E. S. BEACH.

LAY-OUT AND TRANSFER MACHINE.

APPLICATION FILED DEC. 16, 1916.

1,264,882.

Patented May 7, 1918.

2 SHEETS—SHEET 1.

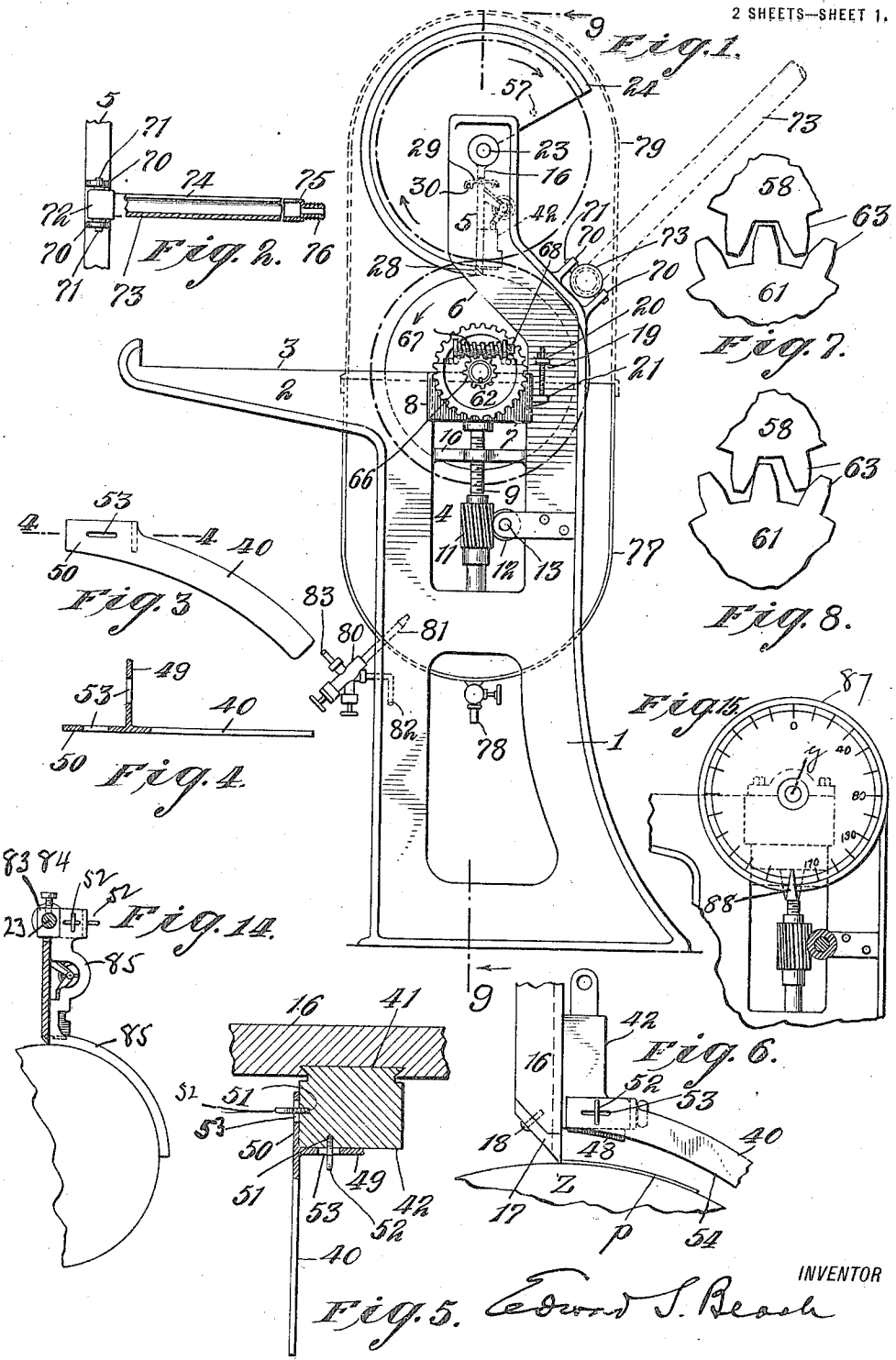


Fig. 1.

Fig. 2.

Fig. 7.

Fig. 8.

Fig. 3

Fig. 4.

Fig. 15.

Fig. 14.

Fig. 6.

Fig. 5.

INVENTOR

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2 SHEETS—SHEET 2.

Fig. 9.

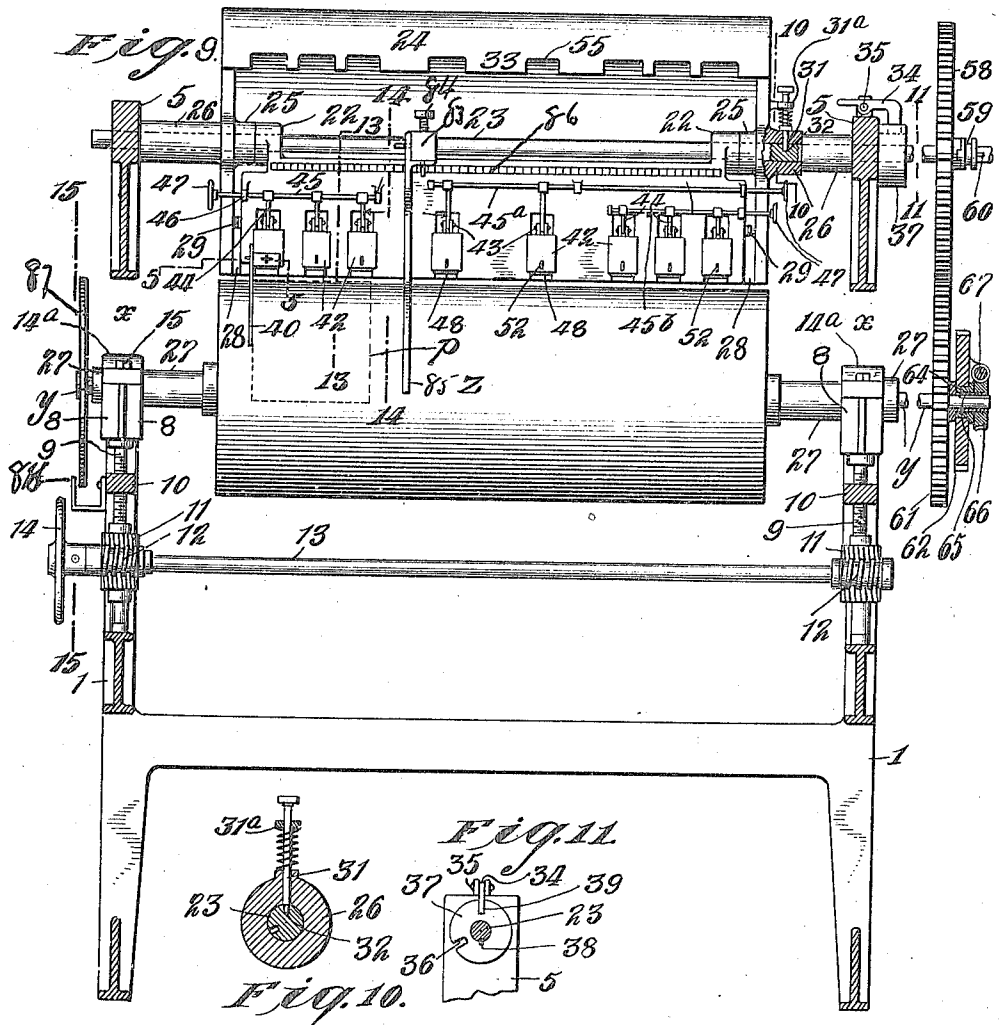


Fig. 11.

Fig. 10.

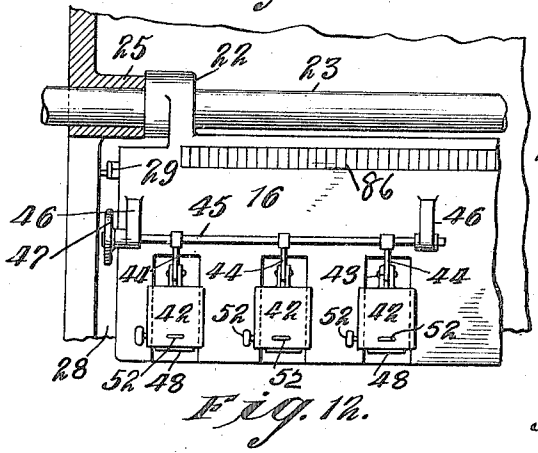


Fig. 12.

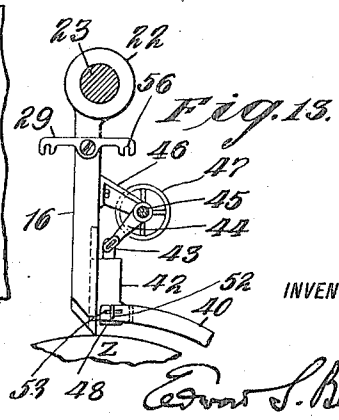


Fig. 13.

INVENTOR

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UNITED STATES PATENT OFFICE.

EDWARD S. BEACH, OF RIDGEFIELD, CONNECTICUT, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO MULTICOLOR INTAGLIO PRESS COMPANY, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE.

LAY-OUT AND TRANSFER MACHINE.

1,264,882. Specification of Letters Patent. Patented May 7, 1918.

Application filed December 16, 1916. Serial No. 137,471.

To all whom it may concern:

Be it known that I, EDWARD S. BEACH, a citizen of the United States, residing at Ridgefield, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Lay-Out and Transfer Machines, of which the following is a specification.

This invention relates to a layout and transfer machine especially adapted for use in obtaining mathematically exact layouts and transfers of photographic carbon-tissue prints on and to printing rolls to be etched. The object of the invention is to provide a practical machine for the purpose stated, and by use of which approximately mathematical layouts and transfers may be obtained to the end that approximately mathematically exact registration may be had in subsequent printing operations wherein a plurality of coöperating etched rolls are used for multicolor printing.

In the accompanying drawings forming a part hereof and illustrating the invention in the best form now known to me,

Figure 1 is a side elevation of my new machine.

Fig. 2 is a view partially in plan and partially in section of a watering device.

Fig. 3 is a side elevation of a detachable side edge guide.

Fig. 4 is a view thereof, partially in section at line 4—4 of Fig. 3.

Fig. 5 is a view partially in section looking down at line 5—5 of Fig. 9, and shows in section a transverse horizontal alining bar, a vertically-reciprocal presser-foot bar, and the side alining bar shown in Figs. 3 and 4.

Fig. 6 is an end elevation showing a portion of the demountable copper-surfaced printing roll to be etched, an end view of the horizontal alining bar for an advancing front edge of a photographic carbon-tissue print to be alined and transferred, and the presser foot with the attached side alining bar in a raised position.

Fig. 7 is a partial view of intermeshing gear teeth which are out of contact one with another; and

Fig. 8 is a similar view showing the intermeshing gear teeth brought into contact preliminarily to simultaneous rotation of the printing roll on which the layout and transfer is made and of the squeegee roll which coöperates with the demountable printing roll.

Fig. 9 is a front sectional elevation of the machine at line 9—9 of Fig. 1.

Fig. 10 is a cross-sectional detail at line 10—10 of Fig. 9 and shows a means for temporarily locking the squeegee roll to its shaft.

Fig. 11 is a view partially in section at line 11—11 of Fig. 9, and shows a means for temporarily locking the shaft of the squeegee roll to the frame of the machine.

Fig. 12 is a partial front elevational view of a part of the squeegee roll carrying the pendulum-like alining bar and showing the latter provided with a series of three vertically reciprocal presser feet and means for raising and lowering them.

Fig. 13 is an end elevation, partially in section at line 13—13 of Fig. 9, and shows the pendulum-like transverse alining-bar, a portion of the demountable printing roll to be etched, means for raising and lowering the presser foot, and a thereto temporarily attached side alining bar, and also means for locking the transverse alining bar to the squeegee roll.

Fig. 14 is a view showing particularly in side elevation a demountable side alining bar which is further illustrated in front elevation in Fig. 9, this side alining bar being detachably secured to a block adjustably mounted on the squeegee-roll shaft.

Fig. 15 is a face elevation of a calibrated disk and index finger for the roll to be etched.

Referring to the drawings, 1, 1 are the upstanding side frames of the machine. Each side frame is provided at its rear side with a rearwardly projecting bracket 2, the upper edge 3 of which extends forwardly to the rear vertical wall of a vertical journal-box-receiving space 4 in the side frame which at its front side and above the journal-box-receiving space 4 is provided with

an upward extension 5 which on its rear face slants downwardly and forwardly at 6 to form a suitable opening such as x for mounting and demounting an end of the usual mandrel y of a printing roll z to be etched, into an open bearing in the top of the journal box 7. The construction of each side frame is the same and in mounting the copper printing roll z with its usual mandrel the mandrel ends are laid on the brackets 2 and the mandrel and its roll moved forward into the open bearings at the heads of the opposed side journal boxes 7. The edges 8 of each journal box are shown overlapping edges of the journal-box-receiving recess 4 thereby to guide it in vertically upward and downward adjustments. Each journal box is supported on its under side by a vertical screw 9 threaded through a transverse bar 10 between the ends of the journal-box-receiving space 4. Each screw 9 is provided with a worm gear 11 which meshes with worm 12 on a transverse worm shaft 13 one end of which is provided with a hand wheel 14 whereby both screws 9 and both journal boxes 7 may be simultaneously raised and kept at an exact level in the rising movement or lowered as may be desired. The mandrel ends are each held in an open recessed bearing of a journal box by demountable bearing caps 14^a fixed temporarily in place by screws 15. By this construction the roll z and its mandrel may be readily mounted in and removed from the machine, and be raised as may be desired, with the mandrel and roll z always in a level position. The purpose of raising the printing roll is to bring its upper peripheral wall into gentle contact with the under edge of the transverse alining-bar 16, the front wall of which is straight and the under edge of which is preferably faced with soft metal or wood 17, the facing being held in position by fasteners 18. It is in most cases important in bringing the copper roll z to position relatively to the transverse alining-bar for layout registration on the roll z, that the periphery of the copper roll should not be indented sufficiently to form an ink-receiving recess, or indented at all unless for a purpose hereinafter indicated. In the form shown, the front wall of the transverse alining bar is in a vertical plane through the axis of the copper roll and of the squeegee roll, and consequently in a clockwise rotation of the squeegee roll and counterclockwise rotation of the copper roll, the latter will be carried out of contact with the under edge of the alining bar. Each side frame 1 is formed with a bracket 19 carrying a screw 20 against the foot of which an ear 21 on the journal box 7 carried by it is adapted to abut. By adjustment of the screws 20 the upward movement of the copper roll can be limited so as to prevent, when and if desired, copper-roll-indenting contact with the transverse alining-bar. The transverse alining-bar 16 is provided with upwardly extending arms the free ends of which are provided with hubs 22 which are bored and hung loosely on the horizontal transverse shaft 23 of the segmental squeegee roll 24. The shaft 23 is journaled in the upward extensions 5 of the side frames and the axes of this shaft 23 and of the mandrel y are in the same vertical plane. Interior bosses 25 on ends of the squeegee roll keep the alining-bar 16 from endwise movement relatively to the squeegee roll and sleeves 26 on the shaft 23 between ends of the squeegee roll and the upward frame extensions 5 keep the squeegee roll from endwise movement relatively to the side frames. Collars 27 on the mandrel y keep the mandrel from endwise movement, and as the mandrels are commonly forced into tapered bearings within the copper or copper-surfaced roll, both the latter and the squeegee roll are prevented from any endwise movement during their simultaneous rotation. This is very important in order that each of a series of co-registering carbon-tissue prints and the subsequent etchings, may have requisite registration which would be destroyed or would be liable to be destroyed by any endwise movements of either the squeegee roll or the copper roll during the transfer operation. A lengthwise-extending arc section is removed from the squeegee roll forming therein an opening through which the workman may reach the front side of the transverse horizontal alining-bar 16. In that position of the squeegee roll, as shown in Figs. 1 and 9, the lower front edge 28 of the peripheral wall of the squeegee roll forms a rearward transverse straight abutment for the back edge of the pendulum-like alining bar 16 which is provided with a latch 29 that is then interlocked with a pin 30 on an end of the squeegee roll. In this position the squeegee roll and its shaft are also temporarily interlocked by means of a pin 31 carried by a bracket 31^a projecting from an end of the squeegee roll, the under end of which pin passing through a hole through the collar 26 is adapted to enter a hole 32 in the squeegee roll shaft 23. In operation the latch 29 is now lifted out of engagement with the pin 30 and the squeegee roll 24 is rocked forward to bring its toothed edge 33 into the position previously occupied by the squeegee roll edge 28. When brought into this position the latch 34 pivoted at 35 to a side-frame extension 5 is constructed to enter a slot 36 in a collar 37 fixed as by a spline 38 on a squeegee roll shaft 23; in the position shown in Figs. 1 and 9, wherein the squeegee roll edge 28

is adjacent the periphery of the copper roll, the latch 34 is entrant in a slot 39 in said collar 37 as shown in Fig. 11 so that in that position of the squeegee roll the squeegee roll is locked to its shaft and the shaft is locked to the frame, and as stated, the squeegee roll and the transverse alining-bar are also locked together by the latch. In this position, the members mentioned are in a stationary position with the transverse alining-bar in proper relation to the upper periphery of the copper roll for a layout of a carbon-tissue print, such as indicated by *p* in dotted lines in Fig. 9, and as shown by *p* in Fig. 6. In Fig. 9 however the copper roll is shown out of contact with the transverse alining-bar, but when the carbon-tissue print is laid out on the copper roll, the latter and the transverse alining-bar are in the positions shown in Fig. 1. In Fig. 9 the side alining-bar 40 is shown in one of its various positions.

The front wall of the transverse alining-bar is provided with a series of vertical dove-tail grooves 41 in each of which there is mounted a vertically movable presser-foot bar or plate 42 the upper end of which is loosely jointed at 43 (Fig. 13) with a rocker arm 44 fixed on a transverse shaft 45 which is mounted in a series of brackets 46 carried by the transverse alining-bar. The shaft 45 is provided with an accessible hand-wheel 47 whereby it may be rocked to lift and lower the presser foot plate, the lower end of which is provided with a soft rubber pad or sole 48. The hand-wheel-carrying end of shaft 45 is shown projecting through an end opening of the squeegee roll between its edges 28 and 33. The side alining bar 40 is provided with a right-angular lug 49 and the corner formed by the rearward butt end portion 50 of the side alining-bar, and this lug 49 fits on a right-angular corner of the presser-foot plate which is provided on each of two adjacent sides with projecting screws 51 each having an elongated head 52. The butt end portion 50 and the lug 49 of the side alining-bar are each provided with an elongated slot 53 through which a screw-head 52 when in the proper position may pass when the side alining bar is to be temporarily fixed to a presser-foot plate. By turning the screws 51 their elongated heads 52 are brought crosswise to the slots 53 and the side alining bar is then detachably clamped to the presser foot plate. The under edge 54 of the side alining bar is curved concentrically to the copper roll, and the side alining bar 40 stands at right-angles to the face of the transverse alining bar 16. As indicated in Fig. 9 the side alining bar forms an abutment for the outer edge of the carbon-tissue print *p* shown in dotted lines in Fig. 9, and as shown in Fig. 6 the front wall of the transverse alining-bar 16 forms a straight edge abutment for the rearward transverse edge of the print which is shown in Fig. 6 and therein indicated by *p*. In Fig. 6 the presser foot is up. With a right-angular corner of the precisely-cut carbon-tissue print carefully abutted against the transverse alining bar and also against the side alining bar, an attendant lowers the presser feet controlled by the shaft 45 upon the front safety margin of the thus laid-out carbon-tissue print. In this position the carbon-tissue print is in its proper laid-out position firmly held by its safety margin against the copper roll.

In the drawings I have illustrated three series of presser feet, one series being controlled by the shaft 45. All the presser feet might be controlled by extension of the shaft 45 clear across the transverse alining bar, but it is preferred to provide one group of presser feet with an independent shaft and means of raising and lowering the presser feet, and another group of presser feet of the same construction with an independent shaft, and still a third group of presser feet with another independent shaft, so that a series of carbon-tissue prints may be laid out on the copper roll and each of the series of tissue prints thus laid out be clamped in position. The intermediate presser-foot actuating shaft is indicated by 45^a, and the third presser-foot-controlling shaft is indicated by 45^b. A side alining bar may be attached to any of the presser feet or its use be dispensed with. It is a convenient adjunct and not a necessary member of the machine. It is to be removed before the squeegeeing operation begins.

Preparatory to the squeegeeing operation, the pin which locks the squeegee roll to its shaft is disconnected from the shaft and the toothed edge of the squeegee roll brought into the lowermost position. Then the teeth 33 will pass between the presser feet and engage by rolling contact the portions of the laid-out prints between the presser feet, and the recesses at 55 between the teeth 33 will inclose the elastic presser foot pads 48. In this position the squeegee roll is connected to the transverse alining bar by the front end 56 of the latch 29, such front end then engaging the pin 57 on the squeegee roll. This connection is to cause the transverse alining bar and the squeegee roll in its rotational movement to move together, and it is preferable to compel the copper roll and the squeegee roll to travel together simultaneously by mechanical means rather than to use the squeegee roll as an idler and merely rotate the copper roll or to use the copper roll as an idler and merely rotate the squeegee roll. The mechanical driving means preferably comprise a gear 58 on the squeegee roll shaft

23, and a shifting device 59 for moving the gear 58 laterally on the shaft which is provided with a spline 60 for the clutch 59 and gear 58. The mandrel *y* of the copper roll is provided with a demountable gear 61 temporarily fixed thereon. In the driving position the gears 58 and 61 have their teeth intermeshing. The mandrel shaft *y* is provided with a driving gear 62. The gear teeth 63 are formed to permit the slight separation required in slightly raising and lowering the copper roll, and in order to insure the starting of the rotational movement of the squeegee roll and of the copper roll simultaneously and without any loss of motion, the driving gear 62 is mounted loosely on a sleeve 64 which is splined at 65 to the mandrel *y*. The sleeve 64 is an extension of a worm gear 66 and the driving gear 62 carries a worm 67 in mesh with the worm gear. The worm is provided with a hole 68 into which a pin may be inserted for rotating the worm and thereby rotating the worm gear and rocking the gear 61 so that the advancing edges of its teeth 63 will be brought into direct contact with the retreating edges of the teeth 63 of the gear 58, prior to rotation of both gears. Thus the squeegee roll and the copper roll may be started simultaneously in their rotational movement for squeegeeing the located prints which are held in place by the presser feet on the periphery of the copper roll and without any lost movement or shock.

Where only one copper roll is to have a print or prints laid out and squeegeed upon it, this precision of movement, and indeed the precision of layout, is not of great importance because if only one copper roll is to be provided with a carbon print, the roll will be used in monocolor work. But for multicolor work, where each of a series of coöperating color printing rolls are to be used and where mathematically exact registration is required, it is very important that each of the series of carbon prints on each of a series of coöperating rolls shall have mathematically exact relative positions on the rolls, and that the successive squeegeeing operations for the series shall begin and continue under like conditions in order to secure registration first of the carbon tissue prints, and secondly of the etchings thereafter produced on the series of rolls.

When the carbon-tissue print or prints have been located and clamped as described by their advancing safety margins on the copper roll, and with their gelatinous faces downward or opposed to the copper roll, the free body portion of the print or prints is to be lifted upwardly away from the periphery of the copper roll in order that the gelatinous face of a print opposed to the copper roll may be softened into an adhesive condition and preferably without wetting the paper back of the print. I accordingly provide one of the side frame extensions 5 with ears 70 in which diametrically opposite trunnions 71 of a solid end 72 of a water pipe 73 are mounted so that the water pipe is hinged to one of the side frame extensions and can be moved out of the way of the operator. This water pipe is provided with a lengthwise-extending slit 74 from its solid end 72 to its free end 75 which is formed with a water-admission nozzle 76 adapted for connection to a water-supply conduit when the water-supply pipe 73 is down in transverse position, in which position its lengthwise-extending slit 74 will permit water under head to be thrown out as a thin sheet into the transverse angular space formed along the front of the squeegee roll and the copper roll by their then opposing peripheral surfaces. Such sheet of water, which will ordinarily be of a temperature of 70° F. more or less, will come in contact with the surface of the copper roll and with the opposing gelatinous face of the lifted print. Both rolls being then in operation, the squeegee roll will home the print into position on the copper roll, thus effecting the transfer of the print to the roll. When the print or prints that have been laid out have thus had their gelatinous faces converted into an adhesive condition and have been squeegeed in place, they are left to dry on the copper roll. Any water falling from the copper roll is preferably caught in the trough 77 properly located between the upstanding frame sides 1 and shown provided with a valved outlet 78.

After the carbon-tissue print or prints have set, a warm water conduit, the water being usually at a temperature of from 100° to 110° F., may be connected with the water pipe 73 and the paper back of the print or prints moistened up so that it can be stripped off. But I conceive that there may be some advantages derived by giving the dried carbon-tissue paper backs treatment by aqueous vapor instead of by warm water, the advantage, if its exists, being in a more even softening up of the paper back preparatory to stripping and consequent elimination of whatever danger there is during the back stripping operation of dislocating any portion of the gelatinous face which contains the photographic image that is to be etched on the roll. Consequently I now prefer to provide for the trough 77 a removable hood 79 such as shown in dotted lines in Fig. 1, and to provide the trough 77 with a well-known form of an aqueous vapor injector 80, its discharge nozzle 81 being entrant into the trough and its body being provided with a steam-admission port 82 and with an air-admssion port 83. The construction is such that by the admission and entrainment of air by the current of

steam, the temperature of the latter can be reduced to any temperature required. Such injectors are well known.

Nothing herein contained is to be deemed to anticipate or qualify any methods or apparatus shown in pending United States patent applications of Charles W. Saalburg, Serial No. 94,332, filed April 29, 1916, and divisions thereof, or in said Saalburg's applications, Serial Nos. 151,165, 151,166, 151,167, 151,168, and 151,169, filed February 27, 1917.

In one respect the mode of operation, in part, of using the hereinbefore-described machine, involves a method invention by said Saalburg, and described in his said application Serial No. 151,167, filed February 27, 1917. I am aware of the subject matter of all such applications and disclaim all that is shown in them.

I have heretofore alluded to indentation of the copper or copper surfaced roll. It is obvious that the working edges of either or both the transverse alining-bar or of the side alining bar might be serrated at any points desired and so used gently to mark the copper roll with suitable guide-marks if so desired, and that a series of copper rolls could be so given surface guide-marks with great exactitude. It is also obvious that the presser feet or some of them could be used to carry guide-mark forming points.

By copper rolls, I include copper tubes or shells, and also rolls having a copper-surface deposited on them. But my machine is useful without regard to the nature of the metal or material forming the printing surface of the roll on which the layout and transfer is to be made. I intend to claim the machine for all uses to which it can be put, and it may be useful generally in various layout and transferring operations, in lithographic as well as in etched rolls for mono- or multi-color printing.

If desired, a sliding block 83 may be slidably mounted on the squeegee roll 23 and held in adjusted position by a set-screw 84. It can be provided with a demountable side-edge alining-bar 85 having a butt end with right-angle slotted members as already described, and held to the block 83 by thumb-screws 52 as in the case of the side alining bar 40. The upper margin of the transverse alining bar 16 is calibrated at 86 and the downwardly-extending blade of the bar 85 serves as an index finger for the calibrations which may be observed for subsequent layouts and transfers on other rolls of other prints.

If desired, a calibrated degree disk 87 can be temporarily attached to an end of the roll mandrel y and an index finger 88 therefor be mounted on the frame for observation and annotation of the peripheral end positions of prints laid out on and transferred to a previous roll or rolls in a co-operating series of rolls.

What I claim is:

1. The combination of means for receiving and supporting a demountable roll; an arcuate chambered squeegee roll; a transverse alining-bar located within the chamber of the squeegee roll; a presser foot; and means for raising and lowering the presser foot.

2. The combination of means for receiving and supporting a demountable roll; an arcuate chambered squeegee roll; a transverse alining-bar located within the chamber of the squeegee roll; a presser foot; means for raising and lowering the presser foot; and a water discharge pipe constructed and operable to discharge water on the demountable roll when it is in place.

3. The combination of means for receiving and supporting a demountable roll; an arcuate chambered squeegee roll; a transverse alining-bar located within the chamber of the squeegee roll; a presser foot; means for raising and lowering the presser foot; and means for approaching and separating the demountable roll when it is in position and the squeegee roll.

4. The combination of means for receiving and supporting a demountable roll; an arcuate chambered squeegee roll; a transverse alining-bar located within the chamber of the squeegee roll; a presser foot; means for raising and lowering the presser foot; means for approaching and separating the demountable roll when it is in position and the squeegee roll; an intermeshing gear drive mechanism for said rolls; and mechanism for bringing the intermeshing teeth of the gears of such drive into positive contact prior to starting said driving mechanism.

5. The combination of a chambered arcuate squeegee roll and a shaft therefor on which the roll is rotatively mounted, with a pendulum-like alining-bar parallel with said shaft, and mounted on the shaft within said chamber; a presser foot carried by the alining bar; means for raising and lowering the presser foot; a device for locking the alining bar and roll temporarily together; means for locking said roll and shaft temporarily together; and means for locking said shaft in a temporarily fixed position.

6. The combination of a roll on which a layout and transfer are to be made; a co-operating roll; a transverse alining bar; a presser foot; and a side-edge alining bar.

7. The combination of a roll on which a layout and transfer are to be made; a co-operating roll; a transverse alining bar; a presser foot; and a side-edge alining bar, the side-edge alining bar being detachably mounted on the presser foot.

8. The combination of a roll on which a

layout and transfer are to be made; a co-operating roll; a transverse alining bar; a presser foot; and a side-edge alining bar, the side-edge alining bar being detachably mounted on the presser foot; and a side-edge alining bar adjustable on the shaft of the coöperating roll.

9. The combination of a roll on which a layout and transfer are to be made; sheet-alining means; a presser foot; means for raising and lowering the presser foot; and a coöperating roll.

In testimony whereof I have hereunto set my hand this 14th day of December; 1916.

EDWARD S. BEACH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."