

April 16, 1935.

W. P. LLOYD

1,998,324

PHOTOCOPY MACHINE

Filed March 30, 1934

6 Sheets-Sheet 1

Fig. 1

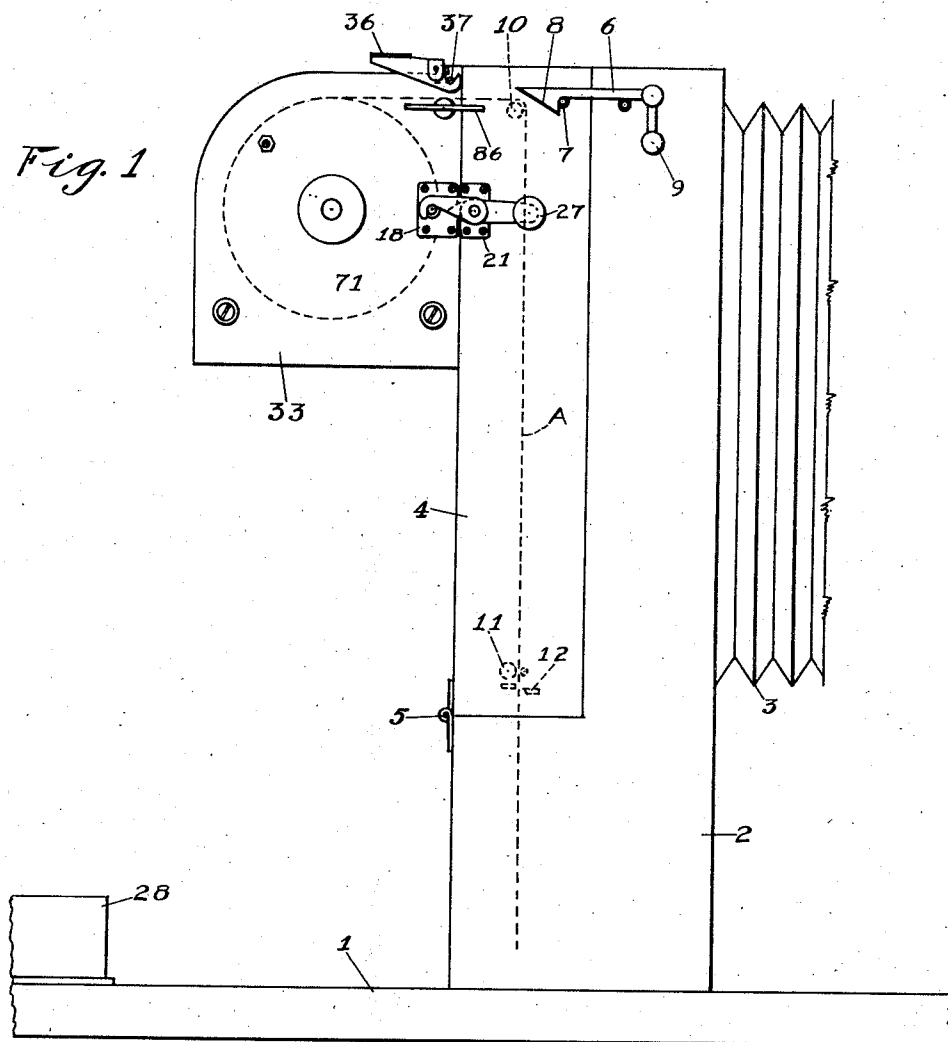


Fig. 3

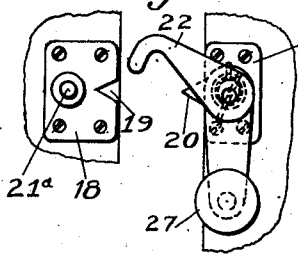


Fig. 4

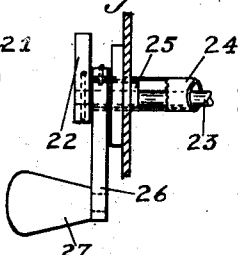


Fig. 5

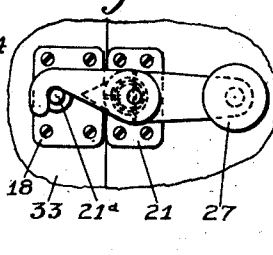
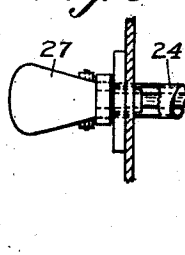


Fig. 6



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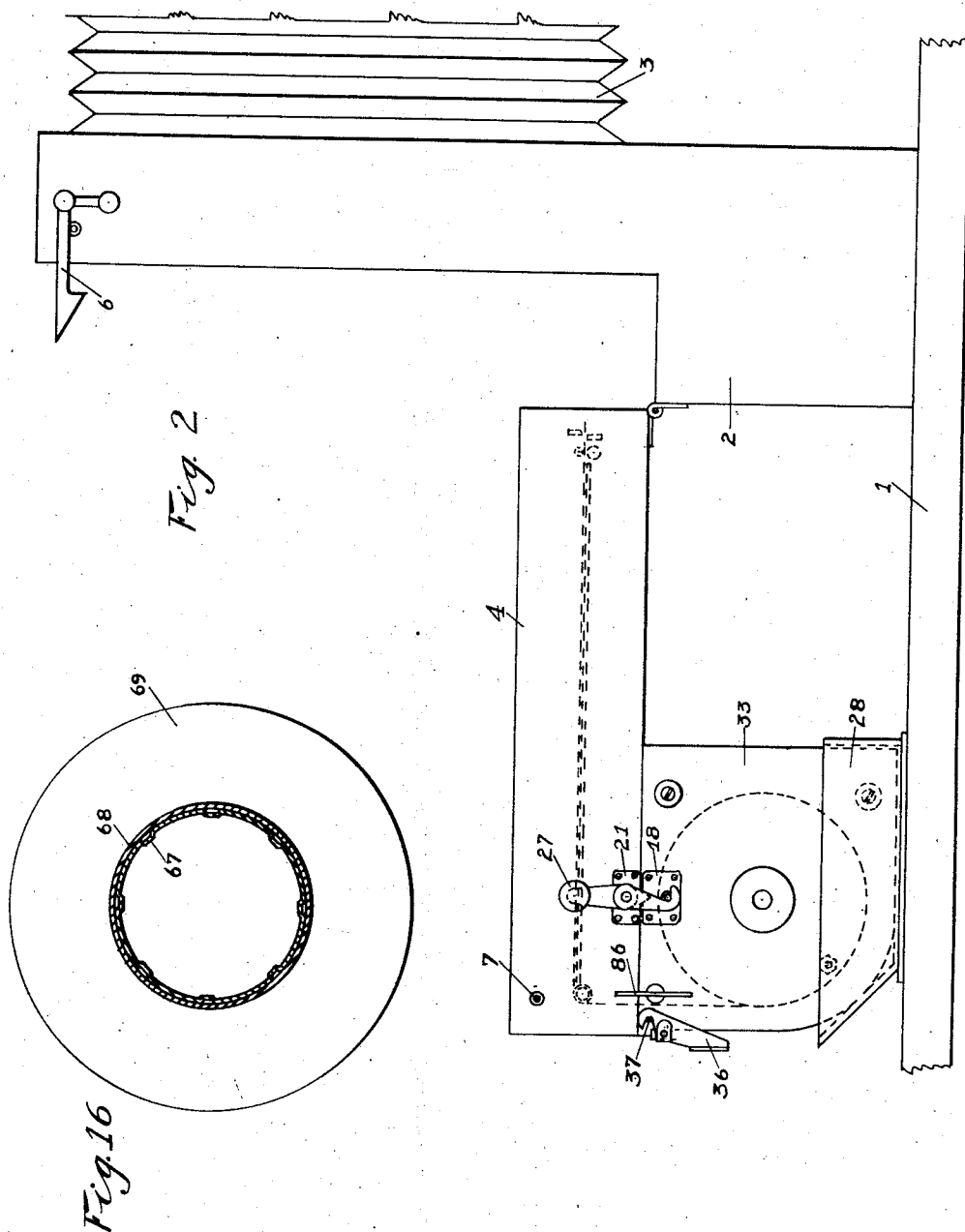
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PHOTOCOPY MACHINE

Filed March 30, 1934

6 Sheets-Sheet 2



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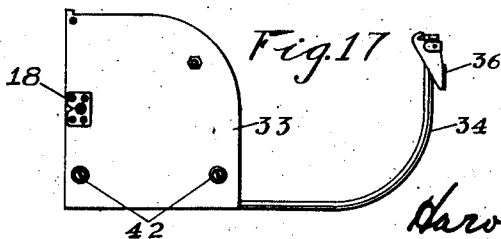
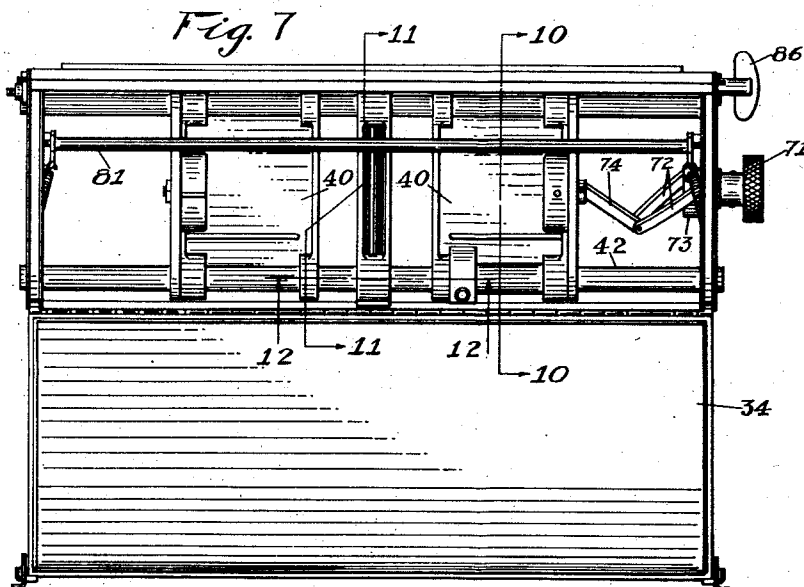
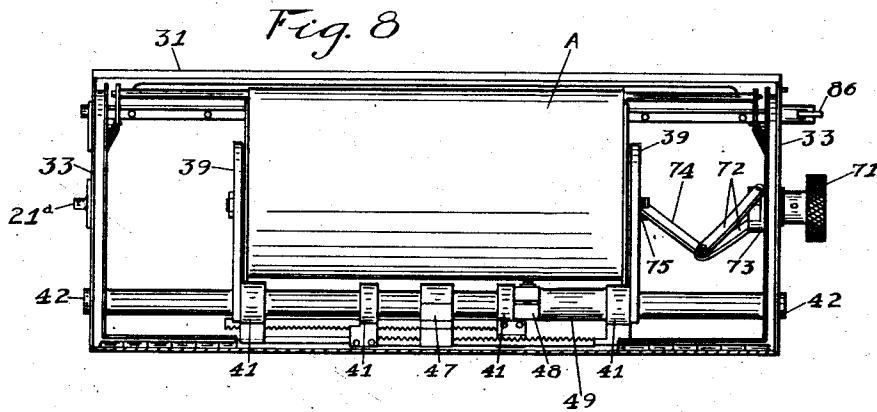
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PHOTOCOPY MACHINE

Filed March 30, 1934

6 Sheets-Sheet 3



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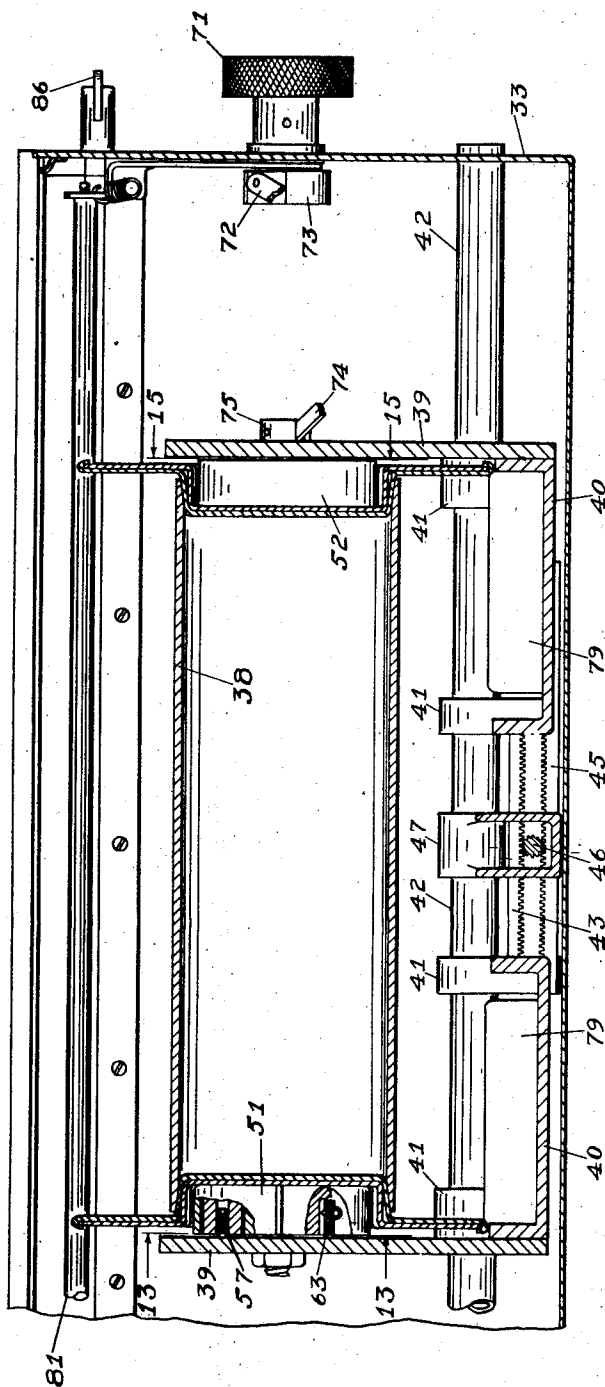
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PHOTOCOPY MACHINE

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6 Sheets-Sheet 4

Fig. 9



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PHOTOCOPY MACHINE

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6 Sheets-Sheet 5

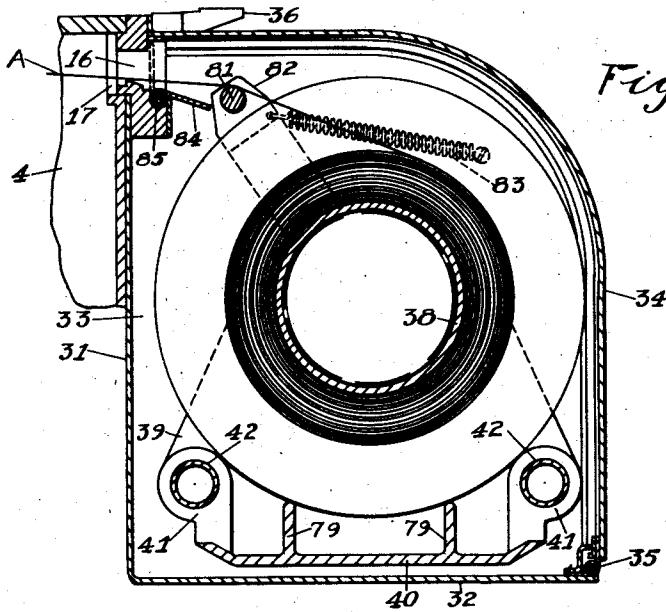


Fig. 10

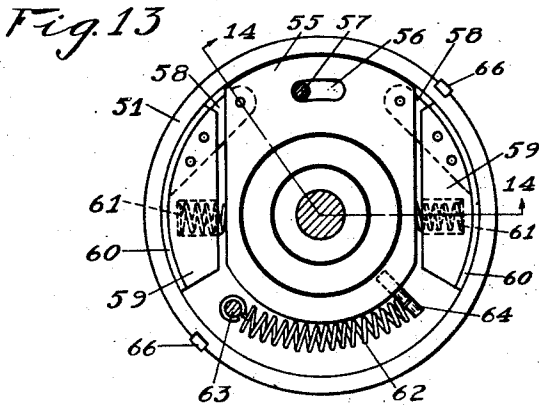


Fig. 13

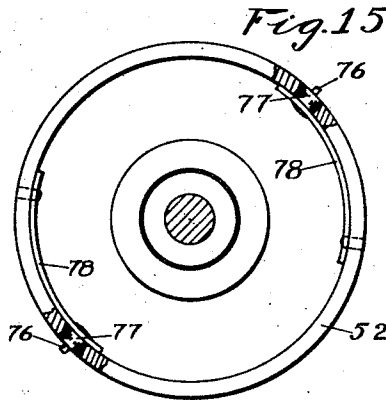


Fig. 15

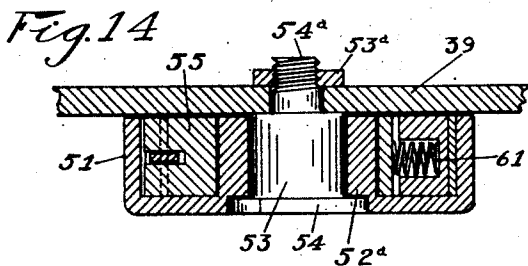


Fig. 14

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PHOTOCOPY MACHINE

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6 Sheets-Sheet 6

Fig. 11

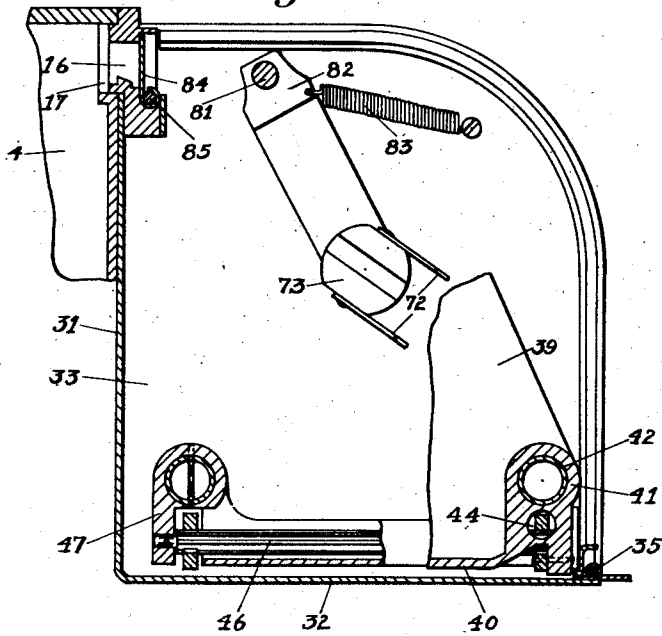


Fig. 12

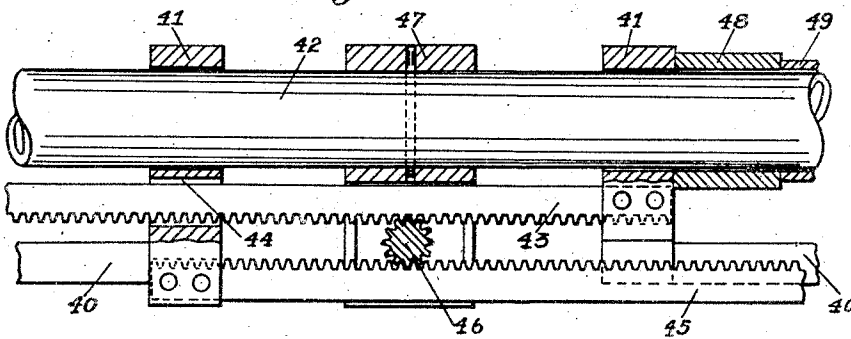
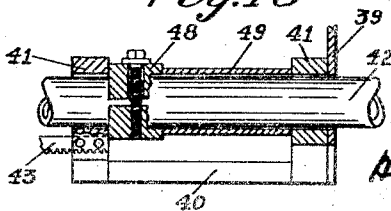


Fig. 18



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UNITED STATES PATENT OFFICE

1,998,324

PHOTOCOPY MACHINE

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Application March 30, 1934, Serial No. 718,194

31 Claims. (Cl. 95—34)

This invention relates to a photo-copy machine, of the general type employed for making copies of documents or records upon a portion of a sheet of sensitized paper which is fed from a supply roll and severed after each exposure, the severed portion to be thereafter developed either in the same machine or in a separate apparatus.

One of the primary objects of the invention is to afford a practical construction that lends itself readily to the use of different rolls of paper without waste by making it possible to remove a roll from the machine and substitute a roll of different size or kind of paper easily, quickly, and with much less loss of paper than with the types of machines now in use.

More particularly, the invention has for its purpose to afford a construction whereby the paper-containing roll box is readily attachable to the outside of the magazine so that a roll of paper can be placed in the machine by merely placing the roll box in suitable position on a stationary support and moving the magazine to attaching relation with the roll box, thus avoiding the necessity of the operator having to open the magazine and lift the roll box into place within the magazine.

An additional purpose of the invention is to provide improved paper roll supporting means, such that rolls of paper of varying widths can be accommodated and will always be centered with respect to the roll box and magazine, the paper will be held taut and even at all times, and provision being also made for rewinding the paper into the roll box when the latter is to be removed from the magazine for inserting another roll of paper.

Another object is to afford a construction that makes it possible to remove and replace the paper-containing roll box without disturbing any of the settings or adjustments of the mechanism in the magazine so that the paper may be changed without affecting the controlling mechanism.

To these and other ends, the invention consists in the details of construction, combinations and arrangement of parts that will hereinafter fully appear from the following description when read in conjunction with the accompanying drawings, the novel features being pointed out in the claims following the specification.

In the drawings:

Fig. 1 is a side elevation of a photo-copy machine with parts broken away, showing the application of the invention in its preferred embodiment,

the magazine and roll box appearing in normal operative position;

Fig. 2 is a similar view showing the magazine and roll box in lowered position to permit removing the roll box;

Fig. 3 is an enlarged side elevation with parts broken away, showing the roll box and magazine slightly separated and the clamping mechanism released;

Fig. 4 is a view in elevation looking from right to left of Fig. 3, parts appearing broken away and in section;

Fig. 5 is a view similar to Fig. 3 with the roll box clamped to the magazine;

Fig. 6 is a view looking from right to left of Fig. 5, with parts appearing in section and broken away;

Fig. 7 is a plan view of the paper-containing roll box with its cover lowered to permit access to the interior for positioning a roll;

Fig. 8 is a rear elevation of the roll box showing a paper roll in position, and the cover of the roll box broken away;

Fig. 9 is an enlarged view similar to Fig. 8, with parts broken away and other parts in section;

Fig. 10 is a transverse sectional view on line 10—10 of Fig. 7, the cover of the roll box being in closed position;

Fig. 11 is a transverse sectional view similar to Fig. 10, partially on the line 11—11 of Fig. 7, and with parts broken away;

Fig. 12 is an enlarged sectional view on line 12—12 of Fig. 7;

Fig. 13 is a sectional view on line 13—13 of Fig. 9;

Fig. 14 is a sectional view on line 14—14 of Fig. 13;

Fig. 15 is a sectional view on line 15—15 of Fig. 9;

Fig. 16 is a detail sectional view of one of the spool ends;

Fig. 17 is an end view of the roll box with its cover in open position, and

Fig. 18 is a detail view of a means for locking the paper roll supports in adjusted position.

Referring more particularly to the drawings showing one practical embodiment of the invention, and in which like reference characters throughout the several views refer to the same parts, 1 designates a supporting frame, 2 is a camera body, and 3 a bellows, see Figs. 1 and 2. 4 designates a magazine which is pivotally attached to the camera body at 5 so as to swing about a horizontal axis from the normal opera-

tive position shown in Fig. 1 to the inoperative position shown in Fig. 2 to permit removal of the paper-containing roll box. The magazine is held in its upright position by pivoted catches 8 arranged on opposite sides of the camera body and engageable with projections 7 on the magazine. The catches 8 are bevelled at 9 to ride over the projections 7 and permit the magazine to be swung upwardly into operative position, and are released from locking engagement therewith by swinging the handles 9.

The magazine is provided with a guide roll 10 at the top over which the paper travels after issuing from the roll box, and feed rolls 11 at the bottom, which may be operated in any conventional way as well known in the art, while 12 designates a knife which can be suitably operated to sever the exposed portion of the sensitized paper after it has been fed downwardly by the rolls 11. The magazine may also contain the usual curtain or masking device which forms no part of the invention and is therefore unnecessary to illustrate.

Heretofore it has been customary to place the paper supply roll and roll box within the magazine, which has a suitable opening that is normally covered by a door or plate, but in the present construction, the roll box is removably clamped against the rear face of the magazine, the abutting surfaces of the roll box and magazine being provided with coincident openings through which the paper feeds from the roll box to the magazine.

To accomplish this, there is employed a roll box, see Figs. 1, 2 and 10, having an opening 16 and the magazine an opening 17, Fig. 10, through which the sensitized sheet of paper, designated at A, travels as it is unwound from the roll. The roll box is removably attached to the magazine and may be held in operative relation thereto by any suitable clamping mechanism, such for instance as illustrated in Figs. 3 to 6 inclusive, which will now be described.

The roll box is provided at either end with plates 18 having centering openings 19 that are engaged by cooperating projections 20 on plates 21 that are attached to the ends of the magazine so that proper positioning of the roll box with relation to the magazine is assured. Extending from the ends of the roll box are pins 21^a which are engaged by catches 22, it being understood that the structure shown in Figs. 3 to 6 is duplicated at the other end of the magazine and roll box, and for an understanding of the operation, it is deemed necessary to show and describe only one end thereof.

The catches 22 are fixedly mounted on a rod 23 which extends from one end of the magazine to the other within a tube 24, the rod 23 being eccentrically mounted in the cylindrical blocks 25 which are fixed within the tube 24. Also fixed to the tube 24 and cylindrical blocks 25 is a crank 26 provided with a handle 27. When the handle 27 is moved from the position shown in Fig. 3 to that shown in Fig. 5, the tube 24 is likewise turned and with it the cylindrical blocks 25, causing the rod 23 and with it the catches 22 to be moved downwardly and laterally from the position shown in Fig. 3 to that shown in Fig. 5 so as to clampingly engage the pins 21^a and hold the roll box tightly against the magazine, the friction between the respective parts being sufficient to hold the catches in their clamping positions.

It is frequently necessary in the operation of one of these machines to change the paper roll

in order to use papers of varying widths and different character, and to accomplish this the roll box must be removed and another roll of paper placed therein, or another roll box secured to the magazine. This is accomplished without the necessity of lifting the roll box to the position shown in Fig. 1, by releasing the magazine and swinging it downwardly to the position illustrated in Fig. 2 where the roll box is shown resting in a support 28 stationarily arranged on the frame 1 and constructed to fit and receive the roll box in the manner illustrated. The support 28 also serves to properly position a roll box when it is to be attached to the magazine.

The magazine, when in this position, can be quickly released by operating the handle 27 and swung up out of the way to permit the roll box to be lifted out of its support 28 and another roll inserted in the roll box or a different roll box placed in the support 28 for attachment to the magazine, in the manner already described. Before the roll box is thus detached from the magazine, the strip of sensitized paper remaining in the magazine is rewound into the roll box to prevent unnecessary waste, and the structure of the roll box including the means for supporting and rewinding the paper will now be described in detail.

The roll box includes a front wall 31, Fig. 10, bottom wall 32, end walls 33, and a cover 34 which is pivoted at 35 and adapted to swing from its closed position illustrated in Fig. 10 to the open position shown in Fig. 17, to permit positioning a roll of paper therewithin. When closed, the cover 34 has light-tight connection with the adjacent walls of the roll box and is held in closed position by the catches 36, Figs. 1 and 2, pivoted to the cover and engageable with projections 37 on the end walls of the roll box.

The paper roll, which is usually mounted on a cardboard core 38, Fig. 9, is mounted on rotatable annular bearings which will be described presently more fully, these being carried by supports or standards 39 that are fixedly attached to the bottom plates 40. The plates 40 carry bosses or brackets 41, Figs. 9, 10 and 11, having openings that engage the cylindrical guides or rods 42 which extend endwise of the roll box and are fixedly attached to the end walls thereof or otherwise conveniently secured. In this way, the roll supports or standards 39 are slidable endwise of the roll box to accommodate paper rolls of different widths, and in order to equalize the movement of these supports so as to center the roll with respect to the roll box and magazine, the following mechanism is provided.

Referring to Figs. 8, 9, 11 and 12, two of the bosses 41 are each provided with a toothed rack 43, movement of which is permitted through the opposite boss by the opening 44, and fixedly connected to each of the two bosses 41 of the other bottom plate 40 is a rack 45, said racks being in engagement with a pinion 46 journaled at the bottom of the roll box in a stationary support 47 and extending transversely thereof, as shown in Fig. 11. With this arrangement, the supports 39 can be moved endwise of the roll box to any desired position by grasping and pulling them in one direction or the other, an equal movement being imparted to both supports through the rack and pinion construction just described. The supports may be held in adjusted position by a split collar 48 that can be tightened on rod 42, and a spacing sleeve 49 between said collar and the adjacent boss 41. The sleeve 49 and collar 48

are slidable on the rod for adjusting the supports to accommodate the paper roll, and when the latter is positioned, the collar can be tightened to hold the parts until the roll is removed.

5 The roll of sensitized paper is mounted on rotatable annular bearings 51 and 52, see Fig. 9, these bearings being carried by the endwise adjustable supports 39 already described. One of the rotatable annular bearings just referred to
10 has associated with it braking mechanism to retard the movement of the paper as it is fed from the roll and maintain the strip of sensitized paper taut, while the other of the annular bearings is connected with a means for turning it in a reverse
15 direction to rewind the paper into the roll box before removing the latter from the magazine, both said rotatable bearings having an interlocking connection with the paper roll, and the details of these several parts will now be described.
20

The braking or paper retarding mechanism is associated with the annular bearing 51, as illustrated in Figs. 9, 13 and 14, where it will be seen that bearing 51 includes an integral sleeve 52^a,
25 rotatable on the central bearing 53, the latter being fixedly secured to support 39 by a nut 53^a which engages the reduced threaded end 54^a of the central bearing 53, while 54 is a head on the bearing 53 engaging a shoulder at the outer end of the sleeve 52^a and acting to hold the rotatable
30 annular bearing 51 in position.

Arranged within the annular bearing 51 and abutting the support 39 is a plate 55 having a slot 56 engaging a pin 57, the latter being fixedly
35 secured to the support 39 and acting to limit the movement of the plate 55 by the length of the slot. Pivotaly connected to plate 55 by means of links 58 are the brake shoes 59 having brake linings 60, and actuated by springs
40 61 outwardly toward the inner periphery of the annular bearing 51, the springs 61 acting to press the shoes against the bearing as the latter is turned.

The spring 62 is connected to pin 63, which is
45 fixed to the support 39, and at its other end with an arm 64 extending from and secured to the plate 55. The spring 62 holds the parts normally in the position shown in Fig. 13, pin 57 and slot 56 determining the position of the plate
50 55. As paper is drawn from the roll, it turns the bearing 51 which is interlocked with the paper roll, such movement of the bearing 51 being resisted by the brake shoes 59. When the paper stops feeding, any slack is immediately
55 taken up by the spring 62 which tends to turn the plate 55 and through the friction brake shoes 59 likewise turns the bearing 51 and the paper roll in the opposite direction.

Interlocking connection between the annular
60 bearing 51 and the paper roll is effected by projections 66, see Fig. 13, on the outer periphery of the annular bearing, these projections engaging with one of the radially extending projections 67, see Fig. 16, which are formed on
65 the inner periphery of the sleeve 52 forming a part of the spool end 69. It will be understood that the spool end 69 is forced into the end of the cardboard core 38, see Fig. 9, of the paper roll and is held frictionally therein, and as bearing
70 51 is brought into operative relation with the paper roll by moving it endwise of the roll box, it enters the spool end and one of the projections 66 engages against one of the inwardly extending projections 67 on the spool end, and
75 thus the retarded action of the bearing 51 is

communicated to the spool end and to the paper roll which cannot travel any faster than the bearing 51.

The annular bearing 52 at the other end of the paper roll is utilized to permit rewinding
5 the paper into the roll box before removing the roll box from the magazine, this being desirable in order to reduce the amount of paper that is wasted when changing rolls. The bearing 52 is rotatably mounted in its support or standard 39,
10 see Fig. 9, and is operatively connected to a rotatable handle 71 that is journaled in the end wall of the roll box. The rotatable handle 71 is connected with the bearing 52 in such a way as to rotate it reversely when necessary and also to
15 permit the necessary endwise adjustment of the support 39 on which the bearing 52 is mounted, and this is preferably accomplished by a flexible connection comprising a pair of arms 72 pivoted to the collar 73 at one end, and to a link 74 at
20 the other end. Link 74 is in turn pivotally connected to a yoke 75 that rotates with the bearing 52 while the collar 73 is fixedly connected to the rotatable device or handle 71.

With this arrangement, see Figs. 7 to 9, by
25 turning handle 71 in a reverse direction, the annular bearing 52 is correspondingly turned through the flexible parts 72 and 74, irrespective of the endwise position of the support 39. As the bearing 52 is turned reversely, the paper roll
30 is correspondingly turned through an interlocking connection between the bearing and the paper roll. The means for accomplishing this is shown in Fig. 15 and comprises a pair of projections 76 extending outwardly from the periphery of the bearing 52 and adapted to en-
35 gage projections 67 on the spool end of the paper roll, the same type of spool end as that already described being frictionally held in both ends of the paper roll. The projection 76, see
40 Fig. 15, is preferably mounted on a block 77 that extends through an opening in the annular bearing 52 and is carried on a spring 78 fixed to the inner periphery of the annular bearing. This arrangement permits the projections 76
45 to yield inwardly if they are in line with one of the projections 67 on the spool end as the latter is positioned on the bearings, the spool end being permitted to turn until the projections 76 are between adjacent projections 67, whereupon
50 the springs 78 force the projections outwardly and maintain the desired interlocking relationship.

In order to position the paper roll easily in
55 alinement with the bearings, the bottom plates have upstanding flanges or walls 79, Fig. 10, which engage the periphery of the spool end so that when the spool ends rest on flanges 79, they are centered and in position to engage the bearings 51 and 52 when the latter are moved to-
60 ward the spool ends.

The apparatus also includes a means to prevent unevenness of the paper due to its shifting laterally or moving faster at one side than at the other. This is accomplished by a rod 81,
65 see Fig. 10, which extends endwise of the roll box at the top, and is adapted to underlie the paper as the latter is unwound from the roll and passes into the magazine. The rod 81 is mounted upon arms 82 at its ends, the arms 82 being pivotally
70 supported on the end walls of the roll box. Each arm 82 is controlled by a spring 83 connected thereto at one end and with its opposite end connected to the end wall of the roll box. By thus mounting the rod 81 in the independently
75

pivoted and spring-controlled arms 82, the springs 83 actuate the rod upwardly against the paper, as shown in Fig. 10, and it is possible for one end of the rod to occupy a slightly higher position than the other end so that the paper is held taut throughout its width despite any tendency to move unevenly or to have greater slack at one side than at the other.

It is desirable to close the paper feed opening 16 in the roll box after the paper is rewound into it and before removing the roll box from the magazine, so that the roll box can be carried to a dark room without the possibility of light entering. This is accomplished by means of a shutter 84, see Figs. 10 and 11, fixedly mounted on a rod 85 that extends endwise of the roll box adjacent to the opening 16 and is rotatable to move the shutter 84 either to its closed position as shown in dotted lines, or open position, as shown in full lines, which latter position it occupies when the paper is being fed to the magazine. The position of the shutter 84 is determined by a handle 86 that is secured to the rod 85 at a point outside the roll box, see Figs. 7 and 9. The rod 85 extends through the end wall of the roll box, and the handle 86 is in a convenient position to be manipulated by the operator when necessary.

In operating the mechanism, assuming that the roll box is empty, its cover 84 is released and swung outwardly and downwardly, the shutter 84 is closed, and a roll of paper with the spool ends positioned therein is inserted within the roll box, the outer peripheries of the spool ends resting upon the positioning flanges 70. The supports 90 are then grasped by the operator and moved toward each other until the annular bearings 91 and 92 are engaged with the spool ends of the paper roll. The collar 48 is then tightened to hold the parts in position. The cover to the roll box is then closed and the box positioned on the support 22, as shown in Fig. 2. The magazine is next swung downwardly and the roll box clamped thereto, whereupon the shutter 84 is opened and the paper threaded into the magazine in any convenient way.

The magazine and roll box are then swung upwardly to vertical position and the machine is ready for exposure. If at any time it is desired to use a roll of paper of different width or a different kind of paper, the paper is first rewound into the roll box by turning the handle 71, the shutter 84 is closed by turning handle 86, and the magazine after being released is swung downwardly to the Fig. 2 position where the roll box can be released. Another roll box can then be similarly clamped on to the magazine or another and different roll of paper can be positioned in the same roll box since the roll supporting mechanism is capable of supporting rolls of paper of varying widths, in the manner already described.

While the invention has been described more particularly with reference to certain details, it is not confined to the particular structure or arrangement herein set forth, and the application is intended to cover any modifications or departures coming within the intent of the improvements, or the scope of the following claims. I claim:

1. In a photo-copy machine, the combination with a camera body and a magazine hinged thereto, of a roll box detachably secured to the exterior of the magazine, the roll box and maga-

zine having coincident openings for the passage of sensitized paper from one to the other.

2. In a photo-copy machine, the combination with a camera body and a magazine hinged thereto, of a roll box positionable against the exterior of the magazine at the top thereof, the magazine and roll box having coincident openings for the passage of sensitized paper from one to the other, and means for removably clamping the roll box to the magazine.

3. In a photo-copy machine, the combination with a magazine, of a roll box, means for removably clamping the roll box exteriorly of the magazine, roll-holding means in the roll box for supporting sensitized paper and permitting its feeding into the magazine, and means accessible from the outside of the roll box for turning said roll-holding means in a reverse direction to rewind the paper into the roll box.

4. In a photo-copy machine, the combination with a magazine, of a roll box, means for removably clamping the roll box exteriorly of the magazine, roll-holding means in the roll box for supporting sensitized paper and permitting its feeding into the magazine, said roll-holding means being adjustable to accommodate rolls of paper of varying widths, and means accessible from the outside of the roll box for turning said roll-holding means in a reverse direction to rewind the paper into the roll box.

5. In a photo-copy machine, the combination with a camera body, of a magazine pivoted thereto to swing about a horizontal axis from a normal vertical position downwardly, a roll box, and means for removably securing the roll box exteriorly of the magazine.

6. In a photo-copy machine, the combination with a camera body, of a magazine pivoted thereto to swing about a horizontal axis from a normal vertical position downwardly, a roll box, means for removably securing the roll box exteriorly of the magazine, and a support for the roll box when the magazine is in its lowered position.

7. In a photo-copy machine, the combination with a camera body, of a magazine pivotally secured thereto and adapted to swing about a horizontal axis from a normal vertical position downwardly, and a roll box removably secured with its front face abutting the rear face of the magazine at the top of the latter, a stationary support for the roll box, the latter being engageable with the stationary support when the magazine is swung downwardly.

8. In a photo-copy machine, the combination with a magazine, of a roll box detachably secured to the exterior of the magazine, the roll box and magazine having coincident openings for the passage of sensitized paper from one to the other, and adjustable roll-holding means in the roll box for supporting rolls of paper of varying widths.

9. In a photo-copy machine, the combination with a magazine, of a roll box positionable against the exterior of the magazine, the magazine and roll box having coincident openings for the passage of sensitized paper from one to the other, means for removably clamping the roll box to the magazine, and adjustable roll-holding means in the roll box for supporting rolls of paper of varying widths.

10. In a photo-copy machine, the combination with a magazine, of a roll box detachably secured to the exterior of the magazine, the roll box and magazine having coincident openings for the passage of sensitized paper from one to the other, roll-holding means in the roll box, and means

accessible from the outside of the roll box for turning said roll-holding means in a reverse direction to rewind the paper.

11. In a photo-copy machine, the combination with a camera body, of a magazine pivoted thereto to swing about a horizontal axis from a normal vertical position downwardly, a roll box, means for removably securing the roll box exteriorly of the magazine, and adjustable roll-holding means in the roll box for supporting rolls of paper of varying widths.

12. In a photo-copy machine, the combination with a camera body, of a magazine pivoted thereto to swing about a horizontal axis from a normal vertical position downwardly, a roll box, means for removably securing the roll box exteriorly of the magazine, adjustable roll-holding means in the roll box for supporting rolls of paper of varying widths, and means accessible from the outside of the roll box for turning said roll-holding means in a reverse direction to rewind the paper.

13. In a photo-copy machine, the combination with a camera body, of a magazine pivoted thereto to swing about a horizontal axis from a normal vertical position downwardly, a roll box, means for removably securing the roll box exteriorly of the magazine, roll-holding means in the roll box, and means accessible from the outside of the roll box for turning said roll-holding means in a reverse direction to rewind the paper.

14. In a photo-copy machine, the combination with a camera body, of a stationary support, a roll box positionable on said support, a magazine attached to the camera body and movable in relation thereto to bring it into clamping relation with the roll box on said support, and means for securing the roll box to the magazine.

15. In a photo-copy machine, the combination with a magazine, of a roll box, roll-holding means in the roll box, paper feeding means in the magazine for drawing paper from the roll box, and means connected with the roll-holding means and accessible at the exterior of the roll box for turning the roll-holding means in a reverse direction to rewind the paper.

16. In a photo-copy machine, the combination with a magazine, of a roll box, roll-holding means in the roll box, paper feeding means in the magazine for drawing paper from the roll box, supports in the roll box for said roll-holding means, said supports being movable endwise to accommodate rolls of paper of varying widths, equalizing means connecting said supports for centering the roll of paper, rotatable means accessible at the exterior of said roll box, and a flexible connection between said rotatable means and said roll-holding means to turn the latter in a reverse direction to rewind the paper.

17. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means in the roll box, supports for said roll-holding means, guides extending endwise of the roll box, said supports being slidable on said guides, racks connected to said supports, a pinion cooperating with said racks for equalizing the movement of the supports endwise of the roll box, rotatable means accessible at the exterior of the roll box, and a flexible connection between said rotatable means and said roll-holding means to turn the latter in a reverse direction to rewind the paper.

18. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding

means in the magazine for drawing paper from the roll box, roll-holding means in the roll box, supports for the roll-holding means, guides extending endwise of the roll box, said supports being slidable on said guides, racks connected to said supports, a pinion cooperating with the racks for equalizing the movement of the supports endwise of the roll box, rotatable means accessible at the exterior of the roll box and connected to one of said roll-holding means to turn the latter in a reverse direction, a spool end for the roll of paper, and interlocking means between said spool end and said roll-holding means.

19. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means in the roll box, supports for said roll-holding means, guides extending endwise of the roll box, said supports being slidable on the guides, racks connected to said supports, a pinion cooperating with the racks for equalizing the movement of the supports endwise of the roll box, rotatable means accessible at the exterior of the roll box connected to one of said roll-holding means to turn the latter in a reverse direction, a spool end for the roll of paper having a series of inwardly extending projections, and an interlocking spring-controlled device on the roll-holding means engageable with one of said projections.

20. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means comprising a pair of rotatable annular bearings, spool ends positionable in a roll of paper and engageable with said annular bearings, said spool ends having radially extending projections, interlocking means on said annular bearings engageable with said projections on the spool ends, braking means associated with one of said annular bearings for retarding the withdrawing of the paper, and rewinding means connected with the other of said annular bearings for turning it in a reverse direction to rewind the paper into the roll box.

21. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means comprising a pair of rotatable annular bearings, spool ends positionable in a roll of paper and engageable with said annular bearings, said spool ends having radially extending projections, interlocking means on said annular bearings engageable with said projections on the spool ends, braking means associated with one of said annular bearings for retarding the withdrawing of the paper, rewinding means connected with the other of said annular bearings and accessible at the exterior of the roll box for turning it in a reverse direction to rewind the paper into the roll box, supports for said annular bearings adjustable endwise of the roll box, and equalizing means connecting said supports for centering the roll of paper.

22. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, a take-up mechanism in the roll box comprising a rod extending endwise and engageable with the paper, arms supporting said rod, said arms being independently pivoted, and springs controlling said arms and effective to actuate the rod against the paper to a greater extent at one end than at the other.

23. In a photo-copy machine, the combination

with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means comprising a pair of annular bearings one of which is rotatable, spool ends positionable in a roll of paper and engageable with said annular bearings, one of said spool ends having radially extending projections, said rotatable bearing having interlocking engagement with one of said projections, and rotatable means accessible from the exterior of the roll box and connected with the last mentioned bearing for rewinding the paper into the roll box.

24. In a photo-copy machine, the combination with a magazine, of a roll box, roll-holding means in the roll box, paper feeding means in the magazine for drawing paper from the roll box, supports in the roll box for said roll-holding means, said supports being movable endwise to accommodate rolls of paper of varying widths, equalizing means connecting said supports for centering the roll of paper, spool ends positionable in a roll of paper and engageable with said roll-holding means, one of said spool ends having interlocking engagement with its roll-holding means, rotatable means accessible at the exterior of the roll box, and a flexible connection between said rotatable means and the last mentioned roll-holding means to turn the latter in a reverse direction and rewind the paper.

25. In a photo-copy machine, the combination with a magazine, of a roll box, roll-holding means in the roll box, paper feeding means in the magazine for drawing paper from the roll box, supports in the roll box for said roll-holding means, said supports being movable endwise to accommodate rolls of paper of varying widths, spool ends positionable in a roll of paper and engageable with said roll-holding means, one of said spool ends having radially extending projections, the cooperating roll-holding means having interlocking engagement with one of said projections, rotatable means accessible at the exterior of the roll box, and a connection between said rotatable means and the last mentioned roll-holding means for turning the latter to rewind the paper.

26. In a photo-copy machine, the combination with a magazine, of a roll box, roll-holding means in the roll box, paper feeding means in the magazine for drawing paper from the roll box, supports in the roll box for said roll-holding means, said supports being movable endwise to accommodate rolls of paper of varying widths, and equalizing means connecting said supports for centering a roll of paper.

27. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from

the roll box, roll-holding means in the roll box, supports for said roll-holding means, guides extending endwise of the roll box, said supports being slidable on said guides, racks connected to said supports, and a pinion cooperating with said racks to equalize the movement of the supports and center a roll of paper.

28. In a photo-copy machine, the combination with a magazine, of a roll box, roll-holding means in the roll box, paper feeding means in the magazine for drawing paper from the roll box, supports in the roll box for said roll-holding means, said supports being movable endwise to accommodate rolls of paper of varying widths, equalizing means connecting said supports for centering the roll of paper, and rotatable means accessible at the exterior of the roll box connected to the roll-holding means for turning the latter in a reverse direction to rewind the paper.

29. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means in the roll box, supports for said roll-holding means, guides extending endwise of the roll box, said supports being slidable on said guides, racks connected to said supports, a pinion cooperating with said racks for equalizing the movement of the supports endwise of the roll box, and rotatable means accessible at the exterior of the roll box and connected to said roll-holding means for turning the latter in a reverse direction to rewind the paper.

30. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means comprising a pair of annular bearings one of which is rotatable, spool ends positionable in a roll of paper and engageable with said annular bearings, one of said spool ends having radially extending projections, said rotatable bearing having interlocking engagement with one of said projections, and rewinding means connected to said rotatable bearing.

31. In a photo-copy machine, the combination with a magazine, of a roll box, paper feeding means in the magazine for drawing paper from the roll box, roll-holding means comprising a pair of annular bearings one of which is rotatable, braking means associated with said bearing to retard its movement, spool ends positionable in a roll of paper and engageable with said annular bearings, one of said spool ends having radially extending projections, and means on said rotatable bearing having interlocking engagement with said projection on the spool end.

WHITTEN P. LLOYD.