

Dec. 18, 1956

J. F. MORMANN

2,774,290

AUTOMATIC COPYING MACHINES

Filed April 10, 1952

5 Sheets-Sheet 1

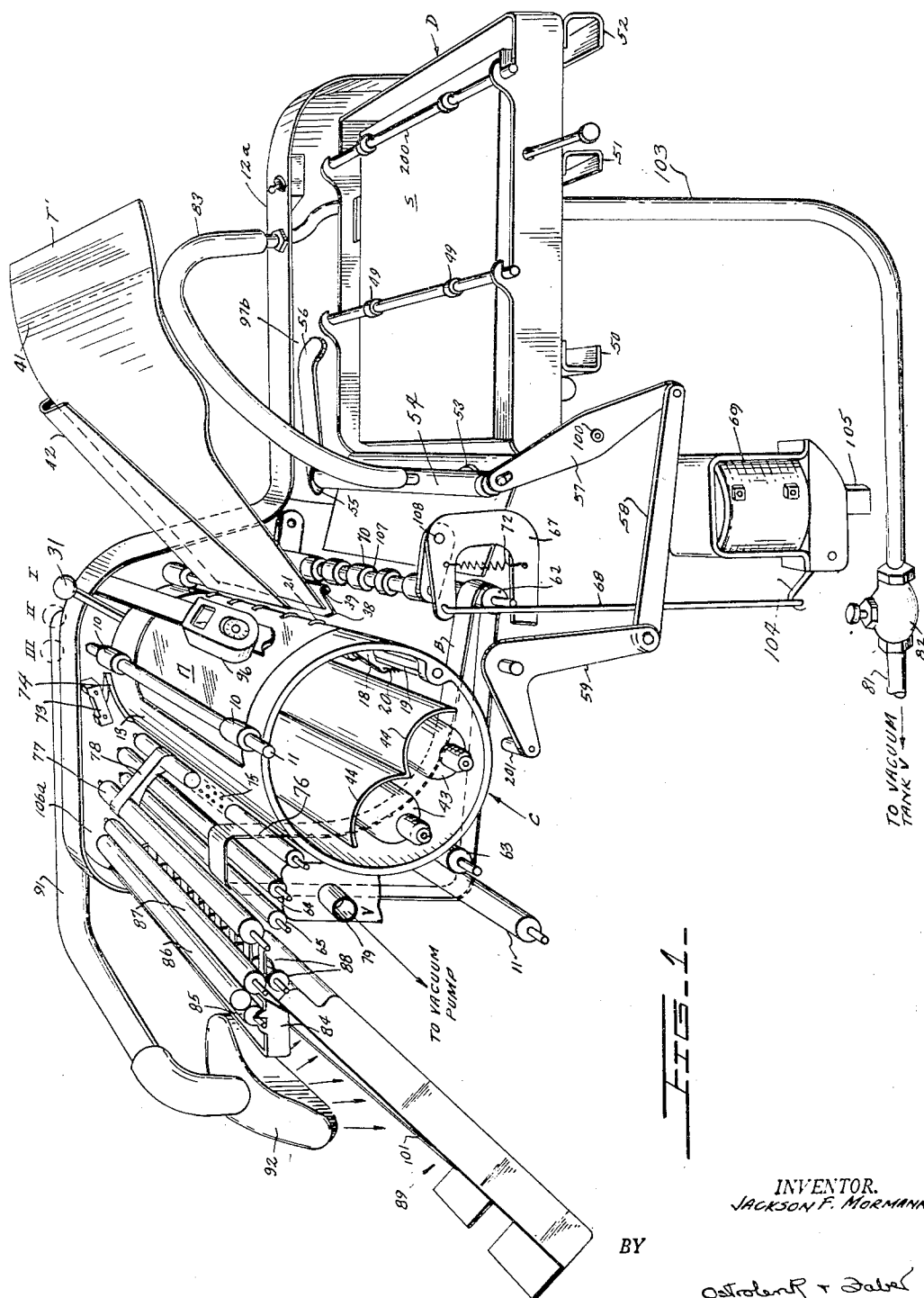


FIG. 1

INVENTOR.
JACKSON F. MORMANN

BY

Ostrolen & Jabel
ATTORNEYS

Dec. 18, 1956

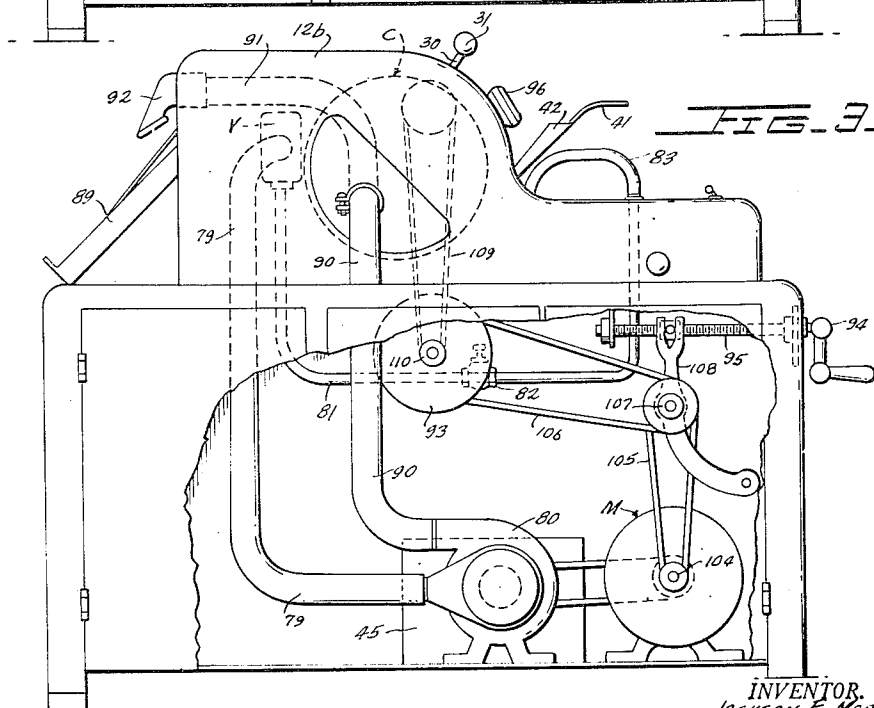
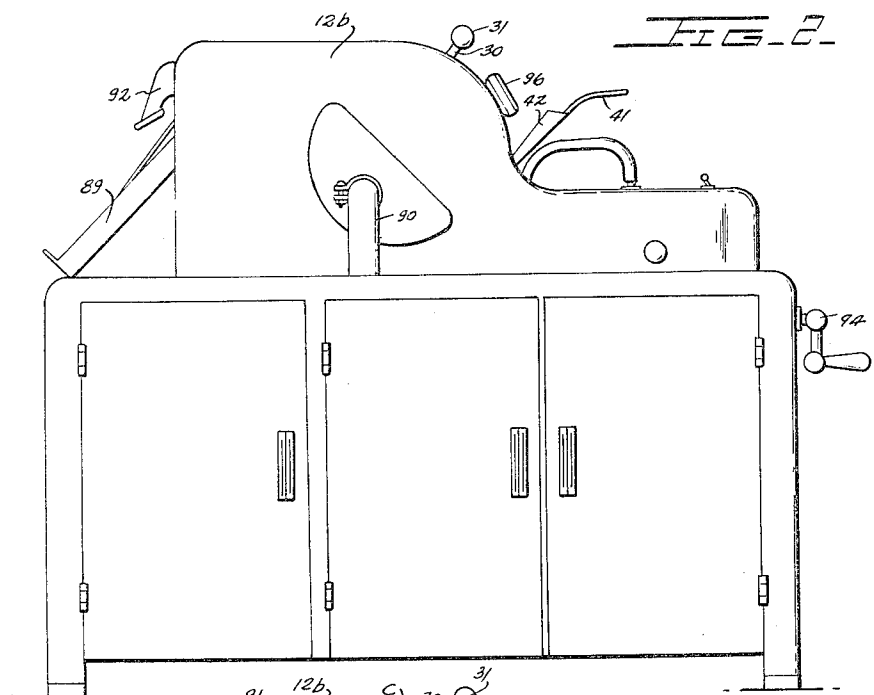
J. F. MORMANN

2,774,290

AUTOMATIC COPYING MACHINES

Filed April 10, 1952

5 Sheets-Sheet 2



INVENTOR.
JACKSON F. MORMANN

BY

Ostroland & Zales

ATTORNEYS

Dec. 18, 1956

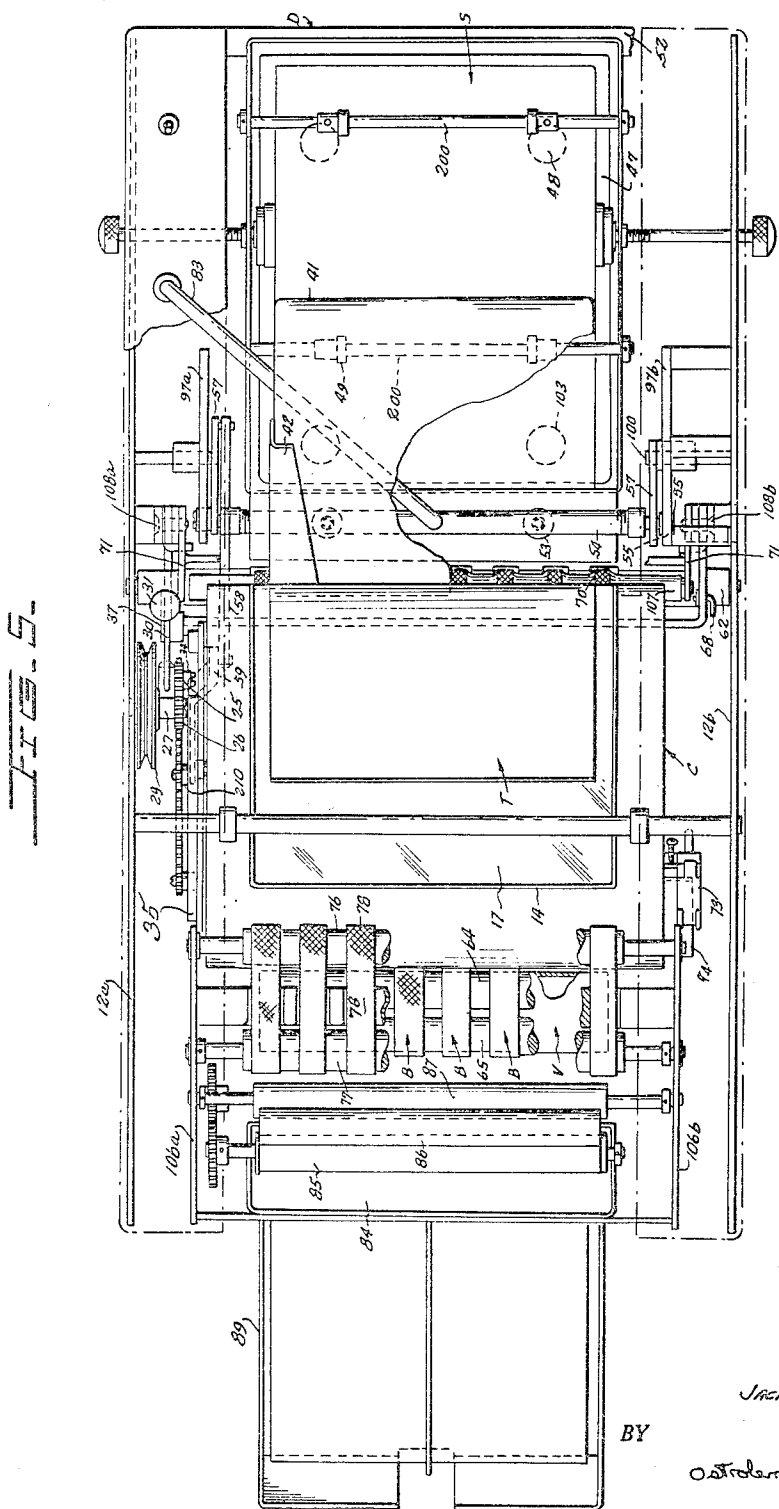
J. F. MORMANN

2,774,290

AUTOMATIC COPYING MACHINES

Filed April 10, 1952

5 Sheets-Sheet 4



INVENTOR.
JACKSON F. MORMANN

BY

Ostrowsky & Jabel
ATTORNEYS

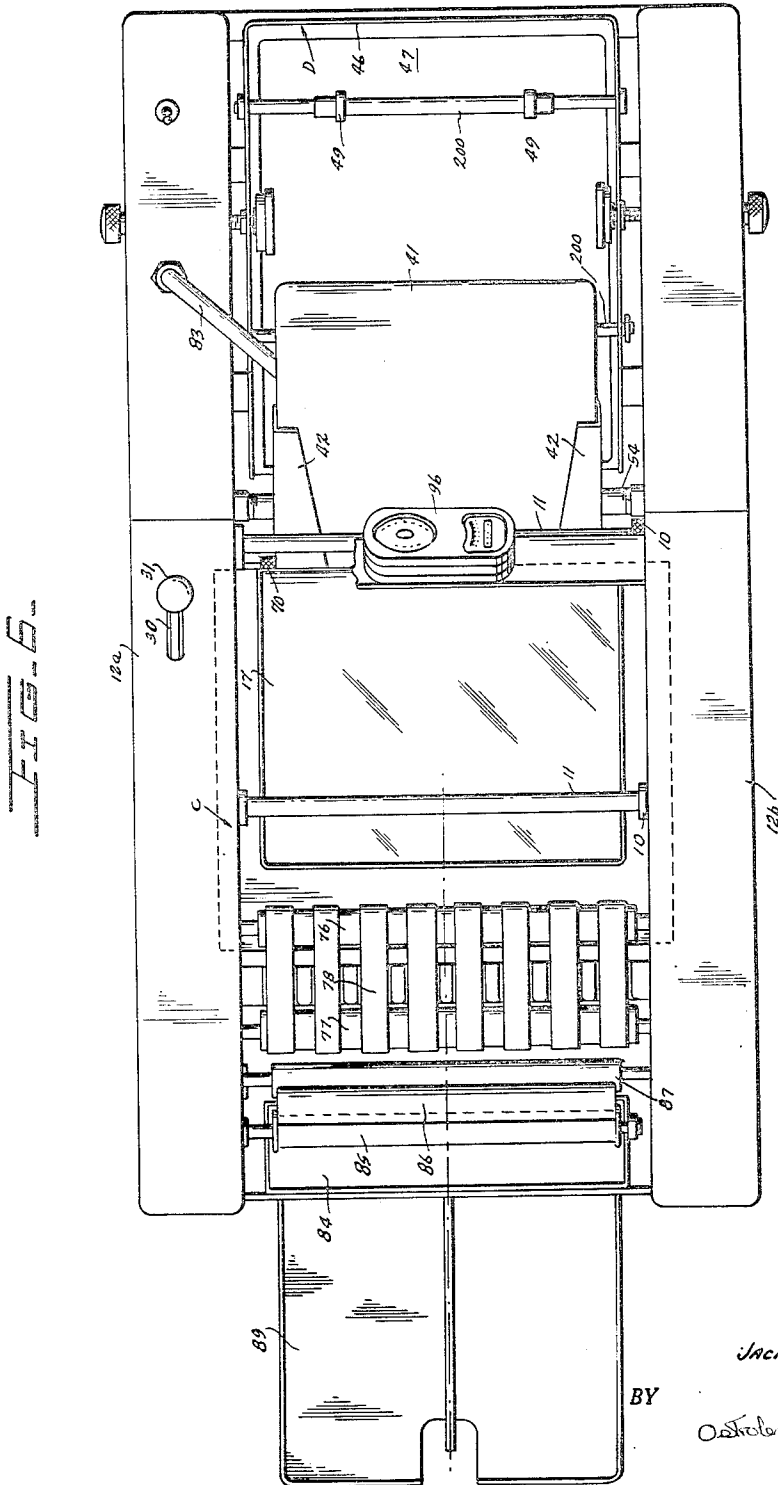
Dec. 18, 1956

J. F. MORMANN
AUTOMATIC COPYING MACHINES

2,774,290

Filed April 10, 1952

5 Sheets-Sheet 5



1

2,774,290

AUTOMATIC COPYING MACHINES

Jackson F. Mormann, Audubon, N. J.

Application April 10, 1952, Serial No. 281,617

3 Claims. (Cl. 95—77.5)

This invention relates to a copying machine and more particularly to a device for automatically providing facsimile reproductions from transparent and translucent original copies.

The apparatus of this invention can be used to copy or duplicate such original copies as engineering drawings, letters, drafts and reports, photographs, accounting records, advertising, invoices and the like.

The machine is provided with a delivery tray in which a supply of sensitized material is placed. An automatic feed device will deliver to a cylinder from this tray, a sensitized sheet in synchronism with the rotation of the cylinder.

This revolving cylinder contains a light source within. An original copy is placed over a transparent window which forms a portion of the peripheral surface of the cylinder. During rotation of the cylinder, the sensitized material is exposed to the transparent or translucent original through this transparent closure. At a predetermined position of rotation of the cylinder, a print separator removes the sheet of "sensitized material" from the original on the cylinder and channels it into the developing stage.

The developing process is a continuous one and is thus accomplished while the print is in motion. The print is then moved from this stage into a receiving tray where the operator can easily remove the finished print. The separator removes only the print from the machine and the original remains on the cylinder. This cycle of duplicating is repeated by automatically feeding another sensitized sheet into the machine.

After a predetermined number of prints have been made from any one particular original copy, it can be removed from the cylinder and another original copy can be placed thereon.

It is, therefore, apparent that the original copy need be placed in the machine only once irrespective of the number of copies to be made from it. The original copy is gripped by a clamping element rotatably mounted on the cylinder. Manual means are provided to release the grip of the clamping means after the desired number of prints have been made. However, during the entire operation of reproducing a quantity of prints from one original copy, this copy remains attached or gripped to the rotating cylinder. It is apparent that only when a predetermined number of prints have been made from the copy that it need be removed from the machine. This obviates the necessity of re-feeding and re-aligning the original for each copying operation.

Machines of the prior art, akin to the machine of the instant application, had the disadvantage that if copying was not done on a continuous roll, it was necessary to feed into the machine both the original copy and the sensitized material. Furthermore, it was essential that the operator first align the original and the sensitized material in order to make a properly centered copy print.

Another disadvantage was that following the feeding,

2

copying and developing stage, both the original and the print were ejected from the machine. Hence, if it was desired to make another copy of the same original, it was necessary that the operator realign the original with another sensitized sheet. This combination was again fed into the machine and the process was repeated. Accordingly, such machines did not have the automatic operation of my device.

My invention overcomes the disadvantages of the prior art machines and, in addition, incorporates additional features.

The automatic features of my machine will speed up production and obviate the necessity of aligning the sensitive material with the original for each print and will automatically stack the finished prints in a delivery tray.

Large copying machines, to provide prints of the order of 42" and 54" are old and well known in the art. However, on such machines, it was rarely necessary to reproduce large quantities of prints from the originals. Generally, only one or two such reproductions were required and hence, no attempt was made to provide these large units with automatic feeding and copying features. Furthermore, it was generally considered that it would not be feasible to adapt these large devices with automatic features to the size and variation in size of the originals to be copied.

Furthermore, it was found to be impractical and inefficient to use these large machines to copy letter size originals. To overcome this disadvantage, machines, identical in operation to the large ones, were made on a reduced scale. Thus, when copying machines of a reduced size were made, no substantial changes were made, and automatic features were not incorporated. That is, since automatic features were not desirable on large units, such features were not considered when the smaller, compact units were made. However, the demands of industry have indicated that automatic features are highly desirable on these smaller units since it is frequently necessary to produce large quantities of letter size copies for purposes of advertising, distribution, etc. Therefore, by my invention, I do not only reduce the large copying machine size to that of a portable unit, but I also incorporate this compact unit with automatic feeding and copying features. Such a device will be a valuable auxiliary in engineering drawing and reproduction departments to supplement similar larger equipment.

The small compact portable machine of my invention will thus relieve similar larger machines of responsibility with respect to letter sized original copies.

Due to the automatic features of my machine, it will find application for use by publishers who desire a quantity of reproductions for certain preproduction phases of their business. Schools and universities will find it useful for reproducing scholastic record transcripts and the like. Accounting, personnel and medical departments, etc., could also make valuable use of my device.

The prints, which are made from the original copy, are made from a light sensitive material. These materials may be of a variety of well known types such as "blueprints," "black and white" or "ozalid" of various coated stocks such as "paper," "cloth," "vellum," "foils" or "films."

The developing material is selected depending on the type of sensitized material used. Thus, for example, if "blueprints" are to be made, the developer would be a water and bichromate bath. For "ozalid" materials, heated ammonia vapor would be the developing agent. Fluid developer would be used for "black and white" processing.

The apparatus of my invention, for the purpose of simplicity, will be described in connection with "black

3

and white" process in which a fluid developing agent is used.

The light sensitive material, from which the print is made, is relatively safe under normal room lighting. However, a latent image is produced when this material is exposed to a high intensity incandescent lamp or a high pressure mercury vapor lamp.

An object of my invention is to provide a machine which has automatic feeding and copying features.

Another object of my invention is to provide a device which eliminates the necessity of the operator manually aligning the sensitive material with the original copy.

A still further object of my invention is to provide a duplicating machine which requires no ink and produces a print which is as readable as the original.

Still another object of my machine is a novel automatic delivery means which co-ordinates vacuum nozzles, stop means and feeding rollers.

Another object of my invention is to provide a variable speed which can be adjusted in accordance with the degree of translucency of the original copy.

Another object of my invention is a device which is compact, light and portable.

Still another object of my invention is to provide a duplicating machine which requires no outside connections or piping for installation, operates entirely by electricity and consumes very small quantities of power.

A still further object of my invention is a duplicating machine which is simple in construction, contains relatively few moving parts and is quiet in operation.

These and other objects and advantages of my invention will be better understood from the following description taken in connection with accompanying drawings:

Figure 1 is a schematic view of the apparatus of my invention.

Figure 2 is a side elevational view of the complete apparatus.

Figure 3 is a side sectional view illustrating the variable speed drive device transformer and compressor system.

Figure 4 is a side sectional view of the main body portion of the device.

Figure 5 is a top plan view partially in section and illustrates the driving means and developing unit.

Figure 6 is a top plan view of my device.

The machine consists essentially of eight elements:

1. Sensitized material delivery tray
2. Feed chute for an original copy
3. The driving means
4. The automatic feed device
5. The revolving exposure cylinder containing an appropriate light source
6. The print separator means
7. The developing means
8. The receiving tray for receiving prints.

1. Sensitized material delivery tray

As may be best seen in Figures 1, 4, 5 and 6, the apparatus is provided with a rectangular tray, denoted by the letter D, to hold the sensitized material from which the prints are eventually made. The channel members 50, 51, 52 support the delivery tray D as best seen in Figures 1 and 4.

The main portion of the rectangular delivery tray D is provided with a flange body portion 46 which has four circular recess areas 103 located at four corners thereof. A series of springs 48 are housed in the circular recesses 103 and extend well above the lower surface of the tray. A floating bed plate 47 is supported in its entirety by the series of springs 48. Sensitized material S is stacked on the floating plate 47 and are therefore urged upwardly by the series of springs 48.

Transverse shafts 200 are supported by the two sides

4

of the delivery tray, as best seen in Figures 1, 5 and 6, and have two hold down rollers 49 rotatably mounted thereon. The hold down rollers 49 engage the top sheet of the supply of sensitized material placed on the floating bed plate 47. Thus, although the series of springs 48 urge the material upwardly, the hold down rollers 49 limit the extreme upward position of the material.

By this means, the top sheet of sensitized material is maintained in appropriate position to react with the vacuum nozzle 53 hereinafter described.

2. Feed chute for the original copy

The feed chute for the original copy is located above and forward of the sensitized material delivery tray. This chute is best seen in Figures 1, 4 and 6. The chute comprises a base or supporting plate 41 with L-shaped guide members 42 located on the side thereof.

Rigidly attached to the base 41 is an extension ear 40 as seen in Figure 4.

A retaining bar 38 is pivotally mounted at 39 on the extension ear 40 of the base plate 41. The retaining bar 38 is resiliently and continuously urged in a clockwise direction. Thus, the leading edge of the translucent original T' will engage the lip extension of the retaining bar 38 so that, together with base plate 41 and its associated guides 42, the additional transparent original T' is appropriately prepositioned for automatic feed into the machine.

The machine is provided with a central knob 31 which can be placed in one of three positions I, II, or III. The purpose and function of these positions will hereinafter be described. When the release knob 31 is rotated counterclockwise of position III, it will rotate its associated lever 36 in the same direction.

Engagement of lever 37 by lever 36 will revolve the clamp element 18 clockwise about shaft 19 against the bias of spring 20. The leading edge 21 of the clamp element 18 will thus engage the retaining bar 38 and force it clockwise around its fixed pivot 39. This operation removes the support 38, for the leading edge of the additional original sheet T' and thereby enables a copy to slide into the leading edge 21 of the element 18.

If an original copy is already located on the cylinder C prior to the preceding operation, the operator can remove it from the machine when the clamping element 18 is rocked clockwise.

3. The driving means

As may best be seen in Figure 3, the source of power for the machine is derived from the motor M, which has a pulley 104 integrally attached to its rotating shaft. Pivotally mounted to the sides of the machine are pulleys 107 and speed drive mechanism 93.

The aforementioned three units are interlinked by means of belts 105 and 106. Speed drive mechanism 93 has a pulley 110 rigidly attached thereto which is the driving element by means of belt 109 for the main sprocket 29.

As may best be seen in Figures 4 and 5, the main sprocket 29 is rigidly mounted on a shaft 28 which, in turn, is rotatably mounted on the side plate 12a.

Rigidly mounted to cylinder C is an exterior tooth gear 22 which is an integral part but in spaced relation with the cylinder C by means of bushings and fastening elements 210. The gear provides a driving means for the cylinder C in a manner now to be described.

A spur gear 25 is pivotally mounted at 33 to member 27 and is in mesh with a companion gear 26. This companion gear 26 is mounted in driving relation with the sprocket 29.

A lever 30 and its associated knob 31 is attached to the extension member 27. This lever is biased by a spring 32 which tends to withdraw the spur gear 25 from engagement with the main gear 22.

The pivotal mounting 33 of the spur gear 25 is pro-

vided with an extension roller 34. This extension roller 34 cooperates with a hold down ring 35 to thereby urge the spur gear 25 and the main gear 22 into driving relation for a complete revolution of the cylinder C. The hold down ring 35 is rigidly attached to one end of the cylinder C and has a split section located therein, which is sufficiently large to permit extension roller 34 of spur gear 25 to pass therethrough. When the cylinder C is in the position noted in Figure 4, the split section will be located opposite the spur gear 25. Thus, if no force were applied to handle 31 to hold it in position I, then the biasing spring 32 would rotate extension member 27 and thereby urge extension roller 34 of its associated spur gear 25 through the split in hold down ring 35. This movement will move handle 31 to position II and disengage spur gear 25 from the cylinder gear 22.

The cam extension 36 is integral part of the member 27 and cooperates with the lever 37 as was heretofore noted. However, when the handle 31 is moved to position II, either by hand or due to the action of spring 32 moving extension roller 34 through the split section in hold down ring 35, the cam extension 36 is not rotated sufficiently to engage lever 37. Thus, with the handle in position II, the clamping means 18—21 will continue to grasp the original copy. However, when the handle is further rotated from position II to position III, the cam extension 36 is rotated to a position where it engages extension lever 37 and thus rotates clamping means 18—21 to release the hold on the copy T. As may be seen in Figure 5, the lever 37 is mounted externally on a shaft 19 and is so mounted to disengage the clamping element 18 when knob 31 is rotated counterclockwise to its extreme position III shown by the dotted line of Figure 4.

Thus, position III of the handle permits the operator to easily withdraw the original T from the clamping element 18 and also serves to depress the retaining bar 38 to allow another original copy T' to fall into place, as heretofore noted.

It will be noted (Figure 3) that the motor M serves both as a driving means for the cylinder C and the pump 80. Although this construction has been found desirable, separate motor means may be provided for the driving means and pump.

The machine is also adapted for variable speed adjustment, which will now be explained.

The speed drive mechanism 93 is a conventional split pulley that is biased closed. Hence, when the tension of the belt 106 increases, it will force the pulley apart and drive on a smaller diameter of the pulley.

As seen in Figure 3, the pulley 107 is carried by the yoke mechanism 108. Adjustment of the hand wheel 94 will cause the yoke 108 to move back and forth on the screw 97. This will vary the tension of belt 106 and cause it to vary the diameter of the effective circumference of split pulley 93. Thus, when the effective circumference of the pulley 93 is reduced, the speed of pulleys 93 and 110 will be increased to thereby step up the R. P. M.'s of the copy cylinder C. Hence, with this means available to regulate the speed of the cylinder C, exposure is adjusted to compensate for variations in the opacity of the originals.

The apparatus is also provided with an exposure meter 96 which is positioned and provided to read the relative light transmission through the translucent original while in place on the printing cylinder C. Thus, the above mentioned speed adjustments are made in accordance with the degree of translucency.

The hand wheel 94 may be provided with calibrations similar to the calibrations on the exposure meter 96. Thus, when the appropriate calibration is read on the meter 96, the operator need only set a speed control to a value corresponding to the meter reading.

4. The automatic feed device

As may best be seen in Figures 1, 4 and 5, a connecting manifold 54 is placed in a transverse position on the machine. At the extremity of this manifold, rollers 55 are rotatably attached. Connected to the side plates 12a and 12b are guide support frames 97a and 97b. As may best be seen in Figures 1 and 4, the guide support frames 97 have a slot 56 disposed therein. The rollers 55, rotatably mounted at the extreme ends of the connecting manifold 54 are housed and guided in the slot 56 of the guide member 97. Hence, the entire unit is free to oscillate in the slot 56 under the control of link mechanism 57 as will be hereinafter more fully described.

A plurality of spaced vacuum nozzles 53 are attached to the connecting manifold 54. The suction ends of the nozzles 53 are disposed above the upper sheet of the stack of sensitized material S. The purpose and function of the nozzle 53 is to grasp the sensitized material S and move it forward into the V-shaped mouth formed by belt B and cylinder C.

The vacuum for the nozzle 53 is supplied through the connecting manifold 54, the flexible lead 83, pipe 103, valve 82, pipe 81, vacuum tank V and pipe 79. As may best be seen in Figure 3, this entire piping mechanism stems from the pump 80. It will be apparent that the pump 80 draws air through pipe 79 and 81 to thereby create a vacuum in tank V and at nozzles 53.

Both the operation and the movement of the nozzles 53 are co-ordinated and synchronized with the positional rotation of the main cylinder C. That is, at a predetermined position of cylinder C, the nozzles 53 will be instrumental in bringing forward the sensitized material S.

At a second predetermined position of the cylinder C, the vacuum of the nozzle 53 will be cut off by valve 82, thereby releasing the paper and allowing other means to bring the sensitized material forward to the cylinder.

The oscillatory motion of the nozzles 53 is controlled by means of the link mechanisms 57, 58 and 59. As may best be seen in Figure 4, link 57 is pivotally mounted at pivot 100. The pivot member 57 pivots about the point 100 and is controlled by the cam following surface 201 on link 59.

The main cylinder C is provided with a cam 61 which is integrally connected with the main cylinder C and rotates therewith. The relationship of cam 61 with the cylinder C may best be seen in Figure 5.

It is noted in Figure 4 that the cam 61 is provided with a raised portion 60. Hence, when the main cylinder C reaches a predetermined rotational position, shown in Figure 4, the cam following surface 201 will be depressed and thereby rotate the link mechanism 57 clockwise, bringing the nozzles 53 forward.

Continued rotation of the main cylinder C will permit the cam following portion 201 of lever 59 to engage the non-raised portion of the cam 61 and thereby rotate the link 57 clockwise and thus move the nozzles 53 to the right, guided by slot 56.

It will be noted that during the major operation of the portion of the main cylinder C, the cam follower portion 201 of lever 59 will ride on the non-raised portion of the cam 61. During this major operation of the portion of the main cylinder C, the nozzles 53 will be in their extreme right position.

It is only when the cylinder C is rotated toward a position so that its raised portion 60 depresses the cam following portion 201 of the lever 59 that the nozzles 53 are moved forward, as above noted, for the first portion of their oscillatory motion.

There is also a control of the vacuum supply of the nozzles 53. The main cylinder C is provided with a cam portion 74 located on the peripheral surface thereof. It is prepositioned to engage the micro-switch 73. At a predetermined rotational position of the cylinder C,

the microswitch 73 acts as an electrical on-off switch for the main solenoid 69. When the cam 74 is rotated into engagement with the contact lever of the micro-switch 73, the energizing circuit for the solenoid 69 is completed. It is thus apparent that the contact of the automatic feed receives an electrical signal directly from the rotational position of the cylinder C without the necessity of lever bias means to transmit the information to the feed means.

The solenoid 69 serves a dual function. The solenoid is provided with an armature 105 which has an extension 104, rigidly attached thereto. When the solenoid 69 is energized due to the closing of the micro-switch 73, the extension 104 rotates to the position shown by the dotted line of Figures 1 and 4. In this position of the extension 104, the valve 82 will be closed to thereby remove the vacuum from the nozzles 53. Hence, the sensitized material S which has been brought forward by these nozzles 53, will be free from the control of the nozzles and will be further moved forward by means now to be described.

Connected to the side plates 12a and 12b, as seen in Figure 5, are pivot pins 108a and 108b. Extensions 71 are pivotally mounted thereon and the end thereof supports the transverse shaft 107. A series of spaced drive rollers 70 are mounted on this shaft 107.

One end of the connecting rod 68 is secured to this extension 71 and the other end of the rod is connected to the armature extension 104. Hence, energization of the solenoid 69 will attract its armature 105, which will rotate the extension 104 to the dotted position and thereby through the connecting rod 68, rotate to drive roller 70 and arm 71 counterclockwise about the pivot 108.

As will hereinafter be more fully explained, a belt control roller 62 is so positioned that when the drive roller 70 is rotated counterclockwise, it will cooperate therewith. As may best be seen in Figure 4, when the rollers 62 and 70 cooperate, they will be instrumental in feeding the sensitized material S forward into the machine.

It will be noted that a stop member 66 is provided to prevent the sensitized material S from being moved into the machine. However, the movement of the stop means 66 is coordinated and synchronized with the movement of drive roller 70 so that when the drive roller 70 is brought into engagement with the roller 62, the stop 66 is removed from the forward movement path of the sensitized material S.

A U-shaped member 67, which has a stop means 66 rigidly attached thereto, is pivotally mounted at 108 and is biased in a counterclockwise direction by a spring (not shown). Any suitable means may be provided to limit the clockwise rotation of U-shaped member 67 to the position shown in Figure 4.

The biasing spring of the U-shaped yoke 67 is not as strong as the biasing spring 72 which connects the yoke 67 to the link 71. Hence, in a position shown in Figure 4, the spring 72 will hold the yoke 67 in a position shown and thereby render the element 66 effective as a stop means for the sensitized material S.

However, when the solenoid 69 is energized, thereby pulling the link mechanism 71 downward, the spring 72 will be relaxed and the biasing means of the U-shaped yoke 67 will rotate it counterclockwise and thereby remove the stop 66 from the path of the material S.

Accordingly, it will be noted that the three operations occur simultaneously and in synchronism with positional rotation of the cylinder C, that is,

1. The vacuum to nozzles 53 is cut off, thereby relieving this unit of the control of the sensitized material.
2. The stop 66 is removed from the path of the sensitized material, and
3. The feed roller 70 is brought into engagement with the belt roller 62, thereby enabling them to move the material S forward to the cylinder C.

Thus, in summary, the pair of spaced vacuum nozzles 53 and the connecting manifold 54 are provided to move the top sheet of the sensitized material S forward. Manifold 54 carries, at its outer extremities, a pair of guide rollers 55 which engage the guide slots 56 and stop plates 97a and 97b. This combination will then be instrumental in guiding the lateral motion of the nozzles. The feed nozzles 53 and manifold 54 are urged back and forth by pivoted lever 57, links 58 and the bell crank 59.

The stop plate 66 of the U-shaped yoke 67 provides a position stop for the sensitized material S. The yoke 67 is connected through a link 68 to the armature 105 of the solenoid 69.

A drive roller 70, supported by link 71, is urged by a spring 72 into contact with a printing belt B, driving the sensitized material into printing relation with the cylinder C at synchronized intervals.

However, immediately prior to this movement, the micro-switch 73 is actuated by the adjustable cam 74. This energizes the solenoid 69 to close the valve 82 and thus cut off the vacuum to feed nozzles 53.

As seen in Figures 4 and 5, rollers 62 are pivotally mounted between the end plates 12a and 12b. Rollers 63, 64 and 65 are pivotally mounted between the auxiliary end plates 106a and 106b and act as a guide for the series of belts B. These belts serve to maintain the sensitized material S, the translucent original T and the transparent closure portion of cylinder in contact while this combination is passing the light source 43.

5. The revolving exposure cylinder containing an appropriate light source

Three main shafts 11 are pivotally mounted between end plates 12a and 12b. Each shaft contains two guide rollers 10. As clearly illustrated in Figure 4, the rollers 10 act as a positional guide for the cylinder C and limits its lateral movements. These rollers act merely as a support for the cylinder C and do not drive the unit.

The printing cylinder C comprises a main body portion 13, and a rectangular opening 14 and supporting lugs 15 and 16. A transparent closure 17 is fitted within the rectangular opening 14 and is supported by these lugs 15 and 16. The closure forms the exposure surface of the cylinder C.

Located within the main cylinder C is a shaft 19 which carries a series of clamping elements 18 biased by springs 20 about shaft 19 in counterclockwise direction. These units are provided to grip the leading edge of the translucent original T by means of leading edge 21. Thus, the translucent original T is held in engagement with the transparent portion 17 of the cylinder C and remains there until an exposure cycle is completed.

An appropriate highly actinic light source 43 and its associated reflector 44 are mounted on said plates 12a and 12b, positioned within the printing cylinder C, and are controlled by the ballast transformer 45, seen in Figure 3. Thus, the light source is stationary and does not move with the cylinder. Accordingly, exposure of the sensitized material S is effected when the transparent portion 17 of the cylinder C and the original T, attached thereto, pass the light source 43.

6. The print separator means

The apparatus is provided with a vacuum tank V which is perforated at 75 to form the print separator means.

The vacuum in tank V is created through a flexible tube 79 by means of the rotary pump mechanism 80. As seen in Figure 3, vacuum is maintained at all times in the vacuum tank V due to the operation of the pump mechanism 80. When the printing cylinder C is rotated to a position so that the sensitized material S is opposite the perforated section at 75, the vacuum from the tank V will draw the exposed sensitized material S

from the translucent original T and guides it into the developing apparatus D. It will be noted that the translucent original T is firmly gripped to the cylinder C by means of the holding mechanism 13 and its lip 21 and thus, will not be removed from the cylinder by the vacuum existing at the perforations 75.

An auxiliary set of rollers 76 and 77 are mounted between the auxiliary end plates 106a and 106b. These rollers guide and control the auxiliary belt 78 which, as best seen in Figures 1 and 4, cooperates with the printer belt B. Hence, when the print separator 75 removes the exposed sensitized material S from the cylinder C, the material S will be guided into the V-shape formed by the belts 78 and B. Cooperation of these belts will properly guide the exposed print into the developing apparatus.

7. The developing means

The developing means of my apparatus is seen generally in the upper left hand corner of Figures 1 and 4.

The developing apparatus comprises the tank 84, pick up roller 85, distributing roller 86, application roller 87 and supporting discs 88. The tank 84 is provided to hold a supply of developing agent.

As will be apparent from the foregoing discussion, the rotation of the printing cylinder C will cause the belts B to rotate. This will result in the rotation of rollers 64 and 65 which are mounted by means of appropriate gear mechanism to the pick up roller 85.

The bath 84 contains a liquid developing agent which is applied to the exposed sensitized material by rollers 85, 86 and 87 as the material emerges from the printing belt B and the belts 78. Hence, at this point, a print is created from the exposed sensitized material S.

8. The receiving tray for the prints

A receiving tray 89 is provided to receive the finished prints as they emerge from the developing apparatus and has a series of holders 101 to keep the prints flat and in position.

A duct 90 forms communication between the pressure side of pump mechanism 80 and the interior of cylinder C to circulate air and cool lamp 43 and cylinder C.

This heated air is exhausted from the cylinder C by means of a duct 91 and through nozzle 92 directs a continuous blast of warm air upon the damp surface of the print as they automatically stack in the receiving tray 89.

Summary

The device consists of a revolving cylinder, transparent in part, upon which is fastened a translucent original of which facsimile reproductions are required.

The cylinder contains a high actinic light source. A sheet of sensitized material is fed to a cylinder in contact with the translucent original fastened thereto. Exposure is made by virtue of light passing from the above mentioned source from the transparent cylinder through a translucent original to a sheet of sensitized material. An exposure thus made produces a latent image which is then developed to a permanent visible image and the resulting point is then delivered to an appropriate receiving tray.

Each revolution of the cylinder produces one facsimile copy. The entire operation is automatic when the handle is held in position I and once the original has been fed into the machine, as many duplicates can be produced as desired without the necessity of removing and reinserting the original copy. It is only after a required quantity of reproductions are made that the original is removed by moving the handle to position III. It may be replaced with another original and the entire automatic operation is then repeated.

If the handle is not held in position I, then the machine will produce one print and stop. Hence, the de-

vice can be used as an automatic or semi-automatic device.

In the foregoing, I have described my invention only in connection with preferred specific embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appending claims.

I claim:

1. In an automatic duplicating machine for making prints from translucent originals, comprising an automatic feed mechanism, a revolving cylinder, manual control means and a driving mechanism; said cylinder having a transparent closure in the peripheral surface thereof; clamping means pivotally mounted on the peripheral surface of said cylinder and positioned adjacent the leading edge of said transparent closure, said clamping means having extending fingers to receive and grip the leading edge of said translucent original; said manual control means being operatively and selectively connectible to said cylinder, said driving mechanism and said clamping means; said manual control means having a first, second and third position, said manual control means manually moved to said first position to connect said driving mechanism to said revolving cylinder, said manual control means disconnecting said driving mechanism from said revolving cylinder when said manual control means is moved to said third and said second position; means operatively connected to said control means to move said manual control means to said second position following a complete revolution of said revolving cylinder, said manual control means operatively connected to said clamping means only when said control means is in said third position to thereby render said clamping means ineffective to grip the leading edge of said translucent original; said machine having automatic duplicating operation from a single translucent original when said manual operating means is maintained in said first position; speed adjusting means operatively connected to said driving means to regulate the speed of said driving means and thereby permit continuous rotation of said cylinder through a complete cycle and from cycle to cycle.

2. In an automatic duplicating machine for making prints from a translucent original comprising an automatic feed mechanism for said prints, a revolving cylinder, a driving mechanism and manual control means; said cylinder having a rectangular opening in the peripheral surface thereof with a transparent closure received by said rectangular opening; clamping means pivotally mounted on the peripheral surface of said cylinder in a line parallel to the axis of said cylinder and positioned adjacent the leading edge of said transparent closure, said clamping means having extending fingers to receive the leading edge of said translucent original; biasing means for said clamping means to render said extending fingers effective to grip the leading edge of said translucent original; said manual control means being operatively connected to said clamping means to defeat the operation of said biasing means only when said manual control means is moved to a third position, said manual control means operatively and selectively connectible to said driving mechanism and said cylinder and effective to connect said driving mechanism to said rotating cylinder when said manual control means is moved to a first position; means operatively connected to said control means to move said manual control means to a second position following a complete rotation of said rotating cylinder; said manual control means effective to disconnect said driving mechanism from said rotating cylinder when said manually operable means is in said second and said third position, said manual control means operatively connected to permit automatic duplicating operation of said machine from said translucent original when said man-

ually operable means is manually maintained in said first position during the operation of said machine; speed adjusting means operatively connected to said driving means to regulate the speed of said driving means and thereby permit continuous rotation of said cylinder through a complete cycle and from cycle to cycle.

3. In an automatic copying machine, for making prints from translucent originals, a delivery tray, a delivery chute, an automatic feed mechanism, a revolving cylinder, driving means, a developing means and a receiving tray; said cylinder having a rectangular opening in the peripheral surface thereof with a transparent closure fitted in said rectangular opening; clamping means pivotally mounted on the peripheral surface of said cylinder on a line parallel to the axis of said cylinder and located adjacent the leading edge of said transparent closure, said clamping means having extending fingers to receive and grip the leading edge of said translucent original; a manual control means with a first, second and third position and being operatively and selectively connectible to said cylinder, said driving means and said clamping means; said manual control means operatively positioned to permit said clamping means to grip the leading edge of said translucent original when said control means is in said first or second position; said manual control means when in said third position operatively connected to said clamping means and being effective through said clamping means to automatically deliver a translucent original from said delivery chute to said extending fingers; said manual control means operatively connected to engage said revolving cylinder and said driving means when said manual control means is moved to said first position and operatively connected to disengage said driving means from said revolving cylinder when said manual control means is in said second and third position; said manual control means operatively connected to effect automatic operation of said copying machine when said control means is manually maintained in said first position; means to bias said manual con-

trol means to said second position, said biasing means operatively connected to said manual control means to move said control means to said second position following a single rotation of said revolving cylinder when external manual force is removed from said control lever to thereby effect non-automatic operation of said copying machine, with manual control means capable of being maintained in said first position when an external force is applied thereto to thereby defeat the operation of said biasing means to thereby effect automatic operation of said copying machine, said manual control means operatively connected to said clamping means to defeat the operation thereof only when said manual control means is moved to said third position; said automatic feed mechanism being effective at predetermined rotational positions of said cylinder to move a sensitized sheet from said delivery tray to said revolving cylinder to thereby place said sensitized sheet in register with said transparent copy; print separator means to remove said sensitized sheet from said original copy at another predetermined position of rotation of said cylinder; developing means to develop a latent image on said sensitized sheet after it has been removed from said translucent copy, said receiving tray adapted to receive said developed sensitized material.

References Cited in the file of this patent

UNITED STATES PATENTS

30	1,676,495	Hammond	July 10, 1928
	1,709,320	Powers	Apr. 16, 1929
	1,958,727	Sullivan	May 15, 1934
	2,220,526	Kluitmann	Nov. 5, 1940
	2,371,925	Schade	Mar. 20, 1945
35	2,373,040	McDonald	Apr. 3, 1945
	2,574,215	Kunstadter	Nov. 6, 1951
25	2,600,469	Breuers	June 17, 1952

FOREIGN PATENTS

40	643,566	Great Britain	Sept. 20, 1950
----	---------	---------------	----------------