Aug. 16, 1966 H. R. BENSON 3,266,402

PHOTOGRAPHIC PRINTER

Filed May 11, 1964 2 Sheets-Sheet 1

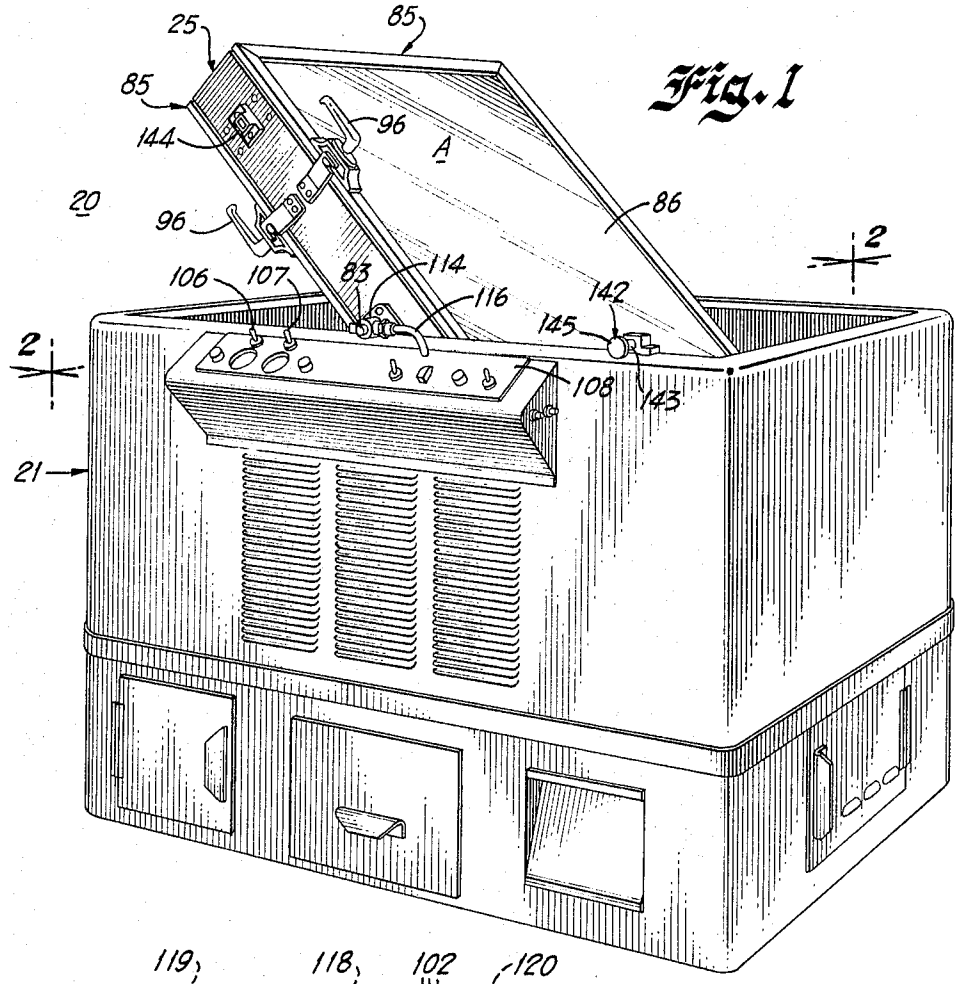


Fig. 1

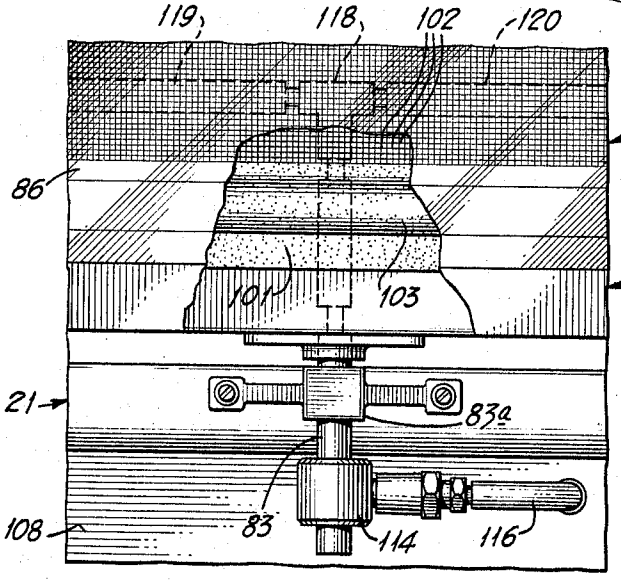


Fig. 3

INVENTOR
HAROLD R. BENSON
by
Mason, Kolehmainen, Rathbunn and Wyss
ATTORNEYS

Aug. 16, 1966 H. R. BENSON 3,266,402

PHOTOGRAPHIC PRINTER

Filed May 11, 1964 2 Sheets-Sheet 2

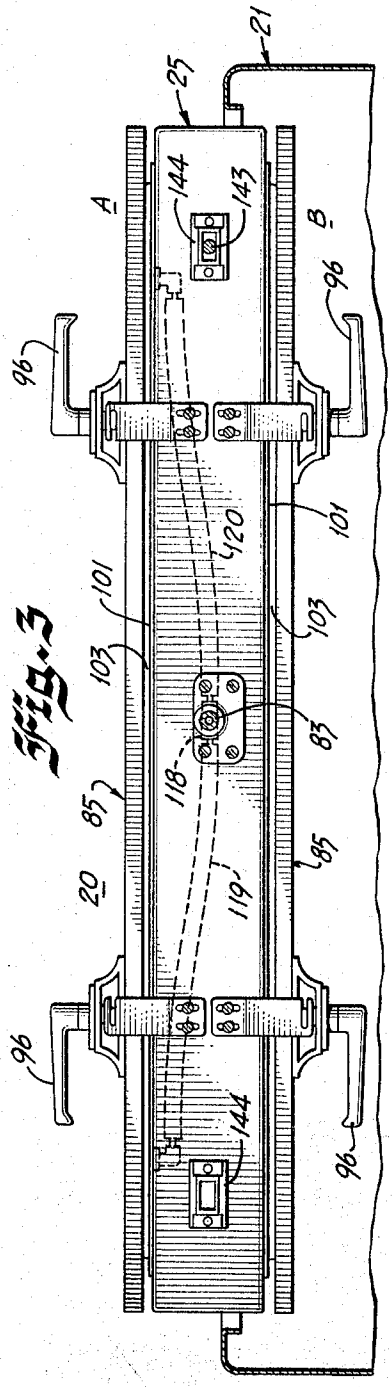


Fig. 3

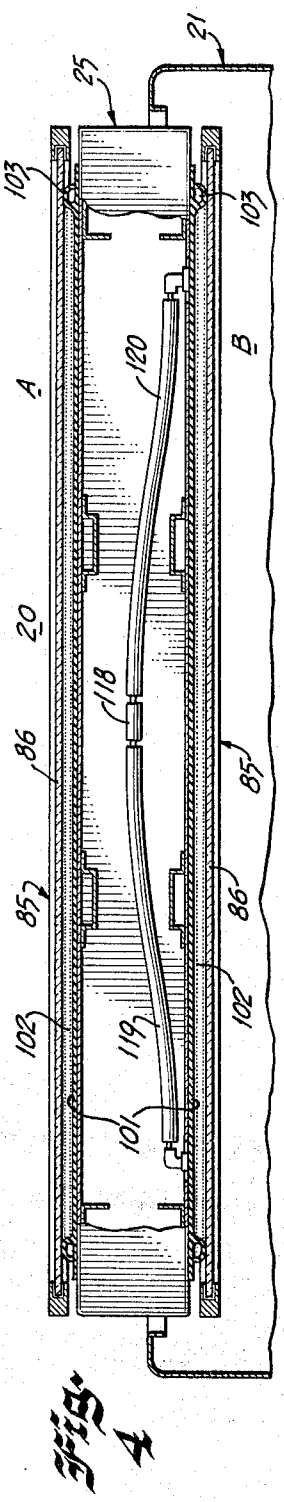


Fig. 4

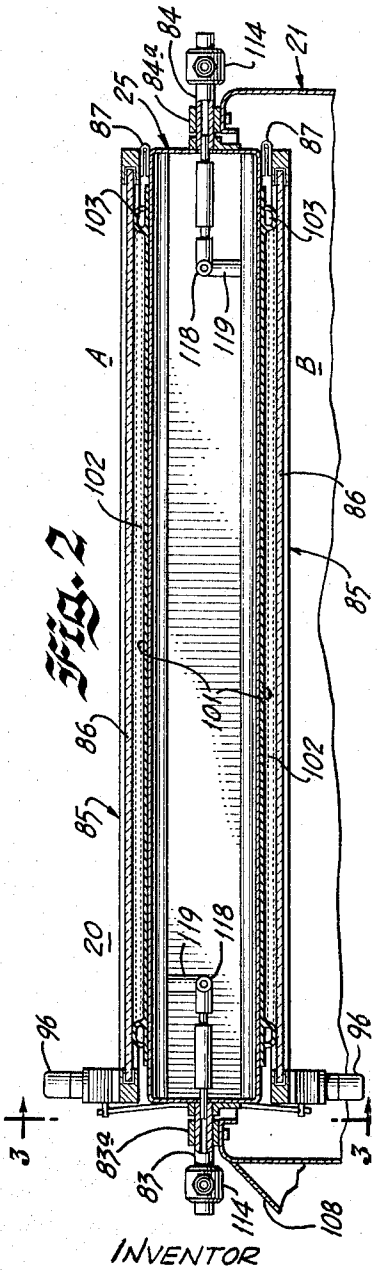


Fig. 2

INVENTOR
HAROLD R. BENSON
by
Mason, Kolehmainen, Rathburn and Wyss
ATTORNEYS.

United States Patent Office 3,266,402 Patented August 16, 1966

3,266,402

PHOTOGRAPHIC PRINTER

Harold R. Benson, Lombard, Ill., assignor to The Nuarc Company, Chicago, Ill., a corporation of Illinois

Filed May 11, 1964, Ser. No. 366,390
3 Claims. (Cl. 95—76)

The present invention relates to photographic printers and, more particularly, relates to contact printing apparatus useful in exposing sensitized metallic plates such as photoengraving offset plates.

In order to photoengrave a metallic plate so that it may be used thereafter to reproduce a work of art or the like, a photographic negative is first made of the work to be reproduced and thereafter a sensitized metal plate is selectively exposed to the pattern of light corresponding to the work of art by interposing the negative between the sensitized surface of the plate and a source of light. Following the exposure of the plate in this manner, the sensitized surface is subjected to an acid etching which selectively removes the unexposed portions of the sensitized surface, thereby to provide what is commonly referred to as an offset printing plate, the surface of the plate having hills and valleys corresponding to the work of art being copied.

One improved photographic printer is disclosed and claimed in my earlier patent, No. 3,043,204, granted July 10, 1962, and assigned to the same assignee as the present invention. As therein disclosed, there is provided a contact printer comprising a cabinet having a light source mounted in the cabinet, and a reflector fixedly mounted in the cabinet for directing a uniform beam of light toward the top of the cabinet where a printing frame is pivotally mounted about a central axis thereof. The frame can be pivoted to one position in which one side thereof is toward the light source and in a second position wherein that one side of the printing frame is toward the top of the cabinet away from the light source. Accordingly, the plate and the negative may be loaded into the frame from the top thereof and the frame may then be pivoted into the position wherein the plate is exposed to the light source. The present invention is an improvement over the photographic printer disclosed and claimed in this patent.

Because the printing frame in my earlier photographic printer provides for loading in one side only of the printing frame, the operator of the printer must first load the photographic plate and the negative into the frame, then rotate the top so that the frame is positioned with the plate exposed to the light source, and thereafter expose the plate. During the exposure of the plate, the operator of the photographic printer must wait idly for completion of the exposure. Upon completion of the exposure, the frame is flipped back with the loading side thereof upwardly so that the operator can remove the exposed plate and negative, and reload the photographic printer with the next plate and negative. It would be desirable in order to increase the production of the photographic printer to provide for exposure of one plate while a second plate is being loaded into the photographic frame.

An object of the present invention therefore is to provide a new and improved apparatus for exposing sensitized metal plates and for photoengraving thereof, and which overcomes the above-mentioned difficulty.

A further object of the present invention is the provision of a new and improved contact printer which will provide increased production without increasing the floor space required for the photographic printer.

A further object of the present invention is the provision of a new and improved photographic printer.

Briefly, the above and further objects are realized in accordance with the present invention by providing a photographic printer, including a cabinet having a source

of printing light mounted in the lower part for directing light toward the top of the cabinet, and a printing frame forming a top enclosure for the cabinet. The printing frame is mounted for pivotal movement about a central axis of the frame thereby to permit the positioning of the frame with either side thereof facing toward the light source. The frame is provided with a transparent hinged plate on each side, and back-to-back pressure responsive vacuum holding means for holding a light sensitive photographic sheet or plate adjacent to the transparent plate are associated with each of the transparent plates. Advantageously the printer, according to the present invention, provides for exposure of one of the vacuum frames, while the other vacuum frame is accessible at the top of the printer for loading the next photographic plate. The present photographic printer converts the normally idle time of the operator during plate exposure into productive working time. It has been found that the output of the photographic printer may be increased over 50% without increasing the floor space of the photographic printer.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

FIGURE 1 is an isometric view of a photographic printer according to the present invention;

FIGURE 2 is a fragmentary cross-sectional elevational view of the photographic printer of FIGURE 1 taken along line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary cross-sectional elevational view of the photographic printer of FIGURE 1 illustrating a printer frame taken along the transverse axis of FIGURE 1;

FIGURE 4 is a fragmentary cross-sectional elevational view of the photographic printer of FIGURE 1 also taken along the transverse axis of FIGURE 1.

FIGURE 5 is a fragmentary plan view of the photographic printer of FIGURE 1 illustrating an apertured pintle connection of the printing frame to the photographic printer cabinet.

Referring now to the drawings, there is provided in accordance with the present invention a photographic printer **20** comprising a generally rectangular cabinet **21** having an automatically operated light source such as a carbon arc light mounted in the bottom of the cabinet. The light source may preferably be a xenon lamp as shown in copending Scheppe application Serial No. 340,762 filed January 28, 1964, and assigned to the same assignee as the present invention. The cabinet and light source construction may be similar to that described and claimed in my above-mentioned Patent No. 3,043,204 and accordingly is not herein described in detail. However, briefly, the light source directs an upward light beam of uniform intensity throughout a predetermined area containing a printing frame **25** pivotally mounted about a central axis thereof to the top of the cabinet **21**. As best illustrated in FIGURE 3, the frame **25** comprises a pair of opposed loading stations A and B. In order to place a sensitized plate and negative in the frame for exposure by the light from the light source within the cabinet **21**, one station, for example station A, of the frame **25** is first loaded, and then pivoted through 180° so that the loading station A is at the bottom. The loading station A may then be exposed while the other station B may be loaded from the top during the exposure of loading station A. After the station A has been exposed, the frame **25** may again be rotated so that the unexposed station B faces toward the light source, while the exposed station A is at the top of the photographic printer **20** to permit removal thereof of the exposed photographic plate and negative and reloading thereof.

For providing pivotal rotation of the frame **25**, the frame **25** is pivotally mounted by means of a pair of pintles **83** and **84**, FIGURE 2, journaled in a pair of bearings **83***a*, **84***a*. The pintles **83** and **84** are coaxially mounted along a central axis of the frame **25** so that the opening in the top of the cabinet **21** is completely covered by the frame **25** in either of its two positions; that is, with either loading station A or B turned downwardly toward the light source.

To provide for loading the stations A and B, each of the stations A and B is provided with a glass frame assembly **85**, which includes a plate glass pane **86**, and which in the illustrated embodiment of the invention is pivotally attached to the rear side of the frame **25** by suitable hinges **87**, FIGURE 2. As hereinbefore indicated, during the loading and exposing operation, the frame **25** is turned to a position with one of the loading stations A or B positioned upwardly at the top of the photographic printer **20** in order that the negative and sensitized photographic plate may be placed within the frame. The glass frame assembly **85** is pivoted upwardly about the hinge **87**. It is understood that in other embodiments of the present invention where a very large printing frame is employed, the glass frame **85**, instead of being pivotally supported, may bodily be raised and lowered while disposed in a horizontal plane. Suitable latch and handle means **96** are provided on each of the glass frame assemblies **85** to provide for latching and unlatching of the glass frame assembly **85** from the frame **25**. To load the frame **25**, the glass frame assembly **85** at one of the loading stations, for example loading station A as indicated in FIGURES 2, 3, and 4, is raised to its elevated position and the glass plate engaging surface of a resilient vacuum blanket **101** of the respective loading station is exposed, and a sensitized photographic plate may be placed therein. The blanket **101** is preferably a one-piece molding of rubber and, as more fully illustrated and described in my above-mentioned earlier patent, may be provided with a plate engaging face which comprises a plurality of square, truncated pyramids or protuberances **102**. The blanket **101** further includes a peripheral sealing portion **103** for engaging the glass pane **86** when the glass frame **85** is in a latched portion, thereby to hermetically seal the cavity defined by the glass pane **86** and the blanket **101**. The seal **103** consists of a generally arcuate bead which is compressed into a generally tubular shape when the glass frame **85** is in a latched position. Since the blanket is formed of a resilient material, the inherent resiliency of the sealing bead **103** urges it against the glass pane to provide the desired seal.

Means are provided to vacuum seal the blanket **101** against the glass **86**. In the preferred embodiment the vacuum is provided by a pair of independent vacuum pumps and motors in a manner known in the art, each similar to that more fully described in my above-mentioned patent. A first suitable vacuum control switch **106** is located on a control panel **108** at the top front of the cabinet **21** and, when actuated, is effective to energize one of the vacuum pumps to draw a vacuum between the glass pane **86** and the blanket **101** at loading station A. A second suitable vacuum control switch **107** is also located on the control panel **108** and, when actuated, is effective to energize the other vacuum pump to draw a vacuum between the glass pane **86** and the resilient blanket **101** of loading station B. The drawing of a vacuum between the glass pane **86** and its respective blanket **101** permits the atmospheric pressure to force the resilient blanket **101** firmly against the glass pane so that sensitized photographic plates and negative material resting on the resilient blanket will be held firmly against the inner face of the respective glass pane **86**. Accordingly, relative movement between the sensitized photographic plate and negative material is prevented, and more importantly, no air pockets remain between the two which could, of course, result in distortion of the image projected on the sensitized surface of the plate.

In order to connect each of the vacuum pumps to the cavity between the respective glass panes **86** and the associated blankets **101**, each of the pintles **83** and **84** are tubular and are connected at their outer ends with a rotatable vacuum fitting **114**. The vacuum fitting **114** is connected to a respective one of the vacuum pumps by means of suitable flexible conduit **116**. The inside of the apertured pintles **83** and **84** are connected to a T fitting **118** disposed within the frame **25** and two outlets thereof are connected through a pair of respective flexible conduits **119** and **120**, FIGURE 4, to suitable apertures provided in each of the blankets **101**. Accordingly, each of the vacuum pumps draws air from the space between its respective blanket **101** and the associated glass pane **86**. Suitable openings are provided in the side of the frame **25** to provide a large area connection between the back side of each of the blankets **101** and the atmosphere so that when a vacuum is drawn between one of the blankets **101** and the respective glass pane **86**, the atmospheric pressure on the back sides of the blankets **101** is effective to press the respective blanket firmly against its associated glass pane **86**.

In order to lock the printing frame **25** in an exposure position with one of the loading stations A, B facing toward the light source, and the other of the loading stations facing the top of the photographic printer, there is provided a spring-loaded, manually operable latch **142**, including a plunger-type bolt **143** which is spring biased into one of a pair of a suitable loatching members **144** located at respective ends of the frame **25** as best illustrated in FIGURE 3. Each member **144** is attached to the front wall of the printing frame **25**, and in order to release the printing frame **25** for rotation thereof, a knob **145**, which is threadedly attached to the bolt **143**, is pulled out to withdraw the bolt **143** from the aperture in the member **144** and thereby to release the frame **25**. Since similar latching members **144** are provided on opposite ends of the printing frame **25**, the frame **25** may be locked in an inverted position with either of the loading stations A, B facing down toward the light source.

From the above detailed description, the operation of the improved photographic printer is believed clear. However, briefly, the operation of the photographic printer will be described. In order to initially load sensitized material, negatives, and the like, into the frame **25** of the photographic printer **20**, and assuming the top loading station to be loading station A as indicated in FIGURE 3, the glass frame assembly **85** in the loading station A is released through manipulation of the latch handles **96** and the glass frame assembly **85** is pivoted upwardly about hinge **87**. The sensitized plate and other photographic material is then laid on the blanket **101** in the loading station A and the glass frame assembly **85** is closed and locked with the latch handles **96**. A vacuum can then be drawn between the blanket **101** and the glass pane **86** of the loading station A by actuation of the vacuum control switch **106**. The atmospheric pressure is then effective to force the blanket **101** against the glass pane **86**.

With the photographic material held firmly against the glass pane **86**, the frame **25** may be rotated by first releasing the latch **142** and thereafter pivoting the frame **25** so that the loading station A faces downwardly toward the light source. The latch **142** will now lock into the aperture in the opposite latching member **144** to lock the frame **25** in this position. Vacuum will continue to be drawn at loading station A through the tubes **119** and **120** leading to the pintle **83**. The photographic material and loading station A may now be exposed in the desired manner by the manipulation of other controls of the photographic printer.

While exposure of the photographic material at loading station A is taking place, loading station B, which has now

been rotated to the top of the photographic printer, may be unloaded and loaded in like manner as loading station A described above. Upon completion of the exposure of loading station A and loading of loading station B, the frame **25** may again be flipped through 180° to permit exposure of loading station B while loading station A is unloaded and reloaded.

It will be understood, according to the present invention, that production of photographic plates may be substantially increased by the present photographic printer since the normally idle time of the operator during plate exposures is now turned into productive working time in a form of loading and unloading the vacuum frames. In other words, one vacuum frame at one loading station is exposed while the other vacuum frame at the other loading station is being unloaded and reloaded. Thereafter the frame **25** is pivoted to permit exposure of the unexposed frame. During exposure of the second frame at the second loading station, the first loading station is unloaded and reloaded.

While there has been shown and described a particular embodiment of the present invention, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the invention in its broader aspects, and it is therefore contemplated in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by letters patent of the United States is:

1. A printer for use in making photographic plates and the like, comprising a cabinet, a source of printing light mounted in the lower part of said cabinet for directing light towards the top of said cabinet, a printing frame, mounting means for mounting said frame in the top of said cabinet for pivotal movement about a central axis of said frame table to permit the positioning of said frame with either side thereof facing towards said light source including a pair of opposed apertured pintles, pump means mounted in said cabinet, a pair of pressure responsive means disposed in said frame, each associated with a respective side of said frame for fixedly positioning photographic material in the respective side of said frame, and fluid connection means between said pump means and each of said pressure responsive means, said connection means each including the aperture in a respective one of said pintles.

2. A printer for use in making photographic plates and the like, comprising a cabinet, a source of light mounted in the lower part of said cabinet, a printing frame including a pair of glass plates and a pair of imperforate resilient blankets, each blanket being disposed in face-to-face relationship with a respective plate and having a continuous seal positioned between a peripheral portion of said plate and said blankets, means for drawing a vacuum selectively between each of said blankets and the respective plates, and mounting means for mounting said frame in the top of said cabinet for pivotal movement about a central axis of said frame, thereby to permit the positioning of said frame with either glass plate thereof facing toward said light source while maintaining a vacuum on said side of said frame.

3. A photographic printer comprising a cabinet having side walls forming an interior cavity and defining an upper opening, said opening communicating with said cavity and having a given configuration, light means disposed in the lower end of said cavity for supplying light upwardly through said upper opening, a generally uniplanar printing frame of said given configuration disposed in and substantially closing said upper opening to provide the top of said cabinet, said printing frame including a pair of transparent plates, each on one side of said frame, and hinged at one end to said printing frame, a pair of holding means each associated with one side of said printing frame for holding light sensitive material adjacent a respective one of said transparent plates, and mounting means on said side walls for mounting said printing frame for pivotal movement between two positions spaced approximately 180° from each other in which said frame is effective to substantially close said upper opening, one of said plates being disposed below the top of said cabinet and the other of said plates being disposed above the top of said cabinet in each of said positions with the lower of said plates positioned to receive light from said light source and reflector means, the other of said plates forming the top of said cabinet in each of said positions to permit unobstructed insertion of said material.

No references cited.

JULIA E. COINER, *Primary Examiner.*