

June 25, 1963

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3,095,192

FEEDING MECHANISM FOR DOCUMENTS OR THE LIKE

Filed March 6, 1961

2 Sheets-Sheet 1

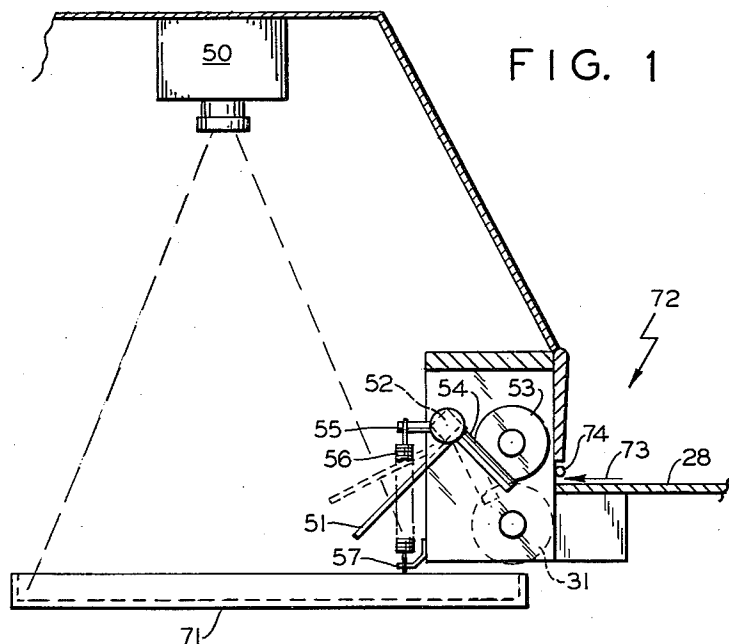
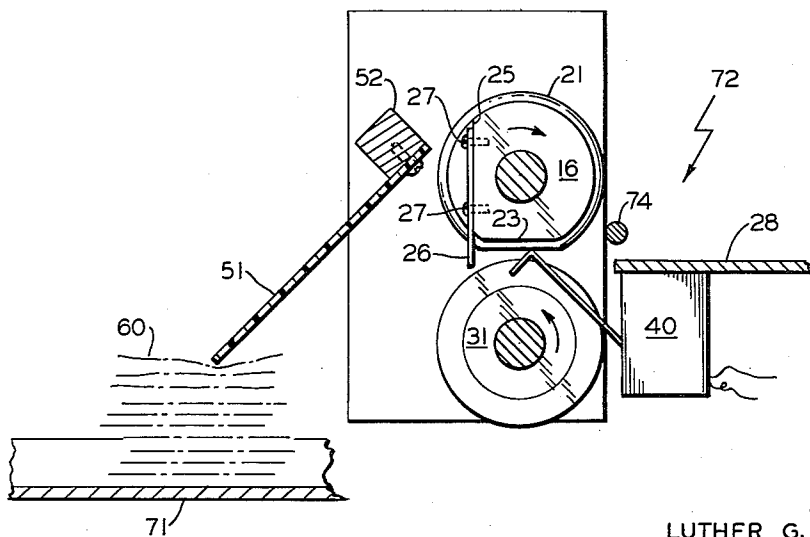


FIG. 4



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FIG. 2

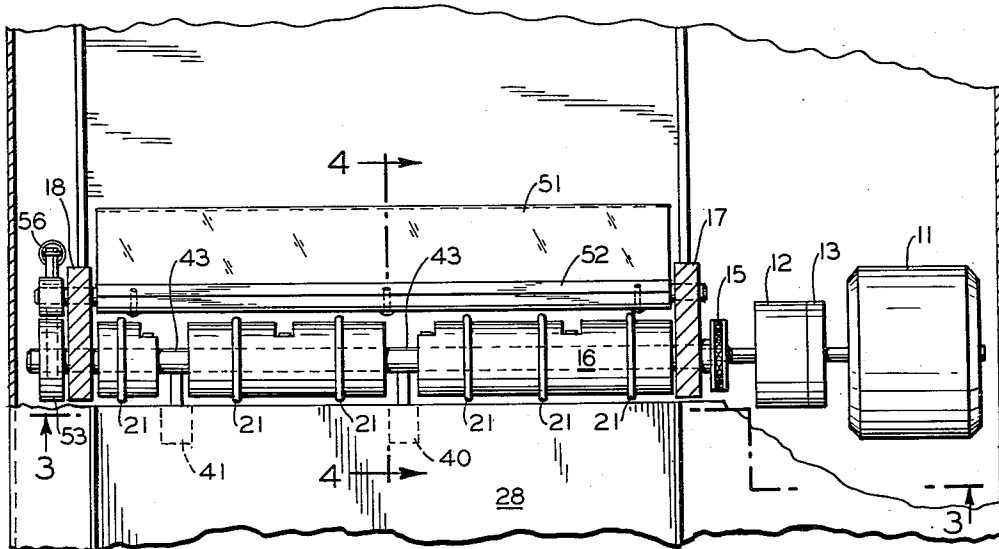
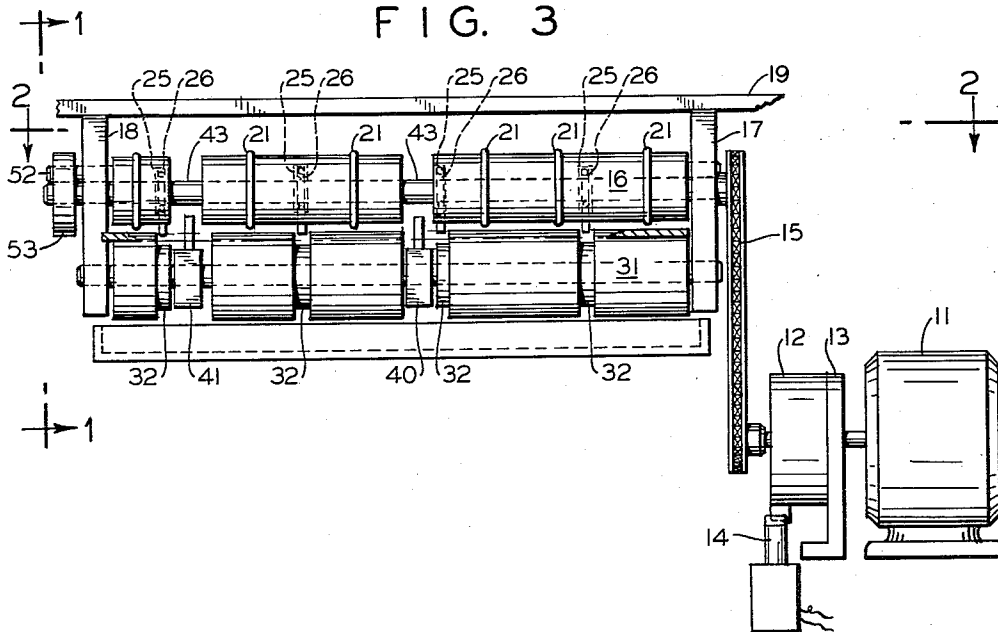


FIG. 3



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## FEEDING MECHANISM FOR DOCUMENTS OR THE LIKE

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Filed Mar. 6, 1961, Ser. No. 93,720

8 Claims. (Cl. 271—3)

This invention relates to feeding mechanisms for documents and has particular reference to a feeding mechanism which is adapted to sequentially feed articles such as paper documents, checks, currency and the like as is required in depository machines.

In my copending application for U.S. Letters Patent entitled "Depository Machine Combined With Image Recording Means," Serial No. 44,778, filed July 22, 1960, I have disclosed a depository device which is adapted to sequentially accept documents such as paper currency and checks and wherein each of the fed documents is photographed in order to provide documentary evidence of the receipt thereof. Feeding of documents of this type presents various problems among which are the various sizes of checks, the curled condition of checks made from tabulating card stock, the resiliency of previously folded, bent or rolled paper currency, etc. Yet, for proper operation of the apparatus, it is essential that the documents fed into the depository apparatus arrive and be maintained at the recording position in a substantially flat condition so as to achieve a documentary record which identifies the document in a good and sufficient manner. Moreover, certain means must be employed in order to assure that the document inserted into the apparatus is not folded, as such folding would obscure serial numbers and other pertinent information pertaining to an individual check or currency bill. Last, but not least, provision must be made to assure that a document manually supplied to the feeding mechanism is started in a prescribed way and is not fed in a skewed manner.

One of the objects of this invention therefore, is the provision of a new and novel feeding mechanism for documents which overcomes several of the disadvantages and limitations of prior art devices.

Another object of this invention is the provision of a feeding mechanism for documents or the like which incorporate means to ascertain that the article to be fed is properly aligned with respect to the feeding mechanism before the mechanism is rendered operable.

Another object of this invention is the provision of a feeding mechanism which includes means to retain a fed article flat after it has been fed through feed rollers.

Still another object of this invention is the provision of a feeding mechanism which incorporates means to prevent feeding of documents whose leading edge is misaligned with respect to the feeding mechanism.

A further object of this invention is the provision of a feeding mechanism for documents or the like which assures that the article to be fed by the mechanism is of a required width.

A still further object of this invention is the provision of a novel feeding mechanism for documents which mechanism initially is provided with a gap to permit manual insertion of a document to be fed and in which a set of rollers is actuated for automatically feeding the document therethrough after sensing means disposed in the gap have ascertained proper alignment of the document.

Further and still other objects of this invention will be apparent by reference to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a vertical view, partly in section, of the feeding mechanism along lines 1—1 in FIGURE 3;

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FIGURE 2 is a plan view, partly in section, along lines 2—2 in FIGURE 3;

FIGURE 3 is an elevational view along lines 3—3 in FIGURE 2, and

FIGURE 4 is an enlarged elevational view along section lines 4—4 in FIGURE 2.

Referring now to the figures, reference numeral 11 identifies an electric motor which is coupled to a one-revolution clutch 12 mounted to a bracket 13. Associated with clutch 12 there is a solenoid actuated release plunger 14 which when momentarily actuated permits one revolution of the clutch output shaft. The combination of one-revolution clutch and release mechanism is well understood, being a commercial unit found in most power actuated business machines. Motor 11 via clutch 12 is adapted to drive a belt and pulley combination 15 in order to impart rotation to an upper roller 16 which is journaled in stationary side plates 17 and 18, both being supported by a bracket 19.

At spaced intervals the circumference of roller 16 is provided with a plurality of O-rings 21 which will engage the document to be fed underneath roller 16. Rings 21 are commercially available annular gaskets made from resilient material. Underneath roller 16 there is disposed an opposing roller 31 which with its shaft is likewise journaled in side plates 17 and 18.

As best seen in FIGURE 4, upper roller 16 is equipped along a portion of its surface with a flattened area, or depression 23, in order to provide a small gap between both rollers when this depression is located opposite roller 31. At any other rotational position of roller 16, rings 21 of the upper roller are in contact with the peripheral surface of lower roller 31. By virtue of the inherent resiliency of O-ring gaskets, rings 21 conform to the roller contour.

Additionally, roller 16 at certain increments along its length is provided with milled, slot-type recesses 25 each of which houses a pin or bar 26 held in the respective recess 25 by a screw means 27, see FIGURES 3 and 4. The array of bars 26 act as a movable gate which prevents the manual passing of a document through the gap between rollers 16 and 31 while this gap is presented to the feeding table 28, FIGURES 1 and 4. In order to permit rotation of roller 16 with bars 26 affixed thereto, and since the protruding lengths of the bars exceed the diameter of roller 16, roller 32 is equipped with oppositely located annular grooves 32. It will be apparent therefore, that the bars 26 are located with respect to the rotational position of roller 16 in such a manner that the bars prevent the pushing of a document through the slot, yet the bars move from the gap position as soon as the rollers are rotated by virtue of motor 11 applying rotation to roller 16 at which time the gap disappears.

A set of sensing means coacts with the gap in order to ascertain that a document inserted between the rollers is properly aligned, that is, its leading edge being disposed substantially parallel to the axis of rotation of the rollers. The sensing means comprise a set of snap-acting switches 40 and 41, each switch having a respective actuating arm reaching into the gap, see FIGURES 3 and 4. Suitable grooves 43 are provided in roller 16 to obtain clearance for the actuating arms. The switches are mounted stationary, being fastened to table 28.

In order to obtain feeding of a document between the rollers, it is necessary that both switch arms be actuated, which action in turn establishes that the leading edge of a document is properly aligned in the gap and that the document's leading edge rests substantially parallel to the axis of the rollers. The spacing between switches 40 and 41 determines the minimum width of the document which can be accepted and fed by the feeding mechanism as

will be apparent from the following discussion. Since the instant feeding mechanism is designed particularly for feeding paper currency and checks, it may be noted that American paper currency has a width of somewhat more than six inches. By adjusting the distance between both switches for a distance of let us say,  $4\frac{1}{2}$  to 5 inches and instructing a depositor to feed the left edge of the document in contact with bracket 18, both switches will be actuated only when the paper currency is substantially unfolded. Also, if currency or checks are fed in lengthwise direction, that is the leading edge being on the smaller side, the power driven feeding mechanism will not be actuated and manual passing of a document through the gap is prevented by virtue of the gate means.

In the rear of the feed rollers, see FIGURES 1 and 4, there are provided means for retaining the documents fed through the rollers in a substantially flat position, thus ascertaining that the face of the document is exposed to image recording means 50. To this end there is provided a plate 51 made of transparent material such as glass, "Plexiglas," or "Lucite." The plate is of substantially the same length as the rollers. This plate at one edge is fastened by suitable screw means to a rectangular bar 52. Bar 52 in turn, by suitable shaft extensions, is journaled in side plates 17 and 18. Roller 16 at its left end, FIGURES 1 and 2, carries a cam 53 which actuates a cam follower 54 coupled to the shaft associated with bar 52. Additionally, there is provided a pin 55, spring biasing means 56 and bracket 57. As roller 16 rotates, cam 53 imparts synchronized motion to plate 51, causing this plate cyclically to be raised and lowered. This motion is adjusted in such a manner that for each revolution of the shaft the plate is raised to permit a document 60, FIGURE 4, to assume the topmost position in the stack of previously fed documents, and immediately thereafter to be lowered onto a face portion of the topmost document to maintain this document substantially flat and with its entire surface exposed to image recording means 50 disposed thereabove. Plate 51 therefore goes through an oscillating motion as rollers 16 and 17 rotate.

Operation of the entire feeding mechanism may be visualized as follows: Motor 11 is energized to drive clutch 12, yet no motion is transmitted initially to roller 16. A depositor desiring to feed a document to the depository 71 faces the feeding mechanism at the feeding position, generally identified by reference numeral 72 in FIGURES 1 and 4.

A document placed on table 28 is pushed forward in the direction of arrow 73, FIGURE 1, and passed underneath horizontal guide bar 74 into the gap between rollers 16 and 31. The document cannot be passed through the gap because of gate 26. If the document is of proper width and the leading edge actuates the respective arms of switches 40 and 41, solenoid actuated plunger 14 associated with the one-revolution clutch is operated, thereby causing roller 16 to be driven. Ensuing rotation of roller 16 displaces the gap and O-rings 21 will engage the forward portion of the document, thus squeezing the document between the rollers and consequently, imparting motion also to the lower roller 31. While the document is fed between the rollers, transparent plate 51 is lifted as shown by the dashed position in FIGURE 1, hence permitting the document to reach depository 71 and causing it to come to rest on top of the stack of previously fed documents. As the document reaches its position on the stack, further motion of the rollers lowers plate 51 which now may engage with its lower edge the surface of document 60 as shown in FIGURE 4. Subsequently, the document is photographed by camera 50 and by virtue of the transparency of the plate, also portions disposed underneath the plate are clearly visible to the recording means. Since the switch arms were restored to their original position after the trailing edge of the document left the rollers, solenoid

actuated lever 14 is no longer retracted and clutch 12 will stop rotation of roller 16 when its original position is reached, that is, as the flat portion 23 is disposed opposite roller 31, the starting position illustrated in FIGURE 4.

The diameter of roller 16 is selected in such a manner as to accommodate during one revolution thereof, the feeding of a single document which does not exceed 4 inches in length along its direction of travel. This length is adequate since it has been determined that paper currency, bank checks and traveler checks vary only from about  $2\frac{1}{2}$  to  $3\frac{1}{2}$  inches. Recent standardizing efforts specify the maximum size very precisely. In the event that an attempt is made to feed an improper document, i.e. a document which is longer than 4 inches along the direction of travel, bars 26 when returning to their starting position pierce the document still present between the rollers, thereby jamming the feeding mechanism and attracting the attention of an attendant. Alternatively, alarm means may be provided which are set off.

Several modifications can be accomplished without deviating from the principles described heretofore. One of such modifications comprises the use of a roller having a resilient surface and a flat spot ground therein instead of providing roller 16 with a set of gasket type annular rings.

Another modification concerns bars 26. Instead of bars 26 being fastened to the upper roller 16, a barrier disposed behind the rollers may be used. This barrier would be raised as soon as the rollers are actuated and lowered when roller 16 has completed one revolution.

Still further, the depression in roller 16 can be replaced by mounting this roller for limited vertical motion. While the roller is raised, a gap is presented and when the roller is lowered on roller 31 the gap is eliminated.

Other and still further modifications to the various mechanisms will be apparent to those skilled in the art.

While there have been described and illustrated specific embodiments of the invention, it will be obvious that various changes and modifications may be made therein without departing from the field of the invention which should be limited only by the scope of the appended claims.

What is claimed is:

1. A cyclically operated feeding mechanism for documents comprising:

an upper and a lower roller disposed substantially parallel to one another for feeding a document therebetween;

drive means coupled to at least one of said rollers for causing a document supplied to the parting line between said rollers to be fed through the rollers;

a depository for receiving documents fed through the rollers disposed behind said rollers at an elevation below the parting line between said rollers whereby sequentially fed documents come to rest stacked on one another;

a retaining means adapted to engage a face portion of the topmost document on the depository to maintain the latter document in substantially flat condition;

means mounting said retaining means for rocking motion about an axis which is disposed above said parting line and causing the retaining means to be inclined away from the rollers toward said depository whereby the lower end of said retaining means is adapted to engage the topmost document;

further means coupled to at least one of said rollers and said retaining means for cyclically rocking said retaining means about said axis to free said retaining means from engagement with the topmost document to enable a subsequent document fed through said rollers to assume the topmost position on the stack, and said further means returning the retaining means

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to its previous position for engaging a face portion of said subsequent document after the latter document has assumed the topmost position.

2. A cyclically operated feeding mechanism for documents as set forth in claim 1 wherein said further means includes resilient means for urging the retaining means into contact with the topmost document disposed on the depository.

3. A cyclically operated feeding mechanism for documents as set forth in claim 1 wherein said retaining means is a plate of substantially the same length as the axial length of the rollers.

4. A cyclically operated feeding mechanism for documents as set forth in claim 1 wherein said retaining means is a plate of transparent material.

5. A cyclically operated feeding mechanism for documents comprising:

an upper and a lower roller disposed substantially parallel to one another for feeding a document therebetween;

drive means coupled to at least one of said rollers for causing a document supplied to the parting line between said rollers to be fed through the rollers;

a depository for receiving documents fed through the rollers disposed behind said rollers at an elevation below the parting line between said rollers whereby sequentially fed documents come to rest stacked on said depository and on top of one another;

a transparent plate adapted to engage a face portion of the topmost document on the depository to maintain the latter document in substantially flat condition;

a bar mounted for supporting said plate disposed in proximity to said rollers above said parting line and along an axis substantially parallel to said rollers; said plate being fastened to said bar and inclined away from the rollers toward said depository whereby the lower end of said retaining means is adapted to engage the topmost document;

drive means coupled to at least one of said rollers and said plate for cyclically rocking said plate about the axis of said bar to free said plate from engagement with the topmost document to enable a subsequent document fed through said rollers to assume the topmost position on the stack,

and bias means acting upon said plate urging the plate to its previous position for engaging a face portion of said subsequent document after the latter document has assumed the topmost position.

6. A cyclically operated feeding mechanism for documents each having a leading edge having a minimum first dimension and a side edge having a maximum second dimension, comprising:

a set of rotary elements to receive therebetween the leading edge of a document and to feed the document therethrough;

first means coupled to said rotary elements having a first state wherein said first means obstructs the passage of the leading edge of the document between and beyond said rotary elements, a second state wherein said first means passes said document beyond said rotary elements, and a third state wherein said first means prevents the complete passage through said rotary elements of a document having a second dimension greater than the maximum; and

second means coupled to said rotary elements and said first means to sense a first condition of a fixed angular relationship between said rotary elements and the leading edge of the document and to sense a second condition of the presence of a leading edge first dimension at least equal to the minimum; and

said second means upon sensing both said conditions concurrently causing said first means to sequentially change from its said first state to its said second and third states.

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7. A cyclically operated feeding mechanism for documents each having a leading edge having a first dimension and a side edge having a second dimension; comprising:

5 a set of rollers, each having an axis, to receive therebetween the leading edge of a document and to feed the document therethrough;

first means including a second dimension standard adapted to distinguish between documents having a second dimension which is less than a preset maximum and those which are equal or greater than said preset maximum, said standard having a first position obstructing the passage of the leading edge of the document between and beyond said rollers, a second position passing said document beyond said rollers and a third position preventing the complete passage through said rollers of a document having a second dimension which is equal or greater than said preset maximum;

20 second means coupled to said first means and including a first dimension standard adapted to distinguish between documents having a first dimension which is less than a preset minimum and those which are equal or greater than said preset minimum, and adapted to distinguish between documents having a leading edge having a preset angular relationship with the axis of one of said rollers and those not having said relationship, and

said second means upon concurrently distinguishing a document first dimension which is equal or greater than said preset minimum and a preset angular relationship causing said first means dimension standard to move from its first to its second and third positions.

8. A cyclically operated feeding mechanism for documents each having a leading edge having a first dimension and a side edge having a second dimension;

a pair of opposed feed rollers mounted for feeding a document therebetween in one revolution thereof; one of said rollers provided with a longitudinal depression along its peripheral surface to cause a gap between said rollers when said depression is adjacent the other roller whereby said gap is adapted to receive the leading edge of a document which is to be fed through said rollers;

45 a set of longitudinally spaced apart, transversely projecting bars fastened along the length of said one roller to block said gap for preventing the passage of a document beyond said gap when said rollers are positioned for providing said gap, the diameter of said one roller providing said one roller with a circumference adapted to measure a document side edge whereby documents having a second dimension less than said one roller circumference are passed fully through said rollers when said rollers undergo one revolution and documents having a second dimension greater than said one roller circumference are pierced by said bars and retained between said rollers;

60 a pair of electrical circuit switching means having actuators disposed in said gap and spaced longitudinally apart for being actuated by the leading edge of a document inserted in said gap and adapted to measure the document leading edge whereby a document having a first dimension equal or greater than the spacing of said actuators is adapted to concurrently operate both actuators;

drive means controlled by said switching means connected to at least one of said rollers for causing rotation of both rollers in response to both of said actuators being in their actuated condition;

75 said rollers when driven by said drive means closing said gap and engaging an inserted document to cause it to be fed between the rollers and also causing said bars to be rotated with said one roller thereby

presenting said document with an unobstructed path;  
and control means connected to said drive means for  
cyclically stopping rotation of said rollers after one  
revolution thereof and restoration of said gap.

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