

Feb. 13, 1962

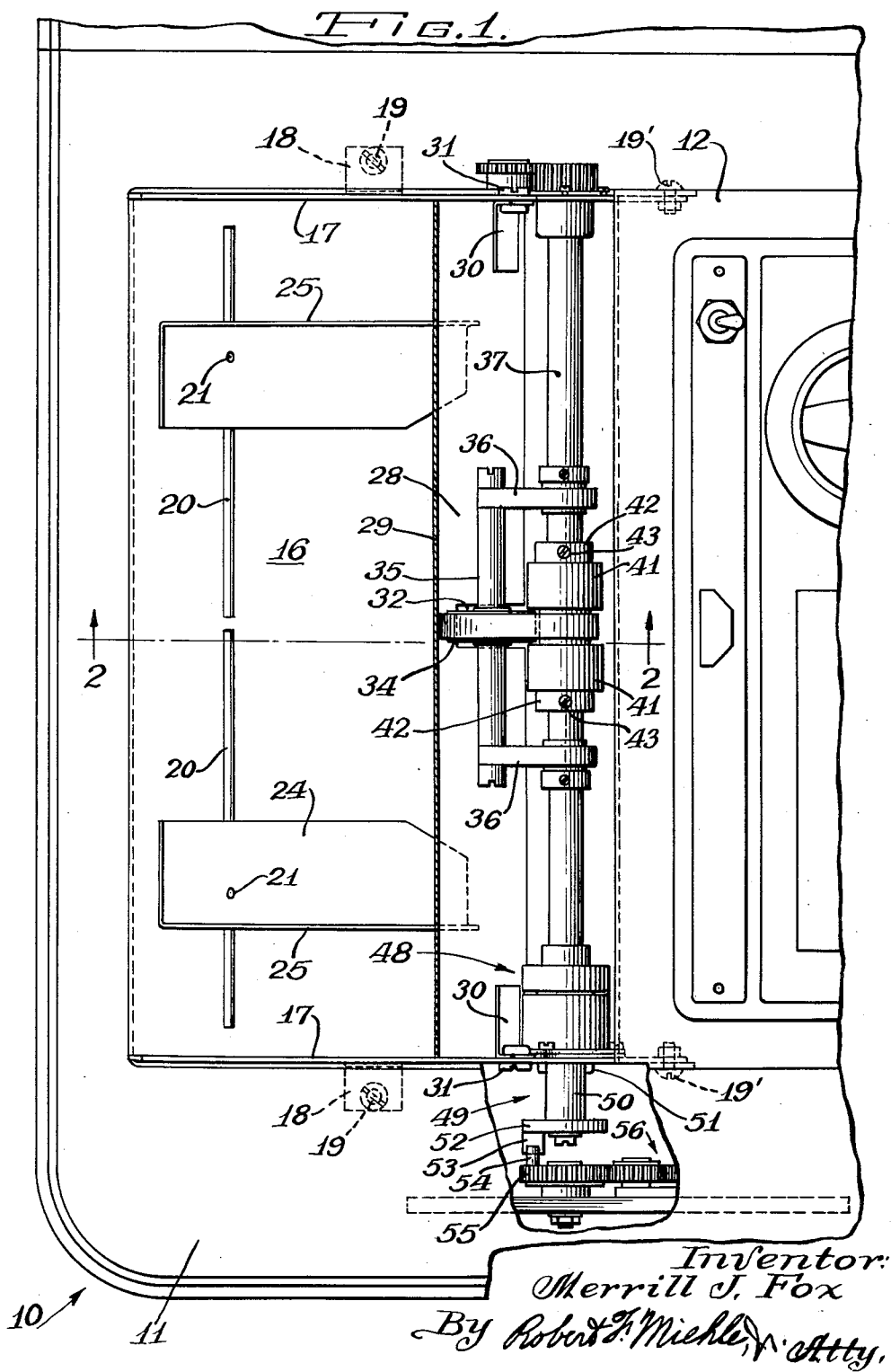
M. J. FOX

3,021,136

SHEET FEEDING MECHANISM

Filed Dec. 2, 1957

4 Sheets-Sheet 1



Feb. 13, 1962

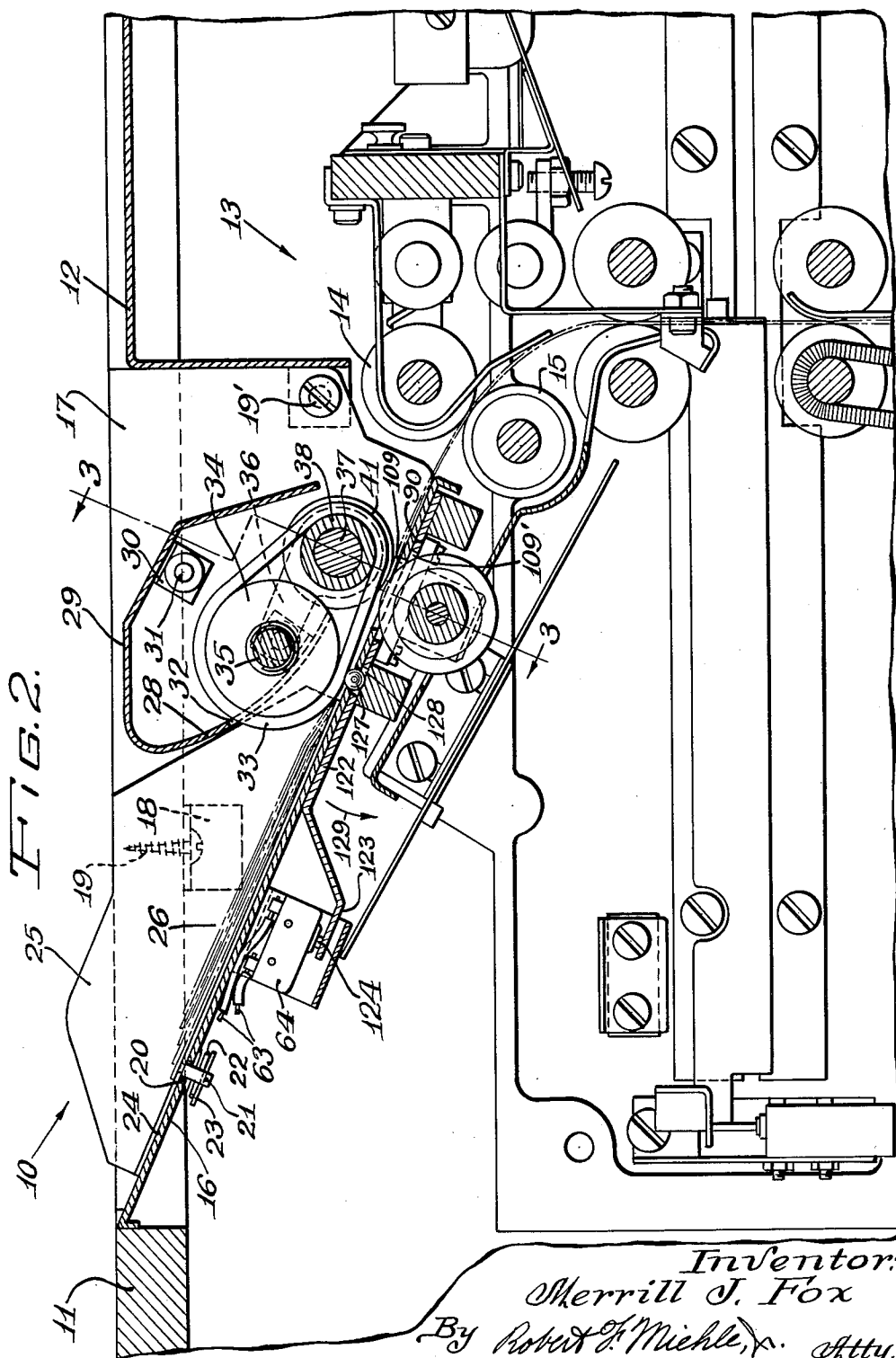
M. J. FOX

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SHEET FEEDING MECHANISM

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4 Sheets-Sheet 2



Inventor:
Merrill J. Fox
By Robert F. Miehle, Jr. Atty.

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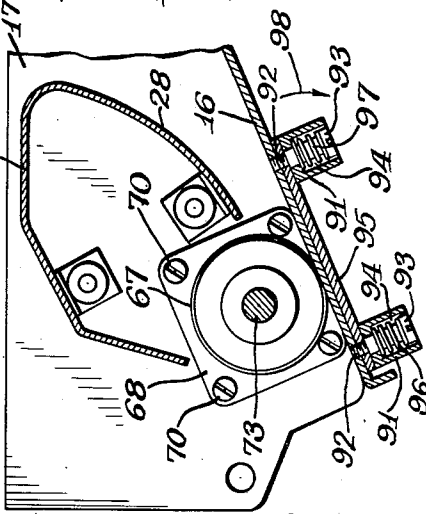
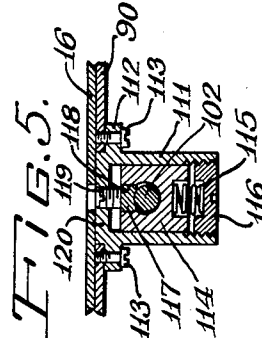
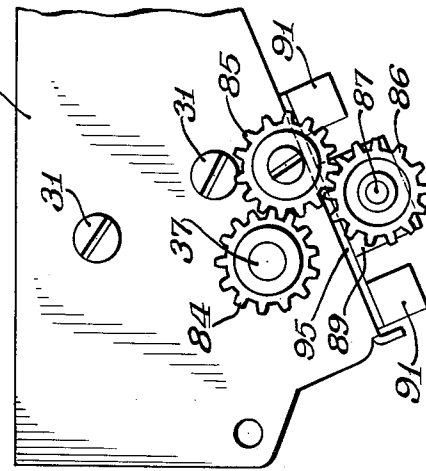
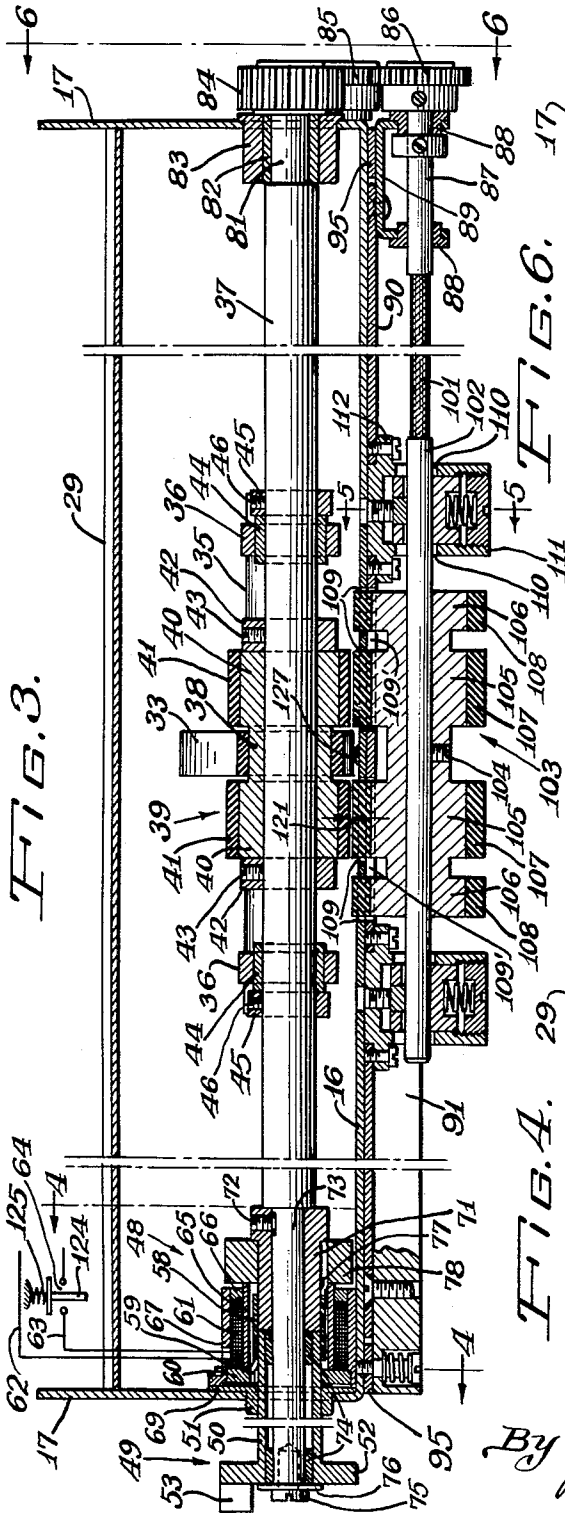
M. J. FOX

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SHEET FEEDING MECHANISM

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4 Sheets-Sheet 3



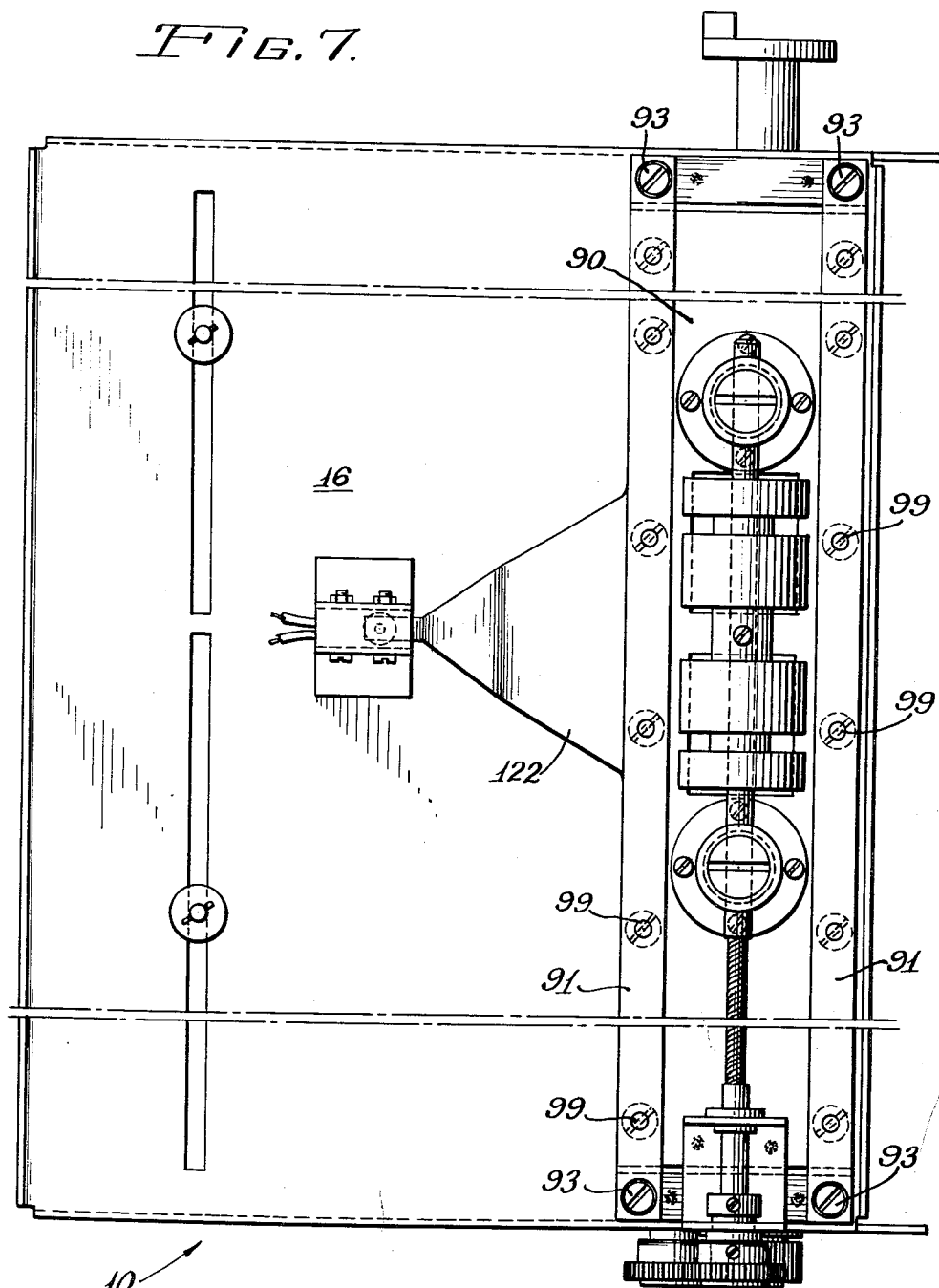
Inventor:
Merrill J. Fox
By Robert F. Miehle, Atty.

Filed Dec. 2, 1957

SHEET FEEDING MECHANISM

4 Sheets-Sheet 4

FIG. 7.



Inventor:
Merrill J. Fox
By Robert F. Miehle, A. Att'y.

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3,021,136

SHEET FEEDING MECHANISM

Merrill J. Fox, Chicago, Ill., assignor to Bell & Howell Company, Chicago, Ill., a corporation of Illinois

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8 Claims. (Cl. 271-36)

This invention relates, generally, to sheet feeding mechanisms and it has particular relation to devices for feeding single sheets or documents to recording apparatus, such as microfilm recording apparatus.

Among the objects of this invention are: To provide for singly feeding sheets or documents from a stack thereof in a new and improved manner; to employ for this purpose oppositely rotating feed and retard rollers the document engaging surfaces of which have different coefficients of friction; to provide the feed roller with a surface having a higher coefficient of friction than the surface of the retard roller; to compensate for wear of the document engaging surfaces of the feed and retard rollers in order to maintain them at a predetermined distance apart; to provide wear shoes between the rollers against which one of them is biased, the wear shoes being characterized by wearing away at a rate corresponding to the rate at which the surfaces of the rollers wear away in order to maintain them at a constant distance apart; to journal the retard roller on support means in a new and improved manner; to mount the retard roller for movement toward and away from the feed roller in a new and improved manner; to declutch the driving connection between the feed roller and its driving means on predetermined movement of the retard roller away from the feed roller; and to employ an electromagnetically controlled clutch for this purpose and to deenergize it on movement of the retard roller away from the feed roller, such as occurs when two sheets or documents appear therebetween.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiment thereof shown in the accompanying drawings and it comprises the features of construction, combination of elements and arrangement of parts that will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

FIGURE 1 is a top plan view of microfilm recording and feeding apparatus in which the present invention is embodied;

FIGURE 2 is a vertical sectional view taken generally along the line 2-2 of FIGURE 1;

FIGURE 3 is a sectional view taken generally along the line 3-3 of FIGURE 2;

FIGURE 4 is a vertical sectional view taken generally along the line 4-4 of FIGURE 3;

FIGURE 5 is a vertical sectional view taken generally along the line 5-5 of FIGURE 3;

FIGURE 6 is a view in end elevation of a portion of the feeder taken looking in the direction of the arrows 6-6 on FIGURE 3; and

FIGURE 7 is a bottom plan view of the feeder shown in FIGURE 1.

Referring to the drawings it will be observed that the reference character 10 designates, generally, a feeder for documents, such as checks, that are to be fed singly to a microfilm recorder or to other apparatus for further processing. Portions of the frame of the microfilm recorder are indicated at 11 and 12, it being understood

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that the feeder 10 is mounted thereon for directing the documents, one by one, to conveying rollers, shown generally at 13 in FIGURE 2, and particularly between entrance rollers 14 and 15. The feeder 10 includes a document support plate 16 that is inclined toward the entrance rollers 14 and 15 and is provided with upstanding sides 17 from which ears 18 project underneath portions 11 of the frame. The ears 18 are secured in position by screws 19. In addition bolts 19' extend through the forward ends of the sides 17 and through portions 12 of the frame for further supporting the feeder 10. Near the upper edge of the document support plate 16 transversely extending slots 20 are provided through which pins 21 project. Surrounding the pins 21 are coil compression springs 22 which react between the underside of the document support plate 16 and washers 23. The pins 21 depend from document guides 24 that can be adjustably positioned toward and away from each other in order to accommodate different sizes of documents. It will be observed that the guides 24 include upstanding walls 25 and that a stack of documents 26, such as a stack of checks, is located on the guides 24 and are directed downwardly at the angle of inclination of the document support plate 16.

Extending across the lower portion of the document support plate 16 there is a lower curved portion 28 of a baffle 29 having brackets 30 at its ends which are secured by screws 31 to the sides 17. A slot 32 is provided in the lower curved portion 28 through which a feed belt 33 projects together with a supporting pulley 34. The feed belt 33 may be formed of rubber or rubber like material the surface of which engages the surface of the uppermost document 26 for moving it downwardly along the support plate 16 toward the entrance rollers 14 and 15. The pulley 34 is rotatably mounted on a shaft 35 having arms 36 at its ends which are rotatable on a feed roller shaft 37. It will be understood that the pulley 34 is freely rockable about the axis of the feed roller shaft 37 and is biased by the force of gravity downwardly to move the feed belt 33 into suitable gripping engagement with the upper surface of the uppermost document 26.

As shown more clearly in FIGURE 3 the feed belt 33 is trained around a central section 38 of a friction feed roller that is indicated, generally, at 39 and is nonrotatably mounted on the feed roller shaft 37. The friction feed roller 39 has end sections 40 which are surrounded by bands 41 of friction material having a relatively high coefficient of friction. The bands 41 engage the upper surface of the documents 26 to feed them forwardly to the entrance rollers 14 and 15. Endwise movement of the friction feed roller 39 is prevented by rings 42 which are secured to the feed roller shaft 27 by set screws 43. Outwardly of the rings 42 are bearing bushings 44 on which the arms 36 are journaled. The feed roller shaft 37 is rotatable relative to the bearing bushings 44 and they are held in position against endwise movement by rings 45 which are secured to the feed roller shaft 37 by set screws 46.

With a view to controlling the rotation of the feed roller shaft 37 a clutch shown generally at 48, is provided for cooperation with a driving member 49. The clutch 48 preferably is of the electromagnetic type and is described in more detail in copending application Serial No. 784,748 filed January 2, 1959, as a continuation in part of now abandoned application Serial No. 689,862 filed October 14, 1957, and assigned to the assignee of this application.

As shown more clearly in FIGURE 1 of the drawings the driving member 49 includes a sleeve 50 which is journaled in a non-magnetic bearing bushing 51 which is carried by the adjacent side 17 of the document support plate 16. At its outer end the sleeve 50 has a radial

flange 52 formed integrally therewith from which an ear 53 projects laterally into the path of an ear 54 which is carried by a gear 55 that forms a part of a gear train, shown generally at 56, which is operated by the recorder drive mechanism.

FIGURE 3 shows the details of construction of the electromagnetic clutch 48. It will be observed that it includes a helical clutch spring 58 a portion of the turns of which surround the inner end of the sleeve 50 while the remaining turns extend around a sleeve 71 (to be described) the external diameter of which is the same as the external diameter of the sleeve 50. The construction of the helical spring 58 is such that it normally slightly grips the surfaces of the sleeves 50 and 71 and the convolutions are so arranged that additional gripping engagement is provided with these surfaces on rotation of the sleeve 50.

The control of the gripping engagement applied by the helical clutch spring 58 is effected by extending one end 59 into an armature 60 in the form of an annular magnetic member which is rotatable on the sleeve 50 and is movable endwise with respect thereto. A coil 61, surrounding the helical clutch spring 58, controls the position of the armature 60. In order to energize the coil 61 and stop further rotation of the armature 60 conductors 62 and 63 are connected through a normally opened switch 64 to a suitable current source, such as a source of direct current. When the switch 64 is closed, as will be described hereinafter, the coil 61 is energized. Normally, however, the switch 64 is held open and the coil 61 is deenergized. The magnetic circuit around the coil 60 includes a cylindrical core 65, an annular end plate 66 and a cylindrical housing 67 which is provided with a radial flange 68, FIGURE 4, which overlies a flange 69 formed integrally with the non-magnetic bearing bushing 51. Screws 70 extending through the flanges 68 and 69 serve to hold the coil 61 and parts associated therewith in proper position on the side 17 of the document support plate 16.

As pointed out hereinbefore one end of the helical clutch spring 58 normally has slight gripping engagement with the outer surface of the sleeve 71. This sleeve is secured to the feed roller shaft 37 by a set screw 72 and it extends over a reduced diameter portion 73 of this shaft. The reduced diameter portion 73 is journaled in bearing bushings 74 which are located within the sleeve 50. At its outer end a screw 75 and washer 76 serve to hold the driving member 49 against endwise movement from the reduced diameter portion 73 of the feed roller shaft 37.

With a view to improving the declutching of the clutch spring 58 from the sleeve 71 the other end 77 of the spring 58 extends into a flywheel 78 which is rotatably mounted on the sleeve 71. When the coil 61 is energized and the armature 60 is stopped, the driving connection between the sleeves 50 and 71 is interrupted and the latter slows down. However, the flywheel 78 tends to continue to rotate at a higher speed and thus tends to relieve the gripping engagement between those turns of the clutch spring 58 that surround the sleeve 71.

At the other end of the feed roller shaft 37, as shown in FIGURE 3, there is a reduced diameter portion 81 which is journaled in a bearing bushing 82 that is carried by a sleeve 83 which extends through the adjacent side 17 of the document support plate 16. A gear 84 is non-rotatably mounted on the outer end of the reduced diameter portion 81 and it meshes with an idler gear 85, FIGURE 6, which drives a gear 86 that is non-rotatably mounted on a short shaft 87.

It will be noted in FIGURE 3 that the short shaft 87 is journaled in bearing bushings 88 that are carried by the downturned ends of a bearing bracket 89 which is mounted on the underside of the elongated rectangular bearing support plate 90. As illustrated more clearly in FIGURE 2 of the drawings the bearing support plate 90

is generally coextensive with and lies underneath the feed roller 39. Along the edges of the bearing support plate 90 there are marginal bars 91, FIGURE 4, which are rectangular in cross section and through which threaded studs 92 project into the document support plate 16 from the underside. Heads 93 on the studs 92 are slidable in counterbored openings 94 at the ends of the marginal bars 91. End plates 95, FIGURE 3, underlie the ends of the marginal bars 91 and are of the same thickness as the bearing support plate 90. The threaded studs 92 project through the ends of the end plates 95 as shown in FIGURE 4.

It is desirable that the bearing support plate 90 be mounted for movement toward and away from the underside of the document support plate 16 for a purpose which will be apparent presently. In order to permit such movement relatively strong compression springs 96 are provided between the heads 93 of the threaded studs 92 along the leading side of the feed roller 39 while relatively weak coil compression springs 97 are provided around the threaded studs 92 and between the heads 93 and the bottoms of the respective counterbored openings 94 along the trailing side of the feed roller 39. By virtue of this construction employing relatively strong and relatively weak springs 96 and 97 the bearing support plate 90 is effectively hinged about the leading side of the feed roller 39 with the portion along the trailing side being movable relatively further away from the undersurface of the document support plate 16 in the direction indicated by the arrow 98 under certain operating conditions which will be described.

Referring again to FIGURE 3 of the drawings it will be observed that the short shaft 87, which is journaled on the bearing support plate 90 to rotate about an axis fixed with respect thereto, is connected by a flexible shaft 101 to retard shaft 102 which carries intermediate its ends a friction retard roller that is indicated, generally, at 103. A set screw 104 secures the retard roller 103 non-rotatably to the retard shaft 102. On opposite sides of the central portion of the retard roller 103 are major retard sections 105 and outwardly thereof are minor retard sections 106. Bands 107 and 108 surround the retard sections 105 and 106, respectively, and they are formed of friction material having a relatively low coefficient of friction as compared to the coefficient of friction of the bands 41 which form a part of the friction feed roller 39. It will be apparent that the friction retard roller 103 rotates in a direction opposite to the direction in which the friction feed roller 39 rotates by virtue of the idler gear 85 previously described. This arrangement normally prevents the feeding of more than one of the documents 26 by the friction feed roller 39 to the entrance rollers 14 and 15. Since the bands 41 around the friction feed roller 39 have a higher coefficient of friction than do the bands 107 and 108 around the friction retard roller 103, the retarding action of the latter is enhanced and the likelihood of more than a single document being fed by the friction feed roller 39 from a stack of documents is correspondingly reduced. It will be understood that the bands 41, 107 and 108 are preferably formed of suitable rubber like plastic materials having the coefficients of friction in the relation indicated.

In FIGURE 2 it will be observed that the bands 107 and 108 surrounding the respective portions 105 and 106 of the retard roller 103 project through registering apertures 109 and 109' in the document support plate 16 and in the bearing support plate 90.

The manner in which the ends of the retard shaft 102 are journaled on the bearing support plate 90 is of particular significance. As shown in FIGURE 3 the ends of the retard shaft 102 extend through slots 110 in cylindrical bearing supports 111 that depend from the underside of the bearing support plate 90. Formed integrally with the upper end of each cylindrical bearing support 111 is a flange 112, FIGURE 5, which is secured by screws 116 projecting therethrough to the bearing support plate 90.

Within each cylindrical bearing support 111 is a bearing 114 which is slidable therein and is biased upwardly toward the friction feed roller 39 by a coil compression spring 115. Each coil compression spring 115 is interposed between the lower side of the respective bearing 114 and the upper side of a screw cap 116. Each spring 115 urges the respective bearing 114 upwardly together with the retard shaft 102. The biasing action is resisted by wear shoes 117 that extend downwardly through openings 118 in the upper side of each bearing 114 which faces the feed roller 39. Each wear shoe 117 is carried by a set screw 119 that is threaded into the base 120 of the respective cylindrical bearing support 111.

It is desirable that the spacing 121, FIGURE 3, between the document engaging surfaces of the friction feed roller 39 and the friction retard roller 103 be maintained constant. However, the surfaces of the respective bands 41 and 107 tend to wear with the result that there is a tendency for the distance 121 therebetween to increase. With a view to maintaining the spacing 121 substantially constant the wear shoes 117 are so designed and characterized that they tend to wear out at a rate which corresponds to the rate at which the surfaces of the bands 41 and 107 tend to wear out. Since the springs 115 constantly urge the bearings 114 upwardly against the respective ends of the retard shaft 102 and they in turn against the respective wear shoe 117, the wearing away of the surface of the latter in engagement with the retard shaft 102 permits the latter to be moved upwardly. Since, as indicated, this wear corresponds to the wear on the surfaces of the bands 41 and 107, the spacing 121 is maintained constant throughout the life of the bands 41 and 107 and of the wear shoe 117.

In the event that more than one of the documents 26 should appear between the feed roller 39 and the retard roller 103, the latter will be moved downwardly a corresponding extent since the axis about which the feed roller shaft 37 rotates is fixed while the axis about which the retard shaft 102 rotates is movable downwardly together with the bearing support plate 90. It will be recalled that this movement is permitted by the sliding connection between the threaded studs 92 and the rectangular marginal bars 91 which are secured to the underside of the bearing support plate 90 by screws 99, FIGURE 7. The coil compression springs 96 and 97 bias the bearing support plate 90 upwardly together with the friction retard roller 103 toward the friction feed roller 39. Since the movement of the bearing support plate 90 is in the direction indicated by the arrow 98 away from the underside of the document support plate 16 when more than one document comes between the feed roller 39 and the retard roller 33, advantage is taken of this action to provide an extension 122, FIGURE 2 and 7, from the bearing support plate 90 underneath the support plate 16 and centrally thereof. The free end of the extension 122 has an offset portion 123 for operating the switch 64, previously referred to. It will be observed in FIGURE 2 that the switch 64 is mounted on the underside of the document support plate 16 and between it and the offset portion 123. A plunger 124 is normally engaged by the offset portion 123 and it holds the same depressed against the biasing action of a spring 125, FIGURE 3, which tends to bias the switch 64 to the closed position.

In order to space the next document to be fed by the feed roller 39 from the surface of the document support plate 16 a ball 127, FIGURES 2 and 3, is provided in an opening 128 in the document support plate 16 directly underneath the pulley 334. The ball 127, which may be formed of any suitable material such as nylon, spaces the next document from the surface of the support plate 16 and prevents adherence therebetween.

In describing the operation of the feeder 10, it will be assumed that documents 26 are being fed from the document support plate 16. Under these conditions the recorder is in operation and the gear 55 is being driven

to effect corresponding action of the driving member 49. Under the assumed conditions the switch 64 is held open and the clutch coil 61 is deenergized. The clutch spring 58 then slightly grips the surfaces of the sleeves 50 and 71 and is tightened into driving engagement therewith since the sleeve 50 is rotating and the feed roller shaft 37 and parts rotatable therewith are free to rotate. The friction retard roller 103 rotates in a direction which is the reverse of the direction of rotation of the feed roller 39 and thereby cooperates with it to insure that the documents 26 are fed singly by the feed roller 39.

As the surfaces of the bands 41 and 107 on the feed roller and retard roller 103 wear, there is a corresponding wear on the surfaces of the wear shoes 117 in engagement with the retard shaft 102 and the spacing 121 is maintained constant. Because of the higher coefficient of friction for the bands 41 and the relatively lower coefficient of friction for the bands 107, the driving action of the feed roller 39 and the retard action of the retard roller 103 are enhanced.

In the event that two of the documents 26 should appear between the feed roller 39 and the retard roller 103, the latter will be moved away from the former a corresponding distance and the bearing support plate 90 together with the end plates 95 will be rocked in the direction indicated by the arrow 98 in FIGURE 4. This is accompanied by a corresponding swinging movement of the extension 122 as indicated by the arrow 129 in FIGURE 2. The offset portion 123 then no longer holds the plunger 124 depressed and the spring 125 is permitted to close the contacts of the switch 64. The coil 61 is energized and the armature 60, which previously was rotating conjointly with the sleeve 50, is stopped. The end 59 of helical clutch spring 58 is stopped and the gripping engagement with the sleeve 50 is released accompanied by a release of the gripping engagement of the helical spring 58 with the surface of the sleeve 71. The declutching action is accelerated by the flywheel 78 in the manner described hereinbefore. The feed roller shaft 37 and feed roller 39 immediately stop. Since the retard shaft 102 and retard roller 103 are driven by the feed roller shaft 37, they also stop. On removal of the double document between the feed roller 39 and retard roller 103, the latter is permitted to move back to the initial position under the biasing action of the springs 96 and 97. The contacts of the switch 64 are opened and the coil 61 is deenergized. The helical clutch spring 58 then is free to grip the surfaces of the sleeves 50 and 71 to restore the driving connection between the driving member 49 and the feed roller shaft 37.

Since certain changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In a document feeding mechanism, in combination, a rotatable feed roller having a document engaging surface positioned to frictionally feed documents from a stack to recording apparatus, a retard roller in opposed relation to said feed roller and rotatable in the same direction as said feed roller and having a document engaging surface to cause said documents to be fed singly by said feed roller, the document engaging faces of said feed and retard rollers having different coefficients of friction, means biasing said retard roller toward said feed roller, and wear shoe bearing means interposed between said rollers in engagement with said retard roller and characterized by wearing away at a rate such as to compensate for the rate at which said document engaging surfaces of said feed and retard rollers wear.

2. In a document feeding mechanism, in combination, a rotatable feed roller having a document engaging surface positioned to frictionally feed documents from a stack

to recording apparatus, a retard roller in opposed relation to said feed roller and rotatable in the same direction as said feed roller and having a document engaging surface to cause said documents to be fed singly by said feed roller, bearing means rotatably mounting said retard roller including wear shoe means interposed between said rollers, and means biasing said retard roller toward said feed roller and against said wear shoe means; said wear shoe means being characterized by wearing away to compensate for the wearing away of said document engaging surfaces of said feed and retard rollers to maintain them at a predetermined distance apart.

3. In a document feeding mechanism, in combination, a rotatable feed roller having a document engaging surface positioned to frictionally feed documents from a stack to recording apparatus, a retard roller in opposed relation to said feed roller and rotatable in the same direction as said feed roller and having a document engaging surface to cause said documents to be fed singly by said feed roller, a shaft projecting from opposite ends of said retard roller, a bearing support at each end of said retard roller having longitudinal slots through which the respective end of said shaft projects, a bearing slidable in each bearing support in which said shaft is journaled, a spring reacting between each bearing support and the bearing therein to bias said retard roller toward said feed roller, and a wear shoe forming a part of each bearing and interposed between said shaft and said feed roller, said wear shoe having said shaft biased thereagainst and characterized by wearing away at a rate such as to compensate for the rate at which said document engaging surfaces of said feed and retard rollers wear to tend to maintain them at a predetermined distance apart.

4. In a document feeding mechanism, in combination, a rotatable feed roller having a document engaging surface positioned to frictionally feed documents from a stack to recording apparatus, a retard roller in opposed relation to said feed roller and rotatable in the same direction as said feed roller and having a document engaging surface to cause said documents to be fed singly by said feed roller, the document engaging faces of said feed and retard rollers having different coefficients of friction, bearing means rotatably mounting said retard roller including wear shoe means interposed between said rollers, means biasing said retard roller toward said feed roller and against said wear shoe means, said wear shoe means being characterized by wearing away at a rate such as to compensate for the rate at which said document engaging surfaces of said feed and retard rollers wear to tend to maintain them at a predetermined distance apart, driving means for said feed roller, normally engaged clutch means between said driving means and said feed roller for controlling the driving connection therebetween, means mounting said bearing means and thereby said retard roller for movement toward and away from said feed rollers, and means responsive to predetermined movement of said retard roller away from said feed roller for disengaging said clutch means.

5. In a document feeding mechanism, in combination, a rotatable feed roller having a document engaging surface positioned to frictionally feed documents from a stack to recording apparatus, a retard roller in opposed relation to said feed roller and rotatable in the same direction as said feed roller and having a document engaging surface to cause said documents to be fed singly by said feed roller, the document engaging faces of said feed and retard rollers having different coefficients of friction, a shaft projecting from opposite ends of said retard roller, a bearing support at each end of said retard roller having longitudinal slots through which the respective end of said shaft projects, a bearing slidable in each bearing support in which said shaft is journaled, a spring reacting between each bearing support and the bearing therein to bias said retard roller toward said feed roller, a wear shoe forming a part of each bearing and interposed between said shaft

and said feed roller, said wear shoe having said shaft biased thereagainst and characterized by wearing away at a rate such as to compensate for the rate at which said document engaging surfaces of said feed and retard rollers wear to tend to maintain them at a predetermined distance apart, driving means for said feed roller, normally engaged clutch means between said driving means and said feed roller for controlling the driving connection therebetween, means mounting said bearing supports and thereby said retard roller for movement toward and away from said feed roller, and means responsive to predetermined movement of said retard roller away from said feed roller for disengaging said clutch means.

6. In a document feeding mechanism, in combination, a document support plate having upstanding sides, a feed shaft journaled at its ends in said sides and carrying intermediate its ends a feed roller having a document engaging surface positioned to frictionally feed documents from a stack on said support plate to recording apparatus, driving means for said feed shaft at one end thereof, disengageable clutch means between said driving means and said one end of said feed shaft, means for controlling said clutch means, an elongated bearing support plate extending underneath said document support plate and aligned generally with said feed shaft, said plates having registering apertures aligned with said feed roller, spring means biasing said bearing support plate toward said document support plate, a pair of bearings depending in spaced relation from said bearing support plate, a retard shaft journaled in said bearings and carrying intermediate its ends a retard roller projecting through said apertures into opposed relations to said feed roller, said retard roller and retard shaft being rotatable in the same direction as said feed roller and the former having a document engaging surface to cause said documents to be fed singly by said feed roller, means for driving said retard roller, an extension from said bearing support plate disposed underneath said document support plate and having a free end, and means operatively interconnecting said clutch control means and said free end of said extension for operating said clutch control means on predetermined movement of said retard roller away from said feed roller to disengage said clutch means and stop further rotation of said feed roller.

7. In a document feeding mechanism, in combination, a document support plate having upstanding sides, a feed shaft journaled at its ends in said sides and carrying intermediate its ends a feed roller having a document engaging surface positioned to frictionally feed documents from a stack on said support plate to recording apparatus, driving means for said feed shaft, disengageable clutch means between said driving means and said feed shaft, said clutch means including electromagnetic means serving when energized to disengage said clutch means, an elongated bearing support plate extending underneath said document support plate and aligned generally with said feed shaft, said plates having registering apertures aligned with said feed roller, spring means biasing said bearing support plate toward said document support plate, a pair of bearings depending in spaced relation from said bearing support plate, a retard shaft journaled in said bearings and carrying intermediate its ends a retard roller projecting through said apertures into opposed relation to said feed roller, said retard roller and retard shaft being rotatable in the same direction as said feed roller and the former having a document engaging surface to cause said documents to be fed singly by said feed roller, means for driving said retard roller, an extension from said bearing support plate disposed underneath said document support plate and having a free end, a switch mounted on the underside of said document support plate in operative relation to said free end of said document support plate, said switch being biased toward closed position and normally held in open position by said free end of said extension from said support plate, and con-

ductor means interconnecting said switch and said electromagnetic means and a current source for energizing said electromagnetic means on predetermined movement of said retard roller away from said feed roller to disengage said clutch means and stop further rotation of said feed roller.

8. In a document feeding mechanism, in combination, a document support plate having upstanding sides, a feed shaft journaled at its ends in said sides and carrying intermediate its ends a feed roller having a document engaging surface positioned to frictionally feed documents from a stack on said support plate to recording apparatus, driving means for said feed shaft at one end thereof, disengageable clutch means between said driving means and said one end of said feed shaft, said clutch means including electromagnetic means operable when energized to disengage said clutch means, an elongated rectangular bearing support plate extending underneath said document support plate and aligned generally with said feed shaft, said plates having registering apertures aligned with said feed roller, spring means at the corners of said rectangular support plate biasing the same toward said document support plate, a pair of cylindrical bearing supports depending in spaced relation from said bearing support plate and having longitudinal slots in the opposite sides, a retard shaft extending through said slots and carrying intermediate its ends a retard roller projecting through said apertures into opposed relation to said feed roller, said retard roller and retard shaft being rotatable in the same direction as said feed roller and the former having a document engaging surface to cause said documents to be fed singly by said feed roller, a bearing slidable in each bearing support in which said retard shaft is journaled, a spring reacting between each bearing support and the bearing therein to bias said retard roller toward said feed roller, a flexible shaft connected at one end to

said retard shaft and at the other end to one end of a short shaft journaled on said bearing support plate, gears on the other ends of said feed and short shaft, an idler gear meshing with said gears to rotate said retard roller in the same direction that said feed roller rotates, an extension from said bearing support plate disposed underneath said document support plate and having its free end offset therefrom, a switch mounted on the underside of said document support plate between it and said offset end of said document support plate, said switch being biased toward closed position and normally held in open position by said free end of said extension from said support plate, and conductor means interconnecting said switch and said electromagnetic means and a current source for energizing said electromagnetic means on predetermined movement of said retard roller away from said feed roller to disengage said clutch means and stop further rotation of said feed and retard rollers.

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