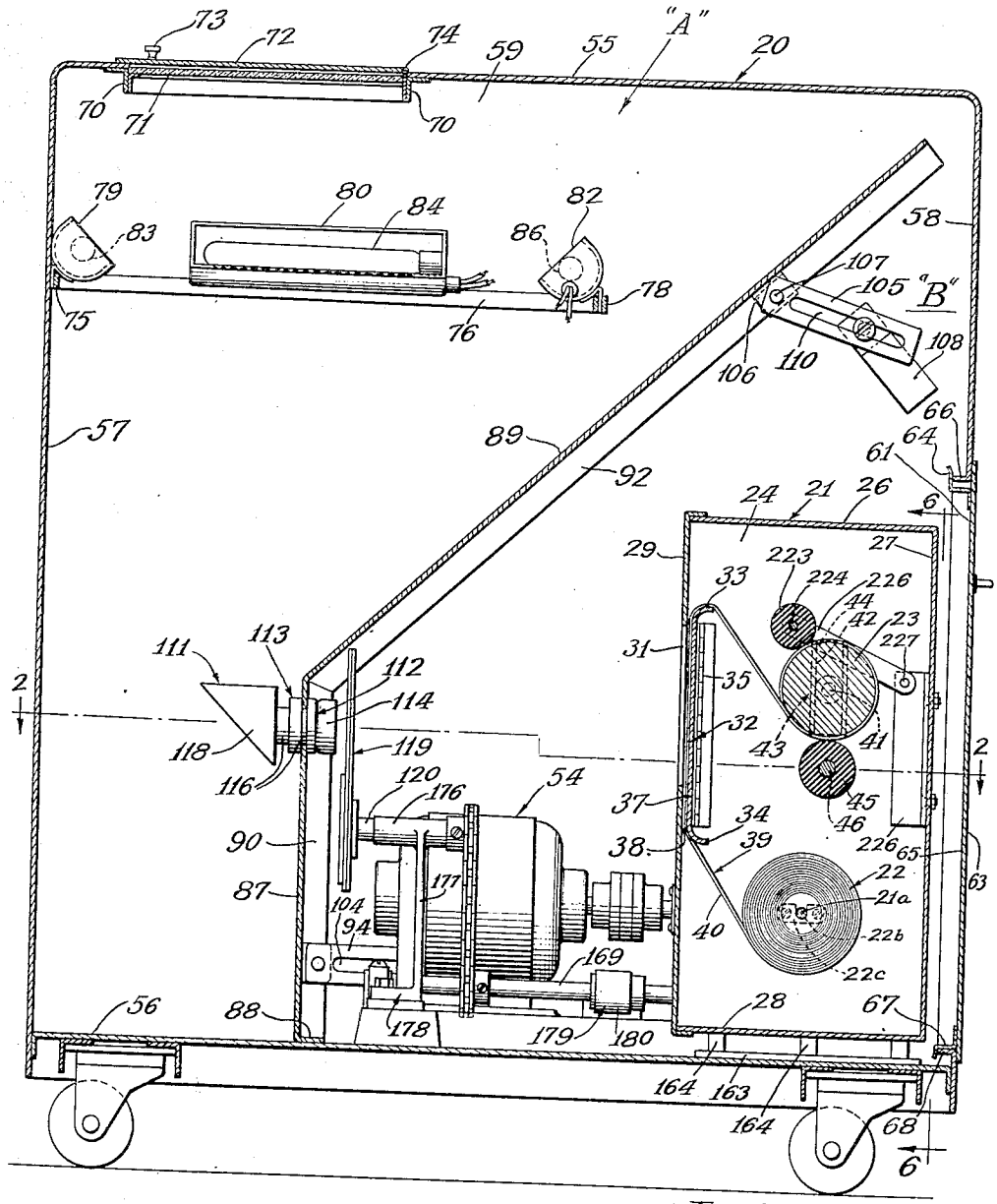
May 25, 1943. L. C. REAGAN ET AL 2,319,882

PHOTOCOPY MACHINE

Filed March 31, 1941 4 Sheets-Sheet 1

FIG. 1.



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PHOTOCOPY MACHINE

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FIG. 2.

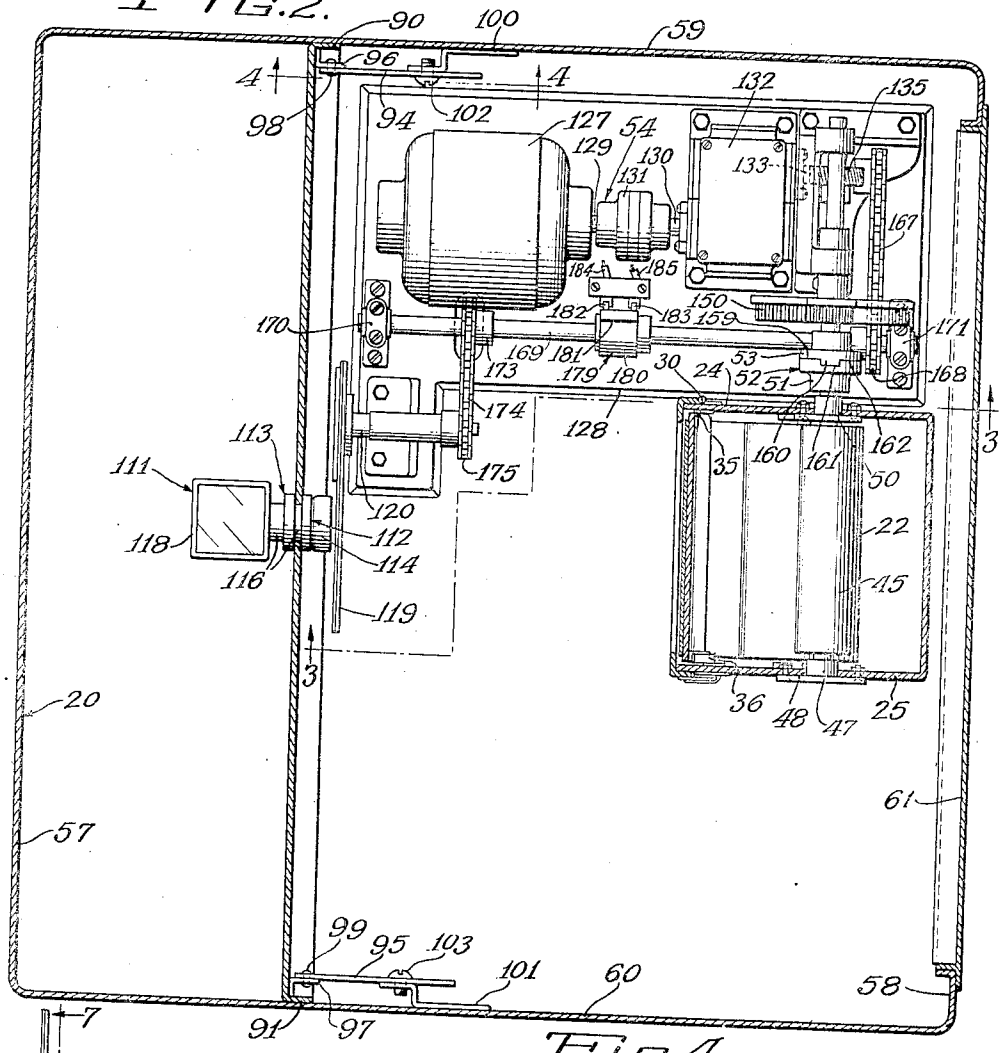


FIG. 3.

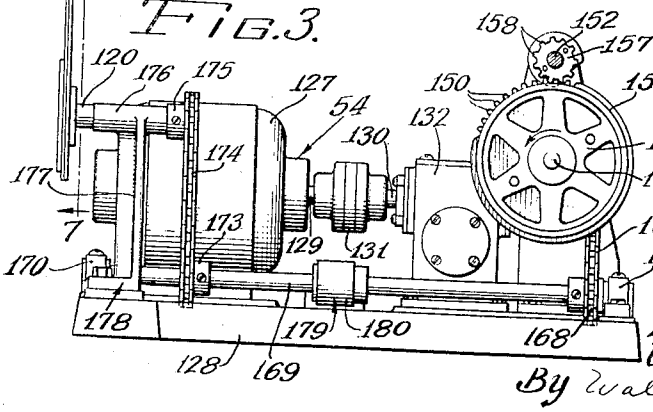
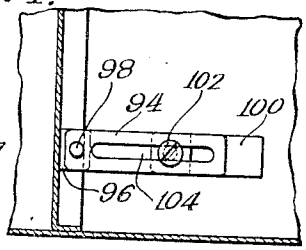


FIG. 4.



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PHOTOCOPY MACHINE

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FIG. 5.

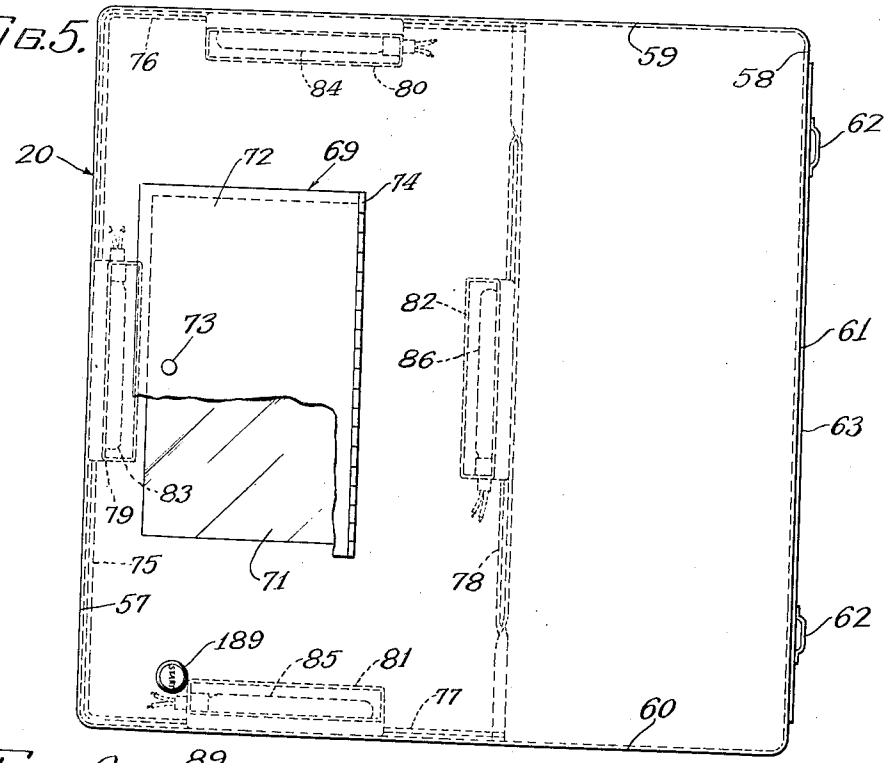
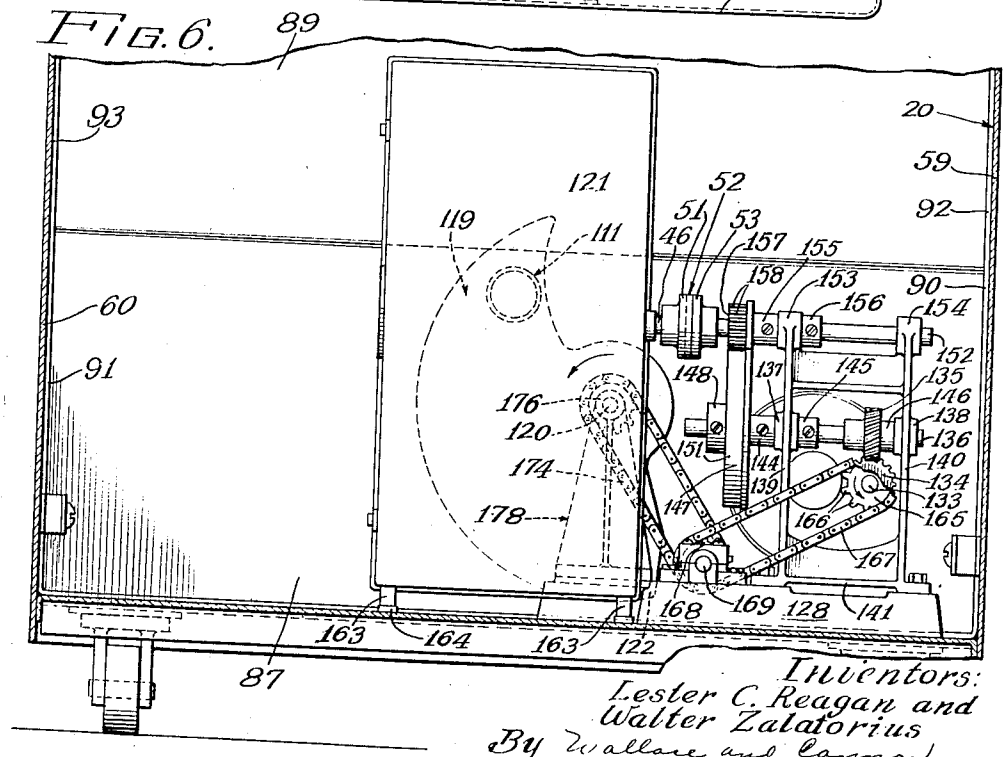


FIG. 6.



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PHOTOCOPY MACHINE

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FIG. 7.

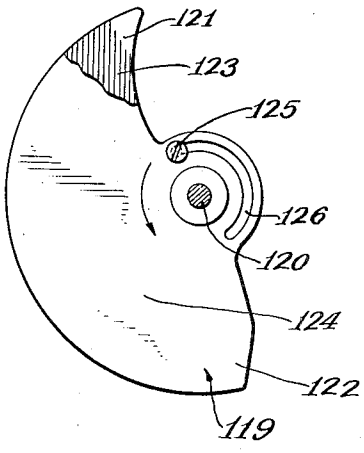


FIG. 8.

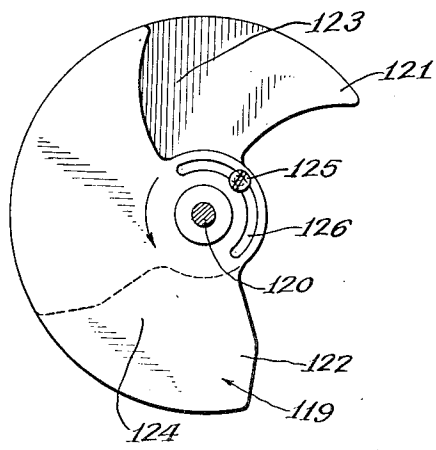
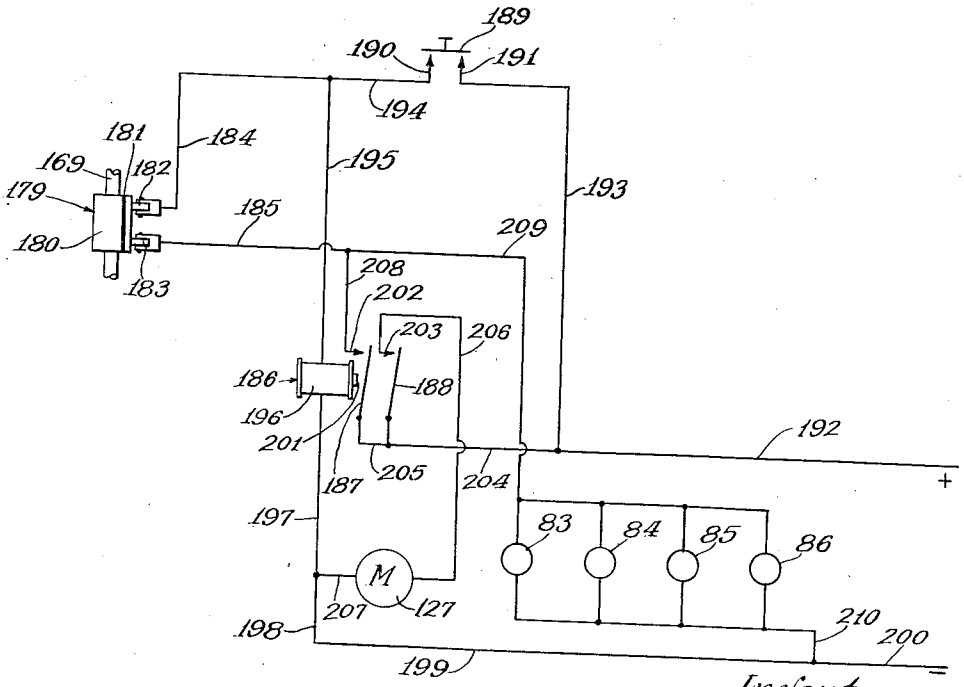


FIG. 9.



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Patented May 25, 1943 2,319,882

UNITED STATES PATENT OFFICE

2,319,882

PHOTOCOPY MACHINE

Lester C. Reagan and Walter Zalatorius, Chicago, Ill.; said Zalatorius assignor to said Reagan

Application March 31, 1941, Serial No. 386,066

7 Claims. (Cl. 88—24)

This invention relates generally to a photocopy or like machine, and more specifically to a photocopy or like machine which is particularly adapted for use in offices and like places of business which are either not equipped to do, or where it is not desired to do, the development of exposed photo-sensitive paper or like material.

In recent years it has become common in insurance offices, law offices and like places to have photocopies made of various instruments or documents such as wills, deeds, insurance policies and the like. However, heretofore, unless an office or like place has been large enough to maintain its own photocopy department, it has been customary to send original documents, which were to be reproduced, out of such office or like place to be reproduced. This practice is undesirable for a number of reasons and among which is the fact that there is always the danger that original documents thus sent out of the office or like place to be reproduced might be lost in transit, and there is the added disadvantage that while the photocopies are being made, the original documents would be out of the office or like place and unavailable for reference thereto or other use, when required.

Accordingly, a primary object of our invention is to effect and realize a photocopy or like machine which may be placed in offices and like places, and which may be used to reproduce legal and other documents without the necessity for sending such documents out of an office or like place to be reproduced, and which is so simple in operation that it may readily be operated by persons unskilled in the photographic and like arts.

Another object of our invention is to construct and arrange the new machine in such a manner that the position of the focusing lens which is embodied therein may be readily adjusted or varied by novel means and in a novel manner.

One of the more difficult operations which is involved in obtaining a desirable photocopy, or like reproduction, is to properly focus the usual photocopy machine, and it has been found that file clerks, stenographers and other employees ordinarily employed in offices, and like places, and who are unskilled in the photographic and like arts, experience difficulty in properly focusing the usual photocopy machine.

Accordingly, it is another object of our invention to construct and arrange the new photocopy or like machine in such a manner that when it has been initially focused at the factory, or upon delivery to the office or other place of business where it is to be used, it will not be necessary, in general, or frequently, to re-focus it during the majority of uses to which it will normally be put thereafter.

Another object of our invention is to construct and arrange the new photocopy or like machine in such a manner that the necessary time of exposure involved in taking the picture with the new machine is automatically timed or regulated by the operation of the machine.

A further object of our invention is to provide an automatic power-driven portable photocopy or like machine which may be used in offices and like places.

Another object of our invention is to construct the new photocopy or like machine in such a manner that, after a cycle of operations has been initiated, all phases of the cycle of operations of the machine are performed and timed automatically.

A further object of our invention is to construct our new photocopy or like machine in such a manner that it will automatically stop after a cycle of operations thereof has been completed.

The usual office, such as an insurance or law office, does not customarily have the skilled employees necessary to properly develop and print photostats, or like photographic reproductions. Therefore, it is desirable that after the desired exposure or exposures have been made upon light-sensitive paper or like material, to remove the exposed light-sensitive paper from the machine and send it to a photostat or like photocopy company for developing and printing, and it is likewise desirable that the exposed paper be immediately replaced with new or unexposed photo-sensitive paper, so that the photocopy or like machine need not be shut down while the first or previously exposed sheet of photo-sensitive paper or like material is being developed.

It will also be understood that upon removal of the exposed photocopy or like paper from a photocopy or like machine it must be entirely shielded from light in order to protect the exposures made thereon.

Accordingly, another object of our invention is to effect and realize a photocopy or like machine wherein the light-sensitive paper is contained in a removable housing or magazine, which may be expeditiously removed from the machine in such a manner as to effectively shield the previously exposed light-sensitive paper from light, and which housing or magazine may be quickly and easily replaced in the machine by another and similar housing or magazine containing a new supply of unexposed light-sensitive photocopy or like paper.

Another object of the invention is to construct and arrange the new photocopy or like machine in such a manner that the web-advancing means, which is associated with the replaceable magazine or housing in which the web or roll of light-sensitive paper is contained, may be automatically operatively interconnected to or coupled with driving means in the machine by merely insert-

ing the said magazine or housing into its intended and proper or operative position in the machine.

A further object of our invention is to construct and arrange the new photocopy or like machine in such a manner that the article which is to be reproduced thereby may be quickly and readily placed thereon in position to be reproduced.

Another object of our invention is to effect and realize a photocopy or like machine wherein, upon each operation of the machine, a definite and predetermined length or extent of a web of light-sensitive paper or like material is fed into position to be exposed during the next succeeding operation of the machine.

An additional object of the invention is to construct and arrange the new photocopy or like machine in such a manner that the electrical control circuit for the illuminating means, and the electrical control circuit for the operating motor which is embodied in the new machine are both substantially simultaneously and automatically opened or broken at the end of each cycle of operations of the machine but both of which circuits are under the control of a single manually operable control switch which is manipulated to close said circuits and initiate a cycle of operations of the machine.

Still another object of the invention is to construct and arrange the new machine in such a manner as to assure that the advancement of the web of light-sensitive paper or like material, relative to the light aperture in the replaceable magazine, will commence immediately after the shutter has closed, and to assure that the advancing movement of the web of light-sensitive paper or like material, relative to the light aperture in the magazine **21**, will be completed and the machine stopped a substantial length of time before the trailing edge of the light shutter uncovers the focusing lens so as to eliminate any possibility that the shutter will leave the focusing lens uncovered at the end of a cycle of operations of the new machine and thus destroy a part of the web of light-sensitive paper or like material.

Other and further objects of the present invention will be apparent from the following description and claims, and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the invention and the principles thereof and what we now consider to be the best mode in which we have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings,

Fig. 1 is a vertical sectional view of the new photocopy or like machine;

Fig. 2 is a horizontal sectional view taken substantially along the line 2—2 in Fig. 1;

Fig. 3 is a detail view taken along the line 3—3 in Fig. 2;

Fig. 4 is another detail view taken along line 4—4 of Fig. 2;

Fig. 5 is a top plan view of the new machine;

Fig. 6 is a partial elevational section taken substantially along line 6—6 in Fig. 1;

Fig. 7 is a detail view along line 7—7 in Fig. 3 and showing the shutter which is embodied in the new machine adjusted for complete exposure of the light-sensitive paper;

Fig. 8 is a detail view similar to Fig. 7 but showing the shutter in a different position; and

Fig. 9 is a schematic wiring diagram showing the electrical circuits which are embodied in the new machine.

General statement of the construction and operation of the machine

The new photocopy or like machine, as best shown in Fig. 1, comprises a casing **20** which is divided into an illuminated chamber or compartment A and a dark chamber or compartment B by a partition wall **87—89**. A window **69—71**, opening into the illuminated chamber A, is provided in the upper wall **55** of the casing **20**, on which the object or document to be reproduced may be placed. Lights **83**, **84**, **85** and **86** are provided within the illuminated chamber or compartment A and are positioned to illuminate the window **69—71** and the object or document positioned thereon during the operation of making a photocopy or like reproduction of said object or document.

A removable or replaceable housing or magazine **21** is replaceably inserted into the dark chamber B and contains a web of light-sensitive paper or like material **39**, said web **39** being adapted to be advanced, by means which includes a driving mechanism **54** in the machine, past a light aperture **31** which is formed in a wall of the magazine **21**.

A focusing lens **111** is mounted in the partition wall **87—89** and is so positioned that during the operation of the new photocopy or like machine it will direct an image of an object or document mounted or disposed on the window **69—71**, which is illuminated by the lights **87—89**, onto that portion of the web of light-sensitive paper **39** which is framed in or in registry with the light aperture **31** in the housing or magazine **21**.

A light shutter **119** is rotatably mounted in the casing **20**, between the focusing lens **111** and the light aperture **31** in the magazine **21**, this shutter **119** being driven by the driving mechanism **54**, during the operation of our machine, successively to uncover and then cover the focusing lens **111** and so to control the light passing from the focusing lens **111** into the light aperture **31** of the magazine **21**.

A cycle of operations of the new machine is initiated by depressing or closing a manually operable control switch **189** which is movably mounted in the top wall **55** of the casing **20**, and each cycle of operations is terminated by a cut-out switch **179** driven by the driving mechanism **54**, and which switch **179** operates to automatically stop the machine upon completion of a cycle of operations thereof.

After the desired number of exposures has been made upon the web of light-sensitive paper or like material **39** in the magazine **21**, the magazine **21** containing the exposed web of paper or like material **39** is removed from the casing **20**, through an opening which is provided in the rear wall **58** thereof, and taken to the place of business of a photocopy or like company, where the exposed web **39** is removed from the magazine **21** and developed and, in the meantime, the magazine thus removed from the casing **20** is replaced by another magazine **21** containing a fresh or unexposed web of light-sensitive paper or the

like material 39, whereupon the foregoing cycle of operations may be repeated.

The construction and operation of the new machine will be more readily understood from a study of the appended drawings in connection with the detailed description of the new machine which will now be set forth.

Detailed description of the construction of the machine

The casing 20 of the new machine includes a top wall 55, a bottom wall 56, a front wall 57, a back wall 58, and side walls 59 and 60. A removable door 61 is provided in the rear wall 58 of the casing 20 so as to allow easy access to the inner portion of the casing 20 and so as to facilitate the insertion and removal of the replaceable magazine 21.

As shown in the drawings (Fig. 5) the removable rear door 61 of the casing 20 is preferably provided with two handles 62 which are attached to its outer face 63, and when the door 61 is in its normal or closed position a group of relatively long hooks 64, which are attached to the inner face 65 of the door 61 along the upper edge portion thereof, engage a flange 66 which is formed on the rear wall 58 of the casing 20, and a group of relatively short hooks 67, which are attached to the inner face 65 of the door 61 along the lower edge portion thereof, engage a flange 68 which is formed on the rear wall 58 of the casing 20. The hooks 64 and 67 are so positioned and proportioned that when the lower hooks 67 are resting upon the flange 68 the upper hooks 64 are still disposed in engagement with the flange 66, but when the door 61 is raised (by means of its handles 62), the maximum distance allowed by the engagement of hooks 64 and flange 66, the lower hooks 67 are raised above the flanges 68 so that the lower portion of the door 61 may be swung outwardly and thus the door 61 may be completely removed from the casing 20 to facilitate insertion and removal of the magazine 21.

The front central portion of the top wall 55 of the casing 20 is provided with a cut-out portion or window 69. Flanges 70 are provided around the peripheral edge portion of the cut-out portion or window 69 and extend sufficiently inwardly thereof so that a sheet of glass 71, or like transparent material, may be placed upon the inwardly extending portion of the flanges 70 in such a manner that the upper surface of the glass plate 71 lies in a horizontal plane slightly below the plane of the upper surface of the top wall 55 of the casing 20 (see Fig. 1).

A cover plate 72 is hingedly attached, as at 74, to the top wall 55 of the casing 20, and is provided with a handle 73. The cover plate 72 is so positioned that it will completely cover the cut-out portion or window 69 when in lowered position, as shown in Figs. 1 and 5.

Arranged in the casing 20, below the window 69—71 (Figs. 1 and 5), are suitable supporting members, such as rods 75, 76 and 77, which are secured to the front wall 57, and side walls 59 and 60, respectively, and a fourth supporting member or rod 78 is secured to the rearwardly extending end portions of the rods 76 and 77. Reflectors, such as 79, 80, 81 and 82, are secured to the rods 75, 76, 77 and 78, respectively, and arranged within the reflectors 79, 80, 81 and 82 are light bulbs 83, 84, 85 and 86. The reflectors 79, 80, 81 and 82 are arranged in such a manner that they will reflect light from the bulbs 83, 84, 85 and 86, respectively, upwardly toward the window 69—71 and will not allow light from the bulbs 83, 84, 85 and 86 to shine directly downwardly toward the bottom wall 56 of the casing 20.

Disposed in the housing 20, below the window 69—71, is a vertical partition wall 87 which extends upwardly from the bottom wall 56 of the casing 20. A flange 88 is formed on the bottom edge portion of the vertical partition wall 87 and this flange rests on the upper surface of the bottom wall 56 of the casing 20.

From the upper edge portion of the vertical partition wall 87, an angularly extending partition wall 89 extends or continues upwardly and rearwardly within the casing 20 (Fig. 1).

Flanges 90 and 91 are formed on the side edge portions of the vertical partition wall 87 and when the partition wall 87 is in position in the casing 20 the flanges 90 and 91 slidably but snugly bear against the side walls 59 and 60, respectively, of the casing 20. Flanges 92 and 93 are formed on the side edge portions of the angularly extending partition wall 89 and when this wall 89 is in position within casing 20 the flanges 92 and 93 also slidably but snugly bear against the side walls 59 and 60, respectively, of the casing 20. Thus it will be seen that the vertical partition partition wall 87, together with the angularly extending partition wall 89, which is, in effect, a continuation of the partition wall 87, form an effective shield to prevent the passage of light from the illuminated front compartment or chamber A into the rear compartment or magazine chamber B of the casing 20.

Slotted brackets 94 and 95 (Fig. 2) are pivotally connected to the vertical partition wall 87, adjacent the side walls 59 and 60, respectively, of the casing 20, by means of lugs 96 and 97 and pins 98 and 99, respectively. These brackets 94 and 95 are, in turn, connected to brackets 100 and 101, respectively, by means of screw and slot connections 102—104, and 103—104*a*, and the brackets 100 and 101 are rigidly attached, as by welding, to the side walls 59 and 60, respectively, of the casing 20. Screws 102 and 103 engage the slots 104 and 104*a* in the slotted brackets 94 and 95, respectively, and are screwed into holes which are tapped into the brackets 100 and 101, respectively.

Slotted brackets 105 are also pivotally connected to the angularly extending partition wall 89, adjacent to the flanges 92 and 93, by means of lugs 106 and pins 107 and these slotted brackets 105 are slidably engaged with brackets 108 by means of screw and slot connections 109—110, the brackets 108 being rigidly attached to the side walls 59 and 60 of the casing 20 (only one bracket 105 being shown, Fig. 1). Screws 109 engage the slots 110 in the slotted brackets 105, and are screwed into holes which are tapped into the brackets 108.

It is known that the refractory properties of focusing lenses vary considerably and hence it is necessary, in a machine such as the new photocopy machine, to provide means for adjusting the position of the focusing lens 111 relative to that portion of the web of photo-sensitive sheet material 39 onto which the image of the object or document to be reproduced is directed.

By constructing the new machine with the focusing lens mounted in the adjustable partition wall 87—89 we have provided a novel and effective means for making any proper or necessary adjustment of the focusing lens 111 to correct for the different refractory properties of various focusing lenses which may be used in

the machine or because of damage to the focusing lens initially provided with the machine.

Another reason for mounting the focusing lens 111 in the adjustable partition wall 87—89 in the new machine is to provide a simple but effective means for regulating and varying the size of the image cast upon the web of photo-sensitive paper 39, which may be accomplished by adjusting the focal point of the focusing lens 111 relative to the web of photo-sensitive paper 39, as will be readily understood by persons skilled in the art.

When the vertical partition wall 87 and the angularly extending partition wall 89 are in operative position in the casing 20, the screws 102, 103 and 105 hold the slotted brackets 94, 95 and 96 tightly against the brackets 100, 101 and 108, respectively, and thereby securely hold the partition walls 87 and 89 in position. However, if and when it is necessary or desired to move or adjust the partition walls 87 and 89 to another or different position in the casing 20, this may be accomplished by loosening the screws 102, 103 and 105, sliding the partition walls 87 and 89 backwardly or forwardly as desired, and then securely tightening the screws 102, 103 and 105 so as to hold the partition walls 87 and 89 in the desired position in the casing 20 into which they have been adjusted.

A focusing lens 111 is mounted in the vertical partition wall 87. This focusing lens 111 is composed of a rear section 112 and a front section 113, as best seen in Figs. 1 and 2. The rear section 112 of the focusing lens 111 includes a rear lens housing 114, in which is mounted a lens (not shown), and the front section 113 of the focusing lens 111 includes a lens tube 116 within which is mounted a lens (not shown), and a prism 118 is mounted on the front or outer end portion of the lens tube 116, as is best seen in Figs. 1 and 2.

The removable magazine or housing 21 includes side walls 24 and 25, a top wall 26, a rear wall 27, a bottom wall 28, and a front wall 29 which is movably attached to the side wall 24 as by hinges 30. The front wall 29 has a light aperture 31 formed therein; said light aperture 31 having dimensions slightly larger than the largest photostat or other photocopy which the new machine is capable of making.

Arranged in the replaceable housing or magazine 21, rearwardly of the light aperture 31, is a vertically extending guide member 32 which has suitably rounded upper and lower edge portions, 33 and 34, respectively, and this guide member 32 is attached by hinges 35 to the side wall 24 of the magazine 21. The guide 32, when in its normal or operative position, extends perpendicularly relative to the side wall 24 and is releasably but positively held in this position by means of a suitable latch 36, which is shown in Fig. 2, and when in its normal position, as in Fig. 1, the front face 37 of the guide 32 completely covers the light aperture 31 but is spaced slightly to the rear thereof, as shown in Fig. 1.

A supply or web of light-sensitive photocopy or like paper 39 is rolled or wrapped upon a feed roll 22 which is disposed in the replaceable magazine 21, and, when the new photocopy or like machine is properly assembled for operation, the web of light-sensitive paper or like material 39 extends from the feed roll 22, across the front face 37 of the guide 32, in close contact therewith and in such a manner that it is horizontally centered directly behind the light aperture 31 in the replaceable magazine 21 and with the front or sensitized face 40 of the web 39 facing the light aperture 31.

From the guide 32 the web of light-sensitive paper or like material 39 extends rearwardly to a take-up roll 23, which is rotatably mounted in the magazine 21, and onto which it is wound during operation of the machine, and the rounded edge portions 33 and 34 of the guide 32 prevent creases or sharp bends from being formed in the web 39 as it is drawn tightly across the front face 37 of the guide 32.

The take-up roll 23 is mounted upon and secured to a shaft 41, and the end portions of the shaft 41 are slidably and rotatably mounted in vertically extending slots 42 which are formed in brackets 43, one of the brackets 43 being mounted on each of the side walls 24 and 25 of the magazine 21.

It will be noted that take-up roll 23 may easily be placed in position in the magazine 21 by lowering the end portions of the shaft 41, into the slots 42, through the open upper ends 44 thereof, until the take-up roll 23 rests upon the drive roller 45.

A weighted roller 223 is mounted in the magazine 21, upon a shaft 224 which is carried by a lever 225 which is pivotally mounted, as at 227, upon a bracket 226 which is secured to the rear wall 27 of the magazine 20. This weighted roller 223 may be swung up, out of the way, when inserting the take-up roll 23 into the magazine 21, but, when the take-up roll 23 is in position in the magazine 21, the weighted roller 223 is allowed to rest upon the take-up roll 23, thus keeping the latter in tight contact with the drive roller 45.

The drive roller 45 is secured on shaft 46 which has one end portion 47 thereof journaled in a bearing 48 which is mounted in the side wall 25 of the magazine 21. The other end portion 49 of shaft 46 is journaled in and extends through a bearing 50 which is mounted in the side wall 24 of the housing 21.

One element 51 of a clutch or coupling 52 is secured to the outer extremity of the end portion 49 of the shaft 46. The clutch or coupling element 51 is adapted to engage a complementary clutch or coupling element 53 which forms a part of a driving mechanism 54, which is arranged in the casing 20, and this coupling or clutch 51—53 establishes a severable connection between the driving mechanism 54 and the shaft 46 and drive roller 45 so as to revolve or rotate the take-up roll 23, thereby advancing the web of light-sensitive paper or like material 39 from the feed roll 22 onto the take-up roll 23, as will be more fully described hereinafter.

In a photocopy or like machine, such as the present machine, it is necessary to provide some means which will allow the light-sensitive paper or like material in the machine to be exposed for the proper length of time to a well lighted image of the article or document to be reproduced, and which means, after the proper exposure has been made, will positively shield the exposed portion of the light-sensitive paper from further undesired exposure to the lighted image or to other light which might affect the light-sensitive paper.

From the description of our invention, thus far, and by reference to Fig. 1 of the drawings, it will be seen that when the magazine 21 is positioned in the casing 20, and the rear door 63 of the casing 20 has been closed, the only source from which light may pass from the light chamber A into the rear or dark chamber B, and thence

into the magazine 21, so as to impinge upon the web of light-sensitive paper 39 within the magazine 21, is by way of the focusing lens 111.

The new photocopy or like machine includes a light shutter 119 which is rotatably mounted in the casing 20, directly behind the focusing lens 111, on a shaft 120, which is driven by the driving mechanism 54, as will be explained presently.

In view of the fact that varying conditions in lighting and the like may be encountered in the use of the new machine, it may be necessary to change the time of exposure during which a picture is "taken" upon the web of paper or other light-sensitive material 39, and hence the shutter 119 is preferably made adjustable. Referring to Figs. 7 and 8, it will be noted that the shutter 119 includes two separate shutter blades 123 and 124, both of which are mounted on the shaft 120, and that the shutter blade 123 includes a portion 121 which provides the trailing edge of the shutter while the shutter blade includes a portion 122 which provides the leading edge of the shutter 119.

The shutter blades 123 and 124 are of like size and configuration and are adjustably fastened together by means of a screw 125 which is inserted through a slot 126 which is formed in the shutter blade 124, this screw 125 being screwed into a hole which is tapped into shutter blade 123. The shutter blade 124 is fast to the shaft 120 but the shutter blade 123 is revolvable upon, and relative to the shaft 120, and is dependent upon the screw and slot connection 125—126 made with the shutter blade 124 for its positive connection to the shaft 120.

It will be noted that when the parts are disposed in the position in which they are shown in Fig. 7, the shutter blades 123 and 124 are arranged in exact coincidence with each other and thus are set for the longest possible exposure time, or conversely, are set for the shortest possible time that the shutter 119 will be positioned directly behind the focusing lens 111 during a cycle of operations of the machine.

The shutter 119 is shown in Fig. 8 with the blades 123 and 124 thereof in a partially spread or "fanned" position and, it will be noted, that in this position of the parts the shutter blade 123 has been adjusted or rotated rearwardly relative to the shutter blade 124 but is held by the screw and slot connection 125—126. When the shutter blades 123 and 124 are disposed in the position in which they are shown in Fig. 8, the exposure time, that is, the time during which a reproduction is "taken," is comparatively short, relative to the exposure time required when the shutter blades 123 and 124 are disposed in the position in which they are shown in Fig. 7.

It will also be noted that when the parts are disposed in the position in which they are shown in Fig. 8, the leading edge 122 of the shutter 119 is disposed in the same position as that in which it is shown in Fig. 7, and will operate to cut off the light from the focusing lens 111 and end the exposure of the web of light-sensitive paper 39 in the magazine at the same point or interval in a cycle of operations of the machine as before, although the shutter 119 will have to be rotated a substantially greater circumferential distance than previously before the exposure of the web of light-sensitive paper 39 will be initiated by the uncovering of the focusing lens 111 by the trailing edge 121 of the shutter blade 123.

By making the shutter 119 adjustable in the manner described above, it is possible for the advancement of the web of light-sensitive material 39, past the light aperture 31 in the magazine 21, to be commenced immediately after the shutter 119 has become closed and to assure that the advancing movement of the web 39, relative to the light aperture 31, will always have been completed and the machine stopped a substantial length of time before the trailing edge 121 of the shutter blade 123 again uncovers the focusing lens 111. Hence, any danger that a person operating the new machine will improperly adjust the shutter 119 so as to leave the focusing lens 111 uncovered at the end of a cycle of operations of the machine, is eliminated.

Referring now to Figs. 2, 3 and 6, wherein the driving or motor-driven operating mechanism of the machine is best illustrated, it will be noted that this driving mechanism, which is generally indicated at 54, includes an electric motor 127 which is mounted on a supporting base 128 which is disposed in the casing 20. The armature shaft 129 of the motor 127 is attached to a shaft 130 by means of a suitable coupling 131. The shaft 130 extends into a gear housing 132 and, through suitable reduction gear (not shown) but which are enclosed in the gear housing 132, the shaft 130 drives a shaft 133. A helical gear 134 is secured to the shaft 133, intermediate the ends thereof (Fig. 6), and meshes with a helical gear 135 which is secured to a shaft 136.

The shaft 136 is journaled in bearings 137 and 138 which are formed in vertically extending arms 139 and 140, respectively, of a supporting member 141, which is secured to the upper surface of the supporting base 128. Collars 144, 145 and 146, which are suitably secured to the shaft 136 by means of pins, screws or the like, maintain the shaft 136 in a fixed longitudinal position within the bearings 137 and 138. A sector gear 147, having a hub 148, is positioned on the inner end portion of the shaft 136 and is suitably secured thereto. Gear teeth 150 are provided on a portion of the peripheral edge of the sector gear 147 and the remaining portion 151 of the peripheral edge of the sector gear 147 lies on or slightly within the dedendum circle of the gear teeth 150.

Extending parallel to and disposed directly above the shaft 136 is a shaft 152 which is journaled in bearings 153 and 154 which are formed in the vertically extending arms 139 and 140, respectively, of the supporting member 14. Collars 155 and 156 are secured to the shaft 152 on opposite sides of the bearing 153 and these collars 155 and 156 maintain the shaft 152 in fixed longitudinal position within the bearings 153 and 154. A gear 157, having teeth 158, is secured to the shaft 152 in such position that the teeth 158 will engage the teeth 150 of the sector gear 147 and be rotated thereby during that portion of the rotation of the sector gear 147 in which the teeth 150 thereof extend upwardly from the sector gear 147 and are positioned directly below the shaft 152 and its gear 157.

It will be noted, in this connection, that the gear 157 and the shaft 152 are so positioned that during the remaining portion of the rotation of the sector gear 147, that is, when the gear teeth 150 are not positioned directly below the gear 157, the gear teeth 158 of the gear 152 will be vertically spaced above the sector gear 147 so as not to engage the peripheral edge portion 151 of the sector gear 147, which lies within the dedendum circle of the gear teeth 150, and that, therefore, the sector gear 147 will turn through this portion

of its rotation without imparting movement to the gear 157.

A clutch or coupling element 53 is secured to the inner end portion of the shaft 152, inwardly of the gear 157. Lugs 160 are provided on the inner face 159 of the clutch or coupling element 53. The lugs 160 are complementary to grooves 161 which are provided in the outer face 162 of a clutch or coupling element 51 which is secured to the shaft 46, as previously described.

When the replaceable magazine or housing 21 is disposed in its intended or operative position within the casing 20, the lugs 160 on the clutch or coupling element 53 engage the complementary grooves 161 which are formed in the clutch or coupling element 51, thus operatively connecting or engaging the shaft 46 of the magazine 21 to or with the shaft 152 of the driving mechanism 54.

It will be noted, in this connection, that the weight of the magazine 21 is such that the friction between the plate 163, which connects the supporting legs 164 of the housing 21, and the bottom wall 56 of the casing 20, is sufficient to maintain the housing 21 in position within the casing 20 and thereby maintain the clutch or coupling element 51 of the magazine 21 in engagement with the clutch or coupling element 53 of the driving mechanism 54.

A sprocket wheel 165 is mounted on the shaft 133 of the helical gear 134 and this sprocket wheel 165 has teeth 166. A sprocket chain 167 engages the teeth 166 of the sprocket wheel 165 and drivingly connects the sprocket wheel 165 to a corresponding sprocket wheel 168 which is secured to a shaft 169 which is journaled in bearings 170 and 171 which are mounted on the supporting base 128 of the machine.

A sprocket wheel 173 is secured to the shaft 169 forwardly of the sprocket wheel 168. A chain 174 connects the sprocket wheel 173 and the shaft 169 to a sprocket wheel 175 which is secured on the rear end portion of the shaft 120 on which the shutter 119 is mounted, said shaft 120 being journaled in a bearing 176 which is formed in the vertically extending arm 177 of a supporting member 178 which is secured to the upper surface of the supporting base 128 of the machine.

A stop-switch rotor 179 is secured to the shaft 169 intermediate the sprocket wheels 173 and 168, and this rotor 179 includes a conductive surface 180 and a non-conductive surface 181. Contact rollers 182 and 183 are secured to the upper surface of the supporting base 128 so that they may engage and roll upon the conductive surface 180, and non-conductive surface 181, of the stop-switch rotor 179.

The contact rollers 182 and 183 are attached to conductors 184 and 185, respectively, which form part of the operating circuit (Fig. 9) for the electric motor 127. When the motor 127 is running, the contact rollers 182 and 183 are maintained in rolling contact with the conductive surface 180 of the stop-switch rotor 179 and the electrical connection between the conductors 182 and 183 is thereby completed. However, at the end of a cycle of operations of the machine the insulating or non-conductive strip 181 contacts the rollers 182 and 183 and the electrical connection between the conductors 184 and 185 is thereby broken, thus deenergizing a relay 186 and allowing the switch blades 187 and 188 to open, which causes the motor 127 to stop and the electrical circuit to remain open until another operation of the machine is initiated by closing a manually operable starting or control switch 189 which is movably mounted in the top wall 55 of the casing 20, as will be described more fully hereinafter.

The gear ratio between the shaft 133 and all of the other shafts 136, 152, 169, 46 and 120, which are directly or indirectly driven thereby, is one to one. Therefore, upon a single rotation of the shaft 133 the shafts 169, 120, 136 and 152 are each caused to make a single revolution and thereby cause the shutter 119, which is secured to the shaft 120, as well as the drive roller 45 on the shaft 46 (which is connected to the shaft 152 by means of the clutch 52) to make one complete revolution, as will be described more fully hereinafter in connection with the description of the operation of the new machine.

The new machine includes, in general, four electrical circuits which are diagrammatically illustrated in Fig. 9, namely, a starting circuit which is associated with the manually operable starting switch 189, an operating circuit for the motor 127, a control circuit for the illuminating lamps 83, 84, 85 and 86, and a circuit through the stop-switch rotor 179.

The starting circuit which is associated with the manually operable starting switch 189 includes a line conductor 192, conductor 193, switch contact 191, starting switch 189, switch contact 190, conductor 194, conductor 195, coil 196 of the relay 186, conductor 197, conductor 198, conductor 199, and the line conductor 200.

The operating circuit for the motor 127 includes the line conductor 192, a conductor 204, switch blade 188, switch contact point 203, conductor 206, motor 127, conductor 207, conductor 198, conductor 199, and the line conductor 200.

The control circuit for the illuminating lamps 83, 84, 85 and 86, includes the line conductor 192, a conductor 204, conductor 205, switch blade 187, switch contact point 202, conductor 208, conductor 209, illuminating lamps 83, 84, 85 and 86, conductor 210 and the line conductor 200.

The circuit through the stop-switch rotor 179 includes the line conductor 192, conductor 204, conductor 205, switch blade 187, switch contact point 202, conductor 208, conductor 185, contact roller 183, conductive surface 180 of the stop switch rotor 179, contact roller 182, conductor 184, conductor 195, relay coil 196 of the relay 186, conductor 197, conductor 198, conductor 199 and the line conductor 200.

Operation

Preparatory to using the new machine, the replaceable housing or magazine 21 may be loaded with a roll of photo-sensitive paper or like material 39, as will now be described; it being preferable that the magazine 21 be loaded in a dark room so as to avoid exposure of the photo-sensitive paper 39.

In loading the magazine 21, the front wall 29 of the magazine 21 is swung into open position on its hinges 30. The latch 36, which latches the guide 32 to the wall 25 of the magazine 21, is then released and the guide 32 swung outwardly, that is, into open position, about its hinges 35.

When the front wall 29 of the magazine 21 and the guide 32 are disposed in open position, the feed roll 22, with a roll of photo-sensitive paper 39 arranged thereon, may then be inserted into the magazine 21 and the end portions of the rod 22A, which extends through the center

of the feed roll 22, may be positioned in the grooves 22B which are formed in the upper edge portion of the feed roll supporting brackets 22C which are attached to the walls 24 and 25 of the magazine 21, in the manner which is illustrated in Fig. 1.

The weighted roller 223 may then be swung into a vertical position, upon its pivot 227, which is secured to the bracket 226. The free end portion of the roll of photo-sensitive paper 39 may then be secured to the take-up roll 23 in any suitable manner, such as, for example, by inserting the edge portion of the free end portion of the photo-sensitive paper into a slot formed in the take-up roll 23. The take-up roll 23 may then be inserted into the magazine 21 and positioned so as to rest upon the drive roller 45, this being accomplished by lowering the end portions of the shaft 41 of the take-up roll 23 into the slots 42 which are formed in the brackets 43 which are secured to the walls 24 and 25 of the magazine 21.

The guide 32 may then be placed in closed position in the magazine 21 so as to bear against a loop of photo-sensitive paper 39 which may be drawn from the feed roll 22 whereupon the slack in the web of photo-sensitive paper 39 may then be rewound onto the feed roll 22, thereby drawing the web of photo-sensitive paper 39 tightly across the guide 32. The front wall 29 of the casing 21 may then be swung into closed position whereupon the magazine 21 is ready to be inserted into the casing 20 of the new machine.

The insertion of the magazine 21 into the casing 20 is accomplished by removing the rear door 63 of the casing 20, as previously described, and then inserting the magazine 21 into the casing 20 through the door opening which is formed in the rear wall 58 of the casing 20. When the magazine 21 is inserted into the casing 20 it rests upon the bottom wall 56 of the casing 20 and may be slid into operative position in the casing 20 and in which position the groove 161 which is formed in the clutch or coupling element 51, which is positively connected to the drive roll 45, operatively engages the complementary lug 160 which is formed on the clutch or coupling element 53 which forms a part of the driving mechanism 54.

From the foregoing description, it will, therefore, be seen that the placing or manual insertion of the magazine 21 into operative position in the casing 20, automatically couples or connects the web-advancing mechanism 45—23—22 in the magazine 21 to the motor-driven operating or driving mechanism in the casing 20, and that this arrangement facilitates the insertion of the replaceable magazine 21 into the casing 20 as well as its removal therefrom.

A cycle of operations of the machine is initiated by the closing of the manually operable control switch 189, which is movably mounted on the top wall 55 of the casing 20, a new or used portion of the web of light-sensitive paper 39 being positioned behind the light aperture 31 in the magazine 21. The pressing of the manually operable control switch 189 completes electrical circuits, which are shown in Fig. 9, in a manner which will be described presently, so as to illuminate the light bulbs 83, 84, 85 and 86 and set the motor 127 in operation.

Referring now to Fig. 9, it will be noted that the wiring diagram therein set forth illustrates the electrical circuits embodied in our machine in the open or non-operating position which they assume prior to the initiation of a cycle of operations of the machine. As illustrated in Fig. 9, the manually operable starting switch 189 is open, and the relay 186 is deenergized so that switch blades 187 and 188 are also open, and the stop-switch rotor 179 has "overrun" slightly so that the contact rollers 182 and 183 are in contact with the conductive surface 180 of the stop-switch rotor 179.

It will be noted, however, that it is immaterial that the contact rollers 182 and 183 are disposed in contact with the conductive surface 180 of the stop switch rotor 179, prior to the initiation of a cycle of operations of the machine, because both the starting switch 189 and the switch blades 187 and 188 are open so that no current may flow through the circuit, and, therefore, the operating motor 127 is stopped.

When it is desired to set the new machine in operation, the manually operable starting switch or push button 109 is momentarily depressed, thus closing contacts 190 and 191. The closing of the starting switch 189 closes an electrical circuit (Fig. 9) and current then flows from the line conductor 192, through the conductor 193, through the contact 191, through the starting switch 189, through the contact 190, through the conductor 194, through the conductor 195, through the coil 196 of the relay 186, through the conductor 197, through the conductor 198, through the conductor 199 and back into the other line conductor 200. The momentary closing of the starting switch 189 thus causes the relay 186 to be energized and the core 201 of the relay 186 is magnetized causing the switch blades 187 and 188 to be drawn against contact points 202 and 203, respectively.

The energization of the relay 186, in the manner described above, is instantaneous so there is no appreciable lag in the closing of switch blades 187 and 188, and upon the closing of the switch blades 187 and 188, circuits through the motor 127 and the lights 83, 84, 85 and 86 are instantaneously completed.

The operating circuit for the motor 127 is completed by the closing of the switch blade 188, whereupon current flows from the line conductor 192, through the conductor 204, through the switch blade 188, through the contact point 203, through the conductor 206, through the motor 127, through the conductor 207, through the conductor 198, through the conductor 199 and into the other line conductor 200.

The light or illuminating circuit (Fig. 9) is completed by the closing of the switch blade 187, whereupon the current flows from the line conductor 192, through the conductor 204, through the conductor 205, through the switch blade 187, through the contact point 202, through the conductor 208, through the conductor 209, through the lights 83, 84, 85 and 86, through the conductor 210 and into the other line conductor 200. The lights 83, 84, 85 and 86 may be arranged in parallel or in series, as desired, depending on whether it is desired to have high or low voltage lights, as will readily be understood by those skilled in the art. In the preferred embodiment of our invention which is shown in the drawings, however, we have shown high voltage lamps arranged in parallel, but if so desired, a series arrangement of low voltage lights may be easily substituted therefor by anyone skilled in the art.

If the shaft 169 and the stop-switch rotor 179 have stopped, at the end of a previous cycle of

operations of the machine, in such a position that the contact rollers 182 and 183 remain in contact with the narrow insulating or non-conductive strip 181, the electrical circuit through the stop-switch rotor 179 is not instantaneously completed upon the closing of the switch blades 187 and 188, but is completed only after the operating motor 127, through the driving mechanism 54, has rotated the shaft 169 and the stop-switch rotor 179 sufficiently to enable the contact rollers 182 and 183 to engage the conductive surface 180 of the stop-switch rotor 179. However, the operating motor 127 rotates the shaft 169 so quickly that the completion of the circuit is practically instantaneous, since it is practically impossible to give the manually operable starting switch 189 such a rapid depression or manipulation that the shaft 169 fails to move sufficiently to close the circuit. However, the overrun of the shaft 169, though necessarily very small, is usually sufficient to move the narrow insulating or non-conductive strip 181 out of contact with the contact rollers 182 and 183 so that the contact rollers 182 and 183 are already in engagement with the conductive surface 180 of the stop-switch rotor 179 when the manually operable starting switch or button 189 is depressed to initiate an operation of the machine.

Hence, it will be seen that either at the instant the starting switch or button 189 is depressed or a fraction of a second later, after the switch blades 187 and 188 are closed, circuit through the stop-switch rotor 179 is completed. This circuit is the essential circuit during the normal operation of the new machine, after the starting switch 189 has been released and is open, because it is this circuit which maintains the relay 186 in an energized condition and therefore maintains the switch blades 187 and 188 in a closed position.

In the circuit through the stop-switch rotor 179, current flows as follows: from the line conductor 192, through the conductor 204, through the conductor 205, through the switch blade 187, through the contact point 202, through the conductor 208, through the conductor 185, through the contact roller 183, through the conductive surface 180 of the stop-switch rotor 179, through the contact roller 182, through the conductor 184, through the conductor 195, through the relay coil 196 of the relay 186, through the conductor 197, through the conductor 198, through the conductor 199, and into the line conductor 200. Therefore, it will be understood that after the motor 127 has started, and while the contact rollers 182 and 183 are maintained in contact with the conductive surface 180 on the stop switch rotor 179, circuit is maintained through the coil 196 of the relay 186, even though the starting switch 189 has been allowed to open. Hence, the relay 186 is maintained in an energized condition and the switch blades 187 and 188 are thus maintained in engagement with contact points 202 and 203, respectively, and therefore the parallel circuits through the lights 83, 84, 85 and 86 and through the operating motor 127 are maintained during a complete cycle of operations of the machine.

At the end of a cycle of operations of the machine, the shaft 169 will have made a complete revolution and the narrow insulating or non-conductive strip 181 will break the contact between the contact rollers 182 and 183 and the conductive surface 180 of the stop-switch rotor 179, thereby cutting off the flow of current through the relay coil 196 of the relay 186, which instantaneously deenergizes the relay 186 and immediately allows the switch blades 187 and 188 to open, thereby opening the circuit through the operating motor 127, as well as the circuit through the lights 83, 84, 85 and 86, and thus stopping the machine.

When the motor 127 has been set in operation, it drives the shaft 133 through the reduction gearing contained in the gear housing 132. The shaft 133 drives the shafts 136 and 169 through the gears 134 and 135 and the ratchet wheels 165 and 168, respectively. During the first portion of a cycle of operations of the machine, however, the gear teeth 150 of the gear 147 on the shaft 136, are not disposed in engagement with the teeth 158 of the gear 157 so that the gear 157 and, consequently, the drive roller 45 remain stationary. The rotation of the shaft 169, however, imparts rotation to the sprocket wheel 173 which is fast thereto and thereby, through the chain 174 and the sprocket wheel 175, drives the shaft 120 in a counterclockwise direction as seen in Fig. 6.

The shutter 119 is fast to the shaft 120 so that during a cycle of operations of the machine, when the shaft 120 is caused to rotate in a counterclockwise direction, as viewed in Figs. 6, 7 and 8, the shutter 119 will be disposed directly behind the focusing lens 111 during part of its rotation but will move away from and uncover the focusing lens 111 during the balance of its rotation; the position which the shutter 119 assumes at the end of each cycle of operations of the machine being illustrated in Fig. 6.

When the shutter 119 has been adjusted, as shown in Fig. 6, it will be noted that upon commencing a cycle of operations of the machine, the end portion 121 of the shutter 119 will quickly move out from behind the lens 111 and will then allow an image of the article being reproduced to be directed from the window 71, through the prism 118 and the focusing lens 111 and thence through the light aperture or opening 31 into the web of light-sensitive paper or like material 39. During the next part of a cycle of operations the photostatic or like photocopy will be "taken," that is, the light-sensitive paper or like material 39 will be exposed to the image of the article or document being reproduced, and this portion of the operation will continue until the rotation of shaft 120 and shutter 119 causes the leading tip or edge 122 of the shutter 119 to move behind the focusing lens 111, thus cutting off the light from the focusing lens 111 onto the web of light-sensitive paper 39.

During the remaining portion of a cycle of operations of the machine, that is, from the time that the leading tip or edge 122 of the shutter 119 moves behind the lens 111 until the shutter 119 has come to a stop in its initial position, as shown in Fig. 6, the light from the focusing lens 111 is interrupted by the shutter 119 so that no light reaches the web of light-sensitive paper 39, and the necessary parts of the driving mechanism 54 are caused to engage and thus advance the web of light-sensitive paper 39 so that a new or unused portion of the web 39 is positioned rearwardly of the light aperture 31 in the magazine 21, to be exposed during the next succeeding cycle of operations of the machine.

Therefore, it will be noted that a new or unused portion of the web of light-sensitive paper or like material 39 is always positioned behind the light aperture 31 in the magazine 21 upon completion

of a cycle of operations of the machine, and that those portions of the web 39 which have previously been exposed are drawn into the body or interior of the magazine 21 so that if light is subsequently allowed either intentionally or accidentally to strike that portion of the web 39 which is positioned behind the light aperture 31 of the magazine 21 only a new or unused portion of the web 39 will be affected and a "double exposure" and loss of material will thus be avoided.

During the time the shutter 119 is turning through the exposure portion of its cycle of rotation, the sector gear 147, driven by the shaft 136, also turns and brings the first gear tooth 150 into engagement with a tooth 158 of the gear 157, which is secured to the shaft 152. Further rotation of the sector gear 147 rotates the gear 157 which causes the shaft 152 to rotate and, through the clutch or coupling 52, rotates the shaft 46 and the drive roller 45. The number of teeth 150 on the sector gear 147 is the same as the number of teeth 158 on the gear 157, with which they engage, so that while the toothed portion of the sector gear 147 is moving in engagement with the teeth 158 on the gear 157, through a partial revolution of the sector gear 147, the gear 157 and consequently the drive roller 45 is turned through a complete revolution.

The take-up roll 23, being in close contact with the drive roller 45, a complete revolution of the drive roller 45 causes the take-up roll 23 to rotate and advance the web 39 a distance equal to the circumference of the drive roller 45. The take-up roller 23 being so driven, it is obvious that the web 39 is advanced a predetermined distance, upon each operation of the machine, and this distance does not vary with the size of the take-up roll 23 as would be the case if the take-up roll 23 were positively driven, as for instance by gear engagement with the shaft 46.

When the shaft 136 and the sector gear 147 have rotated far enough so that the last tooth 150 on the sector gear 147 has passed into and out of engagement with the teeth 158 on the gear 157, the shutter 119 has been rotated to a position wherein the trailing edge portion 121 of the shutter 119 is covering the lens 111, substantially as shown in Fig. 6, and the shaft 169 has made substantially a complete revolution so that the narrow insulating or non-conductive strip 181 of the stop-switch rotor 179 on the shaft 169 engages the contact rollers 182 and 183 and raises them out of contact with the conductive surface 180 of the stop-switch rotor 179, thus momentarily breaking the electrical circuit through the stop-switch rotor 179 and the relay coil 196, and thereby deenergizing the relay 186 and allowing the switch blades 187 and 188 to open and break the circuits (Fig. 9) through the motor 127 and the lights 83, 84, 85 and 86.

As previously pointed out, however, it is not essential that the stop-switch rotor 179 stop while the insulating or non-conductive strip 181 engages the contact rollers 182 and 183 for the reason that, even if the stop-switch rotor overruns slightly so that the contact rollers 182 and 183 again engage the conductive surface 180 of the stop-switch rotor 179, the engagement with the insulating strip 181 has momentarily broken the electrical circuit through the relay 186, and the switch blades 187 and 188 have thereby been opened so that no closed electrical circuit through the machine is possible until the manually operable control switch 189 has again been depressed or closed.

When the machine has stopped it is ready for a new cycle of operations so that, if another copy of a document previously reproduced is desired, it is merely necessary for the operator to press the manually operable control switch 189 again, whereupon the machine will make a new or second exposure of the article or document which is disposed upon the window 71. This procedure may be repeated any number of times, depending upon the number of copies of a document which may be desired, and this procedure is especially desirable either in cases where a number of negatives of the same document are desired or where exposures of a negative are being made and a number of positive copies are desired.

The removability and the replaceability of the magazine 21 is a matter of practical importance. Thus, for example, if four or five copies of a document are desired and yet it is known that the machine will be needed for other work before the desired prints could be developed, it is merely necessary, after the desired number of exposures have been made upon the web 39, to remove the rear door 63 from the casing 20, slide the magazine 21 to the left (as viewed in Fig. 6) so that the clutch or coupling element 51 on the shaft 46 is disengaged from the clutch or coupling element 53 on the shaft 152, and then remove the entire casing 21, with the exposed web of light-sensitive paper 39 therein, through the opening which is formed in the rear wall 58 of the casing 20 and which is normally closed by the door 63 (Fig. 1).

The removal of the magazine 21 from the casing 20 exposes that portion of the web 39 which is disposed immediately behind the light aperture 31 in the magazine 21, but this is immaterial for the reason that this portion of the web 39 has not previously been exposed to the image of a document, and those portions of the web 39 which have previously been exposed to the images of documents are safely rolled upon the feed roll 23 or are shielded behind the guide 32 so that no light can reach them.

If desired, a cover plate may be positioned over the light aperture 31 in the magazine 20 before removing the magazine 21 from the casing 20, so as to protect that portion of the unused web of light-sensitive paper 39 which lies directly behind the light aperture 31. However, due to the relatively inexpensive nature of light-sensitive paper or like material, such as is used in the present machine, it is unnecessary to provide a cover plate for the light aperture 31.

After it has been removed from the casing 20, the entire magazine 21, containing the exposed web of light-sensitive material 39, may be sent to the developers to have the exposed portions of the paper developed, and while this is being done a second magazine 21, containing a new or unexposed web of light-sensitive material 39, may be inserted into the casing 20 and additional exposures made without delaying the development of the previously exposed web 39.

Upon inserting a magazine 21 into the casing 20 it is advisable to run the machine through an idle cycle of operations, i. e., one from which no reproduction is expected, in order to move that portion of the web of light-sensitive material 39, which was positioned behind the light aperture 31, during insertion of the magazine 21 into the casing 20, out of register with the light aperture 31, and so as to move a new or unexposed portion

of the web 39 into register with the light aperture 31 in the magazine 21.

From the foregoing description of our invention it will be apparent that we have provided a new and improved photocopy machine which is relatively simple in operation and construction and which, by reason of its simplicity and novel features, provides a practical photocopy machine which is particularly adapted for use in offices and like places.

Many other advantages and novel features of the present invention will be apparent to persons skilled in the art, and while we have illustrated and described a selected embodiment of our invention, it is to be understood that this is capable of variation and modification and we therefore do not wish to be limited to the precise details set forth but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. In a machine of the character described, in combination, a casing including a wall provided with an opening, a magazine replaceably insertable into said casing through said opening therein, said magazine being adapted to house a web of light-sensitive paper or like material, said casing including a wall having a window provided therein for supporting an article or document to be reproduced upon the said web of light-sensitive paper or like material, means in said casing for illuminating the said window and an article or document disposed thereon, means including a focusing lens in said casing for directing an image of an illuminated article or document disposed upon the said window into said magazine and against said web of light-sensitive paper or like material arranged therein, rotatable means in said magazine for moving the said web of light-sensitive paper or like material past the said focusing lens, means including an electric motor in the said casing for operating the said rotatable means, an electrical control circuit for controlling operation of said illuminating means, an electrical control circuit for controlling operation of said electric motor, said operating means being automatically operatively engaged with the said rotatable means when said replaceable magazine is inserted into position of use in the said casing, a shutter movably mounted in the said casing for movement between the said focusing lens and the said web of light-sensitive paper or like material, means coacting with the said operating means for operating the said shutter, a timing device under control of the said operating means for substantially simultaneously opening the said control circuit for the said illuminating means and the said control circuit for the said motor at the end of a cycle of operations of the machine, and a single common manually operable control switch movably mounted in a wall of said casing for substantially simultaneously closing the said control circuit for the said illuminating means and the said control circuit for said motor to initiate a cycle of operations of the machine.

2. A machine as described in claim 1 in which the said casing includes two compartments and in which machine one of said compartments houses the said illuminating means and in which machine the other of said compartments houses the said replaceable magazine and in which machine the said focusing lens is mounted between said compartments so as to direct an image of the article or document to be reproduced from the said compartment which houses the said illuminating means into the said compartment which houses the said replaceable magazine.

3. A machine as described in claim 1 in which the said casing includes two compartments and in which machine one of said compartments houses the said illuminating means and the other of said compartments houses the said replaceable magazine and in which machine the said focusing lens is mounted between the said compartments so as to direct an image of the article or document to be reproduced from the said compartment which houses the said illuminating means into the said compartment which houses the said replaceable magazine, and in which machine the said magazine includes a wall having a light aperture therein disposed rearwardly of said shutter and in alignment with the said focusing lens.

4. A machine as described in claim 1 in which the said casing includes two compartments and in which one of said compartments houses the said illuminating means and the other of said compartments houses the said replaceable magazine and in which magazine the said focusing lens is mounted between said compartments so as to direct an image of the article or document to be reproduced from the said compartment which houses the said illuminating means into the said compartment which houses the said replaceable magazine, and in which machine the said magazine includes a wall having a light aperture therein disposed rearwardly of said shutter and in alignment with the said focusing lens, and in which machine said replaceable magazine includes means for guiding the said web of light-sensitive paper or like material past the said light aperture in said magazine and in a plane substantially parallel to but rearwardly of the said wall of said magazine in which the said light aperture is provided.

5. A machine as described in claim 1 in which the said rotatable means for moving the said web of light-sensitive paper or the like material includes a feed roll and a take-up roll both rotatably mounted in the said magazine and in which machine the said magazine includes a means for guiding the said take-up roll for movement vertically in the said magazine relative to the said feed roll.

6. A machine as described in claim 1 in which the said rotatable means for moving the said web of light-sensitive paper or the like material includes a feed roll and a take-up roll rotatably mounted in the said magazine and in which machine the said magazine includes means for guiding the said take-up roll in said magazine for movement vertically therein relative to the said feed roll, and in which machine the said feed roll and said take-up roll are both removable from said magazine so as to enable the said web of light-sensitive paper or the like material to be inserted into and removed from the said magazine.

7. A machine as defined in claim 1 in which the said rotatable means includes a coupling member carried by the said magazine and in which the said operating means includes a coupling member and in which machine the said coupling members are operatively engaged by inserting the said magazine into position of use in the said casing.

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