Sept. 24, 1929. F. J. TRUMPOUR 1,729,462

BLUE PRINTING MACHINE

Filed Jan. 10, 1927 4 Sheets-Sheet 1

Fig. 1.

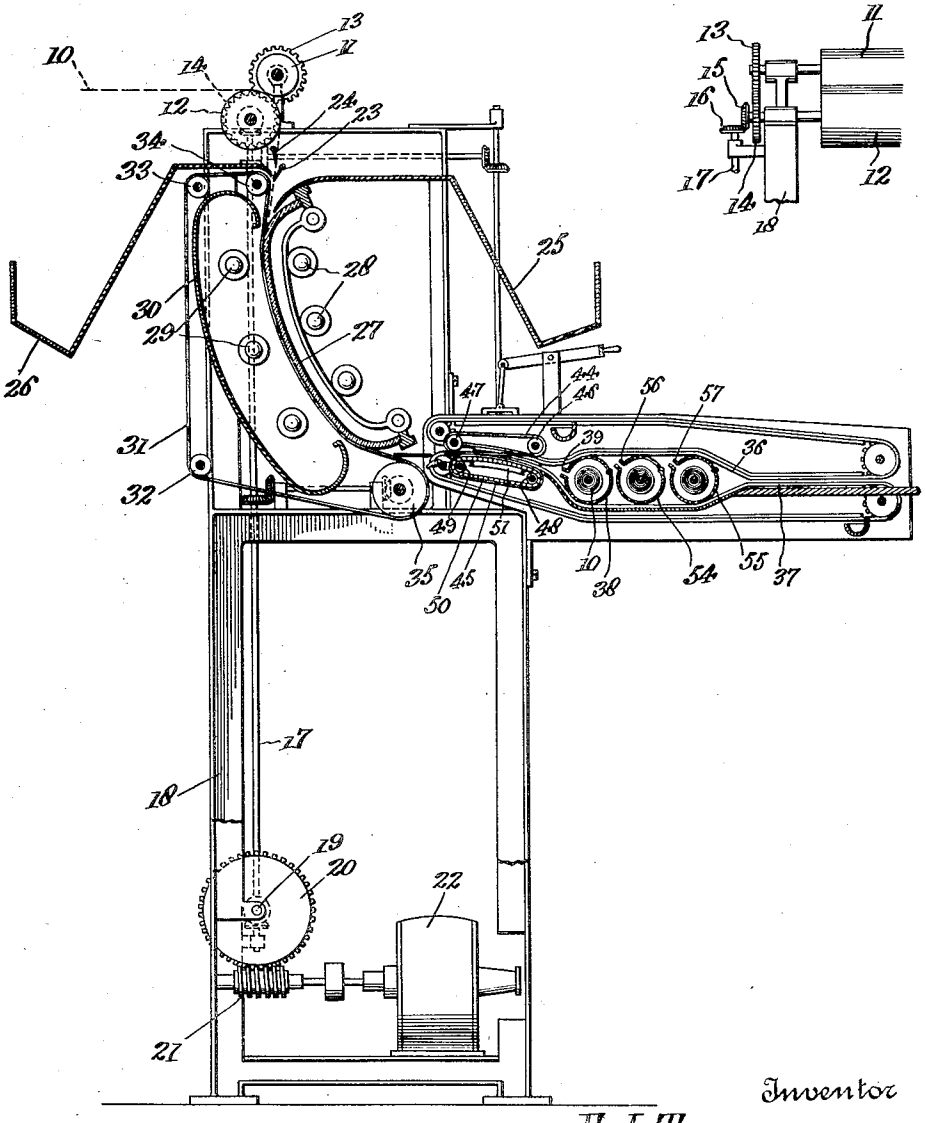


Fig. 2.

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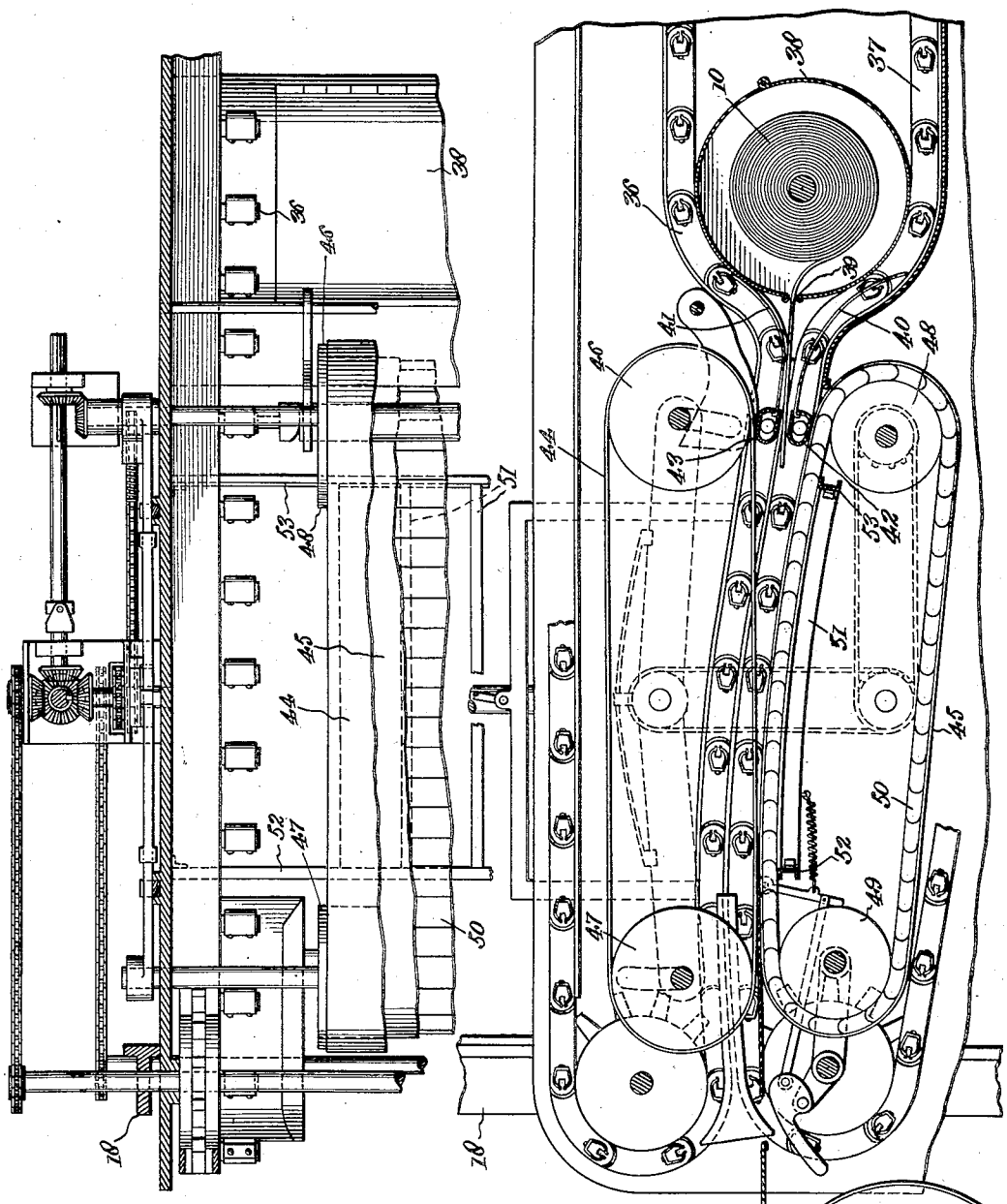


Fig. 3.

Fig. 4.

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BLUE PRINTING MACHINE

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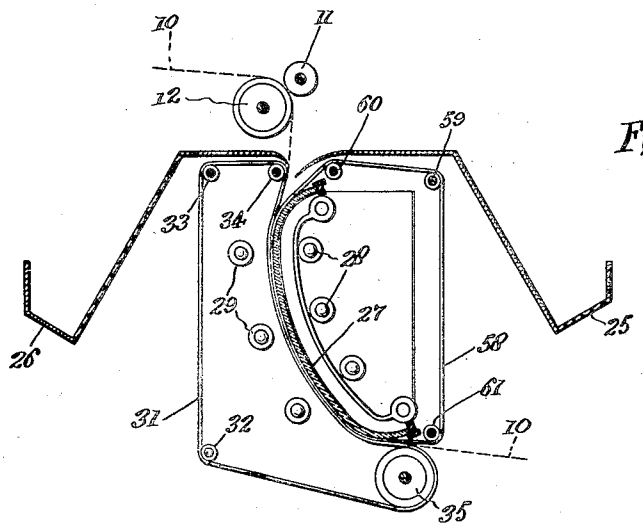


Fig. 5.

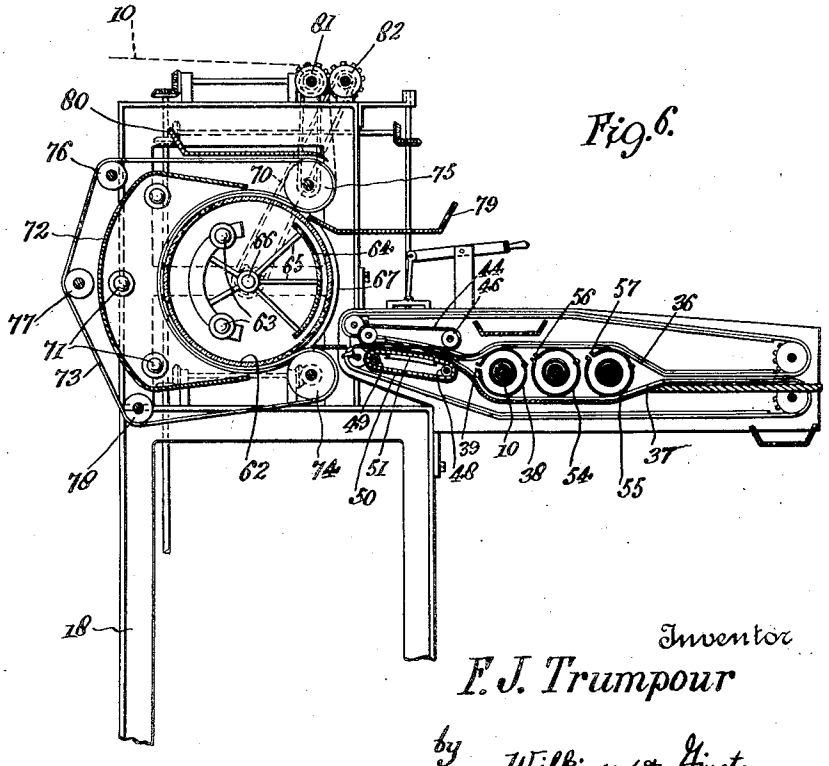


Fig. 6.

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BLUE PRINTING MACHINE

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Fig. 8.

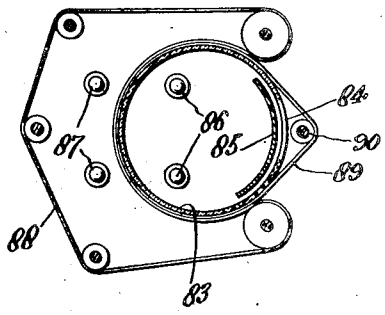


Fig. 7.

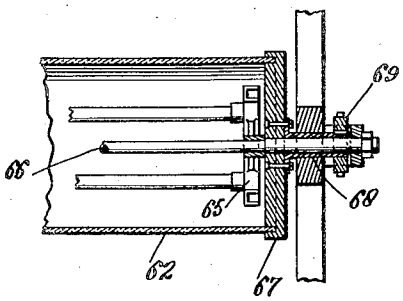
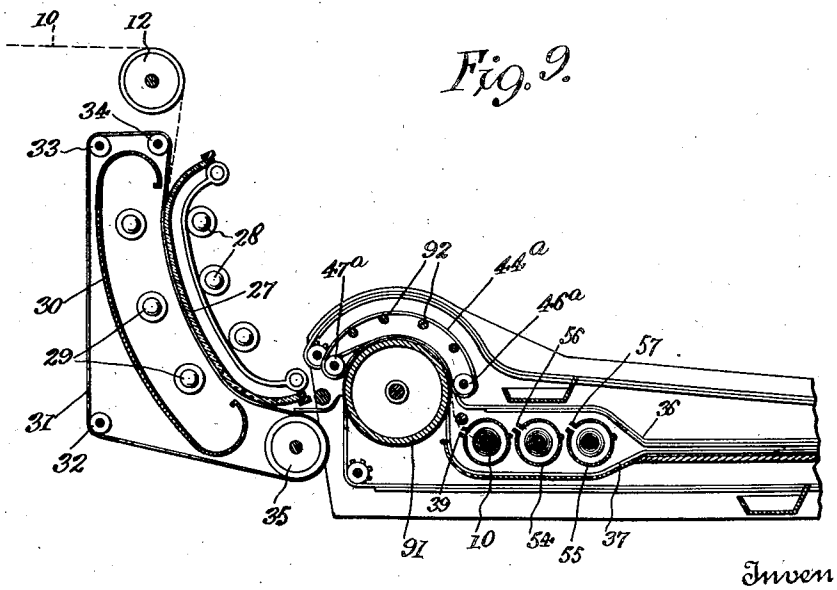


Fig. 9.



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UNITED STATES PATENT OFFICE

FREDERICK JAMES TRUMPOUR, OF FOREST GLEN, MARYLAND

BLUE-PRINTING MACHINE

Application filed January 10, 1927. Serial No. 160,250.

The present invention relates to improvements in blue printing machines and consists in certain improvements over the similarly entitled invention shown and described in my co-pending application, Serial No. 124,046, filed July 21, 1926.

An object of the invention is to dispense with the two exposure stations as provided in the application above referred to, and to reduce and condense the size of the machine and the space required to contain it, and also to limit the device to a single exposure station where the blue print paper, sensitized upon both surfaces, may be subjected simultaneously to printing from negatives at opposite sides thereof. This single exposure station will reduce the time element involved in the printing process and will increase the capacity of the machine and in general, reduce the expense.

A further object of the invention is to provide an improved blue printing machine in which provision is made for printing blue print paper, sensitized upon a single surface only, blue print paper upon which an emulsion is produced upon both surfaces, or Vandyke paper.

A still further object of the invention is to provide an improved blue printing machine in which the accurate registration of the negatives and blue print paper will be assured, in which the printing will be efficiently and faithfully accomplished and in which the movement of the paper and negatives through the machine will be positive and faithful.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation with parts shown in section of an improved blue printing machine constructed in accordance with the present invention.

Figure 2 is a fragmentary detail showing the drive mechanism of the blue print drawing rolls.

Figure 3 is an enlarged horizontal sectional view taken through the assembly and feeding mechanism.

Figure 4 is a side view of the parts shown in Figure 3.

Figure 5 is a fragmentary sectional view taken through the single exposure station showing a slight modification.

Figure 6 is a vertical section taken through a modified form of the machine.

Figure 7 is a fragmentary longitudinal section of the glass exposure station cylinder, and its support as shown in Figure 6.

Figure 8 is a vertical section through a glass cylindrical exposure station, showing a further modification; and

Figure 9 is a vertical section through an exposure station and assembling and feeding apparatus showing a still further modified form of apparatus.

Referring more particularly to the drawings and for the present to Figures 1 to 4, inclusive, the broken line 10 in Figure 1 designates the blue print paper as emerging from between the feed rolls 11 and 12, which feed rolls are also shown in Figure 2 as having extended shafts to which are affixed the pinions 13 and 14 driven from the beveled gear wheels 15 and 16, the latter of which is fixed to the vertical line shaft 17. The shaft 17 extends down to the lower portion of the framework 18 of the machine where it is driven by beveled or other gears from the horizontal shaft 19, having thereon the worm wheel 20 meshing with the worm 21 driven by the electric motor 22 or other appropriate source of power.

The rolls 11 and 12 thus have a peripheral movement in opposite directions such as to draw the blue print paper 10 through the machine. It will be understood that a negative is placed against each side of the blue print paper, and after passing the exposure station, the deflectors 23 and 24 will separate the negatives from the blue print paper, one negative being diverted to the hopper 25 and a second negative to the hopper 26.

The hoppers are located at opposite sides of

the exposure station, having the convex glass 27. In accordance with the present invention, one or more lights 28 are located within or upon the concave side of the exposure glass 27 and a second source of illumination, indicated at 29, is located in spaced relation from the outside or convex surface of the exposure glass 27. A casing 30 may be fitted about the exposure station and within the traveling transparent belt 31, which is trained over the rollers 32, 33 and 34, and is driven by the roller 35 adjacent the assembling and feeding apparatus. This roller 35 is shown as placed at the initial or receiving end of the exposure station. The belt 31 will be of some transparent material and the arrangement is such that one flight of this belt will slide past the convex face of the exposure glass 27 in order to tightly press the negatives and blue print paper thereagainst to secure that desirably great pressure necessary for good printing.

Referring more particularly to Figures 3 and 4, these figures correspond to Figures 4 and 5 of the prior application aforesaid, and reference may be had to the prior application for a more complete description of the construction. I am content in the present specification to point out more particularly the features of improvement over my prior machine. At 36 are shown the upper feed chains and at 37 the lower feed chains, while the blue print or Vandyke paper 10 is shown as placed in a roll within the cylindrical casing 38 located between such chains, the blue print paper issuing through an opening 39 in the casing to engage between the two negatives 40 and 41. These negatives are drawn along with the chains by means of the clamping bars 42 and 43, which are fully illustrated in Figures 6 to 10 of the prior application aforesaid. The feed belts are indicated at 44 and 45. The belt 44 is mounted about the rolls 46 and 47, while the lower feed belt 45 extends about the rolls 48 and 49. These belts exert a pressure upon the negatives and interposed blue print paper. It has been found, however, that a certain slippage or relative creeping of the negative and blue print paper takes place even when the lower belt 45 is caused to move over a table, such as shown in Figure 5 of the co-pending application. In order to avoid this, I provide within the fabric feed belt 45, a flexible slat-work conveyor 50 composed of narrow slats secured flexibly together in any appropriate manner. This slat-work conveyor is also mounted to move about the rolls 48 and 49 with the canvas belt 45. The slats extend transversely of the belt and they possess sufficient rigidity to hold the upper run of the feed belt 45 against the lower run of the upper feed belt 44, but it is desirable to sustain the slats at spaced intervals and this I accomplish by the longitudinally extending rails 51. Such rails may conveniently be of I-beam or channel construction and three or more such rails may be used, one rail at each edge of the slatted belt, and a third rail intermediately of the belt. The rails may be supported upon the transverse beams 52 and 53, supported in the side of the framework.

The blue print paper and negatives are received by the exposure station from the feeding belts 44 and 45, the blue print paper being initially threaded through the machine and through the traction rollers 11 and 12, by which the continuity of the movement of the paper is preserved, aided by the movement of the feeding belts and the positively driven transparent belt 31 of the exposure station.

In Figure 1 there are, besides the cylindrical container 38, two other containers 54 and 55. These three containers are interposed between the chains 36 and 37 and the negatives are carried one above and one below these containers. One container may contain blue print paper having an emulsion on only one side for single printing; a second container may hold blue print paper sensitized upon both obverse and reverse faces, for double blue printing; while the third container may contain Vandyke paper. The spouts or openings 56 and 57 of the second and third containers in series are directed upwardly, or they might be directed downwardly in order to permit the paper held therein to pass freely about the container or containers in front thereof.

Referring more particularly to Figure 5, there is herein shown an exposure station complying in all respects with the description of the exposure station illustrated in Figure 1 and similar parts bear the same reference numerals. There is, however, in Figure 5 an additional transparent belt 58 shown extending about the rollers 59, 60 and 61 and about the convex side of the exposure glass 27 next the glass; or in other words, between the glass and the transparent belt 31. As shown in the broken line, the blue print paper and the negatives are received between the transparent belts 31 and 58 and in this condition pass through the exposure station. The belt 58 moves along either by a positive drive mechanism or by the friction of the moving belt 31 and the negative and blue print paper. In either event, it provides a moving surface against which the upper negative will move as against the fixed glass surface of the exposure station in Figure 1. The belt 58 will prevent any sluggishness, lagging and lack of registration due thereto.

Referring now to Figures 6 and 7, the assembling and feeding mechanism is the same as disclosed in Figure 1, but the exposure station in this instance is comprised of a rotary glass cylinder 62. Within the cylinder are the lamps 63 and a reflector or shield 64

held upon a spider framework 65 radiating from the shaft 66.

As shown in Figure 7, this shaft 66 is stationary and the glass drum 62 is mounted in heads 67 which are secured to a sleeve 68 fitted for rotation about the stationary shaft 66. The sleeve 68 carries a sprocket 69 for receiving the chain 70 by which the drum is driven. The stationary shaft 66 forms an appropriate support for the spider frame 65.

A second series of lamps 71 are shown in Figure 6, as arranged upon the outside of the drum and within the metallic casing 72. The blue print paper and negatives are carried beneath the drum and about a substantial portion of its periphery, being held tightly thereagainst by the transparent belt 73, which extends at its flights about the lower driven roller 74 and upper idler 75, and at its intermediate parts about the drum and about small idlers 76, 77 and 78 on the outside of the shield 72. The blue print paper and negatives are taken off at the upper large idler 75, one negative being immediately introduced into the hopper 79, while the other negative is taken to the upper hopper 80. The blue print paper is indicated by the broken line 10, as being carried up through the feed rolls 81 and 82. Suitable stripping means are provided for separating the negatives from the blue print paper at the several hoppers.

Referring now to Figure 8, a somewhat similar form of exposure station is shown, except that the glass cylinder 83 is an interrupted one, having a slot 84 therein and this glass cylinder is fixed against rotation, the opening 84 being obscured or cut off from the light by the arcuate reflector 85 within the cylinder, which contains the exposure lamps 86. The outside exposure lamps are indicated at 87 and one transparent belt at 88. A second transparent belt 89 is provided in this case, which encircles the cylinder 83 an extends about an idler 90 opposite the slot 84. This web or belt 89 may be positively driven, or it may be only driven by the friction of the moving negative and blue print paper, but it provides a slipping surface much like the belt 58, shown in Figure 5.

As to Figure 9, the exposure station is substantially as shown in Figure 1, and the assembling and feeding station is also much like that shown in Figures 1 and 4, except that the upper feed belt 44^a is curved to conform to the curvature of a drum 91 preferably covered with canvas or some other appropriate material and acting as the lower feed belt 45 of Figure 4. The chains 36 and 37 are also trained about this drum 91 and caused to follow an arcuate path about the upper portion of the drum. The drum may be rotated or not, as desired, but it will form a rigid backing for the lower run of the upper feed belt 44^a, and for the blue print paper and negatives that are passing on to the exposure station.

The rolls for supporting the belt 44^a are indicated at 46^a and 47^a. The lower run of the belt will be supported upon the cylindrical surface of the drum 91, while the upper run of the belt may be held away from the cylinder by appropriate idlers 92 or by spacing rods or other appropriate devices.

It will be understood in connection with the apparatus illustrated in this Fig. 9 that the negatives are pulled through by the chains, such negatives being clamped in the registering bars carried by the chains, which registering bars are referred to at 42 and 43 in Fig. 4. The registering negatives and blue print papers are passed over the drum 91, being pressed tightly thereagainst by the curved belt 44^a, and in general, the mode of operation and the progress of the blue print papers and negatives through the machine is as described in the co-pending application above referred to.

It will be appreciated that when the blue print paper, sensitized upon both sides, is passed through the exposure station, the exposure lamps upon opposite sides thereof will direct their rays simultaneously through both negatives whereby the negatives will be printed at the same time upon opposite sides of the blue print paper. This will accomplish the printing in substantially half the time required where two stations are used. The machine may also be made correspondingly smaller and may be operated quicker and with less difficulty, conserving also the time of the operator and in this way reducing materially the cost of this work.

It will be obvious also that many other changes in the construction, combination and arrangement of parts could be made, which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details, except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. A blue printing machine comprising an exposure station, and an assembly and feeding station comprising a pair of movable chains having means to grasp and draw therewith a pair of negatives, feed belts for receiving the negatives therebetween, and a plurality of receptacles interposed between said belts for containing a single and double sensitized blue print paper and Vandyke paper, whereby to introduce the same between said negatives.

2. A blue printing machine comprising means for assembling negatives on opposite sides of a doubly coated blue print paper, a hollow glass drum mounted for rotation, a fixed shaft in said drum, a spider on said

shaft, illuminating means within the drum carried at one side of said spider, a reflector in the drum carried at the other side of said spider, a second illuminating means disposed without the drum, and a transparent belt for pressing the superposed negative and blue print paper against that part of the exterior surface of said drum, that is between the illuminating means within and without the drum.

3. A blue printing machine comprising means for assembling negatives upon opposite sides of a doubly sensitized blue print paper, said means comprising opposed feeding belts, receptacles adjacent said feeding belts for the blue print paper and having openings through which the blue print paper issues, endless chains having means to pull the negatives through the feeding belts, a single exposure station, means for drawing the superposed negatives and blue print paper past said single exposure station, opposed illuminating means at said exposure station for simultaneously printing upon opposite sides of the blue print paper, and means at the exposure station for pressing said negatives and blue print paper tightly together.

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