Aug. 5, 1952 T. E. HAYES 2,606,023

PAPER MONEY COUNTING MACHINE

Filed Oct. 18, 1946 2 SHEETS—SHEET 1

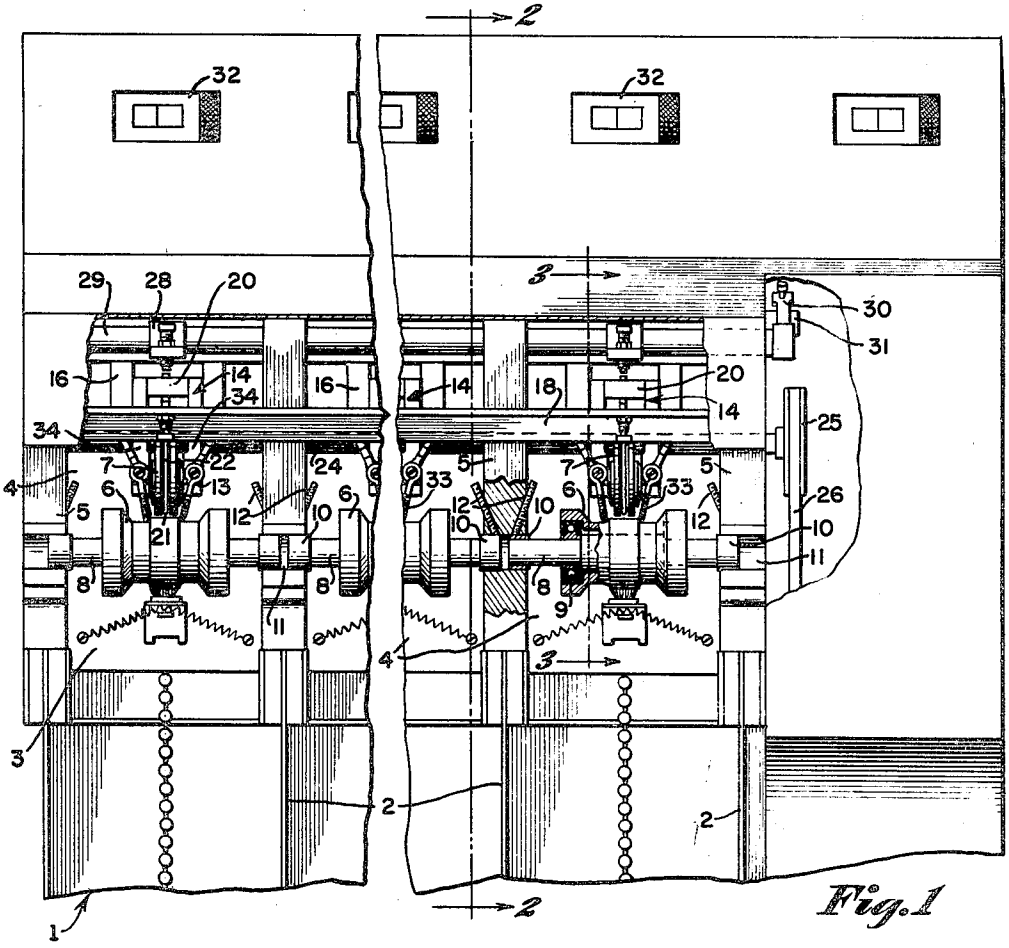


Fig. 1

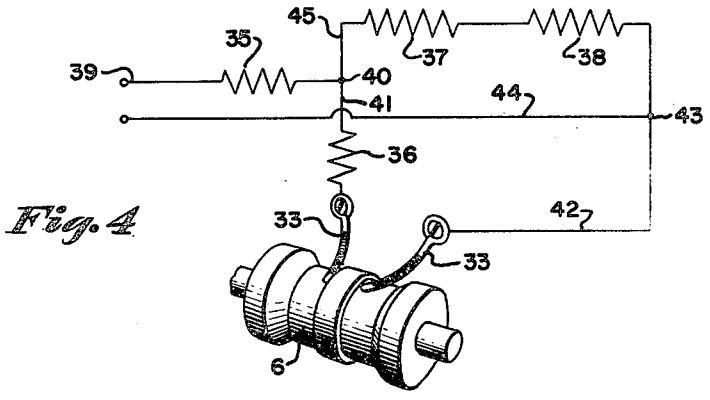


Fig. 4

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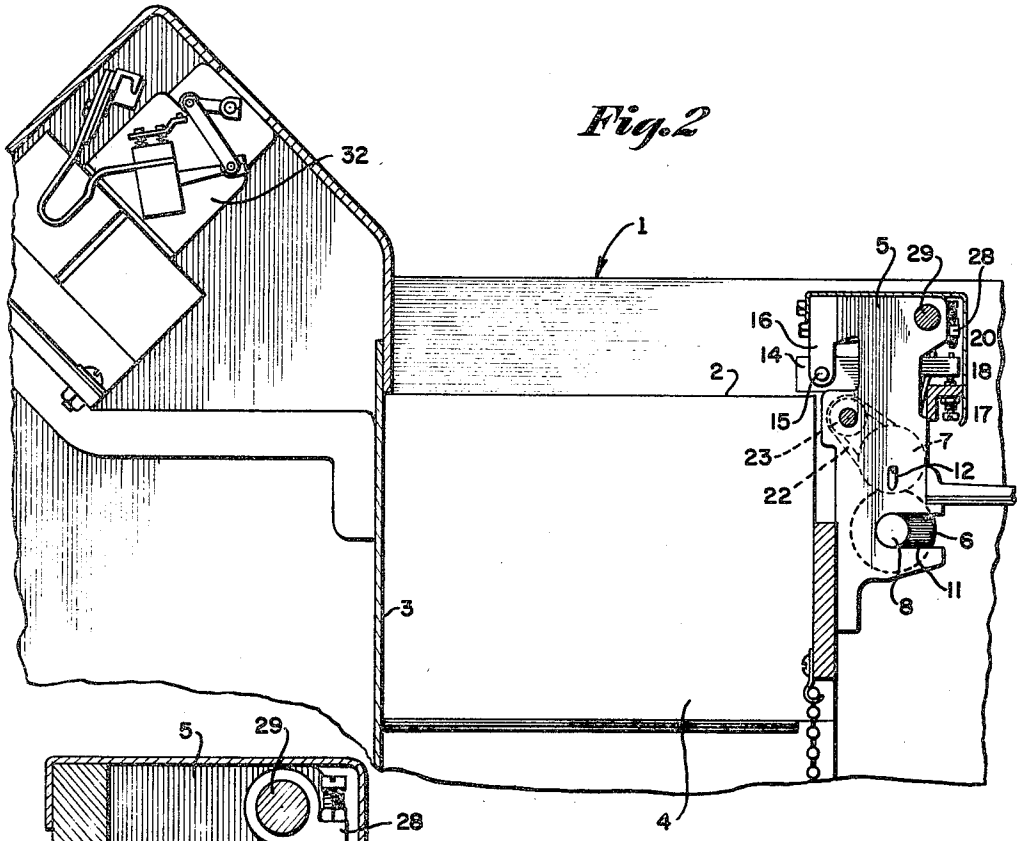
Attorneys

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PAPER MONEY COUNTING MACHINE

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Fig. 2



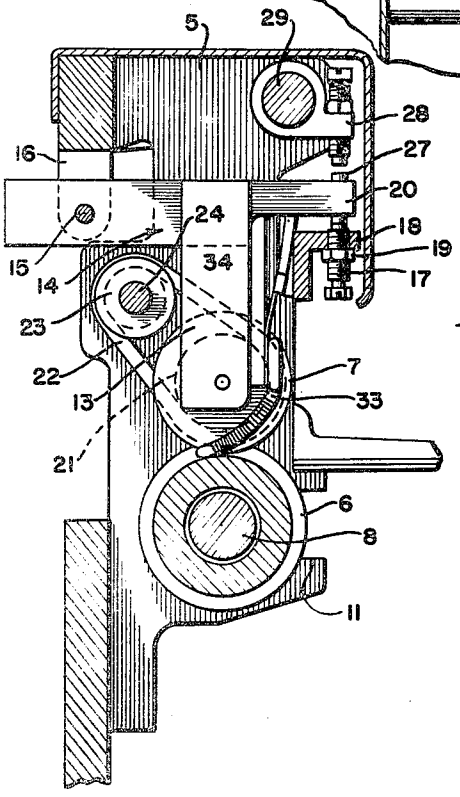


Fig. 3

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UNITED STATES PATENT OFFICE

2,606,023

PAPER MONEY COUNTING MACHINE

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Application October 18, 1946, Serial No. 704,111

5 Claims. (Cl. 271—51)

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This invention relates to money-counting machines of the general type shown in my co-pending application Serial No. 618,185, filed September 24, 1945, now Patent No. 2,429,159.

In my prior application, and other machines of this general type, a cabinet is provided having a plurality of compartments to receive paper currency, each compartment receiving bills of a particular denomination where mixed money is being sorted and counted, or bills of a particular bank of issue where bills of one denomination are being handled. The bills are fed between pairs of rollers located at the upper forward edge of each compartment. The lower rollers of each pair are fixedly mounted on a common power-driven shaft extending the full width of the machine, and the upper rollers are idlers, individually mounted and free to move upward when a bill is inserted between the rollers. The upward movement of the upper roller causes the actuation of a switch to close an electric circuit to a piece-counter which records the number of bills passing into the particular compartment with which it is associated.

This arrangement, particularly the mounting of all the lower rollers on a single power-driven shaft, calls for considerable precision machine work, both in the original construction of the machine and in repair work. Replacing a worn roller requires the removal of the complete shaft and rollers. When the shaft again is placed in the machine, the shaft must be trued and aligned accurately if the machine is to operate properly. However, as the upper rollers serve as calipering means to check the bills inserted between the rollers to prevent a miscount from the accidental feeding of two bills simultaneously, and also serve to instigate operation of the counters, it has not been feasible to drive the upper rollers.

The object of this invention is to provide an improved feed roller assembly wherein the lower rollers may be individually mounted for ease of assembly and replacement.

A further object of the invention is to provide a device of this character, wherein the movable roller is the driving roller, and the rollers are maintained out of contact to reduce noise and wear.

Another object of the invention is to provide improved counter operating means wherein one of the feed rollers of each pair is included as part of a control circuit, the counter for that pair being operated by a bill passing between the rollers and interrupting the control circuit to actuate the counter.

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

In the drawings:

Figure 1 is a partial front elevation of a money-counting machine incorporating the features of the present invention;

Figure 2 is a section taken on the line 2—2 of Figure 1;

Figure 3 is a section taken on the line 3—3 of Figure 1; and

Figure 4 is a diagrammatic view of the electrical connections to the counter.

Referring in detail to the several figures of the drawing, the reference character 1 designates in general a cabinet in which a plurality of vertical partitions 2 are arranged in parallel relation against the back wall 3, forming a series of compartments 4, the horizontal cross-section of said compartments being of approximately the same size and shape as a bill, and adapted for the accumulation of stacks of bills.

At the upper forward edge of the partitions 2, a face plate is mounted provided with a plurality of ribs 5, the ribs extending above, and in vertical alignment with, the partitions 2. Between the ribs, pairs of feed rollers 6 and 7 are mounted, between which bills are fed into the respective compartments. The rollers of each pair are mounted one above the other and serve not only to feed the bills to the compartments but to caliper the bills to prevent a miscount in the event two or more bills are fed to the rollers simultaneously.

In the present embodiment, the lower rollers 6 are idlers, and mounted to rotate freely upon short, individual shafts 8, anti-friction bearings 9 being carried in the ends of the rollers 6 to ensure free and smooth rotation of the rollers upon the shafts. Bushings 10, of suitable bearing material, are fitted on the ends of the shafts. Ribs 5 are provided with horizontal slots 11, which are open to the forward face of the ribs, and into which the ends of shafts 8, with their encircling bushings, are slipped for mounting. Set screws 12 are threaded into ribs 5, running downwardly at an angle to the slots, to engage the bushings 10 on the ends of the shafts to hold the shafts in position within the slots. Each rib is of sufficient width to provide adequate bearing surface for the ends of two adjacent shafts 8, the set screws 12 for the respective

shafts entering the common rib from opposite sides.

It will be readily apparent that with this construction, replacement of a roller is a simple matter. It is necessary only to loosen the two set screws 12 holding the ends of the roller shaft which is to be replaced, slip the shaft forwardly out of the slots 11, slip the ends of the new shaft into the slots and tighten the set screws. This operation does not require the services of a skilled mechanic, and can be performed quickly and cheaply, as no aligning of the shaft is necessary, and only a single roller and short section of shaft need be removed and replaced.

The upper rollers 7 are the driven rollers, and each is mounted in the lower bifurcated end 13 of an arm 14 pivoted as at 15 to a bracket 16 secured at the rear of the face plate to a sill 16 which extends the full width of the machine. Arm 14 is freely pivoted so that roller 7 drops down by gravity toward contacting position with roller 6. The position of rest of roller 7 is determined by means of adjusting screw 17 threaded through the horizontal flange of an angle strip 18 extending across the machine and fixed to the ribs 5. Screw 17 is held in its position of adjustment by means of lock nut 19, and the end of screw 17 contacts the lower surface of an extension 20 projecting forwardly from arm 14 and overlying screw 17. Screw 17 is adjustable upwardly, to rock arm 14 about its pivot and lift roller 7. Proper adjustment is had when roller 7 just clears roller 6 so that roller 7 may rotate freely without imparting rotation to roller 6 when no bill is between the rollers. This saves wear on the rollers, and cuts down on the machine noise.

Rollers 7 are grooved, as at 21, to receive drive belts 22, which also pass around pulleys 23 fixed to a drive shaft 24. Shaft 24 carries a pulley 25 at one end, which is driven by a belt 26 from an electric motor, not shown.

Each of the arms 14, on its upper surface, carries a pin 27, projecting upwardly to strike one of a plurality of fingers 28 attached to a rock shaft 29 when roller 7 and arm 14 are lifted more than the predetermined amount caused by the passage of a single bill between the rollers 6 and 7, there being one of the fingers 28 directly above each of the arms 14. Thus when two or more bills inadvertently are fed to the rollers simultaneously, the upper roller and its arm 14 will be lifted sufficiently to cause movement of the finger 28, which rocks shaft 29. Shaft 29 carries suitable levers 30 at one end, the levers actuating a switch 31 controlling the motor circuit. When shaft 29 is rocked, switch 31 is actuated, causing the machine to stop. The circuit, including switch 31, forms no part of the present invention, but is completely disclosed in my above mentioned co-pending application Serial No. 618,185.

The lower roller 6 forms part of a control circuit for a piece-counter 32, the control circuit normally being closed and the insertion of a bill between the rollers interrupting the current flow through the control circuit causing actuation of the counter. There is a piece-counter 32 for each of the compartments of the machine, the piece-counters being of a well-known type such as that shown in the patent to Veider, No. 1,480,738, granted January 15, 1924. Resilient wiper contacts 33 are carried upon insulating blocks 34, fixed to the lower portion 13 of roller arm 14 on opposite sides of roller 7. The wiper contacts are turned backwardly so that their lower ends are in peripheral contact with roller 6 at spaced points. Roller 6 serves as a bridge to close a circuit, to be described, across the contacts.

Referring to Figure 4, it will be seen that the counter circuit includes the resistances 35, 36, 37, and 38, the wiper contacts 33 and the roller 6. Resistances 37 and 38 are coils of the piece-counter, and resistances 35 and 36 are regulators to reduce the current flowing through the counter coils or the wiper contacts as the case may be, resistance 35 being common to both circuits. It is essential that the combined resistance of counter coils 37 and 38, which are connected in series, be greater than the resistance 36.

When the machine is in operation, current flows from a source of power 39 through resistance 35 to point 40, line 41, resistance 36, wiper contact 33, roller 6, the other wiper contact 33, line 42, to point 43, and negative line 44. Current continues to flow through this circuit until such time as a bill is inserted between the rollers 6 and 7, whereupon the bill passes between the wiper contacts and roller 6, lifting the contacts from the roller and breaking the circuit. With this circuit open, the current will flow through the counter coils 37 and 38 and actuate the counter. This latter circuit comprises positive wire 39, resistance 35 to point 43, line 45 and counter coils 37 and 38 to point 43, and negative line 44. As soon as the bill passes from between the rollers 6 and 7, wiper contacts 33 will again engage roller 6 and the current will resume its course through the circuit of less resistance comprising resistance 36, wiper contacts 33, and roller 6.

Thus it will be seen that current flows continuously through the device, passing through the lower roller 6 as a normal course, and being diverted through the counter coils when the circuit through the roller is broken by the passage of a bill between the rollers.

While I have in the above described what is believed to be a preferred and practical embodiment of the invention, it is to be understood that departures may be made from the precise embodiment disclosed within the scope of the appended claims.

What I claim as my invention is:

1. In a money counting machine, a support having a plurality of ribs, each of said ribs having a slot, a pair of feed rollers mounted between each two adjacent ribs, one of said rollers being mounted for movement toward and away from the other, a short shaft to carry said other roller, said short shaft having its ends removably secured in the slots of said adjacent ribs with the ends of adjacent short shafts being supported in a common rib, a power driven shaft extending the length of said support and journaled in said ribs, and means to drive said movable rollers from said power driven shaft.

2. In a money counting machine, a support having a plurality of ribs, each of said ribs having a slot, a pair of feed rollers mounted between each two adjacent ribs, one of said rollers being mounted for movement toward and away from the other, a short shaft to carry said other roller, said short shaft having its ends removably secured in the slots in said adjacent ribs with the ends of adjacent short shafts being supported in a common rib, a power driven shaft extending the length of said support and journaled in said ribs

and having a plurality of driving pulleys thereon each in alignment with one of said movable rollers, and belts connecting said pulleys with said movable rollers.

3. In a money counting machine as claimed in claim 2, means to adjust said movable roller whereby said rollers may be maintained in non-contacting relation.

4. In a money counting machine, a support having a plurality of ribs, each of said ribs having a slot, a plurality of short shafts having their ends removably secured in the slots of adjacent ribs with the ends of adjacent short shafts being supported in a common rib, a roller on each of said short shafts, a bracket supported between each of said ribs, an arm pivotally connected to each bracket, a roller carried by each arm, a driving shaft extending the length of said support and journaled in said ribs, and means to drive the rollers carried by said arms from said driving shaft.

5. In a money counting machine as claimed in claim 4, an adjustable stop to limit the movement

of said arm in one direction whereby the rollers carried by said arm and the rollers carried by said short shafts may be maintained in non-contacting relation.

THOMAS E. HAYES.

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