

Aug. 19, 1941.

A. E. SCHUBERT ET AL

2,253,052

REVERSING ARRANGEMENT FOR DOCUMENT REPRODUCING MACHINE

Filed July 19, 1940

2 Sheets-Sheet 1

FIG. 1.

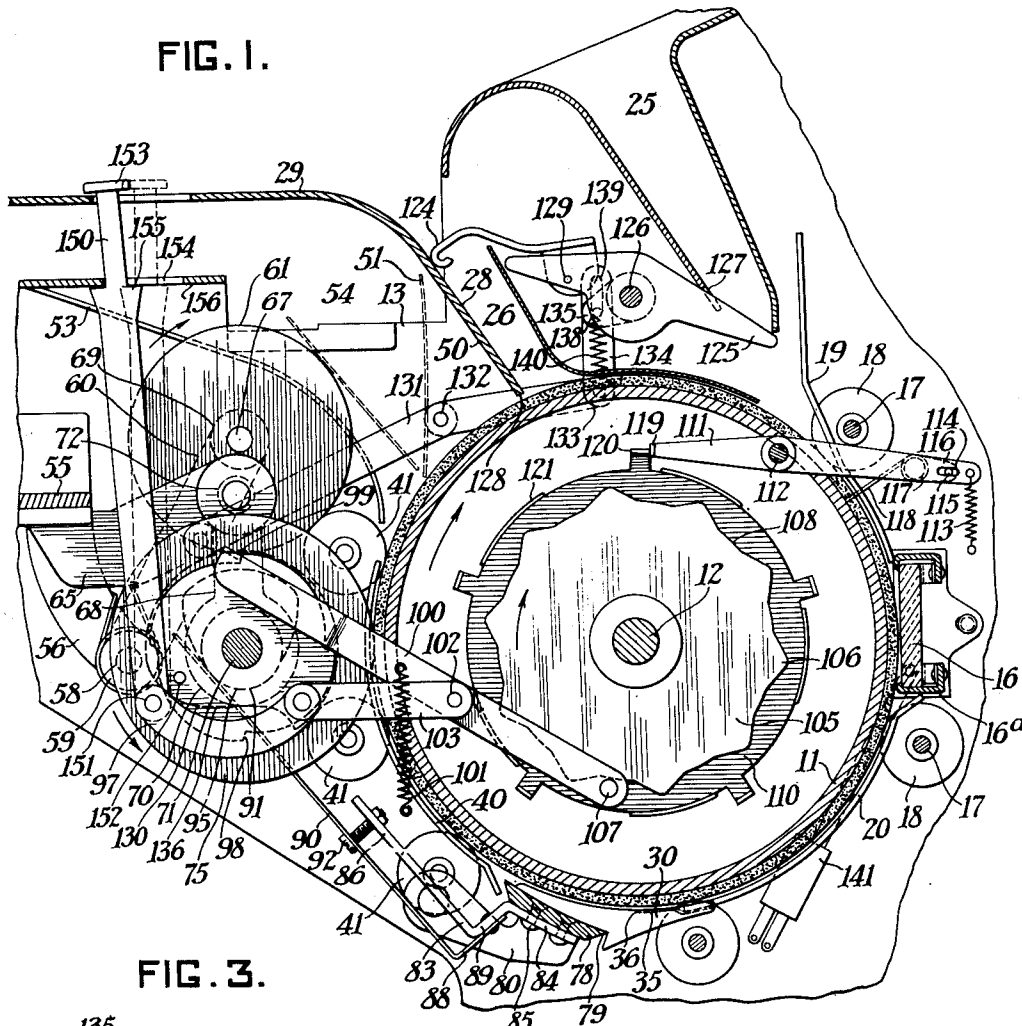
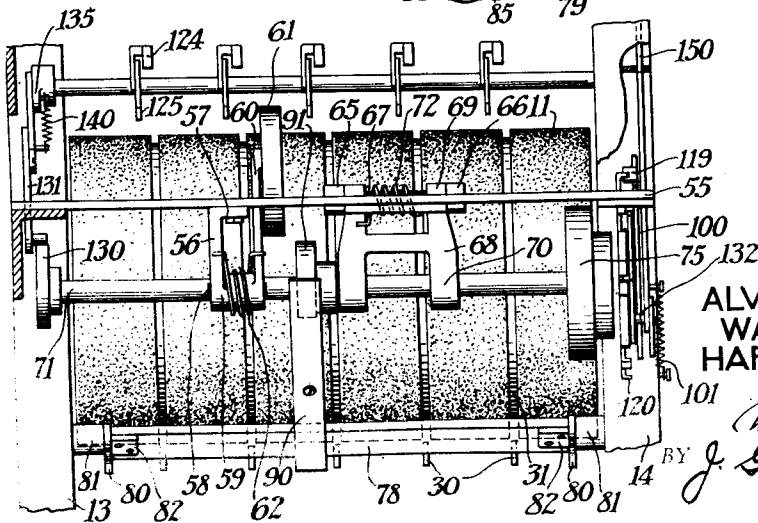


FIG. 3.



ALVIN E. SCHUBERT
WADE S. NIVISON
HARVEY P. HINTZ
INVENTORS

BY *Newton M. Little*
J. Griffin Little
ATTORNEYS

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2 Sheets-Sheet 2

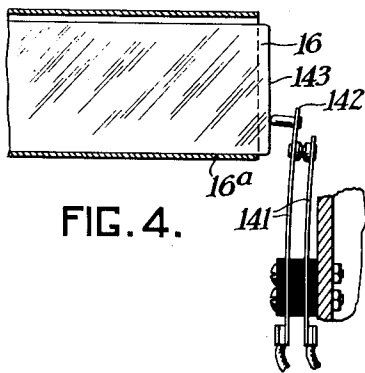


FIG. 4.

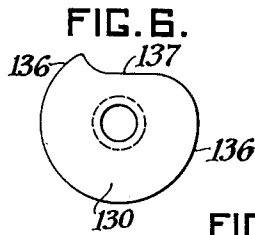


FIG. 2.

FIG. 7.

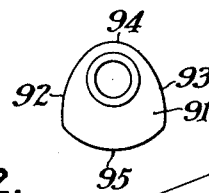
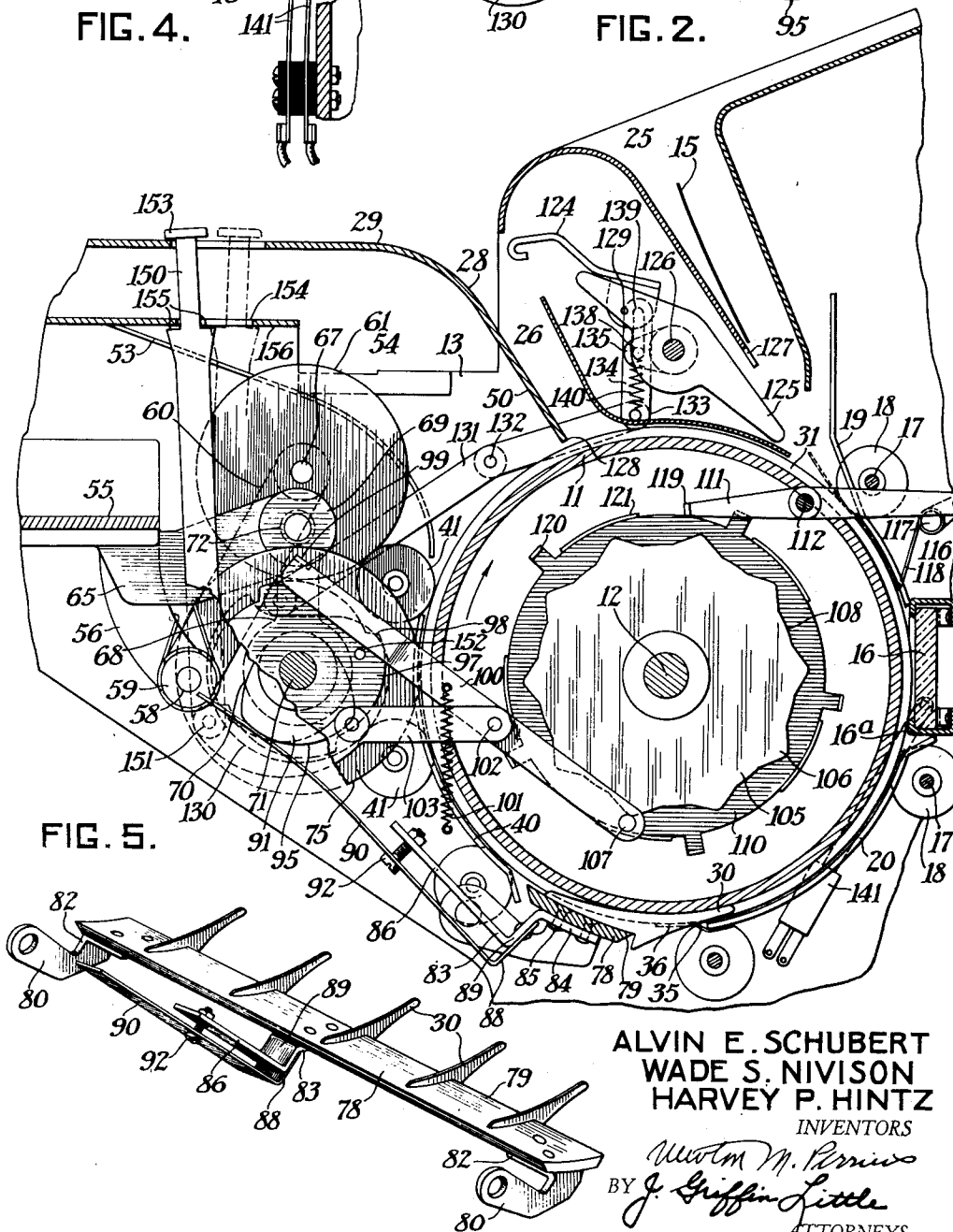


FIG. 5.

ALVIN E. SCHUBERT
WADE S. NIVISON
HARVEY P. HINTZ
INVENTORS

Wm M. P. P. P.
BY J. Griffin Little
ATTORNEYS

UNITED STATES PATENT OFFICE

2,253,052

REVERSING ARRANGEMENT FOR DOCUMENT REPRODUCING MACHINE

Alvin E. Schubert and Harvey P. Hintz, Rochester,
and Wade S. Nivison, New York, N. Y., assignors
to Eastman Kodak Company, Rochester, N. Y.,
a corporation of New Jersey

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14 Claims. (Cl. 271—3)

The present invention relates to a machine for photographically recording checks or other documents, and more particularly to an arrangement whereby the checks or documents may be reversed so that both sides thereof may be photographically recorded. The reversing mechanism of the present invention is particularly designed for use on the recording apparatus shown and described in the patent to C. J. Hughey, No. 1,976,346, dated October 9, 1934, and to the apparatus shown in the patent to A. E. Schubert, No. 2,165,418, dated July 11, 1939.

An object of the invention is the provision in a machine of this class of a mechanism for feeding the document through the machine so as to photograph one side thereof, then automatically reversing the document and again feeding it through the machine so that the other side may also be photographed.

Another object of the invention is the provision in a machine of this class of members which tend to automatically move to a position to guide the document to the reversing means, and are later operated in timed relation to the feeding drum to engage the latter to strip the photographed document therefrom.

Still another object of the invention is the provision of an apertured guide for holding the document against the drum during the travel thereof through the photographic field of the camera.

A further object of the invention is the provision of a motor switch which is so located as to be closed by positioning the apertured guide in the machine so that when the latter is in place the switch may be closed to render the machine operative, and when the plate is removed the switch automatically moves to open position to open the circuit to the drive motor.

Yet another object of the invention is the provision of blocking members adapted to be positioned across the feeding stations to obstruct the latter. The moving of these blocking members to obstructing position is controlled by a mechanism actuated by the leading edge of the document during its initial travel through the camera field, while the removal of these blocking members from obstructing position is controlled by a mechanism actuated by the trailing edge of the reversed document. The movement of the document guiding and stripping members are, on the other hand, controlled from the leading edge of the initial and reversed document.

To these and other ends, the invention resides in certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a side elevation, partly in section, of

a document handling device constructed in accordance with the present invention, with the side plate removed, showing the arrangement of the operating and control mechanisms for the reversing of the document.

Fig. 2 is a view similar to Fig. 1, but with the parts in a slightly different position so as to effectively strip the photographed document from the rotating drum.

Fig. 3 is a front elevation view of the mechanism illustrated in Fig. 1, as viewed from the left thereof but with the feeding hoppers removed and parts in section.

Fig. 4 is a fragmentary view of a portion of the mechanism illustrated in Fig. 2, showing the arrangement by which the motor switch is rendered operative.

Fig. 5 is a perspective view of the guiding and stripping fingers, and the supporting plate therefor.

Fig. 6 is an end view of the cam for controlling the actuation of the feeding hopper blocking members; and

Fig. 7 is an end view of the cam for controlling the operation of the guiding and stripping fingers and the plate illustrated in Fig. 5.

Similar reference numerals throughout the various views indicate the same parts.

The invention comprises, in its broadest aspect, a rotating drum for advancing documents through the photographic field of a camera so that the latter may photographically record one side of the document. Two suitable feeding stations or hoppers are provided, one for small documents such as checks, the other for larger documents such as letters, ledger sheets, etc. The present invention provides suitable mechanism which is actuated by the advancing of the document by the drum for reversing the document, and again feeding it through the photographic field of the camera so that the other side of the document may also be photographically recorded. This mechanism is so arranged that it may be selectively positioned so as to record both sides of a single document or a series of documents. When, however, only one side of a document is to be recorded, the reversing mechanism may be moved to an inoperative position so that when one side has been photographed, the document is automatically discharged from the machine. When the document is fed to the machine, blocking members are automatically moved to obstruct the feeding stations or hoppers to prevent the feeding of a second document through the machine until the first document has been photographed on both sides. In order to insure the complete clearance of the first document before feeding the second, means is provided for controlling the movement of the blocking members to a non-obstructing position from the trailing

edges of the reversed document, all of which will be hereinafter more fully described.

Referring now to the drawings there is shown a rotating feeding or advancing drum 11 which is mounted for rotation on the shaft 12 journaled in opposite walls 13 and 14 of the machine housing, the front of the machine being at the left, as viewed in Figs. 1 and 2. The drum is adapted to advance the documents, generally indicated at 15, Figs. 1 and 2, through the photographic field of a camera, not shown, so that the document may be photographically recorded. An electric motor or other drive means, not shown, is operatively connected to the shaft 12 to rotate the drum 11, such, for example, as illustrated in the above-mentioned patent to Hughey. The document 15 is held in engagement with the drum 11 during its passage through the photographic field of the camera by means of an apertured guide plate which, in the present embodiment, is in the form of a glass plate 16. Brackets 16a secured to the walls 13 and 14 support the plate 16 at its ends only so that an unobstructed view of the document is assured. Spaced shafts 17 are mounted on the side walls 13 and 14 of the machine housing, and carry rollers 18 which hold the document against the drum above and below the apertured guide plate 16. A guide member 19 cooperates with upper rollers 18 to guide the document between the drum and the plate 16, while a lower guide member 20 serves to guide the document along the lower front face of the drum, all of which is shown in Figs. 1 and 2. The drum 11 is also operatively connected to and operated in timed relation with the photographic camera, not shown, in a manner clearly illustrated in the above-mentioned Hughey patent.

The machine is provided with a pair of document feeding stations or hoppers, clearly indicated by the numerals 25 and 26 positioned adjacent the top of the drum 11 and adapted to receive documents to be fed onto the drum. The rear hopper 25 is adapted to receive small documents, such as checks, which are dropped edgewise, as shown in Fig. 2, into the hopper 25 and are then carried or advanced by the drum 11 through the field of the camera to be photographed thereby. The front hopper 26 is primarily intended for larger documents such as letters, ledger sheets, and the like. This front hopper is provided with a rearwardly or upwardly sloping bottom 28 which terminates in a feeding board or support 29 on which the larger documents are positioned prior to the feeding thereof into the hopper 26. This bottom 28 is vertically adjustable for reasons to be later described.

It is thus apparent from an inspection of Figs. 1 and 2 that when the documents are fed to either the hopper 25 or 26, the rotating drum 11 will pick up and carry the document in a clockwise direction, through the photographic field of the camera so as to photograph one side of the document. The document during its travel, is held in engagement with the drum 11 by reason of the plate 16, rollers 18, and guides 19 and 20. When the document reaches the bottom of the drum it is stripped therefrom by means of a plurality of fingers 30 which are recessed in circumferential grooves 31 formed in the drum 11, as shown in Figs. 1, 2, and 3.

It is often desirable, particularly in the case of large checks, to not only photograph the front of the check, as above described, but to also photo-

graph the back of the check so that a photographic record of the various endorsements may also be secured. Even with large documents, it is often desirable, and in some cases essential, to photograph both sides thereof. This photographing of the opposite side of the document may obviously be accomplished by feeding the document through the machine, then manually reversing or flipping the document over, then again manually feeding it through the machine. The present invention, however, provides an arrangement whereby this reversing and re-feeding of the document is accomplished automatically so that all the operator has to do is position and feed the document into one of the hoppers 25 or 26. To secure this result, the fingers 30 are movable downwardly radially from the drum 11, by means hereinafter described, from the position shown in Fig. 2 to the position shown in Fig. 1. In the latter position the fingers 30 have been moved out of the recesses 31 and extend slightly below the surface of the drum 11. It is now apparent that instead of stripping the document from the drum, the fingers 30 will now guide or direct the document to the rear side of the drum. This movement of the fingers or guides 30 is in proper timed relation to the movement of the document 15 by the drum so that the fingers will be moved out of the recesses 31 just prior to the time the document approaches the bottom of the drum. To facilitate the ready passage of the document 15 between the fingers 30 and the drum 11, a set of resilient members 35 are provided. Each of these resilient members has one end thereof secured to the bracket 20 while the free end extends over the lower face of the drum; and, when the fingers 30 are in a lowered position, terminate between the fingers and the drum, as shown at 36, Fig. 1, and direct the document therebetween. The fingers or guides 30 thus perform two separate and distinct functions. When in the position illustrated in Fig. 2, they act to strip the document 15 from the rotating drum 11. When, however, they are moved to the position shown in Fig. 1, they act to guide or direct the document to the rear face of the drum and to a reversing mechanism hereinafter described.

From the fingers 30, the document 15 is guided between a plate 40 and the drum 11. The plate 40 preferably extends the full width of the drum and is secured, in any suitable manner, to the opposite side walls 13 and 14. For the purpose of clarity, this plate has been omitted from Fig. 3. The plate 40 preferably does not engage the drum, but is spaced slightly therefrom as clearly shown in Figs. 1 and 2. As the document advances under the plate 40, it may be held against the drum 11 by means of rollers 41 which are mounted in any suitable and well-known manner, such for example, as shown in connection with the rollers 18 previously described. The plate 40, with its guide rollers 41, thus cooperate with the guide fingers 30 to guide or direct the document to the reversing plate to be presently described.

The document 15 is carried around by the drum 11 until it strikes a reversing plate which, in the present embodiment, comprises the under surface 50 of the hopper bottom 28. This reversing plate cooperates with a spaced plate 53 to form a document reversing chamber 54. This chamber is of such a length as to accommodate the largest document which can be fed through the machine. As the document 15 strikes the surface 50 of the plate 28, it is stripped from the drum 11, and reversed or flipped over in the chamber 54, as shown

at 51, Fig. 1, so that the opposite side of the document is turned uppermost. It is now apparent that if the document is again fed through the machine, the opposite side thereof will pass under the plate 16 and through the photographic field of the camera and will thus be recorded thereby.

A plate or support 55 extends across the front of the machine and is secured to the opposite walls 13 and 14, as shown in Figs. 1 and 2. An L-shaped bracket 56 is secured by screws 57 to the under side of the plate 55, adjacent the center thereof and carries a stub shaft 58. A bearing 59 is loosely mounted on the shaft 58 and has integrally formed therewith a forwardly extending arm 60, the free end of which carries a rubber-coated roller 61. A coil spring 62 is wrapped around the bearing 59 and has one end thereof engaging the bracket 56 while the other end is hooked over the arm 60. The spring 62 thus yieldably holds the roller 61 in engagement with the roller 41 so that the roller 61 will be driven from the drum 11, in the direction indicated by the arrow.

As the document is flipped over or reversed, as above described, the rotating roller 61 picks up the document and directs it onto the rotating drum, to be advanced thereby so that the opposite side of the document may be photographed. While the reversing surface 50 actually flips the document over, the fingers 30 and the plate 40 cooperate to feed or direct the document to the reversing plate, and the roller 61 then directs the reversed document onto the rotating drum, so that these members all cooperate to perform the reversing operation and may, therefore, be broadly considered as document reversing means. Furthermore, the plate 40 and the fingers 30 cooperate to guide the document around the rear face of the drum, so that the plate 40 and the fingers 30 may be broadly classed as means for guiding the document to the reversing surface 50.

The right end of the support 55, as viewed in Fig. 3, carries a pair of spaced rearwardly extending arms 65 and 66 preferably formed integral with the support 55. These arms provide bearings for a shaft 67 on which is hung a suspended yoke, broadly designated by the numeral 68. This yoke is formed with a pair of spaced upper bearings 69 through which the shaft 67 extends, and a pair of spaced lower bearings 70 which support a lower shaft 71, the purpose of which will be hereinafter more fully described. By means of this arrangement, the shaft 71 is hung or suspended between the arms 65 and 66. A coil spring 72 is wrapped around a shaft 67 and has one end thereof hooked under the support 55 and the other end engaging the yoke 68 so as to yieldably force the shaft 71 rearwardly or towards the drum 11, to bring a clutch housing 75, movably mounted on the shaft 71, into engagement with the drum 11.

The fingers 30 are secured to or formed integral with a plate 78 and project rearwardly from the rear edge 79 thereof as best shown in Fig. 5. A pair of cantilever arms 80 are pivotally or rockably mounted at 81 to the side walls 13 and 14 of the housing. The free ends 82 of these arms are connected to the opposite ends of the plate 78, as clearly illustrated in Fig. 5. By means of this arrangement, the plate 78 and fingers 30 are mounted for rocking or turning movement about the offset or eccentric pivots 81. The weight of the plate 78 and fingers 30

is such that the plate 78 tends, due to its weight, to turn in a clockwise direction about the pivots 81, as viewed in Figs. 1 and 2, to automatically move the fingers 30 away from the drum 11 and out of the recesses 31, as shown in Fig. 1, so as to be in a position to guide the document to the reversing mechanism.

A Z-shaped bar 83 has one end 84 secured by rivets 85 or other suitable fastening means, to the under side of the plate 78, while the other end 86 extends upwardly, in an inclined direction, behind the drum 11, as clearly shown in Figs. 1 and 2. An L-shaped member has a short leg 88 thereof suitably secured to the intermediate portion 89 of the bar 83, while the longer leg 90 extends upwardly behind and in substantial parallel relation with the end 86 of the bar 83 to engage a cam 91 carried by the shaft 71. It is apparent that the engagement of the leg 90 with the cam will limit the clockwise rotation of the plate 78 about the pivots 81 to thus position the fingers 30 the proper distance from the drum 11 so as to guide the document to the reversing mechanism. A screw 92 extends through the leg 90 and engages the portion 86 of the bar 83 to permit slight adjustment of the fingers 30 to compensate for the wear of the parts as will be apparent from an inspection of the drawings.

The leg 90 is, in effect, a leaf spring and provides a flexible or yieldable connection between the guiding or stripping fingers 30 and its actuating means, the cam 91. This yieldable connection is provided so that if, due to wear or other reasons, the cam 91 tends to move the fingers 30 into stripping position while the document is passing between the fingers and the drum, the leg 90 will bend or yield to prevent the fingers from being pressed against the document with sufficient force to pierce or puncture the latter.

The cam 91 is of the shape best shown in Fig. 7, and is formed with two actuating portions 92 and 93 and two dwell portions 94 and 95 respectively. The arrangement is such that during the first quarter revolution of the shaft 71, the actuating portion 92 of the cam 91 passes over the flexible arm 90; and, as this portion is of decreasing radius, when rotated in the direction indicated by the arrow Figs. 1 and 2, the cam tends to move away from the arm 90 thus permitting the weight of the plate 78 to rock the latter about the pivots 81 to move the fingers 30 away from the drum 11, as shown in Fig. 1. During the next quarter revolution of the shaft 71 the smaller-radius dwell portion 94 of the cam 91 is in engagement the arm 90 and the fingers 30 thus remain in the document guiding position, as shown in Fig. 1. However, during the third quarter revolution of the shaft 71, the second actuating portion 93 engages the arm 92; and, as this portion is of gradually increasing radius, the arm 90 is moved to the left, as viewed in Figs. 1 and 2, to rock the plate 78 in a counter-clockwise direction about its pivots 81 to move the fingers 30 into the groove 31 to a position to strip the document from the drum. Finally, during the fourth quarter revolution of the cam, the larger-radius dwell portion 95 of the cam 91 is in engagement with the arm 90 and the fingers 30 are retained in the recesses 31. The movement of the fingers 30 to the document directing or guiding position, as shown in Fig. 1, is controlled from the leading edge of the document during its initial travel through the machine, while the movement of the fingers into document stripping position, as shown in Fig. 2, is con-

trolled by the leading edge of the reversed document, all as will be later more fully described.

The shaft 71 is driven by a suitable clutch, not shown, mounted in the clutch housing 75. When the clutch is engaged, the shaft 71 is driven by reason of the engagement of the clutch housing 75 with the drum 11. This clutch arrangement is preferably of the same construction as that shown and illustrated in the above-mentioned patent to Hughey and need not, therefore, be further described.

The clutch also comprises a complementary member in the form of a disk 97 which is secured and rotatable as a unit with the shaft 71. When the disk is held stationary, the clutch is disengaged and the shaft 71 will not be rotated. When, however, the disk is released, it is clutched to the clutch housing 75 and the shaft 71 is then driven. As the clutch housing engages and is driven by the drum 11, it is evident that the shaft 71 will be rotated in timed relation to the rotation of the drum 11.

The disk 97 is formed with four equally spaced abutments or shoulders 98 with which a lug 99 of a lever or blocking member 100 is adapted to engage. When the lug 99 is in engagement with one of these abutments 98, as shown in Fig. 1, the disk 97 and the shaft 71 are held against rotation. However, when the lug 99 is moved out of blocking or obstructing position, in a manner to be later described, the disk 97 is clutched to the clutch housing 75 and the shaft 71 is rotated, as is apparent.

As the lug 99 is moved out of engagement with one of the abutments 98, it rides along the surface of the disk 97 until the next abutment 98 is brought into registry with the lug 99, at which time the lug drops, under the action of a coil spring 101, against the next abutment 98 to prevent further rotation of the disk 97 and the shaft 71. Thus each time the lever 100 is moved out of obstructing position, the shaft 71 makes a quarter revolution to control the fingers 30, as above described. The lever 100 is held in engagement with the disk 97 by reason of the spring 101, one end of which is secured to the wall 14 while the other end is fastened to the lever 100 which, in turn, is pivoted at 102 to a bellcrank 103.

It is imperative that the rotation of the shaft 71 and the movement of the fingers 30 be in proper timed relation to the rotation of the drum 11. To this end, the drum shaft 12 has mounted thereon a ten-pointed cam 105, the points 106 of which are arranged to periodically engage a laterally projecting pin 107 on the right end of the lever 100, as shown in Figs. 1 and 2, to periodically move the lug 99 out of engagement with the shoulders 98, as shown in Fig. 2, so that the shaft 71 may make a quarter revolution. As the cam 105 rotates, the pin 107 moves off the points 106 and onto a dwell portion 108 so that the lug 99 may be moved downwardly under the action of the spring 101 to ride on the surface of the disk 97 whereupon the lug engages the next abutment 98 to arrest rotation of the shaft 71. It is clear from the above description that the rotation of the shaft 71 and the movement of the fingers 30 are in timed relation to the rotation of the shaft and fingers.

The first actuation of the lever 100 permits the disk 97 to make one quarter revolution to move the actuating portion 92 of the cam 91 across the yieldable arm 90 so that the plate 78 may pivot to move the fingers 30 out of en-

gagement with the drum to guide or direct the document to the reversing mechanism. The second actuation of the lever 100 enables the disk 97 to make another quarter revolution, but during this time the dwell portion 94 of the cam 91 is in engagement with the yieldable arm 90 so that the fingers 30 remain in the withdrawn or document directing position. These two actuations of the cam 90 are controlled by the leading and trailing edges respectively of the document during its initial travel through the machine. The third movement of the lever 100 now moves the cam 91 to the third quarter of its revolution to bring the actuating portion 92 into engagement with the arm 90 to now rotate the plate 78 to move the fingers 30 into the recesses 31 to slip the document from the drum. Finally, the fourth actuation of the lever 100 moves the cam 91 through the last quarter of its revolution to pass the dwell portion 95 over the arm 90 so that the fingers 30 remain in stripping position. This third and fourth actuations of lever 100 are controlled by the leading and trailing edges respectively of the reversed document, as will be later explained. Thus with each double passing of the document through the machine, the lever 100 is actuated four times by the cam 105 but the shaft 71 and cam 91 make only a single revolution to move the fingers 30 first out of and then back into the recesses 31, both of such movements being controlled from the leading edge of the document as it moves around the drum.

A trip plate 110 is also loosely mounted on the shaft 12. This plate and the cam 105 are arranged to be periodically clutched to and driven as a unit with the drum 11 in the manner clearly set forth in the above referred to patent to Hughey. The clutching arrangement is such that when the trip plate 110 is held stationary, both the plate and the cam 105 are unclutched from the drum and do not revolve. When, on the other hand, the trip plate 110 is released, both the plate and the cam, are clutched to the drum and rotate as a unit therewith whereby the shaft 71 will be rotated, in a manner above described.

In order to insure the proper functioning of the machine, it is essential that the reversing mechanism, above described, be also operated in proper timed relation to the advancing of the document 15 by the drum 11. To this end, the advancement of the document is utilized to initiate a sequence of operations all of which are in proper timed relation to the movement of the document by the drum.

To secure this result, a control arm 111 is pivoted intermediate ends to a post 112 which extends outwardly from the wall 14. The arm tends to rotate in a clockwise direction under the action of the spring 113. The right end of the arm is slotted as shown at 114 to receive a laterally extending pin 115 secured to a member 116 mounted on the shaft 117 which also carries fingers 118, all of which are clearly shown in Figs. 1 and 2. The left end of the arm 111 is formed with a lip or offset 119 which is arranged to abut lugs 120 and 121 bent out of the material forming the trip plate 110. The lugs 121 are nearer to the center of the plate 110 than the lugs 120, and are displaced angularly therefrom, as shown in the drawings. This arrangement is quite similar to that shown in Fig. 3 of the above-mentioned patent to Hughey,

and Figs. 4 and 5 of the above mentioned patent to Schubert.

Upon the entry of the document between the drum 11 and the upper rollers 18, the fingers 118 are tripped by the leading edge of the document, and the member 118 is rotated in a counterclockwise direction also similarly rotating the control arm 111 so that the lip 119 no longer engages the lug 120. As the trip plate 110 is now free, the plate and cam 105 are clutched to the drum 111 and are rotated as a unit therewith. This rotation of the cam 105 brings one of the points 106 thereof into engagement with the pin 97 and the lever 100 to move the lug 99 out of engagement with the shoulder 98 of the disk 97 so as to permit the shaft 71 and the cam 91 to make their first quarter revolutions to move the fingers 30 radially away from the drum to document guiding position, as shown in Fig. 1. The trip plate 110 and the cam 105 continued to rotate until the lip 119 engages one of the lugs 121 whereupon the trip plate is again held so as to unclutch the plate 110 and the cam 95 from the drum 11. The lip 119 remains in engagement with the lug 121 during the passing of the document under the fingers 118.

When, however, the trailing edge of the document has cleared the fingers 118, the latter rotate in a clockwise direction to the position shown in Fig. 1 in which fingers 118 extend into the grooves 31 of the drum. This movement of the fingers 118 will also rotate the arm 111 in a clockwise direction to lift the lip 119 out of engagement with the lug 121. The trip plate is again free, and will rotate, with the cam 105, until the next lug 120 strikes the lug 119 whereupon the plate 110 is again stopped. During this time the next point 106 on the cam 105 engages the pin 97 to again rock the lever 100 to permit the second quarter revolution of the shaft 71 and cam 91. During this second quarter revolution, however, the fingers 30 remain in their guiding positions due to the dwell portion 94 of the cam 91, as pointed out above. Thus during the first passage of the document through the machine, the cam 105 actuates the lever 100 twice and the cam 91 is rotated a half revolution to move the fingers 30 to and to retain them in stripping position.

After the document has been reversed, it is again fed through the machine and the leading and trailing edges of the reversed document again actuate the trip fingers 118 in the manner above described to cause the cam 91 to move through the third and fourth quarters of its revolution to shift the fingers 30 back into the grooves 31 so that the double photographed document may now be stripped from the drum. In this manner, the movement of the document through the machine initiates an operating cycle by which the reversing mechanism is controlled and operated in timed relation to the rotation of the feeding drum and a movement of the document thereon.

Small documents, such as checks, may be fed quite rapidly through the feeding stations or hopper 25 while larger documents are fed through the hopper 26. If both sides of these checks or documents are to be photographed, it is desirable to have the image of each side arranged on adjacent image areas of the film strip. For this reason, it is desirable to delay the feeding of a second check or document until the preceding one has been photographed on both

sides. This delayed feeding may be done manually, but it is preferred to accomplish it automatically so that all the operator has to do is to feed the document to the proper hopper.

This delayed feeding is accomplished, in the present embodiment, by means of a series of obstructing fingers 124 and 125, of the shape best shown in Figs. 1 and 2, adapted to block the hoppers 26 and 25 respectively, as shown in Fig. 1. The fingers 125 are mounted on and rotatable with a shaft 126, and are adapted to project through slots 127 in the rear wall of the hopper 25 to extend thereacross as shown in Fig. 1, to prevent further feeding of checks or other small documents through the hopper 25. The hopper member 28 and the feeding board 29 are preferably made vertically adjustable, by any suitable means, so as to space the lower end 128 thereof the proper distance from the drum 11. When relatively thin documents are fed through the machine, the end 128 may be positioned relatively close to the drum. When, however, thicker documents, such as cards, are fed, the plate 28 is raised to lift the end 128 further away from the drum 11 to permit free passage of the cards between the drum and the end 128 of the plate 28. In order to accommodate this adjustment of the plate 28, the obstructing fingers 124 are not formed integral with the fingers 125, but are preferably separately formed therefrom and are pivotally mounted at 129 on the tailpiece of the fingers 125 so that the fingers 124 may move in accordance with the position of the plate 28.

The fingers 124 and 125, however, move as a unit about the shaft 126, as will be readily apparent from an inspection of Figs. 1 and 2. The movement of these fingers is controlled by a cam 130 of the shape best shown in Fig. 6 mounted on the shaft 71. This cam engages one end of a lever 131 pivoted at 132 to the machine frame. The other end of the lever 131 is pivotally connected at 133 to a vertical member or link 134 which is in turn connected to an arm 135 secured to and rotatable with the shaft 126. It is apparent from an inspection of Fig. 2, that when the left end of the lever 131 is raised upwardly by the cam 130, that the fingers 124 and 125 will be thrown across the hoppers 25 and 26 to prevent further feeding of documents through the hoppers.

The cam 130 is formed with a relatively long concentric dwell portion 136 and a relatively short smaller-radius actuating portion 137. The arrangement is such that when the leading edge of the document, during its first passing through the machine, engages the fingers 118 to cause the shaft 71 to make its first quarter revolution, the cam 130 is partially rotated to bring the longer radius dwell portion 136 under the left end of the lever 131 to raise the latter. Such movement causes a rocking of the lever 131 about its pivot 132 to move the right end downwardly, thus rocking the shaft 126 in a counterclockwise direction to move the fingers 124 and 125 into obstructing position, as shown in Fig. 1. When relatively short documents, such as checks, are fed through the machine, the leading edge of the reversed document could be used to return the obstructing fingers 124 and 125 to non-hopper blocking position, such as shown in the abovementioned patent to Schubert No. 2,165,418. It has been found, however, that when relatively long documents are fed, the utilizing of the leading edge of the reversed docu-

ments to move the fingers 124 and 125 to inoperative position might open the hoppers before the previous document has completely passed thereunder so that if a second document were then fed, the two documents would pass through the camera field in overlapping relation, the disadvantages of which are obvious. In order to overcome this undesirable feature, the trailing edge of the reversed document is utilized to actuate the cam 130 to move the fingers 124 and 125 to a non-obstructing position.

To this end, the dwell portion 136 of the cam 130 extends substantially three-quarters of the way around the cam. By means of this arrangement, the first three-quarters of the revolution of the cam serves to retain the fingers 124 and 125 in hopper blocking position. However, when the trailing edge of the reversed document passes under the fingers 118, the shaft 71 is rotated through its last quarter revolution. At this time, the left end of the lever 130 now registers with and drops down onto the smaller-radius actuating portion 137 of the cam 130, thus rocking the lever in a counter-clockwise direction about its pivot 132 to raise the right end thereof. This upward movement of the right end of the lever 131 rocks the shaft 126 in a clockwise direction to move the fingers 124 and 125 from the position in Fig. 1 to the position shown in Fig. 2 to open hoppers 25 and 26 with the feeding of a second document therethrough. Such opening of the hoppers does not, however, occur until after the trailing edge of the reversed document has passed under the fingers 118, thus effectively preventing the overlapping feeding of two documents.

It is thus apparent from the above description that the leading edge of the document during its initial travel through the machine serves to move the fingers 124 and 125 to hopper blocking position and to also move the fingers 30 radially away from the drum to the document driving position. The leading edge of the reversed document is then utilized to return the fingers 30 to document stripping position, while the trailing edge serves to move the blocking fingers 124 and 125 from the hopper obstructing position. As the leading edge in both cases is used to actuate the fingers 30, the latter may be broadly considered as controlled from the same edge of the document. The blocking fingers 124 and 125, however, are moved to hopper obstructing position by the leading edge of the initially fed document, and are subsequently moved out of obstructing position by the trailing edge of the reversed document. Therefore, the fingers 124 and 125 may be broadly considered as controlled from different edges of the document.

A resilient connection is preferably provided between the link 124 and the arm 135. To secure this result, the free end of the arm 135 has secured thereto a laterally projecting pin 138 which projects into a slot 139 formed in the upper end of the link 134. A spring 140 has one end thereof anchored to the link 134, and the other end secured to the pin 138 so as to provide a flexible connection between the links 134 and the arm 135. Referring now to Fig. 1, it is seen that when the fingers 124 and 125 are across the hoppers 25 and 26, the pin 138 engages the bottom of the slot 139. Any pressure which is applied to the fingers 125 will move the pin 138 upwardly in the slot 139 against the action of the spring 140. This yieldable arrangement enables the passage of the trailing

edge of a long document, which might be fed through the hopper 25, to freely slide between the hopper wall and the ends of the fingers 121 yet effectively prevents the feeding of a second document to the drum 11 through the hopper 25 until the previous document has been photographed on both sides. In the case of the hopper 26, any pressure on the fingers 124 will cause the latter to rock in a counter-clockwise direction about their pivots 129 to permit the passage of the trailing edge of a long document between the ends of the fingers and the plate 28, yet will effectively permit the inadvertent feeding of a second document into the hopper 26.

When the documents pass through the photographic field of the camera, they move behind the glass aperture guide plate 16. For obvious reasons, it is desirable to maintain the glass in clean condition. To facilitate such cleaning, the plate 16 is slidably mounted in its supporting bracket 16a so that it may be removed from the machine for cleaning and/or replacement. It is apparent, however, that if the machine were operated with the plate 16 removed, no means would be provided for holding the document against the drum during the passage through the photographic field of the camera, and the document might tend to move away from the drum, at that point. In order to eliminate such a possibility, the plate 16 is utilized to close a self-opening switch arranged in the circuit of the drive motor so that when the plate 16 is in position, the switch will be closed and the motor circuit will be closed. However, the removal of the plate will enable the switch automatically to move to open position, thus effectively preventing any inadvertent operating of the machine when the plate is removed. To secure this result, a switch 141 of the self-opening type is connected into the motor circuit and is formed with a flexible movable arm 142 adapted to be engaged by the edge 143 of the plate 16 to close the switch, as clearly shown in Fig. 4. As the arrangement of such a switch in the motor circuit is well known, a detailed showing thereof is not deemed necessary for a full understanding of the operation thereof.

The above described reversing mechanism may be manually moved to an operative position in which a number of consecutive documents may be photographed on both sides, or may be moved to an inoperative position in which the subsequent documents are photographed only on one side. This manual moving means is in the form of a handle 150 the lower end of which is connected at 151 to the left end of a bellcrank 103, as viewed in Figs. 1 and 2. When the handle 150 is moved to the front position, as shown in full line Fig. 1, the bellcrank 103 is rotated slightly in the counter-clockwise direction to bring the pin 107 of the lever 100 into engagement with the cam 105. With the handle in this position, the checks or documents will be photographed on both sides. When, however, the handle is shifted to the neutral position, as shown in dotted lines in Fig. 1, the left end of the bellcrank 103 is lifted slightly upwardly thus depressing the right end thereof, whereby the pin 107 is moved out of engagement with the cam 105. The reversing mechanism is now disconnected from the drum 11 so that the documents which are now fed through the machine will be photographed only on one side.

Occasionally it is necessary to photograph both sides of only one document out of a group, the

remaining documents being photographed only on one side. To accomplish this result, the handle 150 may be moved to the rear position shown in dotted lines in Fig. 2, thus rotating the bellcrank 103 to bring the pin 107 into engagement with the cam 105 in the same manner as when the handle 150 is moved, to the front position, as described in the preceding paragraph. The document to be photographed on both sides is now fed through the machine, the guide fingers 30 operating to guide the document to the reversing surface 50 of the plate 28 and the roller 61 serving to re-feed the document to the drum 11. When however, the shaft 71 rotates to move the fingers 30 to the position shown in Fig. 2, a pin 152 projecting outwardly from the disk 97 strikes the handle 150 and moves the latter to the left or to the neutral position as shown in dotted lines in Fig. 1. When the handle is thus moved to the neutral position, the pin 107 is automatically moved out of engagement with the cam 105 and the reversing mechanism becomes inoperative. In this manner, occasional checks may have both sides thereof photographed, while subsequent checks may have only one side photographed, the change-over being automatic. The handle 150 is provided with a gripping portion 153 which projects upwardly through an opening 154 in the machine frame. When the handle is moved in either the front or rear positions, it is also moved downwardly so as to bring one of the shoulders 155 into engagement with the under surface 156 of a member of the machine frame, as shown in Figs. 1 and 2, to lock the handle 150 in adjusted position.

The machine operates as follows: The handle 150 may be selectively moved to a neutral position, as shown in dotted line in Fig. 1, so as to move the pin 107 out of engagement with the cam 105. Now when checks or documents are fed through the hoppers 25 and/or 26, the documents are advanced by the drum 11 through the photographic field of the camera so as to photograph one side of the document. The single recorded document is then stripped off the drum by the fingers 30 and discharged to a suitable receptacle or hopper, not shown. When, however, the handle 150 is moved to the front position, shown in full line in Fig. 1, the pin 107 is moved into engagement with the cam 105 thus operatively connecting the reversing mechanism to the drum 11. The advancing of the document by the drum 11 causes the leading edge of the document to engage the fingers 118 to rock the arm 111 to move the lip 119 thereof out of engagement with the lug 120. The trip plate 110 is now free and thus automatically clutches the plate and the cam 105 to the drum 11. Upon rotation of the cam 105, a point 106 engages the pin 107 to rotate the lever 100 about its pivot to lift the lugs 99 out of engagement with one of the shoulders 98 of the disk 97. As the latter is now free, it is clutched to the constantly driven housing 75 to rotate the shaft 71, so as to move the document directing fingers 30 downwardly—substantially radially from the drum and to position the blocking members 124 and 125 across the feeding hoppers 25 and 26.

When, however, the shaft 71 has made a quarter revolution the lug 99 engages the next shoulder 88 to arrest rotation of the shaft 71. As the trailing edge of the document passes under the fingers 118, the arm 111 is again actuated and the shaft 71 moves through another quarter revolution. At this time, however, the dwell portions

of the cams 91 and 130 are so positioned that the fingers 30 and the obstructing fingers 124 and 125 remain stationary. The reversed document is now re-fed by the roller 61 to the drum 11. This second passage of the document through the machine, brings the leading edge of the reversed document into engagement with the fingers 118 to again cause the shaft 71 to move through the third quarter of its revolution. During this portion of the revolution of the shaft 71, the guide fingers 30 are moved upward to document stripping position, the obstructing fingers 124 and 125, however, remaining in their blocking position. Now, when the trailing edge of the reversed document passes under the fingers 118, the last quarter revolution of the shaft 71 occurs. During this final movement of the shaft 71, the fingers 30 remain in document stripping position, by reason of the dwell portion 95 of the cam 91, while the engagement of the actuating portion 137 of the cam 130 with the lever 131 serves to move the obstructing fingers 124 and 125 out of hopper-blocking position to permit the feeding of a second document to one of the hoppers.

The reversing of the document is controlled by moving the handle 150 to the rear position, as shown in full line in Fig. 1. When the handle is in this position, the document is fed through the machine to photograph one side thereof, then automatically reversed and fed through a second time to photograph the opposite side, and is then stripped from the drum. When the handle 150 is however, placed in the neutral position, as shown in dotted line, Fig. 1, the document is fed only once through the machine and is then stripped from the drum, thus photographing only one side of the document. On the other hand, when the handle 150 is moved to the front position, as shown in dotted line in Fig. 2, the first document is fed through the machine to photograph both sides of the document, whereupon the handle is automatically returned to the neutral position so that subsequent documents are photographed only on one side. Thus by reason of this arrangement, a series of documents may be photographed on either side or both sides, or a selected document may be photographed on both sides, while the remaining documents are photographed only on one side.

It is thus apparent from the above description that the present invention provides an arrangement whereby checks or other documents may have one or both sides photographically recorded. The reversing mechanism may also be selectively positioned so that a selected document may be photographed on both sides while the other documents are photographed on only one side. In addition, the removal of the glass apertured guide plate renders the machine inoperative. Also, the actuation of the guiding and stripping fingers is controlled from leading edge of the document while the actuation of the hopper blocking fingers is controlled from both the leading and trailing edges of the document. Finally, the various mechanisms are all arranged to operate in timed relation to the rotation of the feeding drum and to the movement of the documents through the machine.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is, therefore, not to be limited to the precise details described, but is intended to cover all variations and modifica-

tions thereof falling within the scope of the appended claims.

We claim:

1. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, means movable radially of said drum for guiding said document to said reversing means, means for controlling said movable means from said drum and in timed relation to the rotation thereof, and a yieldable connection between said movable means and said control means.
2. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, means movable radially of said drum for guiding said document to said reversing means, means for mounting said guide means on said device for movement about an eccentrically arranged pivot so that said member will tend to move automatically away from said drum to document guiding position, and means controlled from said drum and in timed relation to the rotation thereof for moving said guide means about said pivot and into a position adjacent said drum to strip the document therefrom.
3. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, means movable radially of said drum for guiding said document to said reversing means, means for mounting said guide means on said device for movement about an eccentrically arranged pivot so that said member will tend to move automatically away from said drum to document guiding position, means for limiting the movement of said guide means away from said drum, and means controlled by said drum and in timed relation to the rotation thereof for moving said guide means into substantial engagement with said drum to strip the document therefrom.
4. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, means movable radially of said drum for guiding said document to said reversing means, means for mounting said guide means on said device for movement about an eccentrically arranged pivot so that said member will tend to move automatically away from said drum to document guiding position, means controlled from said drum and in timed relation to the rotation thereof for moving said guide means about said pivot and into a position adjacent said drum to strip the document therefrom, and a yieldable connecting member between said guide means and said control means.
5. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, means movable radially of said drum for guiding said document to said reversing means, means for mounting said guide means on said device for movement about an eccentrically arranged pivot so that said member will tend to move automatically away from said drum to document guiding position, a yieldable member connected to said mounting means, means engaging said yieldable member for limiting the movement of said guide means away from said drum, and means engaging said yieldable member and controlled from said drum and in timed relation with the latter for moving said mounting means about said pivot to position said guide means in substantial engagement with said drum to strip the document therefrom.
6. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, a plurality of guide fingers positioned adjacent but slightly spaced from said drum to guide said document to said reversing means, a support for said fingers rockably mounted on said device so that said fingers tend to move away from said drum, means for limiting such movement, means controlled by said drum and in timed relation to the rotation thereof for moving said fingers into substantial engagement with said drum to strip the document therefrom, and a flexible member connecting said support and said control means.
7. In a document handling device, the combination with a rotating drum for advancing a document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field and photographed by said camera, of a plurality of fingers arranged adjacent said drum and adapted to direct said document to said reversing means, a support for said fingers, a pair of arms pivotally mounted on said device and having the free ends connected to said plate so that the weight of the latter will tend to rock said plate in one direction about said pivots to move said fingers radially away from said drum to document directing position, a leaf spring carried by said support, a cam carried by said device and engaged by said spring for limiting the rocking movement of said support in said one direction to position said fingers in proper spaced relation with said drum to effectively guide said document to said reversing means, means for adjusting said support relative to said leaf spring, and means controlled by said drum and in timed relation to the rotation thereof for rotating said cam to actuate said leaf spring to rock said plate in the opposite direction about said pivots to position said fingers substantially in engagement with said drum to strip said document therefrom.
8. In a document handling device, the combination with a drum operatively connected to

a drive means which rotates the drum for advancing a document through the photographic field of a camera so as to be photographed thereby, a removable aperture guide positioned adjacent said drum and in said field, means on said device for supporting said guide, control means for said drive means, and means on said guide for rendering said control means effective only when said guide is in operative position in said field.

9. In a document handling device, the combination with a drum operatively connected to and adapted to be rotated by an electric motor for advancing a document through the photographic field of a camera so as to be photographed thereby, of a transparent guide plate positioned adjacent said drum for holding said document thereagainst during the passage thereof through said field, means on said device for supporting said plate in said field, a self opening electrical switch arranged in the circuit of said motor, and a portion on said plate arranged to engage and close said switch when said plate is in operative position.

10. In an apparatus for photographically recording a document, the combination with a housing having a feeding station for said document, a rotating drum mounted in said housing for advancing said document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field, means for blocking said station to prevent the feeding of a second document therethrough until said other side has been advanced through said field and means controlled by the leading edge of said document for moving said blocking member to station obstructing position and actuated by the trailing edge of the reversed document for moving the blocking member out of said station to permit the feeding of a second document to said drum.

11. In an apparatus for photographically recording a document, the combination with a housing having a feeding station for said document, a rotating drum mounted in said housing for advancing said document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field, means for blocking said station to prevent the feeding of a second document therethrough until said other side has been advanced through said field, means operated by said drum for moving said blocking member into and out of station obstructing position, and means actuated by the leading edge of said document for controlling said operating means to move said blocking member to station obstructing position and subsequently actuated by the trailing edge of the reversed document to control said operating means to move said blocking member out of station obstructing position.

12. In an apparatus for photographically recording a document, the combination with a housing having a feeding station for said document, a rotating drum mounted in said housing for advancing said document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field, means movable radially toward and away

from said drum, means for blocking said station to prevent the feeding of a second document therethrough until said other side has been advanced through said field, and means controlled by the leading edge of said document for moving the blocking member to station obstructing position and for moving said movable means away from said drum to guide said document to said reversing means and also controlled by the leading edge of the reversed document to move said movable means toward and into substantial engagement with said drum to strip the document therefrom and further controlled by the trailing edge of the reversed document for moving the blocking member out of station obstructing position.

13. In an apparatus for photographically recording a document, the combination with a housing having a feeding station for said document, a rotating drum mounted in said housing for advancing said document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field, means movable radially toward and away from said drum, means for blocking said station to prevent the feeding of a second document therethrough until said other side has been advanced through said field, means for separately operating said movable means and said blocking means from said drum, and means actuated by the leading edge of said document for controlling said operating means to simultaneously move said blocking member to station obstructing position and to move said movable means away from said drum to guide said document to said reversing means, said control means being also actuated by the leading edge of the reversed document to move said movable means against said drum to strip the document therefrom and subsequently actuated by the trailing edge of the reversed document to move said blocking member out of station obstructing position.

14. In an apparatus for photographically recording a document, the combination with a housing having a feeding station for said document, a rotating drum mounted in said housing for advancing said document through the photographic field of a camera so as to photograph one side of said document, of means for reversing said document so that the other side thereof may be advanced by said drum through said field, means movable radially toward and away from said drum, means for blocking said station to prevent the feeding of a second document therethrough until said other side has been advanced through said field, and means controlled by the same edge of said document for simultaneously moving said blocking member to station obstructing position and for moving said movable means away from said drum so as to guide said document to said reversing means and also controlled by different edges of the reversed document to first move said movable means against said drum to strip the reversed document therefrom and to then subsequently move said blocking member out of station obstructing position to permit a second document to be fed therethrough.

ALVIN E. SCHUBERT.
HARVEY P. HINTZ.
WADE S. NIVISON.