May 12, 1953 T. E. HAYES 2,638,344

PAPER MONEY COUNTING MACHINE

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Fig. 1.

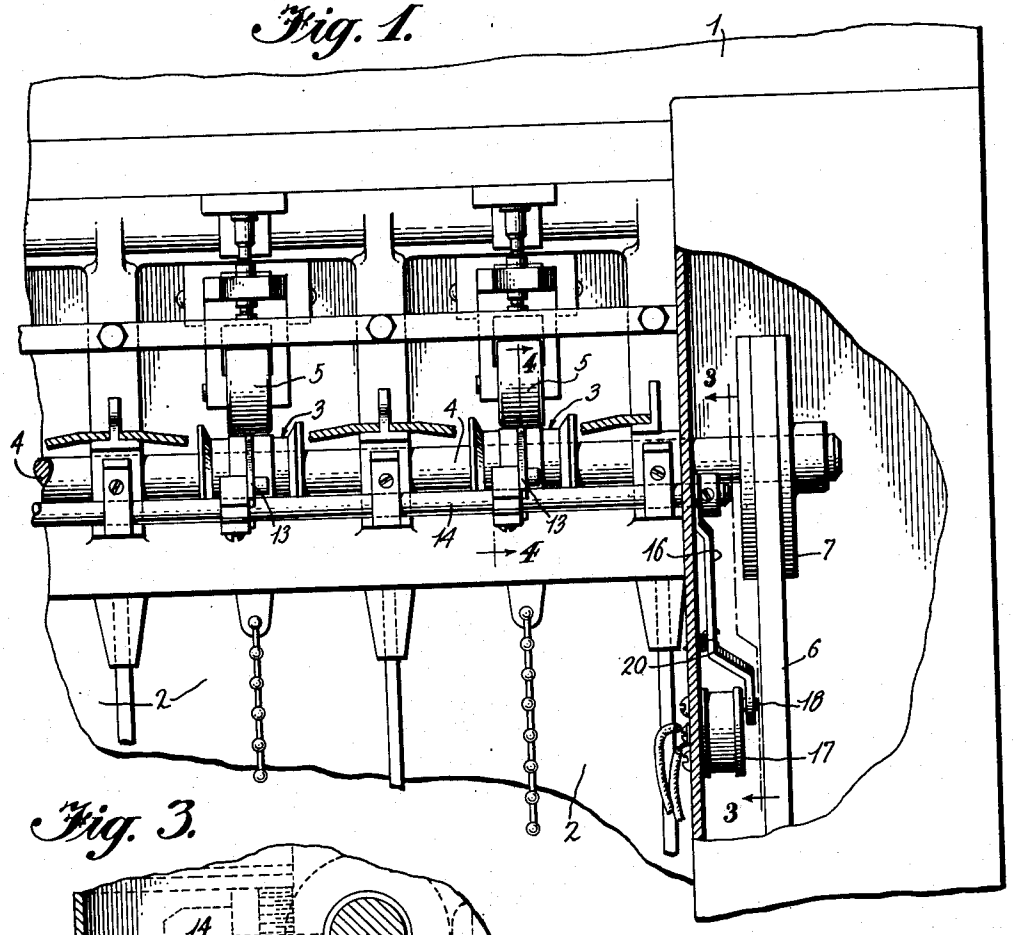


Fig. 3.

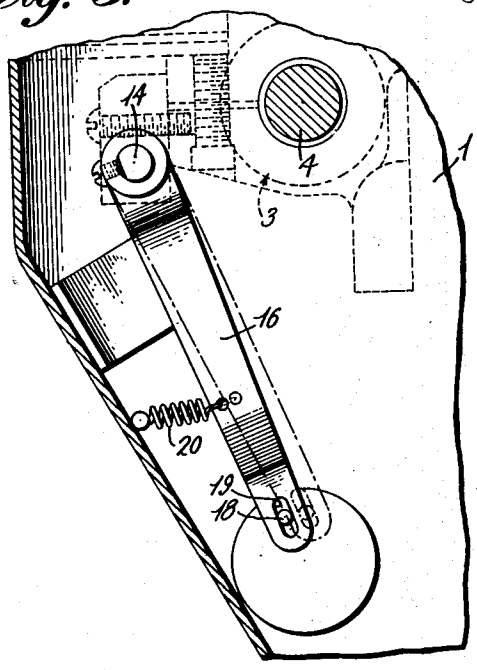
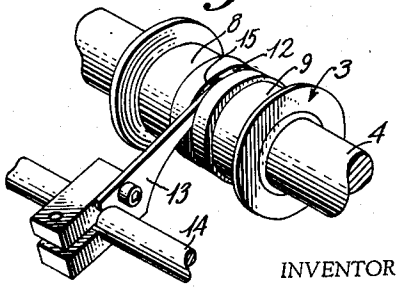


Fig. 2.



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Fig. 4.

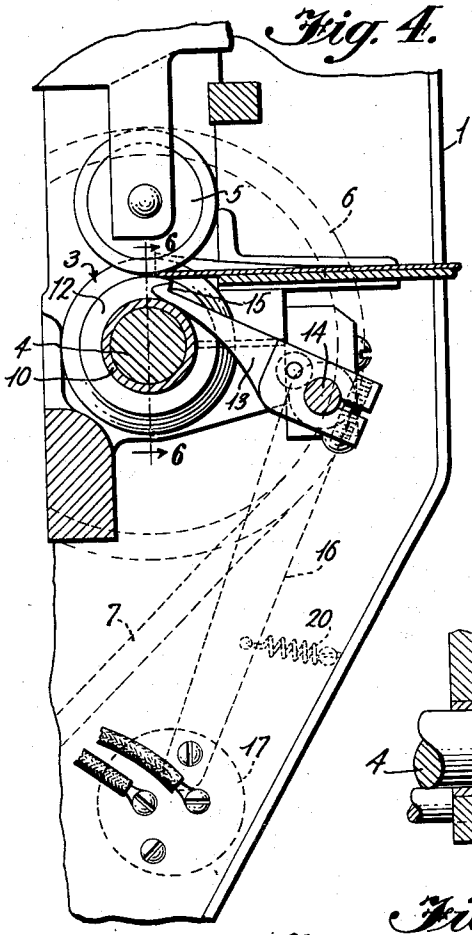


Fig. 5.

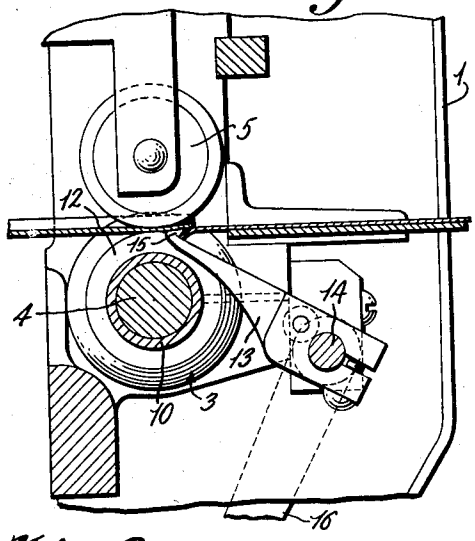


Fig. 6.

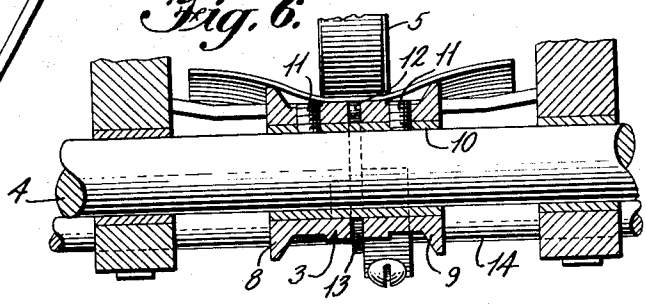
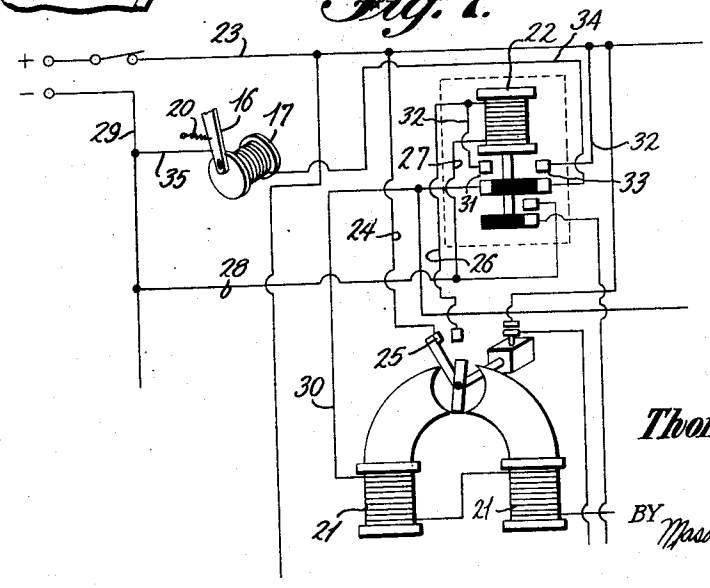


Fig. 7.



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PAPER MONEY COUNTING MACHINE

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4 Claims. (Cl. 271—57)

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This invention relates to machines for counting paper money, and more particularly to automatic means to insure the accuracy of the count regardless of the rapidity with which the bills may be fed to the machine.

The present invention is adapted to be used in connection with a machine such as disclosed in my previous Patent No. 2,429,159, issued October 14, 1947. The machine of that patent is designed to receive bills in various compartments as they are sorted. The bills enter between rollers which thereupon actuate counting mechanism. Although many improvements have been made to speed up the operation of the machine so that the parts will function even though the bills are fed so rapidly that only a small space is present between the trailing end of one bill and the leading edge of the next, the operators become so proficient in the sorting and feeding of the bills that at times the leading edge of one bill will slightly overlap the trailing edge of the one previously fed to the machine. As it is necessary for one bill to clear the rollers so that the upper roller can drop before the next bill enters if a count is to be made, the two bills will be counted as one and a miscount will result. The machine is equipped with automatic means to stop the rollers when a double bill is introduced but in order for this mechanism to function about one inch of the double thickness must pass between the rollers. The overlap resulting from rapid feeding is seldom this great and the double bill mechanism will not function to prevent the miscount.

The object of the present invention is to provide mechanism to prevent the possibility of a miscount regardless of the speed of feeding the bills or the amount of overlap of the bills.

Another object of the invention is to provide such mechanism which will move to operative position with the entrance of each bill between the rollers, but will not retard or interfere with the free passage of the bills so long as they are not fed in overlapping relation.

A still further object is to provide such mechanism which will not stop the machine when bills are overlapped, but will merely retard the forward motion of the second bill until the first has passed from between the rollers, and then permit the second bill to proceed in normal fashion.

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

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In the drawings:

Figure 1 is a partial front elevation of a money counting machine with the present invention shown applied thereto;

Figure 2 is a perspective view of one of the lower feed rollers of the machine with a bill-retarding arm shown in association therewith;

Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 1 showing the operating mechanism for the bill-retarding arm shaft;

Figure 4 is a vertical section through a pair of bill-feeding rollers and associated mechanism illustrating the inoperative position of the bill-retarding arm as a bill is about to enter between the rollers, and is taken on the line 4—4 of Figure 1;

Figure 5 is a section similar to Figure 4 with the bill-retarding arm in operative position and preventing an overlapping bill from entering between the rollers;

Figure 6 is a vertical section on the line 6—6 of Figure 4; and,

Figure 7 is a diagrammatic view of a portion of the control circuit for the machine illustrating the manner in which the present invention is connected into that circuit.

Referring to the drawings in detail, there is shown a machine similar to that disclosed in Patent No. 2,429,159. This machine comprises a cabinet 1 in which a plurality of vertical compartments 2 are arranged. At the upper front of each compartment is a pair of feed rollers comprising a lower roller 3 which is mounted upon shaft 4, and an upper roller 5 which is mounted for vertical movement. The shaft 4 is common to all of the lower rollers, and is adapted to be continuously rotated by means of a motor, not shown, through belt 6 which passes over pulley 7 mounted on the end of shaft 4. When a bill is presented to the rollers it is drawn in by the rotation of the lower roller. The upper roller is lifted the thickness of the bill but rests by gravity upon the bill providing the necessary friction to insure the bill being fed into the compartment with which the rollers are associated. The lifting of the roller operates a switch to actuate a counter as set forth in detail in the above-mentioned patent.

In accordance with the present invention, each lower roller is formed in two parts 8 and 9, which are mounted upon a sleeve 10 and the roller parts and sleeve are secured to the shaft 4 by set screws 11. The roller parts are mounted upon the sleeve in spaced relation so that the roller as a whole is provided with a medial annular groove 12 of substantial depth. It will be obvious

that the roller could be formed of one piece having a milled groove.

For each pair of feed rollers a bill-retarding arm 13 is provided, all of the arms being mounted upon a shaft 14, and each arm being positioned upon the shaft so that its outer end may move freely within the groove 12 of its respective roller 3. All of the arms will be fixed upon the shaft to lie in the same radial plane with respect to the shaft. The base of the arms may be split, and the arm clamped to the shaft by means of a screw.

The arm 13 is hook-like in shape, being formed with a vertical shoulder 15 near its forward end adapted to engage the leading edge of an overlapping bill and hold it against forward movement until the preceding bill has passed through the rollers. The forward end of the arm is reduced in height so that it may lie within the groove 12, when in its inoperative position, completely removed from the nip of the feed-rollers.

Arm 13 is operated by means of a lever 16 which is fixedly mounted on the end of shaft 14. The opposite end of the lever is attached to the movable member of a rotary solenoid 17. The connection of the lever to the solenoid is by means of a pin 18 projecting from the solenoid and passing through a slot 19 in the end of the lever. Thus, rotary motion of the solenoid will cause the lever to rock the shaft 14 raising the arm 13 to operative position. A coiled spring 20 urges the lever to its inoperative position.

Solenoid 17 has its coil connected into the control circuit of the machine. In Figure 7, a portion of that circuit is shown, and the entire circuit is illustrated in Patent No. 2,429,159. As explained in that patent, the passage of a bill through the feed rollers lifts the upper roller and closes a circuit through the counter coils, shown at 21 in Figure 7. The energization of the counter coils causes an armature to be moved to operate the counter mechanism, which, in turn, closes a circuit through a relay 22 which sets up a holding circuit to continue the operation of the control circuit while permitting the counter mechanism to be de-energized and return to its inoperative position. This circuit is illustrated in Figure 7 as following through lines 23 and 24 to counter switch 25, line 26 to holding relay coil 22, and return lines 27, 28, and 29. Energization of relay 22 will lift its armature closing certain contacts. A holding circuit is then set up, which utilizes a current leakage through the counter coils as described in the above-mentioned patent. This circuit runs from the coils 21 through line 30 to the relay contacts 31, line 32, relay coil 22, and lines 27, 28, and 29. The actuation of the relay closes contacts which energize the solenoid 17. This circuit is through lines 23 and 32 to relay contacts 33, line 34 to solenoid 17, and lines 35 and 29. Thus, whenever a bill enters the feed rollers, solenoid 17 will be energized to move arms 13 to operative position. When the bill passes from between the feed rollers the relay holding circuit will be broken and the armature drop, opening contacts 23 and deenergizing the solenoid 17.

In operation the shaft 4 is in continuous motion, and insertion of a bill between the rollers at a particular compartment will lift the upper roller of that pair causing a count to be made. As soon as this happens the relay 22 is energized, and in turn the solenoid 17. The solenoid will rotate counter-clockwise, as viewed in Figure 4, rocking shaft 14 to lift the arm 13.

All of the arms 13 will be lifted even though only one compartment is receiving at bill. The arms at the other compartments will merely rise, as they are so positioned that they will not contact any part of the machine. The arm at the compartment to which the bill is being fed will rise to strike the underside of the bill passing through the rollers. Due to the fact that the forward ends of the arms are positioned ahead of the nip of the rollers, the bill will pass beyond the end of the arm while the arm is at rest in the groove of the lower roller. As soon as the bill enters the rollers, the arm will be lifted, and will be held in contact with the bill during the entire passage of the bill through the rollers.

If the bill is not followed by another in overlapping relation, the arm will have no effect upon the bill passing through. If, as shown in Figure 5, a second bill is fed too rapidly and slip beneath the first one, the shoulder 15, the edge of which is engaging the underside of the first bill, will stop the forward movement of the second one and hold that bill stationary until the first has passed completely through the rollers. Thereupon the solenoid 17 will be de-energized and the arm will drop into the roller groove out of contact with the second bill. The forward edge of that bill will then contact the rotating lower roller and be drawn between the pair of rollers.

The action of the solenoid 17 is very light, and the arms are not held in operative position with any substantial force. The force is sufficient to prevent an overlapping bill which is not between the rollers from moving forward, but is not strong enough to hold the arm in position if an obstruction which is on the bill between the rollers strikes the shoulder. Therefore, if a torn bill which has been mended by pasting a strip over the tear should enter the rollers, the edge of the strip would contact the shoulder on the arm. As this bill is being drawn forward with some force, the arm will be moved downward and the bill will continue through the rollers.

While in the above one practical embodiment of the invention has been disclosed, it will be understood that many changes may be made from the precise structure shown without departing from the scope of invention as defined in the appended claims.

What is claimed is:

1. In a paper money counting machine having a plurality of bill-receiving compartments and a pair of bill-feeding rollers at the entrance to each compartment, a shaft extending across all of said roller pairs, a plurality of bill-stops equal in number to the number of roller pairs attached to said shaft, each of said bill-stops being positioned medially of a roller pair, and means operable when a bill enters between the rollers of any of said roller pairs to rock said shaft to raise all of said bill-stops to a position for yieldingly engaging the leading edge of a bill which may overlap the trailing edge of a preceding bill engaged between the rollers of a roller pair.

2. In a paper money counting machine as claimed in claim 1, said means comprising a solenoid and a plurality of switches in circuit, each of said switches being operable by the separation movement of a roller pair when a bill enters between the rollers of the pair to energize said solenoid.

3. In a paper money counting machine having a plurality of bill-receiving compartments and

a pair of bill-feeding rollers at the entrance to each compartment to feed the bills in a horizontal plane to said compartments, a shaft extending across all of said roller pairs, a plurality of bill-stops equal in number to the number of roller pairs attached to said shaft, one of the rollers of each pair having a peripheral groove to receive its associated bill-stop when the bill-stop is in inoperative position, and means operable when a bill enters between the rollers of any of said roller pairs to rock said shaft to raise all of said bill-stops out of said grooves to a position to yieldingly engage the leading edge of a bill which may overlap the trailing edge of a preceding bill engaged between the rollers of a roller pair.

4. In a paper money counting machine as claimed in claim 3, said means comprising a

rotary solenoid and a plurality of switches in circuit, each of said switches being operable by the separation movement of a roller pair when a bill enters between the rollers of the pair to energize said solenoid.

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