by movement of said accessory part and included in a circuit with said latch coil, whereby movement of said accessory part will cause energization of the latch coil and opening of the relay contact to stop said motor, a circuit to cause downward swinging of said shelf flaps having a switch therein, a cam carried by the totalizing counter and operable when

the totalizing counter is set at zero to close the switch in the flap swinging circuit, a switch in circuit with said reset coil closeable by downward swinging motion of the shelf flaps, whereby said relay may be reset to re-establish the motor circuit after the totalizing counter has been set at zero and the shelf flaps have been swung downwardly.

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