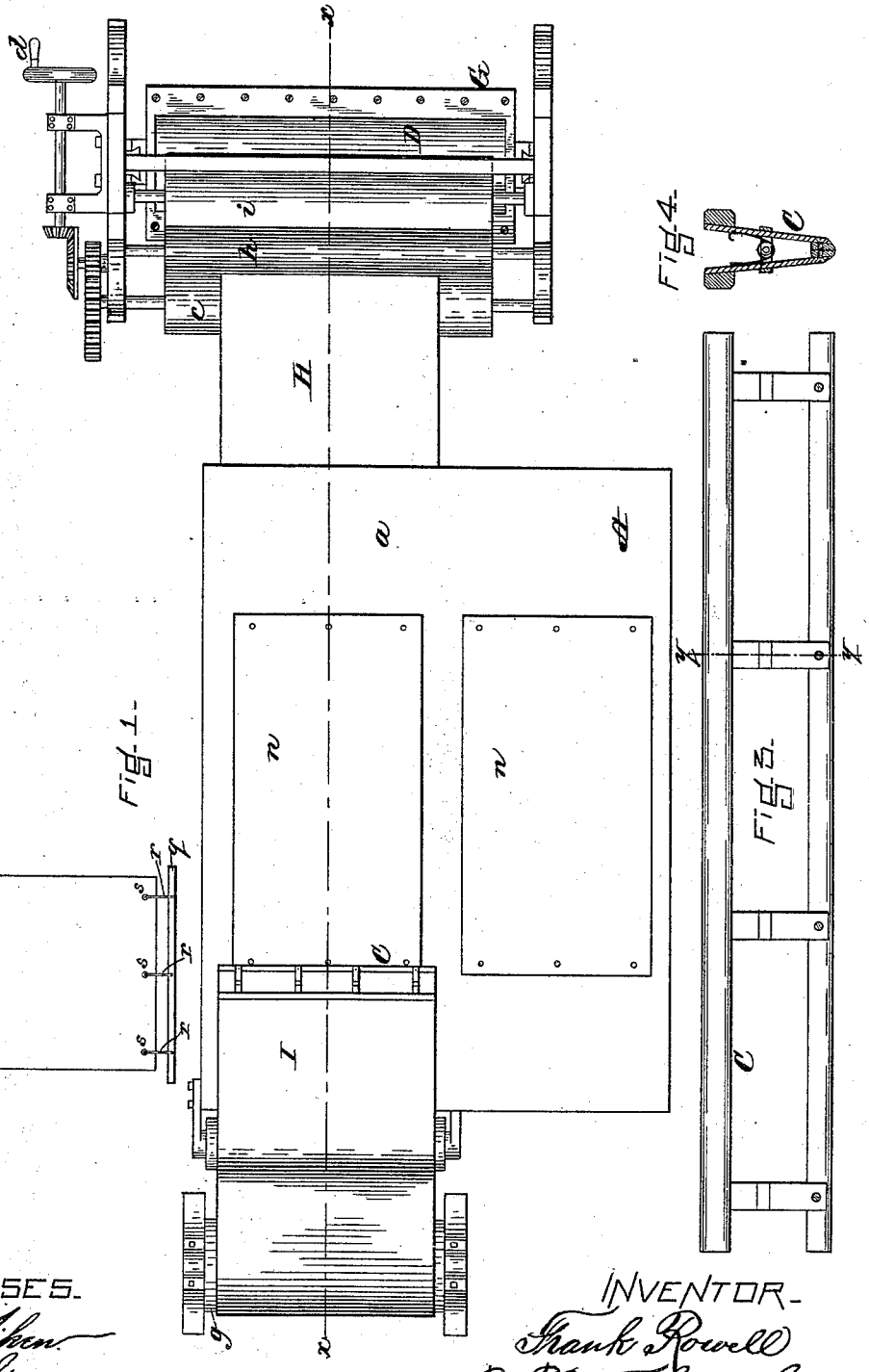
(No Model.) 2 Sheets—Sheet 1.

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No. 415,566. Patented Nov. 19, 1889.



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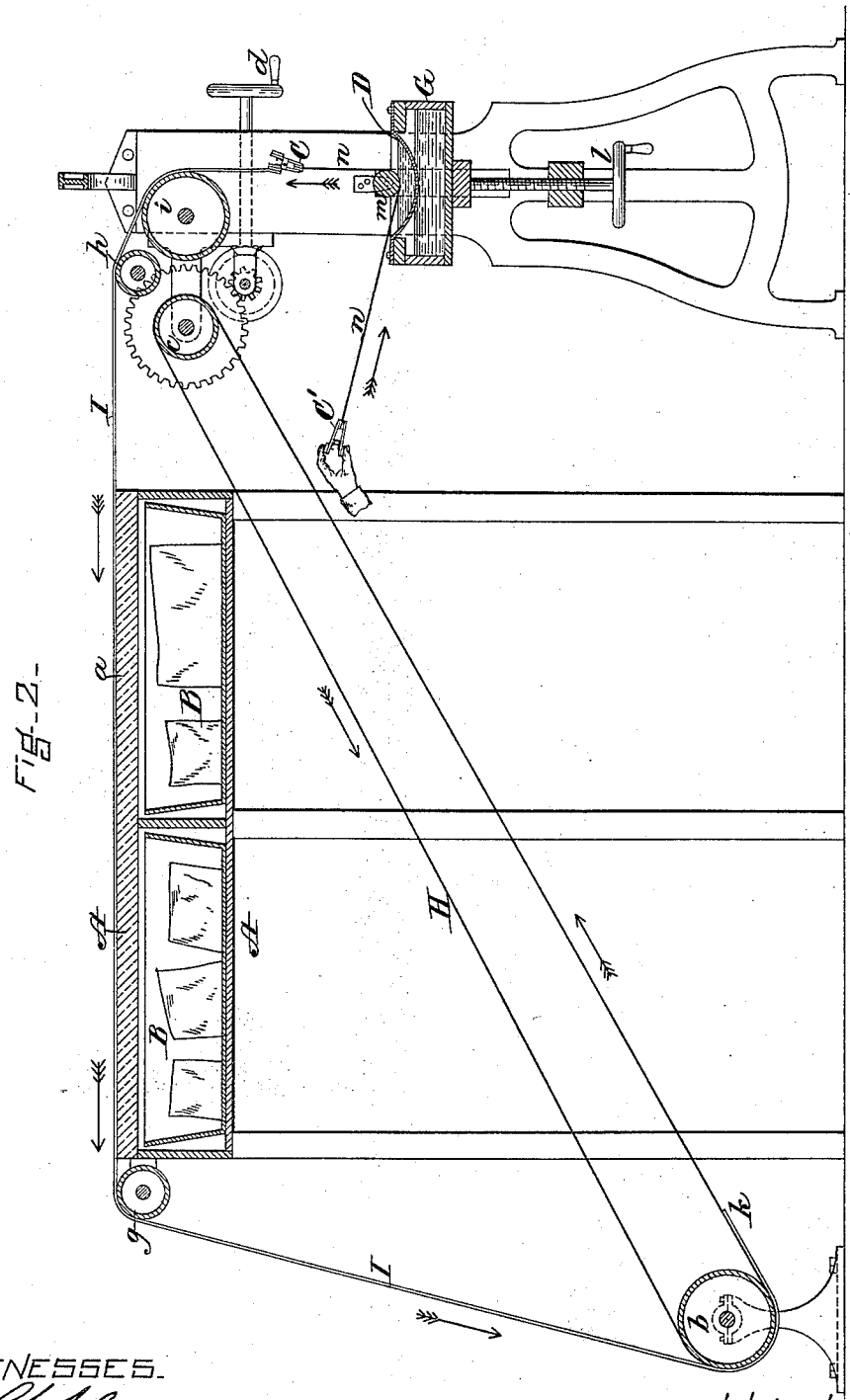


Fig. 2.

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UNITED STATES PATENT OFFICE.

FRANK ROWELL, OF BOSTON, MASSACHUSETTS.

METHOD OF COATING CELLULOID PLATES.

SPECIFICATION forming part of Letters Patent No. 415,566, dated November 19, 1889.

Application filed October 24, 1888. Serial No. 289,057. (No model.)

To all whom it may concern:

Be it known that I, FRANK ROWELL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Method of Coating Celluloid or Zylonite Plates with a Sensitized Emulsion for the Purpose of Making Photographic-Negative Prints, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the apparatus which I employ for coating a celluloid or zylonite plate with a sensitized emulsion. Fig. 2 is a longitudinal vertical section of the same, cut on the line *x x* of Fig. 1. Fig. 3 is a front elevation of one of the clamps of the said apparatus. Fig. 4 is a vertical section of a clamp, cut on the line *y y* of Fig. 3. Fig. 5 is an elevation illustrating the manner in which the celluloid plate is hung up to dry after the emulsion has been applied thereto.

My invention relates to an improved method of affixing a photographic-negative film on a celluloid or zylonite plate, whereby the operation of coating the plate is performed in a more rapid, economical, and satisfactory manner than heretofore.

One feature of my invention consists in preparing a celluloid plate so that the sensitized emulsion will firmly adhere to it in a smooth even coating.

A further feature of my invention consists in quickly gelatinizing said sensitized emulsion on said plate by placing said plate on a cold smooth horizontal surface, which will not injuriously affect the chemicals contained in the emulsion.

A further feature consists in holding said plate in an expanded condition after the sensitized emulsion has been applied thereto, whereby it is prevented from curling or warping while drying.

In carrying my invention into effect I proceed as follows: I make an ice-box A, of wood, excepting its top. The top *a* of said ice-box I make, preferably, of marble; and the top of said marble I make very smooth and perfectly horizontal for the purpose of preventing the sensitized emulsion from running or creeping on the surface of a celluloid plate when first laid upon said top. One side of said box is hung upon hinges for the purpose of conveniently putting in and taking out of said box the vessels B, containing ice, as seen in Fig. 2, and for holding the water from the melted ice. The apparatus is provided with two clamps C C′, which I make of wood. They are like each other and are closed by springs.

D, Fig. 2, is the vessel containing the sensitized emulsion.

G, Fig. 2, is the vessel containing the warm water in which rests the vessel D.

H is the endless belt, and *b c* are the rollers on which said belt moves.

The crank *d* moves and controls the mechanism which operates the driving-roller *c*, which moves the endless belt H, and which in turn moves the conveyer I and all the parts connected with said conveyer. Said conveyer is made of cloth of the width of the clamps C C′, as shown in Fig. 1.

A top view of the ice-box is shown in Fig. 1, and exhibits two recently-coated celluloid plates *n n*, lying side by side.

g, *h*, and *i* are rollers over which and the roller *b* the conveyer I passes in its movements back and forth.

I prepare a celluloid or zylonite plate so that the sensitized emulsion will firmly adhere to it in a smooth even coating by first immersing said plate in water until it becomes saturated. The plate is then withdrawn from the water and laid upon a flat surface, preferably upon a sheet of glass, where I remove, with a flexible-rubber scraper provided with a handle or by any other well-known means, all the free or superfluous water from its surface, leaving said plate in a moist or damp condition, for the purpose of insuring a firm, smooth, and even adhesion to it of said sensitized emulsion. Said plate may remain in the water for many days without harm, but an immersion of nine or ten hours is sufficient. For the purpose of preparing said plate so that it may be held in an expanded state without warping or curling while undergoing the process of drying, I punch three holes near each end of said plate, preferably before immersing it in wa-

ter, said holes being adapted to receive hooks, to be hereinafter referred to. The plate being ready to receive the emulsion, I place the vessel D, containing said emulsion, in another vessel G, supplied with warm water, so as to give said emulsion a temperature of from 100° to 120° Fahrenheit; and for the purpose of applying said emulsion I make use of a part of the well-known apparatus which has been in use for many years in making photographic carbon tissue; but as photographic carbon tissue is made in lengths of hundreds of feet, and as the celluloid plate is very limited in dimensions and requires totally different treatment, I place the ends of said plate between the jaws of the clamps C C′, as seen in Fig. 2, the length of each clamp being an inch or two longer than the width of said plate, as seen in Fig. 1. One of said clamps C is fastened to one end of the conveyer I, the other end of said conveyer being fastened at *k* to the endless belt H. The other clamp C′, which holds between its jaws one end of said plate, is held in the hands of the operator, as seen in Fig. 2, for the purpose of guiding and maintaining the desired and necessary tension on said plate while it is being drawn through the said emulsion.

Before applying the emulsion to a celluloid plate I place one end of said plate between the jaws of clamp C and bring the end of said plate while between the said jaws directly under the center and up against a roller *m*, and before doing this I lower, by turning a crank *l*, the vessels D and G far enough below the roller *m* to permit the necessary manipulations to be performed without coming in contact with the emulsion in the vessel D. Having placed one end of said plate between the jaws of clamp C and under and up against the roller *m*, and the other end of said plate between the jaws of clamp C′, held by the hands of the operator, I now, by turning the crank *l*, raise the vessels G and D until the emulsion in the vessel D touches the said plate. I then turn the crank *d*, which by its connecting-gear turns the roller *c*, which moves the endless belt H, the conveyer I, and its clamp C, and the celluloid plate *n*, with its clamp C′, held by hand, in the direction of the arrows, and finally draws said plate *n* through the emulsion, and when clamp C′ is drawn very near—say within an inch or less of the roller *m*—the springs in said clamp are depressed by the hands holding said clamp C′, and that end of the plate *n* is instantly set free and is drawn through the said emulsion. I continue to turn crank *d* until said plate *n* has been drawn with its coated side uppermost upon the top *a* of the ice-box A. I then remove clamp C from the plate *n* and move said plate sidewise on the top *a* of said ice-box sufficiently to allow a succeeding plate to lie by its side, as shown in Fig. 1. As soon as the plate *n* is drawn upon the top of the ice-box A the cold marble top *a* of said ice-box instantly chills the emulsion on said plate, and so rapidly accelerates the process of gelatinization that by the time a succeeding plate is drawn upon said top the emulsion on the preceding plate will have completely gelatinized and the said preceding plate will be ready to be hung up to dry; and for the purpose of holding said plate in an expanded state, so that it will not curl or warp while undergoing the process of drying, I use two shackle-rods *q*, with three hooks *r* permanently fastened to each of them, the said hooks being fastened at such places on said rods *q* as to correspond to holes *s* made in said plate, whenever said plate and said rods are brought together, for the purpose of inserting said hooks in said holes. The shackle-rods are made of wood, three or four inches longer than the width of said plate, and are of sufficient strength and weight to prevent said plate from curling or warping during the process of drying, and said hooks are made of such size that they may be inserted in the holes in said plate. The hooks on one shackle-rod are inserted in the holes in one end of said plate, and the hooks of the other shackle-rod in the holes in the other end of said plate. I then hang up said plate to dry by resting the ends of one of said shackle-rods which project beyond the width of said plate on pegs *t* or rails made to receive them, as seen in Fig. 5. When dry, said plate is ready for the camera and printing-frame.

In expediting the drying of a celluloid or zylonite plate by holding it over a gas-flame or other source of heat, care must be used not to scorch or burn said plate.

The top *a* of the ice-box, the shackle-rods, and clamps are made of material which will not injuriously affect any of the chemical constituents of the emulsion.

When a sensitized emulsion is applied to a dry and thin celluloid plate, said emulsion will not lie evenly upon it, but will cause said plate to cockle and throw said emulsion into waves and heaps, utterly unfitting it for photographic purposes. For the purpose of producing a level even coating, I apply said emulsion while said plate is moist or damp, as previously described.

When a celluloid plate, after it has been coated with the sensitized emulsion, is laid away or hung up to dry, it will, unless prevented by some intervening device, warp and curl upon itself, so as to ruin the sensitized film on its surface.

In the practice of photography glass plates have been extensively used for supporting the negative film; waxed paper has also been used, and so have gelatine plates; but there are serious objections to each of them. Glass is heavy, cumbersome, and easily broken, gelatine plates are perishable, and waxed paper lacks rigidity and transparency.

The advantages of my invention are many and valuable. Celluloid is a tough leather-like material, very light in specific gravity,

and will never break unless intentional force is employed for the purpose of breaking it. Positive photographic prints made by light transmitted through it are as beautiful as those made from negatives on glass. The breaking of glass plates containing negatives often causes great disappointment and serious losses, as many such negatives cannot be reproduced. The negatives of the movements of the heavenly bodies, of moving steam and sailing ships, flying birds, portraits, and groups of famous persons may be cited as among the irreparable losses caused by the breaking of negatives made on glass.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of preparing a celluloid plate, so that the sensitized emulsion will lie upon it in a smooth even coating, said method consisting in immersing said plate in water and then removing all the free or superfluous water from its surface, whereby said plate is left in a moist or damp condition, substantially as and for the purpose herein set forth.

2. The method of coating a celluloid or zylonite plate with a sensitized emulsion, consisting in immersing said plate in water, then removing all the free or superfluous water from its surface, then applying the sensitized emulsion and rapidly gelatinizing the same by drawing or laying the plate, with its coated side uppermost, upon a cold smooth horizontal surface, then removing the plate from said cold surface, and finally holding and drying it in an expanded condition, whereby it is prevented from curling or warping while undergoing the drying process, substantially as herein set forth.

Witness my hand this 22d day of October, A. D. 1888.

FRANK ROWELL.

In presence of—
P. E. TESCHEMACHER,
HARRY W. AIKEN.