

Sept. 17, 1935.

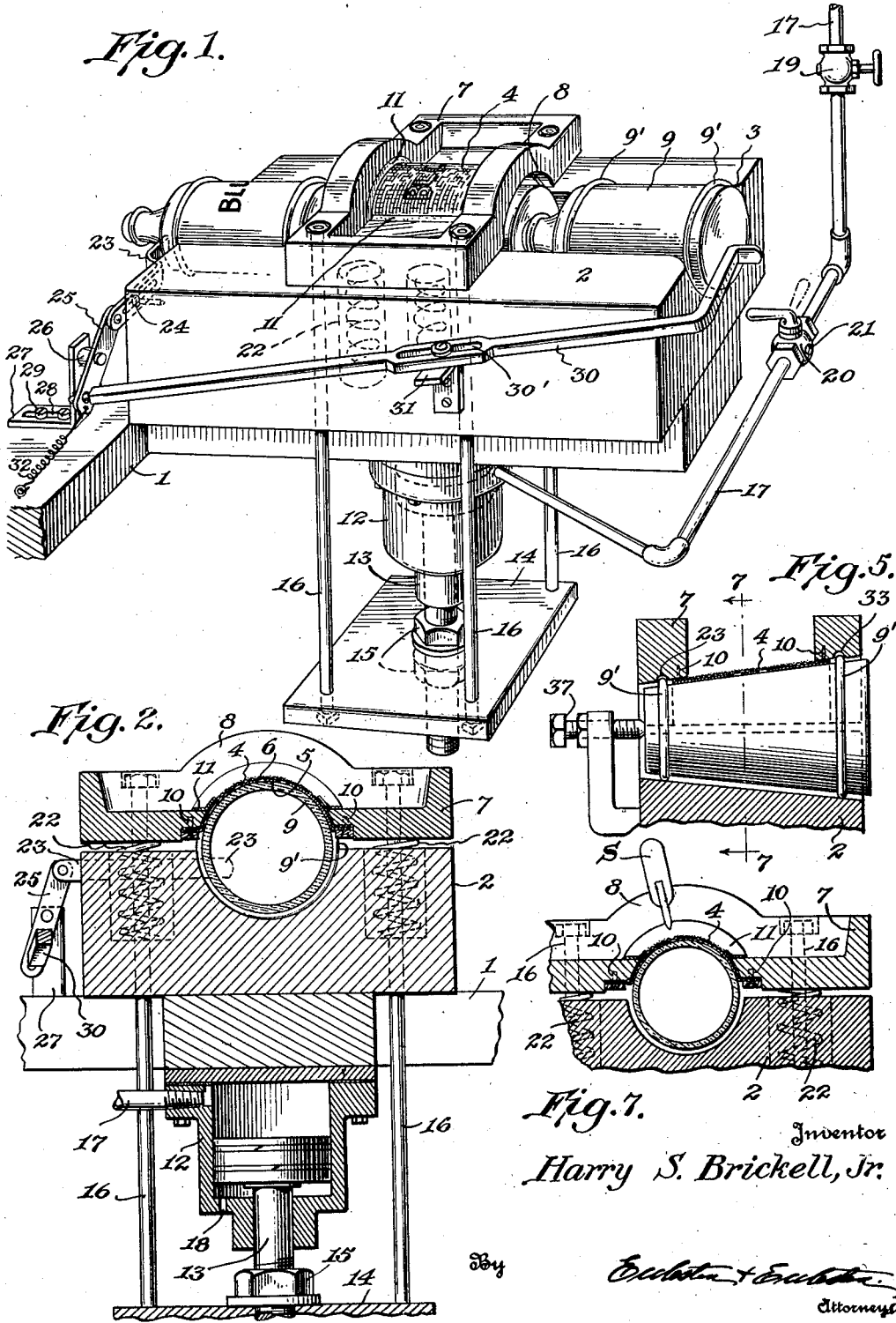
H. S. BRICKELL, JR

2,014,372

METHOD OF AND APPARATUS FOR STENCILING GLASS OR OTHER
CERAMIC CONTAINERS HAVING CURVED SURFACES

Filed May 4, 1933

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

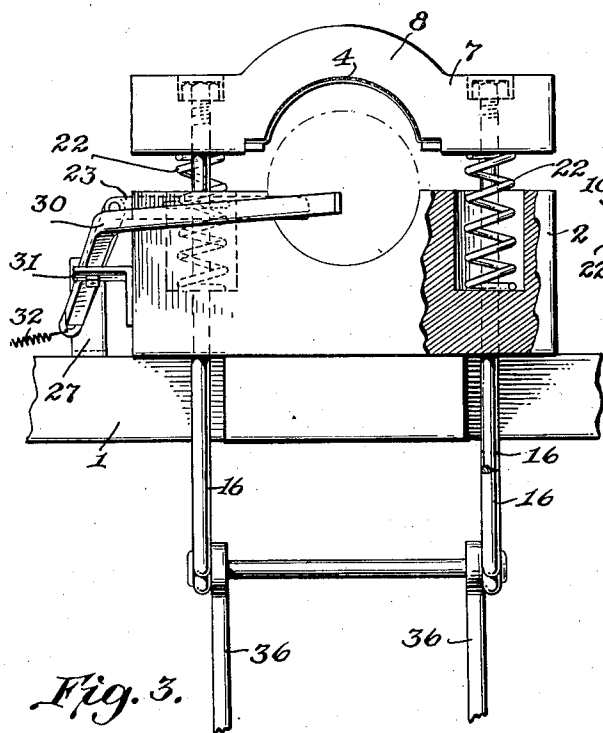


Fig. 3.

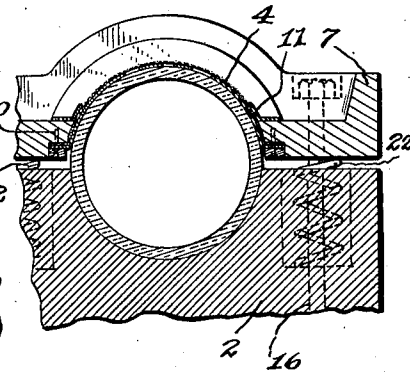


Fig. 8.

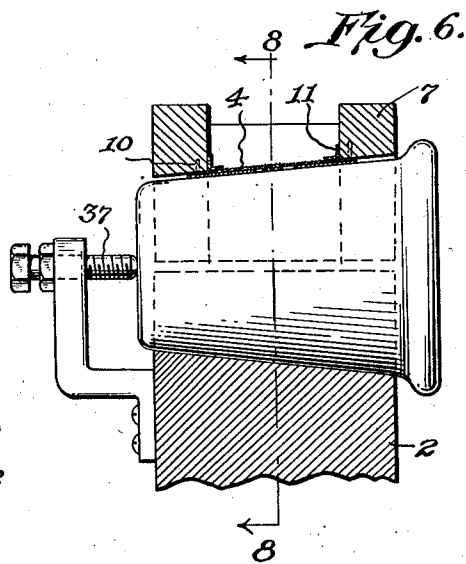


Fig. 6.

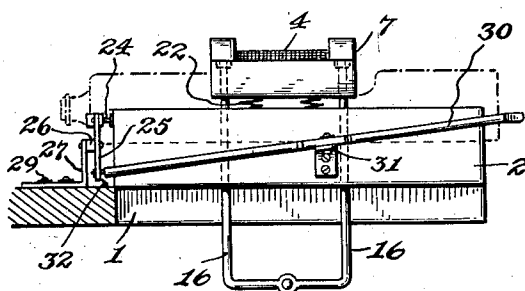
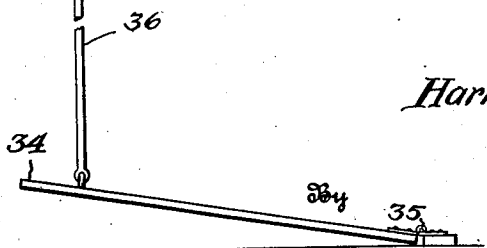


Fig. 4.



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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR STENCILING GLASS OR OTHER CERAMIC CONTAINERS HAVING CURVED SURFACES

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15 Claims. (Cl. 101—114)

The stenciling of bottles, jars, and other containers made of glass or similar material, does not involve any serious problem if the bottles or jars have a plane surface upon which the word or design is to be stenciled. Just the contrary is true in the stenciling of bottles, jars, tumblers and similar glass containers having curved surfaces upon which the word or design is to be applied. This problem is encountered in the stenciling of all round bottles and jars, oval bottles and jars, round or oval tapering bottles and jars, and in fact in all glass containers which have a curved surface, whether such curved surface extends lengthwise of the glass containers, or transversely of the container, or in all directions as in the case of containers having convex or spherical surfaces to be stenciled; and hereinafter when a curved surface is mentioned it will be understood to include any and all curved surfaces of glass containers, as distinguished from containers having flat or plane surfaces. It will also be understood that the present invention relates solely to the stenciling of curved surfaces as distinguishing from the printing or other decoration of curved surfaces; the problems being entirely distinct.

It is old to stencil curved surfaces by rotating the object having the curved surface, but rather complex machines are required, the operation is slow, and numerous difficulties are encountered. In accordance with the present invention curved bottles, jars, tumblers and other similar containers are stenciled with substantially the same ease and rapidity as flat ware, and the mechanism employed is substantially as simple and inexpensive as stenciling machines for flat ware.

The new method and apparatus will be understood by those skilled in the art from the following detailed description when taken in connection with the accompanying drawings; in which,

Figure 1 is a perspective view of the complete machine.

Figure 2 is a vertical transverse sectional view of the machine.

Figure 3 is an end view, partly broken away, of a slightly modified form of the machine.

Figure 4 is a side elevational view of the machine shown in Figure 3.

Figures 5 and 6 are vertical longitudinal sectional views of modified forms of the invention for stenciling round tapered ware; and

Figures 7 and 8 are vertical transverse sectional views taken respectively on lines 7—7 of Figure 5 and lines 8—8 of Figure 6.

Referring to the drawings in more detail, and

particularly to Figures 1 and 2, numeral 1 indicates a table or the like on which is mounted the base member 2 provided with a longitudinal trough or channel 3, through which the articles travel on their way to the stenciling mechanism.

The stencil is referred to generally by numeral 4, and is preferably composed of a sheet of stencil paper 5 in which the letters or other designs are cut, and a silk screen 6 cemented to the stencil paper. While this is the preferred form of stencil, the invention is not limited thereto.

As stated above silk screen stencils are old and well known, but only for the purpose of stenciling flat surfaces. The present invention, for the first time, involves the construction and use of a stencil curved to follow a substantial portion of the surface of a curved bottle, jar or other container. The importance of the invention will at once become apparent to those skilled in the art, for the stenciling of curved surfaces is rendered substantially as simple a matter as has been the stenciling of flat surfaces, complicated and costly mechanism becomes unnecessary, and the number of articles treated per minute is greatly increased. It will be understood, therefore, that one of the very material features of the present invention consists in having the stencil curved to conform exactly to the curvature or shape of the article being treated, whether the glass bottle, jar, tumbler or other glass container, be round, oval, convex or spherical, tapered, or any other regular or irregular curved surface, and while glass containers are particularly referred to herein, it will be understood that the invention applies equally well to containers of any other ceramic material. Having made clear the broad scope of the invention, I shall now describe a specific mechanism for carrying out the invention; such specific mechanism being considered as for illustrative purposes rather than in any limiting sense.

The frame which carries the stencil is referred to by numeral 7, and the transverse bars of this frame are curved as indicated by numeral 8 to conform to the curvature of the particular article being stenciled, in this instance bottles 9 with beads 9'. The stencil itself is stretched to conform exactly to the curvature of the article, and is then securely fastened to the frame by screws 10, or by any other desired means. Though it is not essential, yet preferably the stencil is strengthened by tape 11 or the like, extending along all sides of the stencil above the frame and secured to the stencil and frame. As stated above, in mounting the stencil in the frame it is stretched in all directions

to cause it to conform exactly to the particular curvature and shape of the article to be stenciled, and to insure the desired results in this respect the stencil while being mounted is stretched about one of the articles to be stenciled, as a model. Of course there will be some very minute variations in the series of articles, even though they are all supposed to be identical, but these variations are so slight that they do not affect the efficiency of the stenciling operations.

In order that the stencil may be removed from the article without smudging the design which has been applied thereto, it is necessary that the stencil have considerable body or stiffness. Also to prevent smudging it is desirable that the stencil be lifted vertically, or substantially vertically from the work. One preferred form of mechanism for moving the stencil into and out of contact with the work will now be described. Numeral 12 refers to an air cylinder which is preferably fixed to the under side of the table 1. The piston 13 of the cylinder is adjustably connected to a yoke 14 by nuts 15 above and below the yoke; and connecting rods 16 connect the yoke with the stencil frame 7.

An air line 17 leads from any desired source of air under pressure and is connected with the upper end of the cylinder 12. In the specific embodiment illustrated air pressure is not supplied to the lower end of the cylinder, which is always open to the atmosphere through a vent 18. The air line 17 is provided with a valve 19 to control and regulate the flow of pressure, and to shut off the pressure when the machine is not being used. The line is also provided with a three way operating valve 20, which when in the dotted line position (Fig. 1) admits pressure to the upper end of the cylinder 12, and when in the full line position shuts off the flow of pressure from the source and permits the pressure in the upper portion of the cylinder to exhaust to atmosphere through port 21.

When pressure is admitted to the upper end of the cylinder, the connecting rods 16 will pull the stencil frame downwardly, against the pressure of springs 22, drawing the stencil tightly about the article to be stenciled, so that it conforms exactly to the curvature of the article, as illustrated in Figure 2. It is to be noted that when the stencil has been drawn to such position, the stencil frame is still preferably spaced from the base member 2, and that the piston is still preferably spaced from the bottom of the cylinder 12. Thus the stencil when brought to its operative position is maintained under a strain by the continued pressure in the cylinder. The design is now applied by forcing the thick paint through the stencil by the usual squeegees. When the pressure is released from the cylinder the springs 22 cause the stencil to be quickly lifted vertically from the work, without any smudging of the design.

It is desirable to employ some mechanism to insure the proper positioning of the articles to be stenciled. In the specific embodiment illustrated I employ a finger 23 which, when in operative position projects part way across the trough 3 to intercept the bottles or the like as they are moved along the trough 3. The finger 23 is pivotally and slidably mounted on a bolt or the like 24 attached to the end of the base member 2, and has one end pivotally connected to the upper end of a link 25. This link is pivotally mounted on a stud 26 projecting forwardly from a bracket 27; the bracket being adjustable fore and aft by means of slot 28 and bolts 29. An operating lever 30 extends from the front to the rear end of the

base member, and is pivotally and slidably mounted on a bracket 31 attached to the side of the base member. The rear end of the lever 30 is connected with the lower end of the link 25. Thus when the operator moves the forward end of the lever 30 outwardly the finger 23 will be withdrawn, permitting the articles to move forwardly; and when the operator releases the lever the spring 32 will throw the finger 23 back into position to block the passage of the next bottle. In order that the article to be stenciled may be positioned exactly, to insure the placing of the design at the proper point on the article, the locking mechanism is made adjustable. In setting up the device for the stenciling of a particular article, for instance the bottles shown in Figure 1, the screws 28 are loosened so that the bracket 27 can be adjusted backward or forward. The leading bottle and the bottle about to be stenciled are now moved to bring the latter to the exact position desired, and the bracket is adjusted to bring the finger 23 against the shoulder of the leading bottle; the bracket being then secured in position. It will be understood, of course, that the slot 30' in lever 30 permits the lever to be adjusted backward 25 or forward with the adjustment of the bracket 27, and the bolt or the like 24 is of sufficient length to permit the similar adjustment of the finger 23.

In the present instance round bottles are being stenciled, and it will be noted that the bottles are provided with beads 9' adjacent the top and bottom, which is a common construction. To take care of this particular construction, the under sides of the curved portions of the stencil frame 7 are provided with grooves 33, as best shown in Figure 5, to receive the beads when the stencil is drawn about the article to be stenciled. This does not interfere with the free forward movement of the articles when the stencil frame has been lifted, for it will be noted that the trough of the base member is not provided with similar grooves, so that in the case of beaded bottles the bottles are really supported in the trough by the beads.

No doubt the operation of the machine will be clearly understood from the foregoing description of the construction, however a very brief description of the operation will be given. The bottles, jars, tumblers or other containers of glass or other ceramic material are placed in the trough or channel of the base member; as shown in Figure 1. In the form illustrated the channel is adapted to hold three articles. The leading article has been stenciled and is ready to be discharged as soon as the finger 23 is withdrawn; the intermediate article is in position to be stenciled, and the rear bottle is ready to be moved forwardly to stenciling position. The finger 23 and associated parts have been adjusted, as described hereinbefore, so that the center bottle will be in the exact position desired to receive the design.

The operator now turns the valve 20 to open position to admit air under pressure to the upper end of the cylinder 12, thereby causing the piston rod 13, the yoke 14, connecting rods 16 and stencil frame 7, to move downwardly to bring the stencil into position about the curved article to be stenciled. The pressure in the upper end of the cylinder causes the stencil to be drawn very tightly about the article, as shown in Figure 2; and it will be noted that when the stencil has thus been brought to its operative position the stencil frame is still spaced above the base member, and that the piston is still spaced above the bottom of the cylinder. Thus the stencil is maintained taut

while the paint is forced through the perforations forming the word or other design, by moving a squeegee back and forth over the stencil. The degree of pressure admitted to the cylinder, and hence the extent of pull on the stencil, is regulated and controlled by the valve 19. The stenciling operation having been completed, the operator turns the valve 20 to exhaust the pressure from the upper end of the cylinder to the atmosphere, whereupon the springs 22 quickly lift the stencil vertically from the bottle; the stencil having sufficient body or stiffness to prevent any smudging. The stenciling of an article having now been completed, the operator moves the forward end of the lever 30 to the left to withdraw the finger 23 from the leading bottle. A new bottle is now pushed into the trough thereby moving the last bottle shown in Figure 1 to stenciling position, moving the bottle which has just been stenciled to the leading position and at the same time ejecting the leading bottle shown in Figure 1. In the meantime the lever 30 has been released and the finger 23 springs into the path of the bottle which has just been stenciled and stops it at the proper position to bring the following bottle into stenciling position, whereupon the cycle is repeated.

After the words or designs have been applied to the articles they are fired in the usual manner.

While both the construction and the operation have been described in detail, yet it is to be clearly understood that the invention is in no manner limited to a particular mechanism or a particular mode of operation, for the invention involves a broad principle by which curved containers can be stenciled with substantially the same ease as containers having flat sides, by having the stencil curved to the same curvature as the article to be stenciled, by drawing the stencil tightly about the article, and by forming the curved stencil with sufficient body or stiffness to permit its removal from the article without smudging. The invention is obviously susceptible to a great many changes and modifications, and I shall now describe merely one or two modified forms.

Referring particularly to Figures 3 and 4, the parts remain the same as previously described except with respect to the mechanism for lowering the stencil frame. In the form illustrated in Figures 1 and 2 an air cylinder is employed to lower the stencil frame, while in the form of Figures 3 and 4 a foot treadle is employed for that purpose. For operating the stencil frame in this manner the connecting rods 16 are operatively connected to a foot treadle 34 pivotally mounted at 35, by means of links 36. When the stencil is to be lowered and drawn about the curved article to be stenciled, it is only necessary to apply the foot to the treadle and thus bring the stencil about the article with the exact strain or tautness desired. When the foot treadle is released the springs 22 quickly lift the stencil from the article, without any smudging, just as in the form first described. Except as noted above the operation of the two forms is identical, and therefore no further description is necessary. It might be stated that in the form shown in Figures 3 and 4, the round bottles illustrated are without the beads 9' of the bottles of Figures 1 and 2, and hence the stencil frame need not be provided with grooves to receive these beads, though it will be understood that the presence of these grooves would in no way interfere with the stenciling of bottles without the beads.

The forms illustrated in Figures 5, 6, 7 and 8 retain the same basic principles as involved in

the previously described forms, though they are slightly modified to operate upon tapering ware with curved surfaces. In Figures 5 and 7 the tapering article has the beads 9' and the stencil frame is therefore provided with the grooves 33 to receive the beads. The disclosure of Figures 6 and 8 differs from Figures 5 and 7 only by the omission of the grooves 33, as the tapered articles being treated do not have the beads 9'. In the stenciling of tapered containers, in accordance with the present invention, the stencil is made to conform to the curvature of the article, exactly as described in connection with the forms illustrated in Figures 1, 2, 3 and 4, but in the present instance the curvature of the stencil must change at each point to take care of the different curvatures resulting from the tapering shape of the curved container. In other words, the stencil must be so shaped as to not only wrap itself about the container laterally but also it must follow the incline of the taper. Accordingly, in the forms illustrated in Figures 5, 6, 7 and 8, the trough of the base member 2 is inclined to conform to the taper of the article, and the stencil frame is likewise inclined to cause the stencil to follow the taper of the article. In the particular forms illustrated in these figures the articles are introduced and removed from the front end of the machine, and an adjustable screw 37 causes the article to be properly positioned for the stenciling operation. The stencil frame may be raised and lowered by mechanism hereinbefore described, or by any other desired means, and as the method of stenciling is identical with that previously described in connection with Figures 1, 2, 3 and 4, no further description thereof is necessary. It might be mentioned, however, that in all of the forms it is desirable that the stencil frame be slightly spaced from the base member when the frame is moved to its operative position, as illustrated in Figures 6 and 7 in connection with the tapered articles, and in Figures 2 and 3 in connection with the round articles, so that the stencil is subject to a continuous strain or pull about the article while the squeegee is being operated to apply the paint.

It has not been deemed necessary to illustrate herein mechanism for stenciling convex or spherical containers, as it will be apparent to those skilled in the art that the principle remains exactly the same as hereinbefore described in connection with round containers, oval containers, tapering containers, etc. That is, in the stenciling of convex or spherical articles the stencil is shaped to follow the rounded form of the convex or spherical article, and the stencil is then drawn about the article in the manner hereinbefore described.

Wherever in the claims the containers are defined as of glass it will be understood that it is intended to include containers made of any ceramic material.

Having fully described the invention, what I claim as new is:

1. The method of stenciling curved surfaces of glass containers which comprises shaping a flexible stencil, of the type comprising paper faced with a silk screen, to the curvature of the container, relatively moving the stencil and container to cause the stencil to be drawn tautly about a substantial portion of the container, and with a squeegee applying the stencil design through the stencil to the curved container while the stencil is maintained in this position.

2. The method of stenciling curved surfaces of

- glass containers which comprises shaping a flexible stencil, of the type comprising paper faced with a silk screen, to the curvature of the container, relatively moving the stencil and container to cause the stencil to be drawn tautly about a substantial portion of the container, and maintaining a strain on the stencil while with a squeegee the design is being applied through the stencil to the curved container.
3. The method of stenciling curved surfaces of glass containers which comprises shaping a flexible stencil, of the type comprising paper faced with a silk screen, to the curvature of the container, and forming the curved stencil of sufficient body or stiffness to cause the stencil to maintain its curved shape when being moved into and out of contact with the curved container, moving the stencil downward to cause the stencil to be wrapped tightly about a substantial portion of the curved containers and maintaining a strain on the stencil while with a squeegee the design is being applied through the stencil, and then lifting the stencil from the curved container without smudging the design.
4. A machine for stenciling the curved surfaces of glass containers, including a flexible stencil made of paper faced with a silk screen curved to conform to the curvature of the container, and means for causing the stencil to be drawn tightly about a substantial portion of the container.
5. A machine for stenciling the curved surfaces of glass containers, including a flexible stencil made of paper faced with a silk screen curved to conform to the curvature of the containers, said stencil having sufficient body to retain its curved shape when being applied to and removed from the curved container, means for causing the stencil to be drawn tightly about a substantial portion of the container, and means for lifting the curved stencil from the curved container without smudging the design.
6. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a stencil frame, a curved flexible stencil made of paper faced with a silk screen carried by the frame, and means for relatively moving the base member and stencil frame to wrap the stencil tightly about the curved container.
7. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a stencil frame, portions of said frame being curved, a flexible stencil made of paper faced with a silk screen secured to the curved portions of the frame and conforming to the curvature of the container, and means for relatively moving the base member and stencil frame to wrap the stencil tightly about the curved container.
8. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a stencil frame, a curved flexible stencil made of paper faced with a silk screen carried by the frame, means for moving the frame downwardly to draw the stencil tightly about the curved container, and means for maintaining the stencil under a strain while the design is being applied to the container.
9. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a stencil frame, a curved flexible stencil made of paper faced with a silk screen carried by the frame, and means for moving the frame downwardly to draw the stencil tightly about the curved container, the frame when in lowered position being spaced from the base member, for the purpose described.
10. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a stencil frame, a curved flexible stencil made of paper faced with a silk screen carried by the frame, means for moving the frame downwardly to draw the stencil tightly about the curved container, and means for lifting the stencil from the container.
11. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a curved flexible stencil made of paper faced with a silk screen carried by the frame, means for moving the frame downwardly to draw the stencil tightly about the curved container, and springs for lifting the stencil from the container.
12. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a curved stencil carried by the frame, a cylinder and piston rod for moving the frame downwardly to draw the stencil tightly about the curved container, a valve associated with the cylinder for regulating the strain on the stencil, and springs for lifting the stencil from the container.
13. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a curved stencil carried by the frame, a pressure cylinder and piston rod for moving the frame downwardly to draw the stencil tightly about the curved container, the frame being spaced from the base member when in lowered position and free to move further downward, whereby the pressure in the cylinder maintains the stencil under a strain during the stenciling operation.
14. A machine for stenciling the curved surfaces of glass containers, including a base member to receive the containers, a curved stencil carried by the frame, a cylinder and piston rod for moving the frame downwardly to draw the stencil tightly about the curved container, springs for lifting the stencil from the container, and means for adjusting the position of the containers for the stenciling operation.
15. A machine for stenciling the curved surfaces of tapering glass containers, including a flexible stencil made of paper faced with a silk screen curved to conform to the curvature of the container through a substantial portion of the taper, and means for relatively moving the stencil and container to cause the stencil to be wrapped about a substantial portion of the curved tapering container.