April 5, 1938. T. H. SLOAN 2,113,413

STENCILING APPARATUS

Filed July 10, 1936 4 Sheets-Sheet 1

Fig. 1.

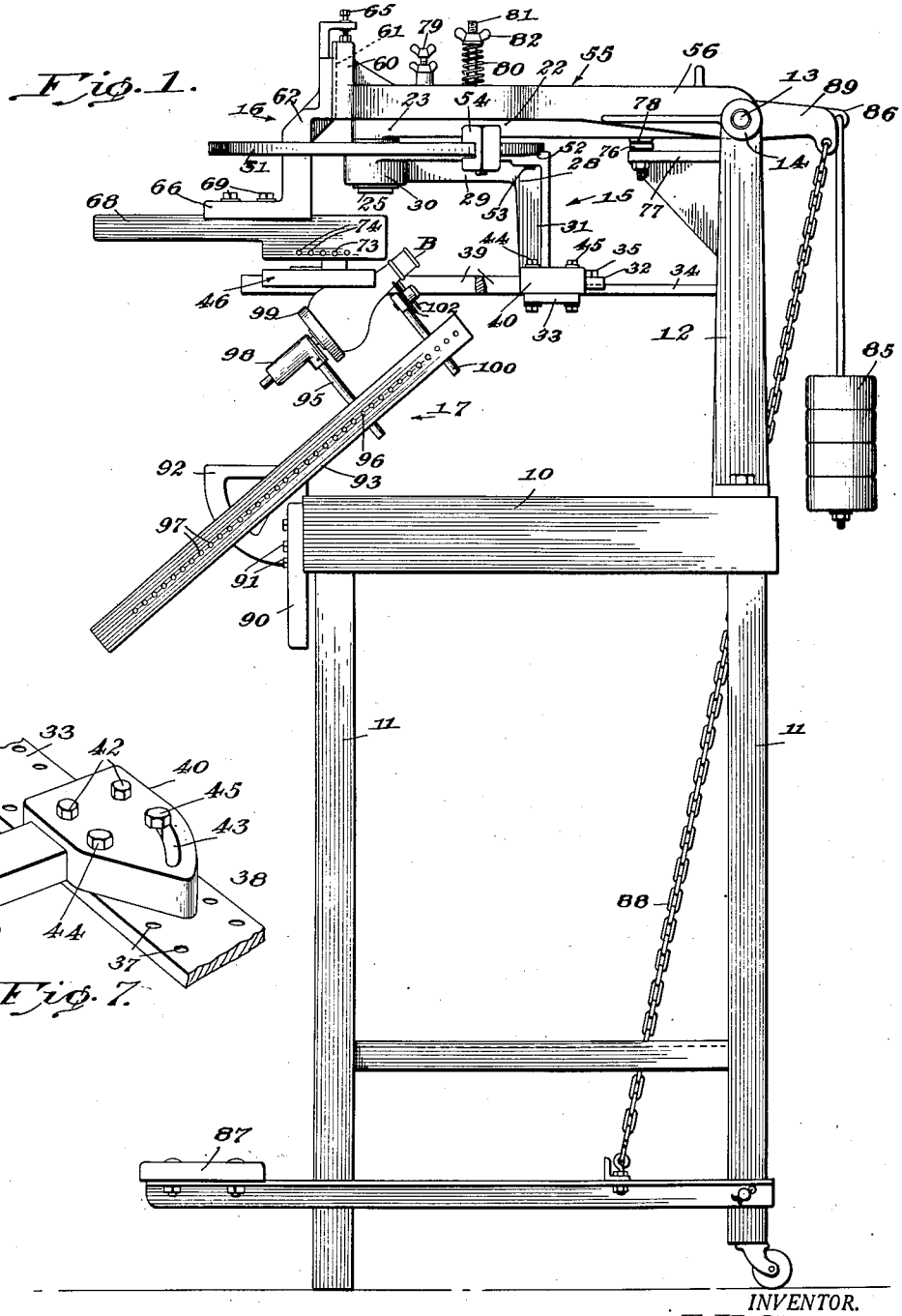


Fig. 7.

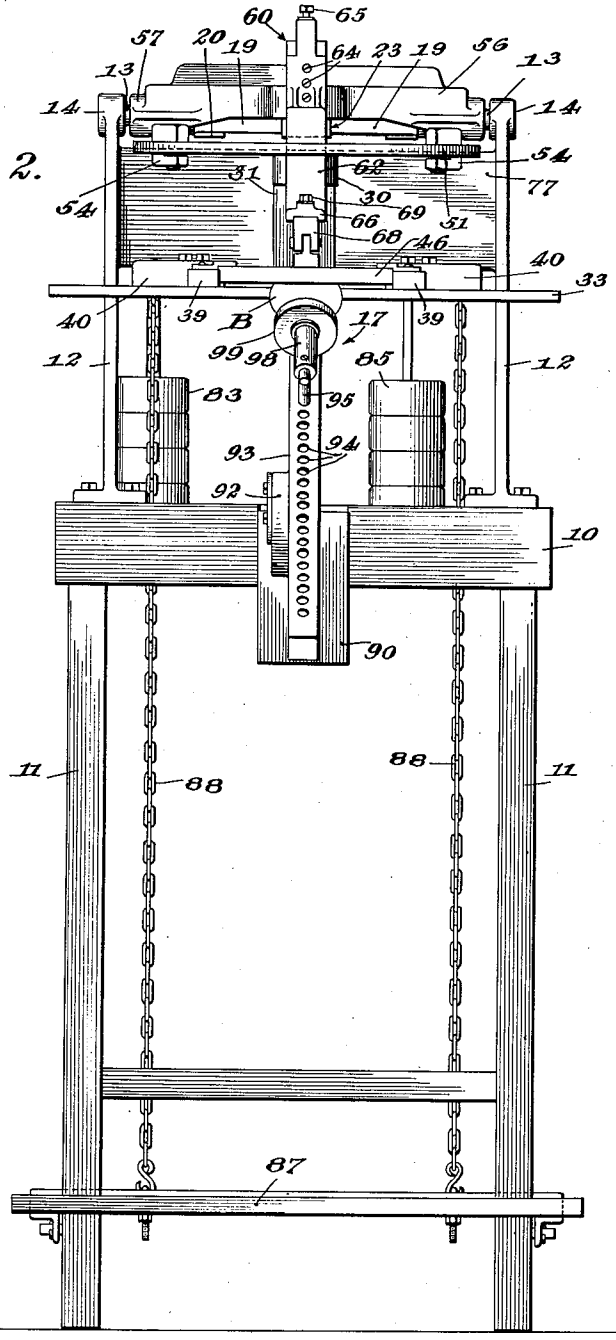
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Fig. 2.



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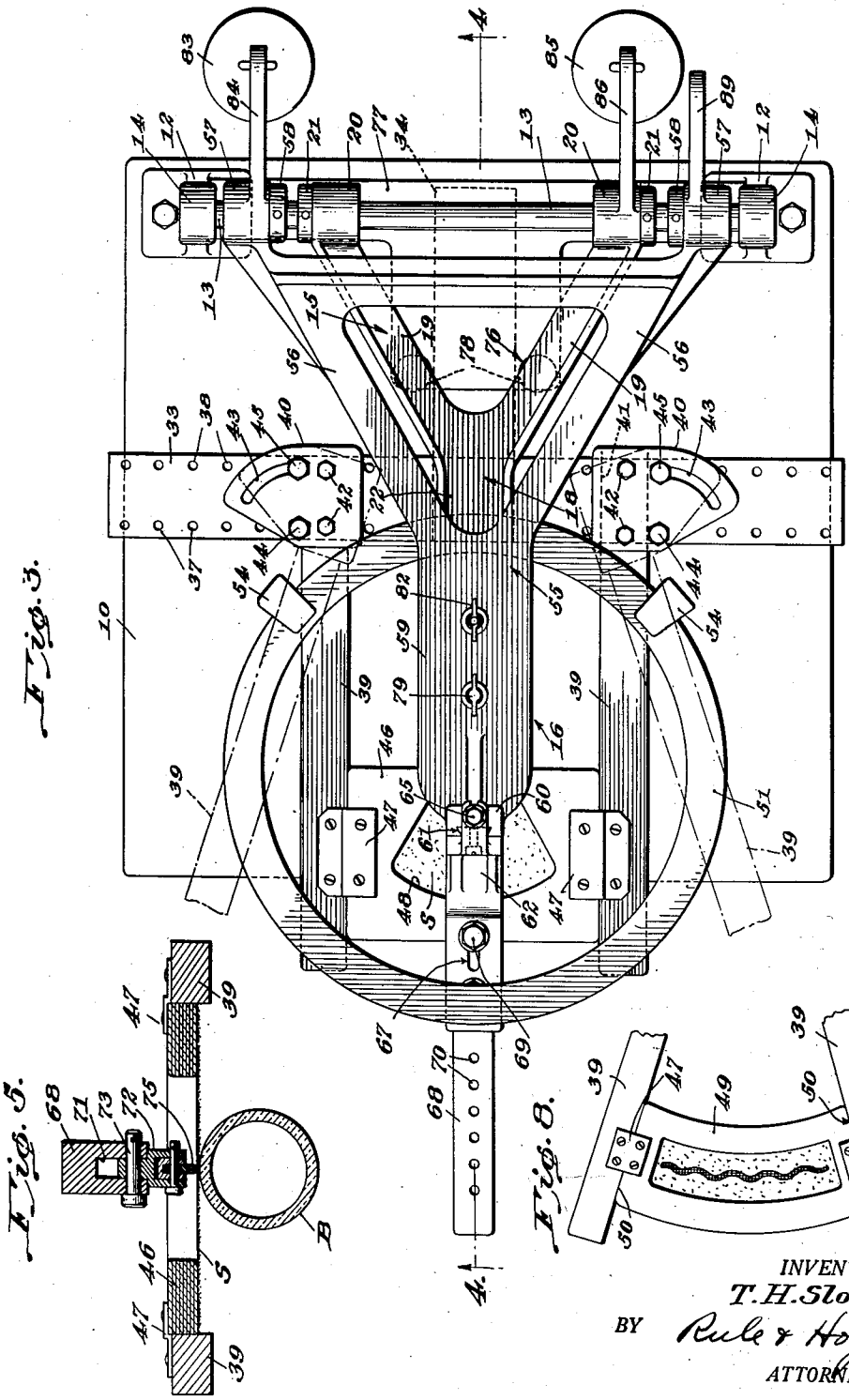


Fig. 3.

Fig. 5.

Fig. 6.

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STENCILING APPARATUS

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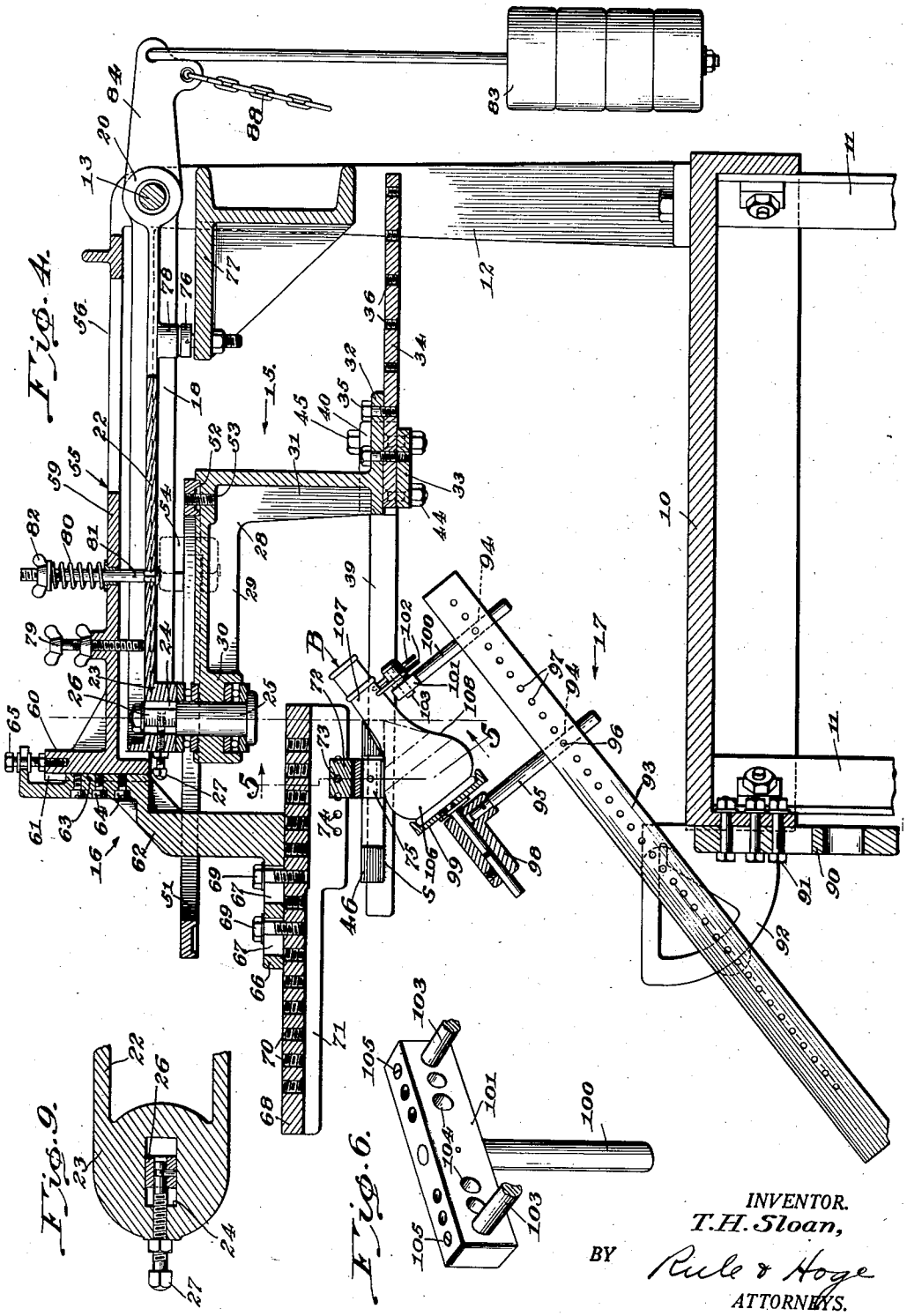


Fig. 4.

Fig. 5.

Fig. 6.

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Patented Apr. 5, 1938

2,113,413

UNITED STATES PATENT OFFICE

2,113,413

STENCILING APPARATUS

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Application July 10, 1936, Serial No. 89,972

13 Claims. (Cl. 101—124)

The stenciling apparatus comprising the present invention is primarily adapted for use in applying a vitreous enamel composition or paint to articles of glassware such as bottles, jars and the like and to other articles of a vitreous or ceramic nature in the lettering or decorating thereof by a stenciling process.

The principal object of the invention is to provide an apparatus of the character set forth above which, by virtue of an improved means for supporting various articles in a multitude of positions against a stencil screen to receive the decoration therefrom, is particularly well adapted for universal use in decorating the frusto-conical surfaces, such as the tapered or shoulder portions of bottles and other containers, etc., even though these portions be of extreme obtuse configuration.

Another object of the invention is to provide a stenciling apparatus having a movable swinging stencil screen, designed for engagement with the articles during the stenciling operation, which may be adjusted to swing in an arc of any desired radius of curvature to accommodate bottles or other articles having different diameters and consequently different degrees of peripheral curvature.

Yet another object of the invention is to provide a movable stencil screen assembly designed for tractional engagement with a substantially frusto-conical surface of a bottle or like article in the decoration thereof, which is so constructed that freedom of movement of the screen assembly is obtained without interference from the projecting neck portion of the bottle.

Other objects of the invention will appear hereinafter.

Referring to the accompanying four sheets of drawings:

Fig. 1 is a side elevational view of a stenciling apparatus manufactured in accordance with the principles of the invention;

Fig. 2 is a front elevational view of the apparatus shown in Fig. 1;

Fig. 3 is a top plan view of the apparatus shown in the preceding figures;

Fig. 4 is a sectional view taken substantially along the line 4—4 of Fig. 3;

Fig. 5 is a sectional view taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a perspective view of an adjustable bottle neck supporting assembly forming a part of the present invention;

Fig. 7 is a perspective view of an adjustable bracket forming a part of the present invention;

Fig. 8 is a top plan view of a modified form of stencil screen unit designed for use in applying designs of an elongated form to the articles to be decorated, and

Fig. 9 is a sectional view taken substantially along the line 9—9 of Fig. 4.

The apparatus involves in its general organization a platform or table 10 having supporting legs 11. A pair of standards 12, bolted or otherwise secured to the table 10, extend upwardly from the rear corners thereof and support therebetween a transversely extending horizontal rock-shaft 13 which is journalled at its ends in cup-like bearings 14 on the upper ends of the standards 12.

Referring now to Fig. 3, the rock-shaft 13 extends across the rear edge of the table 10, is substantially coextensive therewith, and rockably supports the inner or rear end of an adjustable-center stencil screen assembly 15 which is best illustrated in Fig. 4.

A forwardly extending adjustable-center squeegee assembly 16 is similarly supported upon the rock-shaft 13. The assemblies 15 and 16 overlie the table 10.

An adjustable article supporting chuck assembly 17 is secured to the forward edge of the table 10 and occupies a position beneath the stencil screen, and squeegee assemblies 15 and 16, and above the level of the table 10.

The stencil screen assembly 15 consists of a yoke 18 (Figs. 3 and 4) having rearwardly diverging arms 19 terminating in a pair of axially aligned sleeves 20, integrally formed thereon, through which the rock-shaft 13 extends. The yoke 18 is centered upon the rock-shaft 13 by means of collars 21 mounted upon the rock-shaft 13 outside of the sleeves 20. The yoke 18 is provided with a forwardly extending supporting arm 22 having a hub 23 formed on the outer forward end thereof and through which extends a longitudinal slot 24 shown in detail in Fig. 9. A depending pivot pin 25 having a square reduced portion 26 extending through the slot 24 is adjustably supported by the hub 23. An adjusting screw 27 projects through the hub 23, with which it makes threaded engagement, and into the slot 24. This screw extends into and is anchored in the square portion 26 of the pin 25 and facilitates shifting of the pin longitudinally of the machine within the limits of the slot 24.

An inverted L-shaped carrier arm 28, provided with a horizontal portion 29 having a hub 30 formed thereon, and a vertical portion 31 having a foot 32 at its lower end, is pivoted on the hub 23 for oscillation about the axis of the adjustable pivot pin 25, which connects the two elements.

A T-shaped support consisting of a transverse bar 33, riveted or otherwise secured medially of its ends to one end of a longitudinal bar 34, is adjustably secured to the foot 32 by means of cap screws 35, which extend through the foot and are threaded into a series of spaced threaded apertures 36 in the bar 34. Thus, the support 33, 34, is adjustably mounted on the foot 32 and may be shifted forwardly or rearwardly as desired.

The transverse bar 33 (Fig. 3) is provided with a series of longitudinally spaced threaded apertures 37 which extend along one edge thereof. A second series of similarly spaced, threaded apertures 38 extend along the opposite edge of the bar 33 and are preferably formed at points transversely opposed on the bar to the apertures 37 for a purpose subsequently to be described.

A pair of forwardly extending stencil screen supporting arms 39 (Figs. 3 and 7) preferably formed of wood, are adjustably secured to the bar 33 on opposite sides of the center thereof by means of relatively thick metal brackets 40, one of which is shown in detail perspective in Fig. 7. The brackets 40 are complementary in form and accordingly a description of one will suffice for both.

The bracket 40 is provided with a slot 41 on the underneath side thereof and in which one end of the arm 39 is received and permanently secured by means of cap screws 42. Extending completely through the bracket 40 is an arcuate slot 43 of small radius of curvature, the center of which occupies a position within the confines of the bracket. The bracket is adjustably secured at this center to the bar 33 by means of a cap screw 44 which is selectively received on one of the series of apertures 37. A clamping screw 45 extends through the arcuate slot 43 for selective reception in one of the series of apertures 38. Thus by loosening the clamping screw 45, the bracket 40 may be adjusted angularly on the bar 33 in any one of a number of positions therealong, as clearly shown by the dotted line positions of the bars 39 and brackets 40 in Fig. 3.

The stencil screen supporting arms 39 extend forwardly from the bar 33 in parallel relationship with respect to each other and support therebetween a stencil screen holder in the form of a rectangular frame 46, the opposite ends of which are secured to the arms 39 by means of attachment plates 47. The frame 46 is provided with a sector-shaped opening 48 in the central region thereof and a silk screen or other conventional screen S having impervious and pervious portions, the latter representing the design to be stenciled on the articles, is stretched across the bottom of the opening 48 and is secured to the underneath side of the frame 46.

The inner ends of the slots 43 (Figs. 3 and 7) provided in the brackets 40 terminate at points transversely opposed on the brackets to the centers of curvature of the slots. Inasmuch as the apertures 37 and 38 are transversely opposed in pairs on the bar 33 as previously described, the clamping studs 45 serve to limit the inward adjustment of the bars 39 to their parallel position as shown in Fig. 3 in full lines. In this manner, assembly of the screen holder 46 in position between the bars 39 is facilitated.

In Fig. 8, a modified form of stencil screen holder designed for applying designs of an elongated form to the tapered or shoulder portions of long neck bottles is shown. The holder 49 is generally of arcuate shape, the ends thereof being provided with straight edges 50 which are inclined with respect to each other. The frame 49 is attached to the supporting arms 39 by means of the plates 47 as shown in Fig. 8 and in dotted lines in Fig. 3.

Referring now to Fig. 4, the upper surface of the horizontal portions 29 of the carrier arm 28 has secured thereto a continuous circular ring 51, an arcuate portion of which is seated in a groove 52 in said arm and is secured therein against circumferential shifting by a screw 53. The axis of the ring 51 coincides with the axis of the hub 30 and the ring is of sufficient diameter to place the forward portion thereof within convenient reach of the operator who, by manually engaging the same, may oscillate the entire screen assembly about the axis of the pin 25. A pair of limit stops 54 are circumferentially adjustable on the ring 51. These stops project upwardly from the ring above the lower level of the arm 22 of the yoke member 18 and are adapted to abut against this arm on either side thereof in the limiting positions of the stencil screen assembly. Thus the amplitude of the oscillation of the screen assembly may be varied.

Referring now to Fig. 3, the squeegee assembly 16 consists of a yoke 55 having rearwardly diverging arms 56, the outer ends of which carry integrally formed, axially aligned sleeves 57 through which the rock-shaft 13 extends. The sleeves are positioned on the shaft 13 outside of the sleeves 20 of the yoke 18 and the entire yoke 55 is centered upon the shaft 13 by means of collars 58. The yoke 55 is provided with a forwardly extending arm 59 which terminates in a head 60 (Fig. 4) having a vertically extending dovetail groove 61 formed in the front face thereof.

A squeegee supporting member 62, best illustrated in Fig. 4, is provided with a vertically extending dovetail 63 which cooperates with the groove 61 in permitting vertical adjustment of the member 62 on the head 60. A series of set screws 64 permit anchoring of the member 62 in any desired adjusted position. In order to facilitate such vertical adjustment, an adjusting screw 65 carried by the member 62 is threaded into the head 60 in such a manner that turning movement of the same in one direction or the other will cause the member 62 to be raised or lowered.

The lower end of the member 62 is provided with a foot 66 having a pair of slots 67 extending therethrough and to the lower surface of which an elongated squeegee holder 68 is adjustably clamped by means of cap screws 69 which pass through the slots 67 and are selectively received in alternate apertures of an aligned series of threaded holes 70 provided in the holder 68.

The squeegee holder 68 is provided with a longitudinal groove 71 (Figs. 4 and 5) between the walls of which a longitudinally adjustable link 72 is supported by means of a pin 73 selectively receivable in a series of aligned apertures 74. The lower end of the link 72 is bifurcated and a squeegee blade 75 is pivoted thereto for limited rocking movement between the furcations of the link 72.

The stencil screen S is normally supported in the machine in a substantially horizontal position the exact location of which may be determined by means of a pair of adjustable limit stops 76 (Figs. 1, 3 and 4) provided on a cross-beam 77 the ends of which are supported between the standards 12. These limit stops 76 cooperate with

abutments 78 formed on the underneath side of the yoke 18.

In order to initially adjust the squeegee blade 75 to the stencil screen S and to obtain the proper degree of pressure thereon, an adjusting screw 79 (Figs. 3 and 4) passing through the arm 59 of the yoke 55, engages the arm 22 of the yoke 18. The arm 59 of the yoke 55 is movable upwardly about the axis of the shaft 13 independently of the arm 22 of the yoke 18. Thus the squeegee holder 65 may be manually lifted by the operator to cause the squeegee blade 75 to clear the screen S. In order to return the arm 59 to its normal screen-engaging position, a coil spring 80, centered upon a pin 81 carried by the arm 22 and passing through the arm 59 bears against the arm 59 at one end thereof and against a wing nut 82 at the other end thereof. Adjustment of the wing nut 82 will lessen or increase the pressure applied by the squeegee blade 75 upon the screen S.

Referring now to Figs. 3 and 4, a series of counterweights 83 suspended from a short arm 84 formed on one of the sleeves 57 provides a counterbalance for the entire stencil screen assembly 15. A treadle mechanism 87 which projects forwardly of the machine adjacent the bottom thereof in a convenient position for the operator of the machine, operates through a pair of chains 88 attached to the short arm 84 and to a short arm 89 formed on the other sleeve 57 to swing the two assemblies 15 and 16 upwardly about the axis of the rock-shaft 13 when depressed by the foot of the operator.

The article supporting chuck assembly 17 (Fig. 4) includes a casting 90 suitably secured as at 91 to the forward edge of the table 10 for vertical adjustment thereon. An integral attachment plate 92 projects forwardly from the casting 90 and a chuck supporting bar 93 is adjustably clamped to the plate 92 for angular or longitudinal axial adjustment in the apparatus.

The chuck supporting bar 93, or carrier, is shown as occupying an inclined position in the apparatus with the upper portion thereof overlying the forward portion of the table 10 and positioned beneath the screen S. A series or row of equally spaced bores 94 extend perpendicularly through the bar 93 and are adapted to selectively receive therein the lower end of a chuck supporting stem 95 which is anchored in any desired adjusted position by means of a set screw 96 which is selectively received in threaded apertures 97 that communicate with the bores 94. The stem 95 carries at its upper end a chuck bearing 98 in which a shallow cup-like article supporting chuck 99 is rotatably journalled. A yoke supporting stem 100 provided with a yoke 101 at its upper end has its lower end selectively received in the bores 94. A pair of rollers 102 rotatably journalled on short stems 103 are adjustably mounted on the yoke 101 by means of a plurality of transverse bores 104 provided in the yoke and in which the stems are selectively receivable. The stems are anchored in position by means of set screws 105.

The article B to be decorated is in the present instance in the form of a bottle having a relatively large base portion 106 adapted to be supported on the base chuck 99 and provided with a relatively long neck portion 107. The neck portion of the bottle is supported upon the rollers 102 which are properly adjusted for this purpose.

The bottle B includes a tapered or shoulder portion 108 providing a frusto-conical surface to which the decoration is applied. When the bottle B is in operative position in the apparatus for decoration of its frusto-conical surface, the screen S occupies a horizontal position and is tangent to the surface. The parts of the apparatus are arranged so that an extension of the vertical axis of the pivot pin 25 intersects the axis of rotation of the bottle at or very near the apex of the cone of which the portion of the bottle is a frustum.

The underneath surface of the screen S is brought to bear on the shoulder of the bottle by adjustment of the limit stops 77 and by making the proper selection of apertures 36 for attachment of the T-shaped support 33, 34, to the foot 32. When the screen S is properly positioned with respect to the bottle B, the neck portion of the bottle projects upwardly above the level of the screen and rearwardly thereof. Because of the vertical alignment of the axis of rotation of the screen assembly 15 with the apex of the cone of which the portion of the bottle to be decorated is a frustum, the neck portion 107 will not restrict or obstruct oscillation of the screen assembly during the decorating operation.

The squeegee blade 75 is held during the decorating operation directly over the line of contact between the stencil screen S and the frusto-conical surface being decorated in such a manner that proper depth of contact together with the proper degree of pressure is obtained between the squeegee and screen. In attaining such correct positioning of the blade 75, proper selection of the apertures 76 for longitudinal adjustment of the squeegee holder, and proper selection of the apertures 74 for longitudinal adjustment of the squeegee blade is first made. Subsequently, proper elevation of the blade and correct application of pressure is effected by manipulation of the adjusting screw 79 and wing nut 82 respectively.

The actual stenciling operation is made in the usual manner by the application of a suitable colored vitreous enamel preparation or paint to the upper surface of the screen and by moving the screen from one extreme position to the other as determined by the limit stops 54. During such oscillation of the screen, the stationary squeegee blade 75 forces coloring matter through the pervious portions of the screen and onto the surface of the bottle. The bottle, being rotatably supported by the base chuck 99 and rollers 102, is caused to rotate by virtue of its tractional engagement with the stencil screen S during the movement of the latter.

Upon completion of the stenciling operation, and prior to engagement of either limit stop 54, with the arm 22, the operator, by manually engaging the squeegee holder 68 is enabled to raise the squeegee assembly with the aid of the counterweights 83 and 85 momentarily against the action of the spring 80 to permit the squeegee blade 75 to clear the screen S and enamel preparation thereon sufficiently to permit the enamel to pass under the blade 75 and occupy a position ahead of the squeegee for proper application of the enamel to the next succeeding bottle to be decorated.

Upon depression of the treadle mechanism 87 by the operator, the squeegee and stencil screen assemblies 16 and 15 respectively are swung upwardly about the rock-shaft 13 to afford sufficient clearance for removal of the bottle B from the chuck assembly 17 and for substitution of the next succeeding bottle to be decorated.

Release of pressure upon the treadle mechanism 87 by the operator causes lowering of the

two assemblies 15 and 16 into operative decorating position.

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

I claim:

1. In an apparatus for stenciling an article having a frusto-conical surface, a flat stencil screen mounted for oscillation about an axis perpendicular to the plane of said screen, a stationary squeegee in contact therewith, means for positioning an article against said screen with its frusto-conical surface in contact therewith, means operable independently of said squeegee for adjusting the position of said screen with respect to said axis to lengthen or shorten the radius of curvature of the same, and means for adjusting the position of said axis to vary the position of said screen along the line of contact between said surface and screen.

2. In an apparatus for stenciling articles having frusto-conical surfaces of different angularity, means for supporting an article so that it is free to rotate about the axis of its respective surface, a flat horizontally disposed stencil screen, means for adjusting said supporting means to bring the frusto-conical surface of said article into tangential contact with said screen, a squeegee, means for holding said squeegee in contact with said screen along the line of contact between said screen and surface, and means for adjusting said holding means to vary the depth of contact between said screen and squeegee.

3. In an apparatus for stenciling articles having frusto-conical surfaces of different angularity, means for supporting an article so that it is free to rotate about the axis of its respective surface, a flat horizontally disposed stencil screen, means for adjusting said supporting means to bring the frusto-conical surface of said article into tangential contact with said screen, a squeegee, means for holding said squeege in contact with said screen along the line of contact between said screen and said surface, means for adjusting said holding means to shift said squeegee along said line of contact, and additional means for adjusting said holding means to vary the depth of contact of said squeegee and screen.

4. A machine for decorating the surface of an article comprising in combination, means for holding the article so that it is free to rotate about an axis, means for adjusting the angularity and elevation of said holding means, a screen frame, a flat screen carried thereby, means for oscillating said frame about an axis with the screen moving in its own plane in tractional rolling engagement with said surface, and means for applying decorating material through the screen to said surface.

5. A machine for decorating bottles having relatively long neck portions and adjoining frusto-conical surfaces of comparatively large angularity comprising in combination, adjustable means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface, a flat stencil screen having one edge thereof curved, means for adjustably positioning said screen in tractional tangential contact with said frusto-conical surface with the neck portion projecting above the level of the screen in close proximity to said curved edge, and means for applying a decorating material through said screen to said surface.

6. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly and a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen.

7. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen and means normally urging said assemblies toward each other to establish a degree of pressure between said squeegee and stencil screen.

8. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen and means for adjusting the angular position of said assemblies with respect to each other to vary the depth of contact between said squeegee and stencil screen.

9. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen, means normally urging said assemblies toward each other to establish a degree of pressure be-

tween said squeegee and stencil screen, and means for adjusting the angular position of said assemblies with respect to each other to vary the depth of contact between said squeegee and stencil screen.

10. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen and means for independently adjusting the elevation of said squeegee in said squeegee assembly.

11. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen and means for independently adjusting the axis of oscillation of said stencil screen in said stencil screen assembly toward and away from said rock-shaft.

12. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen and means for independently adjusting the position of said squeegee in said squeegee assembly toward and away from said rock-shaft.

13. An apparatus for decorating the frusto-conical surfaces of bottles and like articles comprising a support, a horizontal rock-shaft carried by said support, a stencil screen assembly mounted for tilting movement on said rock-shaft, a stencil screen carried by said assembly and normally occupying a horizontal position in the apparatus, means for oscillating said stencil screen in said assembly in its own plane, means for supporting a bottle so that it is free to rotate about the axis of its frusto-conical surface with said surface in tangential rolling line contact with said stencil screen, a squeegee assembly mounted for tilting movement on said rock-shaft independently of said stencil screen assembly, a squeegee carried by said squeegee assembly and normally occupying a position in contact with said stencil screen and means for independently adjusting the position of said stencil screen in said stencil screen assembly toward and away from said rock-shaft.

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