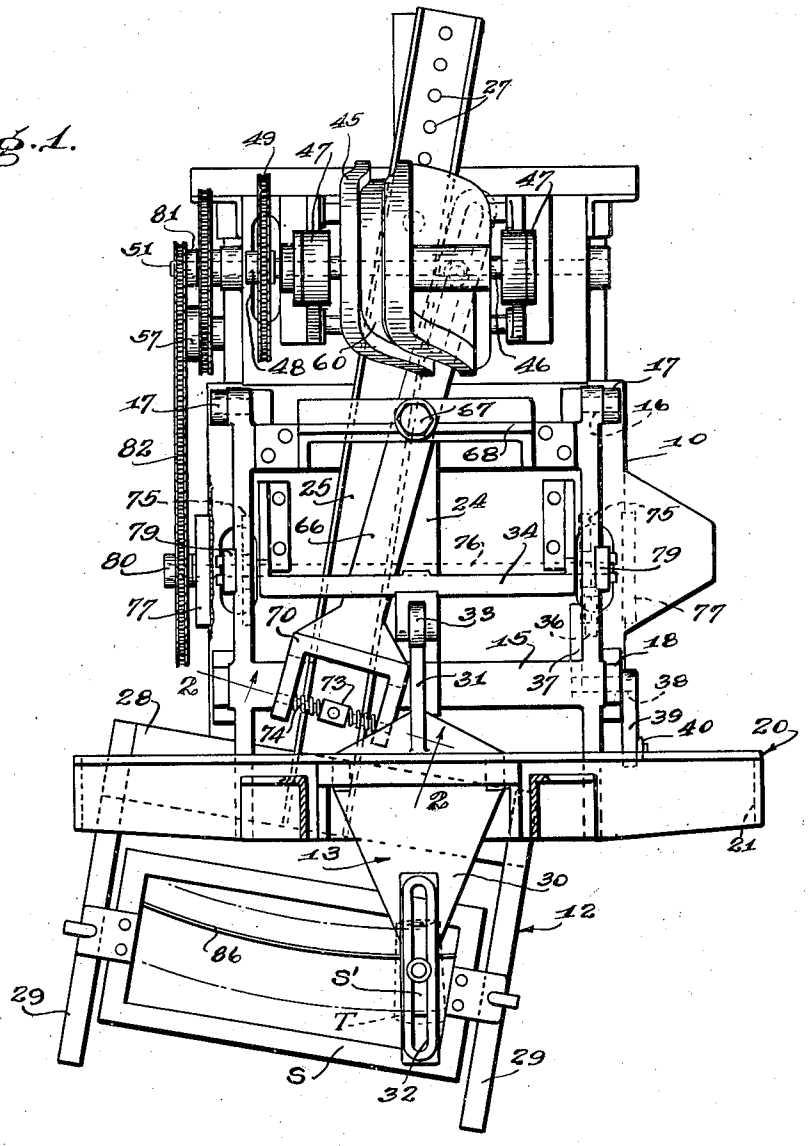
Dec. 8, 1942. T. S. BAUMAN 2,304,725

AUTOMATIC STENCILLING MACHINE

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Fig. 1.



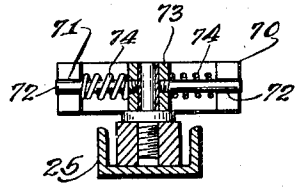


Fig. 2.

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AUTOMATIC STENCILLING MACHINE

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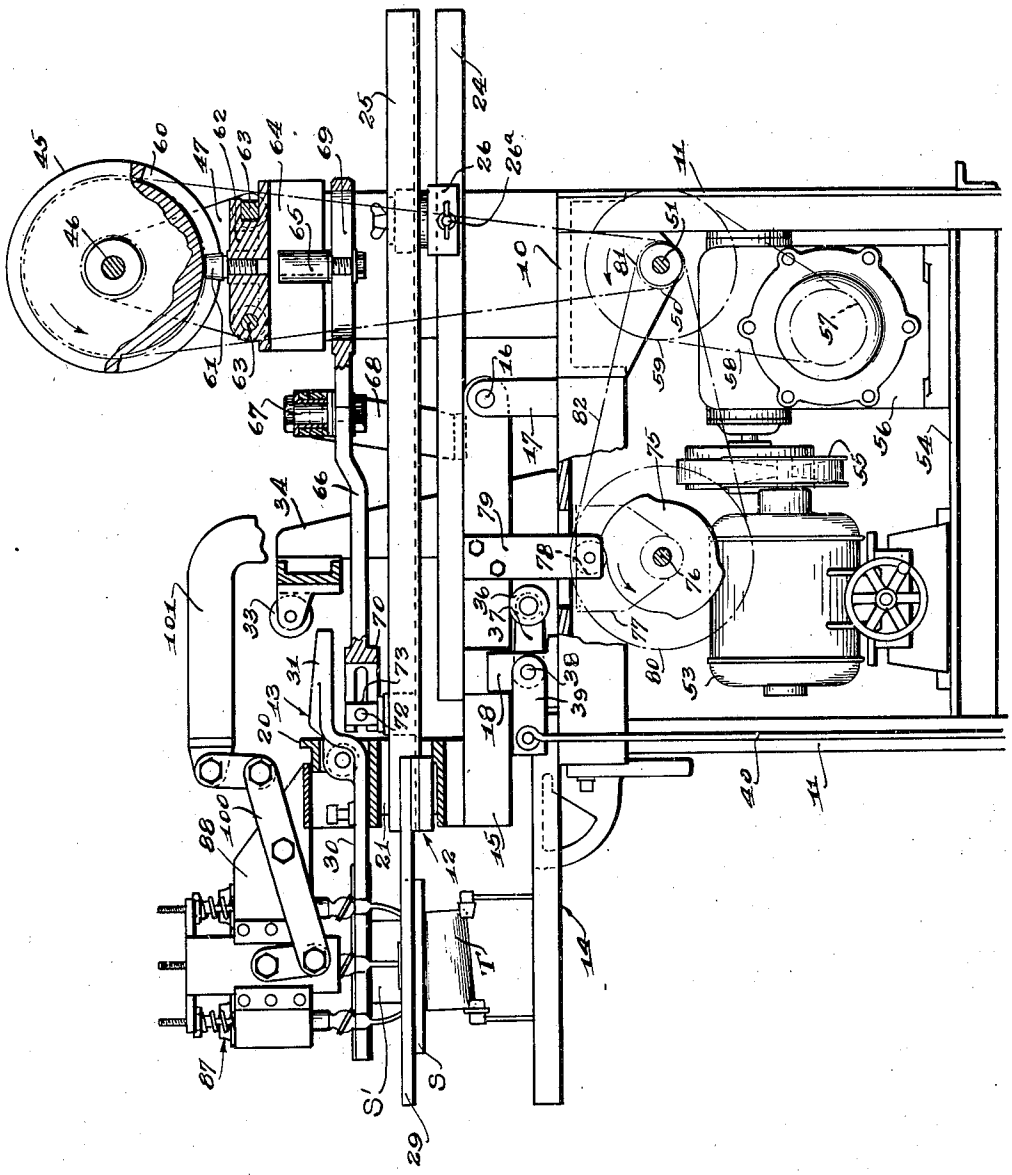


Fig. 3.

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AUTOMATIC STENCILLING MACHINE

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Fig. 4.

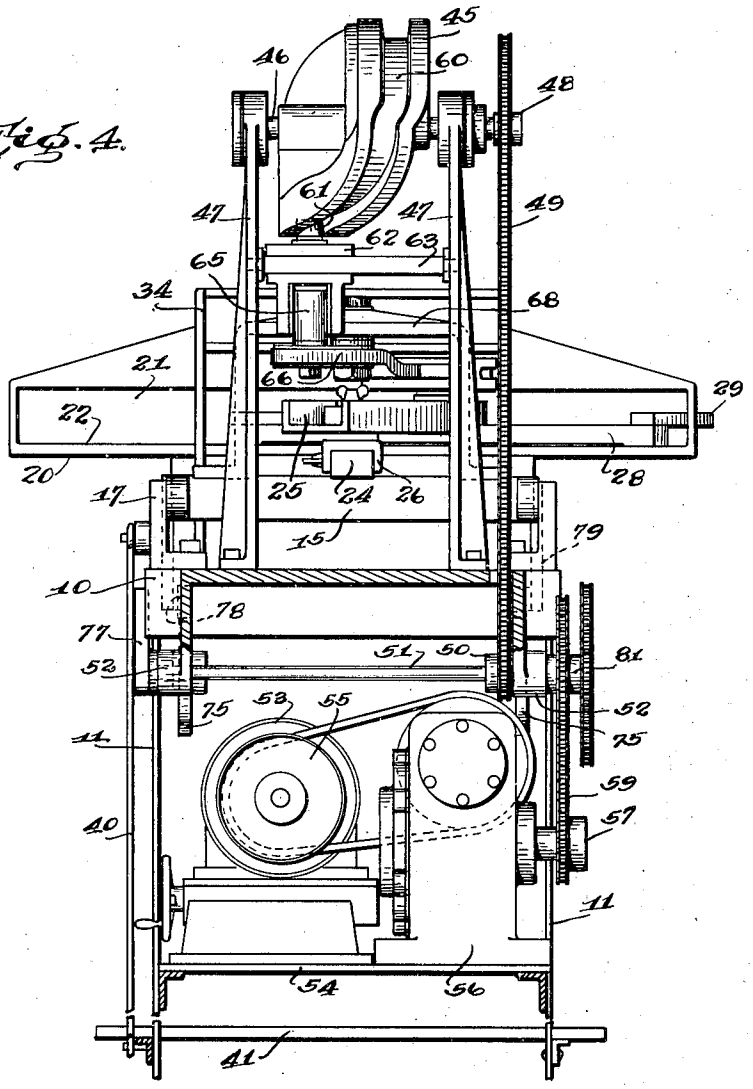
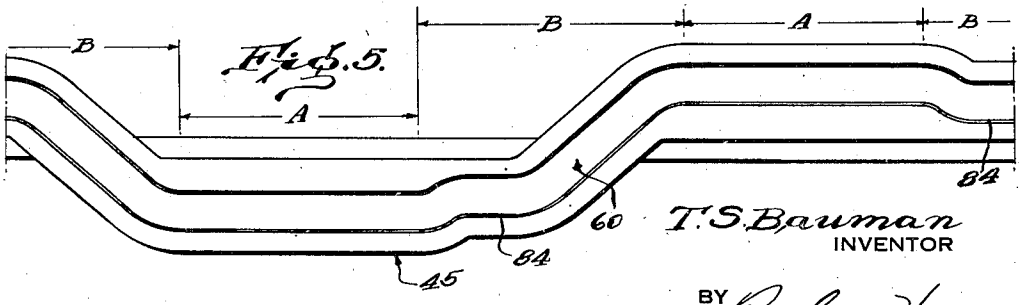


Fig. 5.



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AUTOMATIC STENCILLING MACHINE

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Fig. 6.

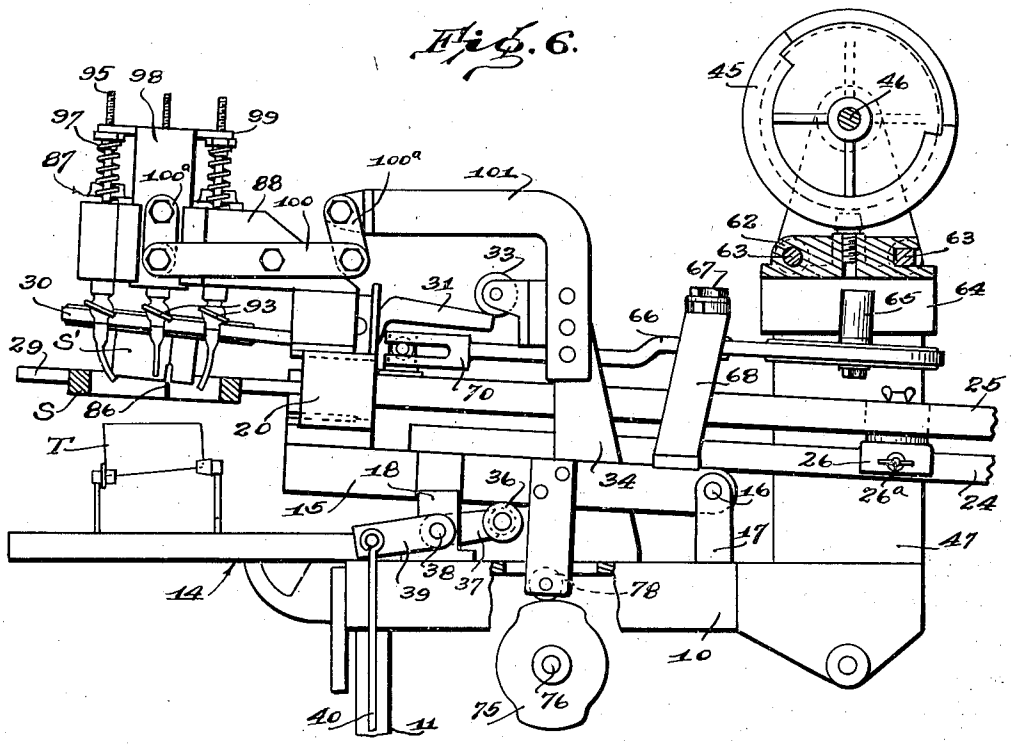


Fig. 8.

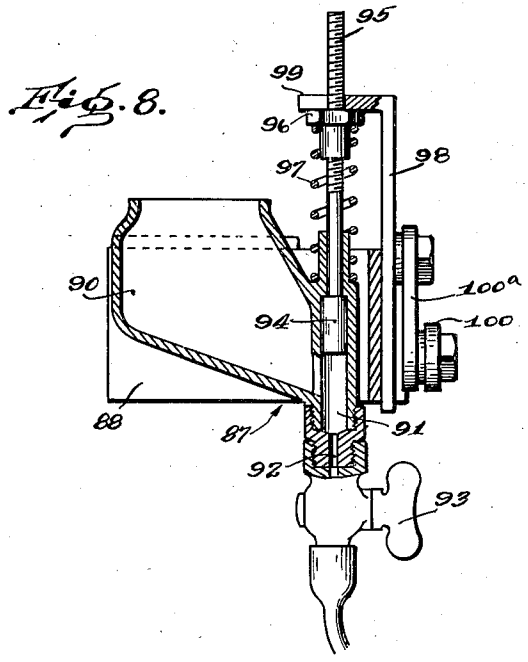
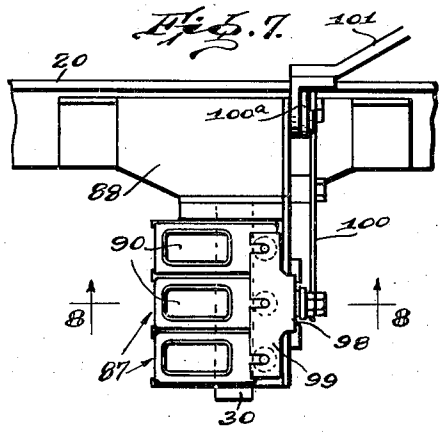


Fig. 7.



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Patented Dec. 8, 1942 2,304,725

UNITED STATES PATENT OFFICE

2,304,725

AUTOMATIC STENCILING MACHINE

Thomas S. Bauman, Toledo, Ohio, assignor to Libby Glass Company, a corporation of Ohio

Application May 31, 1941, Serial No. 396,012

11 Claims. (Cl. 101—115)

The present invention relates to improvements in stenciling machines of the type used in applying a ceramic or vitreous enamel color to articles of glassware, such as bottles, jars and tumblers.

The principal object of the invention is the provision of novel mechanism for operating a standard stenciling machine which heretofore has been operated manually. Thus the speed of production may be increased and the operator considerably relieved of fatiguing manual operations.

Another object of the invention is the provision of novel means for automatically swinging the stencil screen for decorating an article.

A further object is the provision of novel automatic means for raising the stencil screen and squeegee to an inoperative position at the end of each decorating stroke.

A further object of the invention is the provision of mechanism for automatically feeding coloring material to the decorating screen.

Other objects will be in part apparent and in part pointed out hereinafter.

In the drawings:

Fig. 1 is a top plan view of a decorating machine of the silk screen stencil type embodying my invention.

Fig. 2 is a vertical sectional detail view taken along the line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional elevational view taken longitudinally through the machine, the driving chains being indicated by broken lines for the sake of clarity.

Fig. 4 is a rear elevational view of the machine with parts shown in section.

Fig. 5 is a developed view of the screen swinging cam.

Fig. 6 is a side elevational view of the machine in non-decorating position.

Fig. 7 is a plan view of the mechanism for automatically feeding the paint or coloring material.

Fig. 8 is a vertical sectional view through one of the paint reservoirs taken along the line 8—8 of Fig. 7.

The present invention is embodied in a decorating machine of the silk screen stencil type, an example of which is illustrated in Patent #2,146,773 to T. H. Sloan, dated Feb. 14, 1939, and to which reference may be had for a complete description of the apparatus and its operation.

Referring to the drawings, Figs. 1 and 3 in particular, the apparatus comprises generally a table or base 10 having legs 11. The decorating mechanism which is mounted upon the table includes a stencil screen assembly 12 carrying a screen S and a squeegee assembly 13 on which a squeegee S' is mounted for cooperation with the screen.

A stationary article holder assembly 14 for rotatably supporting an article to be decorated, such as a tumbler T, is mounted on one end of the table 10 and projects forwardly thereof so that the article supported thereon is positioned beneath the screen S and squeegee S'.

The screen assembly 12 and squeegee assembly 13 are rockable vertically as a unit relative to the article holder 14 and table 10 by means of cam actuated mechanism which includes a horizontal open rectangular frame 15 overlying the table 10. This frame is pivoted at its inner or rear end to a pair of horizontal hinge pins 16 which are carried by upstanding arms 17 on the table 10. The forward portion of this frame 15 is guided in its vertical movement by a pair of guide fingers 18 which also function to limit downward movement of the frame relative to the table and article holder. The forward end of the frame supports an elongated casting 20 which extends transverse to the length of said frame and is provided with a longitudinal horizontal opening 21, or slot, designed to accommodate the screen support. The lower wall or bottom of the slot is provided with a slideway 22 extending lengthwise thereof in which a slide block 28, or cross-head, is mounted. A supporting beam 24 carried by the frame 15 and extending rearwardly thereof in part provides operative connection between said frame and the screen assembly 12.

This screen assembly 12 is mounted for oscillation horizontally relative to the article support 14 to thereby effect the necessary relative movement between the screen S and an article T which is to be decorated. Moreover, the arc through which the screen S moves must be adjustable to compensate for variations in the taper and diameter of the articles. Accordingly, this assembly includes a radius arm 25 which is formed of channel iron and is connected to the supporting beam 24 by means of an adjustable clamp 26. A portion of this clamp straddles the beam 24 and is secured thereto by a screw 26a while an upstanding part thereof projects through any one of a longitudinal series of vertical openings 27. By changing the setting of this clamp along the beam 24 and arm 25, it is obvious that the arcuate path of movement of the screen S incident to horizontal swinging of the beam 24 may be regulably controlled. The forward end of the radius arm 25 is attached

to the aforementioned slide block 28 and the latter supports the screen S through the medium of a pair of horizontal forwardly projecting arms 29.

The squeegee assembly 13 (Figs. 1 and 3) includes a forwardly extending supporting arm 30 pivoted for vertical swinging movement on the casting 20 and having a rearwardly extending finger 31. The squeegee S' is adjustably secured within a slot 32 in the arm 30. A roller 33 for engaging the tongue 31 at times is mounted on a bracket 34, the latter having a pair of downwardly extending legs which straddle the beam 24 and radius arm 25 and are secured to the table 10.

At the beginning of each decorating cycle the screen assembly may of course be at either end of its stroke. The screen is raised at the end of each stroke (Fig. 6) to permit introduction of a tumbler T into the holder. The raising of the screen a predetermined distance also causes the squeegee to be lifted out of contact therewith by reason of the finger 31 engaging the roller 33. Raising of the screen and squeegee assemblies manually is accomplished by means including a roller 36 carried on a rock arm 37 journalled on a stub shaft 38 in one of the bearing blocks 17 and bearing on the under side of the frame 15. The shaft 38 also carries a second rock arm 39 connected by a rod 40 to a foot operated treadle 41 (Fig. 4) pivoted on the legs 11. Normally when the screen and squeegee are lowered into contact with the article to be decorated by releasing the foot treadle, the screen is moved by hand to complete the decoration.

It is to this end that I have provided mechanism whereby such decorating movements are accomplished automatically thus relieving the operator of considerable manual effort and also increasing the productive speed of the machine.

The mechanism for moving the screen through the decorating stroke includes a rotary cam 45 (Figs. 1, 3, and 4) keyed on a horizontal shaft 46 which is journalled in bearings at the upper end of a pair of upright members 47 bolted to the table 10. A sprocket 48 on the shaft 46 is connected by a chain 49 to a sprocket 50 carried on a countershaft 51 which is journalled in bearings 52 beneath the table. The countershaft 51 is driven by a motor 53 which is adjustably mounted on a platform 54 supported by the legs 11. The motor is connected through a variable speed drive pulley 55 with a gear reduction unit 56 which is provided with a take-off sprocket 57. A chain 58 provides driving connection for a sprocket 59 keyed to the countershaft 51.

The cam 45 is provided with a closed path 60 or groove, which will be described in detail presently and in which a roll 61 is adapted to run. The roll is mounted on a slide block 62 which is supported for reciprocation on a pair of slide rods 63 secured between the upright members 47. The block is provided with a downwardly facing longitudinal guideway 64 in which a driving roll 65 is adapted to run. This guideway is disposed at right angles to the length of the slide rods 63.

This driving roll 65 is mounted upon one end of a horizontal lever 66 which is connected at its other end to the aforementioned radius arm and between its ends is pivoted for horizontal swinging movement which is effected by reciprocation of said slide block 62. The lever overlies the radius arm and is pivoted to a vertical hinge pin 67 at the upper end of an inverted U-shaped bracket 68 which in turn is secured to the rockable frame 15. The rear end of the lever is provided with a longitudinal slot 69 in which the driving roll 65 is adjustably supported, whereby to permit variation in the extent of motion of the lever. The forward end of this lever is formed with a yoke 70 and a pair of horizontal slots 71 (Figs. 2 and 3).

Pins 72 carried by a rotatable trunnion block 73 secured to the radius arm 25 project into the slots and support coil springs 74 (Fig. 2) which provide a yieldable connection for moving the screen. As the lever 66 moves from side to side, the difference in radii about which the arm 25 swings, is overcome by the pins 72 moving longitudinally of the slots 71.

The raising of the screen and squeegee assemblies at the end of each decorating stroke is accomplished by means of a pair of cams 75 (Figs. 3 and 6) keyed on a shaft 76 disposed transversely of the table and supported in bearings 77. Cam rolls 78 for engaging the cams are carried at the lower end of arms 79 which are bolted to and project downwardly from the frame 15. The cams are continuously rotated by means of sprockets 80 and 81 on the shafts 76 and 51 respectively (Fig. 2) which are interconnected by a chain 82. The machine operator may at times manually operate the treadle 41 and connecting rock arms 39 and 37 to hold the screen in elevated position for wiping off excess coloring material or making other minor adjustments.

Referring now to Fig. 5, the cam 45 is divided roughly into pairs of dwell sections A and traversing sections B. At the end of each section B the swinging movement is momentarily arrested as indicated at 84. At this time the high portion of the cams 75 engages the rolls 78 and raises the screen and squeegee. The continuation of the cam path from the section 84 to the following dwell section A produces a slight additional swing or overtravel of the screen after the sequence has been raised out of contact therewith. During the decorating stroke, the squeegee has forced a small amount of coloring material or enamel ahead of it which is allowed to settle during the dwell period. The overtravel of the screen thus allows the squeegee to lower into the body of enamel prior to the following stroke so that a small amount of the material will be forced ahead of it for decorating the next article.

In order to maintain an adequate and constant body of enamel on the screen I have provided mechanism for automatically supplying a predetermined amount thereof at each decorating stroke (Figs. 3, 6, 7, and 8). When multiple color designs are to be printed, one or more partitions 86 (Figs. 1 and 6) may be placed in the screen S to separate the different colors. As illustrated in Fig. 6, one color may be deposited to the right of the partition and two colors on the left. When two colors are placed side by side a blending effect is obtained in the printed design.

The mechanism for supplying the coloring material includes a plurality of pumps 87 removably supported in a bracket 88 which is secured to the casting 20 and positioned substantially over the squeegee arm 30. Each pump 87 includes a reservoir 90 communicating with a vertically disposed cylindrical chamber 91 which opens through a passage 92 and petcock 93 for directing the enamel to the screen. A plunger 94 within the chamber is provided with an upward-

ly extending stem 95 threaded at its upper end to receive an adjusting nut 96. A coil spring 97 between the nut and the plunger housing holds the plunger in raised position.

The plunger operating mechanism includes a vertically disposed slide 98 carrying a bar 99 at its upper end formed at right angles thereto for engaging the stems 95 and adjusting nuts 96. The slide is mounted in vertical ways formed on the forwardly projecting portion of the bracket 88 and is connected by a lever 100 pivoted on the bracket and links 100a to a stationary arm 101 secured to the previously described bracket 34.

Figs. 3 and 6 illustrate two positions of the mechanism for pumping enamel from the reservoir. At each downward stroke of the slide, the plunger is lowered to expel a measured quantity of the enamel. The length of movement of the plunger may be regulated by adjusting the nut 96 to vary the amount of enamel to be discharged onto the screen with each operation.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. A stenciling apparatus comprising a radius arm, a stencil screen carried by said arm, a supporting beam to which the arm is pivoted for movement in a horizontal plane, a frame carrying said beam and arm and rockable about a horizontal axis, squeegee mechanism carried by the frame, an article holder for supporting an article to be decorated in operative relation with said screen and squeegee, a lever pivoted to the frame and yieldably connected at one end to said radius arm, mechanism for swinging said lever, and means for rocking said frame.

2. A stenciling apparatus comprising a radius arm, a stencil screen carried by said arm, a supporting beam to which the arm is pivoted for movement in a horizontal plane, a frame carrying said beam and arm and rockable about a horizontal axis, squeegee mechanism carried by the frame, an article holder for supporting an article to be decorated in operative relation with said screen and squeegee, a slide block, a lever pivoted to the frame and yieldably connected at one end to said radius arm, adjustable means connecting the other end of the lever with said slide block, for transmitting motion therebetween, mechanism for swinging said lever including a continuously rotating cam, said slide block reciprocated by the cam, and means for rocking said frame.

3. A stenciling apparatus comprising a radius arm, a stencil screen carried by said arm, a supporting beam to which the arm is pivoted for movement in a horizontal plane, a frame carrying said beam and arm and rockable about a horizontal axis, squeegee mechanism carried by the frame, an article holder for supporting an article to be decorated in operative relation with said screen and squeegee, a slide block, a lever pivoted to the frame and yieldably connected at one end to said radius arm, adjustable means connecting the other end of the lever with said slide block, for transmitting motion therebetween, mechanism for swinging said lever including a continuously rotating cam, said slide block reciprocated by the cam, and means for rocking said frame, including cam rollers carried on the lower side of said frame, and continuously rotating cams operatively engaging said rollers.

4. A stenciling apparatus comprising a tiltable frame, a supporting beam secured thereto, a radius arm pivoted on said beam and oscillatable horizontally, a screen carried on the free end of said arm, an article holder adapted to support an article to be decorated in contact with the screen, a squeegee arm above and pivoted to the frame for vertical swinging movement, a squeegee carried by the arm for contact with said screen, a lever disposed in substantially parallel relation to and above the radius arm and pivoted for horizontal swinging motion, means providing yieldable connection between one end of the lever and the radius arm, a roller mounted for longitudinal adjustment on the other end of the lever, a slide block engaging said roller, a rotary cam for reciprocating said block and thereby swinging said lever, means for tilting the frame and means for continuously rotating the cam.

5. A stenciling apparatus comprising a tiltable frame, a supporting beam secured thereto, a radius arm pivoted on said beam and oscillatable horizontally, a screen carried on the free end of said arm, an article holder adapted to support an article to be decorated in contact with the screen, a squeegee arm above and pivoted to the frame for vertical swinging movement, a squeegee carried by the arm for contact with said screen, a lever disposed in substantially parallel relation to and above the radius arm and pivoted for horizontal swinging motion, means providing yieldable connection between one end of the lever and the radius arm, a roller mounted for longitudinal adjustment on the other end of the lever, a slide block engaging said roller, a rotary cam for reciprocating said block and thereby swinging said lever, means for tilting the frame including a roller carried thereby, a rotary cam engaging the roller, and means for continuously rotating both cams in synchronism.

6. In a decorating machine of the silk screen stencil type, an article holder, a stencil screen, an oscillatable support for the screen, a tiltable frame carrying said support, a squeegee adapted with said screen to decorate an article supported by the holder, means for oscillating the screen horizontally including a lever connected at one end to the support and pivoted for horizontal swinging motion, a roller carried by the other end of said lever, a slide engaging said roller, a rotary cam operable for moving the slide thereby swinging said lever and screen, a rotary cam for tilting the frame, and means for imparting continuous rotation to said cams.

7. A stenciling apparatus comprising a tiltable frame, a supporting beam secured thereto, a radius arm pivoted on said beam and oscillatable horizontally, a screen carried on the free end of said arm, an article holder adapted to support an article to be decorated in contact with the screen, a squeegee arm above and pivoted to the frame for vertical swinging movement, a squeegee carried by the arm for contact with said screen, said squeegee being mounted for tilting movement independently of said frame, a lever disposed in substantially parallel relation to and above the radius arm and pivoted for horizontal swinging motion, means providing yieldable connection between one end of the lever and the radius arm, a roller mounted for longitudinal adjustment on the other end of the lever, a slide block engaging said roller, a rotary cam for reciprocating said block and thereby swinging said lever, means for tilting the frame and means for continuously rotating the cam.

8. A stenciling apparatus comprising a tiltable frame, a supporting beam secured thereto, a ra-

dius arm pivoted on said beam and oscillatable horizontally, a screen carried on the free end of said arm, an article holder adapted to support an article to be decorated in contact with the screen, a squeegee arm above and pivoted to the frame for vertical swinging movement, a squeegee carried by the arm for contact with said screen, said squeegee being mounted for tilting movement independently of said frame, a lever disposed in substantially parallel relation to and above the radius arm and pivoted for horizontal swinging motion, means providing yieldable connection between one end of the lever and the radius arm, a roller mounted for longitudinal adjustment on the other end of the lever, a slide block engaging said roller, a rotary cam for reciprocating said block and thereby swinging said lever, means for tilting the frame, means for continuously rotating the cam, and means for automatically supplying enamel to the screen for decorating an article.

9. A stenciling apparatus comprising a tiltable frame, a supporting beam secured thereto, a radius arm pivoted on said beam and oscillatable horizontally, a screen carried on the free end of said arm, an article holder adapted to support an article to be decorated in contact with the screen, a squeegee arm above and pivoted to the frame for vertical swinging movement, a squeegee carried by the arm for contact with said screen, said squeegee being mounted for tilting movement independently of said frame, a lever disposed in substantially parallel relation to and above the radius arm and pivoted for horizontal swinging motion, means providing yieldable connection between one end of the lever and the radius arm, a roller mounted for longitudinal adjustment on the other end of the lever, a slide block engaging said roller, a rotary cam for reciprocating said block and thereby swinging said lever, means for tilting the frame, and means operable in response to tilting of the frame for supplying a predetermined quantity of enamel to the screen for decorating an article, said last named means including a pump, and linkage connecting said pump and a stationary abutment on said machine.

10. A stenciling apparatus comprising a frame tiltable about a horizontal axis, a horizontal supporting beam secured to the frame, a radius arm pivoted on said beam near one end thereof and oscillatable in a horizontal plane directly over the beam, a stencil screen carried at the other end of the arm, a stationary article holder adapted to support an article in decorating relation with the screen, a squeegee arm pivoted on the frame over the holder and movable vertically independently of the frame, a squeegee carried by the arm for decorating contact with the screen, a lever pivoted on the frame in substantially parallel relation with the radius arm, a yieldable connection between said lever and radius arm, a roller adjustably carried by the lever, a pair of stationary uprights disposed rearwardly of the frame on either side of said rock arm, a slide block mounted for reciprocation between said uprights and engaging said roller, a cam rotatably mounted between the uprights and adapted to reciprocate the slide thereby causing oscillation of the lever and radius arm to move the screen through a decorating stroke, means for tilting the frame including rollers on the lower side thereof, rotary cams engaging the rollers to tilt the frame in synchronism with the movements of said arm and screen, means for continuously rotating said cams, and means operable in response to tilting of said frame for automatically supplying a predetermined amount of enamel to the screen for decorating an article.

11. Stenciling apparatus comprising an article holder, a stencil screen assembly including a screen disposed horizontally above the article holder, a squeegee assembly including a squeegee positioned above the screen for vertical movement into contact with the screen, a mechanism including a continuously rotating cam for oscillating the screen horizontally and an additional cam for tilting the screen and squeegee at intervals relative to the article holder, and cam mechanism actuated in response to tilting of the screen for elevating the squeegee relative to the screen.

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