United States Patent

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[15] **3,635,557**

[45] **Jan. 18, 1972**

[54] MEANS FOR PHOTOGRAPHICALLY COPYING BOOK PAGES

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[22] Filed: **June 2, 1970**

[21] Appl. No.: **42,696**

[30] **Foreign Application Priority Data**

Dec. 24, 1969 Great Britain 62,967/69

[52] **U.S. Cl.** **355/65,** 355/25, 355/66, 355/82

[51] **Int. Cl.** **G03b 27/70**

[58] **Field of Search** 355/65, 66, 82, 25, 132

[56] **References Cited**

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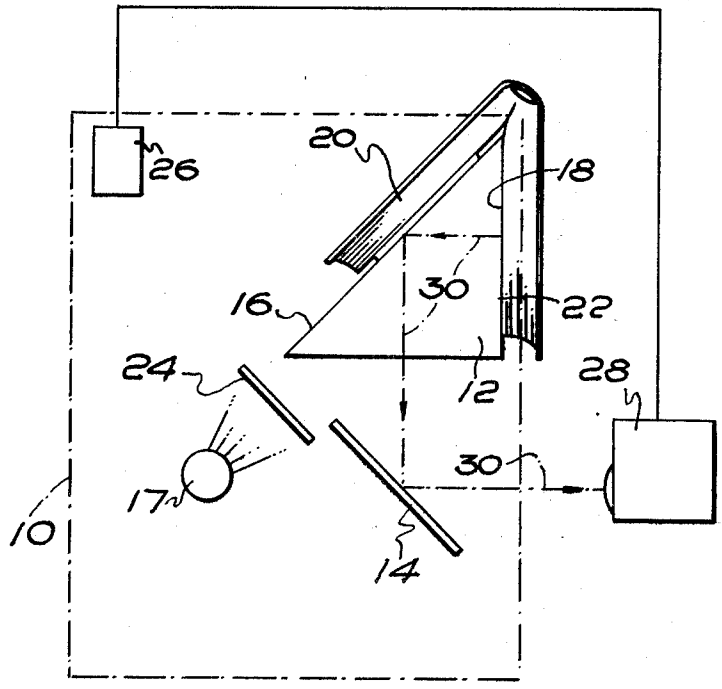
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[57] **ABSTRACT**

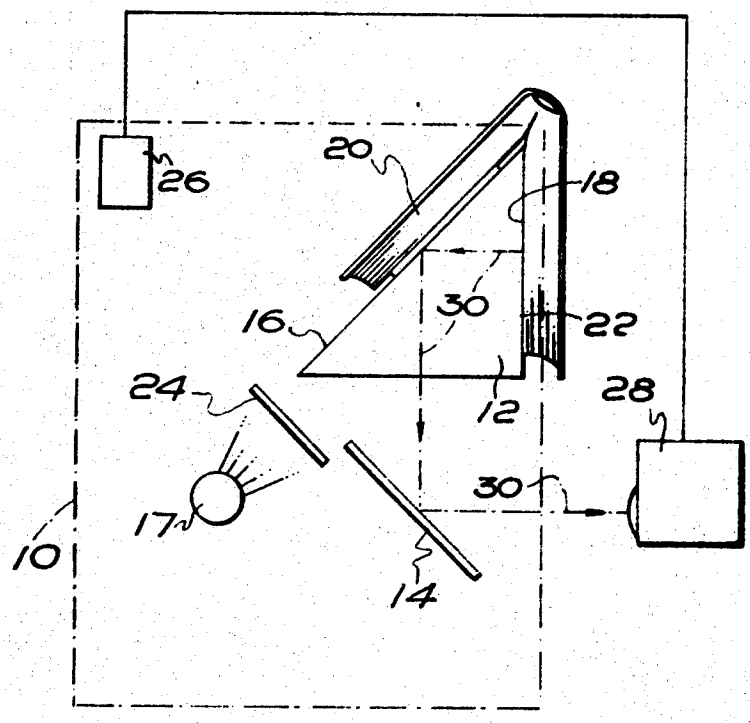
In the photographic copying of a page of a book, the book is partially opened at the page to be copied and a first plane reflective surface lies at an angle to said page and between said page and the opposite page to direct a reversed image on to a second reflective surface from which a corrected and reflected image is presented to photographic copying apparatus.

2 Claims, 1 Drawing Figure



PATENTED JAN 18 1972

3,635,557



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MEANS FOR PHOTOGRAPHICALLY COPYING BOOK PAGES

The present invention concerns a method of presenting an image of a page of a book, particularly but not exclusively, a hard covered book, so that the image may be photographically copied, and to apparatus for carrying out the method.

With the presently known methods of photocopying or photographing pages of hard covered books, the book must be opened completely and laid flat on a support surface. The pages to be copied are usually placed in face to face contact with the support surface, which is defined by a transparent sheet, and the pages are copied, photographically through such sheet. One readily apparent drawback of the known methods is that the gutter margins, when the book is opened to a flat condition, may be sharply curved as they pass from the binding to the support surface, and printed matter on such edges is seen in distorted form by the photocopying apparatus. The result is that in the copy of the page, there is distortion of the information at one edge thereof.

Another drawback is that repeated opening of the book to a flat condition tends to damage the book spine and this is unacceptable in the case of valuable books.

It is an object of this invention to provide a method and a means which at least in their preferred forms, will obviate or mitigate this disadvantage.

According to the present invention, there is provided a method of presenting an image of a page of a book particularly, but not exclusively a hard covered book, so that the image may be photographically copied, wherein an inverted image is reflected from a first plane reflecting surface lying at an angle to the page to be copied, and the inverted image is corrected by a second reflective surface so that it can be presented to photographic copying apparatus.

Preferably, the first plane reflecting surface extends towards the spine of the book and lies between the page to be copied and the opposite page of the book. This first plane reflecting surface may be defined by one face of a glass prism and in the method the book may lie with the page to be copied and the opposite page respectively on adjacent faces of the glass prism. In this preferred case, it will be appreciated that the book will not be fully open and damage to the spine thereof will be avoided.

In the method, the page of the book being copied will preferably be illuminated by a light source for example in the form of bulbs or a strip light. In one case, the open page is positioned on one face of the prism, the source illuminates the page through the prism and an optical step wedge to give substantially even light intensity over the book page.

The invention also extends to copying photographically a page of a book wherein the image of the book is presented to the photographic copying apparatus by the method as aforesaid.

The exposure time of the photographic apparatus may be controlled by a photometer in known manner.

Further, according to the invention, there is provided apparatus for use in presenting an image of a page of a book, particularly, but not exclusively a hard covered book, so that the image may be photographically copied, comprising means defining a first reflecting surface by which the image of the book page to be copied is reversed and a second reflecting surface arranged to receive and correct the reversed image from the first reflecting surface, and provide a reflected image which is suitable for reception by photographic copying apparatus, said apparatus further defining a register area or position into which the book page is placed to ensure that the image is reflected by both reflecting surfaces.

Preferably, the first reflecting surface is defined by the interior surface of a side of a glass prism while the second reflecting surface is the face of a surface coated mirror.

The prism may be a 45°—45° prism with the reflecting surface on the interior of the largest face and lying at 90° to the second reflecting surface.

Prisms of other angles may of course be employed.

The book is preferably opened to a 45° or a 90° position with the page being copied resting on a smaller face of the prism and the opposite page resting on a support member on the exterior surface of the larger side of the prism to maintain the book at the desired attitude during image presentation and copying.

The apparatus may further include illuminating means such as a bulb or strip lamp to illuminate the page. The illuminating means may be positioned to pass the light to the page through the prism and an optical step wedge which ensures that the intensity of illumination will be substantially constant over the whole page.

In copying the page, the inverted and corrected image is preferably projected to and received by a photosensitive surface, i.e., film or sensitized sheets or surfaces as used in photocopying machines, positioned on an optical axis laying normal to, but spaced from the page being copied. The image formed on the sensitive surface is subsequently used in known manner in the production of a copy of the page.

The prism will of course extend sufficiently in the lengthwise and widthwise direction of the page to enable the whole page to be copied.

As a sharp edge of the prism extends into the spine of the book the copying can be carried out with the book in part open condition; thereby the damage to the book is prevented and moreover, copies with a minimum of distortion can be obtained. The invention is suitable for use in the locations where photocopying of pages of books is carried out i.e., in libraries and museums etc.

During the copying process, means can be introduced if desired, to enable the image to be presented for copying in magnified or diminished form in relation to the original.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing of which the single FIGURE shows in diagrammatic sectional side elevation, apparatus according to the invention.

Referring to the drawing, the apparatus comprises a box casing **10** shown only in outline. Extending between and supported by the side panels of the casing **10** are a 45°—45° glass prism **12** and a surface coated mirror **14**, the mirror **14** being arranged in a plane at 90° to the largest side **16** of the prism **12**, the mirror **14** and side **16** both lying at 45° to the horizontal when the casing stands upright.

The interior surface of side **16** is reflectorized and the outer surface may be provided with a blanking sheet or effect i.e., it may be ground, to prevent loss of light through such side **16**.

The top edge of mirror **14** is spaced from the adjacent lower edge of prism **12** to enable light from a light source **17** such as bulb or a strip light to illuminate a page **18** of a book **20** partially opened and placed on the prism **12** as shown. Thus, the book page **18** is illuminated artificially in this example, by light which passes through the prism **12**.

As the light from the source **17** has to travel through different lengths to reach different vertical parts of the prism face **22** on which the page **18** to be copied rests, and optical step wedge **24** is positioned between the source **17** and the prism **12** to ensure that there is substantially even illumination intensity throughout the face **22**.

In the casing **10** is also a photometer **26** which is coupled to photographic apparatus illustrated diagrammatically at **28** to ensure that the exposure time of apparatus **28** is automatically adjusted if for some reason, such as a drop in supply voltage to the illumination means **17**, the light intensity of the source **17** alters.

In using the apparatus, the book **20** is placed on the prism as shown and the page **18** to be copied is illuminated by source **17** through the optical step wedge **24**. The image of the page **18** is reflected and reversed by the interior surface of side **16** and the image is corrected and reflected by mirror **14** presenting the correct image for reception by apparatus **28**. The light transmitting the image travels along the path indicated by arrowed lines **30** and it will be seen that the light travels from page **18**, at right angles to face **22**, out of the prism **12** at right

angles to the third face of the prism 12, and this ensures that there is no difficulty with refraction of the light. As a 45°—45° prism and a mirror arranged at 45° are used, the image presented to the photographic apparatus contains no distortion whatsoever and as will be seen it has not been necessary to open the book 18 fully.

The prism itself forms the support means for the book in the example described and illustrated, but separate book support means may be provided if desired. Indeed, the book support means may be so located that in using the apparatus the prism is not positioned between the pages of the book.

I claim:

1. Optical projection apparatus for use in photographically copying an image of a whole page of a book comprising:

a. a casing having rectilinear side panels and a light source therein;

b. a regular 45°—45° prism supported between the side panels of said casing and positioned therein;

c. the edge of the prism formed by the intersection between its larger side face and one of the smaller side faces, facing upwardly to support a book with its spine extending along said edge and said whole page of said book in contact with said one of the smaller side faces and further positioned generally above said light and oriented with respect to said light source so that the page to be copied is illuminated and an image of said page is directed inwardly toward the larger face and reflected therefrom and out through the other smaller face;

d. a plane reflecting mirror located below said prism with the plane of said mirror being at an angle to the larger side face of said prism, whereby, with the casing in the upright position, said mirror and said larger side face both lie at an angle to the horizontal;

e. said mirror defining a reflecting surface which transmits a natural image of said whole page to be copied as a result of the reflection of the light from the inner surface of said larger side face, said inner larger side face surface reflecting a reverse image as the incident image to said mirror reflecting surface; and,

f. photographic copying means along the optical axis of said reflected beam from said mirror.

2. Optical projection apparatus as claimed in claim 1, including an optical step wedge positioned between said light source and said prism to ensure substantially constant intensity of illumination over the page of the book.

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