

Nov. 10, 1942.

J. P. ARNDT

2,301,239

PHOTO-REPRODUCING MACHINE

Filed April 5, 1940

3 Sheets-Sheet 1

Fig. 1.

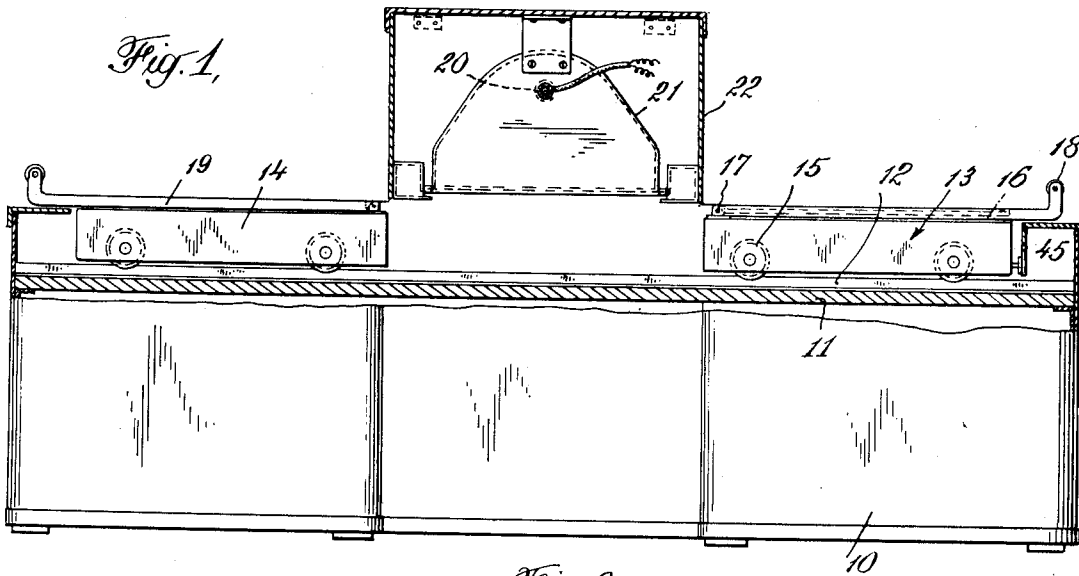


Fig. 2.

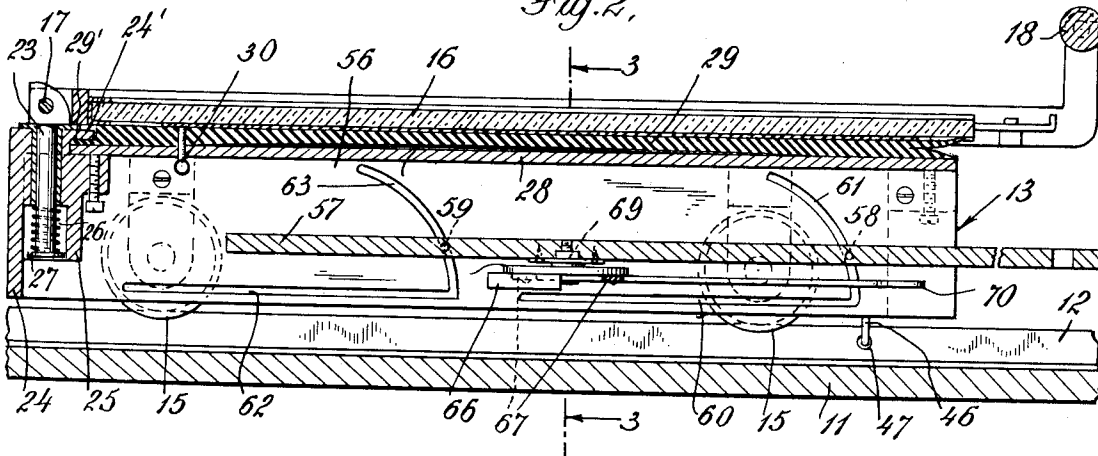
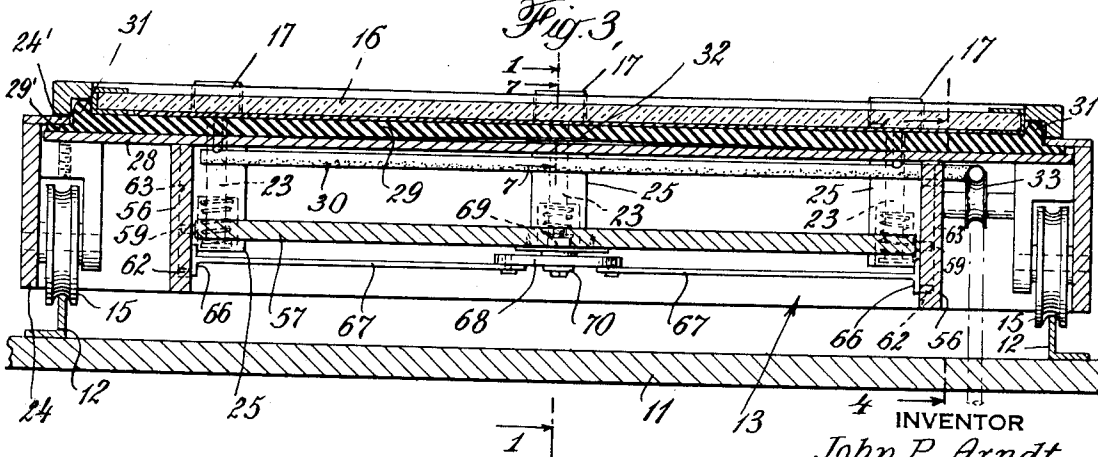


Fig. 3.



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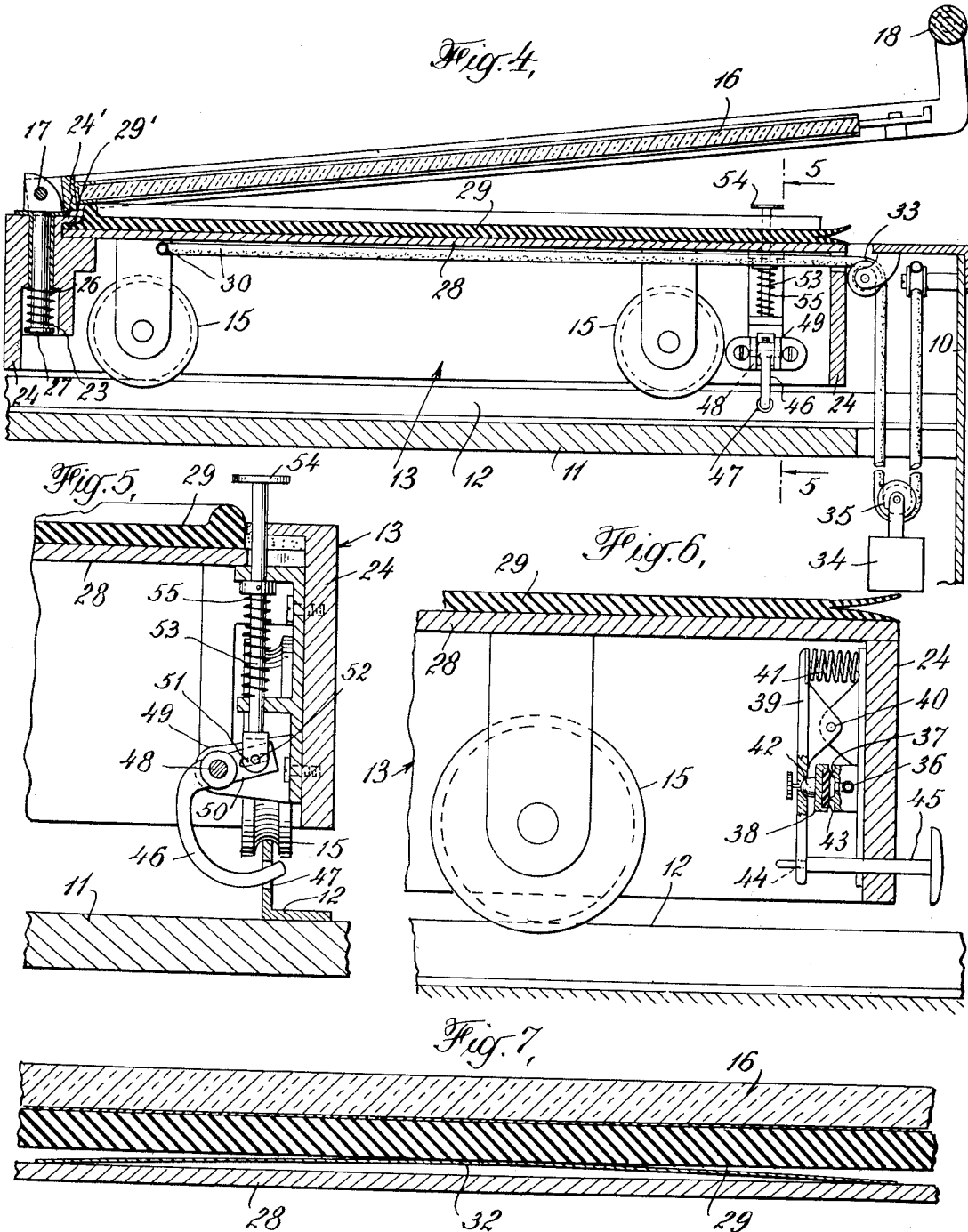
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3 Sheets-Sheet 2



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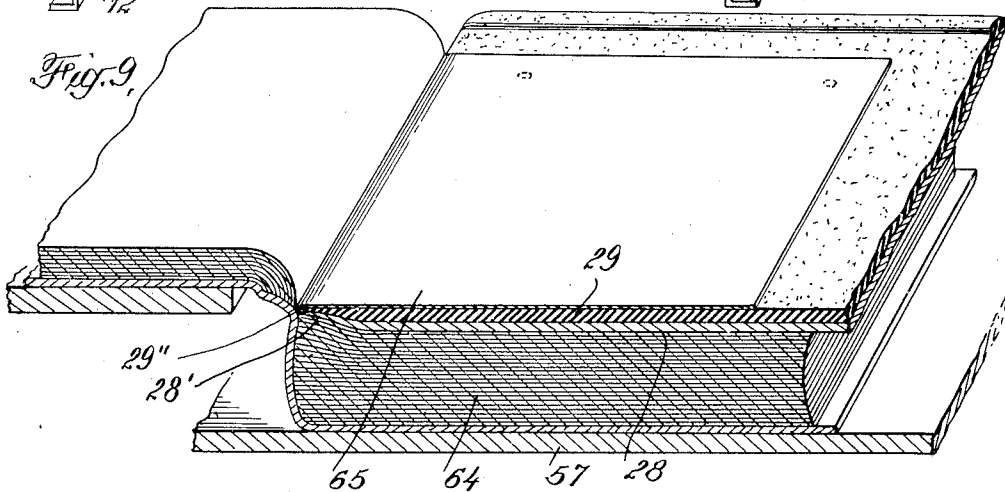
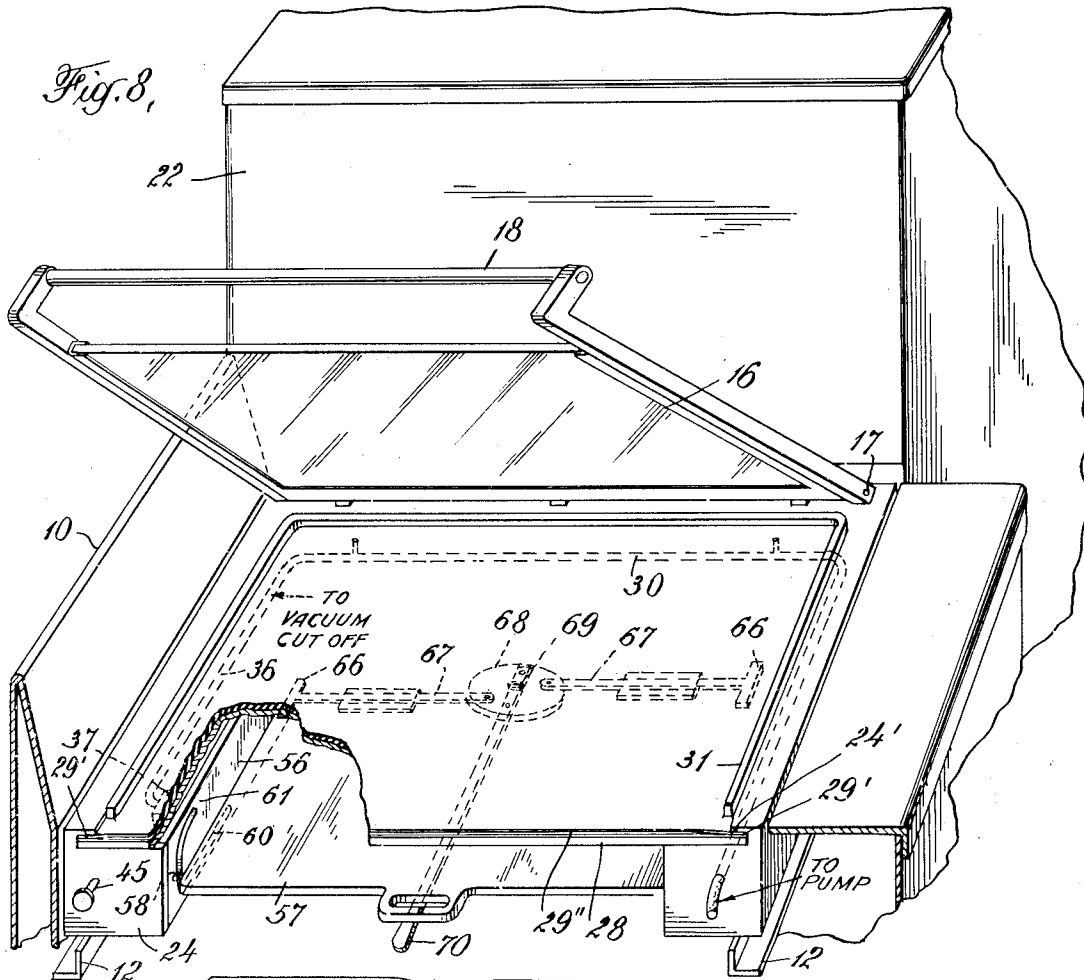
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PHOTO-REPRODUCING MACHINE

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3 Sheets-Sheet 3



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PHOTO-REPRODUCING MACHINE

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21 Claims. (Cl. 95—73)

The present invention relates to machines for copying by the reflex method and embodies, more specifically, a machine by means of which reflex copying may be accomplished in a more effective fashion.

Reflex copying has long been known and attempts have been made to utilize the method in a commercial way. Due to the many operations required, and the exacting nature of many of such operations, these attempts have not met with success.

An object of the present invention is to provide a machine by means of which copying by the reflex method is facilitated.

A further object of the invention is to provide a machine of the above character wherein means is provided to carry out the several operations necessary to accomplish the copying in an effective manner.

Another object of the invention is to provide a machine of the above character wherein a screen is provided by means of which documents of varying thickness may be copied with equal efficiency.

A further object of the invention is to provide a machine of the above character wherein the positioning of the paper during the copying operation is accomplished by a vacuum mechanisms of improved form.

A further object of the invention is to provide a machine of the above character wherein means is provided for supporting books and the like when portions thereof are to be copied.

Yet another object of the invention is to provide a machine of the above character wherein interlock mechanism is provided for preventing improper operation of the parts thereof to cause damage.

Further objects of the invention will be apparent as it is described in connection with the accompanying drawings, wherein:

Fig. 1 is a view in front elevation, partly broken away and in section, showing a machine constructed in accordance with the present invention.

Fig. 2 is an enlarged view in section showing one of the carriages of Fig. 1 in greater detail.

Fig. 3 is a view in section, taken on line 3—3 of Fig. 2 and looking in the direction of the arrows.

Fig. 4 is a view in section, taken on the line 4—4 of Fig. 3 and looking in the direction of the arrows.

Fig. 5 is an enlarged detail view in section taken on the line 5—5 of Fig. 4 and showing an

improved locking mechanism constructed in accordance with the present invention.

Fig. 6 is an enlarged detail view in section showing the vacuum release mechanisms constructed in accordance with the present invention.

Fig. 7 is a partial view in section taken on line 7—7 of Fig. 3 and looking in the direction of the arrows.

Fig. 8 is a perspective view, partly broken away and in section, showing the printing carriage illustrated in Figs. 2 and 3.

Fig. 9 is a perspective view in section showing the manner in which a page of a book is copied by means of the machine constructed in accordance with the present invention.

With reference to the above drawings, the copying machine is shown at 10 and is provided with a table 11 upon which tracks 12 are mounted. These tracks extend from end to end of the machine and support carriages 13 and 14 by means of rollers 15 carried thereby.

One of the carriages, for example, carriage 13, is provided with a screen 16 that is hinged at 17 and has a handle 18 to facilitate movement of the screen about the pivot. The handle is preferably offset upwardly so that the operator's hand will not interfere with the adjacent portion of the cabinet. The other carriage 14 is similarly provided with a hinged glass plate carrying member 19 to support the paper to complete the printing after the first exposure under the screen 16.

The exposure of the paper carried by the carriages is effected by means of a lamp 20 mounted in a reflector 21 that is received within a hood 22 carried by the cabinet 10. Each carriage is adapted to be rolled into a position beneath the lamp so that the desired printing operation may be carried out and in order that the improved features provided by the present invention may be more readily understood the details of the carriage mechanism and cooperating parts will now be described.

The hinge 17 is carried by pins 23 that are received in the carriage frame 24 of the carriages. In order that the screen or glass may be maintained parallel to the supporting surface of the carriage for varying thicknesses of the paper to be copied, the pins 17 are slidably received in bosses 25 and are urged into the position shown by means of springs 26 that seat against plates 27 removably secured to the ends of the pins.

The carriages are formed with a supporting table 28 upon which a rubber blanket 29 is re-

ceived to support the paper to be copied. The blanket is formed with a peripheral flange 29' that underlies a flange 24' carried by the frame. To insure intimate and uniform contact of the paper with the screen 16, the space between the blanket and screen is evacuated by means of a suction line 30. The blanket is formed with a bead 31 to provide a seal and, in order that the pressure on the paper against the screen may progress from the center outwardly, a light spring 32 is provided to insure initial central contact. At the forward end the bead 31 is omitted and the edge slotted as at 29'' to reduce the thickness of the blanket at this point. The upper lip of the slot 29'' is normally urged upwardly to give the yielding effect desired.

The suction line is mounted over a pulley 33 mounted on a fixed axis and supports a light weight 34 through pulley 35 in order that the suction line may be maintained taut in all positions of the carriage.

To prevent moving the screen upwardly except when the carriage is in the outer or end position illustrated in Fig. 6, the suction line 30 is provided with an extension 36 terminating in a valve seat 37. This valve is closed by a valve plate 38 carried by an arm 39 of a lever pivoted at 40 upon the carriage frame and urged into a seated position by means of a spring 41.

The valve plate is accurately seated by means of a ball mounted connection 42 between the plate 38 and arm 39, an effective seal being preserved by providing a soft rubber facing 43 on the plate 38.

A second arm 44 connected to arm 39 is provided with an operating plunger 45 that is slidably supported in the carriage frame 24. As the carriage reaches the position shown in Figs. 1 and 6, the plunger engages a fixed portion of the cabinet 10 and disengages the valve from the valve seat 37, thus breaking the vacuum and permitting the screen to be swung upwardly as illustrated in Fig. 4. This prevents damage to the screen by striking it against the hood 22.

In order that the carriage may be held in the outer position while the screen is raised as in the position shown in Fig. 4, a latch 46 is provided (Fig. 5) that is adapted to engage an aperture 47 in the track 12. The latch is pivoted at 48 in a bracket 49, carried by the carriage and is formed with an arm 50 having a slot 51 receiving a pin 52 carried by a plunger 53 that extends through the carriage frame and is formed with a head 54 that is engaged by the frame of the screen 16. A spring 55 normally urges the head upwardly and the latch toward the aperture 47. When the screen is released by the breaking of the suction as the carriage reaches its outer position, the operator may lift the screen to provide access to the paper on the rubber blanket. As the screen is lifted, the carriage is locked in the outer position, thus preventing it from moving in and striking the screen against the hood 22.

The carriage 13 is provided with means to support a book from which copies are to be made and, to this end, the frame 24 is provided with walls 56 between which a book plate 57 is mounted. The plate is formed with front and rear pins 58 and 59, respectively, at either side thereof. The front pins ride in slots having horizontal portions 60 and upwardly and rearwardly extending slot portions 61, while the rear pins ride in slots having horizontal portions 62 and upwardly and rearwardly extending portions 63.

When a book is to be supported for copying, the plate 57 is pulled out as shown in Fig. 9, the book placed thereon as shown at 64, the plate 57 moved inwardly and upwardly until the book is held snugly against the underside of the table 28, the page 65 placed over the blanket 29 and the screen 16 lowered into the position shown in Fig. 2. A print is then made in a known fashion.

The plate 57 is locked in the position shown in Fig. 3 by means of friction feet 66 carried by links 67 pivoted to a plate 68. The plate 68 is pivoted at 69 to the underside of plate 57 and has secured thereto an operating handle 70. The pivot points of links 67 to the plate 68 are located so that movement of the handle 70 in one direction will force the friction feet against the walls 56 to secure the plate 57 in a desired position while movement in the opposite direction will release the feet.

To permit the page to be copied over as great an area as possible, the table 28 is formed with a thin outer edge 28' and the rubber blanket 29 is likewise thinned as at 29''. This permits these edges to be moved directly against the binding so that as much as possible of the page may be placed over the blanket.

From the foregoing, it will be seen that there has been provided a copying machine that enables photographic or other copying to be accomplished effectively and with relatively little skilled attention to the successive steps required in the process of reproduction. While the invention has been described with reference to the machine shown in the accompanying drawings, it is not to be limited save as defined in the appended claims.

I claim:

1. In a copying machine, a device for supporting a paper to be copied, a source of light adapted to be exposed to the paper, a transparent plate carrying member adapted to be held with the copying paper in a predetermined position with respect to the source of light, a flexible blanket beneath the last named member adapted to be held closely thereagainst, and resilient means on the side of the blanket opposite from the plate carrying member to urge the central portion of the flexible blanket against the member for distribution of pressure radially outwardly from the central portion thereof.

2. In a copying machine, a device for supporting a paper to be copied, a source of light adapted to be exposed to the paper, a transparent plate carrying member adapted to be held with the copying paper in a predetermined position with respect to the source of light, a flexible blanket beneath the last named member adapted to be held closely thereagainst, and an elongated upwardly bowed spring to urge the central portion of the flexible blanket against the member, whereby upon evacuating the space between the blanket and the plate the pressure of the blanket upon the paper begins at the central portion thereof and progresses outwardly.

3. In a copying machine, a device for supporting a paper to be copied, a source of light adapted to be exposed to the paper, a transparent plate carrying member adapted to be held with the copying paper in a predetermined position with respect to the source of light, and vacuum mechanism including a flexible blanket beneath the last named member adapted to be held closely thereagainst, said vacuum mechanism including a resilient member to cause the central portion of the blanket to engage the paper and transparent plate member before other portions there-

of contact the same, whereby upon evacuating the space between the blanket and the plate the pressure of the blanket upon the paper begins at the central portion thereof and progresses outwardly.

4. In a copying machine, a device for supporting a paper to be copied, a source of light, said device being movable to and from a light exposing position, a transparent plate carrying member adapted to be held with the copying paper in a predetermined position with respect to the source of light, a flexible blanket beneath the last named member adapted to be held closely thereagainst, means to evacuate the space between the plate carrying member and the blanket, and means operable to break the vacuum in the space when the paper supporting device is moved out of light exposing position.

5. In a copying machine, a table provided with a light source and a work receiving device, a transparent plate carrying member movably mounted with respect to the device, a flexible blanket beneath the last named member adapted to be held closely thereagainst, means to evacuate the space between the blanket and the plate carrying member, means to bring the light source and the work receiving device into cooperative relationship and into an inoperative position, and means operable to break the vacuum when the light source and device are brought into inoperative position.

6. In a copying machine, a table provided with a light source and a work receiving device, a transparent plate carrying member movably mounted with respect to the device, a flexible blanket beneath the last named member adapted to be held closely thereagainst, means to evacuate the space between the blanket and the plate carrying member, means to bring the light source and the work receiving device into cooperative relationship and into an inoperative position, a valve seat communicating with the evacuating means, a valve plate normally urged against the valve seat, and means actuated upon movement of said devices into inoperative position to open the valve plate.

7. In a copying machine, a table provided with a light source and a work receiving device, a transparent plate carrying member movably mounted with respect to the device, a flexible blanket beneath the last named member adapted to be held closely thereagainst, means to evacuate the space between the blanket and the plate carrying member, means to bring the light source and the work receiving device into cooperative relationship and into an inoperative position, a valve seat communicating with the evacuating means, an arm, a valve plate mounted on the arm for universal movement, means to urge the valve plate against the valve seat, and a plunger connected to the arm and actuated upon movement of said devices into inoperative position to open the valve plate.

8. In a copying machine, a device for supporting paper to be copied, a source of light adapted to be exposed to the paper, means to move the device into light exposing position, a transparent plate carrying member, means to mount the last named member movably on the device, means to lock the device against movement, and means actuated upon movement of the plate carrying member away from the device to move the lock into locking position.

9. In a copying machine, a device for supporting paper to be copied, a source of light adapted

to be exposed to the paper, means to move the device into light exposing position, a transparent plate carrying member, means to mount the last named member hingedly on the device, means to lock the device against movement, a plunger connected to the lock, a spring urging the lock into locking position, and means to mount the plunger in the path of the plate carrying member whereby the last named member will release the lock when it is moved into a position against the paper supporting device.

10. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, a supporting table fixed on the device and having an edge thereof reduced in thickness, a plate movable on the device beneath the table for supporting a book in copying position with the binding of the book closely adjacent said edge so that substantially the entire portion of any page thereof can be supported above said table, and means to adjust the position of the plate on the device.

11. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, a supporting table fixed on the device and having an edge thereof reduced in thickness, a plate movable on the device beneath the table for supporting a book in copying position adjacent said edge so that a page of the book can be disposed on the table with that part of the book to one side of said page disposed on the underside of said table, means to mount the plate slidably on the device for movement vertically toward and away from the paper supporting portion thereof, and means to secure the plate in a desired position.

12. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, said device comprising a platform and side members fixed on the device and adapted to receive thereon a page to be copied, a plate movably mounted beneath the platform and adapted to support a book in copying position with the binding of the book closely adjacent an edge of said platform so that a page thereof can be received above the platform, and means to mount the plate adjustably in the side members for vertical adjustment of said plate relative to said platform.

13. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, said device comprising a platform and side members fixed on the device and adapted to receive for support thereon a page to be copied, a plate movably mounted beneath the platform and adapted to support a book in copying position with the binding of the book closely adjacent an edge of said platform so that a page thereof can be received above the platform, and means to mount the plate slidably in the side members for vertical adjustment of said plate relative to said platform.

14. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, said device comprising a platform and side members fixed on the device and adapted to receive for support thereon a page to be copied, a plate movably mounted beneath the platform and adapted to support a book in copying position adjacent an edge of said platform with a page of the book receivable above said edge and on said platform, grooves in the side members having portions extending upwardly and pins in the plate engaging grooves

for vertical adjustment of said plate relative to said platform.

15. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, said device comprising a platform and side members fixed on the device and adapted to receive for support thereon a page to be copied, a plate movably mounted beneath the platform and adapted to support a book in copying position adjacent an edge of said platform with a page of the book receivable above said edge and on said platform, grooves in the side members having portions extending horizontally and, at their forward ends, having portions extending upwardly and rearwardly, and pins in the plate engaging the grooves for horizontal and vertical adjustment of the plate.

16. In a copying machine, a light source, a device for supporting articles to be copied by exposure to the light source, said device comprising a platform and side members fixed on the device and adapted to receive for support thereon a page to be copied, a plate movably mounted beneath the platform and adapted to support a book in copying position adjacent an edge of said platform with a page of the book receivable above said edge and on said platform, grooves in the side members having portions extending horizontally and, at their forward ends, having portions extending upwardly and rearwardly, pins in the plate engaging the grooves for horizontal and vertical adjustment of the plate, and means on the plate to secure it in an adjusted position.

17. In a copying machine, a light source, a device for supporting paper to be copied by exposure to the light source, said device comprising a platform fixed on the device and adapted to receive the page of a book, and means to support a book in a position with respect to the platform to permit a page thereof to be received on the platform, the edge of the platform adjacent the book being reduced in thickness to permit the same to be positioned closely adjacent the binding of the book.

18. In a copying machine, a light source, a device for supporting paper to be copied by exposure to the light source, said device comprising a platform adapted to receive the page of a book, a flexible blanket on the platform and means to support a book in a position with respect to the platform to permit a page thereof to be received on the platform, the edge of the platform and blanket adjacent the book being reduced in thickness to permit the same to be positioned closely adjacent the binding of the book.

19. A copying machine comprising a table, a light source including a light directing hood positioned above the table, a paper supporting device movable into copying position beneath said hood, a transparent plate carrying member movably mounted on the device and adapted to hold paper between it and the device, and pressure means to hold said member in a paper holding position against said device while said member is beneath the hood.

20. A copying machine comprising a table, a light source including a light directing hood positioned above the table, a device movable to and from a position beneath the hood, said device being provided with a flexible blanket for supporting a paper to be copied, a transparent plate carrying member hingedly mounted on the device, means to evacuate the space between the plate carrying member and the blanket, and means operable to break the vacuum in the space when the member is clear of the hood.

21. In a copying machine, a light source, a device for supporting paper to be copied by exposure to the light source, said device comprising a transparent plate, a platform including a vacuum frame beneath the plate, means to permit movement between the plate and vacuum frame to permit a page of a book to be inserted therebetween, means to apply a vacuum to the vacuum frame, and means adjacent the platform to support the balance of the book the page of which is being copied.

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