July 30, 1940. R. S. DAVIS 2,209,688

DECORATING MACHINE

Filed Feb. 1, 1936 3 Sheets-Sheet 1

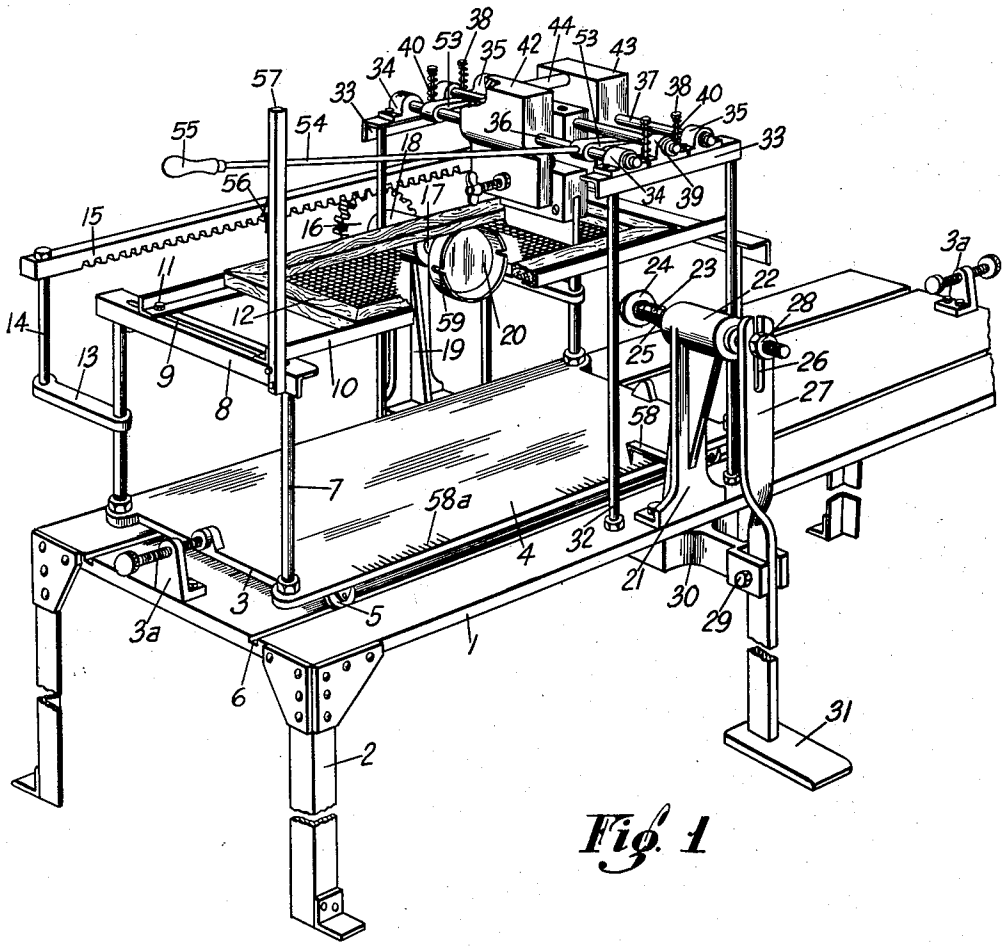


Fig. 1

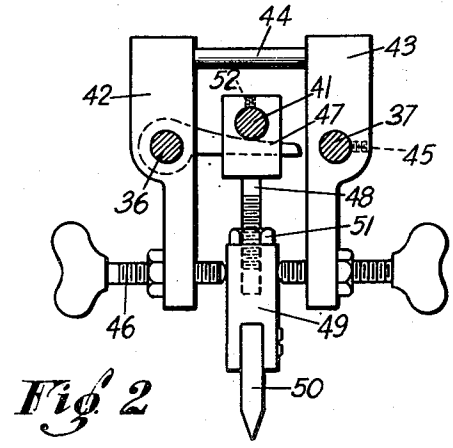


Fig. 2

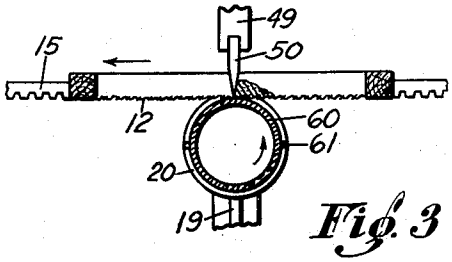


Fig. 3

INVENTOR.
Robert S. Davis.

BY
Cobb & Mahoney
ATTORNEYS.

July 30, 1940. R. S. DAVIS 2,209,688

DECORATING MACHINE

Filed Feb. 1, 1936 3 Sheets-Sheet 2

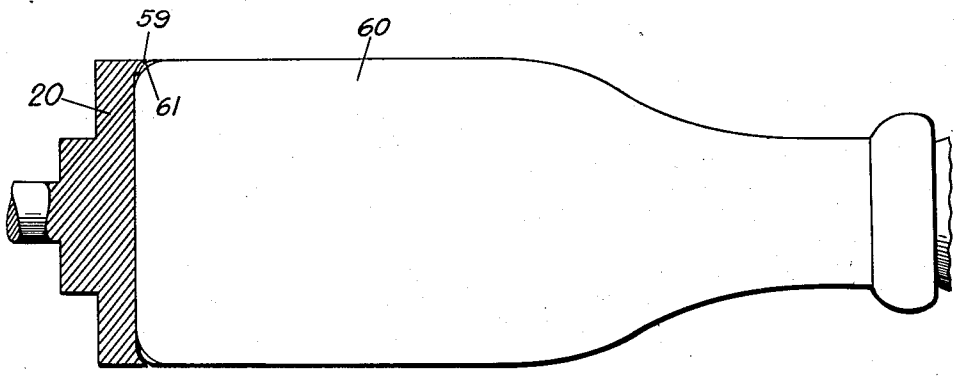


Fig. 4

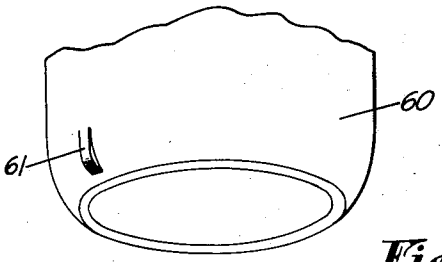


Fig. 5

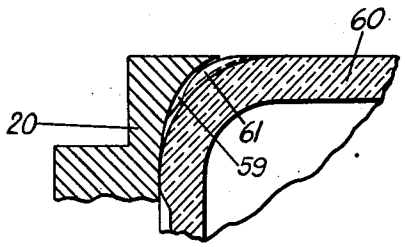


Fig. 6

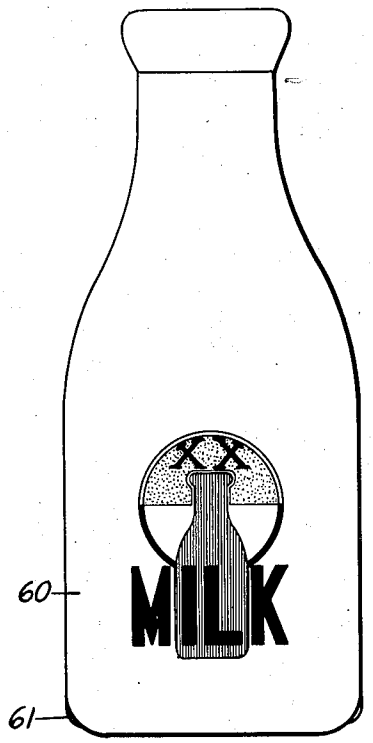


Fig. 7

INVENTOR.
Robert S. Davis.

BY Cornell & Mahoney
ATTORNEYS.

July 30, 1940. R. S. DAVIS 2,209,688

DECORATING MACHINE

Filed Feb. 1, 1936 3 Sheets-Sheet 3

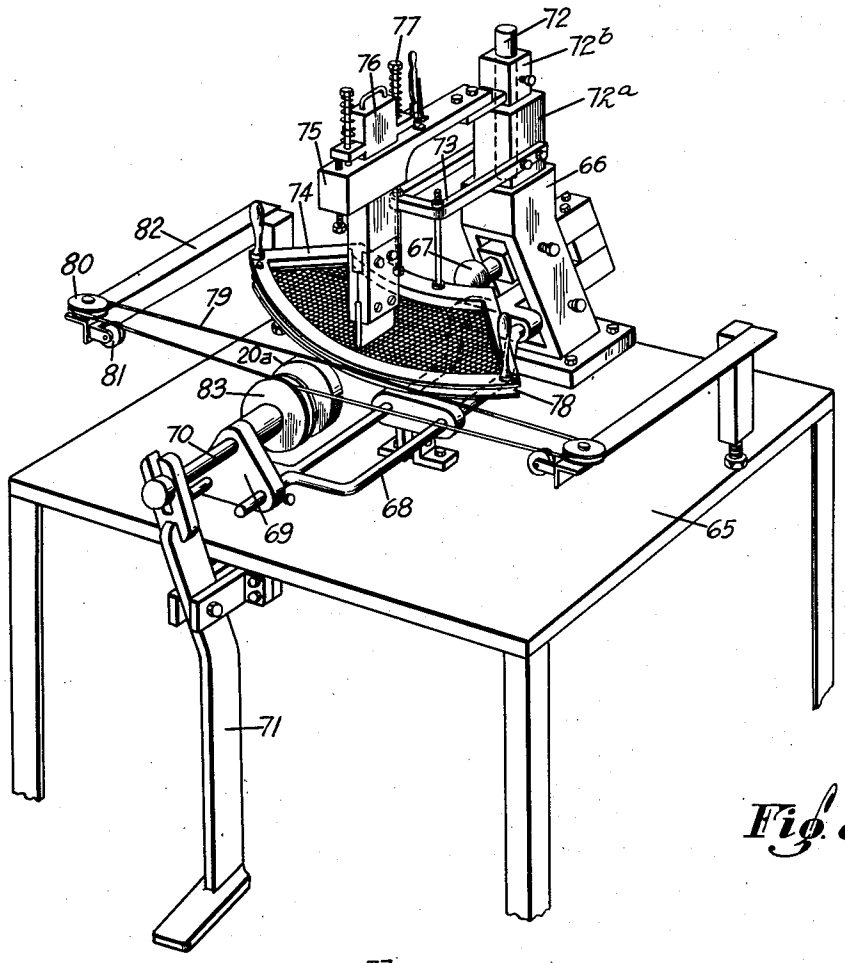


Fig. 8

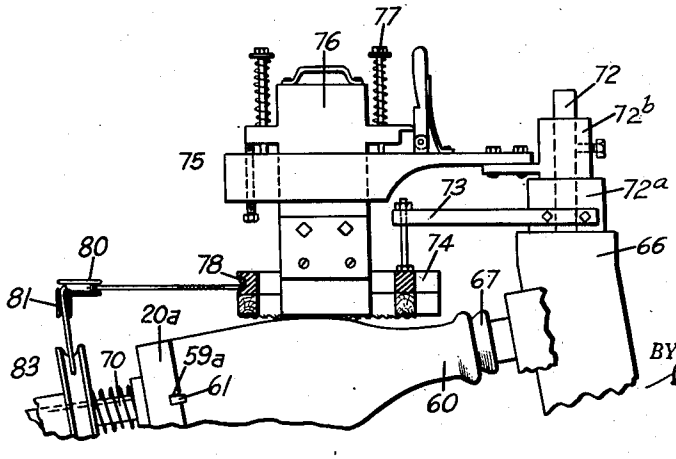


Fig. 9

INVENTOR.
Robert S. Davis.

BY Cowles & Mahoney
ATTORNEYS.

Patented July 30, 1940 2,209,688

UNITED STATES PATENT OFFICE

2,209,688

DECORATING MACHINE

Robert S. Davis, Parkersburg, W. Va., assignor, by mesne assignments, to Solar Laboratories, Beaver, Pa., a corporation of Pennsylvania

Application February 1, 1936, Serial No. 61,916

8 Claims. (Cl. 101—124)

My invention relates to a decorating machine. It has to do, more particularly, with a machine for decorating glass articles by the screen stencil printing process, although certain features of my invention are not necessarily limited thereto.

Recently there has been a great demand for glass articles decorated with colored designs, either one or a plurality of colors, or having advertising matter printed thereon. The screen stencil printing process, employing vitreous colored enamel, is commonly used for producing designs on glass articles.

In applying unitary designs having two or more colors to a glass article, considerable difficulty is encountered because of the care needed for effecting proper registration of the two parts of the design. In printing a unitary design of two or more colors, it is necessary to remove the article from the decorating machine after each part of the design is applied to the article and to dry the article before the next part of the design of different color can be printed thereon. In replacing the article on the machine preparatory to printing the next part of the design it is necessary to place the article in the same relative position it occupied in the prior printing operation. At the present time considerable care is required to do this and there is always danger of error which would prevent proper registration of the two parts of the design. This difficulty of obtaining proper registration of the different parts of a complete design of different colors, materially slows up the decorating operation and increases the decorating cost.

Even with a one-color design, it is quite desirable to locate the design at a preselected position, such as, in the case of a milk bottle, midway between the seams of the bottle. Furthermore, when the article has some permanent design already blown into it or otherwise formed, it is desirable to have the color design in a fixed and predetermined position with relation to such permanent design. This also requires great care in positioning the article in the chuck of the decorating machine, which also slows up the operation and increases the cost.

One of the objects of my invention is to provide a decorating machine of the type indicated which is provided with means for receiving the article and for positioning it in a predetermined relation relative to the stencil so that the design will be applied to the article at a preselected position, or if several printing operations are required to produce the unitary design, so that all parts of the design will properly register.

Another object of my invention is to provide means of the type indicated for properly positioning the article relative to the stencil, which is of such a type that the article may be readily placed on the machine in the proper position and which is very simple although very effective for the purposes intended.

Another object of my invention is to provide an article to be decorated which is provided with means for cooperating with the chuck or other article-receiving portion of a decorating machine to position the article on the machine in a predetermined position.

In its preferred form my invention contemplates the provision of a decorating machine provided with a screen stencil which is movable relative to an article-receiving chuck forming a part of the machine. Means is provided for positively rotating the article-receiving chuck as the screen stencil is moved relative thereto. The screen stencil and the article-receiving chuck are arranged so that the article and the screen stencil will have rolling contact with each other and the design will be progressively applied to the surface of the article. I preferably provide on the article a pair of projections or lugs which cooperate with a pair of slots in the article-receiving chuck to properly position the article in the chuck in predetermined relation to the stencil. This insures that each time the article is removed and replaced on the machine it will be in the same predetermined relation to the stencil. Consequently, the design applied to the article will be in a preselected position on the surface thereof and in case a design of several colors is to be obtained, the article will be properly positioned for each printing operation so that all parts of the unitary design will properly register with each other.

The preferred embodiment of my invention is illustrated in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a perspective view of a decorating machine of the type indicated which is provided with means for insuring that the article will be properly positioned on the machine relative to the screen stencil each time it is placed thereon.

Figure 2 is a detail of the means for mounting the squeegee on the machine.

Figure 3 is a view illustrating the screen stencil and the article in contact with each other during the printing operation.

Figure 4 is a transverse section showing the chuck and the article positioned therein.

Figure 5 shows the lower end of the article and one of the lugs which is formed thereon.

Figure 6 is a detail in section illustrating how the lug cooperates with the slot formed in the chuck to properly position the article therein.

Figure 7 is a view in side elevation of an article which has been decorated on the machine, showing the completed unitary design thereon of different colors, and illustrating how the various parts of the design properly register with each other.

Figure 8 is a perspective view of a machine for decorating tapered surfaces of articles, the machine being provided with certain features of my invention.

Figure 9 is a side elevation of the machine illustrated in Figure 8.

In the accompanying drawings I have shown a decorating machine of the screen stencil printing type although it will be understood that my invention is not limited to this particular type of machine.

This machine is shown as comprising a base plate 1 which is supported by a plurality of legs 2. A carriage 3 indicated generally by the numeral 3 is mounted for longitudinal movement on the base plate 1. This carriage embodies a lower plate 4 which is carried by a plurality of rollers 5 mounted on the lower side thereof which operate in groove 6 formed in the upper surface of plate 1. A rod or post 7 is mounted on the plate 4 at each corner thereof and extends upwardly a considerable distance. The pair of rods or posts 7 at each end of the plate 4 support a transversely extending angle iron 8 which is provided with an elongated slot 9 in the horizontal portion thereof. A pair of longitudinally extending angle irons 10 are supported at their ends on the members 8 and are secured thereto by bolts 11 passing through the slots 9. Thus, these members 10 may be adjusted laterally towards or away from each other and may be secured in adjusted position. A screen stencil 12 of the usual type, embodying a wood frame and a screen having the design formed thereon, is adapted to be gripped between these members 10. Each of the members 7 at the rear of plate 4 has a rearwardly projecting arm 13 rigidly secured thereto which has an upwardly projecting pin 14 at its rear end. These pins 14 support a longitudinally extending rack member 15 which extends the entire length of the carriage 3.

The longitudinally extending rack 15 is adapted to mesh with a gear 16. This gear 16 is supported on the rear end of a shaft 17 which is rotatably mounted in a bearing 18. This bearing 18 is formed on the upper end of a standard 19 having its lower end secured to the plate 1 adjacent the rear edge thereof. The standard 19 is so positioned that it will not interfere with movement of the carriage 3. The forward end of the shaft 17 carries a chuck 20 which is adapted to receive the lower end of a milk bottle to be decorated by the machine.

Directly opposite the standard 19 is a similar standard 21. This standard has a bearing 22 formed on its upper end which receives a shaft 23 which is both slidably and rotatably mounted therein. The rear end of this shaft 23 has a head 24 of frusto-conical form which is adapted to project into the neck of a milk bottle to be decorated on the machine. A spring 25 surrounds the rear end of the shaft 23 and is adapted to normally urge the head member 24 towards the chuck 20. The forward end of the shaft 23 projects from the bearing 22 through a slot 26 formed in the upper end of a bar 27. A nut 28 is threaded on shaft 23 at a point in front of the bar 27. The bar 27 is pivoted at 29 to a support 30 secured to the lower surface of plate 1 and projecting forwardly therefrom. This bar 27 has a shoe or pedal member 31 rigidly secured to its lower end. It will be apparent that the operator may press on the pedal 31 with his foot in order to move the head 24 a greater distance from the chuck 20 so that the article may be positioned in the chuck and when the pedal is released, the head 24 will move into the neck of the bottle and hold the bottom of the bottle firmly in the chuck 20. It will be noted that the standards 19 and 21 are located substantially midway between the ends of the plate 1.

At the forward and rear edges of the plate 1 and adjacent the standards 19 and 21 a pair of vertically extending rods 32 are disposed. These rods have their lower ends secured to the plate 1 and project above the screen stencil supporting members 10 a substantial distance. Each pair of rods supports an angle iron member 33 which connects their upper ends together. These angle irons 33 are adapted to support the squeegee mechanism of the machine. At one end of each member 33 a bearing 34 is disposed while at the other end a bearing 35 is disposed. The bearings 34 receive a transversely extending shaft 36 which is free to rotate therein while the bearings 35 similarly receive a transversely extending shaft 37. A pair of pins 38 are supported on each member 33 between bearing members 34 and 35 and extend upwardly from said member. These pins support a bearing member 39 which is mounted for vertical sliding movement thereon. The bearing members 39 are normally held in their lowermost position by means of springs 40 which surround pins 38. The bearings 39 rotatably support a transversely extending shaft 41.

The shaft 36 supports a plate 42 while the shaft 37 supports a plate 43. The two plates 42 and 43 are rigidly secured together by a member 44. The shaft 36 is free to rotate in plate 42. A setscrew 45 is threaded into plate 43 so that it will contact with shaft 37 in order to maintain the unit comprising the plates 42 and 43 in any desired position along the transversely extending shafts 36 and 37. The plates 42 and 43 extend downwardly below the shafts 36 and 37 and each plate has a large setscrew 46 threaded therethrough. These setscrews project towards each other. The shaft 41 is disposed between the plates 42 and 43 and supports a block member 47 through which the shaft passes and within which it may rotate. This block 47 has a pin 48 projecting downwardly therefrom which carry a member 49 that is provided with a socket in its lower edge for removably receiving the squeegee blade 50 of rubber or suitable material. The lower end of the pin 48 is threaded into member 49 and, consequently, the vertical position of the member 49 may be adjusted. A lock nut 51 is provided for maintaining the adjustment. A setscrew 52 is threaded through block 47 so as to engage shaft 41 and hold the block at a preselected position along the shaft 41 and prevent rotation of the block on the shaft.

The setscrews 46 carried by blocks 42 and 43 are adapted to be adjusted so that their ends are slightly spaced from member 49 in order to permit vertical movement of the squeegee but to aid in preventing lateral movement of the

squeegee. The springs 40 normally tend to maintain the squeegee in contact with the screen stencil. However, I provide mechanism for raising the squeegee out of contact with the stencil when desired. This means comprises a pair of arm members 53 which are keyed to shaft 36 and which project beneath and engage shaft 41. Extending from one of the arms 41 is a rod 54 having a handle 55 on its outer end. By means of this rod 54 the shaft 36 may be rotated and the arms 53 will be swung upwardly. This will raise the shaft 41 against the force of the springs 40 and, consequently, will raise the squeegee blade 50 out of contact with the screen stencil. A latch member 56 is provided on a vertically extending support 57 for engaging the outer end of rod 54 to hold it in its lowermost position when it is desired to maintain the squeegee out of contact with the screen stencil for a period of time.

In operation of this machine an article is mounted thereon as previously described, the squeegee is lowered in contact with the screen stencil and the carriage 3 is reciprocated on the base plate 1. It will be noted that the base plate 1 is substantially twice the length of the carriage 3 and that the squeegee and article-receiving mechanism are disposed substantially midway between the ends of plate 1. This will permit movement of the carriage in either direction for a distance substantially equal to the length of the carriage. Adjustable stops 3a are provided for limiting movement of the carriage. When the carriage is moved in either direction, the screen stencil 12 will be moved relative to an article supported on the machine. Simultaneously during such movement, the article will be positively rotated by means of the rack 15 and the gear 16. Thus, the article and the screen will be in rolling contact and the design on the stencil will be progressively applied to the article. Since the squeegee is stationary and the screen reciprocates relative thereto, the squeegee will scrape over the surface of the screen stencil and force the paint therethrough onto the article. During movement of the carriage in each direction a single article will be decorated. At the end of each movement of the carriage, the squeegee may be raised out of contact with the stencil so that another article may be placed on the machine without danger of smearing it. Then the squeegee is lowered to force the screen stencil down against the article and the printing or decorating operation may be repeated.

I preferably provide the standard 21 with a finger or pointer 58 which cooperates with marks 58a on the plate 4 of the carriage. This pointer and cooperating marks are provided for indicating the point where the squeegee should be lowered in contact with the screen stencil and the point where it should be raised after the printing operation.

I will now describe one of the most important features of my invention. As previously stated it is desirable in printing designs upon an article to have the article positioned on the machine relative to the stencil in such a manner that the design will be printed on the article in a predetermined position thereon, or in a predetermined position relative to a design or configuration blown or molded into the article. For example, in the case of a milk bottle it is desirable to have the design printed thereon midway between the seams formed at opposite sides of the article by the mold. Furthermore, when a design of two or more colors is printed on the article, it is desirable to have means for insuring that the article will be placed on the machine in the same predetermined relation relative to the screen stencil for each printing operation so that the different colored parts of the design will properly register with each other and form a composite design.

In order to accomplish the above, I have provided the chuck 20 with a pair of slots 59 formed at diametrically opposed points. In Figures 4 to 7 I have illustrated an article adapted to be placed in this chuck. This article, for example, may be a milk bottle as shown. The article is provided with small lugs 61 integrally formed thereon during the molding process at diametrically opposed points. These lugs 61 are adapted to cooperate with the slots 59 in the chuck 20 to maintain the article 60 in a predetermined position therein. The outer end of the lots 59 is open so that when the article is inserted in the chuck the lugs may pass through the slots until the bottom of the article rests on the bottom of the chuck. At this time the lugs 61 will be in the position indicated in Figure 6 and will cooperate with the bottom portion of the slots to prevent rotation of the article in the chuck. The lugs 61 are preferably formed at the points where the seams are formed which are produced during the molding operation so that the design will be printed on the article midway between these seams.

The screen stencil 12 will have the design formed thereon at a predetermined distance from each end of the frame thereof. Furthermore, the screen stencil will be mounted on the carriage at a predetermined distance from each end thereof. Consequently, if the article is placed in the chuck so that the lugs fit into the cooperating slots with the carriage in the position indicated in Figure 1 and the carriage is then reciprocated, it will be apparent that the design will be printed on the article at a predetermined position around the circumference thereof. The screen stencil is preferably of such a length and the design is in a certain position thereon so that the design printed on the article will be midway between the seams thereof. However, two or more circumferentially spaced designs might be produced on the article.

In producing a design on the article of two or more colors, the article is placed on the machine and the machine is operated to print one portion of the design thereon. Then it is necessary to dry the article. The article is then placed on the same machine or on a different machine of the same type with a different stencil to form another part of the design. Because of the slots 59 and the cooperating lugs 61, the article will be placed in the same predetermined relation to the screen stencil each time it is positioned on the machine. The various stencils for various parts of the design will be formed in such a manner that they will cooperate to form a unitary design, if the article is properly positioned on the machine during each printing operation. The lugs and slots insure that each time the article is placed on the machine it will be in a predetermined relation to the screen stencil. Consequently, all parts of the design will properly register with each other.

In Figure 7 I have illustrated a design of three colors which might be produced by my machine. It will be apparent from this figure that the three

parts of the design accurately register with each other to form a composite design of three colors.

It will be apparent that instead of two of the lugs 61 and cooperating slots 59, one lug and slot or any number of cooperating lugs and slots may be provided. Also, it is possible to have a projection on the chuck and an indentation in the article to hold the two members in the proper relative position. Also, the lugs need not necessarily be an integral part of the article. The main object is to provide some means which will insure that each time the article is placed in the chuck, it will be in a predetermined relation to the stencil. This means should be of such a type that the article may be quickly positioned on the machine with a little care being required to properly position it in the chuck so as not to slow up the decorating operation and increase the decorating cost. With the means which I have disclosed, the article may be quickly positioned on the machine and it will always be in a proper relation to the stencil. There will be no danger of error which would prevent proper registration of the parts of the design.

It will be noted that the rack and gear mechanism for rotating the article in response to movement of the carriage, which carries the screen stencil, cooperates with the means for holding the article in the chuck in a predetermined position, to insure that the design will be printed in a proper position on the article. The article will be positively rotated by this rack and gear mechanism in response to movement of the carriage for the screen stencil. Consequently, the design will be accurately printed on the article since there will be no danger of slippage between the screen stencil and the article. Other mechanism may be provided for rotating the article and moving the stencil relative thereto, but I preferably employ some means which will positively rotate the article without slippage upon movement of the screen stencil.

In Figures 8 and 9 I have illustrated a machine for printing or decorating the tapered surface of a milk bottle or other tapered articles. This machine is provided with a chuck, as in the machine described before, which has slots that cooperate with lugs on the milk bottle to position the article properly relative to the screen stencil each time it is placed on the machine. I have shown this machine to illustrate that the means for insuring that the bottle will be properly positioned relative to the screen stencil is also applicable to a machine for printing or decorating the tapered surfaces of articles.

This machine comprises a table 65 upon which is mounted at the rear thereof a standard 66. This standard 66 supports a rotatable head 67 adapted to fit into the neck of a bottle. The head 67 is supported on the rear end of a supporting structure 68. The structure 68 has its rear end adjustably mounted in the standard 66 and its forward end carries a bearing member 69. This bearing member carries a shaft 70 free to slide through an opening formed therein and movable back and forth by foot pedal mechanism 71. The rear end of shaft 70 supports a chuck 20a which is exactly the same as that previously described being provided with slots 59a that cooperate with the lugs 61 on the milk bottle. The support 68 is bent as indicated so as no o interfere with positioning of the bottle on the chuck. The support 68 is carried intermediate its ends by a member 68a which is free to rock in a vertical plane.

A block 72a is pivoted on standard 66 by means of a pin 72 upon which it rotates. A forwardly extending support 73 is secured to the block 72a and supports an arcuate shaped screen stencil 74 on its forward end. A block 72b is keyed to the upper end of pin 72 and supports squeegee mechanism 75 on its forward end. This mechanism comprises a squeegee holder 76 that is mounted for vertical sliding movement but is normally held downwardly by springs 77 which cause the squeegee to contact with the screen stencil. It will be apparent that the screen stencil may be swung from side to side about the pivot pin 72 while the squeegee will remain stationary. Thus, the squeegee will wipe over the surface of the screen and force the paint therethrough onto the article.

In order to rotate the article in response to movement of the screen stencil the forward edge of the frame of the screen stencil is grooved as at 78 and this grooved portion firmly contacts with a cable 79. This cable 79 is supported by means of pulleys 80 and 81 on supporting members 82. The cable passes around a sheave 83 as indicated. This sheave 83 is splined on the shaft 70. It will be apparent that when the screen stencil is moved, the article will be rotated by means of the cable drive which rotates the chuck 20a.

It will be apparent from Figure 9 that the article is supported in an inclined position. It is preferably so inclined that the screen stencil 74 will swing about an axis, which is the axis of pin 72, which intersects the axis of the article at the apex of the cone of which the tapered surface of the article forms a part. This will insure that there will be no slippage between the screen stencil and the tapered surface of the article and, consequently, there will be no danger of smearing the article during the printing of the design thereon. The inclination of the article may be adjusted by adjusting the support 68 to different inclinations. Since the support 68 carries the chuck 20a and head 67, the article will be inclined in accordance with the inclination of the support.

It will be apparent that with this machine also, when the article is placed in the chuck, the lugs on the article will cooperate with the slots in the chuck to position the article in a predetermined relation to the screen stencil. Consequently, the design will be printed on the article at a preselected position and if several printing operations are necessary to make a composite design, all parts of the design will be properly registered with each other.

Having thus described my invention, what I claim is:

1. In a decorating machine for stenciling an article having a protuberance formed thereon, a stencil, means for supporting the article to be decorated in cooperative relation with the stencil, said means including a chuck for receiving the article, and a slot formed in the chuck for cooperating with a protuberance on said article, said protuberance and said slot cooperating with each other to insure that the article will be supported by the chuck in a predetermined relation to the stencil when the article is placed on the chuck so that the design or other configuration of the stencil will be printed on the article in a proper predetermined position.

2. In a decorating machine for decorating articles, a stencil, means for supporting the article to be decorated in cooperative relation

with the stencil, said means including a chuck for receiving the lower end of the article, said article having a pair of lugs formed thereon at diametrically opposed points adjacent the lower end thereof, the lower end of the article being adapted to fit in the chuck, said chuck having a pair of slots formed therein at diametrically opposed points, said lugs and said slots cooperating with each other to insure that the article will be supported by the chuck in a predetermined relation to the stencil when the article is placed in the chuck so that the design or other configuration of the stencil will be printed on the article in a proper predetermined position.

3. In a decorating machine for decorating an article having a cooperating lug thereon, a stencil, means for supporting the article to be decorated in cooperative relation with the stencil, means for moving the stencil relative to the article, means for positively rotating the article without slippage in response to movement of the stencil, said article supporting means including a chuck, and a chuck cooperating with the lug on the article for insuring that the article will be supported by the chuck in a predetermined relation to the stencil when the article is placed on the chuck so that the design or other configuration of the stencil will be printed on the article in a proper predetermined position.

4. In a decorating machine for stenciling an article having an interfitting portion thereon, a stencil, means for supporting the article to be decorated in cooperative relation with the stencil, movable means for supporting the stencil and for moving the stencil relative to the article, and rack and gear mechanism for positively rotating the article when said stencil supporting means is moved, said article supporting means including a chuck, and an interfitting portion on the chuck cooperating with the interfitting portion on the article for insuring that the article will be supported by the chuck in a predetermined relation to the stencil when the article is placed on the chuck so that the design or other configuration of the stencil will be printed on the article in a proper predetermined position.

5. In a decorating machine of the type described, a stencil, squeegee supporting mechanism, said squeegee supporting mechanism comprising a member which carries the squeegee blade, said member being supported by a shaft extending over the stencil, said shaft having its ends mounted for rotation in bearing members, said bearing members being supported for vertical movement, the squeegee being in contact with the stencil when the bearings are in their lowermost position, means for normally maintaining the bearing members in their lowermost position, and means for raising said bearing members and, consequently, raising said squeegee out of contact with the stencil.

6. In a decorating machine of the type described, a stencil, squeegee supporting mechanism, said squeegee suporting mechanism comprising a member which carries the squeegee blade, a shaft extending over the stencil and supporting said member, said shaft having its ends mounted in bearing members, means for supporting said bearing members for vertical movement, the squeegee being in contact with the stencil when the bearings are in their lowermost position, means for normally maintaining the bearing members in their lowermost position, said means comprising springs which maintain the squeegee in resilient contact with the screen stencil, means for raising said bearing members and, consequently, raising said squeegee out of contact with the stencil, means for restraining lateral movement of said member which carries the squeegee blade, said means comprising a pair of plates positioned at opposite sides of said member, said plates having screws threaded therethrough and projecting towards opposite sides of said member.

7. In a decorating machine of the type described, a stencil, squeegee supporting mechanism, said squeegee supporting mechanism comprising a member which carries the squeegee blade, a shaft extending over the stencil and supporting said member, said shaft having its end rotatably mounted in members supported for vertical movement, the squeegee being in contact with the stencil when said shaft supporting members are in their lowermost position, means for raising said shaft supporting members simultaneously, said means comprising a second shaft rotatably mounted adjacent said first shaft, said second shaft having arms keyed thereto which project under said first shaft, and a handle member for rotating said second shaft.

8. In a stenciling apparatus, a chuck and article including means providing an interfitting connection for unitary rotation of the chuck and article, a stencil, and a transmission means for rotating the chuck responsive to movement of the stencil relative to the article and in fixed driving relationship to said stencil.

ROBERT S. DAVIS.