May 29, 1923. 1,456,954

G. VON LÜCKEN

METHOD OF PHOTOGRAPHICALLY REPRODUCING PICTURES REPRESENTED ON CURVED SURFACES

Filed June 16, 1921 2 Sheets-Sheet 1

Fig:1.

Fig:2.

Fig:3.

Inventor
Gottfried von Lücken,
By [signature] Atty.

May 29, 1923. 1,456,954

G. VON LÜCKEN

METHOD OF PHOTOGRAPHICALLY REPRODUCING PICTURES REPRESENTED ON CURVED SURFACES

Filed June 16, 1921 2 Sheets-Sheet 2

Fig. 4.

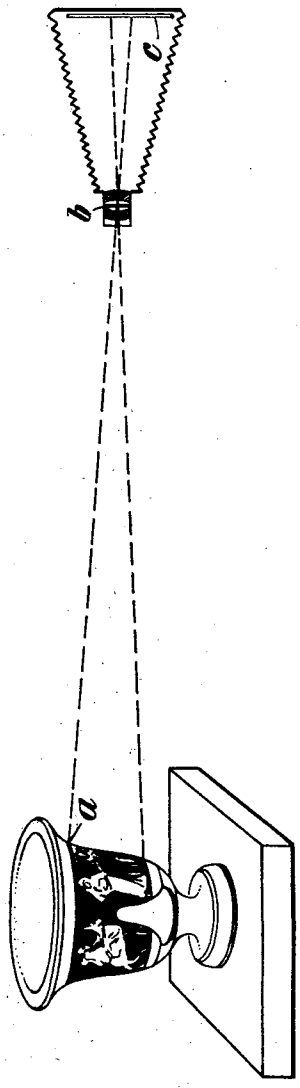
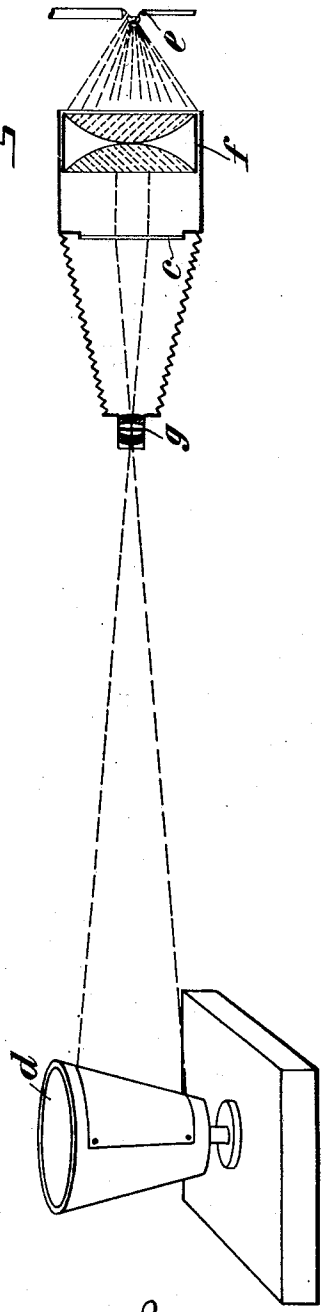


Fig. 5.



Inventor,
Gottfried von Lücken
By Henry Orth & Co
Atty.

Patented May 29, 1923. 1,456,954

UNITED STATES PATENT OFFICE.

GOTTFRIED VON LÜCKEN, OF BERLIN, GERMANY.

METHOD OF PHOTOGRAPHICALLY REPRODUCING PICTURES REPRESENTED ON CURVED SURFACES.

Application filed June 16, 1921. Serial No. 478,088.

To all whom it may concern:

Be it known that I, Dr. GOTTFRIED VON LÜCKEN, residing at Berlin, Germany, have invented certain new and useful Improvements in Methods of Photographically Reproducing Pictures Represented on Curved Surfaces, of which the following is a specification.

To enable the pictures drawn on curved surfaces of Grecian vases, which are the only relics of Grecian painting of the classical epoch, to be manifolded by photography, heliographic printing etc. and to be illustrated in books, archeologists frequently desire to reproduce these pictures on a plane surface without distorting them. The manifolding of these pictures has hitherto been carried out by means of handmade copies, but, apart from the fact that such drawings are always inaccurate, they are exceedingly expensive. Thus the pre-war cost of 60 plates of the work of Furtwängler-Reichhold published by Bruckmann in Munich and now out of print amounted to 600 marks.

Many attempts have been made (by A. Smith, Meydenbauer etc.) to produce undistorted photographic reproductions. The vessel to be photographed was arranged to be rotated whilst the photographic plate was shifted, narrow strips of the picture being taken one at a time. All these methods are cumbersome, expensive and cannot be employed in all cases.

The present invention enables curved pictures to be reproduced on plane surfaces with the aid of simple means and at small cost.

Assuming, at first, that only cylindrical or conical surfaces, i. e. evolvable surfaces, are to be dealt with, the invention consists in the curved surface being photographed in the ordinary way and in then projecting the negative obtained onto sensitive paper wound round a body of the same shape as the said curved surface. If the photograph is to be of the same size as the original the body round which the sensitive paper is wound must have exactly the same size as the original body and it must be placed in exactly the same position, and, if the foci of the taking objective and the projecting lens are equal, the distances between the body and the objective on the one hand and between the objective and the negative on the other hand must be the same as the distances between the original body and the objective on the one hand and between the objective and the photographic plate on the other hand. If the scale of the drawing is to be different, the body on which the sensitive paper is wound must be similar in shape to the original body, but it must be correspondingly larger or smaller in size and the distances must be altered accordingly. The process may also be employed for original surfaces curved in two directions, if the curvature in the vertical direction of the body is not excessive. In such cases the body round which the sensitive paper is wound must not be congruous to the original, but must have an evolvable surface which is the particular cylindrical or conical surface that is most nearly similar to that of the original body.

The invention is illustrated by way of example in the drawing in which

Fig. 1 is a direct photograph of the original object shown in Fig. 3,

Fig. 2 is a photographic reproduction on the same scale as Fig. 1 produced by the novel process,

Fig. 3 shows the original body on a smaller scale,

Fig. 4 is a diagrammatic representation of the arrangement for taking the photographs in the ordinary way, and

Fig. 5 is a diagrammatic representation of the arrangement for producing corrected reproductions of the ordinary photographs.

The part *a* to be taken of the Grecian vase selected by way of example has a surface which is slightly concave and tapers toward the bottom. A photographic camera with a lens *b* and a sensitive plate *c* is placed opposite the surface *a* to be taken. The taking camera is preferably placed at a sufficient distance from the object to get its receding portions as well as its prominent portions sufficiently distinct. The reproduction of the photograph taken is accomplished as follows: A body *d* is made whose size is the same and whose shape is practically similar to that of the original body. Thus in the example illustrated, instead of a body that is slightly concave like the original, a body with a conical surface has had to be used. In the reproducing apparatus the negative *c* is illumined through the condenser *f* by the

light *e* and projected through the lens *g* onto the surface of the body *d* round which a sheet of sensitive paper is wound.

I claim:—

The method of photographically reproducing pictures of curved surfaces, which consists in making a photographic negative of the curved picture surface, winding a sensitized paper on a body having an evolvable surface as similar as possible to that of the surface to be copied and then projecting the negative onto the sensitized paper.

In testimony whereof I have signed this specification in the presence of two witnesses.

GOTTFRIED VON LÜCKEN.

Witnesses:

HEINRICH HILLICKE,

ADOLF FRORATE.