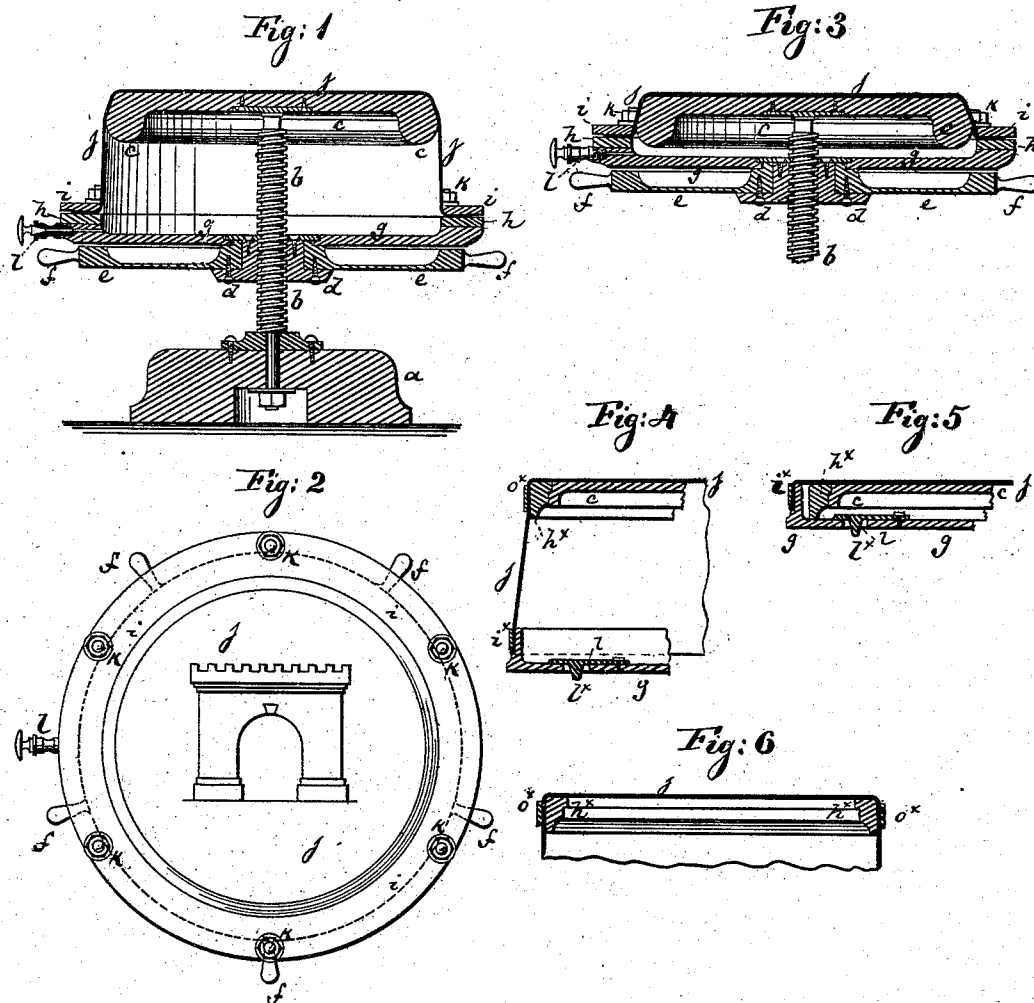


V. GUÉRIN.

APPARATUS FOR ENLARGING AND REDUCING PRINTS.

No. 173,720.

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Witnesses:

A. Moraga.
A. O. Kildner

Inventor:

Victor Guérin
by his attorney
A. Briesen

UNITED STATES PATENT OFFICE.

VICTOR GUÉRIN, OF PARIS, FRANCE.

IMPROVEMENT IN APPARATUS FOR ENLARGING AND REDUCING PRINTS.

Specification forming part of Letters Patent No. **173,720**, dated February 22, 1876; application filed October 11, 1875.

To all whom it may concern:

Be it known that I, VICTOR GUÉRIN, of Paris, France, have invented Improved Apparatus for Enlarging and Reducing Designs, Prints, and other delineations; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawing, making a part of the same.

This invention relates to improved apparatus for reducing or enlarging drawings, designs, labels, lithographic, typographic, and other prints. The reduction and enlargement of such designs are usually effected by hand, which is a tedious and expensive process, requiring the aid of specially skilled labor. An apparatus has, however, already been devised for the purpose, composed of a thin sheet of india-rubber, of square form, bearing the design to be reduced or enlarged.

In making a reduction, the elastic sheet is stretched previous to the application of the design, and when allowed to contract the design is also reduced to a corresponding extent. If, on the contrary, it is desired to enlarge the design, it is transferred to the elastic sheet before the latter is stretched. The mechanism employed to distend the india-rubber sheet is, however, complicated, and the apparatus consequently expensive, which has hitherto prevented it coming into general use. Another great disadvantage is that, owing to the square form of the elastic sheet, the tension is irregular, being greater near the middle of the four sides than at the four angles, in consequence of which the design is distorted instead of being uniformly acted on at all parts.

The present invention is designed to obviate these objections, the apparatus being of simple construction, and so arranged that any print or design may be rapidly reduced or enlarged without liability of distortion.

The apparatus is composed of two metal rings, forming a circular frame, between which is firmly clamped a circular sheet of india-rubber, thickened around its circumference to form a kind of beveled edge. This elastic sheet is drawn over a fixed disk or circular table mounted on the end of a screw-pillar fixed upon a suitable pedestal. On this screw

a nut is caused to travel up and down by means of hand-wheel, or otherwise, said nut being fitted to turn freely between collars on a plate, to which is attached the circular frame in which the elastic sheet is clamped, so that the frame will be caused to move up and down with the nut without partaking of its rotary motion. The whole being thus arranged to distend the sheet, the nut is turned so as to draw down the said frame, and with it the edge of the sheet, whereby it is stretched over the fixed disk or table above mentioned, the extent to which the sheet is stretched being regulated by the distance traversed by the nut upon the screw. It will be seen that the elastic sheet will be uniformly distended, as the tension is equally applied at all parts of its circumference, and therefore perfectly correct reductions or enlargements of the design, transferred onto the sheet of india-rubber, will be obtained.

It will be understood that the disk, instead of being fixed, may be movable, the screw only being made to turn, the nut remaining stationary. Instead of a screw, a rack or other mechanical equivalent may be employed.

The rise and fall of the disk for stretching the elastic sheet may also be obtained by means of an arrangement of spiral springs, which are compressed and retained in that position.

The design being applied upon the elastic sheet, the springs are then released, so as to raise the disk and distend the india-rubber, whereby the design becomes enlarged. The action is reversed if the design is to be reduced.

Further, in order that the elastic sheet may be uniformly stretched in every direction, and to insure that it bears properly upon the disk, I may blow or force air into the chamber formed beneath the sheet of india-rubber, at an opening provided for the purpose, whereby the elastic sheet is raised and detached from the stretching-disk, so that its free extension or contraction is not impeded by its adhesion to the said disk.

The invention is illustrated in the accompanying drawings, which show two arrangements of the apparatus, by way of example only.

Figure 1 is a sectional elevation of the apparatus, and Fig. 2 a plan of same, showing the elastic sheet before it is stretched, with the design to be enlarged thereon. Fig. 3 is a partial vertical section, showing the sheet contracted. Figs. 4 and 5 are detail sectional views of a modification of the invention. Fig. 6 is a sectional view of the distended sheet clamped in the annular frame.

The same reference-letters apply to all these figures.

a is foot or pedestal; *b*, screw-pillar fixed thereon, and surmounted by the stretching-disk *c*; *d*, nut traveling on *b*; *e*, wheel with handles *f* for turning nut *d*; *g*, plate in which nut *d* is fitted to turn loosely, as shown. To this plate is affixed ring *h*, between which and another ring, *i*, the edge of the elastic sheet *j* is clamped by the aid of bolts *k*, or a circular groove may be made around the plate *g*, and the edge of the elastic sheet be secured either by a ligature or by an elastic ring. The central portion of the sheet, onto which the design is to be transferred, is made of thin india-rubber, while the outer portion, which does not require to be stretched radially, is made of rubber-coated fabric, which will stretch circularly, but not otherwise. *l* is an aperture for supplying air to the under side of the elastic sheet, or a passage may be made in the foot *a* and the screw *b* for the same purpose. The aperture *l* is closed by a plug.

Figs. 4 and 5 of the drawing show the modification of the apparatus, which differs from that above described only in certain details, designed to facilitate the use of the apparatus. These modifications relate, first, to the fixed disk or table, which is encircled by a removable ring, for a purpose hereinafter described; second, to the substitution of a valve for the plug shown in the former arrangement; and, third, to the employment of two hoops or bands, the one for clamping the edges of the elastic sheet to the movable plate, and the other for retaining the sheet when distended upon the removable ring, which is then detached from the disk for the purpose of transferring the design to stone.

The apparatus represented in Figs. 4 and 5 is to be made with a foot, a screw-pillar mounted thereon, and surmounted by the stationary disk, with a nut traveling on the screw; with a movable plate in which the nut is fitted to turn loosely, and with handles for turning the nut, the same as heretofore described. *l*^{*} is a valve for inlet and exit of air

through hole *l* fitted onto the plate *g*; *h*^{*}, a ring encircling the stationary disk; *i*^{*}, a hoop for clamping the edges of the elastic sheet to the rim of plate *g*; *o*^{*}, a hoop for securing the said sheet in its distended condition upon ring *h*^{*}.

The following is the action of the apparatus: To enlarge, it is first necessary to produce the design upon the elastic sheet *j*, which is then secured by its edges to the plate *g* by means of the hoop *i*^{*}. This is done while the plate *g* is in the raised position, Fig. 5, and the nut *d* is then turned by handles *f* to draw down the plate *g* until the elastic sheet is sufficiently distended. During the descent of the plate air enters at valve *l*^{*}, which opens automatically. The elastic sheet *j* having been thus stretched, and the design thereon correspondingly enlarged, the hoop *o*^{*} is then applied and tightened up, if necessary, so as to firmly retain the elastic sheet upon ring *h*^{*}. The plate *g* is now raised to release the edges of the sheet from tension, and enable it to be detached from the plate by removing the hoop *i*^{*}; but before doing this the valve *l*^{*} is raised to allow the air within to escape. The central part only of the elastic sheet being now retained by the hoop *o*^{*} upon ring *h*^{*} the latter is removed, as shown in Fig. 6, in order to transfer or apply the enlarged design in any convenient manner to the stone, which is then prepared for obtaining prints by the ordinary means employed in lithography.

In order to reduce a drawing or design the action is reversed—that is to say, the elastic sheet is stretched before the design is applied or traced thereon, and on releasing the sheet the reduction is effected.

I claim as my invention—

1. The combination of the fixed circular plate *c*, movable circular plate *g*, and clamping-ring *i*, with each other, for extending or contracting a circular elastic sheet, constructed substantially as specified.

2. The rings *h*^{*} and *o*^{*}, combined with the plates *c* and *g* of a sheet distending and contracting apparatus, constructed substantially as specified.

3. The air-opening *l* applied to the plate *g* of a sheet distending and contracting apparatus, constructed substantially as specified.

VICTOR GUÉRIN.

Witnesses:

ROBT. M. HOOPER,
CHARLES DESNOS,
ADOLPHE GUION.