

July 19, 1938.

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2,124,011

APPARATUS FOR STENCILING

Filed June 25, 1936

5 Sheets-Sheet 1

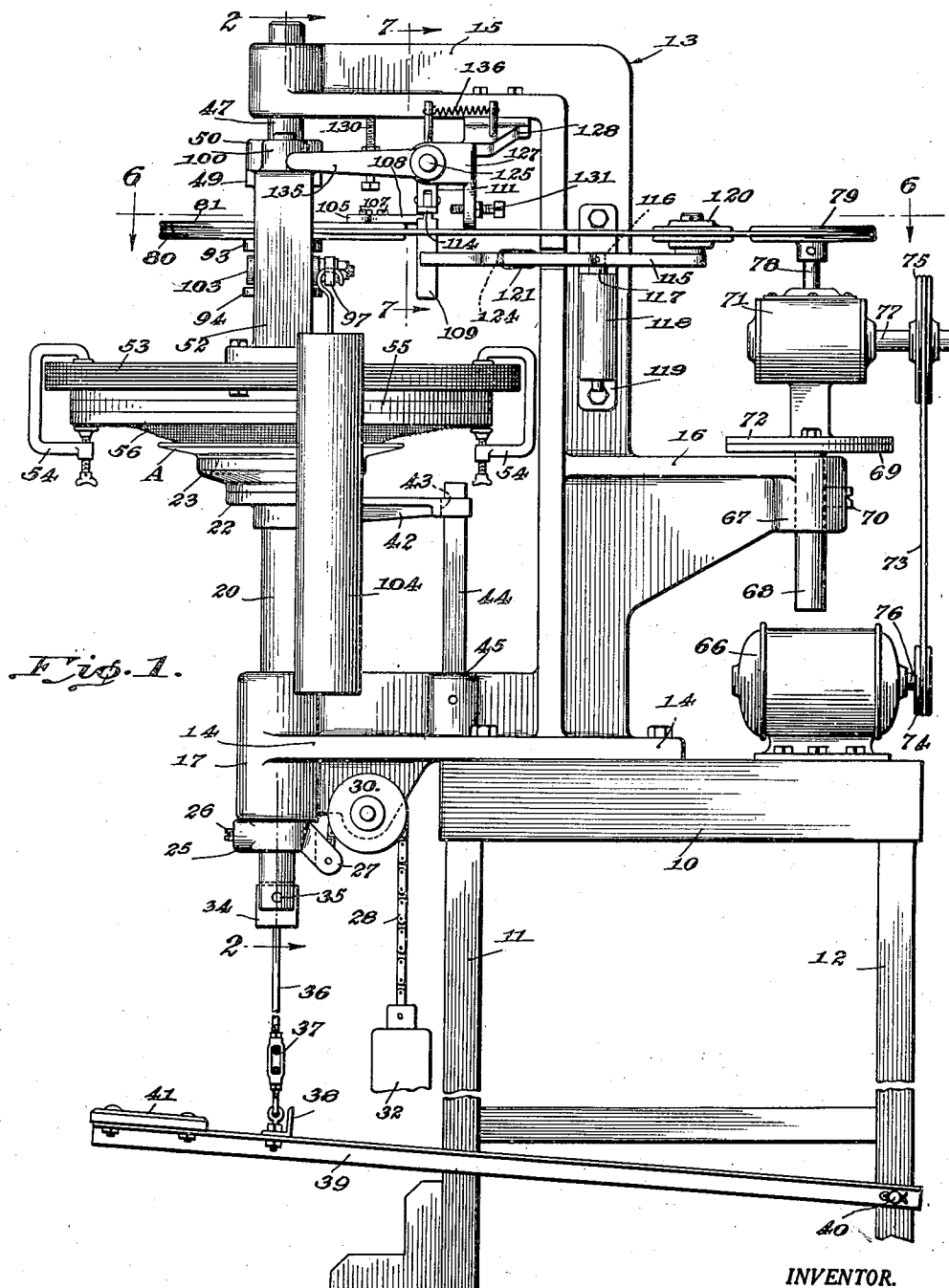


Fig. 1.

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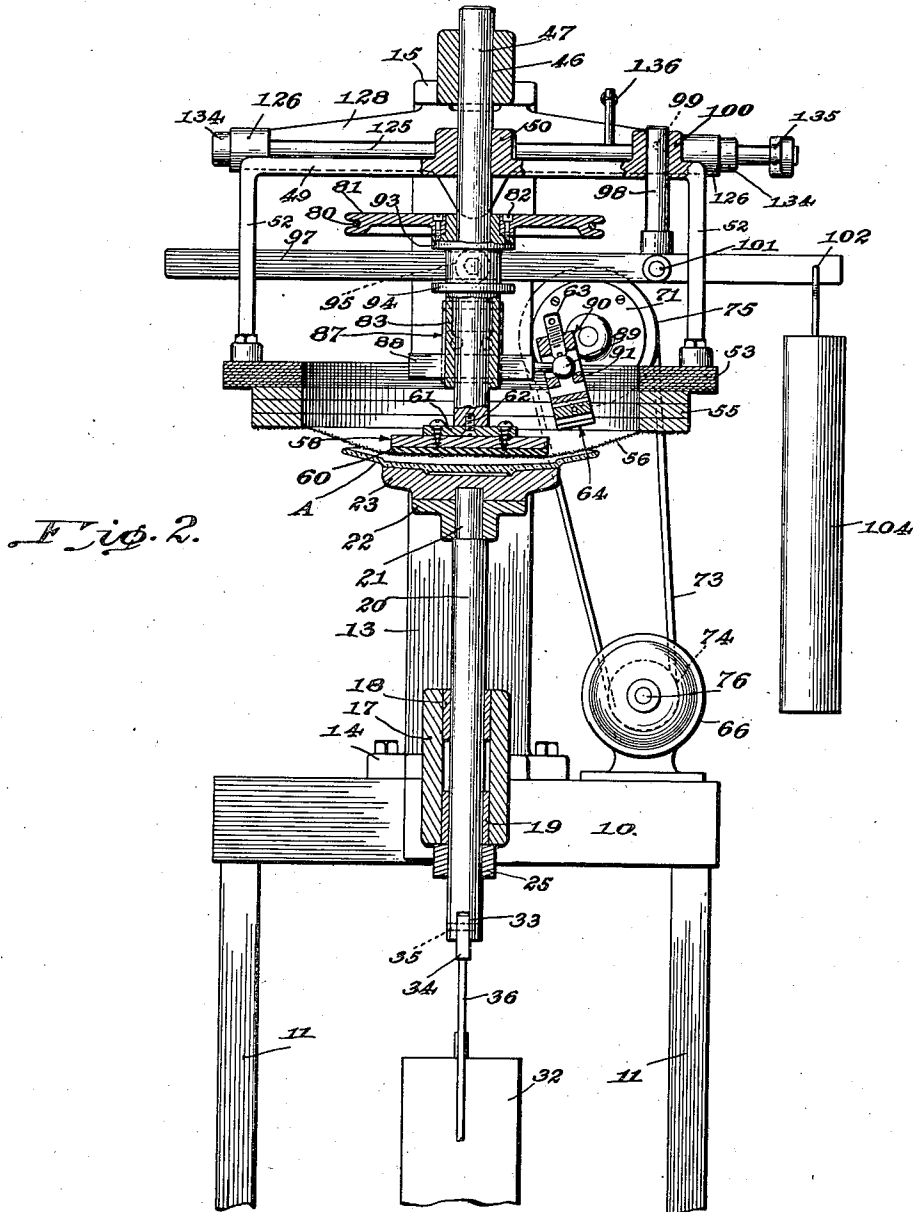
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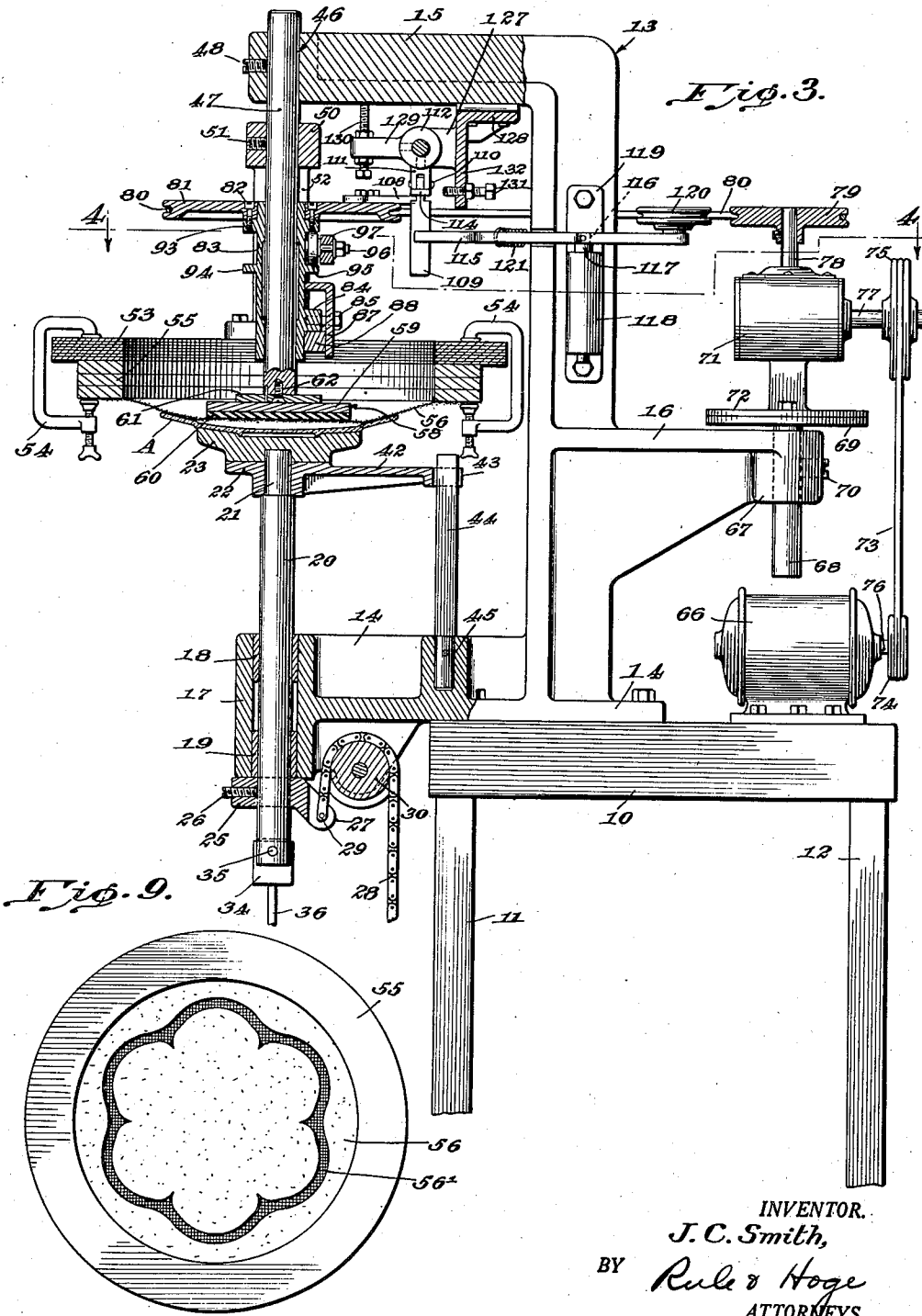
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5 Sheets-Sheet 3



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2,124,011

APPARATUS FOR STENCILING

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Application June 25, 1936, Serial No. 87,163

13 Claims. (Cl. 101—123)

The improved apparatus for stenciling comprising the present invention is primarily designed for commercial use in stenciling circular or substantially circular designs of vitreous enamel on the peripheral areas or regions of vitreous or ceramic articles such as plates, dishes, saucers and the like. The apparatus may, however, be employed in applying a circular design by a stenciling process to any article capable of receiving the same.

The principal object of the invention is to provide an apparatus for stenciling which will effectively apply to the articles being treated a continuous closed design in such a manner as to leave on the articles no trace of overlap in the design yet which will insure a closed design having no gap apparent therein.

The present invention is concerned with stenciling apparatus of the type employing a suitable mesh screen, portions of which are rendered impervious and other portions of which are left open to form the design to be imparted to the articles, and in which a vitreous enamel preparation is poured upon the screen and uniformly spread over and forced through the open portions of the screen and onto the articles by a rubber squeegee. It is another object of the invention to provide a machine of this type which, apart from the application of the articles to and the removal of the articles from the same, is automatic in its operation and is therefore capable of increased output, while at the same time an improved quality of work is insured by the incorporation therein of a better method of enamel distribution resulting from an improved positioning of the stencil.

The provision of a stenciling apparatus in which there is incorporated improved means for aligning and supporting the articles in position to receive the stencil impression; improved means for holding the stencil taut in position on the articles; an improved supporting means for adjustably supporting the squeegee to accommodate articles of different size and peripheral slope; an automatic clutch mechanism, operable in conjunction with an automatic stop mechanism for removing the driving torque applied to the squeegee at the completion of each stenciling operation; and a manually operated trip mechanism operable to return the driving torque to the squeegee for the duration of each individual stenciling operation, are further advantageous features that have been borne in mind in the production and development of the present invention.

Other objects and advantages of the invention

will become more readily apparent hereinafter.

In the accompanying drawings:

Fig. 1 is a side elevational view of a stenciling apparatus embodying the principles of the invention;

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1 in the direction indicated by the arrows;

Fig. 3 is a central longitudinal vertical view of the apparatus. In this view certain parts are broken away and others are shown in section to more clearly reveal the nature of the invention;

Fig. 4 is a sectional view taken substantially along the line 4—4 of Fig. 3 in the direction indicated by the arrows;

Fig. 5 is a top plan view of the stenciling apparatus;

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 1 in the direction indicated by the arrows;

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 1 in the direction indicated by the arrows;

Fig. 8 is a perspective view of a pair of toggle elements forming a part of a trip mechanism employed in connection with the present invention, clearly showing the detail construction of each and the manner in which the two elements are assembled; and

Fig. 9 is a top plan view of a stencil screen employed in connection with the present invention.

The stenciling apparatus is in the form of a machine, involving in its general organization a support or table 10 (Fig. 1) provided with front and rear supporting legs 11 and 12 respectively. Bolted or otherwise secured to the upper surface of the table 10 is a frame or standard 13 in the form of a relatively heavy casting designed to operatively support thereon the greater portion of the operative machine instrumentalities.

The standard 13 consists of a base portion 14 which projects forwardly over and beyond the front edge of the table 10 and serves to operatively support an article aligning and supporting chuck mechanism, the nature and function of which will hereinafter be described. The extreme upper end of the standard 13 is provided with a forwardly extending overhead supporting arm 15 which operatively supports at its outer end a stencil framework or holder together with an associated rotary squeegee assembly, both of which will be fully described hereinafter. A rearwardly extending supporting arm 16 extends medially from the standard 13 and overlies a

portion of the table 10 and serves to support thereon a gear reduction mechanism forming a part of the squeegee driving mechanism, the character and function of which will also be set forth later. The standard 13, together with the forwardly extending portions 14 and 15, and the rearwardly extending portion or arm 16, provide the stationary supporting structure for the various machine elements, instrumentalities, and assemblies, for supporting the same in proper relative position with respect to each other, while at the same time permitting various adjustments to be made when required.

Integrally formed on the outer end of the forwardly projecting base 14 (Figs. 1 and 3) is a vertical guide 17 provided with upper and lower bushings 18 and 19, through which there extends a vertically slidable chuck supporting rod 20, the upper end of which is reduced as at 21. A chuck support 22 is fitted over the reduced upper end portion 21 of the rod 20. The upper end of the rod projects above the top of the chuck support, thus providing in effect a centering pin over which there may be removably positioned a chuck 23 of a size suitable to accommodate the article "A" undergoing decoration.

The chuck support 22 is secured against rotation about the axis of the rod 20 by a structure including a rearward extension or guide 42 having a guide opening 43 formed in the end thereof through which there projects a vertically extending guide rod 44, the lower end of which is anchored in a socket 45 formed in the base 14.

The chuck 23 is designed to successively receive thereon the articles to be decorated, and towards this end, the upper face thereof is contoured substantially complementary to the underneath surface of the article. Both the chuck 23 and the chuck support 22 are readily removable from the rod 20 to permit substitution when required.

A collar 25, provided with a set screw 26, is slidably and adjustably mounted upon the rod 20 below the guide 17 and this collar serves as a limit stop for limiting the upward movement of the rod 20. Thus vertical adjustment of the collar 25 may be made to adjust the elevation of the chuck when the same is in its upper position in which, as will appear, the article receives its stencil impression.

The rod 20 is designed to normally occupy its elevated position, and toward this end, an attachment ear 27 is formed on the collar 25 and a chain 28 has one end thereof secured as at 29 to the attachment ear 27. The chain 28 passes over a pulley 30 carried by the forwardly extending base 14 above the level of the collar 25, while the other end of the chain is secured to a counterweight 32, the mass of which is somewhat in excess of the mass of the vertically movable chuck supporting instrumentalities. Thus it will be seen that the upward pull exerted on the rod 20 by the chain 28 will normally bring the rod 20 to its uppermost position with the collar 25 in abutting position on the underneath side of the guide 17.

In order to permit the chuck 23 to be lowered at will, the lower end of the rod 20 is bifurcated as at 33 and an attachment plate 34, possessed of a limited swinging movement in one plane, is suspended from a pin 35, the ends of which are supported in the bifurcations 33. A connecting link 36, having a turnbuckle 37 interposed medially of its ends, has one end thereof secured to the plate 34, while the other end thereof is

anchored centrally to a crossbar 38 forming an element of a foot pedal assembly now to be described.

The foot pedal assembly consists of a pair of forwardly extending side bars 39, the rear ends of which are pivoted as at 40 to the rear supporting legs 12 of the table 10 adjacent the bottom thereof. A foot pedal proper 41, having its ends secured to the forward ends of the side bars 39, extends across the front of the machine, while the cross bar 38, above referred to, has its ends secured to the side bars 39 rearwardly of the pedal 41. Thus a second degree leverage is applied to the rod 20 in order to lower the article supporting chuck 22 when the operator of the machine applies a portion of his weight to the pedal 41.

The outer end of the overhead supporting arm 15 (Figs. 2 and 3) is provided with a bore 46 which is vertically aligned with the bore provided by the guide 17. A depending shaft 47, vertically adjustable by means of a set screw 48 extends through the bore 46 and has its lower end terminating in the vicinity of the article holding chuck 23. A crosshead 49 having a central boss 50, through which the shaft 47 extends, is mounted for vertical adjustment on the shaft 47 by means of a set screw 51 which extends through the boss 50. A pair of trunnions 52, integrally formed on the ends of the crosshead 49, extend downwardly in the direction of the article holding chuck 23 and have their lower ends secured at diametrically opposed points to a horizontally extending stencil supporting ring 53. Removably secured to the lower surface of the stencil supporting ring 53, (Figs. 1 and 3) as, for example, by means of removable clamps 54, is a stencil supporting hoop 55. Fastened in any suitable manner to the lower side of the hoop 55, as, for example, by gluing, is a stencil screen 56 having impermeable portions and permeable portions representing the design to be stenciled upon the articles. Obviously the exact character of these portions depends upon the nature of the design to be obtained. The portion may be continuous if the design happens to assume the form of a continuous band, as shown in Fig. 9 at 56'. A series of stencil carrying hoops, each representing a different design to be applied to the articles, may be prepared and designed for interchangeable application to the stencil supporting ring 53.

In the operation of the machine, when the article supporting and centering chuck 23 is in its uppermost position with the article "A" positioned thereon, the crosshead 49 is adjusted vertically by means of the set screw 51 so that the article will abut against the underneath side of the stencil screen 56 to receive the stencil imprint therethrough. In order to hold the stencil screen 56 taut so that the design will be properly centered upon the article "A" and will not creep thereon during application of the design, the lower end of the shaft 47 has secured thereto a stencil screen holder 58 in the form of a circular plate 59, preferably formed of wood, and having a contact surface 60 formed of sponge rubber. A backing plate 61, through which there extends a securing screw 62, forms the means by which the stencil screen holder assembly is secured to the lower end of the shaft 47. In the initial adjustment of the machine, the shaft 47 is adjusted vertically so that the stencil screen holder 58 is brought to bear against the screen 75

56 with sufficient pressure to hold the screen taut for application of the articles thereto.

In order to apply the design to the articles, a small quantity of a suitably colored, finely ground, quartz-like enamel, which has been worked to a pasty consistency with a suitable fluid carrier, is applied to the stencil screen 56 and is forced through the pervious portions thereof by means of a revoluble squeegee element 64 which is driven from a suitable source of power in a manner now to be fully set forth.

The source of power just referred to is in the form of an electric motor 66 which is bolted or otherwise secured on the table 10 behind the machine. The outer end of the rearwardly extending arm 16 has a sleeve 67 formed thereon, and a supporting rod 68, having a table 69 formed on the upper end thereof, is slidably mounted in the sleeve 67 and is adjustably secured therein by means of a set screw 70. A gear speed reduction device 71 has its base 72 bolted or otherwise secured to the adjustable table 69 and a driving belt 73 passes over respective pulleys 74 and 75 mounted on the driving shaft 76 of the motor and the driven shaft 77 of the gear reduction device 71.

The gear reduction device 71 is provided with a vertically extending driven shaft 78 upon which there is mounted a pulley 79, designed for rotation in a horizontal plane. The pulley 79 is operatively connected by means of a belt 80 to a second pulley 81, somewhat larger in diameter than the pulley 79. The pulley 81 is removably secured by means of set screws 82 to a sleeve 83 which surrounds the shaft 47 and is vertically slidable and rotatable thereon.

The sleeve 83 is provided adjacent its lower end with a radially extending boss 84 designed to threadedly receive therein a clamping screw 85 which passes through a clamping plate 87, one end of which bears against the sleeve 83 and the other end of which serves to clamp the inner end of a squeegee holding arm 88 to the sleeve 83 in such a manner that the arm 88 occupies a tangential position with respect to the sleeve. The arm 88 extends outwardly from the sleeve 83 to a point adjacent the periphery of the stencil hoop 55 and terminates in a rounded bearing element 89 forming one element of an adjustable universal joint. A squeegee holder 90, having the squeegee 64, previously referred to, secured to its lower end, is provided with a knife edge seat 91 interiorly thereof, which seat is caused to bear against the rounded element 89 by means of a set screw 93 carried by the holder 90 in such a manner that the holder is adjustable within limits on the end of the arm 88.

The arm 88, while tangentially mounted on the sleeve 83, is by virtue of its tangential extent, permitted to have a radial sweep around the interior of the stencil hoop 55, in such a manner that when the sleeve 83 is in its lowermost position on the shaft 47, the enamel placed upon the upper surface of the stencil screen 56 will be passed through the pervious portions thereof and applied to the article "A" therebeneath.

The sleeve 83 is normally held in elevated position on the shaft 47 in order that the squeegee 64 may clear the stencil screen together with the liquid enamel thereon and is adapted to be lowered at the will of the operator. Accordingly, the sleeve 83 is provided with a pair of spaced upper and lower external annular flanges 93 and 94 respectively, between which flanges there rides a roller 95 which is mounted on a pin 96

that extends medially through a lever 97. Depending from the crosshead 49 adjacent one end thereof is a supporting rod 98, (see Fig. 2), the upper end of which is adjustably secured by means of a set screw 99 that passes through a boss 100 provided in the crosshead 49. The lever 97 is pivoted as at 101 medially of its ends to a stud 103 rockably supported in a bearing sleeve 86 carried by the lower end of the supporting rod 98. One end of the lever is provided with an aperture 102 which provides a means for supporting a counterweight 104 of sufficient mass to overbalance the weight of the squeegee assembly, including the rotatable sleeve 83 and the revoluble squeegee arm 88. The other end of the lever 97 projects outwardly from the machine and is readily accessible to the operator, who, by depressing the same causes the roller 95 to bear against the lower radial flange 94 to lower the squeegee assembly until the squeegee engages the stencil screen 56.

The revoluble squeegee assembly has associated therewith an automatic stop mechanism which, in addition to limiting the revolution of the squeegee to one complete revolution for the application of a complete closed design in which no trace of overlap is present to each succeeding article placed in the machine, also operates in the manner of a clutch to remove the application of driving torque to the squeegee assembly at the end of each revolution thereof. Toward this end, a flat metal bracket 105, having a pair of circumferentially extending slots 106 extending through the same, is adjustably secured for limited radial adjustment to the upper face of the pulley 81 by means of clamping bolts 107 which extend through the slots 106 and are threadedly anchored in the body of the pulley 81. The bracket 105 is provided with a radially extending arm 108 which projects over the circumferential edge of the pulley 81 and provides one element of the automatic stop and clutch mechanism.

A finger 109 (see Figs. 6, 7 and 8) forming a counterpart of the arm 108, is designed to be engaged by this arm to limit the rotational movement of the pulley 81 at the end of each stencil operation. The finger 109 is pivoted as at 110 to a bracket 111 formed on a collar 112 forming an element of a trip mechanism subsequently to be described. The finger 109 is possessed of limited swinging movement as shown by the dotted lines in Fig. 7 and its movement is limited in one direction to such dotted line position by means of an abutment 114 formed on the bracket 111. The finger 109 extends downwardly below the plane of the pulley 81 and the lower portion thereof abuts against one end of a lever 115 which is secured for swinging movement in a horizontal plane to the reduced end 116 of a stud shaft 117 rockably journaled in a sleeve 118 carried by a bracket 119, bolted or otherwise secured to a vertical portion of the stand 13. The rear end of the lever 115 has mounted thereon an idler tension pulley 120 which, upon swinging movement of the lever 115, is moved into and out of engagement with the driving belt 80 and is normally held in belt engaging position by means of a spring 121, one end of which is anchored as at 122 to the standard 13 and the other end of which is anchored as at 124 to the lever 115 medially thereof.

In the normal belt engaging position of the lever 115 and idler pulley 120, the belt 80 is held taut so as to frictionally engage the pulley 81 and drive the revolving squeegee mechanism above described. Upon completion of each stenciling

operation, the arm 108 engages the finger 109 and urges the same into its limiting position as shown by the dotted lines in Fig. 7, thus swinging the lever 115, carrying the pulley 120, into the inoperative dotted line position shown in Fig. 6 to release the tension in the belt 80 and permit the pulley 81, when released by the manually controlled trip mechanism subsequently to be described, to be rotated throughout one complete revolution for effecting a subsequent stencil operation.

The manually controlled trip mechanism above mentioned, consists of a shaft 125 mounted for limited rocking movement in a pair of aligned sleeves 126 carried by ears 127 which extend forwardly from opposite sides of a bracket 128 bolted or otherwise secured to the underneath side of the forwardly projecting overhead portion 15 of the standard 13. The collar 112 is provided with a forwardly projecting arm 129 having a set screw 130 extending therethrough designed to engage the underneath side of the overhead portion 15 of the standard 13 to limit the rocking movement of the shaft 125 in one direction, while a similar set screw 131 extending through a depending portion 132 of the bracket 128 is designed to engage the bracket 111 formed on the collar 112 and limit the rocking movement of the shaft in the other direction. A spring 136 applies a torque to the shaft 125 to normally urge the shaft into its limiting position as determined by the set screw 130.

The rockable shaft 125 is held against lateral shifting by means of a pair of collars 134 secured to the shaft 125 outside of the sleeves 126. One end of the shaft 125 is extended laterally and outwardly from the bracket 128 and has secured thereto a manually operable lever 135 which extends forwardly in the machine. The collar 112, having formed thereon the bracket 111 which pivotally carried the depending finger 109, is secured centrally to the shaft 125, and thus it will be seen that when the operator of the machine depresses the lever 135 to rock the shaft 125, against the action of the spring 136, the collar 112 is rocked about a transverse horizontal axis to swing the bracket 111 and finger 109 bodily rearwardly to clear the radially projecting arm mounted on the pulley 81. In this manner, the tension on the spring 121 is released and the forward end of the lever 115 is swung to the full line position shown in Fig. 6 so that the pulley 120 engages the belt 80 to remove the existing slack therein and cause the same to frictionally engage the pulley 81 and thus set the squeegee assembly into operation in the manner previously described.

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

I claim:

1. Apparatus for applying a continuous series of designs to an article by a stenciling process comprising an article holder, a stencil screen arranged for stationary contact with one face of the article and having pervious areas representing a continuous series of designs, means for forcing a coloring material through said pervious areas onto the article, and means automatically terminating the color applying operation immediately upon completion of the application of a single continuous series of designs to the article.

2. Apparatus for applying a closed band of designs to an article comprising an article holder, a stencil screen having pervious areas representing the closed band of designs, a squeegee, means for effecting relative movement between the screen and squeegee with the two elements in contact with each other to force a coloring material

through said pervious areas onto the article, and means automatically arresting said relative movement between the screen and squeegee immediately upon completion of the application of said band to the article.

3. In an apparatus for stenciling continuous designs on articles having inclined sides, a removable screen having pervious portions adjacent the periphery thereof, means for positioning an article against said screen with the inclined sides thereof in contact with the peripheral areas of said screen, a radially adjustable squeegee element mounted for revolution about a central axis and designed to sweep the peripheral areas of said screen for forcing coloring matter through said pervious portions onto said article, and means for adjusting the inclination of said squeegee to accommodate the inclination of said sides.

4. In an apparatus for selectively stenciling continuous closed bands of designs on the base or on the inclined marginal regions of saucer-shaped articles, a removable screen having pervious portions adjacent the periphery thereof, means for positioning the inside of an article against the underneath side of said screen in intimate coextensive contact therewith, a radially and angularly adjustable squeegee element mounted above said screen for revolution about a central axis and designed to sweep the peripheral areas of said screen for forcing coloring matter through said pervious portions onto said article, and means for vertically adjusting said squeegee element.

5. In an apparatus for stenciling designs on articles, a stencil screen having peripheral pervious portions representing the design to be applied to the articles, an article support movable toward and away from said screen for operatively positioning an article against the underneath side of said screen, means normally urging said support into operative position, a squeegee element normally positioned above said screen and out of contact therewith, means for revolving said squeegee about the central axis of said support, and means for lowering said squeegee into contact with the peripheral portions of said screen.

6. In an apparatus for stenciling continuous designs on articles, a stencil screen having continuous series of pervious portions representing the design to be applied to the articles, means for positioning an article in contact with said screen to receive an impression therefrom, a revolvable squeegee movable around the central axis of said article and in contact with the peripheral portions of said screen for forcing coloring matter through said pervious portions onto said article, means for revolving said squeegee, and means for rendering said last mentioned means inoperative at the completion of one revolution of said squeegee.

7. In an apparatus for stenciling continuous designs on articles, a stencil screen having a continuous series of pervious peripheral portions representing the continuous design to be applied to the articles, article supporting means movable toward and away from said screen for permitting articles to be individually and successively applied thereto, a revolvable squeegee movable around the central axis of said design and in contact with the peripheral portions of said screen for forcing coloring matter through said pervious portions and onto each succeeding article, means for revolving said squeegee, and means for arresting movement of said squeegee and for rendering said revolving means inoperative upon completion of each revolution of said squeegee.

8. In a stenciling apparatus having a stencil screen provided with a continuous pervious portion extending around the periphery thereof and representing a design to be applied to an article positioned in contact therewith, a stationary shaft axially aligned with said screen, a sleeve rotatably mounted on said shaft, a squeegee mounted on said sleeve in engagement with said screen adjacent the periphery thereof and revolvable around said shaft upon rotation of said sleeve, a driven pulley mounted on said sleeve, a driving pulley, a lever, an idler pulley mounted on said lever, a belt mounted in frictional driving relation on said pulleys, said lever upon movement in one direction causing said idler pulley to move out of engagement with said belt to discontinue said driving relation, an abutment on said driven pulley and a cooperating finger positioned in the path of said abutment and adapted to be engaged thereby upon completion of each revolution of said driven pulley to limit the rotational movement of the same, said finger upon being engaged by said abutment being movable into contact with said lever to move the same to belt releasing position.

9. In a stenciling apparatus having a stencil screen provided with a continuous pervious portion extending around the periphery thereof and representing a design to be applied to an article positioned in contact therewith, a stationary shaft axially aligned with said screen, a sleeve rotatably mounted on said shaft, a squeegee mounted on said sleeve in engagement with said screen adjacent the periphery thereof and revolvable around said shaft upon rotation of said sleeve, a driven pulley mounted on said sleeve, a driving pulley, a lever, an idler pulley mounted on said lever, a belt mounted in frictional driving relation on said pulleys, said lever upon movement in one direction causing said idler pulley to move out of engagement with said belt to discontinue said driving relation, an abutment on said driven pulley, a cooperating finger positioned in the path of said abutment and adapted to be engaged thereby upon completion of each revolution of said driven pulley to limit the rotational movement of the same, said finger upon being engaged by said abutment being movable into contact with said lever to move the same to belt releasing position and a trip mechanism for moving said finger out of engagement with said abutment.

10. In an apparatus for applying a design to the inclined peripheral areas of saucer-shaped articles, an article support, a screen having pervious portions adjacent the periphery thereof, means for maintaining the periphery of said screen

elevated with respect to an article undergoing decoration, means bearing against the central region of said screen to hold the peripheral regions thereof taut and in intimate contact with the inclined areas of said article, a squeegee, and means for effecting relative movement between the screen and squeegee with the two elements in contact with each other to force coloring material through said pervious portions onto the inclined areas of said article.

11. In an article for stenciling the inclined peripheral areas of saucer-shaped articles, an article support, a screen having pervious portions adjacent the periphery thereof, means for maintaining the periphery of said screen elevated with respect to an article on said support, means bearing against the central region of said screen to hold the peripheral regions thereof taut and in intimate contact with the inclined areas of said article, and an inclined squeegee mounted for revolution around a central axis and designed to sweep the peripheral areas of said screen for forcing coloring material through the pervious portions thereof and onto the inclined areas of said article.

12. In an apparatus for applying a design to the inclined peripheral areas of saucer-shaped articles, an article support, a screen having pervious portions adjacent the periphery thereof, means for maintaining the periphery of said screen elevated with respect to an article undergoing decoration, means bearing against the central region of said screen to hold the peripheral regions thereof taut and in intimate contact with the inclined areas of said article, a squeegee, means for effecting relative movement between the screen and squeegee with the two elements in contact with each other to force coloring material through said pervious portions onto the inclined areas of said article, and means automatically arresting said relative movement between the screen and squeegee immediately after completion of the application of a complete design to said inclined areas.

13. In an apparatus for stenciling continuous designs on the frusto-conical rim portions of saucer-like articles, a stencil screen having a frusto-conical surface, means for mounting said screen with the frusto-conical portion thereof in coextensive contact with the frusto-conical rim portion of an article to be decorated, and means for forcing coloring material through the frusto-conical portion of said screen and onto the frusto-conical portion of the article.

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