

Aug. 27, 1963

G. V. HALL

3,101,665

SILK SCREEN PRINTING PRESS

Filed Aug. 3, 1961

5 Sheets-Sheet 2

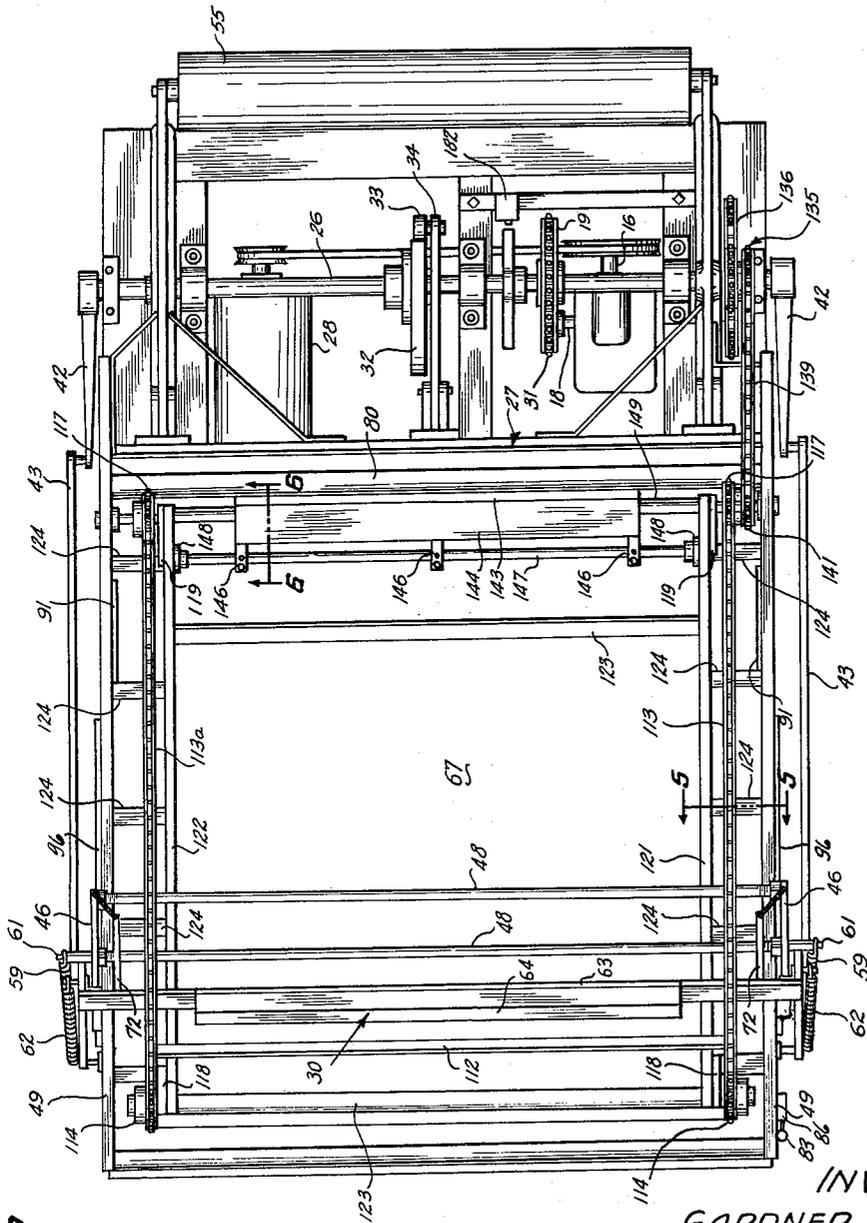


FIG. 2

INVENTOR.
GARDNER V. HALL

BY *Lowell & Henderson*
ATTORNEYS.

Aug. 27, 1963

G. V. HALL

3,101,665

SILK SCREEN PRINTING PRESS

Filed Aug. 3, 1961

5 Sheets-Sheet 4

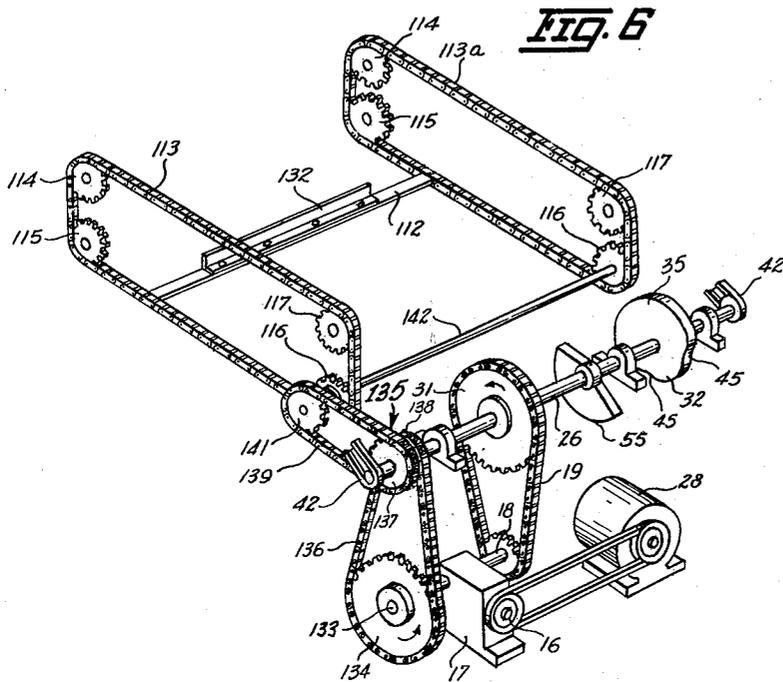


FIG. 6

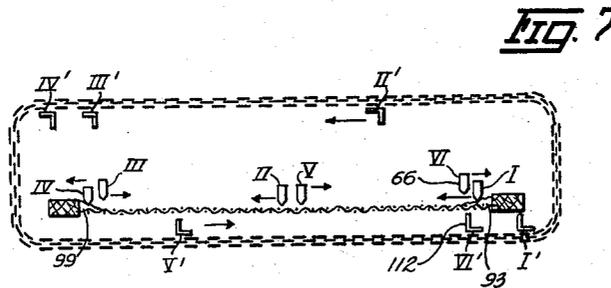


FIG. 7

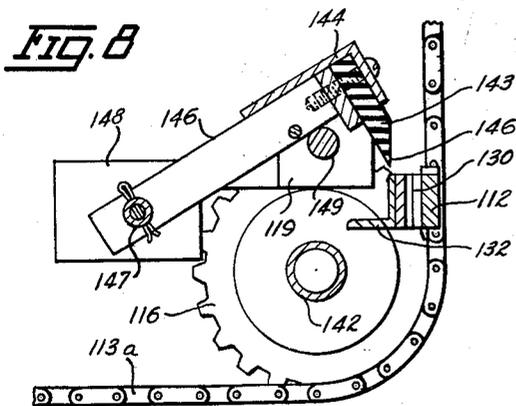


FIG. 8

INVENTOR.
GARDNER V. HALL

BY *Lowell & Henderson*

ATTORNEYS.

Aug. 27, 1963

G. V. HALL

3,101,665

SILK SCREEN PRINTING PRESS

Filed Aug. 3, 1961

5 Sheets-Sheet 5

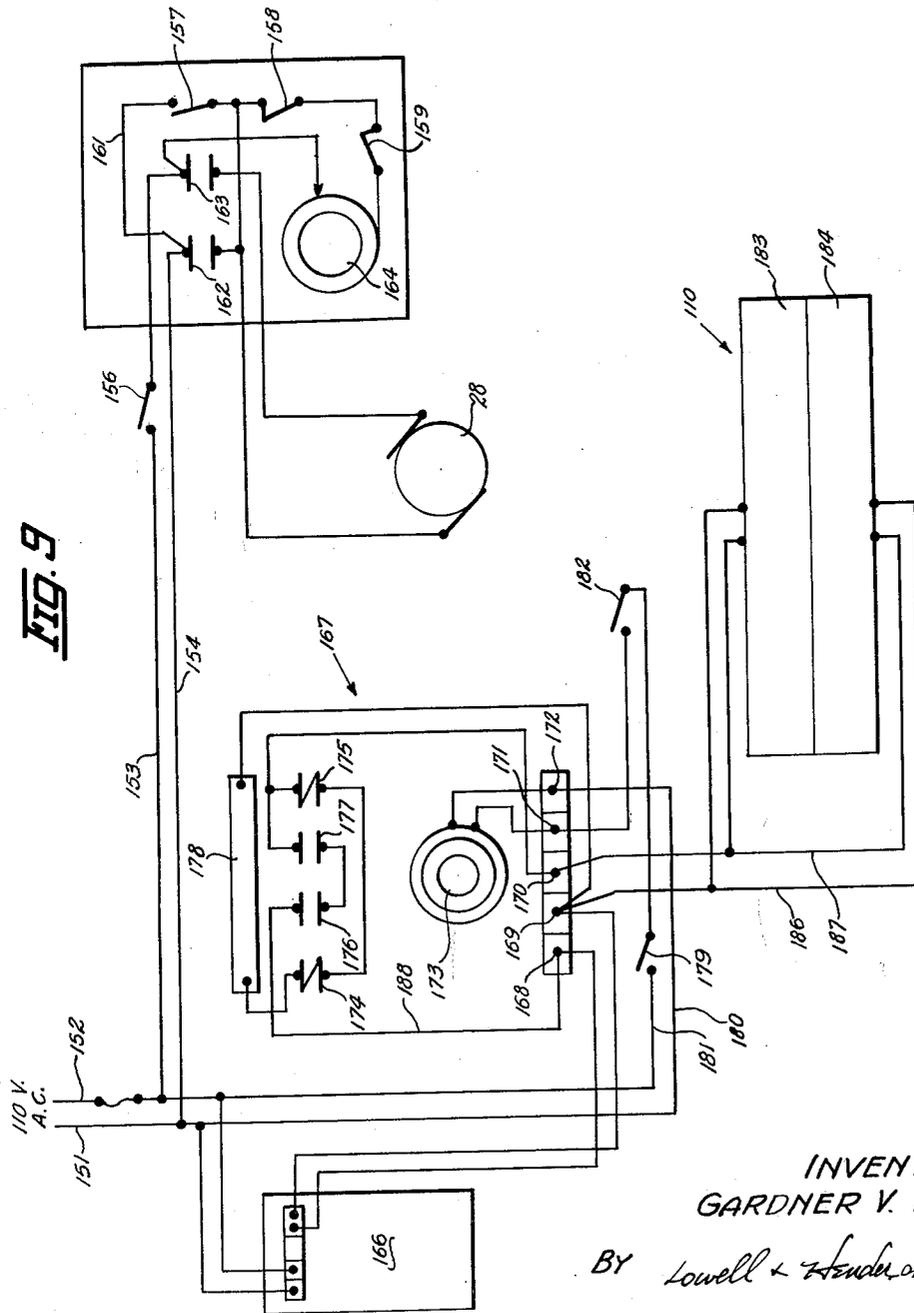


FIG. 9

INVENTOR.
GARDNER V. HALL

BY *Lowell + Fenderon*

ATTORNEYS.

1

3,101,665
SILK SCREEN PRINTING PRESS
Gardner V. Hall, 1618 75th St., Des Moines, Iowa
Filed Aug. 3, 1961, Ser. No. 129,035
4 Claims. (Cl. 101—123)

This invention relates generally to printing presses and more particularly to a silk screen printing press.

An object of this invention is to provide an improved silk screen printing press.

Another object of this invention is to provide a silk screen printing press wherein a pair of squeegee members are movable in predetermined paths relative to a single screen to accommodate various printing operations.

Yet another object of this invention is to provide a silk screen printing press which includes a screen mounted for up and down movement relative to the material to be printed upon, and wherein one squeegee is arranged above the screen for fill and impression movements across the screen, and another squeegee is arranged below the screen for movement thereunder for wiping away surplus printing fluid, the movements of both squeegees being in timed relationship to each other and to the vertical movement of the screen.

A further object of this invention is to provide a silk screen printing press as described above with a device for removing printing fluid from the wiping squeegee during operation of the press.

Another object of this invention is to provide a silk screen printing press as described above with a device for automatically holding metal flat against a surface below the screen during the impression pass, and which releases the metal for transport purposes at all other stages of the press operation.

Yet a further object of this invention is to provide a silk screen printing press for printing embossed surfaces.

Still another object of this invention is to provide a silk screen printing press capable of attaining the above objects which is relatively simple in construction, economical in manufacture, and efficient in operation.

Further objects, features and advantages of this invention will become apparent from a consideration of the following description when taken in connection with the accompanying drawings in which:

FIG. 1 is a side elevational view of the printing press of this invention showing the chase therefor in a lowered position on the bed frame;

FIG. 2 is a top plan view of the press in a position slightly forward from that shown in FIG. 1;

FIG. 3 is an enlarged, fragmentary perspective view from a side of the press showing the chase in a raised position, with certain parts broken away for purpose of clarity;

FIG. 4 is an enlarged, side elevational view showing a moved position of the upper squeegee supporting frame at the rear end of the stroke therefor, as viewed from inside the press, certain parts shown in section and others in dotted line for clarity;

FIG. 5 is an enlarged, vertical sectional view taken along the lines 5—5 in FIG. 2;

FIG. 6 is a schematic view of the driving arrangement for the lower squeegee blade;

FIG. 7 is a diagrammatic view showing the relative paths of the upper and lower squeegee blades during a flood printing operation;

FIG. 8 is an enlarged fragmentary vertical sectional view taken along the line 6—6 in FIG. 2; and

FIG. 9 is a diagram of the electric circuit for the press. With reference to the drawing, the printing press of this invention is an improvement over my earlier silk screen printing press illustrated and described in my Patent No. 2,936,705, issued May 17, 1960. My improved

2

press, as will be described in detail hereinafter, is adapted specifically to automatically apply reflective and fluorescent type paint to embossed metallic surfaces; however, the invention is limited only by the appended claims.

The press, indicated generally at 20 in FIG. 1, includes a main frame 21 for supporting an inclined open bed frame 22. For convenience of description, the end 23 of the main frame 21 will be referred to hereinafter as the front end of the machine 20 and the opposite end 24 will be referred to as the rear end of the machine. Pivotaly supported on a shaft 26 (FIG. 2), arranged transversely of the bed frame 22, is a screen supporting frame or chase 27 which extends forwardly from the shaft 26. An upper squeegee supporting frame 30 is movably mounted on the chase 27 for back and forth movement thereon.

A motor 28 (FIGS. 1 and 2), carried on a supporting plate 29 extended transversely of the main frame 21 below the bed frame 22, drives a shaft 16 for a gear reduction unit 17. A second shaft 18 for the unit 17 drives, via a chain 19, a sprocket wheel 31 secured to the shaft 26 for rotation in a counterclockwise direction as viewed in FIG. 1. A cam 32, secured to the shaft 26, engages a follower roller 33 (FIG. 2) carried on one end of a link member 34 (FIG. 1). The opposite end of the link 34 is pivoted to an upright bracket (not shown) secured to the motor supporting plate 29. A link 39, rigidly connected to the link 34 is pivotally connected to one end of a link 41, the opposite end of which is pivotally connected to the chase 27.

It is seen, therefore, that on rotation of the cam 32, with the enlarged side 35 thereof in contact with the roller 33, the chase 27 is maintained in a raised position by the links 34, 39 and 41. A counterweight 55, secured to and extended rearwardly from the chase 27 and positioned on the opposite side of the shaft 26 facilitates the maintaining of the chase 27 in a raised position.

The weight of the chase 27 provides for a following movement of the roller 33 along the small side 40 of the cam 32 in the lowered position of the chase 27. In response to rotation of the follower 33 on the inclined portions 45 of the cam 32, the chase 27 is moved upwardly and downwardly during predetermined portions of the rotation of the cam 32. By virtue of the shape of the cam 32, with the substantially constant diameter side portions 35 and 40, and the relatively short inclined portions 45 therebetween, the chase 27 is rocked in up and down directions about the shaft 26 relatively quickly and is maintained in an up or down position for a predetermined time period. In a down position, the chase 27 is parallel to and adjacent the bed frame 22 for printing purposes. During the time the chase 27 is in an up position, the material to be printed, or painted as the case may be, is manually removed from the bed frame 22 and a next piece of material to be printed is inserted beneath the chase 27.

Mounted on the ends of the shaft 26 (FIGS. 1 and 2), in a predetermined angular relation with the cam 32, are a pair of crank arms 42, arranged outwardly of the bed frame 22. A pair of links 43, corresponding to the crank arms 42, are pivotally connected to and extend between the crank arms 42 and the squeegee frame 30 to provide for driving of the frame 30 in directions longitudinally of the chase 27, in response to a rotation of the crank arms 42.

It is seen, therefore, that upon rotation of the shaft 26, the chase 27 is rocked up and down about the shaft 26 and the upper squeegee frame 30 is concurrently moved back and forth along the chase 27. By virtue of the predetermined angular relation of the crank arms 42 and the cam 32, the chase 27 is in a down position during travel of the upper squeegee frame 30 toward the front end 23

of the machine 20. During a return movement of the frame 30 toward the rear end 24 of the machine 20, the chase 27 is in an up position spaced above the bed frame 22.

By virtue of the downward movement of the chase 27 at a time corresponding to the reversal of the direction of travel of the upper squeegee frame 30, the frame 30 is momentarily maintained in a substantially stopped position on the chase 27. In other words the links 43, which move the frame 30 on the chase 27, are traveling upwardly from a dead center relation with the cranks 42 at a time when the chase 27 is moving downwardly. As a result, the downward rotational movement of the chase 27 compensates for the upward rotational movement of the links 43 to provide for a stopped position of the frame 30 on the chase 27 during the time the chase 27 is moving downwardly.

As best appears in FIGS. 1 and 2 the upper squeegee supporting frame 30 includes a pair of rectangular end plates 46 connected together by a pair of spacer bars 48 extended transversely of the chase 27. Each end plate 46 corresponds to and is positioned outwardly of a channel shape side frame member 49 for the chase 27. Two pairs of vertically spaced rollers 51 (FIG. 4) on each end plate 46 are positioned on opposite sides of the top flange 52 for the corresponding frame member 49 to provide for a longitudinal rolling movement of the squeegee frame 30 on the chase 27.

A supporting unit 53 (FIGS. 1 and 3), consisting of a pair of pivotally connected scissor members 54 and 56, is mounted on the outer side of each end plate 46. The scissor members 54 and 56 in a unit 53 are pivotally connected by a transverse pivot 57 extended through the adjacent end plate 46 for pivotally supporting the unit 53. Each member 54 is of a reduced thickness adjacent the pivot 57 to thus form a stop 58 shown by the dotted line across member 54 which is engaged with the cooperating member 56 to limit pivotal movement of the members 54 and 56 in directions toward each other. A spring 59 extended between the member 54 in a unit 53 and a transversely extended stop pin 61 on the adjacent end plate 46 biases the unit 53 into engagement with the stop pin 61. The spring 59 also maintains the members 54 and 56 in a unit 53 in positions in which the stop engages the member 56.

A spring 62 extended between the free ends of the members 54 and 56, in a supporting unit 53, further biases the scissor members 54 and 56 toward the closed position in which the member 56 engages the stop 58. The members 54 and 56 are maintained in a closed position during operation of the machine 20; however, for safety purposes, the members 54 and 56 are movable in directions away from each other against the action of the springs 59 and 62 when it becomes necessary. For a purpose to appear later, a roller 65 (FIG. 4) is carried on an inwardly extended shaft 70 on the free end of each of the members 54.

A supporting plate 63 (FIGS. 1 and 2), secured to and extended between the free ends of the scissor members 56 adjustably supports a wooden holder 64 for a depending upper squeegee blade 66 formed of a flexible material such as rubber or the like. In one position of the plate 63, the holder 64 is vertically adjusted on the plate 63 to provide for a desired wiping engagement of the squeegee 66 with the silk screen 67 carried by the chase 27 at a position below the squeegee 66.

It is apparent that the plate 63 and the squeegee 66 carried thereby are vertically movable relative to the chase 27 and the screen 67 on swinging movement of the support units 53 about the pivots 57 therefor. Stated otherwise, on downward swinging movement of the units 53, as viewed in FIG. 3, the plate 63 is moved downwardly toward the screen 67. As best appears in FIG. 1, in the engaged positions of the units 53 with the stop

pins 61, the squeegee blade 66 is spaced above the screen 67.

For maintaining the plate 63 in a downwardly moved position corresponding to a position of the squeegee 66 in wiping engagement with the screen 67, a hook 68 (FIG. 4), provided on one of the end plates 46 is engaged with an inwardly directed pin 69 on one of the scissor members 56. The hook 68 is positioned between the plate 46 and the member 56 and is secured to a pivot 71 journaled in and extended through the end plate 46. An L-shape lever 72 secured to the pivot 71 at a position inwardly of the plate 46 acts as a counterweight biasing the hook 68 toward a position engaged with the pin 69. The curved top end 60 of the hook 68 provides for a forward movement of the hook 68 on the engagement thereof by the pin 69, as the pin 69 moves downwardly. The hook 68 is thus movable forwardly and then rearwardly to an engaged position on the pin 69, on downward movement of the pin 69. On rotation of the lever 72 in a clockwise direction as viewed in FIG. 4, the hook 68 is movable out of an engaged position on the pin 69.

A roller 76 (FIG. 4) is provided on the free end 77 of the lever 72 for a purpose to appear later. A spring 78, loosely extended between an end plate 46 and the lever 72 acts to return the lever 72 to a position resting on one of the spacer bars 48. A dog 73, pivoted to the lower end of the hook 68, is movable into engagement with the lower end of the hook 68 on rearward movement of the dog 73 relative to the hook 68. On further rearward movement of the dog 73, the hook 68 is moved forwardly off the pin 69. By virtue of this arrangement, the dog 73 is freely movable in a forward direction without affecting the position of the hook 68.

It is apparent that on movement of the hook 68 off the pin 69, the plate 63 is moved by the springs 59 to a stop position corresponding to the engaged position of the scissor member supporting units 53 with the stop pins 61. It is seen, therefore, that the upper squeegee blade 66 is movable both longitudinally of the screen 67 and up and down relative to the screen 67.

An upper position of the upper squeegee 66, corresponding to the engagement of the supporting units 53 with the stop pins 61 on the end plates 46, provides for a location of the upper squeegee 66 spaced above the screen 67. The lower position of the squeegee 66 in engagement with the screen 67 corresponds to a downwardly moved position of the units 53 which position is maintained by the engagement of the hook 68 with the pin 69. Upward rotation of the lever 72 or rearward movement of the dog 73 operates to disengage the hook 68 from the pin 69.

An outwardly projected plate 82 (FIG. 3) arranged on each chase side frame member 49 intermediate the ends thereof, engages the dog 73 prior to the movement of the squeegee 66 to the forward end of the stroke therefor. On engaging the plate 82, the dog 73 acts to disengage the hook 68 from the pin 69. In response to such disengagement, the squeegee 66 is quickly moved upwardly by the springs 59 out of contact with the screen 67.

Pivotally supported at 84 (FIGS. 1 and 3) on a block 87 secured to the side frame member 49 at a position forwardly of the plate 82, is a cam 83 having an inclined face 85. A handle 86 secured to the cam 83 facilitates the manual movement of the cam 83 between the generally horizontal dotted line position A (FIG. 3) and the generally vertical solid line position B (FIG. 3). A stop pin 88 on the block 87 engages the cam 83 to define the positions A and B.

In the position A, the cam 83 is in a clearance relation with all of the parts of the squeegee frame 30 so as not to affect the movement thereof. In the position B (FIG. 1) the inclined face 85 of the cam 83 is engaged by one of the rollers 76 during the forward travel of the squeegee frame 30. As a result of the downward and forward inclination of the face 85, the roller 65 moves down-

wardly and forwardly along the face 35 to in turn move the supporting units 53 downwardly to a position in which the pin 59 is engaged by the hook 68 on an end plate 46. The hook 68 maintains the units 53 and the squeegee 66 in a down position during rearward travel of the squeegee 66.

An L-shape member 91 (FIGS. 1 and 3), secured to one of the chase side frame members 49 extends forwardly therefrom and has an upwardly and rearwardly inclined cam face 92 at its forward end. During rearward travel of the squeegee 66, the roller 76 on the hook operating lever 72 travels upwardly on the cam face 92 prior to the above described engagement of the rollers 65 with the cams 81.

In response to the upward travel of the roller 76 on the cam face 92, the lever 72 is rotated in a clockwise direction, as viewed in FIG. 4, to in turn rotate the hook 68 in the same direction. In the event the hook 68 is engaged with the pin 69, it is apparent that such rotation operates to move the hook 68 off the pin 69 to provide for an upward movement of the squeegee 66 off of the screen 67. In the event the hook 68 is not engaged on the pin 69, so that the squeegee 66 is already in an up position, the travel of the roller 76 on the cam face 92 is without any effect on the position of the upper squeegee 66.

Immediately following the upward travel of the roller 76, the roller 65 engages the cam 81 to provide for movement of the upper squeegee 66 to the down position therefor.

A flood printing operation of the upper squeegee 66 is normally used when a large area is being printed so that large amounts of paint must be forced through the screen 67, or a transparent or reflective type paint is used which must be uniformly applied. For such a printing operation, paint is distributed over the screen 67 during rearward travel of the squeegee 66. To set the machine 20 for a flood printing operation, the lever 86 on the cam 83 is moved upwardly to move the cam 83 to its solid line position B (FIG. 3).

In the instant application of the machine 20, the usual supporting structure (not shown) mounted on the bed frame 22 for holding sheet material to be printed is supplanted by an electromagnetic bed 110 (FIGS. 1, 3 and 9) mounted on a pair of transversely spaced supports 111 (only one showing) attached to the underside of the bed frame. The bed 110 has a surface of sufficient size to hold at least a pair of conventional metal license plates, for example, or other metal or plastic plates or signs of various shapes having raised or embossed surfaces. The screen 67 has a conventional block-out material (not shown) applied to it so as to leave an open screen area slightly larger than the area on the bed 110 to be screened.

Assume that the chase 27 is in the down position illustrated in FIG. 1 and that the upper squeegee 66 is moving forwardly as indicated at II in FIG. 7. Further assume that the dog 73 has engaged the plate 82 and the rollers 65 have traveled off the track flanges 94. The squeegee 66 has therefore moved upwardly to the position III off the screen 67 and forwardly over the paint reservoir 99 concurrently with the raising of the chase 27.

One of the rollers 65 then moves along the downwardly and forwardly inclined face 35 of the cam 83 to thus move the units 53 downwardly to a position in which the hook 68 engages the pin 69. The upper squeegee 66 is thus lowered in the position IV into the paint reservoir 99 concurrently with the beginning of the rearward stroke of the squeegee 66. The upper squeegee 66 thus acts to evenly spread or distribute paint from the reservoir 99 over the screen 67 during rearward travel of the squeegee 66 while the chase 27 is raised. By virtue of the flexibility of the screen 67, none of this paint is forced through the screen 67 by the squeegee 66.

Immediately prior to engagement of the rollers 65 with

the cams 81 at the rear end of the stroke of the squeegee 66, the roller 76 on the hook operating lever 72 rides upwardly on the cam face 92 on the member 91. The hook 68 is thus rotated forwardly to a position off the pin 69 to thus cause raising movement of the squeegee 66 at a position VI (FIG. 7) corresponding to the front side of the paint reservoir 93 at the rear end of the screen 67.

The squeegee 66 moves rearwardly above the paint reservoir 93 until it moves downwardly at I (FIG. 1) into the paint reservoir 93 in response to a downward travel of the rollers 65 on the cams 81. The chase 27 moves downwardly to feed the rollers 65 into the spaces between the track flanges 94 for forward travel of the squeegee 66 on the screen 67.

As the upper squeegee 66 is moved forwardly from position I (FIG. 7) through position II, the screen 67 is moved or flexed downwardly by the squeegee 66 into contact with the embossed surfaces of the material held flat on the bed 110. The paint is thus forced through the open screen 67 as the upper squeegee 66 moves forwardly over the screen 67. In areas where no embossing is present, the absence of contact of the screen with those areas obviates the impression of the paint thereon.

It is seen, therefore, that in a flooding operation (FIG. 7) the squeegee 66 travels back and forth on the chase 27 in contact with the screen 67 between the paint reservoirs 93 and 99. At the end of each stroke, the squeegee 66 jumps over a paint reservoir for travel in the opposite direction to spread such paint. A uniform application of relatively large amounts of paint to the material being printed is thus formed.

It has been found to be of importance that after each printing or impression cycle of the upper squeegee 66, the under surface of the screen 67 should be wiped. The purpose of this is to remove paint from the under surface which could eventually build up and run through open areas not in contact with the embossed material, thereby spoiling the printing job. For the purpose of providing such under screen wiping action, the following structure is provided in combination with the structure described hereinbefore.

A lower squeegee blade 112 (FIGS. 2, 3 and 6) is disposed transversely across the screen 67 and movable longitudinally over and under the screen 67 by a pair of endless chains 113 and 113a. Rotatably mounted for supporting the chains 113 are two sets of four sprocket wheels 114, 115, 116 and 117. The wheels of each set are arranged in a vertically disposed rectangle as illustrated, with the upper wheels 114 and 117 directly above the lower wheels 115 and 116, respectively. Additionally, the commonly designated wheels of both sets are transversely aligned with each other.

Each set of wheels are mounted on front and rear brackets 118 and 119, respectively, connected together at their upper ends by braces 121 and mounted in turn on each of a pair of parallel, longitudinally extended, transversely spaced channel members 121 and 122 (FIGS. 2 and 5). The members 121 and 122 are interconnected adjacent their front and rear ends by a pair of angle irons 123 (FIG. 2) which form the frame for receiving and supporting the screen 67. The members 121 and 122 are also supportingly suspended from the chase frame members 49 by a plurality of bracket units 124 (FIGS. 2 and 5). Each unit 124 includes a Z-shaped brace 126 bolted to the adjacent channel member and to a plate 127 secured to the inside of the chase frame member.

A depending leg 128 (FIG. 5) of each brace 126 supports an elongated L-shaped guide 129 (FIG. 3) on which is mounted a nylon bar 131. The bar 131 acts as a support for the lower flight of the chain 113, thereby providing for a non-yielding and even wiping movement of the lower squeegee blade 112 against the screen 67 during its passage therebeneath. Referring particularly to FIG. 6, it is seen that the blade 112 is interconnected transversely

between the chains 113 and 113a so as to extend normal to its direction of travel, and includes an L-shaped member 132 of hard rubber, plastic or the like which actually contacts the screen 67. The member 132 can be built up on shims 130 (FIG. 8) relative to the blade 112 for adjustment relative to the screen 67. Furthermore, connections for the member 132 to the blade 112 are such that a slight amount of longitudinal adjustment of the member 132 is provided.

Drive for the wheel 114—117 is provided by a take-off shaft 133 (FIG. 6) and large sprocket wheel 134. A chain 136 transmits the drive to the inner sprocket wheel 138 of a double sprocket wheel unit 135 (FIG. 2) which is rotatably mounted on the main shaft 26, the unit being supported against movement axially of the shaft 26. The outer sprocket wheel 137 (FIG. 6) drives, via a chain 139, another wheel 141 which in turn rotates a shaft 142 to which the two sprocket wheels 116 are secured. The remaining wheels 113—115 act therefore as idlers for the chains.

Thus, by arranging the location of the lower squeegee wiping blade 112 relative to the upper squeegee 66, and by arranging the reduction of the drive thereto to the desired ratio, the following is readily foreseeable. As the upper squeegee blade 66 reciprocates forwardly and rearwardly (FIG. 7) through the positions I—VI to effect a complete printing cycle, the lower wiping blade 112 is also moved through its positions I'—VI', which correspond respectively to those of the upper blade 66, to effect a complete wiping cycle. Importantly, as the upper blade 66 moves rearwardly from position IV to position VI, the lower blade 112 always trails the upper blade 66 so that the lower blade 112 never passes beneath the upper blade 66 while the latter is in engagement with the screen 67.

To remove excess paint from the lower squeegee blade member 132 (FIG. 8), a scraping blade 143 of hard rubber or the like is provided. The scraping blade 143 is elongated and is secured via an angle plate 144 to a trio of transversely spaced arms 146 (FIG. 2) rockably mounted on a shaft 147 secured at each end to a plate 148 mounted on a channel member 121 or 122. The arms 146 normally rest on a rod 149 (FIGS. 2 and 8) extended between the rear brackets 119; however, upon engagement of the blade member 132 with the pointed end 146 of the scraping blade 143, it may be seen that as the squeegee 112 is moved upwardly on the chains, the blade 143 is rocked upwardly in a counterclockwise direction (FIG. 8) as it removes the excess paint from the blade member 132. The blade 143 then falls downwardly until the arms 146 strike the rod 149. Although not shown herein, means can be provided for receiving the paint scraped from the member 132 and for returning it to a reservoir or to the top of the screen 67.

Referring now to FIG. 9, the electric circuit for operating the press 20 is illustrated. Current is fed through input A.C. lines 151 and 152 to lines 153 and 154 for the motor 28. A safety switch 156 is provided in the line 153, and a normally open switch 157, normally closed hand switch 158, and normally closed foot switch 159 are provided in line 161 leading from one of two relays 162 and 163 to a holding coil 164. Upon closing switches 156 and 157, the coil 164 is energized to hold the relays 162 and 163 closed for normal operation of the motor 28.

In the remainder of the circuit, the A.C. current is led to a rectifier 166 for changing the current to D.C. before transmitting it to a commercial switch unit 167. Within the unit 167, a plurality of terminals 168, 169, 170, 171 and 172 are provided, plus a holding coil 173 for closing normally open relays 174 and 175. Normally closed relays 176 and 177 are also provided in series with a resistance 178. A safety switch 179 is provided in one of the A.C. lines 180 and 181 to a cam operated switch 182 (see FIG. 2) for applying A.C. to the holding coil 173.

The arrangement is such that when the cam 32 (FIG. 2) actuates the linkage to move the upper squeegee blade 66 forward through its printing or impression stroke of positions I to III (FIG. 7), the electromagnetic bed 110, comprising a pair of soft iron blocks 183 and 184 laid side by side and covered by a flat plate (not shown), receives D.C. through lines 186 and 187 from the terminals 169 and 170 respectively. This occurs as the cam 32 acts to close the switch 182 and energize the coil 173 thus closing the relays 176 and 177 and transmitting D.C. through line 188 for the terminal 168 to the terminal 170. Thus, by transporting metal license plates, for example, to a location on the top plate of the electromagnetic bed 110 while the chase 27 is up, the plates are held down flat against the bed 110 during the paint impression pass to ensure a perfect application of the paint on the embossed surfaces. It can well be appreciated that should other signs, etc., be painted which are not ordinarily warped as are conventional license plates, means other than the electromagnetic bed 110 for holding the material in place for the impression pass of the upper squeegee 66 can be used. The press 20, therefore, is not to be so limited.

When the upper squeegee 66 has completed its forward printing stroke, the cam 32 moves away from engagement with the switch 182, the switch opens and de-energizes the coil 173. To prevent residual magnetism within the bed 110 occurring so as to retain the license plates against removal, the relays 174 and 175 are arranged to close an instant before the other relays 176 and 177 open, thereby shortening out the bed 110 across the terminals 168 and 169. As the chase 27 raises during the return or rearward stroke of upper squeegee blade 66 from position IV (FIG. 7) to position VI, the license plates are released for removal and the bed 110 then clear for receipt of more license plates. The press is then automatically ready to paint another set of license plates or the like.

In summary, a silk screen printing press is disclosed for automatically painting the embossed surfaces of license plates or the like, wherein in addition to a squeegee blade above the screen for doing the painting, another squeegee blade below the screen is provided for movement in relation to movement of the upper squeegee for wiping away paint from the underside of the screen.

Although a preferred embodiment has been disclosed herein, the invention is not to be so limited, as various modifications and alternate constructions can be made thereto without departing from the scope of the invention as defined in the appended claims.

I claim:

1. A silk screen printing press comprising a main frame, supporting means on said main frame for holding embossed surfaced material to be printed upon, a screen positioned above said supporting means and movably mounted on said frame for up and down movement to and from an operative printing position relative to said material, a first squeegee operatively associated with said screen for moving a fluid therethrough from one side of said screen when the screen is in a printing position, a second squeegee operably associated with said screen for removing fluid from the opposite side of said screen when the screen is in a position away from said material, and means for moving said squeegees in timed relationship to each other so as to act at different times on said screen.

2. A silk screen printing press comprising a main frame, supporting means on said main frame for holding stationary material to be printed upon, a screen positioned above said supporting means and movably mounted on said frame for up and down movement toward and away from an operative printing position, a first squeegee operatively associated with said screen for moving a fluid therethrough from a side of said screen opposite said supporting means, means for moving said first squeegee back and forth across said screen to effect said fluid movement,

9

means operable in timed relationship with the movement of said squeegee providing for the movement of said screen from a non-printing position to a printing position prior to travel of said squeegee in one direction, a second squeegee operatively associated with said screen for removing fluid therefrom from the side of said screen adjacent said supporting means, and means for moving said second squeegee in timed relationship with said screen movement means for moving said second squeegee across said screen when said screen is in said non-printing position.

3. The silk screen printing press defined in claim 1 wherein the supporting means includes electromagnetic means, and said press includes means operable in timed relationship with said down screen movement to energize said electromagnetic means when said screen is in

10

said operative printing position whereby to hold magnetizable material securely in place on said support means.

4. The silk screen printing press defined in claim 1 including means operatively associated with said second squeegee for scraping said fluid therefrom after said second squeegee has removed the fluid from said screen.

References Cited in the file of this patent

UNITED STATES PATENTS

767,684	Burdick -----	Aug. 16, 1904
1,553,529	Hayden -----	Sept. 15, 1925
1,999,903	Harshberger -----	Apr. 30, 1935
2,936,705	Hall -----	May 17, 1960
2,975,705	Gilman -----	Mar. 21, 1961