

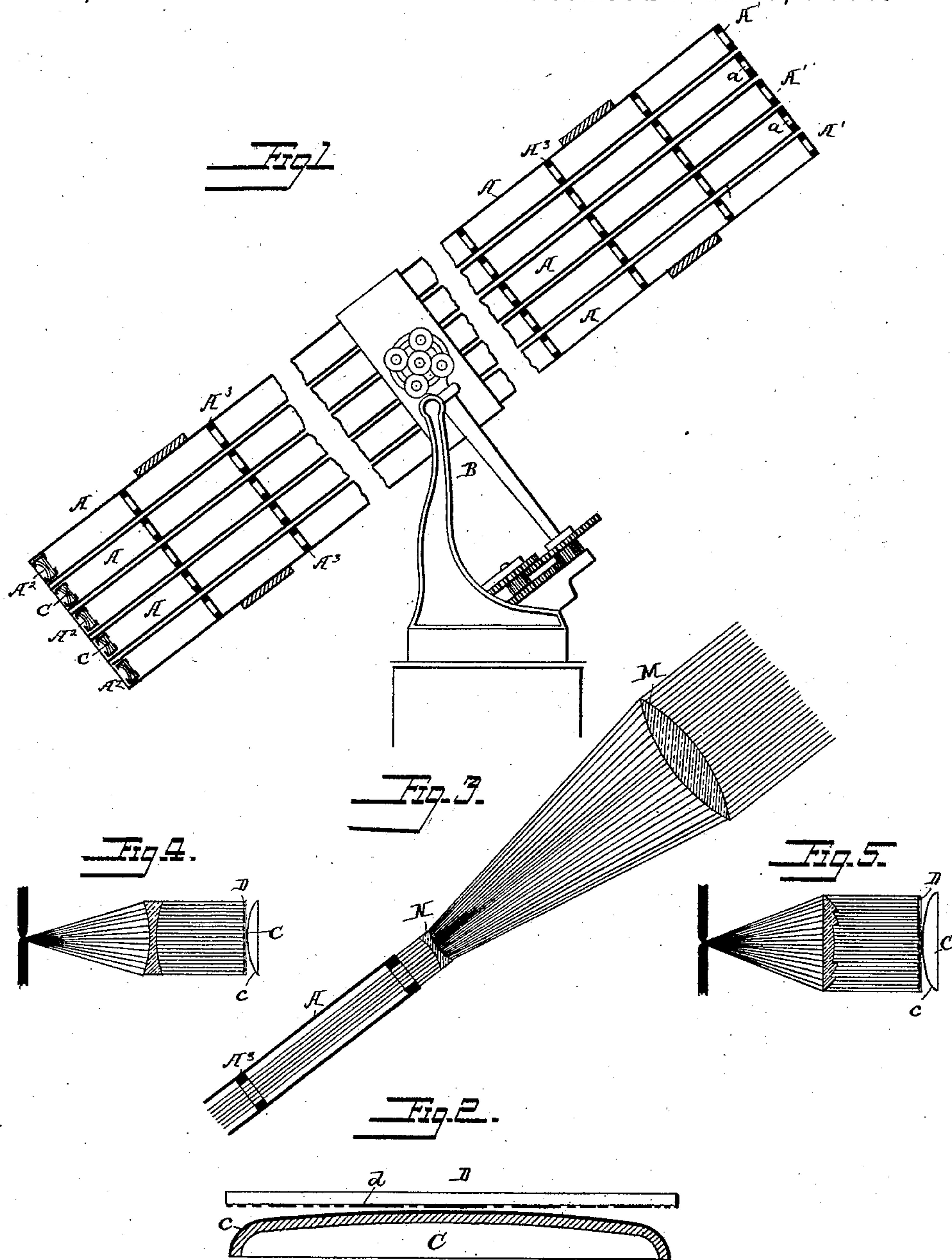
(No Model.)

J. BAYNES.

APPARATUS FOR DECORATING METALS.

No. 379,092.

Patented Mar. 6, 1888.



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR DECORATING METALS.

SPECIFICATION forming part of Letters Patent No. 379,092, dated March 6, 1888.

Application filed May 18, 1887. Serial No. 238,681. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN BAYNES, a subject of the Queen of Great Britain, and a resident of the county of Westchester, in the State of New York, United States of America, have invented certain new and useful Improvements in Decorating Metals, of which the following is a specification.

The object of my invention is to overcome the difficulties in photographing upon convex, concave, or irregular surfaces by the use of a plane negative. I attain this end by taking steps to secure light in the form of parallel or nearly parallel rays and by exposing the properly-prepared surface to such light with a plane negative over it, the parallel rays acting on the surface with the same effect as if the negative were in close contact at all points.

It will be understood that the foreshortening of the figures due to the inclination of portions of the surface should be allowed for by correspondingly distorting the negative, and that a long exposure to the parallel rays will be required, because my method of excluding all the rays not parallel tends to weaken the effect of the sunlight or other light employed. The weakening, however, may be largely offset by employing a condenser or combination of lenses to concentrate the sunlight or other light, so that a larger number or quantity than usual of parallel rays may be available in the limited space employed.

I will describe the invention as applied to the decoration of watch-backs; but it is obvious that the invention will be equally valuable in other relations.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a general side elevation showing the entire apparatus in one form on a small scale. Fig. 2 is a section through the watch-back and its sensitive coating with the plane negative in place over it. This is on a very much larger scale than Fig. 1. Fig. 3 is a diagram showing the arrangement by which more light is condensed into a tube when required. This latter expedient applies with one tube only in use. The plan shown in Fig. 1 allows a large number of tubes to be used at

once and turned by the same clock-work. Figs. 4 and 5 are diagrams showing the direction of the light-rays in their relation to the operating parts of the device. Fig. 1 is shortened by portions of the tubes being supposed to be broken out and the ends brought nearer together. A portion of the tubes is shown in section. The tubes may be four feet long and only sixteen inches or less in diameter.

Similar letters of reference indicate like parts or corresponding parts in all the figures where they occur.

A A are a series of tubes, smoked or otherwise made as absorbent of light as possible on their interiors, and mounted in a bearing, B, equipped with mechanism similar to that long known in astronomical observatories to give a motion corresponding to the revolution of the earth, so that the tubes may remain steadily aimed at one point in the heavens. The upper end of each tube has a changeable ring, A', with an aperture, a, smaller than the tube A. I propose to change the rings A' as required, to give a larger or smaller aperture a, according to the delicacy of the work, the smaller aperture giving the sharpest and nicest work, but requiring longer exposure.

A<sup>2</sup> are removable devices of any ordinary or suitable kind for conveniently introducing and removing the articles to be decorated, together with the plane negatives, which are firmly held in the required position over the respective faces which are exposed to the light coming through the respective tubes.

C is a watch-back, for instance, having a sensitive coating, c, of a character suitable to serve as a "resist" in etching. I prefer to employ for the sensitive coating the material described in a patent to me dated August 7, 1883, No. 282,485, which is composed of ninety parts Syrian asphalt or other good and hard asphalt, ten parts gum-copal, and eighty parts oil of turpentine.

D is a plate of glass, and d a decorative device on one face, preferably the under face, of the plate of glass D, made in strongly-marked alternations from clear transparent portions to densely-opaque portions.

To operate the invention the negative is fixed in position above a watch-back and out of contact therewith, and held by any ordinary



clamps or other suitable means, and mounted in the base of one of the tubes A. As the face of the sun is not a mere mathematical point, but on the contrary a disk having a diameter of about one degree, the light shining from a small portion only of the face of the sun will flow down through the whole length of the tube. All the light from other portions of the sun's face will, by entering the tube a little oblique to its axis, strike the sides of the tube and be absorbed. After a sufficiently long exposure the light from only a small portion of the sun will have sufficiently affected the sensitive coating *c* by shining through transparent portions of the negative, and the holder A<sup>2</sup> may be removed from the tube A, the watch-back taken out and washed to remove the portions of the coating which have been unaffected by light and remain soluble and exposed to acid to etch through those openings. These operations may be as set forth in my patent of August, 1883, above referred to, and the solvent being oil of turpentine or other essential oil in which asphalt is soluble. After the removal of a watch-back for such final treatment a fresh one properly coated with the sensitive composition is placed under the same negative, or under another one of about the same size, and the holder A<sup>2</sup> is again affixed to the tube A and exposed another two hours or other sufficient period, and so on so long as the sun is sufficiently high and the weather is clear.

A series of internal rings, A<sup>3</sup>, in the tube A, densely blackened with as dead a black as can well be obtained, aids to still further prevent any reflection of light from the insides of the tube. The effect of these is to intercept the oblique rays of light and to give the slight reflection which obtains in directions which send it away from the lower end of the tube.

In Fig. 3, M is a large convex lens concentrating a large amount of sunlight at the concave lens N, which again makes it parallel, but in a smaller space than before. The light thus concentrated flows through the tube A and is treated as above described, producing its effect more rapidly by reason of its greater quantity in a given space.

I can use any sensitive coating which will serve as a resist after a portion has been dissolved and removed. Instead of the asphalt composition above described, I can use albumen or gelatine or the two together. I can use gelatine with a small proportion—say about two and one-half per cent.—of bichromate of ammonia, or I can use a similar percentage of bichromate with potash. I can use as the biting agent perchloride of iron or sesquichloride. Water should of course be used as the solvent for the portions unacted on by light when the albumen or gelatine coatings are used. The dissolution and removal may be done by a gentle current of water without brushing.

Further modifications may be made in the

details without departing from the principle or sacrificing the advantages of the invention.

I can use much larger tubes so long as the aperture *a* is kept small and sufficiently distant from the negative. The tubes may, for cheap apparatus, be kept pointed by hand instead of by an observatory clock. The fact that it is immaterial what part of the sun is aimed at, or even if it is very unsteady and sometimes aims entirely outside of the sun for brief periods, greatly recommends such a cheap mode of working.

Parts of the invention may be used without the whole. I can vary the number of the internal rings, A<sup>3</sup>, or can dispense with them entirely. I can use a single tube, A, instead of a cluster, as shown.

Instead of using a negative, D *d*, which is plane, it may be dished to a slight extent. In other words, my invention will succeed with the negative of a form much or little out of conformity to the sensitive coating to be treated.

The tube is of little or no service where there is no diffused light and the rays are received from a point.

Figs. 4 and 5 show the light received from electric-arc lights, a suitable lens being interposed to make the rays parallel; and some success may be attained without any tube, and I have so shown the parts in these figures; but, as there is much diffused light from the walls of the apartment under all ordinary circumstances, it is much better in all cases to use the tube.

What I claim is—

1. The combination, with a tube provided with a holding device, of a flat negative and a curved or irregular sensitized surface, substantially as described.
2. The combination, with a tube provided with apertures at one end and a holding device at the other, of a flat negative and a curved or irregular sensitized surface out of contact with the negative, substantially as described.
3. A tube having a holder at one end and apertures at the other, in combination with mechanism for holding it to the light, a flat negative plate in the holder, and an irregular or curved sensitive coated article out of contact with the plate, substantially as described.
4. The combination, with a tube arranged to transmit parallel rays of light, of a flat plate having a foreshortened negative thereon, and a curved or irregular surface having a sensitized coating, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN BAYNES.

Witnesses:

P. KEMBLE, Jr.,  
BERNARD J. KELLY.