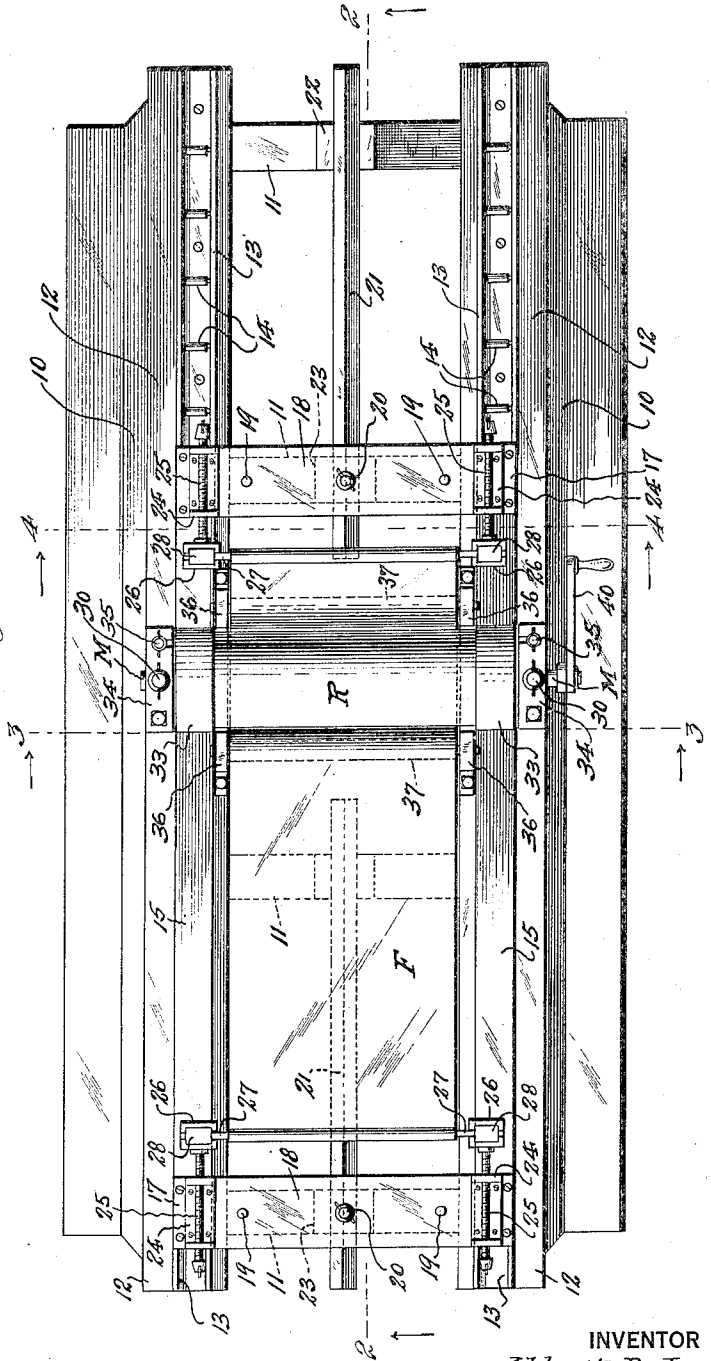
July 26, 1932. A. D. LA POINTE 1,868,709

APPARATUS FOR PREPARING PHOTO STIPPLE INTAGLIO ENGRAVED PRINTING ROLLS

Filed Feb. 7, 1929 3 Sheets-Sheet 1

Fig. 1



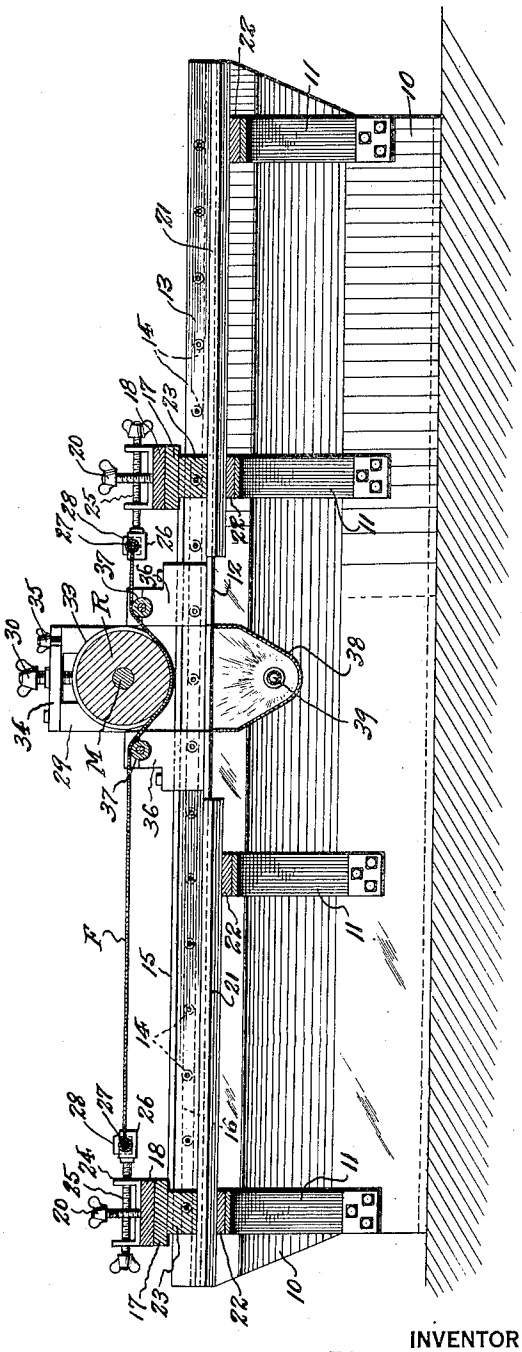
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Fig. 2



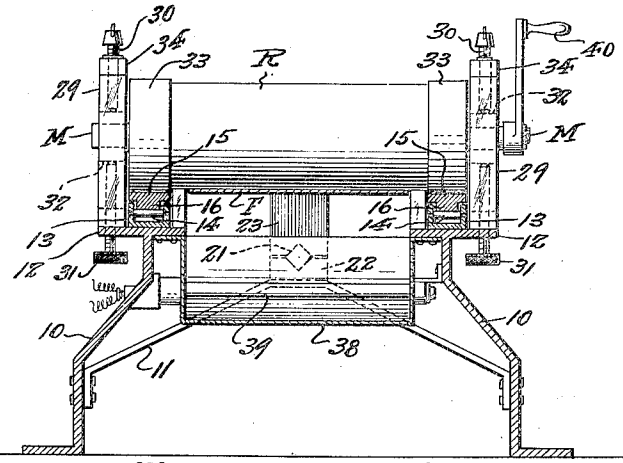
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Fig. 3



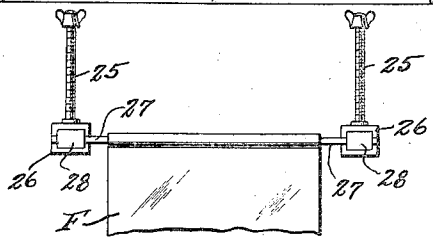
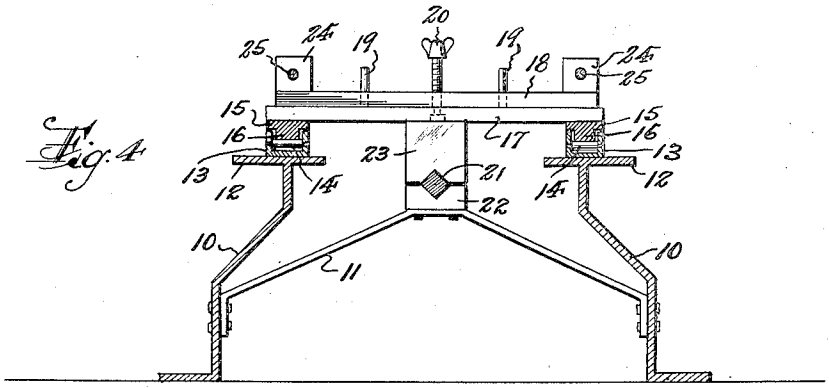


Fig. 5

Fig. 4



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UNITED STATES PATENT OFFICE

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APPARATUS FOR PREPARING PHOTO STIPPLE INTAGLIO ENGRAVED PRINTING ROLLS

Application filed February 7, 1929. Serial No. 338,081.

This invention relates to an apparatus for preparing textile printing rollers, whereby a desired pattern is photographically applied to the surface of the roller, which may then be treated and etched to produce the pattern in intaglio.

The invention has for its principal object to provide a novel construction of photographic printing machine for manipulating the master film containing the design relative to the surface of a sensitized metallic roller upon which the design is to be transferred and then etched in intaglio to form a printing roller ready for use in a textile printing machine.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

An illustrative embodiment of photographic printing machine of this invention is shown in the accompanying drawings, in which:

Figure 1 is a plan view of the printing machine; Figure 2 is a longitudinal vertical section therethrough, taken on line 2—2 in Figure 1; Figure 3 is a transverse vertical section, taken on line 3—3 in Figure 1; Figure 4 is a transverse section, taken on line 4—4 in Figure 1; and Figure 5 is a fragmentary detail plan of adjustable film supporting elements of the film carriage of the machine.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

In the use of the instant invention, preparatory to the production of the desired printing roller for textile printing machines, three color separation photographic negatives are made from a selected color design, and from these negatives three corresponding positives are made. From the positives three direction negatives are made through a screen on sheets of celluloid, which are thereupon placed and secured in register on a thick celluloid sheet called a film support. This film support, thus carrying the direction negatives, is hereinafter referred to as the "design transfer film", which is adapted to be mounted on the film carriage of the printing machine hereinafter described, and used to photographically transfer the design to the surface of a roller in course of preparation of the latter for service as a printing roller for textile printing machines.

The printing roller per se comprises a polished and cleaned cylindrical metallic roller R, preferably made of copper; the same initially possessing a highly polished and smooth surface. This roller is mounted and fixed on a mandrel M. The surface of the roller R is sensitized by a suitable photographic solution or emulsion, which for example, may consist in bichromated gum. The cylindrical surface of the roller R when coated with the sensitizing solution is thereupon dried, whereupon it is ready to be mounted in the printing machine in cooperative relation to the design transfer film F, and subject to the photographic printing process whereby the design of the film may be transferred to the surface of the roller R.

The novel printing machine, made according to and embodying the principles of this invention, comprises the following structure:

Arranged in parallel laterally spaced apart relation are a pair of side frames 10 of suitable longitudinal extent, and secured together by bridging tie bars 11, which are connected to and between the same. Each side frame 10 is provided along its upper longitudinal edge with a horizontal supporting shelf or base 12, which is disposed in the same horizontal plane, and preferably laterally spaced apart as shown in the drawings.

Fixed upon said shelves or bases 12, so as to extend longitudinally from end to end thereof, are guide-members 13. These guide-members 13 are preferably formed of U-shaped channel iron with their open sides upward so as to provide a slideway intermediate the vertical flanges or walls thereof. Journaled in and between the vertical flanges or walls of said guide-members, and so as to lie transversely across the slideway formed thereby, are a plurality of longitudinally spaced traction rollers 14.

Mounted for longitudinal reciprocation on the guide members 13 is a film carriage.

This film carriage comprises a pair of longitudinally disposed slide rails 15, having on their undersides traction shoes 16 of reduced width to fit into the slideways of said guide-members 13, and so as to ride on the traction rollers 14 of the latter. The laterally opposed end portions of the slide rails 15 are connected together by transverse end plates 17 suitably and rigidly secured thereto. Superimposed upon said end plates 17, and arranged for vertical adjustment relative thereto are carriage plates 18, the same being maintained in alignment with said end plates by posts 19, which are anchored in the end plates 17, and upon which said carriage plates 18 are vertically movable. The means for adjusting said carriage plates consists in adjusting screws 20 footed in said end plates so as to turn freely, and threaded through said carriage plates 18. It will be obvious that turning the adjusting screws 20 in proper directions the carriage plates may be raised or lowered relative to the fixed end plates 17, to predetermine the desired level of the former.

In order to rigidly maintain the film carriage against undue lateral play during its reciprocatory movement in operation, additional guiding and steadying means is provided for the support thereof, the same comprising guide-bars 21 preferably of rectangular cross-section. These guide-bars 21 are disposed for longitudinal extension midway between the side-frames 10; the same extending inwardly from each end of the frame work, but terminating short of the intermediate point between said ends. Said guide-bars 21 are preferably fixed in bed-blocks 22 mounted on the bridging tie bars 11, and so that an angular portion thereof is upwardly presented toward the underside of the film carriage. Fixed to and depending from said end plates 17 are rider blocks 23 having their undersides grooved to conform to the upwardly presented contour of said guide bars 21, and disposed so as to bear and slide upon the latter.

The means for coupling the respective ends of the design transfer film F to the ends of the film carriage, and so that the tension of said film as it extends from end to end of the film carriage and between the end plates 17 of the latter, comprises the following devices:

Fixed on the carriage plates 18 are laterally spaced apart yoke members 24 in the upstanding arms of which are mounted longitudinally disposed adjusting screws 25. In swiveled connection with the inward ends of said adjusting screws 25 are upwardly open coupling boxes 26 having indented side walls. Transverse film supporting rods 27 are provided, about which the ends of the design transfer film F are looped and then secured, so that the end portions of said rods project beyond the sides of the film. Said end portions of the rods 27 are provided with coupling blocks 28 which may be entered and seated in the coupling boxes 26 with portions of the rods extending through the indented side walls of the latter. When the parts are thus arranged the film F will be supported at its respective ends so as to extend horizontally from end to end of the film carriage and in coupled relation thereto so as to move or reciprocate therewith. While the above described film coupling means is satisfactory, I am aware that there are many other arrangements and constructions of film coupling means possible to be used, and consequently I do not limit myself to the aforesaid particular design and construction thereof, which may be variously modified and changed.

The means for mounting the roller R in the printing machine, and subject to cooperation with a design transfer film F supported by the film carriage, comprises a pair of laterally opposed bearing standards 29 fixed on the shelves or bases 12 of the side frames 10 and exteriorly of the guide-members 13. Said standards 29 are positioned midway between the ends of said shelves or bases 12. Vertically adjustable in said standards 29, under the control of upper and lower adjusting screws 30 and 31, are bearing blocks 32. The mandrel M of the roller R is journaled in and between said bearing blocks 32, so as to extend transversely between the guide-members 13. Before thus mounting the roller R traction wheels 33 are fixed on the respective ends of the mandrel M adjacent each end of the roller. These traction wheels are so positioned as to respectively engage the slide rails 15, so as to impart motion thereto when the roller is rotated. By adjusting the bearing blocks 32, said traction wheels may be caused to bear on said slide rails 15 sufficiently to assure firm tractive engagement therewith. In order to facilitate placement of the roller in and removal thereof from the machine as necessity requires, the upper ends of the bearing standards 29 are provided with openings for insertion and removal of the bearing blocks 32, said openings being normally closed by a movable cap-piece 34, which may be pivoted at one end and laterally slotted at the other end to engage a lock screw 35 for holding the same in closed position. The cap-pieces 34 carry the upper adjusting screws 30. It will be understood, however, that any other arrangement and structure adapted to permit insertion and removal of the roller R with respect to its normal assembled relation to the machine may be employed.

Mounted on the shelves or bases 12, and interiorly of the guide-members 13, are laterally opposed pairs of bearing members 36, disposed adjacent to opposite sides of the roller R, when the latter is operatively mounted in

the machine. Journaled in and between these bearing members 36 are carrier rollers 37 over which the design transfer film F rides so as to be upheld in operative engagement with the underside of the printing roller R.

Extending transversely between the side frames 10, and aligned beneath the design transfer film F and printing roller R as operatively mounted in the machine, is an upwardly open light box 38 of any suitable form, and through which extends a suitable source of light, such e. g. as a mercury vapor electric lamp 39.

In operation, the design transfer film F is mounted by the coupling devices on the film carriage so as to extend from end to end of the latter, and over the carrier rollers 37; and the sensitized roller R is thereupon placed in position so as to be rotatably supported above and in contact with the film F. One end of the roller mandrel M is provided with a crank handle 40 by means of which the roller R and the traction wheels 33 may be turned in desired direction. Before starting operations, the film F is adjusted to attain a proper tension thereof and consequent pressure upon the underside of the roller R; this being accomplished by manipulating the adjusting screws 2 to attain an even longitudinal stretch of the film throughout its entire area. It is also desirable that the film F extend in true horizontal plane between the coupling devices by which it is attached to the film carriage and the carrier rollers 37; and this may be attained by manipulating the adjusting screws 20 to raise or lower the carriage plates 18 as circumstances may require.

The film F and roller R having thus been mounted in the machine, and the necessary adjustments made as above mentioned, the operator turns on the light source 39 so that light is transmitted through the film F to the sensitized surface of the roller R. The operator now turns the crank handle 40 to rotate the roller R and traction wheels 33 in one direction. The motion of the traction wheels 33 is transmitted to the slide bars 15 thereby causing the film carriage to travel on the guide-members 13 in one direction, so that the film F moves synchronously with the surface movement of the roller R, thus carrying the film against the entire cylindrical surface of the latter, so that the light transmitted through the film to the sensitized surface of the roller photographically transfers the design of the film to said roller surface. The roller is turned alternately in opposite directions, thus causing the film carriage to be reciprocated to carry the film back and forth over the sensitized roller surface; and since the film carriage receives its motion from the traction rollers of the sensitized roller, the film remains in proper register with the photographically printed roller surface during the back and forth movements of the film. The length of time required to obtain a proper print on the sensitized roller surface can be determined by the appearance of the picture developed on the roller surface, since the light which passes through the transparent parts of the film F will cause the sensitizing solution on the roller surface to change color sufficiently to show the design or pattern of the film.

After the sensitized surface of the roller R has been photographically printed from the film F in the manner and by means of the novel machine above described, the roller R is removed from the machine and coated with a suitable ink resist, whereupon the same is placed in a trough of tepid water in which its surface is washed with the aid of a tuft of absorbent cotton. By carefully rubbing the surface of the roller, the design photographically printed thereon will be developed, and will become distinctly visible. The roller R is then rinsed and dried, and thereupon a very fine powder of bitumen is rubbed upon the printed surface, and after the surplus powder is removed the design imprint will appear in ink and powdered bitumen. The roller is now heated sufficiently to fuse the powder, thus forming thereof an acid resist.

After thus being prepared the roller R is ready for etching, to which end the same is revolved in a bath of iron chloride solution, care being taken to observe the corrosive effect of the solution on the copper surface of the roller, so that as soon as a desired depth of etching is attained the roller may be taken from the bath, and thereupon washed to remove the acid resist. When the etching of the roller surface is thus completed the same is ready to be placed in a suitable textile printing press to there function to produce imprints of the design borne thereon upon the textile material run through the press.

From the above description it will be apparent that the present invention provides a novel printing machine so constructed and arranged as to permit exposure of the entire sensitized roller surface to light transmitted through the design transfer film for any desired length of time without risk of loss of register between the printed surface of the roller and said film.

As various changes could be made in the above described apparatus and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A machine for photo-printing designs on printing rollers preparatory to etching the surfaces thereof, comprising means to rotat-

ably mount a printing roller provided with a light sensitized surface including traction wheels at opposite ends of the roller, a reciprocatory film carriage to support a design transfer film, said carriage having slide rails frictionally engaged by said traction wheels to transmit motion to said carriage whereby the latter is reciprocated and the film is caused to move in contact with the roller surface at speeds synchronized to the surface speed of the latter, and means for transmitting light through said film to the sensitized surface of said roller.

2. A machine for photo-printing designs on printing rollers preparatory to etching the surfaces thereof, comprising means to rotatably mount a printing roller provided with a light sensitized surface including traction wheels at opposite ends of the roller, a reciprocatory film carriage to support a design transfer film, stationary carriage rollers to guide said film and support the same in contact with the under side of said printing roller, said traction wheels being frictionally engageable with said carriage to transmit the motion of the former to the latter whereby said carriage is reciprocated and the film is caused to move in contact with the printing roller surface at speeds synchronized to the surface speed of the latter, and means for transmitting light through said film to the sensitized surface of said printing roller.

3. In a machine of the kind and for the purposes defined in claim 2, means on said film carriage for coupling the film thereto for extension from end to end thereof, and means for adjusting said coupling means to determine the running tension of said film.

4. A machine for photo-printing designs on printing rollers preparatory to etching the surfaces thereof, comprising a frame-work, bearing supports mounted on said frame work, a mandrel journaled in and between said bearing supports to carry a printing roller having a light sensitized surface whereby said roller is transversely disposed across said frame-work, longitudinal guide-members fixed on said frame-work, a film carriage having slide rails movable in said guide-members, means for mounting a design transfer film on said carriage so as to engage the underside of said roller, traction wheels on said roller carrying mandrel to frictionally engage said slide rails of said carriage to transmit motion imparted to said roller to said carriage whereby the film is caused to move in contact with said roller at speeds synchronized to the surface speed of the latter, and means for transmitting light through said film to the sensitized surface of said roller.

5. A machine for photo-printing designs on printing rollers preparatory to etching the surfaces thereof, comprising a frame-work, bearing supports mounted on said frame-work, a mandrel journaled in and between said bearing supports to carry a printing roller having a light sensitized surface whereby said roller is transversely disposed across said frame-work, longitudinal guide-members having anti-friction rollers mounted therein, said guide-members being fixed in lateral spaced parallel relation on said frame-work, a film carriage having longitudinal slide rails, said slide rails having traction shoes to engage in said guide members and ride on said anti-friction rollers thereof, means on said carriage for coupling a design transfer film thereto for extension from end to end thereof, stationary carriage rollers mounted on said frame-work to guide said film and support the same in contact with the underside of said printing roller, traction wheels on said roller carrying mandrel to frictionally engage said carriage slide rails to transmit motion imparted to said printing roller to said carriage whereby the film is caused to move in contact with said printing roller at speeds synchronized to the surface speed of the latter, and means for transmitting light through said film to the sensitized surface of said roller.

6. In a machine of the kind and for the purposes defined in claim 5, including addi- for adjusting said film coupling means to determine the running tension of said film.

7. In a machine of the kind and for the purposes defined in claim 5, including additional film carriage guiding means adapted to prevent undue lateral play of said carriage during operative movements thereof.

8. In a machine of the kind and for the purposes defined in claim 4, including additional film carriage guiding means adapted to prevent undue lateral play of said carriage during operative movements thereof.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 3rd day of January, 1929.

ALBERT D. LA POINTE.