T. HALL.

Improvement in Apparatus for Copying Designs.

No. 131,819. Patented Oct. 1, 1872.

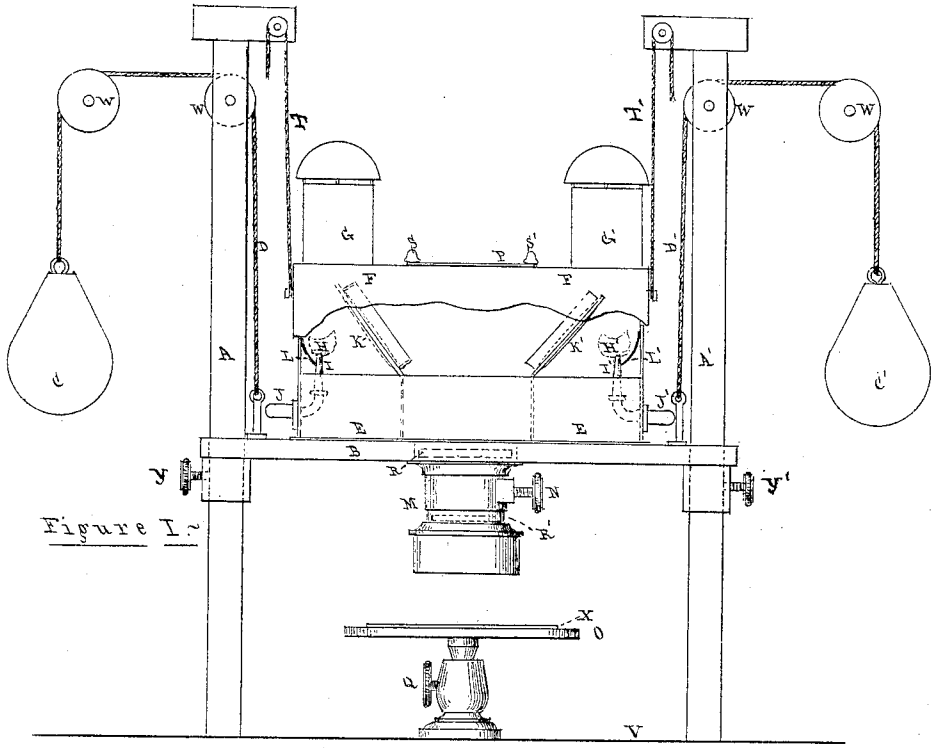

Figure I.

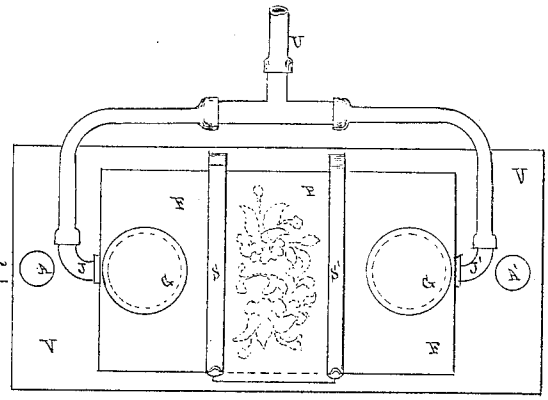

Figure II.

In presence of
John M. Batchelder
Henry T. Brown

Thomas Hall

UNITED STATES PATENT OFFICE.

THOMAS HALL, OF NEWTON, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR COPYING DESIGNS.

Specification forming part of Letters Patent No. **131,819**, dated October 1, 1872.

To all whom it may concern:

Be it known that I, THOMAS HALL, of Newton, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Copying Designs, of which the following is a specification:

My improved system of copying and enlarging designs for calicoes and other fabrics, consists in a novel construction and mode of use of a camera, the apparatus being so made that an image of any opaque fabric or pattern that is to be reproduced upon an engraved roller that is to be used in a printing-machine, is thown directly upon the metallic plate that is to be used in the pentagraphic engraving-machine, this image being in form and color the exact reproduction of the original and of any required size, the adjustments for position and focal distance being such as to insure any required proportion between the original pattern and the colored image that falls upon the horizontal plate.

By the mode of copying now commonly in use one or two weeks are required for the preparation of a sketch in outline of an elaborate pattern. This is made in black ink upon transparent paper, which is of a definite size as compared with the required size of the figure that is to be produced upon the printing-roller. This sketch is placed between two sheets of plate-glass, which form the top of a camera-box, which is placed under a sky-light. This box is attached to the upper end of an open tube that is from twenty to forty feet in length, its lower end being just above a horizontal table, upon which is a sheet of paper to receive an image in black lines formed by the passage of sunlight through the pen-and-ink sketch above referred to. To set this apparatus to a definite scale of enlargement, two persons are required—one at the upper end of the long tube and one at the table where the image falls. This image, formed by transmitted light, is not in colors, and great care is required to distinguish those lines that are to be (in the finished fabric) of one color and printed by one engraved roller.

My improved apparatus can be used in a small room; but one attendant is required; artificial light is used; the image is in colors; this image falls upon the metallic plate that is to be used in the pentagraphic-engraving machine. An original design or figure, made upon opaque paper, on a piece of the calico or other cloth that is to be copied, are placed in the instrument, thus dispensing with the labor and time usually required for the preparation of a sketch upon transparent paper.

Figure I is a side view and section of the apparatus. Fig. II is a top view, showing the position of the pattern that is to be copied.

A suitable frame to support the apparatus is formed by the side-posts A A′, Fig. I, which rest upon the floor V. To this frame pulleys W W are attached, which support the cords D D′. These cords are fastened to the platform B at opposite ends, and carry counter-weights C C′ that support the weight of the camera F E M and attached parts, which rest upon the platform. This may be moved vertically and retained in place by the clamping-screws Y Y′. The drawing-table O is centrally placed within the frame. It can be raised or lowered a short distance, and held at the required height by the clamp-screw Q. A metallic plate, X, usually of zinc or lead, is fastened to the table. Its upper surface is smooth, and it may be slightly coated with flake white, so that pencil-marks drawn upon it may be legible. When this plate is taken from the table the lines marked in pencil are cut in with a graver, and the tracer of the engraving-machine follows these lines. An oblong box, E, having its top open, rests upon the platform, and another box, F, open at the bottom, and of a little larger size than the box E, is placed over it. The upper box has two chimneys, G G′, for the escape of smoke from the gas-lights H H′, which are situated at each end of the oblong box near to the bottom. Gas is supplied to the burners I I′ through the tubes J J′ leading to a main supply-tube, U, Fig. II, which is provided with a stop-cock for letting on and shutting off the gas. At each end of the box E there are reflectors L L′ behind the gas-lights H H′. At a short distance from the gas-lights toward the centre of the box there are convex lenses K K′, which act as condensers of the light. A camera-tube, M, is secured to to the bottom of the traversing platform B, the object-glass R′ being nearest to the table O. The other glass or lens R is above it, and the position of

the two lenses, with reference to each other, is adjusted by the thumb-screw N. The light of the gas flames is thrown by the reflectors L through the convex lenses or condensers K, and falls upon the lower side of the pattern P, shown in dotted lines in Fig. II. The pattern is stretched smooth and held in place by the two springs S and S′, and may be a design upon paper, a printed figure, or a sample of the cloth or fabric that is to be reproduced, the sketch usually made upon transparent paper, and hereinbefore referred to, being dispensed with. The light is reflected from the lower side or face of the pattern P, and, passing downward through the lenses of the camera M, falls upon the plate X, and produces an exact image of the pattern P both in form and color.

In the instrument now constructed, I have used a Voightlander tube, the object-glass being about two inches in diameter. Its usual height above the drawing-table is such as to allow a pencil to be used freely below it.

The size of the image upon the metallic plate that lies upon the table is regulated by the cords T T′, which move the box F and carry the pattern P up or down, and by the cords D D′, which raise or lower the platform B, the table-clamp Q and the thumb-screw N being mainly used for adjustment to distinct vision.

The room in which the instrument is placed is darkened, and copies of patterns may be made in the evening as well as by day-light.

The apparatus is intended, mainly, for the production of figures upon a metallic plate that is to be subsequently used in an engraving-machine; but it is also suitable for the reproduction upon paper or card-board of designs of all kinds for carpets, shawls, tapestry, and other woven fabrics.

The lenses in my apparatus are, as before mentioned, of small size, while in the instruments used with a transparent pattern they must be four or five inches in diameter, in order to give sufficient illumination and a definite image upon the drawing-table.

What I claim is—

1. The copying and enlarging of designs, figures, or patterns by artificial light thrown directly upon an opaque pattern by means of the reflectors L, the condensers K, and the adjustable boxes E F, the rays passing thence through a camera-tube and producing a colored image of the pattern upon a metallic plate or a sheet of paper, substantially as herein described.

2. I also claim the combination of the pattern or design P and its supporting-box F, with the lower box E, the adjustable platform B, and the drawing-table O, substantially as herein described.

THOMAS HALL. [L. S.]

In presence of—
JOHN M. BATCHELDER,
HENRY S. ROWE.