

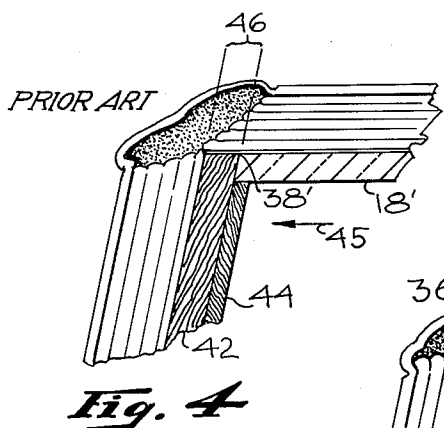
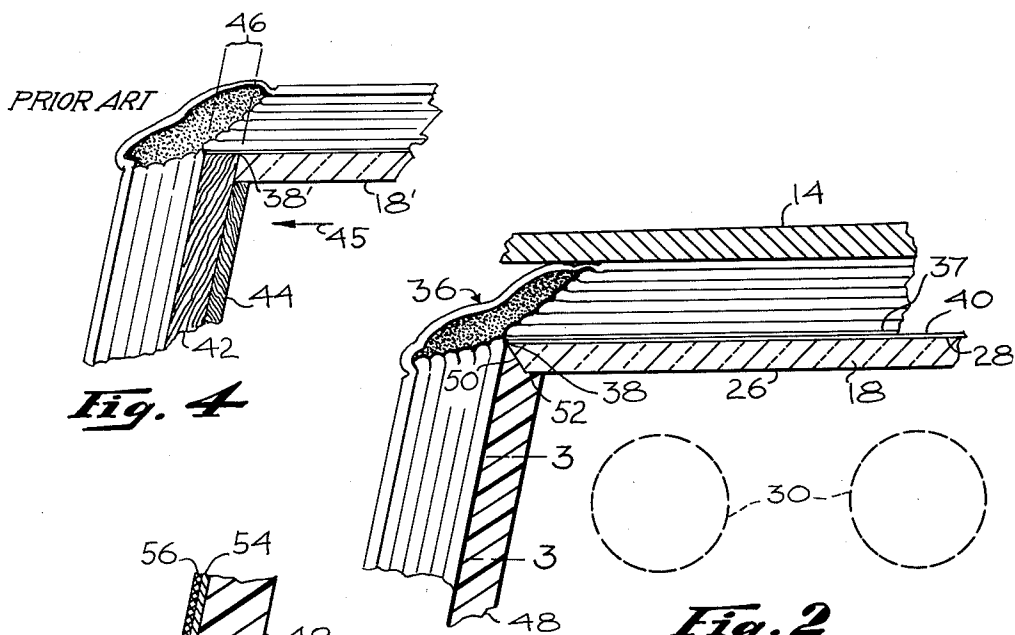
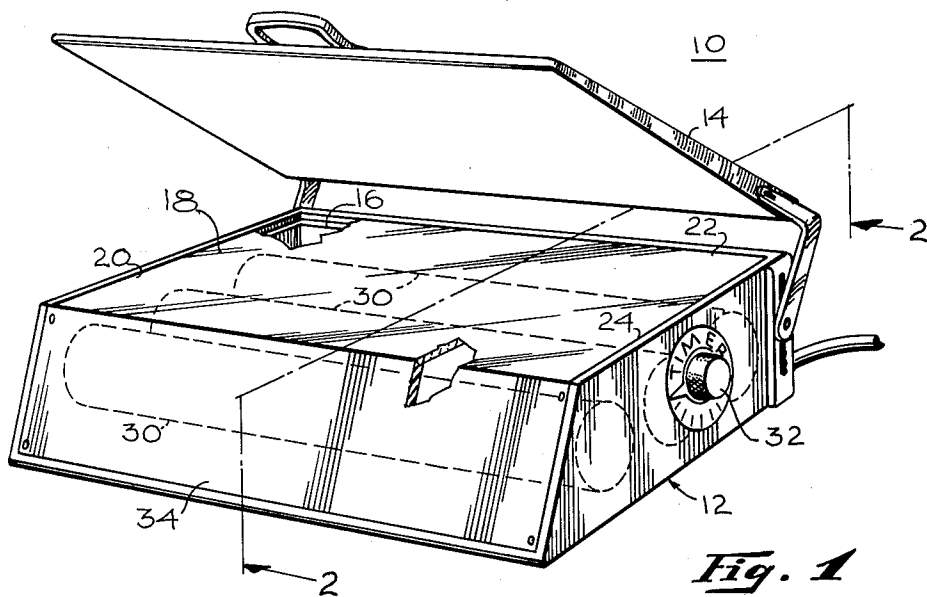
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R. B. LEWIS

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LIGHT BOX

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PRIOR ART

Fig. 4

RICHARD B. LEWIS
INVENTOR.

BY *Friedrich M. Orshulski*
attorney
Monis Spector
ATTORNEY

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LIGHT BOX

Richard B. Lewis, Hermosa Beach, Calif., assignor to
Thompson Ramo Wooldridge Inc., Canoga Park, Calif.,
a corporation of Ohio

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The present invention relates to improvements in apparatuses and devices commonly referred to as light boxes in which is supported a light-transmissive work plate illuminated on one surface by a light source so as to permit the controlled exposure of light-sensitive media placed on the opposite surface of the work plate.

The uses to which devices of the type with which the present invention is concerned are many. A common form of light box apparatus is used in photographic contact printers. An even more common form of light box apparatus is that used in document copying machines widely employed throughout industry and libraries for making duplicates or copies of materials printed on substantially opaque surfaces such as, for example, letters, magazines, newspapers, boxes, etc. Such copying machines are generally comprised of a rectangular box structure open at its top. The front, rear and side wall members of the box, as well as its bottom, are usually made of an opaque material such as wood or metal. Within the box at its bottom is placed some form of light source such as tungsten or fluorescent lamps connected to a power source in circuit with some form of timing mechanism for reproducibly exciting the light source during specified exposure time intervals. Near the top of the box, on the inner surfaces of its sides, is generally placed some form of supporting structure for holding a light-transmissive work plate, such as a sheet of plate glass, with its upper surface flush with the upper edge extremities of the box. The work plate is many times cut to be of the same dimension as the inner horizontal cross section of the box. Thus, materials to be copied may be placed in contact with light-sensitive media, such as photographic paper, upon the upper outer surface of the glass plate. A hinged clamping lid is generally provided so that once the material to be copied is placed in contact with the light-sensitive media, the lid may be lowered to tightly compress the material to be copied against the light-sensitive media and work plate to thus ensure a more perfect reproduction of the material being copied.

Where such copying machines are to be used for copying bound volumes, such as magazines or books, an effort has been made in the prior art to minimize the thickness of the front wall member to the light box adjacent a straight line peripheral edge of the work plate. The bound volume may be then opened and partly placed against the outside of this front wall member with the page which is to be copied and remainder of the volume facing downwardly against the upper outer surface of the work plate. Even though the box wall member, against which the bound volume is placed, is made relatively thin, the pages of some bound volume materials cannot be successfully copied in their entirety. This is because the margin on each printed page of the bound volume which extends from the left-hand edge of the printed matter on the page to the binding is smaller in dimension than the thickness of the box wall member against which the volume is held. The box wall member being of an opaque material thereby prevents the light produced by the light source from reaching the left-hand extremity of the printed matter on the page.

With the above problem in mind, some prior art light boxes used in such copying machines have been made with a very thin box wall member adjacent what may be termed the peripheral working edge of the glass work

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plate and have incorporated no structure for supporting this edge of the glass work plate. Such arrangements, however, have been found less than satisfactory in that the glass plate is subject to breakage even when moderate pressures are applied against it along this working edge as when the clamping lid of the copying machine is closed down upon it. In the larger variety of copying machines, such glass plates are quite expensive, the replacement cost to the user being as much as \$25.00 to \$40.00, depending upon size.

It is, therefore, an object of the present invention to provide improved supporting structure for the light-transmissive work plate of a light box which will permit successful copying of even the smallest margined bound volume material and yet provide adequate support for the work plate along that peripheral edge thereof against which the bound volume is held.

For this purpose, the present invention provides a supporting member for the peripheral working edge of the light-transmissive work plate of a light box which is comprised of a light-transmissive material having one edge thereof conformed for close fitting abutment with the working edge of the work plate with a light-reflective coating applied to but one surface of the supporting member so as to reflect light from the light source within the light box and direct this light to the extremities of the working edge of the work plate.

A better understanding of the present invention, as well as an appreciation of its many features of advantage may be had by reference to the following description, especially when read in conjunction with the accompanying drawing, in which like parts are given like reference numerals and where:

FIGURE 1 is a partly broken away isometric view of a typical document copying machine employing a light box having a work plate supporting member in accordance with the present invention;

FIGURE 2 is a cross sectional view of that portion of the light box structure shown in FIGURE 1 which is broken away as viewed, projected upon a plane defined by the broken lines associated with the arrows 2-2 in FIGURE 1 and looking in the direction of the arrows;

FIGURE 3 is an enlarged cross sectional view showing in more detail that portion of the supporting member of the present invention shown in FIGURE 2 taken between the dotted lines 3-3 thereof; and

FIGURE 4 is a cross sectional view similar to that of FIGURE 2 illustrating prior art structure for the purpose of better understanding the advantages of the present invention.

Turning now to FIGURE 1, there is shown, by way of example, a typical form of copying machine used in industry and library document copying work. The copying machine 10, as illustrated, comprises a light box 12 and a hinged clamping lid 14. The light box 12 is closed on all sides except the top. At the upper portion of the light box 12 and on the inner walls thereof a supporting ledge 16 is provided for holding a light-transmissive work plate 18. The work plate 18 is generally nothing more than a substantially planar sheet of glass having substantial thickness. The supporting ledge 16 is shown to provide support for the work plate along three peripheral edges of the work plate abutting three sides of the light box indicated at 20, 22 and 24.

The work plate 18 has a lower illuminable surface 26 and an opposing upper surface 28 which surface may be termed a "working surface." Shown by the dotted lines 30, within the light box, is some form of light source, such as fluorescent fixtures, power to which is controlled by a timer mechanism indicated at 32. That peripheral edge of the work plate 18 which is immediately adjacent the front wall member 34 of the light box may be termed

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the "working edge" of the work plate for, as shown in FIGURE 2, in copying materials from a bound volume, such as 36, the working edge 38 of the work plate 18 extends into and is in substantial abutment with the binding of the volume. In use, the volume from which a page of material is to be copied is arranged as shown in FIGURE 2 so that the page 37 to be copied lies along the working surface 28 of the work plate 18. A light-sensitive media such as a sheet of paper indicated at 40 is then interposed between the page to be copied and the upper surface 28 of the work plate 18. The hinged clamping lid 14 is then lowered to conform both the light-sensitive media 40 and the page to be copied to the planar working surface 28 of the work plate 18. The timer 32 is then actuated to activate the light source 30 for a predetermined exposure time interval.

Reference will now be made to FIGURE 4 which illustrates a typical prior art arrangement for supporting a working edge 38' of a work plate 18'. Here it can be seen that the working edge 38' of the work plate is supported by two opaque members 42 and 44. The members 42 and 44 would comprise at least the upper portion of the front wall member 34 of the light box 12. The member 42 prevents the work plate 18' from being displaced in the direction of the arrow 45 while the member 44, fastened to the member 42, would provide vertical support for the work plate 18'. In such a typical prior art arrangement, it is clear that light from the light source 30 cannot reach that portion of the page to be copied generally indicated by the bracket 46.

In accordance with the present invention, however, at least the upper portion of the front wall member 34 is constructed as shown in FIGURE 2 where the supporting member 48 for the working edge 38 of the work plate 18, is not comprised of opaque material but instead is made of a light-transmissive material. A material found satisfactory for this purpose is that commonly known as Lucite. Glass or other light-transmissive materials can be used. The upper edge of the supporting member 48 is conformed for close fitting abutment with the working edge 38 of the work plate 18.

In the preferred form of the invention shown, the upper edge of the supporting member 48 is shaped to form a supporting ledge 52 on which the front edge of the work plate 18 rests. The contiguous edges of both the supporting member 48 in the front wall 34 and the work plate 18 are beveled at an acute angle to form a bevel joint indicated at 50. Therefore, light from the light source 30 is transmitted by both the supporting member 48 and the work plate 18 to the apexes of the beveled edges which form the peripheral working edge 38 extending into the binding of the copy material, such as the volume 36. The outer surface of the Lucite supporting member 48, particularly with a portion of the volume 36 covering it, will act as a reflecting surface to further intensify light at the peripheral working edge 38.

As shown in FIGURE 3, in further accordance with the present invention, a light-reflective coating 54 may be applied to that surface of the supporting member 48 which is closest to the working edge but most remote from the illuminable surface of the work plate. This coating may be comprised of white paint, silver paint or any light-reflective coating or material which may be caused to adhere to the light-transmissive supporting member 48. An opaque coating 56 may then be applied on top of the light-reflective coating 54 to positively prevent light leakage from the box or for decorative purposes. Thus, light from the light source 30, in FIGURE 2, will pass through the light-transmissive supporting member 48 and be reflected from the coating 54 up to and generally around the working edge 38 of the work plate 18. In this way, the working edge 38 of the work plate acts to transmit light from within the light box to the lateral front extremity of the light box thereby permitting all material appearing on the page of the bound

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volume in this vicinity to be usefully illuminated. At the same time, due to the conformation of the upper edge of the supporting member 48 to the illuminable surface 26 of the work plate 18, pressure produced by the action of the clamping lid on the work plate 18 is more evenly distributed over the plate, thereby reducing the chance of the work plate 18 breaking during use of the copying machine.

Having thus described the invention, what is claimed is:

1. For use in a light box in which is supported a light-transmissive work plate, said work plate having a working surface upon which light-sensitive media may be placed and an illuminable surface designated for exposure to a light source, said work plate having at least one peripheral working edge designated for useful contact at its extremity with light-sensitive media, a structure comprising: a supporting member comprised of a light-transmissive material having one edge thereof conformed for close fitting abutment with the peripheral working edge of the work plate and a light-reflective coating applied to that surface of said supporting member which is closest to the working edge of said work plate when said supporting member is placed in supporting relationship to said work plate.
2. For use in a light box in which is supported a light-transmissive work plate, said work plate having a working surface upon which light-sensitive media may be placed and an illuminable surface designated for exposure to a light source, said work plate having at least one peripheral working edge designated for useful contact at its extremity with light-sensitive media, a structure comprising: a supporting member comprised of a light transmissive material having one edge surface thereof conformed for close fitting abutment with both the peripheral working edge of the work plate and the illuminable surface of the work plate immediately adjacent said working edge and a light reflective coating applied to that surface of said supporting member closest to the working edge of said work plate when said supporting member is placed in supporting relationship to said work plate.
3. A light box, comprising: support means for supporting a light-transmissive work plate having a substantially planar working surface upon which light-sensitive media may be placed and a substantially planar illuminable surface designated for exposure to a light source from which light may pass through the work plate to act upon media placed upon the working surface; a light source mounted within said light box for illuminating the illuminable surface of the work plate when supported by said support means; and a supporting member positioned in the light box for supporting one peripheral edge of the work plate, said supporting member being comprised of light-transmissive material having one edge surface thereof conformed for close fitting abutment with the illuminable surface of the work plate along said peripheral edge thereof and a light-reflective coating applied to that surface of said supporting member which extends transversely to the plane of the work plate working surface and most remote from said light source.
4. For use in a light box in which is supported a light-transmissive work plate having a working surface upon which light-sensitive media may be placed and an opposing illuminable surface designated for exposure to a light source, said work plate having at least one peripheral working edge generally conforming to a straight line, the working edge being designated for useful light communicative contact at its lateral extremity with light-sensitive media placed upon the working surface of the work plate, a structure, comprising: a supporting member comprised of a light-transmissive material having one edge surface thereof generally conformed for close fitting abutment with the working edge of the work plate and a light-reflective coating applied to that surface of said supporting member closest to the edge of the work plate

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when said supporting member is acting in supporting relation to said work plate.

5. Structure according to claim 4 wherein said supporting member is comprised of a material which is substantially transparent and wherein the edge surface of said supporting member is also conformed for close fitting abutment with the illuminable surface of the work plate immediately adjacent the straight line peripheral working edge thereof.

6. In a light box in which is to be supported a light-transmissive work plate having two opposing substantially planar surfaces separated by the thickness of the plate, the first of these surfaces being a working surface upon which light-sensitive media may be placed, the second of these surfaces being an illuminable surface designated for exposure to a light source within the light box, the work plate having a plurality of peripheral edges one of which is a working edge conforming to substantially a straight line, the combination of: means for supporting the work plate along edges thereof other than said working edge; a supporting member rigidly fastened to said last-named means for supporting the work plate substantially along said working edge, said supporting member being comprised of a light-transmissive material having one edge surface thereof conformed for close fitting abutment with both the lateral edge surface of the work plate which is contiguous with said working edge and the illuminable surface of the work plate immediately adjacent said lateral edge surface; and a light reflective coating applied to that surface of said supporting member closest to said working edge but most remote from the illuminable surface of the work plate when supported in said light box whereby the working edge of the work plate acts to transmit light from within the light box to that lateral extremity of the light box closest to said working edge.

7. A light box comprising:

- A. a support having three side walls with a supporting ledge extending along the upper edges thereof, a front wall having at least the upper portion thereof formed of light transmissive material, said front wall being joined to said side walls to form an enclosure;
- B. a work plate formed of light transmissive material and having its peripheral edges resting on said supporting ledges, said work plate having a lower illuminable surface and an upper working surface; and
- C. a source of light mounted within said enclosure;
- D. the contiguous edges of said upper portion and said work plate being beveled at an acute angle to form a bevel joint with the contiguous apexes of said beveled edges forming a peripheral working edge which receives light transmitted through both said upper portion and said work plate.

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8. A light box comprising:

- A. a support having three side walls with a supporting ledge extending along the upper edges thereof, a front wall having at least the upper portion thereof formed of light transmissive material and having a light reflective outer surface, said front wall being joined to said side walls to form an enclosure;
- B. a work plate formed of light transmissive material and having its peripheral edges resting on said supporting ledges, said work plate having a lower illuminable surface and an upper working surface; and
- C. a source of light mounted within said enclosure;
- D. the contiguous edges of said upper portion and said work plate being beveled at an acute angle to form a bevel joint with the contiguous apexes of said beveled edges forming a peripheral working edge which receives light transmitted through both said upper portion and said work plate.

9. A light box comprising:

- A. a support having three side walls with a supporting ledge extending along the upper edges thereof, a front wall having at least the upper portion thereof formed of light transmissive material and having a light reflective outer surface, said front wall being joined to said side walls to form an enclosure and having a supporting ledge along the upper edge of said upper portion;
- B. a work plate formed of light transmissive material and having its peripheral edges resting on said supporting ledges, said work plate having a lower illuminable surface and an upper working surface;
- C. and a source of light mounted within said enclosure;
- D. the contiguous edges of said upper portion and said work plate being beveled at an acute angle to form a bevel joint with the contiguous apexes of said beveled edges forming a peripheral working edge which receives light transmitted through both said upper portion and said work plate.

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