Dec. 7, 1965 R. R. RUDOLPH ETAL 3,221,643

METHOD AND APPARATUS FOR DECORATING BOTTLES

Filed Aug. 5, 1963 2 Sheets-Sheet 1

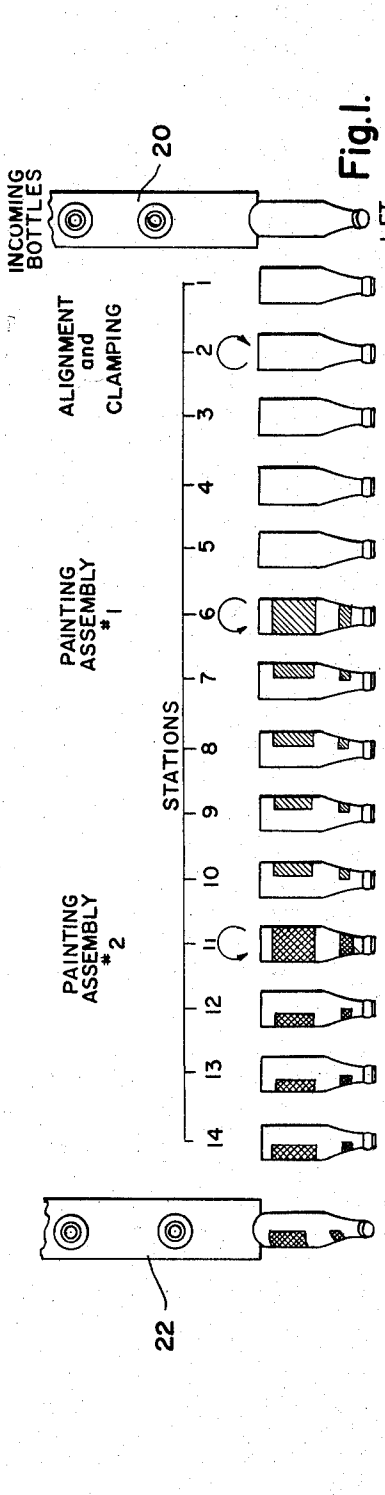


Fig. 1.

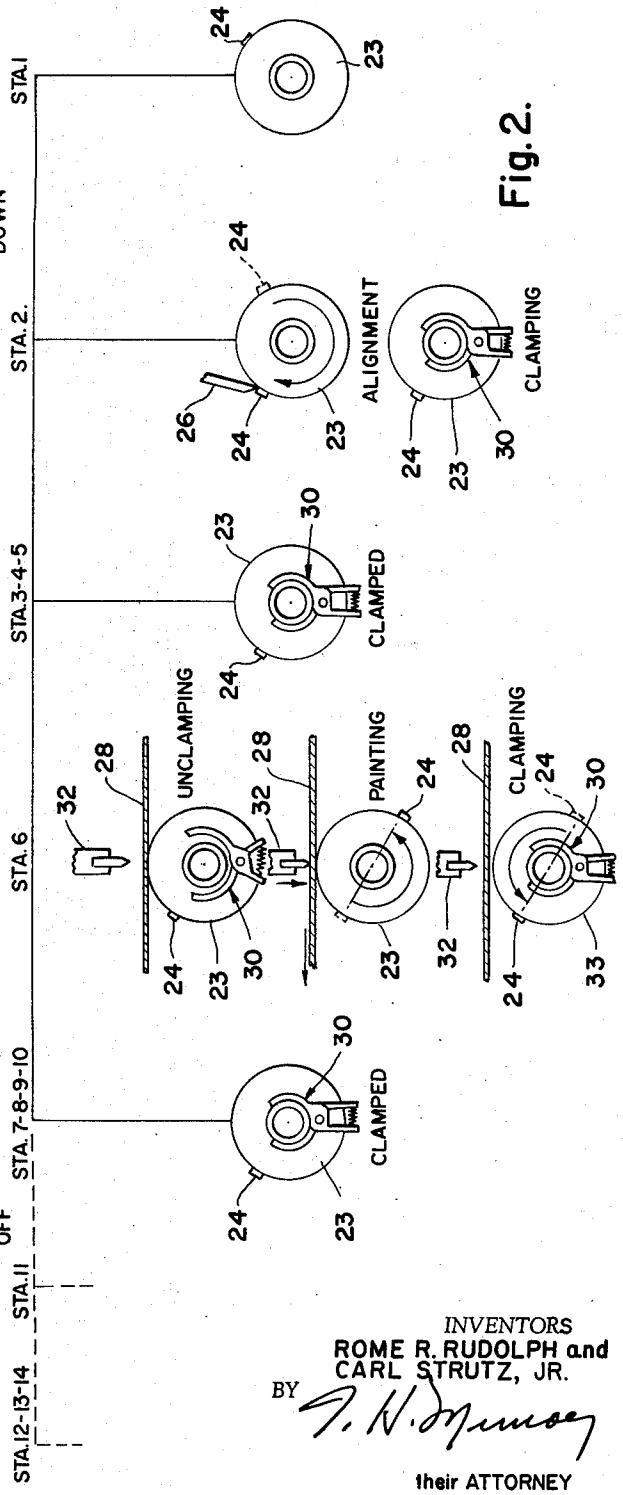


Fig. 2.

INVENTORS
ROME R. RUDOLPH and
CARL STRUTZ, JR.
BY
their ATTORNEY

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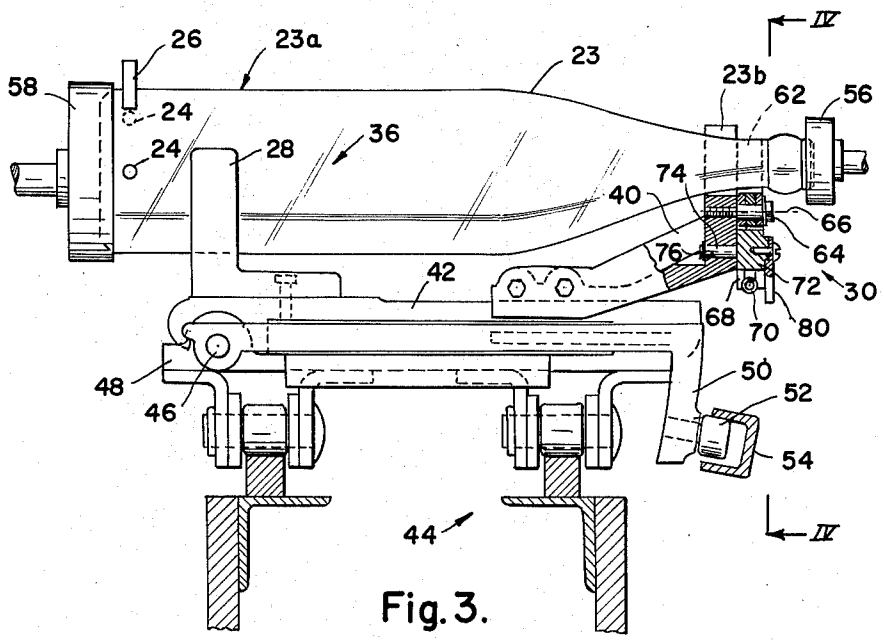


Fig. 3.

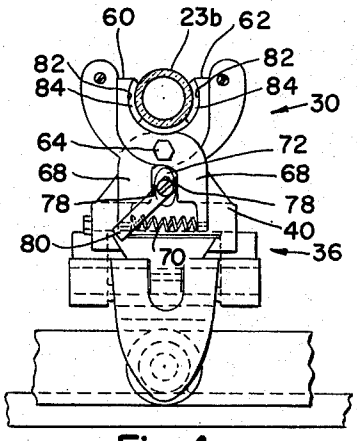


Fig. 4.

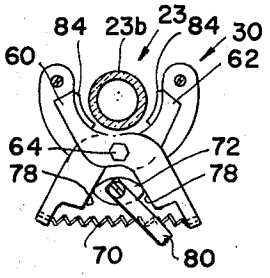


Fig. 5.

INVENTORS
ROME R. RUDOLPH and
CARL STRUTZ, JR.
BY T. N. Simmons
their ATTORNEY

United States Patent Office

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METHOD AND APPARATUS FOR DECORATING BOTTLES

Rome R. Rudolph, Gibsonia, and Carl J. Strutz, Jr., Mars, Pa., assignors to Carl Strutz & Co., Inc., Valencia, Pa., a corporation of Pennsylvania

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6 Claims. (Cl. 101—38)

This invention relates to a method and apparatus for decorating bottles, and more particularly to a method and apparatus for decorating bottles wherein the registry of said bottles with respect to a decorating screen or screens is maintained throughout the travel of said bottles through a decorating machine.

The present invention finds particular utility in the decoration of cylindrical bottles whose cylindrical shape does not afford an inherent registration aid as in the case of bottles having square or rectangular cross sections. An example of a bottle having an inherent registration aid will be found in U.S. Patent No. 2,925,030. Furthermore, the present invention finds equal utility when used on machines wherein the bottles are supported about a horizontal axis or about a vertical axis.

One of the major problems associated with automatic bottle decorating machines concerns the registration of the area to be decorated on the bottle with the decorating screen or screens. This registration is considerably complicated when two or more colors are to be applied, as for example, a background color and a foreground color which are applied successively and must be aligned or registered with respect to one another and also with respect to a specific area of the bottle.

To aid in the registration of the area to be decorated with the stencil screen, it is a normal practice to provide small projections or lugs on each bottle which are formed or cast therein at a suitable location, for example, near the base. The projections or lugs facilitate precise locating of the ware for registration of single or successive decorating imprints. In the case of cylindrical bottles, for example, the bottle is rotated about its longitudinal axis whereupon the projection or lug abuts an arm which is operatively connected to the bottle rotating mechanism for stopping the rotation of the bottle. The arm is so positioned whereby the bottle will be stopped at a predetermined position or orientation wherein the area to be decorated is in approximate or exact registry with a decorating screen.

Heretofore, in the decorating art, it has been a practice to pre-align each bottle to within a certain specific number of degrees of its proper orientation. That is to say, the bottle is initially revolved and then stopped at a predetermined position which predetermined position is nearly the desired orientation. The bottle is then conveyed to the first painting station.

It should be understood at this time, that the bottles are not transferred in a continuous flow but rather in a stop-start or intermittent flow. This should be evident since in order to pre-align, decorate or perform any operation on the bottle, the bottle must be stationary with respect to the mechanism performing the operation. For this reason, then, the bottle must undergo a final alignment. Hence, the bottle is again revolved and stopped in an exact registration. The area to be decorated now is placed in exact registry with the decorating screen or screens. The bottle is then decorated.

Thereafter, the bottle is transferred to a second pre-aligning station wherein the bottle is once again pre-aligned as in the first pre-alignment station. The bottle is then transferred to a second painting station for a second final alignment and a second decoration.

The important point to note is that each bottle undergoes two alignment steps, namely, "pre-alignment" wherein the bottle is approximately aligned and "final alignment" wherein the bottle is exactly aligned. It should be evident that the multiple alignments of the bottles reduces the number of bottles which could be decorated since each alignment step requires a certain amount of operating time. Further, the cost of the decorating machine is increased by the inclusion of multiple alignment apparatus.

Accordingly, it is the primary object of the present invention to provide novel apparatus for maintaining the exact alignment of bottles throughout their travel through a decorating machine whereby only one alignment operation is required for each paintaing operation.

Other important objects of the present invention include:

To provide apparatus for maintaining the exact orientation of the bottles wherein the production of decorated bottles is higher than heretofore possible;

To provide apparatus for maintaining the exact orientation of bottles which apparatus does not interfere with the painting operation;

To provide apparatus for maintaining the exact orientation of the bottles with respect to the decorating screen or screens whereby the number of bottles rejected due to mismatching of multiple imprints is reduced;

To provide apparatus for maintaining the exact orientation of the bottles with respect to the decorating screen or screens whereby the number of bottles rejected due to mismatching of a single or multiple imprints with respect to an exact area of said bottle is reduced; and

To provide a novel method for decorating bottles.

These and other objects and advantages of the present invention will become apparent from the following detailed description by reference to the accompanying drawings, in which:

FIGURE 1 is a diagrammatic plan view of a decorating machine having two painting stations and in which the present invention is utilized;

FIG. 2 is a diagrammatic view illustrating the operation of the decorating machine of FIG. 1 through the first painting station thereof and also illustrating the use of the present invention therein;

FIG. 3 is a fragmentary side elevation view, partly in cross section, illustrating a cradle means including the clamping means of the present invention;

FIG. 4 is a front elevation view as viewed from the line IV—IV of FIG. 3; and

FIG. 5 is a fragmentary front elevation view, similar to FIG. 4, and illustrating the present clamping means in an open position.

The present invention provides a clamping means for maintaining the bottles in a predetermined orientation which orientation comprises the exact registry of the bottle area or areas to be decorated with the decorating screen or screens. The present clamping means is particularly adapted for use with automatic decorating machines which have a plurality of bottle support cradles secured to a conveyor means for movement therewith and means adapted to engage and rotate each bottle into a desired position. Examples of conventional decorating machines having support cradles, a conveyor and means adapted to engage and rotate each bottle will be found in U.S. Patent Nos. 2,231,535 and 2,721,516.

According to the present invention, each of the support cradles is provided with one of the present clamping means. The clamping means is secured to the neck yoke of the support cradle and is so positioned whereby once the bottle has been rotated into the predetermined position, the bottle is clamped in a non-rotatable relation

with the support cradle. Each bottle is then transferred to a painting station whereupon it is released for decoration.

Each bottle may undergo a single painting wherein an imprint of a single color is applied or multiple paintings wherein a single or multiple imprints are applied each of which may consist of two or more colors. The necessity for registering round bottles for multiple paintings is self-evident. The necessity for registering round bottles for a single painting will become apparent when it is remembered that most round bottles are made from two identical halves which are subsequently fused togther to form the complete bottle. This type of bottle has two seams which are diametrically opposed. It is very desirable to place the decorative imprint in the region between the two seams and hence, the bottle must be registered. Other bottles have raised surfaces upon which the decorative imprint is to be applied. These bottles also must be registered since the imprint will be applied at a specific location on the bottle.

In the case of cylindrical bottles, each bottle is rotated through 360° while being decorated. At the completion of the decorating process, the bottle reaches the predetermined position whereupon it is again clamped. The bottle is then removed to the next painting station. It is important to note that each bottle remains clamped in the predetermined position while it is being transferred and is released only during the decorating process. Hence, the bottle area to be decorated is at all time in exact registry with the decorating screen.

In order to facilitate a full understanding of the method provided by the present invention, attention is directed to FIGS. 1 and 2 wherein a decorating operation is diagrammatically illustrated.

In FIG. 1, there is diagrammatically illustrated a decorating machine having stations **1–14**, inclusive. Station **2** comprises an alignment and clamping station, while sations **6** and **11** comprise painting assemblies number **1** and **2**, respectively, as indicated.

The undecorated bottles are conveyed by means of conveyor **20** to a letdown mechanism (not illustrated) which deposits the bottles on the decorating machine. At the discharge end of the decorating machine, a take-off mehcanism (not illustrated) serves to deposit the decorated bottles onto a discharge conveyor **22** which transfers the decorated bottles to another area for further processing or storage.

The incoming undecorated bottles stand on the conveyor **20** in a vertical position. The letdown mechanism (not shown) lowers each individual bottle into a horizontal position with the neck extending toward the front of the machine. The bottles are then moved from station-to-station from right to left without interruption. At the discharge end (to the left of station **14**) the decorating bottles are raised to a vertical position and deposited on the discharge conveyor **22**.

Referring to FIG. 2, each bottle **23** is provided with a small lug or projection **24** which facilitates precise locating of a bottle for registration of successive decorating imprints. Each bottle **23**, when at station **1**, has its projection **24** oriented in a random manner. The bottle **23** is then moved to station **2** wherein two are performed. In the first operation, a drive mechanism (not shown) is activated which rotates the bottle **23** (e.g., clockwise) to bring the projection **24** to an exact predetermined position. As the bottle **23** rotates, the lug **24** will abut a registration finger **26** which deactivates the drive mechanism and thereby stops the rotation of the bottle. It should be stressed here that the registration finger **26** is so positioned whereby the bottle **23** will be stopped in a position wherein the area to be decorated is in exact registry with a decorating screen **28** (see station **6**, FIG. 2).

At this point, a second operation is performed, namely, a clamping means **30** is activated to rigidly secure the bottle **23** in a non-rotatable relation with the support cradle (not shown). The bottle **23** then undergoes the stop-start movement while being transferred to the painting assembly number **1** at station **6**. Notice, however, that the bottle **23** remains rigidly clamped during its passage through stations **3**, **4** and **5**.

At station **6**, then, the clamping means **30** first is released whereupon a squeegee **32** is lowered into contact with the decorating screen **28** and forces the decorating screen **28** into contact with the surface of the bottle **23**. As illustrated, the bottle **23** is rotated in a counterclockwise direction while the decorating screen **28** is moved from right-to-left and in rolling contact with the surface of the bottle **23**. The squeegee **32** is then raised. During the decorating process, the bottle is rotated through exactly 360°. Therefore, upon completion of the decorating process, the bottle resumes its position of exact registry. At this point, the clamping means **30** is again activated to rigidly secure the bottle **23** in a non-rotatable relation with the support cradle (not shown). The bottle **23** remains rigidly clamped during its passage through stations **7**, **8**, **9** and **10**. At station **11** which corresponds with the painting assembly number **2**, the second decorative imprint is applied to the bottle **23** in exactly the same manner as the first imprint was applied at station **6**. When the application of the second imprint is completed, the bottle **23** is transferred through stations **12**, **13** and **14** and is deposited onto the discharge conveyor **22** by means of a take-off mechanism (not shown). Clamping of the bottle **23** beyond station **11** is not necessary.

Reference is now directed to FIGS. 3, 4 and 5 wherein a preferred construction of the present clamping means **30** is illustrated. In FIG. 3 there is illustrated a support cradle **36** comprising a cradle horn **38**, and an extended neck yoke **40** both of which are secured to a cradle strap **42**. The bottle **23** is shown supported on the support cradle **36** with its bottom portion **23***a* resting on the cradle horn **38** and its neck portion **23***b* resting on the extended neck yoke **40**. The support cradle **36** is releasably secured on a conveyor means **44** in a manner well known in the art. The cradle means **36** is pivotal at one end about a shaft **46** on the drive bar **48** of the conveyor means **44**. At the other end of the cradle strap **42** there is provided a guide arm **50** which depends therefrom and which includes a roller **52** engaged with and guided by a rail member **54**. The rail member **54** serves to lower the support cradle **36** from a vertical position to the horizontal position at the feed end of the decorating machine as illustrated and serves to elevate the support cradle **36** from the horizontal position to a vertical position at the discharge end of the decorating machine.

FIG. 3 illustrates the support cradle **36** in a position which would correspond to station **2** of FIGS. 1 and 2. The hereinbefore mentioned drive mechanism which rotates the bottle **23** about its longitudinal axis is schematically illustrated herein as comprising a neck chuck **56** and a bottom chuck **58** which are engaged with the top and bottom portions **23***b*, **23***a*, respectively, of the bottle **23** and which clamp the bottle **23** therebetween. The neck chuck **56** preferably is a freely rotatable member while the bottom chuck **58** is rotated by mechanism not shown. When the drive mechanism is activated, the bottle **23** will be rotated whereby the projection **24** will be moved from the full-line position to the dotted-line position. At this point, the projection **24** will engage the registration finger **26** which deactivates the drive mechanism to stop the rotation of the bottle **23**.

Referring now to FIGS. 3 and 4, the clamping means **30** preferably is positioned at the extreme end of the extended neck yoke **40**. The clamping means **30** preferably comprises a pair of opposed jaw members **60**, **62** which are pivotally secured to the extended neck yoke **40** by means of bolt **64**. The bolt **64** defines an axis indicated by the dashed-dot line **66** about which both of the

jaw members **60** and **62** pivot. Each of the jaw members **60** and **62** includes an arm **68** which is contiguous therewith and depends therefrom. As best shown in FIG. 4, a spring member **70** extends between the arms **68** and serves to urge the jaw members **60, 62** into a clamping position as illustrated in FIG. 4.

A cam member **72** is provided which is disposed centrally between the arms **68** and which is pivotal about a shaft **74**. The shaft **74** is pivotally retained within a bore **76** in the extended neck yoke **40**. The cam member **72** is so positioned whereby when it is pivoted, it will engage cam surfaces **78**, one each provided on each of the arms **68**. An operating arm **80** is secured to and serves to rotate the cam member **72**.

As can be seen in FIGS. 3 and 4, the clamping means **30** is positioned so as to clamp the neck portion **23***b* of the bottle **23**. Each of the jaw members **60, 62** includes an arcuate surface **82** upon which is secured a pad **84** which is preferably formed from hard rubber. The pads **84** are adapted to engage the neck portion of the bottle **23** and thereby clamp the bottle **23** in a non-rotatable relation with the support cradle **36**.

Reference is now directed to FIG. 5 wherein the clamping means **30** is shown in an open condition. When the bottles are positioned at one of the painting assemblies, the clamping means **30** is released whereby the bottle is free for rotation and thus may be decorated. As can be seen in FIG. 5, the cam member **72** has been rotated in a counterclockwise direction by means of an external force applied to the operating arm **80**. The cam member **72**, when so rotated, engages the cam surfaces **78** to spread the arms **68** and hence the jaw members **60, 62**. The bottle **23** now may be rotated.

While the bottle is being decorated, it revolves through exactly 360°. At this point, the operating arm **80** and hence the cam member **72** are rotated in a clockwise direction and into the position illustrated in FIG. 4. Simultaneously, the spring member **70** (see FIG. 5) will urge the jaw members **60, 62** into the clamped condition shown in FIG. 4 thereby clamping the bottle **23** in a non-rotatable relation with the cradle **36**. The bottle **23** now may be transferred to the next painting assembly for application of a second decorating imprint.

Although the invention has been shown in connection with one specific embodiment, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention.

We claim as our invention:

1. In a method of decorating bottles on a decorating machine having a single registration station at which bottles are registered exactly with a decorating screen bearing a design to be transferred to the bottles and at least one painting station spaced from said registration station and including a decorating screen bearing a design to be transferred to the bottles, the steps of bringing the bottles in succession along a straight line path of travel to said single registration station, registering the bottle area to be decorated with said design on said decorating screen at said registration station, thereafter immobilizing the bottles at said registration station against rotation about their longitudinal axes, transporting the bottles in their immobilized and registered condition along said straight line path of travel to said painting station, and releasing the bottles at said painting station in their registered condition for decoration.

2. In a method for decorating bottles on a decorating machine having a single registration station and at least one painting station spaced from said registration station and including a decorating screen bearing a design to be transferred to the bottles, the steps of bringing the bottles in succession along a straight line path of travel to said single registration station, registering the bottle area to be decorated with said design on said decorating screen at said registration station, thereafter rigidly clamping the bottles at said registration station to prevent rotation thereof about their longitudinal axes, transporting the bottles in their registered and rigidly clamped condition along said straight line path of travel to said painting station, and releasing the bottles at said painting station in their registered condition for decoration.

3. In a method for decorating bottles on a decorating machine having a single registration station at which bottles are registered exactly with a decorating screen bearing a design to be transferred to the bottles, a plurality of spaced painting stations each including a decorating screen bearing a design to be transferred to the bottles, and an endless conveyor comprising a plurality of horizontal support cradles each receiving a bottle at the feed end of said machine for transferring the bottles along a straight line path of travel sequentially to said single registration station and said painting stations, the steps of bringing the bottles successively to said single registration station wherein the bottles are sequentially (a) rotated about their longitudinal axes and (b) stopped at a position wherein the bottle area to be decorated is registered with said design of said decorating screens, thereafter immovably clamping the bottles at said registration station to the support cradles in said position, transporting the bottles in said position and in their clamped condition to a first painting station, releasing the bottles at said first painting station in said position for decoration immovably clamping the bottles at said first painting station to the support cradles in said position after decoration; transporting the bottles in said position and in their clamped condition to a second painting station, and releasing the bottles at said second painting station in said position for decoration.

4. In bottle decorating apparatus having at least one painting station including a horizontal decorating screen bearing a design to be transferred, the combination comprising: means for conveying bottles through said decorating apparatus along a horizontal straight line path of travel including a plurality of cradles secured at spaced points along the length of said conveyor means, each of said cradles receiving a bottle at the feed end of said decorating apparatus and being positioned to horizontally support the bottle; single means spaced from said painting station and positioned along said straight line path of travel for rotating each bottle, prior to decoration, into exact registration with said design of said horizontal decorating screen; cooperating means mounted on each of said cradles and movable therewith for releasably and rigidly clamping each bottle to said cradle after registration; the bottles being maintained in their clamped condition during transfer to said painting station by said conveyor means; and means at said painting station for releasing said cooperating means whereby each bottle is freed for rotation and decoration.

5. In bottle decorating apparatus having at least one painting station including a decorating screen bearing a design to be transferred, the combination comprising: means for conveying bottles along a straight line path of travel which positions the bottles successively in decorating relation with said painting station; single means disposed along said straight line path of travel and spaced from said painting station for rotating each bottle about its longitudinal axis, before decoration, into exact registration with said design of said decorating screen; means movable with said conveyor means for immobilizing the bottles against rotation about their longitudinal axes; the bottles being maintained in their immobilized condition during transfer along said straight line path of travel to said painting station by said conveyor means; and means at said painting station for releasing said immobilizing means whereby each bottle is freed for rotation and decoration.

6. In decorating apparatus having at least one decorat-

ing station including a horizontal decorating screen bearing a design to be transferred, the combination comprising: means for conveying bottles successively through said decorating apparatus along a straight line path of travel including a plurality of cradles secured at spaced points along the length of said conveyor means, each of said cradles receiving a cylindrical bottle at the feed end of said decorating apparatus and being positioned to horizontally support the cylindrical bottle with its neck portion extending beyond the outboard end of said cradle; single means spaced from said painting station and positioned along said straight line path of travel for rotating each bottle, prior to decoration, into exact registration with said design of said horizontal decorating screen; releasable jaw means mounted on the outboard end of each cradle for rigidly clamping the neck portion of the

bottle after registration to render the bottle immovable with respect to the cradle; the bottles being maintained in their clamped condition during transfer along said straight line path of travel to said painting station by said conveyor means; and means at said painting station for releasing said jaw means whereby the bottle is freed for rotation and decoration.

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EUGENE R. CAPOZIO, *Primary Examiner.*