May 17, 1966 J. M. BLANK ETAL 3,251,707

METHOD AND APPARATUS FOR DECORATING GLASSWARE

Filed Jan. 31, 1963 8 Sheets-Sheet 1

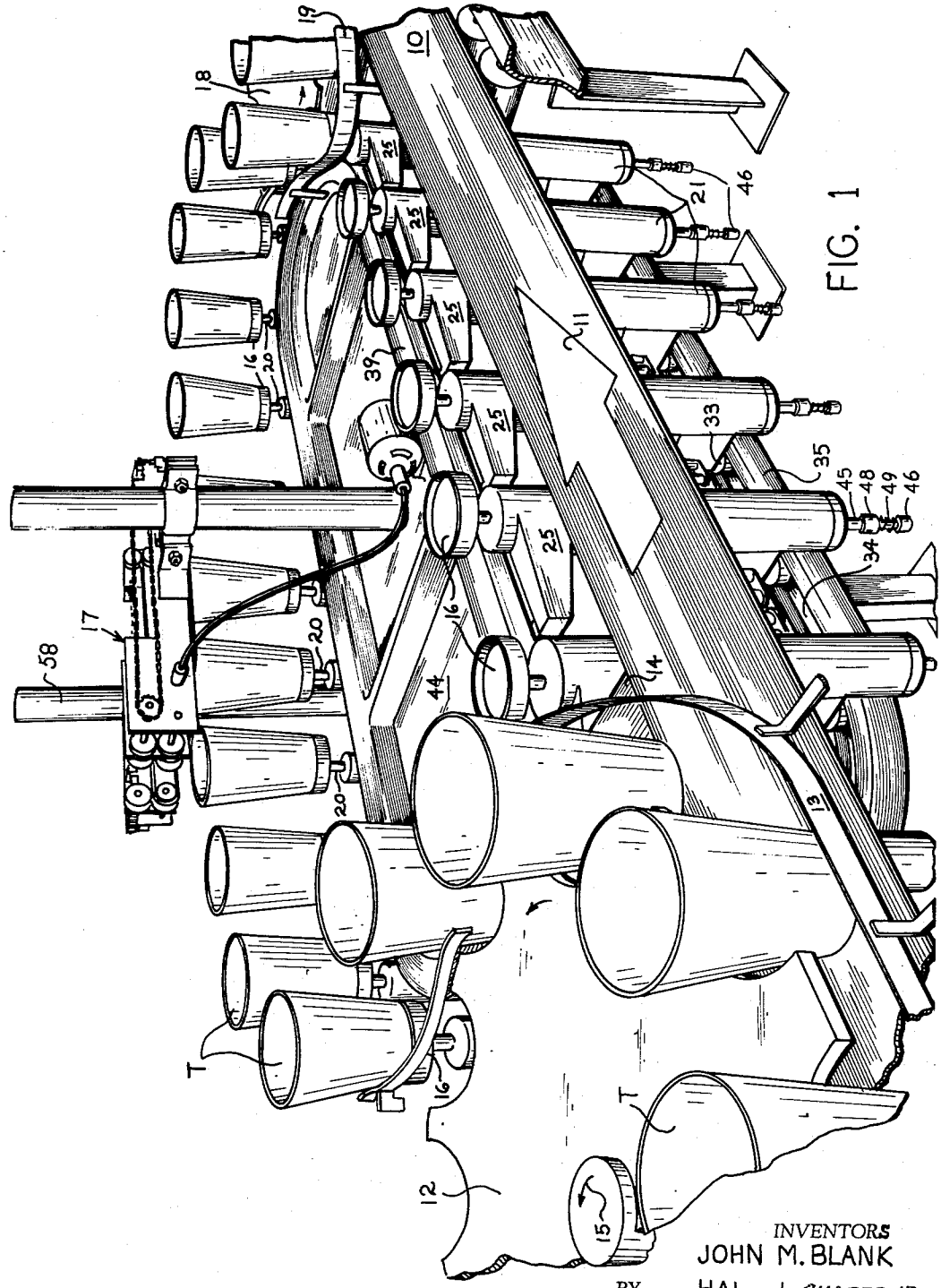


FIG. 1

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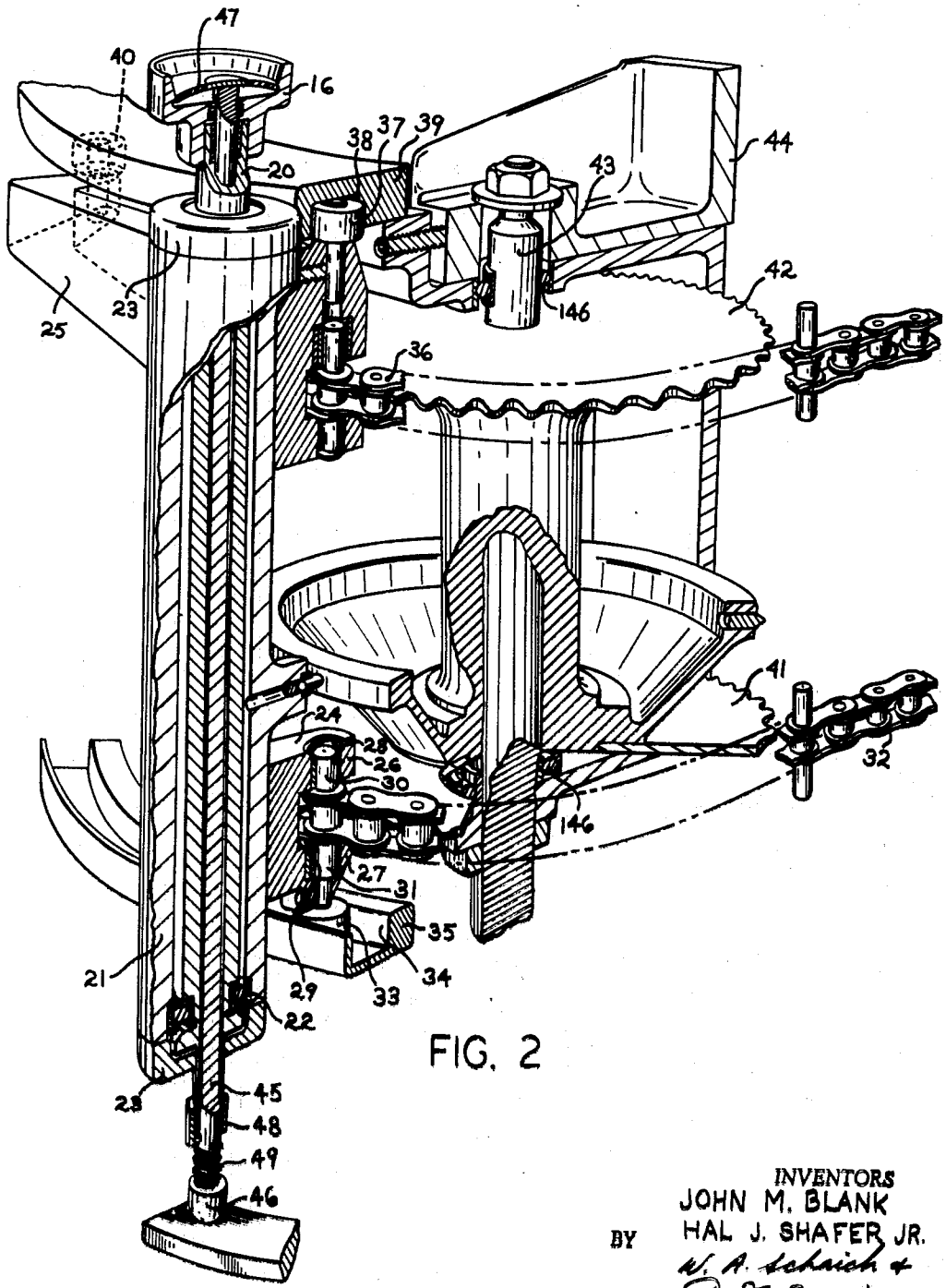


FIG. 2

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METHOD AND APPARATUS FOR DECORATING GLASSWARE

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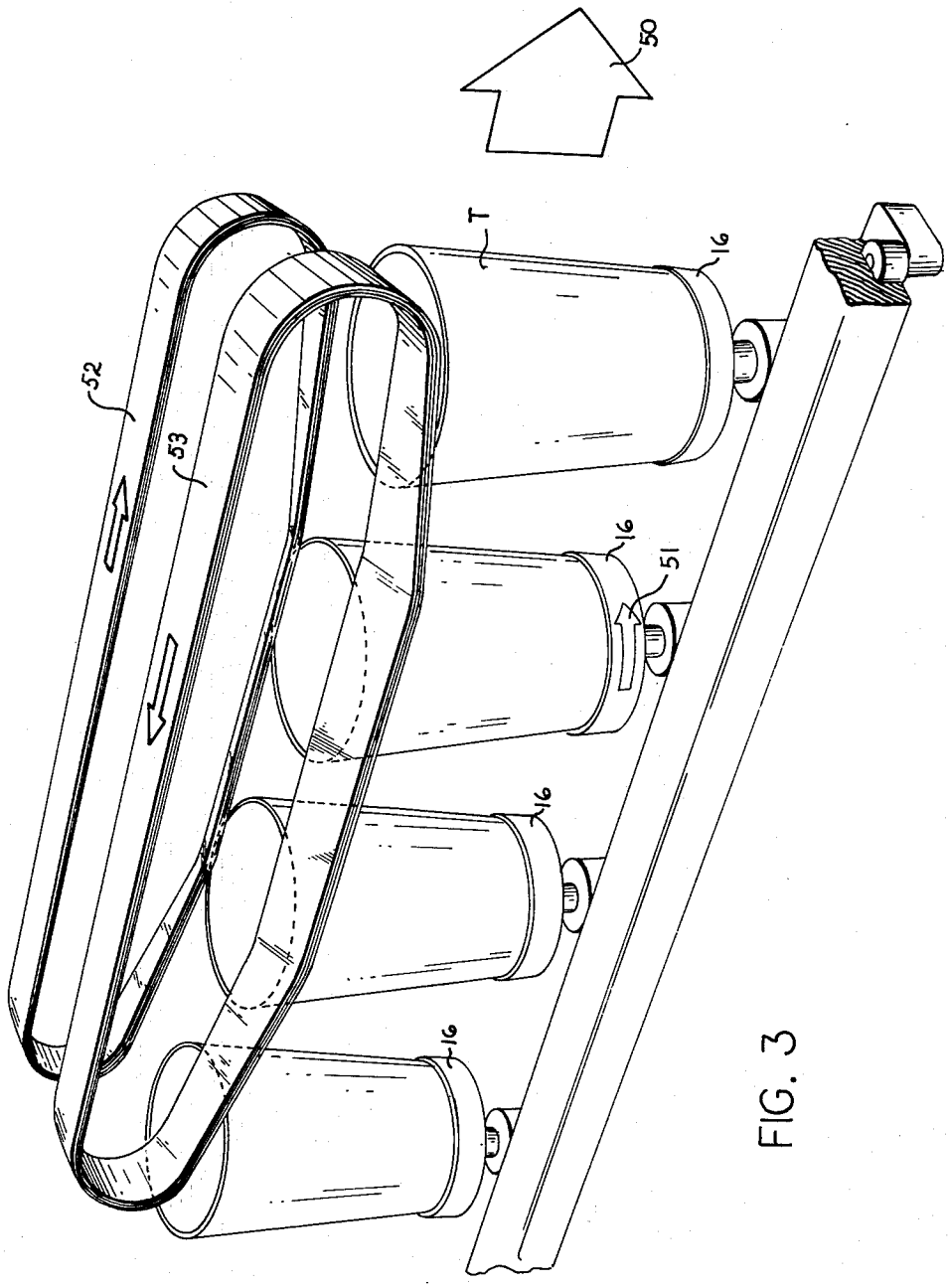


FIG. 3

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METHOD AND APPARATUS FOR DECORATING GLASSWARE

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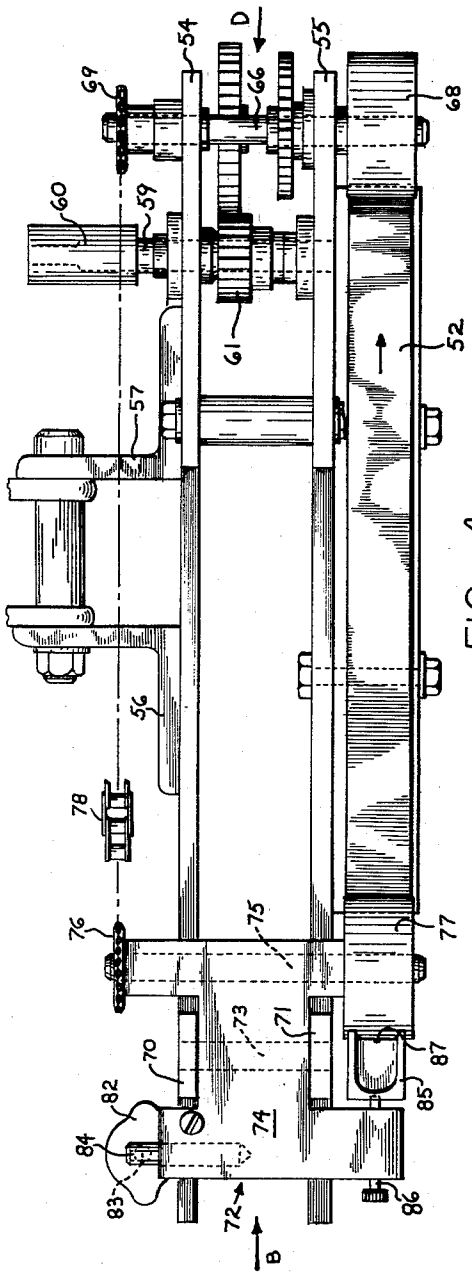


FIG. 4

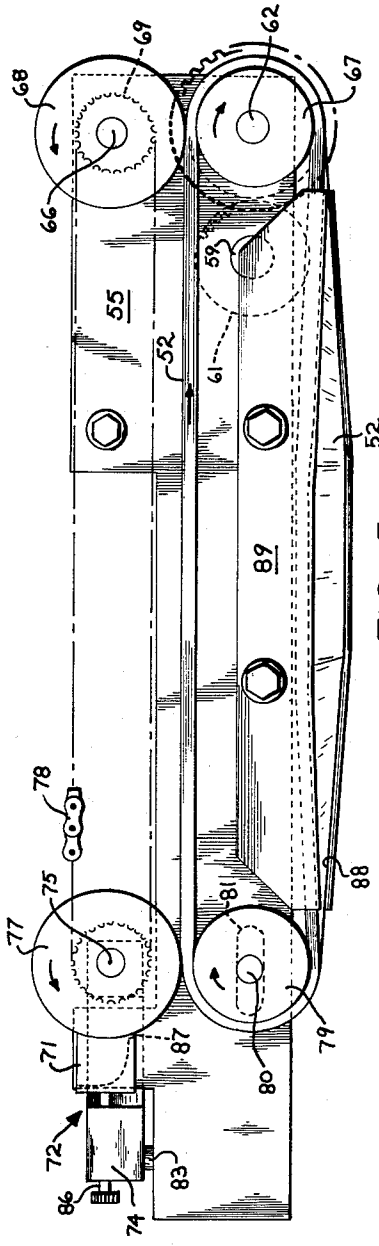


FIG. 5

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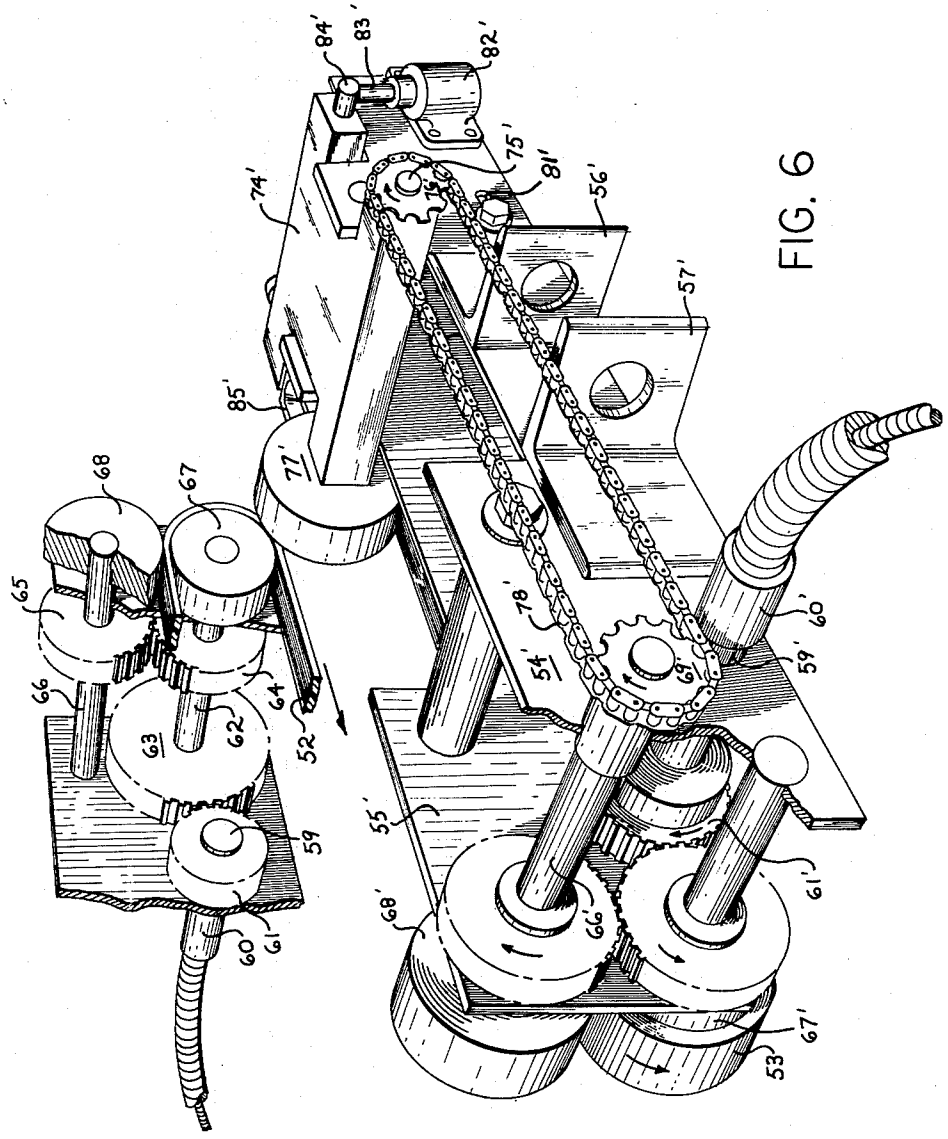


FIG. 6

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METHOD AND APPARATUS FOR DECORATING GLASSWARE

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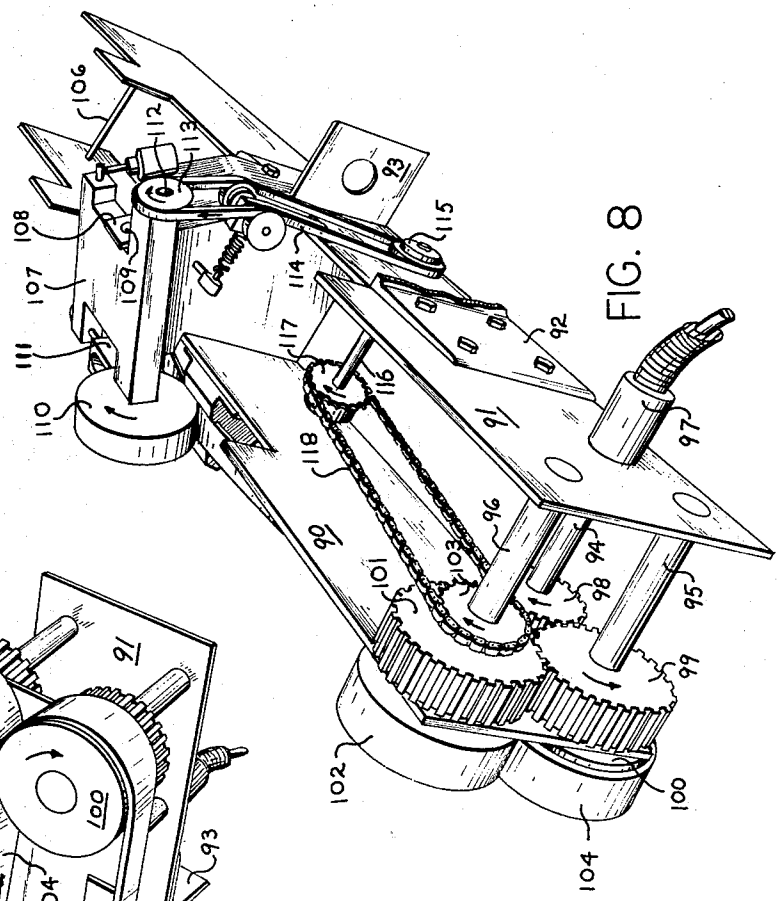


FIG. 8

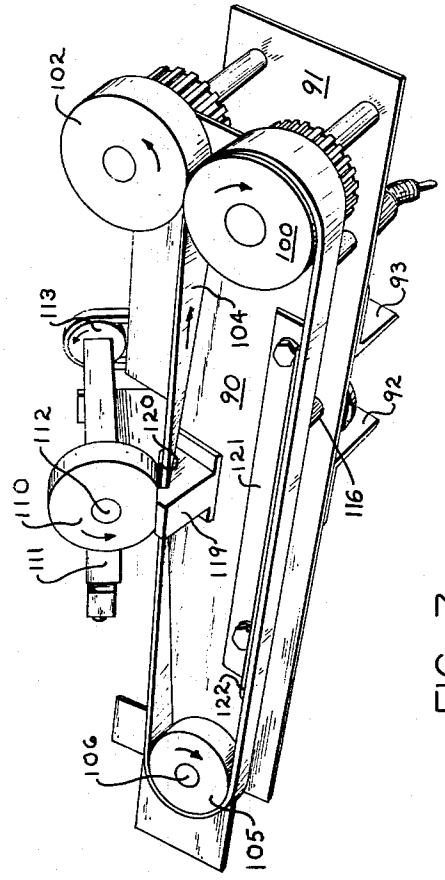


FIG. 7

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FIG. 9

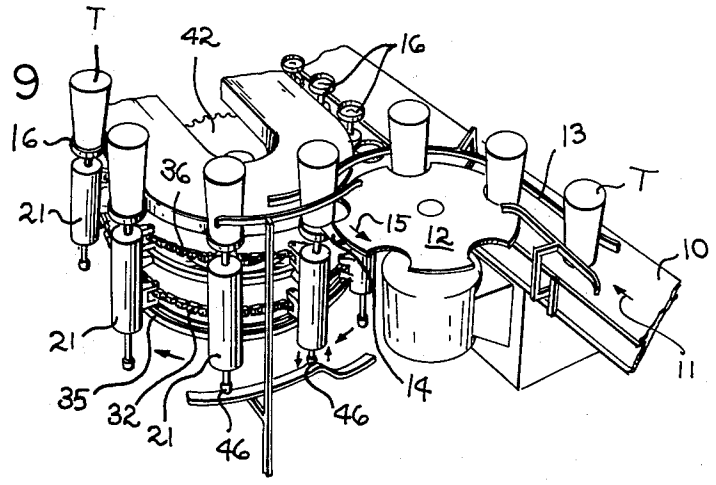
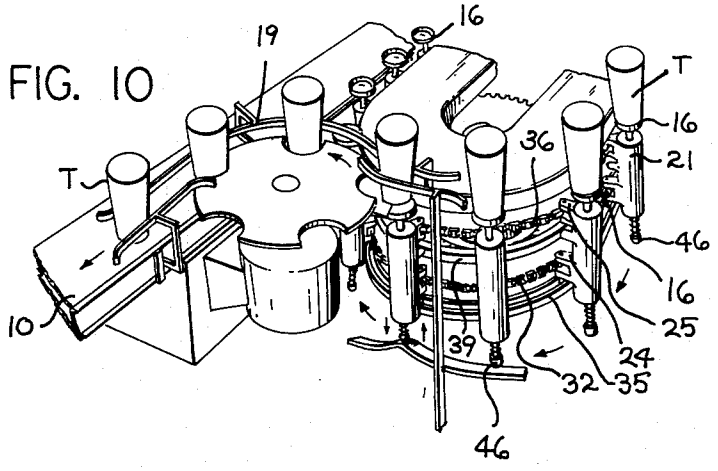


FIG. 10



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METHOD AND APPARATUS FOR DECORATING GLASSWARE

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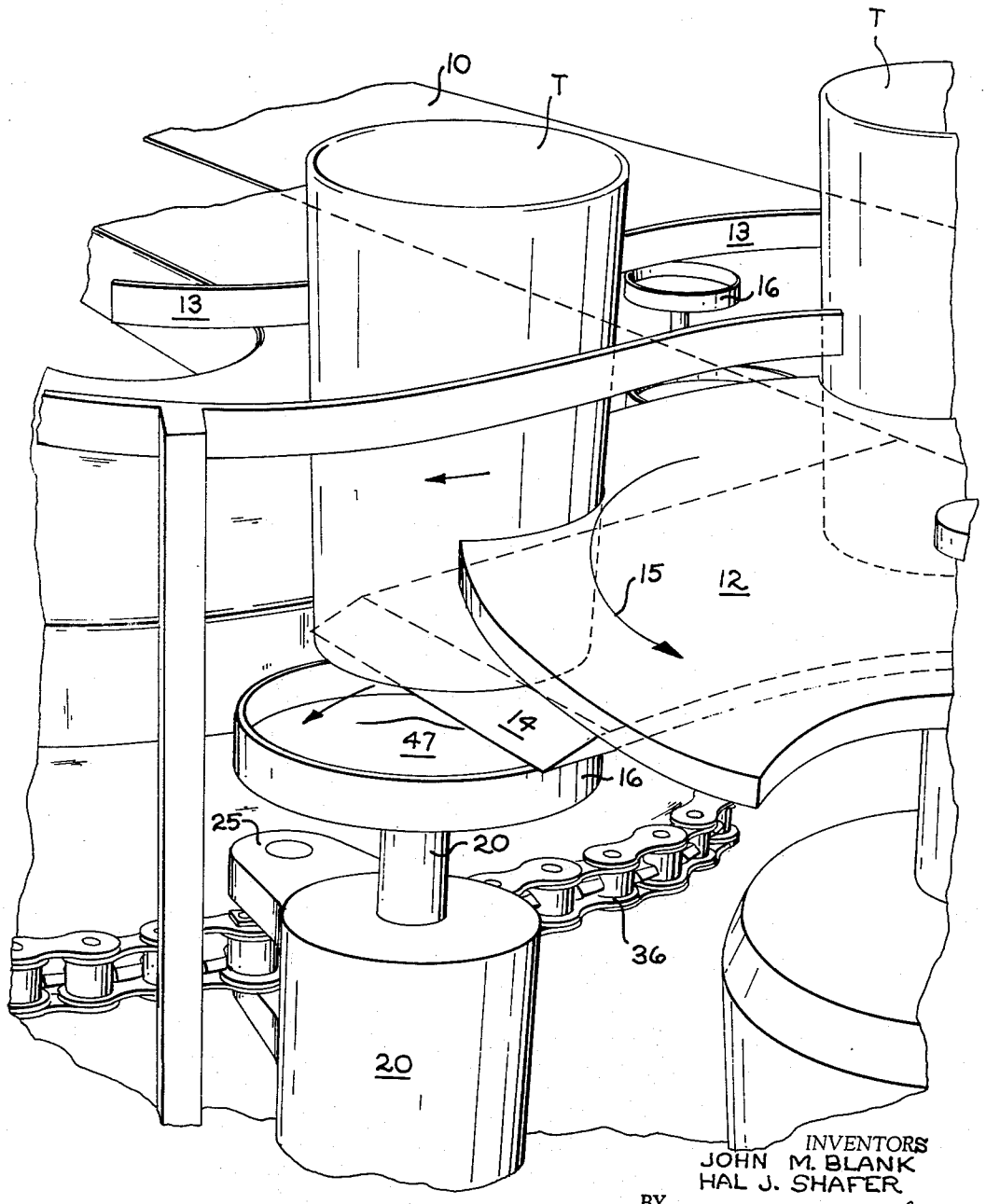


FIG. 11

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United States Patent Office

3,251,707

Patented May 17, 1966

3,251,707

METHOD AND APPARATUS FOR DECORATING GLASSWARE

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Filed Jan. 31, 1963, Ser. No. 255,355
9 Claims. (Cl. 117—43)

This invention relates to a method and apparatus for decorating glassware and more particularly pertains to means for applying a gold band to the bead edge or rim portion of tumblers and like articles having a surface of revolution.

In the past, it has been the practice to apply a gold band to the bead edge of tumblers by an elaborate process involving individually chucking the tumblers and rotating the tumbler in relation to the ink applying rolls. This type of apparatus is only capable of handling one tumbler at a time and required considerable handling of the tumbler, particularly in loading the tumbler on the chuck and unloading the tumbler after the decoration was completed.

The present invention contemplates applying a gold band to the bead edge of the tumbler in such a manner that the tumblers may be conveyed in a line in an upright position, continuously through the zone of decoration. Furthermore, in the present invention the glassware may be transferred from a moving line, in succession, onto moving ware bottom supporting members which in turn are moved in an endless path to carry the tumblers into and through a decorating position or zone and then remove the tumblers and position them on the conveyor at a linearly displaced point for further processing, with all of the steps being performed automatically without requiring the services of an operator to handle the ware.

With the foregoing in mind, it is an object of this invention to provide apparatus for carrying tumblers through a zone where a gold band is applied to the bead surface of a tumbler.

It is an additional object of this invention to provide a method of applying a gold band to the bead edge of a tumbler.

It is a further object of this invention to provide a method of supporting and moving tumblers in a particular manner into and through a zone where a band of gold ink or other decoration is applied to the rim portion or bead of the tumbler.

It is a still further object of this invention to provide apparatus for applying a gold band to the bead surface of a plurality of tumblers moving in succession through the apparatus for applying the band.

Other and further objects will be apparent from the following description taken in conjunction with the annexed sheets of drawing, wherein;

FIG. 1 is a schematic perspective view of a portion of the decorating and ware handling apparatus of the invention;

FIG. 2 is a schematic perspective view, with parts broken away, illustrating the details of the tumbler supporting and moving mechanism;

FIG. 3 is a schematic perspective view of one embodiment of the invention, illustrating the orientation of the band applying belts with relation to the ware and their supports;

FIG. 4 is a detailed top plan view of one of the band applying belts and the drive mechanism therefor;

FIG. 5 is a side elevational view of FIG. 4;

FIG. 6 is a schematic perspective view, with parts broken away, illustrating the mechanism for supporting and driving both band applying belts;

FIG. 7 is a schematic perspective view, looking from below, of a second embodiment of the invention;

FIG. 8 is a schematic perspective view of the apparatus of FIG. 7 turned 90° and viewed from above;

FIG. 9 is a schematic perspective view of a ware handling mechanism at the ware loading end;

FIG. 10 is a schematic perspective view of the ware handling mechanism at the ware unloading end; and,

FIG. 11 is a perspective view similar to FIG. 9, on an enlarged scale, showing the ware loading mechanism.

With reference to FIGS. 1, 2, 9 and 10 the general organization of the mechanism for supporting and moving the tumblers in succession through the decorating zone will be described.

The ware is brought to the decorating station by a conveyor **10** moving in the direction of the arrow **11**. The tumblers "T" are arranged on the conveyor **10** in alignment and as they approach the mechanism, illustrated in FIGS. 1, 9 and 11 a star wheel **12**, having a plurality of ware engaging cut-out portions about its periphery, will engage the tumblers and in cooperation with a side rail **13** will carry the ware from the conveyor **10** onto an adjacent flat surface **14** (see FIG. 9). The star wheel **12** is rotated in the direction of the arrow **15** and will slide the ware from the surface **14** into position such that the tumblers are placed in the open upper end of a chuck **16**. The cut-out portions of the star wheel **12** are spaced apart, and the star wheel is driven at a speed synchronous with the movement of the chucks in their oblong path, so that a tumbler will be brought to position and deposited on a chuck as the chucks pass beneath the star wheel and surface **14**.

The chucks are moved in a continuous manner and describe a straight line passing beneath a decorating mechanism, generally designated **17**. After passing through the decorating mechanism **17**, the tumblers, carried by the chucks, arrive at the location of a second star wheel **18** (see FIG. 10) which engages the sides of the tumblers and the tumblers will be moved from the chucks and, in cooperation with the second side rail **19**, will be guided back onto the conveyor **10** and carried away from the decorating mechanism.

With particular reference to FIG. 2, there is shown one chuck and the driving mechanism and mounting arrangement for the chucks. It should be understood, and as can readily be seen when viewing FIG. 1, there are a plurality of chucks. The chucks **16** are mounted on the upper end of a spindle **20**. The spindles **20** are mounted for rotation about their axes within spindle housings **21** with spindle bearings **22** actually supporting each spindle within its respective housing. Only the bearings **22** at the bottom end are shown in FIG. 2; however, it should be understood that similar bearings are provided at the upper end of the housing **21**.

Each housing has bearing caps **23** covering both its upper and lower ends. The spindle housing **21** is fixed to a pair of vertically spaced brackets **24** and **25**. The lower bracket **24** has a pair of horizontally extending, vertically separated arms **26** and **27** with vertically aligned openings

28 and 29 formed therethrough. The two arms 26 and 27 are adapted to receive vertically extending stub shafts 30 and 31 within the openings 28 and 29 of the arms. Each stub shaft is connected to opposite sides of a link of a chain 32 and thus a positive connection is provided between the chain 32 and the spindle housing 21. Below the lower end of the stub shaft 31, the arm 27 receives the axle of a roller 33. The roller 33 is positioned within an upwardly opening channel 34 of a continuous track 35, it being understood that the track 35, as shown in FIG. 1, extends in a closed oblong path beneath and parallel to the path that the chucks 16 described in their movement.

The upper bracket 25 is linked to a second chain 36 in substantially the same manner as described above with respect to bracket 24. The upper bracket likewise carries a roller 37 which is mounted above the upper surface of the bracket. The roller 37 is adapted to travel in a downwardly opening channel 38 formed in a continuous track 39. In addition to carrying the roller 37 which rides in the channel 38, the bracket 25 also carries a second roller 40 on an arm thereof which is laterally displaced from the axis of the roller 37. The roller 40 is also adapted to ride in the channel 38 and serves to stabilize the housing 21 against rotation.

The chains 32 and 36 are endless chains which also describe substantially the same path as the movement of the chucks 16. A pair of sprocket wheels 41 and 42 fixed to a vertical shaft 43 are in engagement with the chains and, upon rotation of the shaft 43 (from any suitable motive power), the chains will be driven at the same rate and effectively will continuously drive the brackets and attached spindle housings 21 in a closed path. The shaft 43 is supported in a main support structure 44 by bearings 46, thus permitting relatively free rotation of the shaft with respect to the main frame 44.

As can readily be seen when viewing FIGS. 1, 2 and 11, the chucks 16 have a fairly deep recess in the upper surface thereof within which the tumbler is adapted to seat. In order to insure that the tumblers may be easily removed from the chucks by lateral movement, after the decoration or gold band has been applied to the tumbler, a spindle rod 45 is provided which extends through the hollow interior of the spindle 20. The lower end of the rod 45 carries a cam follower member 46 connected thereto. The upper end of the rod 45 is in abutting relationship with respect to a flexible diaphragm member 47 fixed at its edges to the interior of the chuck 16 but with its center portion capable of being flexed upwardly. Thus, it can be seen that raising of the rod 45, as shown in FIGS. 2 and 10, will raise a tumbler with relation to the chuck 16. In this manner the tumblers are lifted so that the star wheel 18 may conveniently move the tumblers from the chucks onto the conveyor 10. The connection between the rod and the diaphragm may be such that the center portion of the flexible diaphragm is fabricated of metal to provide a wear resistant contact surface. However, it should be understood that there is sufficient flexure in the member 47 so that the central portion of the member will be raised at least as high as the upper rim of the chuck 16. The lower end of the spindle 20 is formed with a downwardly extending coaxial sleeve portion 48 which abuts the sides of the rod 45 to provide a seal therebetween. The rod 45 is normally held in a "down" position relative to spindle 20 by a helical spring 49 positioned between the cam follower member 46 and the sleeve 48.

Thus, it can be seen that the freely rotatable chucks 16 are successively loaded with tumblers (see FIG. 11) and serve to carry the tumblers in a straight line through the decorating or gold banding zone. A somewhat serpentine path is described by the tumblers during their passage from the conveyor, through the decorating zone and then back to the conveyor.

With specific reference to FIGS. 3–6, a description of one embodiment of the invention as pertains to the means for applying the decoration in the form of a gold band to the tumblers will be described.

FIG. 3 shows the relationship of the tumbler contacting belts with respect to the tumblers. As previously described, the tumblers are moved in succession by their supporting chucks 16 in a straight line in the direction of the arrow 50 on FIG. 3. The chucks are freely rotatable with respect to their supports and will rotate in the direction of the arrow 51 shown in FIG. 3 on one of the chucks. A pair of endless belts 52 and 53 are continuously driven in the direction indicated by the arrows shown thereon and describe a path in which the bottom run of the belt extends slightly downward and the belt is twisted about its length so that the belt will contact the rim of the tumbler at an angle of approximately 45°. The belts 52 and 53 are formed preferably with resilient surfaces. The particular manner of mounting the belts, driving the belts and supplying them with decorating ink will be described hereinafter. FIG. 3, in effect, illustrates the disposition and handling of the ware as it is passing through the decorating zone. It should be understood that the belt 53 will be running at a somewhat greater speed than belt 52. Thus, in effect, compensating for the fact that the tumbler is precessing through the decorating zone.

With specific reference to FIGS. 4 and 5, the mechanism for driving the belt 52 will be described. A pair of parallel, spaced-apart, plate-like members 54 and 55 serve as a supporting frame. The member 54 has a pair of angle brackets 56 and 57 fixed to the side thereof which serve as the means for adjustably mounting or supporting the decorating mechanism on a stationary support member 58 (see FIG. 1) located adjacent the path of travel of the tumblers through the decorating zone. A plurality of horizontal shafts extend through openings formed in the members 54 and 55, with a shaft 59 serving as the power input shaft. One end of the shaft 59 extends beyond the member 54 and has a quick disconnect, flexible shaft, coupling member 60 fixed thereto. The portion of the shaft which extends between the members 54 and 55 carries a drive pinion 61. A second shaft 62 extends between members 54 and 55 and is provided with suitable bearings so that the shaft is rotatable with respect to the members 54 and 55. The shaft 62 carries a pinion 63, fixed thereto, which is in mesh with the pinion 61. A second pinion 64, carried by the shaft 62, is positioned adjacent the member 55 and is in mesh with a third pinion 65. The pinion 65 in turn is mounted on a shaft 66 which will be rotated by rotation of the pinion 65. Both the shafts 62 and 66 extend through the plate-like member 55 and carry rollers 67 and 68 thereon respectively. The roller 67 serves as the drive roller for the belt 52 which passes thereover, with the belt actually passing between the rollers 67 and 68. The two pinions 64 and 65 are of the same diameter, thus insuring that both the rollers 67 and 68 will rotate in opposite directions at the same speed. The function of the roller 68 is to spread or distribute the ink applied to the upper surface of the belt 52 over the width of the belt to insure a uniform thickness of ink at the center of the belt. The shaft 66 also extends beyond the plate-like member 54 and has a sprocket 69 fixed thereto.

The members 54 and 55 are formed with upstanding ears 70 and 71 at one end thereof with a horizontal shaft 73 extending therebetween providing a pivot axis for an ink or gold dispenser, generally designated 72. This dispensing means generally comprises an H-shaped member 74 which is normally positioned horizontal with the shaft 73 extending through an opening provided in the cross bar portion of the H-shaped mmeber. Thus, the H-shaped member 74 is mounted so that it may pivot about the horizontal axis of the shaft 73. A horizontal opening formed in the H-shaped member 74 has a shaft 75 extending therethrough which is free to rotate therein. The shaft 75 has ends which extend beyond the H-

shaped member and a sprocket **76** is fixed to one end and an inking roller **77** is fixed to the other end. An endless chain **78** drivingly connects the sprockets **69** and **76**. As can be seen when viewing FIG. 5, a second belt supporting roller **79** is mounted for rotation with respect to the members **54** and **55** on a horizontal shaft **80** which extends through the member **55**. It should be understood that suitable bearings are provided between the roller **79** and the shaft **80** so that the roller is freely rotatable thereon. The shaft **80** extends through elongated slots **81** formed in the members **54** and **55** and thus may be horizontally adjusted toward or away from the shaft **62** to insure that the belt **52** is maintained under tension. With this particular arrangement it can be seen that the belt **52** extends between the inking roller **77** and roller **79**. Inasmuch as the roller **77** is carried by the pivotally supported H-shaped member **74**, the force with which the roller **77** is held in engagement with the belt **52** is adjustable merely by adjusting the force applied to the H-shaped member in a clockwise direction. This biasing of the roller **77** against the belt **52** is accomplished by a small air motor **82** fixed to the member **54** and having its piston rod **83**, extending vertically therefrom, engaging a stub shaft **84** on the H-shaped member **74**. This stub shaft **84** is fixed to the H-shaped member **74** on the opposite side of its pivot **73** from the side supporting the inking roller **77**.

Ink is supplied to the inking roller **77** from a trough-shaped member **85** which may, for example, be formed of a wear resistant material such as nylon. The member **85** has an open face, in contact with the surface of the roller **77** and is held in engagement with the roller by means of a threaded shaft **86** which extends through one leg of the H-shaped member **74** and abuts the rear wall of the ink reservoir or trough-shaped member **85**. The bottom wall of the ink reservoir **85** has a relatively small semi-circular opening **87** formed in the leading edge thereof. The size of the opening determines the amount of ink which will be deposited on the roller **77**, it being understood that the edge of the nylon ink reservoir **85** serves to wipe the roller clean except in the area of the opening **87**, thus permitting a relatively small amount of ink to be deposited on the roller **77**, as it rotates in the direction of the arrow shown thereon. The belt **52**, after passing over the roller **67**, is guided within a downwardly opening channel **88** formed in an elongated member **89** which is bolted to the side of the plate-like member **55**. The channel **88** is of substantially the same width as the belt **52** but is cut so that the belt will be twisted about its central, longitudinal axis through an angle of approximately 45°. It is the area in which the belt is twisted that applies the gold ink or decoration to the bead edge of the tumblers. In this manner the drive mechanism and the inking mechanism of the invention is mounted with the members **54** and **55** defining vertical planes and with the belt **52** running horizontally throughout a major portion of its travel, with only that portion of its travel through the channel **88** being at an angle with respect to the horizontal.

It can readily be seen that as the drive coupling **60** is rotated, the roller **67** will be rotated to drive the belt **52** in the direction of the arrow shown thereon, with the chain **78** also being driven so that the roller **77** will be rotated in the direction of the arrow shown thereon. As the roller **77** is rotated, a small amount of ink will be deposited on the central portion of the roller surface and since the roller is maintained in contact with the belt **52**, this ink will be transferred from the roller **77** to the belt **52**. As the belt **52** continues its travel, the roller **68** will contact the coated surface of the belt **52** and complete the spreading of the ink over the major width of the belt, with the belt then passing over the roller **67** and through the channel **88**. In this manner a regular supply of ink is provided for the decorating surface of the belt **52**.

The above description has been of the details of the mechanism for inking and driving the belt **52**. It should be understood that the mechanism for inking and driving the other belt **53** is substantially identical and thus those mechanical elements which are the same in the mechanism for driving the belt **53** have been provided with the same reference numerals as the mechanism for driving the belt **52**. In order to distinguish the two mechanisms, the reference numerals used in conjunction with the drive for belt **53** have been primed. For example, the spreading roller **68** of the mechanism for driving the belt **52** is shown as **68'** on the mechanism for driving the belt **53**. The one distinction between the two drives is clearly illustrated in FIG. 6, this distinction being the relative sizes of the driving pinions **61** and **61'**. The driving pinion **61** is substantially smaller than the driving pinion **61'**. Thus, the belt **53**, as previously stated, is driven at a greater speed than the belt **52**. It should be understood that the pinions **61** and **61'** are driven either from the same power source or from synchronized power sources so that they will both be driven at the same speed.

With particular reference to FIGS. 7 and 8, a second embodiment of the invention as it relates to the inking and decorating mechanism will be described in detail. This embodiment has as its main supporting structure a pair of platelike members **90** and **91** of substantially identical construction to the previously described members **54** and **55**. A pair of angle brackets **92** and **93** are bolted to one side of the member **91** and serve as the means for mounting the decorating mechanism to a stationary support member. Three parallel shafts **94**, **95** and **96** extend normal to the members **90** and **91** with the shaft **94** extending through the member **91** and carrying a quick disconnect coupling **97** for a flexible drive shaft thereon. In the area between the members **90** and **91**, the shaft **94** carries a pinion **98** which meshes with a pinion **99** mounted on the shaft **95**. The shaft **95** extends through the member **90** and carries a pulley or roller **100** thereon. The pinion **99** in turn is in mesh with the pinion **101** mounted on the shaft **96**. The shaft **96** extends through the member **90** and carries a roller **102** fixed to its end. The shaft **96** also carries a sprocket **103**. An endless belt **104** is arranged to pass between the rollers **100** and **102** and to continue around the roller **100**, as is clearly shown in FIG. 7. An idler roll **105** is mounted outside the member **90** on a shaft **106** and the belt **104** passes therearound. The mechanism for applying the ink or decorating material to the belt is located midway of the upper run of the belt and is comprised of a generally H-shaped member **107**, pivotally supported on a bracket **108** by a shaft **109**. The H-shaped member **107** is identical to the previously described H-shaped member **74**, of the embodiment shown in FIGS. 4–6. This H-shaped member carries an inking roller **110**, an inking reservoir **111**, with the roller **110** mounted on a shaft **112**. The shaft **112** carries a driven pulley **113** which is rotated by a belt drive. The belt drive consists of an endless belt **114** connecting the pulley **113** to a pulley **115** fixed to a shaft **116**. The shaft **116** extends between members **90** and **91** and has a sprocket **117** mounted thereon. The sprocket **117** is connected to the sprocket **103** by an endless chain **118**.

As the belt **104** is driven beneath the inking roller **110**, the belt is twisted so that its upper surface, which is in contact with the roller **110**, will be in a horizontal plane. This twisting of the belt is accomplished by a bracket **119** having a channel **120** in the upper surface thereof. This channel is of substantially the same width as the belt and its bottom surface is horizontal. Thus, the ink is applied to the belt while the belt is in a horizontal orientation. However, since it is necessary for the belt, when in contact with the tumblers to be at an angle of approximately 45°, the members **90** and **91** are oriented at an angle of approximately 45°. In order to be certain that the belt stays in contact with the tumblers throughout the decorating zone, an angle bracket **121** is bolted to the side of the member **90** and has a flange portion **122** beneath which the belt **104** is adapted to continuously slide. The bracket

121 thus guides the belt in a predetermined linear path at the time that the belt is in contact with the tumblers being decorated.

From the foregoing description, it can be seen that applicants have provided two arrangements or embodiments for applying the decoration to the bead edge or rim of a tumbler, and it can readily be seen when viewing FIGS. 6 and 7, that the application and initial spreading of the ink on the belt is accomplished in both instances when the belt surface is oriented in a horizontal plane. This is necessary from the standpoint that any angular orientation of the belt at this time would cause unequal distribution of the ink on the surface of the belt.

In the embodiment shown in FIGS. 3–6, this is accomplished by having the entire ink applying and belt driving mechanism oriented so that the belt is horizontal and the belt is then caused to assume a 45° angle only during its lower run than where it will contact the ware.

In the second embodiment, illustrated in FIGS. 7 and 8, the ink applying mechanism is maintained in a horizontal plane while the driving mechanism is oriented at substantially a 45° angle, thus requiring that the belt be twisted into the horizontal plane only in its upper run.

Having thus described the invention in detail, it should be understood that the invention should be limited only insofar as the scope of the claims dictates and that other and further embodiments may be resorted to within the spirit and scope of the attached claims.

We claim:

1. A method of applying a liquid coating material to the bead surface of a tumbler or like article, comprising oppositely driving a pair of endless belts in parallel side-by-side relationhip, guiding the lower run of each belt so that their bottom surfaces are oppositely inclined at an angle, applying and spreading a coating material over the belt surface, supporting a tumbler for rotation about its vertical axis and laterally moving the tumbler in a straight line into simultaneous contact with the inclined portions of said belts, whereby the tumbler will precess through the zone of contact with said belts and be decorated on the bead surface.

2. A method of applying a liquid coating material to the bead surface of a tumbler or like article, comprising oppositely driving a pair of endless belts in side-by-side relationship and with at least a portion of the bottom surfaces of said belts oppositely inclined at the same angle, applying and spreading a coating material over the belt surface, supporting a tumbler for rotation about its vertical axis, and laterally moving the tumbler in a straight line into simultaneous contact with the inclined portions of said belts, whereby the tumbler will precess through the zone of contact with said belts and be decorated on the bead surface.

3. Apparatus for applying a liquid coating material to the bead surface of tumblers or like articles, comprising a pair of endless belts each having a resilient surface, said belts being arranged side by side and having at least a portion of their bottom surface oppositely inclined at an angle to the bead surface of a tumbler positioned therebelow in upright position, means for supporting the tumblers for rotation about their vertical axis, means connected to said tumbler supporting means for laterally moving the tumbler support means in succession beneath the belts, means for applying and spreading a coating material over the surface of both belts and means for driving said belts in opposite directions at different speeds whereby tumblers moved into contact therewith will precess through the zone of contact with said belts.

4. Apparatus for applying a liquid coating material to the bead surface of a tumbler or like article comprising, a pair of endless belts, means for supporting said belts in side-by-side relationship with at least a portion of their bottom surface oppositely inclined at an angle to the horizontal, means supporting a tumbler in an upright position for rotation about its vertical axis, means connected to said supporting means for laterally moving the tumbler bead surface into contact with the inclined surfaces of said belts, means for applying and spreading a coating material over the belt surface and means for driving said belts in opposite directions at different speeds whereby tumblers moved into contact therewith will precess through the zone of contact with said belts and be coated over the entire bead surface.

5. The apparatus as defined in claim 4, wherein said means for applying and spreading the coating material on the belt surface comprises, an open sided reservoir for the material, a roller closing the open side of said reservoir and being biased in contact with the belt surface and means for rotating said roller in synchronism with said belt, whereby material is transferred from the reservoir to the belt surface.

6. Apparatus for applying a liquid coating material to the bead surface of a tumbler or like article comprising, a pair of support frames, a pair of horizontally spaced pulleys rotatably mounted on each frame, a pair of endless belts extending between said pulleys, means mounted on said frames for guiding the bottom runs of each belt so that the bottom surfaces thereof are oppositely inclined at an angle to the horizontal, means for supporting a tumbler in an upright position for rotation about its vertical axis, means connected to said supporting means for laterally moving the tumbler bead surface into contact with the inclined surfaces of said belts, means for applying and spreading a coating material over the belt surface and means for driving said belts in opposite directions at different speeds whereby tumblers moved into contact therewith will precess through the zone of contact with said belts and be coated over the entire bead surface.

7. The apparatus as defined in claim 6, wherein said means for applying and spreading the coating material on the belt surface comprises, an open sided reservoir containing the coating material, a roller closing the open side of said reservoir and being biased in contact with the belt surface and means for rotating said roller in synchronism with said belt, whereby material is transferred from the reservoir to the belt surface.

8. Apparatus for applying a liquid coating material to the bead surface of tumblers or the like articles comprising, a plurality of cup-shaped tumbler chucks, a plurality of spindles connected to the under surface of said cup-shaped chucks, bearing means for supporting said spindles for rotation with their axes vertical, a first oblong track mounted in fixed horizontal position, a second oblong track positioned below said first track, a plurality of first rollers connected to said bearing supports and adapted to ride in said first track, a plurality of second rollers connected to said bearing supports and adapted to ride in said second track, means connected to one plurality of said rollers and adapted to move said rollers in spaced relationship along said tracks to laterally move said tumbler chuck supports in succession in an oblong oval pattern, means at one end of said oblong track for loading tumblers on to said chucks in succession, means at the opposite end of said oblong track for unloading tumblers from said successively presented tumbler chucks, a pair of endless belts mounted above the path of movement of said tumbler chucks between said loading and unloading means, means for supporting and driving said belts in opposite directions at different speeds in parallel, spaced-apart relationship with respect to the movement of the tumbler chucks, means for applying and spreading a coating material to the surface of said belts, and means connected to said belt supports for guiding the lower run of said belts such that the belts will contact tumblers carried by said chucks at oppositely inclined angles with respect to the bead surfaces of tumblers.

9. The apparatus as defined in claim 8, wherein said means for guiding the lower run of said belts comprises, a pair of horizontal members each having a downwardly opening channel formed in its undersurface with the channel being of substantially equal width to that of the belt.

References Cited by the Examiner

UNITED STATES PATENTS

506,184	10/1893	McDonald	118—257 X
988,335	4/1911	Harbeck	118—233
2,206,964	7/1940	Kimball et al.	118—257 X
2,367,722	1/1945	Guthrie	118—218
2,369,871	2/1945	Trollen	118—232 X
2,836,145	5/1958	Becker	118—233 X
2,868,162	1/1959	Knain	118—257 X
2,952,239	9/1960	Stover	118—244
2,966,134	12/1960	Stanley et al.	118—257 X

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