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COMPLETE SPECIFICATION

Improvements in and relating to Apparatus for the Photographic Reproduction of Documents by Artificial Light

I, LUCIEN JULES EMILE ANDRE DODIN, a French Citizen, of rue Tixador, Canet Plage (Pyrenees Orientales), France, formerly of Seine, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to apparatus for use in the photographic reproduction of documents by artificial light.

Apparatus for effecting photographic reproduction of documents generally comprise, for illumination, two lamps or two series of lamps arranged one on each side of the optical axis of the objective of a photographic camera included in said apparatus.

The sources of light must uniformly illuminate the document to be reproduced and must be placed in such a way that the only light directed into the objective is that which is reflected from the document in a diffused manner. If no rays are to be directly reflected from the surface to be reproduced, into the objective, even when the surface is placed beneath a glass sheet, there is a limit to the closeness with which the sources of light can be mounted with respect to the optical axis of the apparatus. The two sources of light should be placed outside a dihedron having the line of junction of its two planes passing perpendicularly through the optical axis of the objective on the opposite side of the object to be photographed from said objective, the distance from the plane of said object and said line of junction being equal to the distance between said object and the camera objective and the said dihedron planes diverging at such an angle as to pass through opposed edges of the document framing aperture.

Referring to the accompanying drawing which illustrates diagrammatically and in half-section, apparatus embodying the present invention, the lamps, having regard to the foregoing considerations would require to be located, e.g., at points L and L^1, outside a dihedron as aforesaid of which the line AB represents part of one plane. The line AB forms at B, with the vertical plane normal to the document 1 and passing through the point B, an angle α. This angle α corresponds with the angle between the said vertical plane and the line BO which passes through the optical centre O of camera lens 2 so that line BO would be a path of reflected light were the source of illumination located on AB.

The lamps L and L^1 are symmetrical with respect to the optical axis OC of lens 2.

The necessity of disposing the lamps as far apart as is shewn for lamps L and L^1 renders the apparatus cumbersome and it is the object of the present invention to provide apparatus which is more compactly arranged.

To this end the present invention provides apparatus for the photographic reproduction of documents comprising a light chamber having at one end a photographic camera for photographing documents placed at the other end of the chamber, two light stations housed outside the chamber, one on each side of the optical axis of the apparatus, and two plane mirrors within the chamber, also arranged one on each side of the optical axis of the apparatus, the chamber being apertured adjacent the light stations and these stations and the mirrors being so arranged that in use light from each station is directed through the adjacent aperture in the chamber, across the light beam from the other station, and is then reflected by the mirror on the opposite side of the chamber, onto the document to be photographed, whereby the latter is uniformly illuminated, the angle of such reflection being such that no light rays are directly reflected from the document to the camera objective and the internal surfaces of the

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light chamber (apart from the mirrors) being substantially non-light reflecting.

Referring now in detail to the drawing, 3 designates an external housing the lower portion 4 of the wall of which converges towards an aperture BB¹ which is rectangular and is adapted to frame the document 1 to be reproduced which lies in a plane perpendicular to the optical axis OC of the camera lens 2. Within housing 3 a light chamber 6 is formed by walls 5 and 5¹ and a top wall 7 which supports the camera lens 2. The chamber is extended beyond the wall 7 to form a dark chamber 8 with an end wall 11 within which is positioned a light-sensitive plate 9.

An electric lamp 12 is placed at a convenient level on one side of the light chamber, between this chamber and the housing 3, another electric lamp 12¹ being placed symmetrically to lamp 12 with respect to the optical axis OC of the apparatus, on the other side of the light chamber.

In use, the light rays from lamps 12 and 12¹ pass through apertures 13 and 13¹ in the walls 5 and 5¹ respectively and after crossing, the rays from the opposed lamps 12 and 12¹ are reflected by plane mirrors 14 and 14¹ respectively onto the document to be reproduced.

The inclination to the horizontal of the mirrors 14 and 14¹ is such that the virtual images in the mirrors 14 and 14¹ of the lamps 12 and 12¹ are situated outside the dihedron hereinbefore mentioned, of which the line AB represents part of one side. In the embodiment illustrated the virtual images of the lamps 12 and 12¹ are at L¹ and L respectively so that the required conditions of illumination obtain, none of the rays directly reflected from the document to be reproduced being directed into the camera lens 2. As will be seen the reflected rays which pass nearest to the camera lens are the rays which are reflected from the lower edge portions of the mirrors 14 and 14¹ and which after striking the surface of the document to be reproduced are directed upwards, in the case of the light originating at lamp 12¹ at an angle β to the line BO.

The whole surface of the document is illuminated by light reflected from each of the mirrors 14 and 14¹ and this promotes that uniformity of illumination which is desired.

The apertures 13 and 13¹ are so dimensioned in relation to the mirrors 14 and 14¹ that the light rays from the stations are substantially all directed on to the plane mirrors the latter in turn reflecting these rays to illuminate an area corresponding with the aperture BB¹. In order to avoid detrimental reflections from the internal surfaces of walls 4, 5 and 5¹ there are treated, e.g., by blackening and dulling.

Reflectors 18, 18¹ are provided in the housing 3 for directing the light emitted by the lamps 12, 12¹ through apertures 13, 13¹ onto mirrors 14, 14¹, and the edges 15, 15¹ of the apertures 13, 13¹ are turned towards the lamps 12, 12¹ to avoid or reduce interfering reflection from such edges, which are strongly illuminated, and to promote the transmission of concentrated beams of light onto the mirrors.

Vents 19, 19¹ are provided in the wall of the housing 3 to permit escape of heat generated by the lamps.

What I claim is:—

1. Apparatus for the photographic reproduction of documents comprising a light chamber having at one end a photographic camera for photographing documents placed at the other end of the chamber, two light stations housed outside the chamber, one on each side of the optical axis of the apparatus, and two plane mirrors within the chamber, also arranged one on each side of the optical axis of the apparatus, the chamber being apertured adjacent the light stations and these stations and the mirrors being so arranged that in use light from each station is directed through the adjacent aperture in the chamber, across the light beam from the other station, and is then reflected by the mirror on the opposite side of the chamber, onto the document to be photographed, whereby the latter is uniformly illuminated, the angle of such reflection being such that no light rays are directly reflected from the document to the camera objective, the internal surfaces of the light chamber (apart from the mirrors) being substantially non light-reflecting.

2. Apparatus as in claim 1 having concave reflectors for directing light from the light stations onto the opposed mirrors within the light chamber.

3. Apparatus as in any preceding claim wherein the edges of the apertures in the light chamber through which light passes from the light stations, are turned outwards, towards the stations, for the purpose described.

4. Apparatus for the photographic reproduction of documents, substantially as herein described with reference to and as illustrated in the accompanying drawing.

Dated this 31st day of August, 1949.

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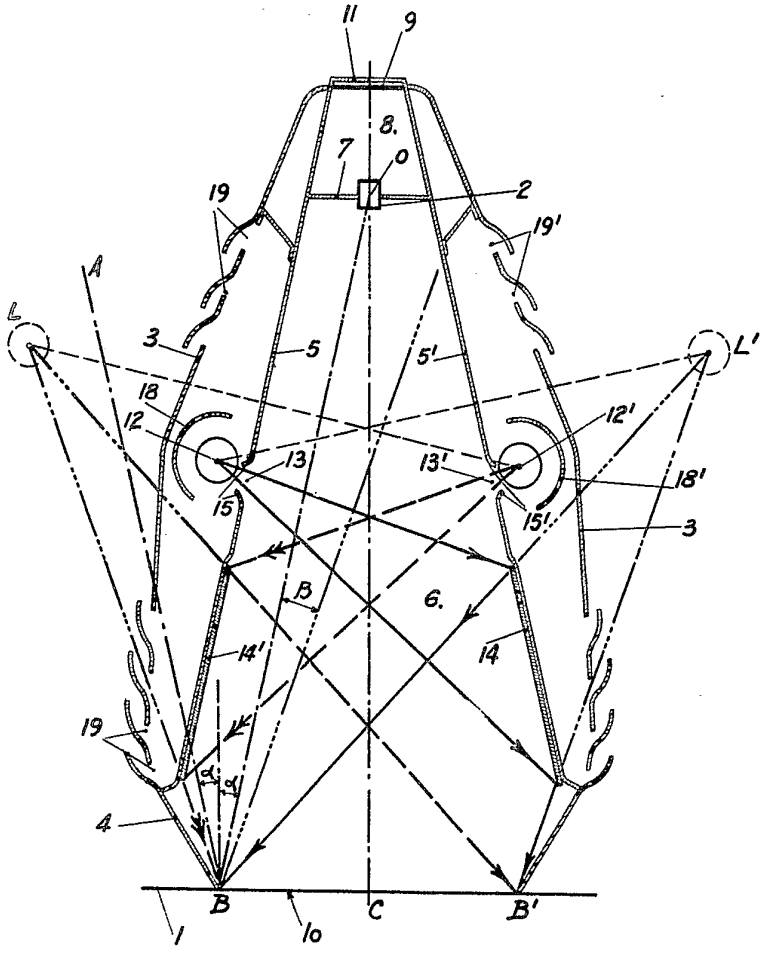

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