

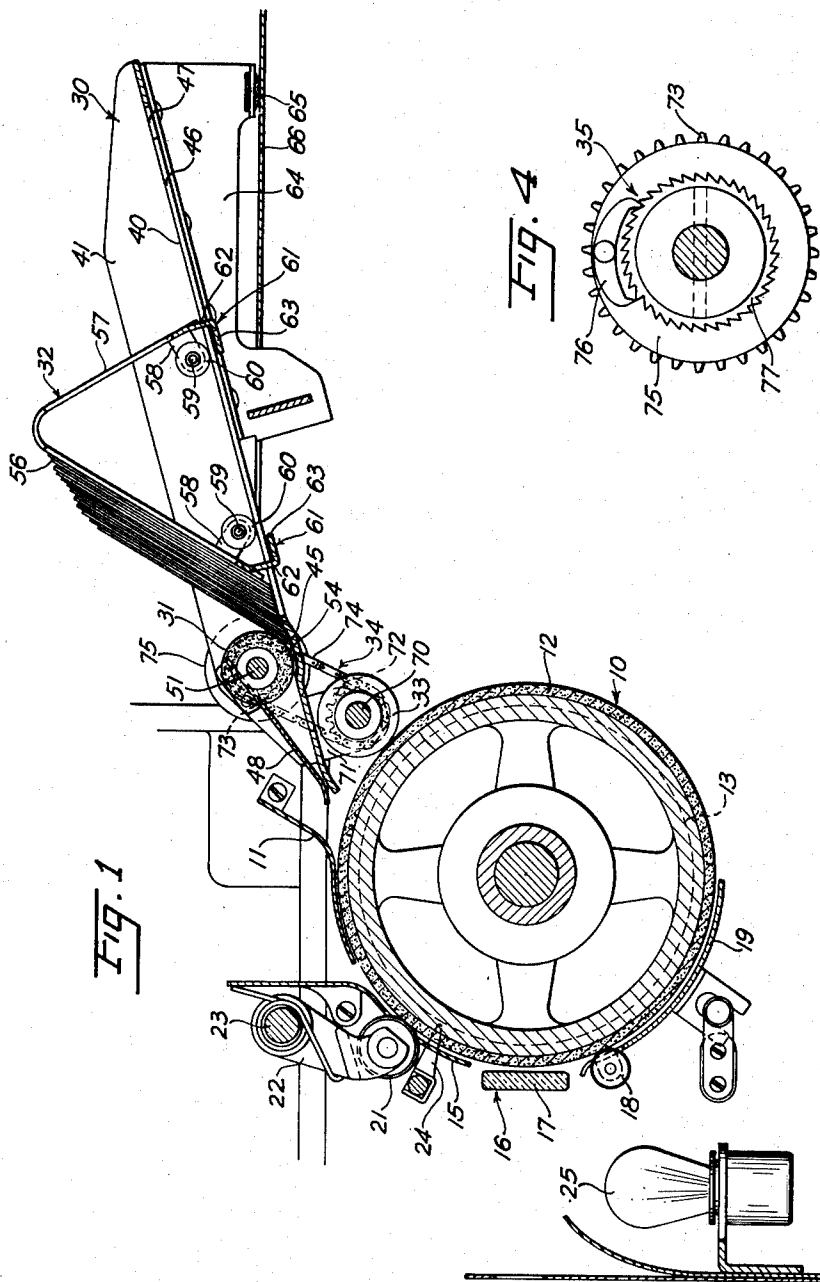
Oct. 21, 1952

W. L. CUTHBERT, JR
DOCUMENT FEEDING DEVICE

2,614,837

Filed Dec. 21, 1949

2 SHEETS—SHEET 1



WILLIAM L. CUTHBERT, JR.
INVENTOR

BY *Daniel J. Mayne*
Lloyd F. Schubert
ATTORNEY & AGENT

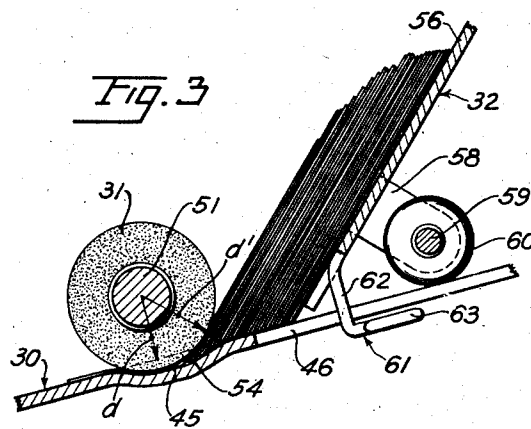
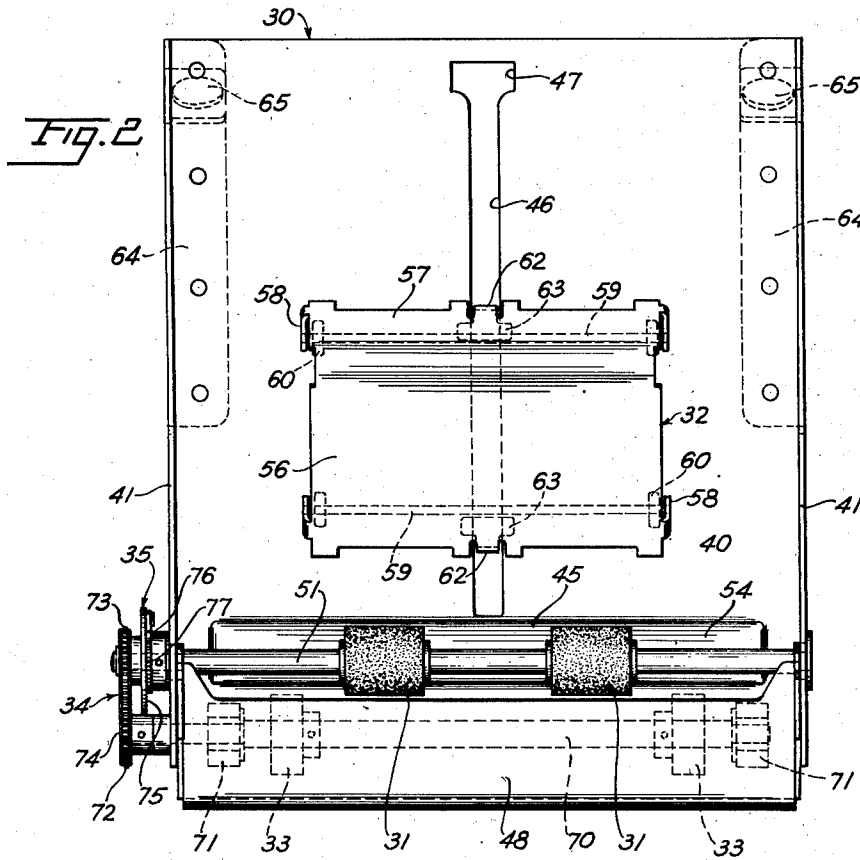
Oct. 21, 1952

W. L. CUTHBERT, JR
DOCUMENT FEEDING DEVICE

2,614,837

Filed Dec. 21, 1949

2 SHEETS—SHEET 2



WILLIAM L. CUTHBERT, JR.
INVENTOR

BY *Daniel J. Mayne*
Raymond E. Weckel
ATTORNEY & AGENT

UNITED STATES PATENT OFFICE

2,614,837

DOCUMENT FEEDING DEVICE

William L. Cuthbert, Jr., Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey

Application December 21, 1949, Serial No. 134,245

3 Claims. (Cl. 271--39)

1

This invention relates to feeding apparatus and more particularly to feeders of the type for delivering single checks or documents from a stack to a specified station such as the document advancing means of a photographic copying apparatus.

Numerous attempts have been made to design and construct a feeder which will satisfactorily remove single checks from a stack for delivery to another station without double feeding, i. e. the removal of more than one check from the stack at a time. To eliminate double feeding it is common practice to provide numerous adjustments for positioning the stripping or feed rollers with respect to the plate supporting the stack and for adjusting the follower which maintains the stack at an angle against the stripper rollers. Also, most feeders of checks or documents do not readily lend themselves to both automatic stack feeding and shelf feeding of individual checks or documents without making various changes or adjustments in the feeder when changing from one form of feeding to the other.

In the present invention, it has been found that by providing a recess at the forward end of the document supporting plate member and locating the stripper or feed rollers so that the periphery of said rollers extends into said recess and is below the surface of the plate member that double feeding is eliminated and that the feed rollers require no adjustment after assembly regardless of the weight of document being fed or the manner of feed. The recess or well with the feed rollers extending thereinto provides more document area in engagement with the feed roller during either stack or shelf feeding. With normal and heavier weight documents more positive feeding also results due to increased friction resulting from the document being bowed into the recess by the feed rollers. Further, a follower is provided which is mounted on rollers and has retaining members which freely engage a slot in the plate member for guiding the follower and permitting free movement thereof along said plate member so that a uniform and constant pressure is maintained against the stack by the follower. As a result, the checks or documents are maintained against the feed rollers with a uniform pressure against the stack regardless of the number of checks in the stack. Since the follower is slidably retained on the plate member, it may easily be removed or replaced to convert from one form of feeding to the other.

The primary object of the invention, therefore, is to provide the stack supporting member of a

2

document or check feeder with a recess at the delivery end thereof and positioning the feed rollers in said recess to improve the feeding of single documents from the stack.

Another object of the invention is to provide the stack supporting member of a document or check feeder with a recess at the delivery end thereof and positioning the feed rollers so that they extend partially into the recess, the distance from the axis of rotation of the feed rollers to the surface of the supporting member being less than the distance from said axis to the point where the document engages the feed roller, whereby the document area in contact with the feed rollers is greatly increased to provide improved automatic feeding or shelf feeding of individual documents.

Yet another object of the invention is to provide a document or check feeder in which the stack follower maintains a uniform pressure on the stack, is readily removed from or replaced on the feeder, and is provided with two document engaging surfaces for selectively positioning the stack at the desired angle with respect to the support member.

Still another object of the invention is to provide a document or check feeder which delivers said documents or checks to a continuously rotating drum and which is provided with a drive member adapted to engage the drum and a drive means operatively connecting the drive member to the feed rollers, said drive means including an overrunning clutch interposed between said drive means and said feed rollers for rotating the same and for permitting withdrawal of the document engaging said feed roller and drum at a faster rate.

And another object of the invention is to provide a document or check feeder which is relatively inexpensive to manufacture, which does not require any adjustments when feeding different weights of documents or when changing from stack to shelf feeding, or vice versa, and which is reliable in its operation.

Other objects and advantages will be apparent to those skilled in the art by description which follows.

The objects of the invention are embodied in a document or check feeder for delivering checks to apparatus for photographically copying said checks, said apparatus being of the type in which the checks are continuously moved past a photographing station by means of a rotating drum. Such a feeder comprises a plate member provided with a transverse recess at the delivery end

thereof and on which a stack of documents are supported on edge, a pair of rotatable members mounted on said plate member and extending partially into said recess and for frictionally removing documents singly from said stack for delivery to said drum, a follower retained on said plate member and movable therealong for maintaining said stack against said rotatable members and at an angle to said plate member, a drive member rotatably mounted on said plate member and adapted to engage said drum, and a drive means including an overrunning clutch interposed between said drive means and said rotatable members for rotating said rotatable members and for permitting said documents to be withdrawn from under said rotatable members by said drum at a faster rate.

Reference is now made to the accompanying drawings wherein like reference numerals designate like parts, and wherein:

Fig. 1 is a vertical section through the check feeder and showing its relation to a photographic copying apparatus and the manner in which the drive member contacts the continuously rotating drum of said apparatus;

Fig. 2 is a plan view of the check feeder showing particularly the location of the recess in which the rotatable members are positioned, the location of the driving members and the arrangement for maintaining the stack follower on said feeder;

Fig. 3 is an enlarged detail view showing the position of one of the rotatable members with respect to the recess in the support member and to the stack of checks and the manner in which a single check engages the feed roller as it is withdrawn from the stack; and

Fig. 4 is an enlarged detail view of the overrunning clutch interposed between the drive means and the rotatable members.

The photographic copying apparatus with which the feeder embodying the invention is adapted to be used is of a well-known type in which the check or document is introduced onto a continuously rotating drum 10 which may be driven in any well-known manner. The check is fed onto drum 10 near the top thereof and beneath plate 11 which serves to hold the check on said drum. Drum 10 is provided with a layer 12 of material, such as cork, having a high coefficient of friction and with a plurality of circumferential grooves 13 spaced axially of said drum in a well-known manner. Formed plates 14 and 15 tend to guide the check as it is moved toward photographing station 16 and beneath glass plate 17. Rollers 18, which are rotatably mounted on plate 19, hold the check against drum 10 as it is moved through the photographing station, and plate 19 guides the check to a suitable receptacle not shown. A roller 21, which is rotatably mounted in bracket 22 pivotally mounted on the tie rod 23, cooperates with a plurality of fingers 24 to properly orient or straighten any checks before they reach the photographing station. Lamps 25 are arranged parallel to the axis of the drum for illuminating the photographing station. A more detailed description of the photographic apparatus will be found in U. S. Patents 1,957,889 issued to R. S. Hopkins et al. on May 8, 1934 which relates to the feeding means, 1,976,346 issued to C. J. Hughey on October 9, 1934 which relates to the clutch means for moving the film strip in synchronism with the moving check, and 2,196,741 issued to A. E. Schubert

on April 9, 1940 which relates to a double sheet stop.

The feeder used in conjunction with the above-described apparatus comprises, broadly, a stack support member or plate 30, a pair of rotatable members or feed rollers 31, a stack follower 32, drive members 33 which are adapted to engage drum 10, and a drive means 34 including an overrunning clutch 35.

The support member or plate 30 has a flat center section 40 and formed up side walls 41. Adjacent the delivery end of section 40, a shallow recess 45 extends transversely of said section for a purpose to be described hereinafter. Section 40 is also provided with a longitudinal slot 46 which extends from a rectangular aperture 47 at the rear end of the section toward recess 45 at the delivery end thereof. A deflector plate 48 is positioned at the delivery end of section 40 and serves to direct the document toward the drum 10.

A pair of rotatable members or feed rollers 31 are spaced transversely of an above section 40 on shaft 51, as shown in Fig. 2. Feed rollers 31 are preferably of rubber or a similar material having a high coefficient of friction and are fixed to shaft 51 for rotation therewith, shaft 51 being journaled in side walls 41. With reference to Fig. 3, it will be noted that rollers 31 are aligned over recess 45 and that the peripheries of said rollers extend into said recess but do not engage the top surface 54 of said recess. As a result, the distance d from the axis of rotation of shaft 51, and hence that of rollers 31, to the top surface of section 40 is less than the distance d' from said axis to the point where the check engages the roller, or in other words, the radius of rollers 31. In stack and shelf feeding of checks or documents such as an arrangement of recess 45 and feed rollers 31 provides more document area in engagement with the rollers. It can be readily appreciated that where the feed roller is tangent to the surface supporting the stack, the area of document contact with the feed roller can be increased only by increasing the angle of the stack. However, where the checks or documents are "fanned" for feeding, there is an optimum angle for the stack which provides the best results, and by placing feed rollers 31 in recess 45 not only is the optimum angle retained but the area of document contact is increased and double feeding is eliminated. Likewise, when documents are shelf fed and the feed rollers are tangent to the stack supporting surface, the roller makes only line contact with the document, whereas when the feed rollers are placed in recess 45, there is a definite area of document contact with the feed rollers and increased friction between the document and feed roller because the document is bowed into the recess.

The stack follower 32 is formed from a single sheet of metal and is provided with document engaging surfaces 56 and 57 and formed over ears 58 in which shafts 59 are journaled, said shafts having rollers 60 rotatably mounted thereon, as shown in Figs. 1 and 3. Surfaces 56 and 57 are formed at different angles to the horizontal to provide two different stack angles with respect to section 40, one of which provides more wrap-around the feed rollers than the other depending on the weight of check being fed. Both surfaces 56 and 57 terminate in a portion which has located centrally thereof a T-shaped projection 61, see Figs. 2 and 3, which retains the follower on plate member 30 and guides it in slot 46. The leg portions 62 of projections 61 are slightly nar-

5

rower than slot 46 and the cross members 63 are slightly smaller than the aperture 47 to permit said cross members to be easily removed through or placed in said aperture. When the feeder is placed in position, as shown in Fig. 1, the plate member 30 is positioned at an angle to the horizontal by the positioning members 64 which are secured to the bottom of section 40 and which have feet 65 for engaging the top 66 of the apparatus. As a result, the follower 32 is free to move along the inclined section 40 of its own weight on rollers 60, being guided by slot 46 and maintaining a uniform pressure on the stack of checks or documents at all times.

When a stack of checks or documents is to be placed on plate member 30 for automatic feeding, follower 32 is moved to the rear of plate member 30. The operator can then place the stack on section 40 against rollers 31 and release follower 32 to permit it to roll along section 40 to seek engagement with the rear end of the stack. To reverse the angle of the stack, the follower 32 is moved rearwardly until the rear cross member 63 can be withdrawn through aperture 47 and is then moved still farther rearwardly until the front cross member is under aperture 47 for withdrawal therethrough. The follower is then rotated through 180 degrees so that the rear cross member 63 is first inserted through aperture 47 as the front cross member, the follower then being moved forward until the other cross member is positioned so that it can also be dropped through aperture 47.

Drive members 33 are secured to shaft 70 which is journaled in the blocks 71 secured to the bottom of section 40 and are adapted to engage drum 10 when properly positioned on the apparatus, as shown in Fig. 1. Sprocket 72 is fixed to one end of shaft 70 and is rotatable with members 33. A second sprocket 73 is freely rotatable on shaft 51 and is connected to sprocket 72 by chain 74. A plate 75 is integral with sprocket 73 and has pivotally mounted thereon a pawl 76 of the escapement type which engages ratchet 77. Pawl 76 and ratchet 77, therefore, constitutes the overrunning clutch 35 which is interposed between the drive means comprising sprockets 72 and 73 and chain 74 and the rollers 31. As is well known, upon rotation of sprocket 73 in a clockwise direction, as shown in Fig. 4, pawl 76 will pick up ratchet 77 to rotate shaft 51 and rollers 31. Since sprockets 72 and 73 have been chosen so that rollers 31 are rotated at a peripheral speed less than that of drum 10, the document is removed from the stack at that speed until it contacts the drum. Once the leading edge of the document has been moved onto drum 10, it is moved at the speed of the drum, and pawl 76 permits shaft 51 to be rotated at the faster speed until the trailing edge of the document has cleared rollers 31 at which time pawl 76 again picks up ratchet 77 to rotate it at its normal speed.

From the foregoing description, it can be readily appreciated that the arrangement of a recess with the feed rollers extending thereinto provides a relatively inexpensive and efficient way of obtaining more document area in contact with the feed rollers and improves the feeding of documents from a stack, or the shelf feeding of individual documents. It is not intended that the invention be limited to the apparatus described inasmuch as, in view of the disclosure, other modification and uses, other than in connection with photographic apparatus, will readily suggest

6

themselves to those skilled in the art without departing from the spirit of the invention or the scope of the appended claims.

Having now particularly described my invention, what I desire to secure by Letters Patent of the United States and what I claim is:

1. In a device for feeding discrete documents to a photographic apparatus, the combination comprising a plate member for supporting a stack of documents on edge, and plate member being arranged at an angle to the horizontal and having a parti-cylindrical depression in said plate extending transverse to the direction of sheet travel, located at the delivery end of said plate member and extending substantially the width of said plate member, a rotating member mounted on said plate member on an axis parallel to said depression and having a portion of the periphery thereof extending into said depression and for frictionally removing documents singly from said stack, and a follower retained on said plate member and movable therealong for maintaining said stack against said rotating member and at an angle to said plate member.

2. In a device for feeding discrete documents to a photographic apparatus, the combination comprising a plate member for supporting a stack of documents on edge, said plate member being arranged at an angle to the horizontal and having a parti-cylindrical depression in said plate extending transverse to the direction of sheet travel, located at the delivery end of said plate member and extending substantially the width of said plate member, a plurality of coaxial spaced rotating members mounted on said plate member on an axis parallel to said depression and having a portion of the periphery of each rotating member extending into said depression and for frictionally removing documents singly from said stack, the normal distance from the axis of rotation of said rotating members to the surface of said plate member being less than the normal distance from said axis to the point where a document engages said rotating members, and a follower retained on said plate member and movable therealong for maintaining said stack against said rotatable members and at an angle to said plate member.

3. In a device for feeding discrete documents to a photographic apparatus, the combination comprising a plate member for supporting a stack of documents on edge, said plate member being arranged at an angle to the horizontal and having a parti-cylindrical depression in said plate extending transverse to the direction of sheet travel, located at the delivery end of said plate member and extending substantially the width of said plate member and being provided with a longitudinal slot centrally thereof and perpendicular to said depression, a plurality of coaxial spaced rotating members mounted on said plate member on an axis parallel to said depression and having a portion of the periphery of each rotating member extending into said depression and for frictionally removing documents singly from said stack, the normal distance from the axis of rotation of said rotating members to the surface of said plate member being less than the normal distance from said axis to the point where a document engages said rotating members, and a follower movable along said plate member for maintaining said stack against said rotatable members and at an angle to said plate member and comprising two intersecting surfaces arranged at different acute angles to the

same plane and a member formed integral with each surface and adapted to engage said slot for guiding said follower in its movement along said plate member and for permitting said follower to be detached from said plate member for selectively positioning one of said surfaces against said stack.

WILLIAM L. CUTHBERT, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

5

10

UNITED STATES PATENTS

Number	Name	Date
985,429	McArdle et al. -----	Feb. 28, 1911
1,061,585	Armstrong -----	May 13, 1913
1,085,781	Allen -----	Feb. 3, 1914
2,080,968	Krell -----	May 18, 1937
2,089,946	Davidson -----	Aug. 17, 1937
2,363,357	Post -----	Nov. 21, 1944