

March 9, 1965

R. R. RUDOLPH ET AL

3,172,357

PNEUMATICALLY OPERATED STENCILING APPARATUS

Filed March 4, 1963

3 Sheets-Sheet 2

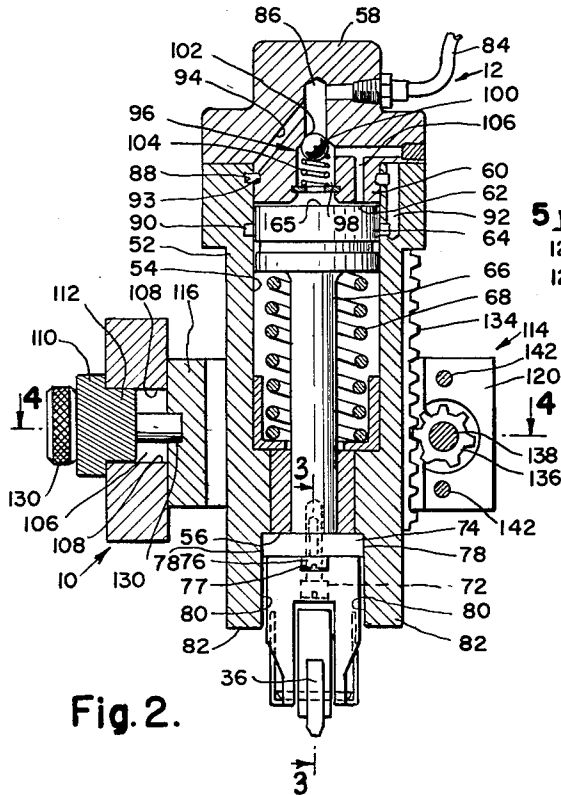


Fig. 2.

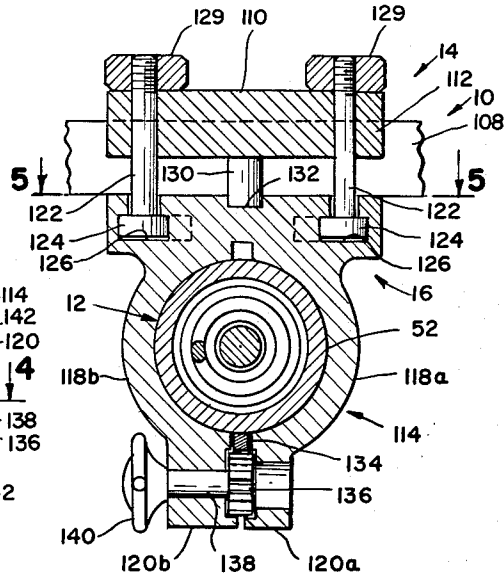


Fig. 4.

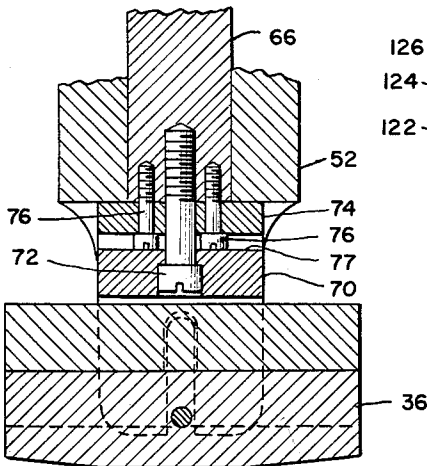


Fig. 3.

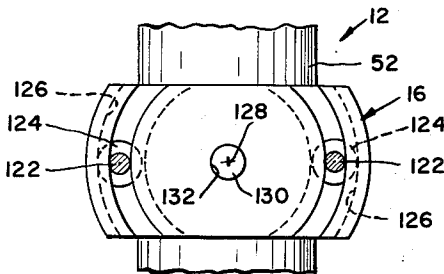


Fig. 5.

INVENTORS
 Carl Strutz, Sr.
 Rome R. Rudolph
 BY *J. N. May*
 their ATTORNEY

March 9, 1965

R. R. RUDOLPH ET AL

3,172,357

PNEUMATICALLY OPERATED STENCILING APPARATUS

Filed March 4, 1963

3 Sheets-Sheet 3

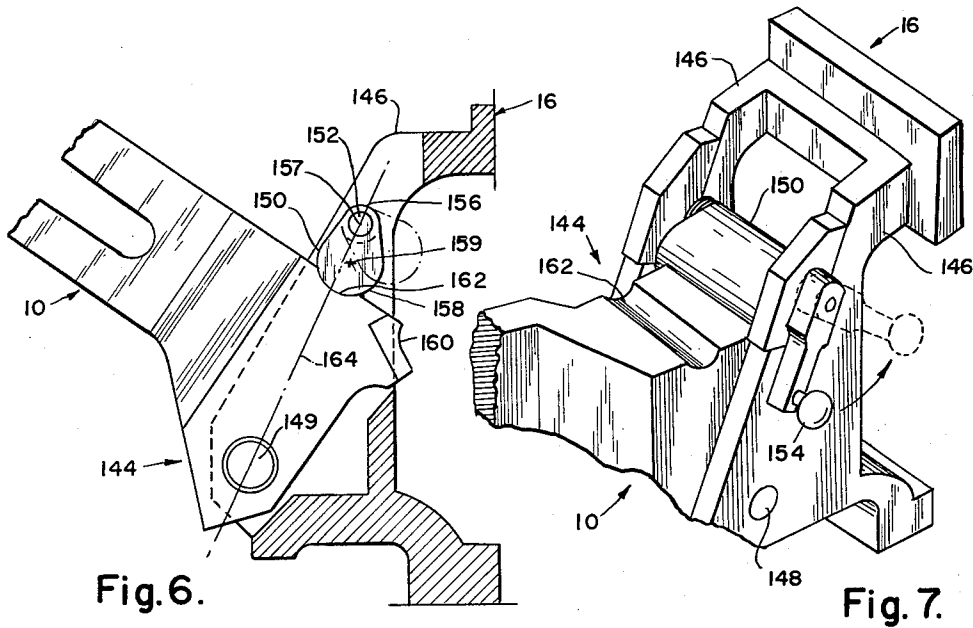
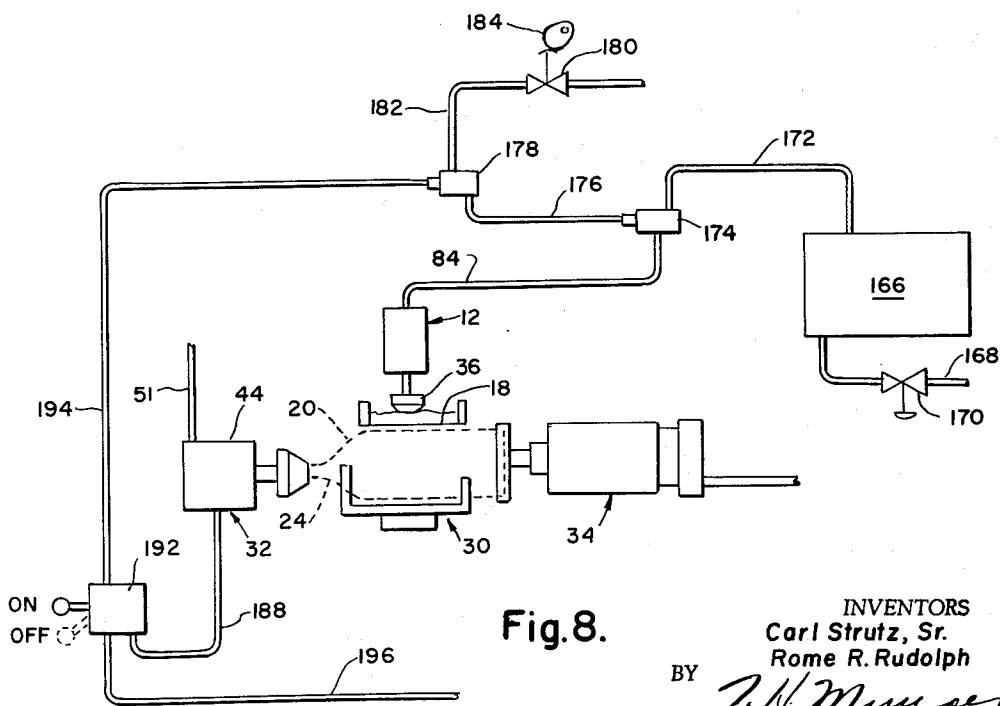


Fig. 8.

INVENTORS
Carl Strutz, Sr.
Rome R. Rudolph
BY *J. H. Mumery*
their ATTORNEY

1

2

3,172,357

PNEUMATICALLY OPERATED STENCILING APPARATUS

Rome R. Rudolph, Gibsonia, and Carl Strutz, Sr., Mars, Pa., assignors to Carl Strutz & Co., Inc., Valencia, Pa., a corporation of Pennsylvania
Filed Mar. 4, 1963, Ser. No. 262,714
10 Claims. (Cl. 101-126)

This invention relates to stenciling apparatus and more particularly to stenciling apparatus employing pneumatically operated and controlled squeegee assemblies.

The apparatus of the present invention finds particular utility when employed in automatic stenciling machines having a plurality of carriages secured together in an endless chain configuration for supporting the members to be decorated. The carriages are utilized to position the members to be decorated beneath a stencil screen. Automatic stenciling machines which are utilized for decorating glass bottles, as for example, normally include a neck chuck and a clutch brake which are axially aligned and cooperate to rigidly position the glass bottle beneath the stencil screen. Prior to being positioned beneath the stencil screen, the bottle is rotated so that the portion to be decorated is properly positioned with respect to the screen whereupon the carriage transports the bottle to a position beneath the screen. At this point in the stenciling operation, the neck chuck is activated to engage the top or neck of the bottle while the clutch brake is activated to engage the bottom of the bottle. Thus, the bottle is rigidly held by the neck chuck and the clutch brake.

The actual stenciling operation may take one of several forms. That is to say, the movements of the squeegee, the bottle and the stencil screen relative to one another may take one of several forms. For example, in the case of a cylindrical bottle, the squeegee may be held stationary while the bottle is rotated and the stencil screen is moved at a speed corresponding to the linear speed of the rotating bottle. Alternatively in the case of a cylindrical bottle, the stencil screen may be held stationary while the squeegee is moved and the bottle is rolled along the stencil screen. In the case of bottles having a flat face or a curved face wherein the radius of curvature is large, both the bottle and the screen may be held stationary while the squeegee is moved across the stencil screen.

The present invention, as herein illustrated, is incorporated in an automatic stenciling machine wherein the squeegee remains stationary and the stencil screen and bottle are moved. However, it should be evident that the present invention could, with equal utility, be used in other types of stenciling machines, such as, semi-automatic and manual machines.

According to the present invention, a squeegee assembly is provided which is supported above a horizontal stencil screen. The squeegee assembly comprises a pneumatically operated cylinder having a piston slideably supported therein. The piston has a shaft secured thereto which extends through an end wall of the cylinder and which supports a squeegee. The squeegee assembly maintains the squeegee in a normally raised position wherein the squeegee is spaced from the stencil screen. Hence, when positive pressure is applied to the piston, the squeegee is lowered into decorating contact with the stencil screen; and when the pressure is relieved, the squeegee is raised into its normally raised position.

Incorporated in the squeegee assembly is a means for cushioning the return of the squeegee to its normally raised position so that none of the stenciling fluid adhering to the squeegee is splattered.

The present squeegee assembly is connected to a support arm which is cantilevered over and above the stencil screen and which is adapted to support one or more of

the squeegee assemblies. A novel unitary support means also is provided for connecting the squeegee assembly to the support arm. The novel unitary support means provides for positioning the squeegee assembly anywhere along the support arms; for inclining the squeegee assembly so that to position the squeegee parallel with the stencil screen; and for adjusting the height of the squeegee above the stencil screen. Hence, each squeegee may be easily and quickly positioned with respect to the surface which is to be decorated. The present invention further provides a pneumatic operating and control circuit for lowering and raising the squeegee into and out of decorating contact with the stencil screen; and for preventing the lowering of the squeegee in the event that the carriage positioned beneath the stencil screen is empty, i.e., is not supporting a bottle.

The primary objects of this invention include:

To provide a squeegee assembly wherein a consistent and constant positive pressure is employed in its operation;

To provide a squeegee assembly which is lowered into decorating contact with a stencil screen by the application of positive pressures and which is raised above the stencil screen by the removal of positive pressure;

To provide a squeegee assembly having means for cushioning the return of the squeegee which prevents the splattering of the stenciling fluid adhering to the squeegee;

To provide a squeegee assembly having a novel unitary support means whereby the squeegee may be easily and quickly positioned with respect to the surface which is to be decorated;

To provide a pivotal support arm for the squeegee assemblies having novel locking means whereby the support arm may be locked into a lowered or raised position; and

To provide a squeegee assembly having control means included in the operating circuit for preventing the lowering of the squeegee onto the stencil screen when no member is present beneath the stencil screen.

These and other objects and advantages of the present invention will become apparent from the following detailed description by reference to the accompanying drawings, in which:

FIGURE 1 is a fragmentary elevation view illustrating a stenciling apparatus employing the squeegee assemblies of the present invention;

FIG. 2 is a cross-sectional view, taken along the line 2-2 of FIG. 1, illustrating the squeegee support of the present invention;

FIG. 3 is a fragmentary cross-sectional view, taken along the line 3-3 of FIG. 2;

FIG. 4 is a cross-sectional view taken along the line 4-4 of FIG. 2;

FIG. 5 is a cross-sectional view taken along the line 5-5 of FIG. 4;

FIG. 6 is a cross-sectional view of a pivotal connection for a support arm and illustrating the support arm in a raised position;

FIG. 7 is a fragmentary isometric view further illustrating the pivotal connection of the support arm; and

FIG. 8 is a schematic illustration of the control circuit for one of the present squeegee assemblies.

Referring now to FIG. 1, there is illustrated a support arm 10 to which squeegee assemblies 12 are secured by unitary support means 14. The support arm 10 is cantilevered from a stationary base 16 and extends over and above stencil screens 18 which are maintained adjacent to the surface of the member to be decorated which in FIG. 1 is illustrated in phantom outline as a bottle 20. The bottle 20 includes a base 22, a top 24, and horizontal and sloped decorating areas indicated by the dotted outlines 26 and 28 respectively. As can be

3

seen, the stencil screens 18 are positioned directly over the decorating areas 26 and 28.

The bottle 20 is supported by carriage 30 which is movable in a direction normal to the plane of the drawings so as to transfer the bottle 20 to a position beneath the stencil screens 18. A neck chuck 32 is engaged with the neck 24 of the bottle 20 while the clutch brake 34 is engaged with the bottom 22 of the bottle 20. The carriage 30, the neck chuck 32 and the clutch brake 34 form parts of an automatic stenciling machine which is not shown.

The squeegee assemblies 12 include squeegees 36 which are shown in a normally raised position above the stencil screens 18. The right-hand squeegee assembly 12 is positioned normal to the bottle 20 so that the squeegee 36 is maintained parallel with the horizontal decorating area 26. The left-hand squeegee assembly 12 is inclined with respect to the bottle 20 so that its squeegee 36 is maintained substantially parallel to the sloped decorating area 28.

The neck chuck 32 has a neck engaging member 38 which is rotatably supported on a chuck shaft 40 by means of bearings 42. The chuck shaft 40 extends into a housing 44 and is contiguous with a chuck piston 46. A spring member 48 biases the neck engaging member 38 toward the housing 44. The housing 44 includes a passageway 50 which serves to communicate a working fluid, introduced by conduit means 51, into the interior of the housing 44. As illustrated in FIG. 1, the neck engaging member 38 has been moved into engagement with the neck 24 of the bottle 20 and cooperates with the clutch brake 34 to rotate the bottle after the squeegees 36 have been lowered into decorating contact with the stencil screens 18.

Reference is now directed to FIGS. 2 and 3 wherein the squeegee assembly 12 is more fully illustrated. The squeegee assembly 12 comprises a cylindrical body 52 having a longitudinal bore 54 and a first end wall 56; a cap member 58 having a hub portion 60 engaged in the bore 54 and including a face 62 serving as a second end wall; a piston 64, slidable within the bore 54, including a working face 65 opposite the face 62 of the hub portion 60 and a shaft 66; and a spring member 68 which biases the piston 64 toward the face 62 of the hub portion 60. The shaft 66 extends through the first end wall 56 and is connected to a squeegee holder 70 by means of a bolt 72.

Interposed between the squeegee holder 70 and the first end wall 56 is a guide member 74 which is rigidly secured to the shaft 66 by means of fasteners 76. The heads of the fasteners 76 reside in a slot 77 which is cut in the top of the squeegee holder 70. The guide member 74 comprises a bearing plate means having parallel opposed sides or surfaces 78 (see FIG. 2) which are in sliding engagement with faces 89 of spaced parallel projections or legs 82 extending from the cylindrical body 52. The guide member 74 serves to prevent the rotation of the squeegee 36 about the central longitudinal axis of the shaft 66. The guide member 74 preferably is formed from nylon but alternatively could be formed from any suitable plastic or metallic materials.

As hereinbefore stated, the squeegee assembly 12 is operated by the application and removal of a working fluid under positive pressure. In order to introduce the working fluid into the interior of the cylindrical body 52, conduit means 84 communicates with a central bore 86 in the cap member 58. The cylindrical body 52 includes spaced apart grooves 88, 90 which are connected by a passageway 92. The cap member 58 has a groove 93 which registers with the groove 88. A passageway 94 in the cap member 58 connects the grooves 88 and 93 with the central bore 86. A valve means 96 resides within an enlarged portion 98 of the central bore 86 and preferably comprises a ball 100 which is maintained engaged with a lip 102 by means of a suitable spring 104. The spring 104 preferably is of such strength

4

that it will yield to the pressure of the incoming working fluid and communicate it to the face of the piston 64. The hub portion 60 also includes a plurality of passageways 106 (only one shown) which communicates with the enlarged portion 98 of the central bore 86 and the face 62 of the hub portion 60.

As can be seen in FIG. 2, the piston 64 is covering the groove 90. Hence, initially the incoming working fluid passes through a first conduit means defined by the central bore 86, the valve means 96, the enlarged portion 98 and the plurality of passageways 106 until such time as the piston 64 is moved downwardly a sufficient distance so that the working fluid may also enter by way of a second conduit means defined by the passageway 94, the cooperating grooves 88, 93, the passageway 92 and the grooves 90. Thereafter the piston will continue to move the squeegee 36 downwardly into decorating contact with the stencil screen 18.

It is an object of the present invention to provide a squeegee assembly having means for cushioning the return of the squeegee whereby the splattering of the stenciling fluid adhering to the squeegee is prevented. Referring still to FIG. 2, after the squeegee has been lowered, as hereinabove described, and the stenciling operation is completed, the positive pressure of the working fluid is lowered whereupon the spring member 68 displaces the piston upwardly toward the face 62 of the hub 60. Notice, however, the valve means 96 prevents the discharge of the working fluid through the enlarged portion 98 and thus restricts the outward flow of the working fluid to the path defined by the groove 90, passageway 92, grooves 88 and 93, passageway 94, and out through the conduit means 84. However, when the piston 64 again closes the groove 90, a portion of the working fluid is trapped between the working face 65 of the piston 64 and the valve means 96. This trapped portion of the working fluid is compressed by the force of the spring member 68 and serves to cushion the return of the squeegee 36. Hence, none of the stenciling fluid adhering to the squeegee 36 is splattered.

Another object of this invention is to provide a squeegee assembly having a novel unitary support means whereby the squeegee may be easily and quickly positioned with respect to the surface which is to be decorated. To this end, reference is now directed to FIGS. 1, 2, 4 and 5.

The support arm 10 has a central longitudinal slot 106 defined by parallel faces 108 which extends over a major portion of the length of the support arm 10. As can best be seen in FIGS. 2 and 4, the unitary support means 14, in part, comprises a clamping bar 110 which is wider than the slot 106 and includes an elongated projection 112 which is inserted between and guided by the faces 108. The unitary support means 14 also includes a clamping holder 114 comprising a base portion 116 and arcuate arms 118a and 118b which encircle the cylindrical body 52 of the squeegee assembly 12. The arcuate arms 118a, 118b terminate in flanges 120a, 120b, respectively.

As can best be seen in FIGS. 4 and 5, a pair of T-bolts 122 has their heads 124 retained in arcuate slots 126. The arcuate slots 126 have a center at point 128 (see FIG. 5). The T-bolts 122 extend through and beyond the clamping bar 110. Nuts 129 are threaded onto the T-bolts 122 so that the squeegee assembly is secured at a fixed location on the support bar 10 by having a portion of the support bar 10 clamped between the clamping bar 110 and the base 116 of the clamping holder 114.

The unitary support means 14 also provides for inclining the squeegee assembly 12 for aligning the squeegee 36 with the surface to be decorated. As can be seen in FIGS. 2, 4 and 5, the elongated bar 110 includes a rod 130 which projects into an aperture 132 in the base 116. The longitudinal axis of the rod 130 and the point 128 are coincident whereby the rod 130 provides a pivot about which the clamping holder 114 may be rotated.

5

In order to rotate the clamping holder 114 and thereby incline or align the squeegee assembly 12, the nuts 129 are first loosened whereupon the clamping holder may be rotated about the rod 130 while the heads 124 of the T-bolts 122 slide along the arcuate slots 126. When the squeegee assembly 12 has been properly aligned with respect to the surface to be decorated, the nuts 129 are again tightened to clamp the squeegee assembly 12 in the aligned position.

The unitary support means 14 also provides for adjusting the height of the squeegee 36 with respect to the stencil screen 18. Referring to FIGS. 2 and 4, the cylindrical body 52 is provided with a rack 134 which extends longitudinally thereof. A pinion 136 is secured to a stub shaft 138 which extends through the flange 120b of the arcuate leg 118b, to a handle 140. A pair of fasteners 142 (see FIG. 2) extend through the flange 120a and are threaded into the flange 120b. The fasteners 142 serve to frictionally clamp the arcuate arms 118a, 118b to the cylindrical body 52. To adjust the height of the squeegee assembly 12 with respect to the stencil screen 18, the fasteners 142 first are loosened whereupon by turning the handle 140 in the proper direction the squeegee assembly 12 may be either lowered or raised.

It is another object of this invention to provide a pivotal support arm for the squeegee assembly which includes a novel locking means whereby the support arm may be locked in a lowered or raised position. To this end, reference is directed to FIGS. 1, 6 and 7. The support arm 10 is shown in its lowered position in FIGS. 1 and 7 and in its raised position in FIG. 6.

The support arm 10 has an enlarged portion 144 which fits between side members 146 of the stationary bases 16. A first shaft 148 having an axis at 149 extends through the enlarged end portion 144 and the side members 146. The support arm 10 is rotatable about the first shaft 148. A locking member 150 extends between the side members 146 of the stationary base 16. The locking member 150 is parallel with the first shaft 148 and includes stub shafts 152 which extend through the side members 146. The stub shafts 152 are axially aligned so as to form a second shaft about which the locking member rotates. A locking handle 154 is secured to one of the stub shafts 152 externally of the side members 146. As can be seen in FIG. 6, the locking member 150 has an egg-like cross-section and includes a small diameter end 156 with which the stub shafts 152 are contiguous and a large diameter end 158. The small diameter end 156 has a center 157 coincident with the axes of the stub shafts 152. The large diameter end 158 has a center indicated by a cross at 159.

The enlarged end portion 144 of the support arm 10 has a first groove 160 in which the locking member 152 is engaged when the support arm 10 is in its lowered position as shown in FIGS. 1 and 7; and a second groove 162 in which the locking member 152 is engaged when the support arm 10 is in its raised position as shown in FIG. 6.

When the support arm 10 is in its lowered position, refer to FIG. 1, the center 159 is to the left, as viewed in FIG. 1, of a dash-dot line 164 extending between the center 149 of the first shaft 148 and the center 157 of the smaller diameter end 156. Inspection of this construction will reveal that any force which tends to rotate the support arm 10 in a clockwise direction will cause the locking member 150 to become more firmly wedged between the stub shafts 152 and the first groove 160. An example of such a force is the upward force provided by the squeegees when they are lowered into contact with the bottle 20.

Similarly, when the support arm 10 is in its raised position, refer to FIG. 6, the center 159 of the large diameter end 158 is to the right of the line 164 as viewed in FIG. 6. Inspection of this arrangement will reveal that any unintentionally applied force which will move the support

6

arm 10 in a counterclockwise direction, as viewed in FIG. 6, will cause the locking member 150 to become more firmly wedged between the stub shafts 152 and the second groove 162. Thus, by means of the locking arrangement of the present invention, the support arm 10 is securely locked in either the lowered or raised position. Therefore, it cannot be unintentionally lowered when it is in its raised position and it is rigidly held in its lowered position against the upward force created by the squeegees 36 when they are lowered into decorating contact with the bottle 20, as for example.

The operation of one of the squeegee assemblies 12 will now be described with reference to FIG. 8. As hereinbefore stated, the present squeegee assemblies are positive pressure operated devices. The positive pressure preferably is provided by means of compressed air supplied from a tank 166. A conduit 168 supplies the tank 166 with the compressed air from a main air supply (not shown) which is at a considerably higher pressure. A regulator 170 serves to reduce the pressure from the main air supply to a level which is useable in the squeegee assemblies 12. The tank 166 serves to supply the squeegee assemblies 12 with a more constant pressure level than could be achieved through the use of a regulator 170 alone.

A conduit 172 communicates the compressed air to a normally closed three-way valve 174 to which the conduit means 84 of the squeegee assembly 12 is connected. The valve 174 is constructed so that when in its normally closed condition, the conduit 84 is vented to the atmosphere; and when in an open condition, the conduit 84 communicates with the conduit 172. A control conduit 176 extends to a normally open three-way valve 178 which in turn is connected to a control valve 180 by means of conduit 182. The control valve 180 is constructed so that when it is closed the conduit 182 is vented to the atmosphere and when open, compressed air flows through the conduit 182. The control valve 180 is opened and closed by means of a cam operator 184 to control the flow of compressed air from the main air supply (not shown) to the normally closed three-way valve 174.

When the bottle 20 is positioned beneath the screen 18, compressed air is admitted into the housing 44 of the neck chuck 32 so that the neck engaging member 38 is moved into engagement with the neck 24 of the bottle 20. At this time, the cam operator 184 opens the control valve 180 to supply compressed air to the normally closed three-way valve 174 in order to open it whereupon compressed air from the tank 166 is supplied to the squeegee assembly 12. The squeegee 36 is thereby lowered into decorating contact with the stencil screen 18 and the stenciling operation proceeds. When the stenciling operation is completed, the cam operator 184 closes the valve 180 to vent the compressed air from the conduits 176, 182. The valve 174 is then closed whereupon the compressed air is vented from the conduit 84. The cycle may now be repeated.

It is another object of this invention to provide a squeegee assembly having control means included in the operating circuit for preventing the lowering of the squeegee onto the stencil screen when no member is present beneath the stencil screen. To this end, reference is again directed to FIG. 1. The housing 44 of the neck chuck 32 includes a plurality of second passageways 186 (only one shown) which communicate with a conduit 188 by means of a groove 190. The passageways 186 are exposed to the compressed air only when the piston 46 moves to the limit of its travel to the right of FIG. 1, this being possible only when an empty carriage 30 is presented beneath the screen 18. Referring now to FIGS. 1 and 8, the conduit 188 extends to a main on-off valve 192. A conduit 194 extends between the main on-off valve 192 and the normally open three-way valve 178. The conduit 188 communicates with the conduit 194 only when the main on-off valve 192 is in an on position.

Thus, if any empty carriage 30 is presented beneath the screen 18 when the compressed air is introduced into the housing 44, the piston 45 will then move to the limit of its travel to the right of FIG. 1 whereupon the compressed air will be communicated through the passageways 186, grooves 190 to the conduit 188, valve 192, conduit 194 and to the normally open three-way valve 178 to close it. When the three-way valve 178 is closed, the squeegee assembly 12 becomes inoperative since no operating air can be communicated to it. Hence, the stencil screen 18 is protected against the lowering of the squeegee when no member is beneath the stencil screen to carry the load of the squeegee.

The main on-off valve 192 also has a conduit 196 which is connected to the main air supply (not shown). When the main on-off valve 192 is turned to its off position, the conduit 196 communicates compressed air from the main air supply (not shown) to the conduit 194 so that the normally open three-way valve 178 is closed. Once again the squeegee assembly is made inoperative.

It should be understood from the foregoing detailed description, that the present invention provides a squeegee assembly wherein a consistent and constant positive pressure is employed in its operation; a squeegee assembly which is lowered into decorating contact with the stencil screen by the application of positive pressures and which is raised above the stencil screen by the removal of the positive pressures; a squeegee assembly having means for cushioning the return of the squeegee whereby the stenciling fluid adhering to the squeegee is prevented from splattering; a squeegee assembly having a novel unitary support means whereby the squeegee may be easily and quickly positioned with respect to the surface which is to be decorated; a pivotal support arm for the squeegee assemblies which includes a novel locking means whereby the support arm may be locked in a lowered or raised position; and a squeegee assembly having control means included in the operating circuit for preventing the lowering of the squeegee onto the stencil screen when no member is present beneath the stencil screen.

Although the invention has been shown in connection with certain specific embodiments, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention.

We claim as our invention:

1. In stenciling apparatus having carriage means supporting a member to be decorated for positioning said member beneath a stencil screen, the improvement comprising:

pneumatically operated piston means;
a squeegee secured to said piston means, said squeegee being normally spaced from the screen whereby when said piston means is activated said squeegee is lowered into decorating contact with the screen;

a cantilever support arm extending over and beyond the screen and parallel with the central axis of the member to be decorated for supporting said piston means; and

clamping means for releasably and slideably connecting said piston means directly on said support arm whereby said squeegee is positionable along said support arm at any position along the length of the member to be decorated.

2. In stenciling apparatus having carriage means supporting a member to be decorated for positioning said member beneath a stencil screen, the improvement comprising:

pneumatically operated piston means;
a squeegee secured to said piston means, said squeegee being normally spaced from the screen whereby when said piston means is activated, said squeegee is lowered into decorating contact with the screen;

a cantilever support arm extending over the screen for supporting said piston means;

clamping means for releasably connecting said piston means to said support arm whereby said squeegee is positionable along said support arm at any position along the length of the member to be decorated; and

pivoting means for pivoting said piston means about an axis disposed transversely of said squeegee whereby said piston means may be inclined to align said squeegee with a surface of the member to be decorated.

3. In stenciling apparatus having carriage means supporting a member to be decorated for positioning said member beneath a stencil screen, the improvement comprising:

pneumatically operated piston means;

a squeegee secured to said piston means, said squeegee being normally spaced from the screen whereby when said piston means is activated said squeegee is lowered into decorating contact with the screen;

a cantilever support arm extending over the screen for supporting said piston means; and

unitary clamping means and pivoting means for releasably connecting said piston means to said support arm whereby said squeegee is positionable along said support arm at any position along the length of the member to be decorated and for pivoting said piston means about an axis disposed transversely of said squeegee whereby said piston means may be inclined to align said squeegee with a surface of the member to be decorated.

4. In stenciling apparatus having a carriage means supporting a member to be decorated for positioning said member beneath a stencil screen, the improvement comprising:

pneumatically operated piston means;

a squeegee secured to said piston means, said squeegee being normally spaced from the screen whereby when said piston means is activated said squeegee is lowered into decorating contact with the screen;

a cantilever support arm extending over the screen for supporting said piston means;

unitary clamping and pivoting means for releasably connecting said piston means to said support arm whereby said squeegee is positionable along said support arm at any position along the length of the member to be decorated and for pivoting said piston means about an axis disposed transversely of said squeegee whereby said piston means may be inclined to align said squeegee with a surface of the member to be decorated; and

elevating means associated with said unitary clamping and pivoting means for elevating and lowering said piston means to position the squeegee at a predetermined level above the stencil screen.

5. In stenciling apparatus having a pneumatically operated squeegee assembly comprising a cylinder having a bore, a piston slideable within said bore and including a shaft extending therefrom through a first end wall of said cylinder, a squeegee secured to said shaft externally of the said cylinder, and spring means for biasing said piston toward a second end wall of said cylinder, the improvement comprising:

inlet conduit means in said second wall for communicating a compressible fluid under pressure to the working face of said piston, said piston being displaced whereby said squeegee is moved away from the said cylinder, said inlet conduit means comprising a central bore in said second end wall, groove means in the inner wall of said cylinder, and passageway means connecting the said central bore and the said groove means;

valve means in said central bore for restricting the outward flow of said fluid to said groove means, said

9

passageway means and that portion of said central bore downstream of said valve means; and

means within said cylinder for sealing said groove means whereby a portion of said fluid is trapped between said second end wall and said piston, the trapped portion of said fluid being compressed by the force of said spring means whereby the return travel of said squeegee is cushioned.

6. In stenciling apparatus having at least one squeegee means, and pneumatically operated piston means carrying said squeegee for lowering said squeegee into contact with a decorating screen, the improvement comprising:

a stationary base;

a support arm extending from said stationary base in cantilever beam relation and supporting said piston means, said support arm being pivotally connected at one end thereof to said stationary base about a pivotal axis disposed transversely of and adjacent to the bottom of said support arm, said support arm also having spaced apart, transverse shallow grooves in the top thereof and above the pivotally connected end thereof; and

a locking member having an arcuate wedging surface along one edge thereof and means for rotatably connecting said locking member at its other end to said base for rotation about a rotational axis which is spaced from and parallel to the pivotal axis of said support arm whereby said arcuate wedging surface may be moved into wedging engagement with one of said grooves to maintain said support arm in a horizontal position and moved into wedging engagement with the other of said grooves to maintain said support arm in an inclined position, said arcuate wedging surface when engaged in one of said grooves residing between said pivotal axis and said rotational axis whereby attempted movement of said support arm from one of said positions toward the other of said positions will be resisted by further wedging of said arcuate surface in the groove with which it is engaged.

7. In stenciling apparatus having carriage means for supporting a member to be decorated and for positioning said member beneath a stencil screen, the combination comprising:

a stationary base;

a support arm extending from said stationary base in cantilever beam relation, said support arm being pivotally connected at one end thereof to said stationary base about a pivotal axis disposed transversely of and adjacent to the bottom of said support arm, said support arm also having spaced-apart, transverse grooves in the top thereof and above the pivotally connected end thereof;

locking arm means secured to said stationary base for rotation about a rotational axis which is parallel to said pivotal axis of said support arm, said locking arm means having an arcuate wedging surface which is spaced from said rotational axis for maintaining said support arm in a horizontal position during a decorating operation when said arcuate wedging surface is engaged in one of said transverse grooves and for maintaining said support arm in an inclined position during adjustment of parts of the stenciling apparatus when said arcuate wedging surface is engaged in the other of said transverse grooves;

a squeegee positioned above the stencil screen and normally spaced therefrom;

pneumatically operated piston means carrying said squeegee for lowering said squeegee into decorating contact with the stencil screen, said piston means maintaining said squeegee stationary with respect to the member to be decorated, said piston means com-

10

prising a cylinder having a bore, a piston slideable within said bore and including a shaft extending therefrom through a first end wall of said cylinder, means for securing said squeegee to said shaft, spring means for biasing said piston toward a second end wall of said cylinder, inlet conduit means in said second end wall for communicating a compressible fluid under pressure to the working face of said piston, said piston being displaced whereby said squeegee is moved away from said cylinder, valve means within said inlet conduit means for restricting the outward flow of said fluid, and means within said cylinder for trapping a portion of said compressible fluid between said second end wall and said piston, the trapped portion of said fluid being compressed by the force of said spring means to cushion the return travel of said squeegee whereby any stenciling fluid adhering to said squeegee will not be thrown therefrom; and

unitary clamping means and pivoting means for releasably connecting said piston means to said support arm whereby said squeegee is positionable along said support arm at any position along the length of the member to be decorated and for pivoting said piston means about a second pivotal axis disposed transversely of said piston means whereby said piston means may be inclined to align said squeegee with a surface of the member to be decorated.

8. In stenciling apparatus having a pneumatically operated squeegee assembly comprising a cylinder having side walls and an end wall, a piston slideable within said cylinder and cooperating with said side walls and said end wall to define a variable volume chamber; means connecting a squeegee to said piston for movement therewith; and spring means for biasing said piston in a direction which decreases the volume of said chamber, the improvement comprising:

first conduit means for communicating a compressible fluid to said chamber through said end wall;

a check valve in said first conduit means which allows said compressible fluid to flow into said chamber and prevents said compressible fluid from flowing out of said chamber through said first conduit means;

second conduit means for communicating said compressible fluid to said chamber through said side walls; and

means within said cylinder for sealing said second conduit means whereby a portion of said fluid is trapped within said chamber for cushioning the return travel of said squeegee.

9. The improvement of claim 8 wherein said means for sealing said second conduit means comprises said piston.

10. The improvement of claim 8 wherein said second conduit means communicates with said first conduit means at a point downstream of said check valve means.

References Cited by the Examiner

UNITED STATES PATENTS

2,174,298	9/39	Whisner	101—124
2,261,255	11/41	Jackson	101—124
2,695,148	11/54	Anderson	248—16
2,694,973	11/54	Shoemaker	101—126
2,730,320	1/56	Srader	248—16
2,767,647	10/56	Hakogi	101—126
2,770,191	11/56	Holly	101—126
2,830,563	4/58	Burchhalter	121—46
2,904,009	9/59	Salter	121—38
2,971,629	2/61	Black	101—126 X
2,972,943	2/61	Velonis	101—124
2,991,711	7/61	Ehrhard et al.	101—126

EUGENE R. CAPOZIO, *Primary Examiner.*