Jan. 7, 1936. E. M. HOMMEL ET AL 2,027,102

METHOD OF AND APPARATUS FOR STENCILING

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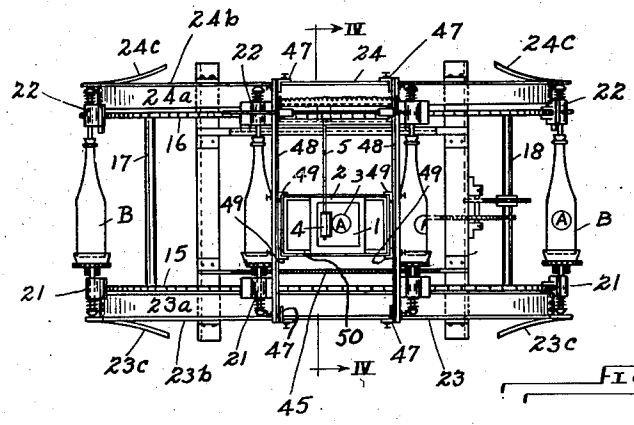


Fig. I

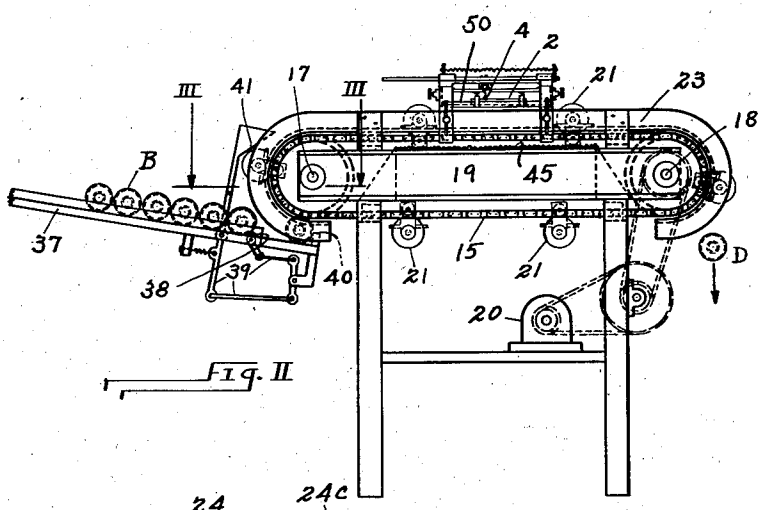


Fig. II

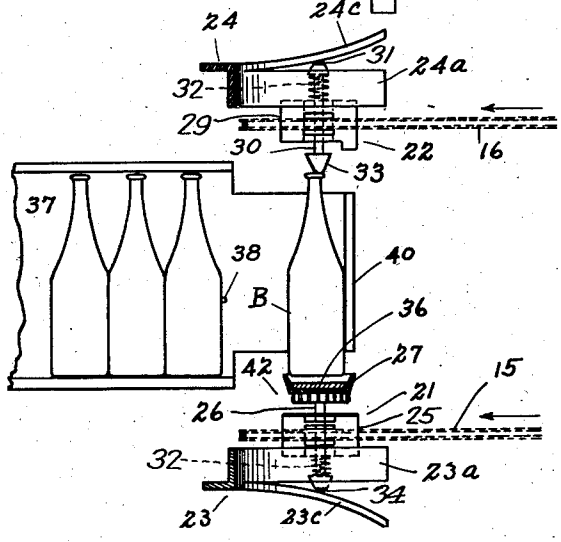


Fig. III

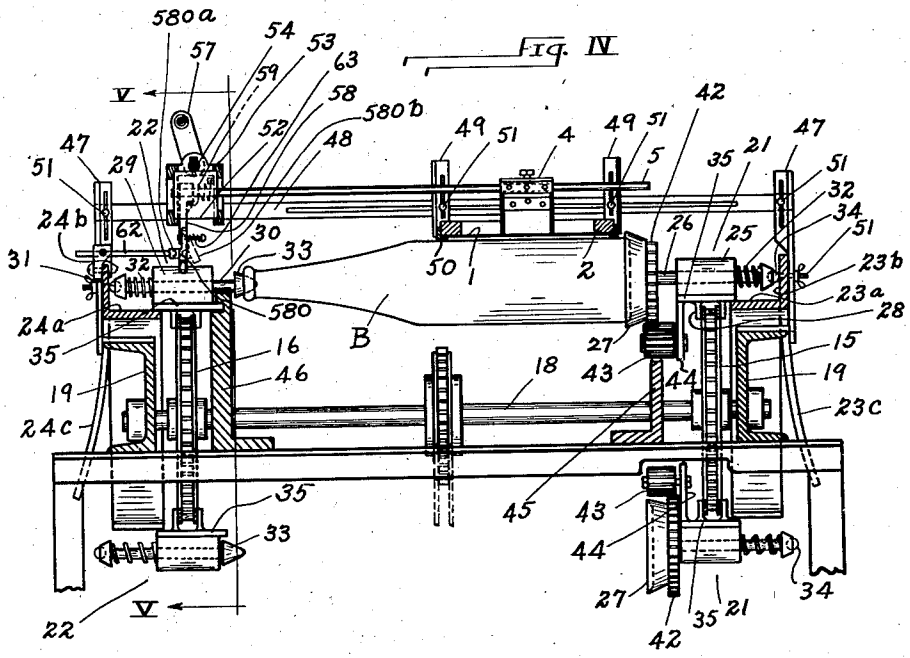
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Fig. IV



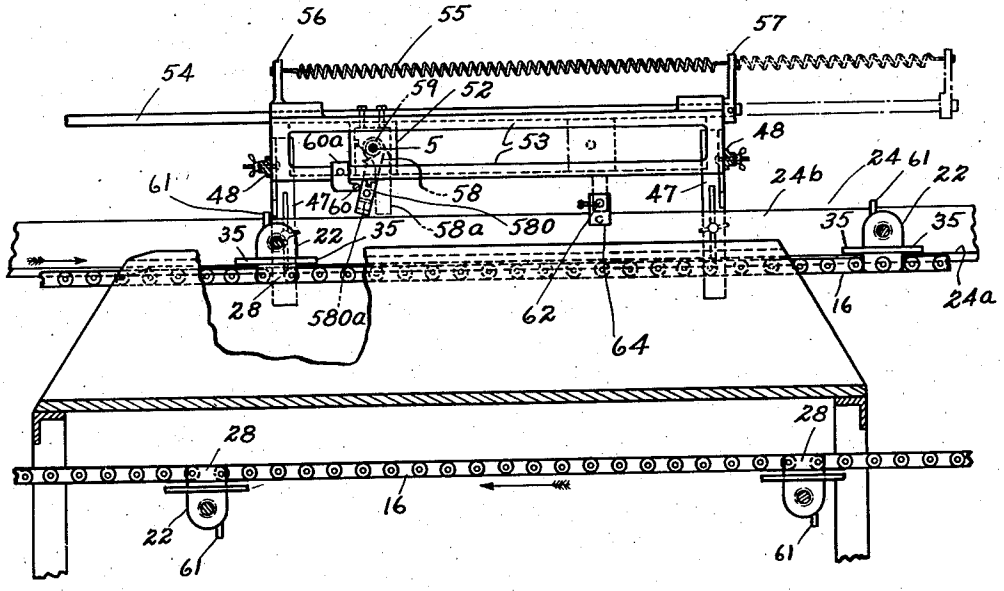


Fig. V

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METHOD OF AND APPARATUS FOR STENCILING

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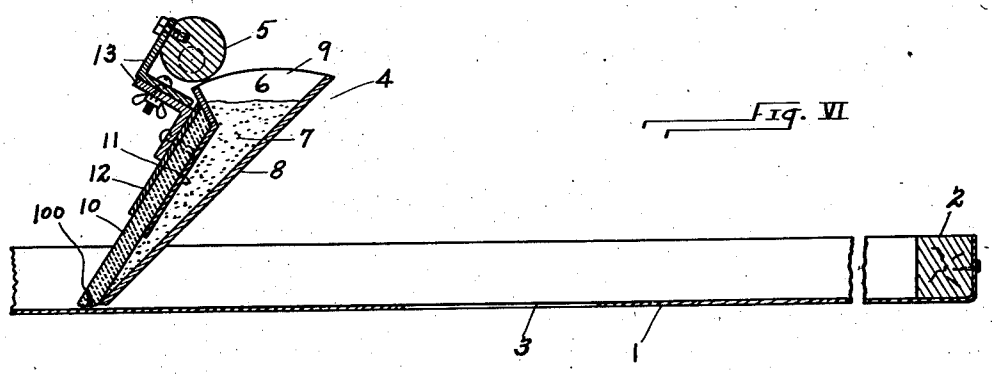


Fig. VI

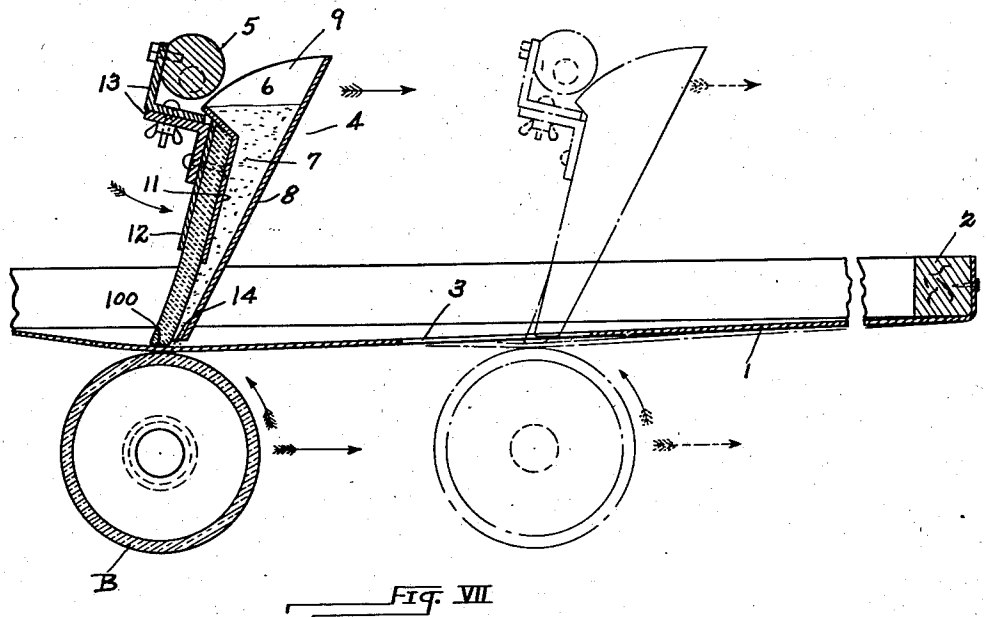


Fig. VII

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METHOD OF AND APPARATUS FOR STENCILING

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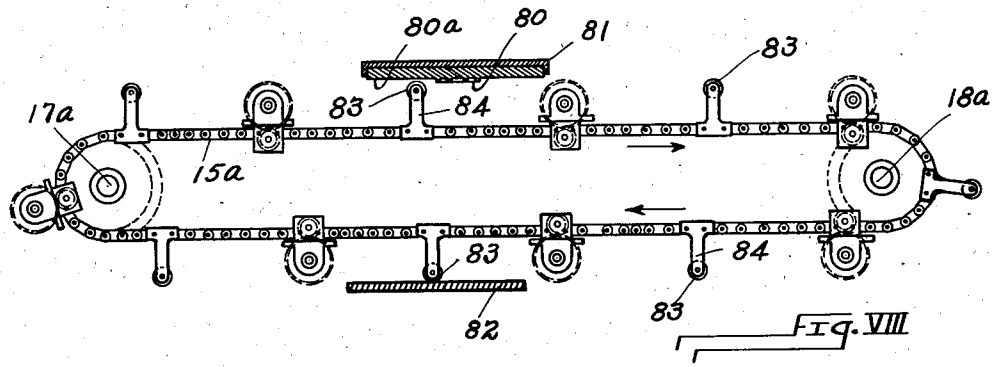


Fig. VIII

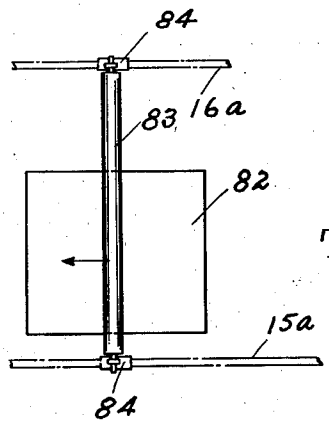


Fig. IX

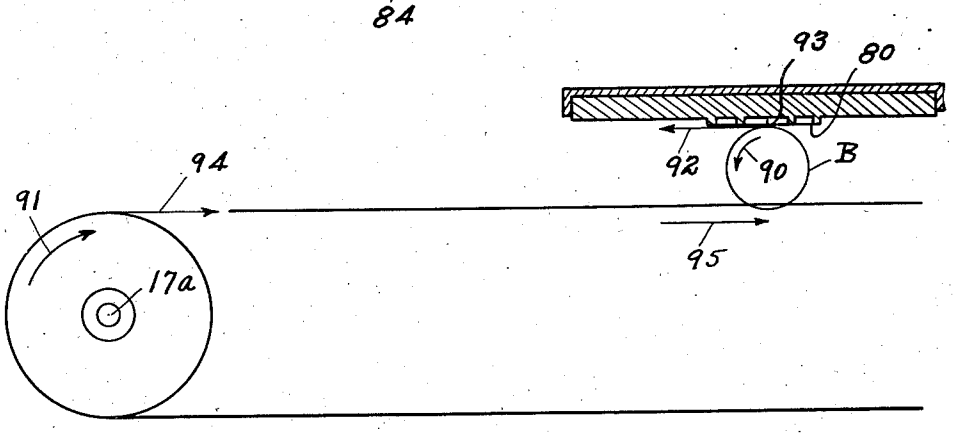


Fig. X

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UNITED STATES PATENT OFFICE

2,027,102

METHOD OF AND APPARATUS FOR STENCILING

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Application August 1, 1933, Serial No. 683,142

12 Claims. (Cl. 101—123)

The invention relates to apparatus for applying characters and decorations upon bottles, jars, and other objects. More particularly the invention is directed to a machine for applying markings of vitreous color material to cylindrical objects of glass, to the end that the decoration may be vitrified and fused in the surface of the glass in accordance with well-known practice.

The invention contemplates the application of material which may be uncolored initially, but which may receive color after its application to the object; indeed, the invention may be used in decorating round objects with material other than vitrifiable material.

The object of the invention is to provide an automatic decorating machine of this sort—a machine which automatically takes the glass objects from a supply, automatically applies the decoration upon the objects, and automatically discharges the decorated objects at a place of disposal. Speed and certainty of operation, and economy in the construction and supervision of such a machine are other objects of the invention.

In the accompanying drawings Fig. I is a view in plan from above of a machine embodying the invention; Fig. II is a view of the machine in side elevation; Fig. III is a fragmentary sectional view, taken on the plane III—III of Fig. II, and showing to larger scale the feeding instrumentalities of the machine about to pick up an object (which in this case is shown to be a bottle) from a supply chute; Fig. IV is a transverse sectional view of the machine, taken on the plane IV—IV of Fig. I, and showing certain details of construction; Fig. V is a fragmentary view of the machine, partly in elevation and partly in vertical section, as viewed on the plane V—V of Fig. VI; Fig. VI is a fragmentary view in vertical, medial section of the stencil which is organized in the apparatus, and illustrates in vertical section the automatic squeegee device which cooperates with the stencil in applying decorations to the objects fed through the machine; Fig. VII is a view comparable to Fig. VI, showing the squeegee device in successive positions of service, and indicating a bottle advancing through the machine; Fig. VIII is a diagrammatic view, showing a modification in the means for applying the decoration to the objects; Fig. IX is a detail of parts shown in Fig. VIII; and Fig. X is a diagrammatic view illustrating the movement imparted to the objects while they are advancing through the machine.

While it will be seen and readily understood that the invention is applicable in many fields, the machine in this case was especially developed for the marking of glass bottles, and in such embodiment the invention will be described. Referring to the drawings the machine affords mounting for a stencil screen 1. The screen in this case consists of silk fabric drawn taut upon and secured to a rectangular frame 2 of wood. As a matter of fact, the screen may be a fine-mesh metal screen, or it may be a screen of fabric other than silk. In any case the screen is flexible, and provision is made that it shall be impervious to liquid, save over a pattern area 3. Over that area the screen is pervious. This is accomplished, conveniently, by applying upon the upper face of the fabric a thin coating of nitrocellulose lacquer, leaving only the pattern area 3 uncoated. A squeegee device 4, mounted upon an automatically-reciprocated arm 5, is adapted to sweep to and fro across the upper face of screen 1; as presently will appear the movement of the squeegee device is synchronized with the advance of the bottles B through the machine; and as presently will appear the bottles B are rolled one after the other across the nether face of the screen, while the squeegee device 4 advances across the upper face of the screen in unison with the bottle beneath. The squeegee device 4, cf. Figs. VI and VII, as it advances in unison with a bottle, automatically feeds a film of the material to be applied upon the bottle to the upper face of the screen. Accordingly, in the advance of the squeegee device 4 over and the rolling of the bottle beneath the screen, the material is exuded through so much of the screen as is pervious, and applied upon the surface of the bottle.

Insofar as a clear understanding of the squeegee device 4 will facilitate a comprehensive consideration of the machine in general, the structure and operation of such device will now be described. Turning to Figs. VI and VII, it will be perceived that the squeegee device 4 includes a downward converging hopper 6 in which is held a store 7 of the material to be applied to the bottles. In the instance chosen for illustration the material applied as decoration is, after application, to be vitrified upon the surface of the bottle. Accordingly the material stored in hopper 6 is a vitreous color material (or a material capable of receiving color after application), as distinguished from a paint, a lacquer, or a heavy ink. Such other materials may in other cases be employed for providing bottles or other objects with air-hardened decorations. The vitrifiable color material first alluded to may comprise a vitrifiable pig-

ment (or a pigment mixed with a vitrifiable substance) carried by a liquid vehicle, such as balsam capaiba or damar varnish. Alternately, the material within the hopper 6 may be balsam copaiba, damar varnish, or other vehicle which when applied to the bottles in the pattern of the predetermined decoration is capable of receiving and retaining color material dusted upon it. In the following specification the material applied to the bottles is mentioned as a vitrifiable color material, but it will be understood in view of what has been said that decoration-affording materials and materials that serve in the production of decoration upon the surface to be decorated are intended and are to be held equally in contemplation.

The front wall 8 and side walls 9 of hopper 6 are rigid and are conveniently fashioned integrally of sheet metal, while the rear wall of the hopper is in part rigid and in part flexible. The flexible material of which the rear wall is in part formed takes the form of a relatively heavy sheet of rubber, which sheet of rubber forms the squeegee member of the device. In this case, the rear wall of the hopper consists of a rubber sheet 10, secured between two walls 11, 12 of sheet metal; in a working model a rubber sheet of approximity 3/8" in thickness was used with good results. The lower edge 100 of the rubber squeegee member extends slightly below the lower edge of wall 8, and normally the inner face of the rubber member lies snugly against such edge of wall 8, so that normally the store 7 of color material has no downward escape from the hopper.

The squeegee device 4 is secured to the arm 5, by means of brackets 13. Provision is made, as will presently appear, for reciprocating the arm 5, and the device 4 with it, to and fro across the expanse of the screen 1. The movement imparted to the arm 5 is a compound movement. Beginning with the normal or stationary position of the device shown in Fig. VI, the movement of arm 5 is first one of counter-clockwise turning (through a small angle, say from five to twenty degrees) and then a left-to-right horizontal movement across the face of the stencil screen. The motions described are then repeated in opposite directions, and the device 4 is restored to its initial position. Fig. VI shows the squeegee device in its normal or inactive position, in which position it remains until a bottle in its course through the machine advances to a position beneath the screen 1. When the bottle B (Fig. VII), advancing from left to right, reaches a position substantially in vertical alignment with the device 4, the arm 5 turns in counter-clockwise direction, swinging the device 4 from its position of normal inclination (see Fig. VI) to its operative position in which its inclination approaches the vertical (see Fig. VII). In consequence of the angular movement of the device 4, the edge 100 of the squeegee member 10 is shifted from a position immediately above the screen 1 (Fig. VI) to such position that it engages and presses the screen downward into positive engagement with the crest of the bottle's cylindrical face (Fig. VII). It is characteristic of the squeegee device 4, that the wall member 10 is elastic, so that its lower portion may yield from the plane of its extent. The rigid supporting walls 11, 12 terminate a substantial interval above the bottom of the hopper 6 to admit of such yielding. Accordingly, as the arm 5 turns and brings the edge 100 of the rubber squeegee member 10 into engagement with the screen 1, depressing the screen, the portion of member 10 extending below the rigid wall 12 is flexed to the position in which it is shown in Fig. VII. Thus the engagement between member 10 and the lower edge of wall 8 is broken, and a narrow mouth 14 is provided, through which a thin film of material 7 flows from within the hopper and upon the screen.

The left-to-right advance of the bottle B is continuous and, as will presently appear, means are provided to rotate the bottle counter-clockwise as it advances, with a surface velocity equal and at the point of tangency with the screen opposite in direction to the horizontal velocity of advance. When, during the advance of the bottle, the squeegee device has been swung into the position shown in Fig. VII and in consequence the screen 1 has been pressed into contact with the side of the bottle, the turning movement of the arm 5 ceases, and is followed by a left-to-right linear advance of the arm. The velocity of advance of the arm 5, and of the squeegee device carried by it, equals the linear velocity of the bottle B. Accordingly, the squeegee device and the bottle advance in unison, and during the advance a thin film of the material 7 is spread upon the upper face of the screen 1. Upon reaching the pervious area 3 of the screen, the material is, by the edge 100 of squeegee member 10, pressed through the screen, and progressively applied upon the cylindrical face of the advancing bottle, so that, upon traversing the pervious area of the screen, the bottle is coated with the material in the predetermined pattern.

When the squeegee device has traversed the effective or pervious area of the screen, means presently to be described function, to swing the arm 5 clockwise and restore it to the inclination in which it is shown in Fig. VI. Thereupon, the arm 5 is shifted horizontally, back to its initial, inactive position. Manifestly, this clockwise turning of the arm 5 is effective to relieve the pressure of engagement between the squeegee member 10 and the screen, and in consequence the screen rises from contact with the surface of the bottle and the elastic member 10 returns to its position against the lower edge of hopper wall 8. Thus, the mouth 14 of the hopper is closed, and the flow of the color material is stopped during the return of the squeegee device to its normal position, in which position it remains until the operation is automatically repeated for the next succeeding bottle on its way through the machine. When the decoration has been fully applied to the bottle and the arm 5 makes its return swing in clockwise direction, the rotation of the bottle will advantageously be intermittent. Its linear progress, however, will continue. Intermission of the now purposeless rotation is advantageous, in order to insure that the work will not be smeared by unintended contact with the screen. Having considered above the general mode of operation of the machine, a detailed description will now be given of the mechanical means for automatically feeding the bottles across the screen in conjunction with the mechanism for operating the squeegee device in the described manner.

Turning to Fig. I, it will be observed that the machine includes two endless chains 15 and 16, trained each upon a pair of sprocket wheels which are secured to two shafts 17 and 18. The shafts 17, 18 are trunnioned at their opposite ends in machine frame members 19, and extend in common plane and in parallelism. The sprocket wheels are of equal size, and are so relatively lo-

cated on the shafts that the chains extend in parallelism longitudinally of the machine. The upper and lower reaches of the chains 15, 16 are of equal length, and the upper reaches of the chains lie in a common horizontal plane. A motor 20 (Fig. II), by suitable means, such as that indicated, is caused to drive the shaft 18, and in service the motor is adapted to rotate such shaft clockwise, effecting the travel of the chains 15, 16 in unison and in such direction that the upper reaches of the chains advance from left to right, as viewed in Figs. I, II, and V. Bottle-supporting devices 21 are secured at regular intervals to the chain 15, and (in precisely the same intervals) cooperating devices 22 are secured to the chain 16. Considering the two chains 15, 16 together, it will be understood that the devices 21, 22 are paired in alignment transversely of the machine, and that during the travel of the chains the paired devices 21, 22 remain always in such alignment. The devices 21, 22 of each pair cooperate in supporting, and (in response to the travel of the chains) in moving a bottle through the machine.

Organized with chains 15, 16 are guides, to which the reference numerals 23 and 24 are severally applied; these guides, conveniently, are fashioned of structural angle members, and are so organized in the machine that their horizontal flanges 23a, 24a (Fig. IV) serve as rigid supports for the devices 21, 22 in the travel of the chains through their upper reaches, while the vertical flanges of the guides are instrumental during the joint travel of the chains in causing the bottle-supporting devices automatically to pick up bottles from a source of supply at the entrance end of the machine, to support the bottles on their way through the machine, and to allow the bottles to escape at the discharge end of the machine. As may be seen in Fig. IV, each device 21 comprises a bearing block 25, through which a spindle 26 projects. The bearing block 25 is secured to the chain 15, by means of two lugs 28, in accordance with the well-known manner of securing a block or other device to an endless sprocket chain. On its inner end the spindle 26 carries a socket member 27 (cf. Fig. III) which is adapted to seat snugly over the bottom of bottle B. On the outer end of the spindle 26 a ball bearing 34 is secured. A compression spring 32 is arranged on the spindle between the bearing block 25 and the bearing 34, and such spring tends to move the spindle 26 to the right, Fig. IV.

The bottle-supporting devices 22 are in general features of structure identical with the devices 21; that is, each device 22 includes a bearing block 29, a spindle 30, a ball bearing 31 on the outer tip of the spindle, and a spring 32 tending to shift the spindle outward with respect to the vertical mid-plane of the machine. However, there is this distinction to be noted,—in place of the socket 27; the spindle 30 of the device 22 carries at its inner end a conical nose member 33, adapted to enter and snugly engage the mouth of a bottle B.

As may be observed in Figs. I and II, each guide 23, 24 is in its extent shaped in correspondence with the course of its associated sprocket chain (15, 16). That is to say, the guides 23, 24 extend severally adjacent and parallel to the upper reaches of chains 15, 16 and at their opposite ends the guides are curved downward, having the axes of the shafts 17, 18 as radii of curvature. The bearing blocks 25, 29 of the bottle-supporting devices are provided with rigid wings 35 (cf. Fig. V). As the chains 15, 16 carry the bottle supports 21, 22 around the sprocket wheels and along the path defined by the upper reaches of the chains, these wings 35 ride the horizontal flanges 23a 24a (see Figs. IV and V) of the guides mentioned above, and, as has been already indicated, the flanges 23a 24a serve as rails to hold the bottle supports in true course in their left-to-right advance, Fig. II. As the chains 15, 16 in their travel round the sprocket wheels on shafts 17, 18, the ball bearings 31, 34 (borne upon the outer tips of the bottle-supporting spindles 26, 30 and under the urgings of springs 32) ride against the vertical flanges 23b, 24b of the guides 23, 24. It will be understood, therefore, that the interval between the socket member 27 and nose 33 of each pair of bottle supports 21, 22 is determined by the interval between the vertical guiding flanges 23b, 24b.

Along the upper reaches of the sprocket chains such vertical guiding flanges are straight (see Fig. I) and are so spaced apart that a bottle B may be engaged by and supported between the socket member 27 and nose 33 of each pair of bottle-supporting devices 21, 22. At the curved end portions of the stationary guides, the flanges 23b, 24b are flared outward, as indicated at 23c and 24c in Figs. I and III. Due to such structure as the chains travel the spindles 26, 30 of the opposite bottle supports 21, 22 of a pair are axially shifted in their bearing blocks 25, 29, when the chains 15, 16 carry them around the sprocket wheels at the left-hand end of the machine. More specifically, when the bottle-supporting devices are advancing from right to left (Fig. II) through the lower reach of travel of the sprocket chains the spindles 26, 30 are free, and the springs 32 are effective to maintain the spindles in such positions that the interval between the bottle-engaging elements 27, 33 of each pair of supporting devices 21, 22 is at a maximum, an interval that is greater than the length of a bottle B to be fed through the machine. When in their course of travel an opposed pair of bottle-supporting devices starts to round the sprocket wheels at the left-hand end of the machine, Fig. II, the ball bearing equipped tips of the spindles 26, 30 engage the flared flanges (23c, 24c), and as the devices advance, their spindles 26, 30 are by their combined engagement with the flanges shifted on common axis toward one another. During such inward shifting of the spindles the bottle-engaging elements 27, 33 are closed in engagement with the opposite ends of a bottle B. The bottle then, as the chains advance is carried upward, around the sprocket wheels, and then horizontally, through the extent of the upper reaches of the chains.

Means are provided for automatically bringing a succession of bottles one after another to the position in which the bottle-engaging elements 27, 33 will close upon them. In Fig. III the bottle B is shown in such position, and a pair of bottle-supporting devices 21, 22, advancing with the lower reaches of chains 15, 16, is in progress of rounding the sprocket wheels at the entrance end of the machine. The spindles 26, 30 of the bottle-supporting devices, in bearing at their outer tips against the converging guiding flanges 23c, 24c (during such advance of the chains) are shifted axially toward the vertical midplane of the machine, and are shown in positions immediately preceding the engagement of the elements 27, 33 with the bottle B. Continued advance of the chains, accompanied by the inward shifting of the spindles 26, 30, brings the socket member

27 to a position over the bottom of the bottle, and moves the conical element 33 into the mouth of the bottle. Thus the bottle B is engaged by a pair of traveling supporting devices, whereby the bottle is automatically removed from the supply station, and carried into the course of travel defined by the upper reaches of chains 15, 16. The lateral flanges of the guides 23, 24 are so spaced apart that, as the bottle is carried upward, into and through the common upper reach of chains 15, 16, the supporting elements 27, 33 bear with substantial pressure against its opposite ends. Advantageously, the conical element 33 is made of rubber, and the socket member 27 is faced with an elastic gasket 36 of rubber or cork, Fig. III, to prevent the pressure exerted upon the bottles from being too severe, and to compensate for such usual small variations as exist in the dimensions of bottles of a given size.

In exemplary way, the means for automatically presenting bottles to the machine are shown in Figs. II and III. Conveniently, an inclined platform 37 is supported at the entrance end of the machine; the platform is aligned longitudinally with the path followed by the bottles through the machine; a supply of bottles is placed on the platform, and, due to the inclination of the platform, the bottles roll toward the entrance end of the stenciling machine. A movable stop 38 is provided to hold the line of bottles normally in check; a mechanical linkage 39 is organized with the stop, and in response to the actuation of such linkage the stop 38 is oscillated, freeing the foremost bottle of the line, to roll down the platform to a position against a stationary stop 40, and to allow the line of bottles to advance through the vacated interval. When at rest against the stop 40, the bottle B (Fig. III) is in the precise position for the bottle-supporting devices 21, 22 to pick it up, preparatory to carrying it into the machine in the manner already described. The linkage 39 includes a tripping block 41 (Fig. II), and, as the bottle B which was last removed from the pick-up position mentioned is rounding the sprocket wheels, the tripping block 41 is engaged by the bottle, and swung in such manner as to operate the mechanism 39 for the release of another bottle from the line. The immediate return of stop 38 to initial position checks the advance of the succeeding bottles in the line of supply. So, the bottles are fed one by one to a position against stop 40, whence the advancing devices 21, 22 engage them and carry them in succession past the stencil screen 1.

In the forepart of this specification, it was shown that the bottles B are rolled across the nether face of the stencil screen. Provision is made that such rolling of the bottles shall be positive and at an angular velocity definitely related to the linear velocity of advance. Referring to Fig. IV, it will be perceived that each of the bottle-supporting devices 21 includes a gear 42 in mesh with a pinion 43. The gear 42 is integrally mounted upon spindle 26, and pinion 43 is idly mounted upon a bracket 44 which is carried by bearing block 25. A rack 45, having gear teeth along its upper edge, is secured to the frame of the machine in such organization that, as the bottles B approach the stencil screen 1, the pinions 43 of the advancing bottle-supporting devices mesh with the rack 45, and produce counterclockwise rotation of the bottles (Fig. VIII). The teeth on the rack 45 are discontinued at a point near the right-hand end of the stencil. Accordingly, while the linear advance of the bottle continues uninterrupted, their rotation is intermitted when the decorations have severally been applied upon them. The pitch diameter of each gear 42 is equal to the diameter of the bottle being decorated, whereby the surface velocity of the bottle at the line of contact with the screen is equal to the linear velocity of bottle advance. The rack 45 in engaging the pinions 43 cooperates with the horizontal flange 23a of the guide 23 in supporting the devices 21, while a guide 46 (see Fig. IV) cooperates with the horizontal flange 24a of guide 24 in supporting the devices 22, so that the devices 21, 22 and the bottles are held securely in true course on their way through the working pass of the machine.

The stencil screen 1 is mounted in the machine by supporting means which are adjustable vertically and laterally of the machine, so that the position of the screen may be altered to suit bottles of various sizes. Such supporting means comprise four corner members 47 secured to the guides 23, 24 (see Figs. I, IV, V). To the members 47 two cross bars 48 are secured; and the cross bars 48 carry four vertical angle members 49, to whose lower ends a rectangular metal frame 50 is secured. In the frame 50 the stencil screen borne upon the wooden frame 2 is firmly held, by means of any suitable screws or clamps. As shown in Fig. IV, the members 47, 48 and 49 of the screen-supporting means are all provided with longitudinal slots, and all are mounted and held in assembly by means of bolts 51 extending through the slots and secured in place by wing nuts. Manifestly, such structure admits of vertical and lateral adjustment of the screen 1.

Turning now to a consideration of the means which operate the squeegee device 4 in synchronism with the advance of bottles through the machine, attention is directed to Figs. IV and V. The arm 5 which supports the squeegee device is rotatably secured in a hollow sliding head 52; the head 52 is slideable in a guide frame 53 which is supported by the cross bars 48, above mentioned. A rod 54 is secured to the sliding head 52, and such rod is supported in bearings carried by the opposite ends of frame 53. A tension spring 55 is secured at its one end to a stationary post 56 and at its other end to an arm 57 fixed upon rod 54. Within the hollow sliding head 52 a lever 58 is secured upon the arm 5, and a torsion spring 59 is organized between the lever and the wall of the sliding head. The torsion spring tends to swing the lever 58 clockwise, Fig. V, but such swinging normally is limited by a stop 60 which is adjustably secured to the frame 53.

The upper body portion 60r of the stop extends athwart the way in frame 53 in which the head 52 is slideable, and serves as an abutment against which the sliding head 52 normally bears, under the tension of spring 55 which is effective through the rod 54 upon the sliding head. In the normal or inactive position of the sliding head 52 (see Fig. V), the lever 58 is inclined, and in such inclined position of the lever, the arm 5 is angularly so adjusted that the squeegee device 4 is held in the position shown in Fig. VI. As has been already explained, the position of the squeegee device in Fig. VI is the inactive position—the position of rest in which the squeegee member 10 closes the outlet of hopper 6.

Each of the bottle-supporting devices 22 carried by the chain 16 is provided with a finger 61, and in the travel of the device through the upper reach of chain 16 (see Fig. V), the finger 61 en-

gages the distal end of the lever 58, and, in the advance of the chain, swings the lever counter-clockwise to the dotted-line position 58a, from which position further swinging of the lever is positively prevented by engagement of the edge of the lever with the wall of the sliding head 52 (cf. Fig. V).

The counter-clockwise swinging of the lever 58 turns the arm 5, and swings the squeegee device 4 from the inactive position shown in Fig. VI into the operative position shown in Fig. VII. In limiting the counter-clockwise swing of lever 58 in the described manner, it is manifest that the uninterrupted advance of the chain 16 and the corresponding travel of the bottle-supporting devices will, by engagement of finger 61 against the lever, effect first the counter-clockwise swinging of the lever 58 into vertical position, and then the linear advance of the sliding head 52 along the guiding frame 53. Of course, the advance of the sliding head 52, in the frame 53, effects the left-to-right travel of the squeegee device 4 (Fig. VII). Such forward advance of the sliding head 52 is produced against the tension of spring 55, and, when the advance of the sliding head has caused the squeegee device to traverse the stencil screen, the engagement between the finger 61 of the bottle-supporting device is interrupted, by means of a tripping rod 62 (Figs. IV and V). Thereupon, the sliding head is freed to the influence of spring 55, and the lever 58 is freed to the influence of torsional spring 59. Manifestly, under the influence of these springs, the parts are quickly restored to their initial positions.

More specifically, the lower portion 580 of the lever 58 is pivotally secured to the upper body of the lever, and is adapted to swing laterally of the path of advance of the fingers 61 carried by the bottle-supporting devices 22. The swingable portion 580 of the lever bears a tapering cam block 580a, and the lateral face of such cam block, in the left-to-right advance of the sliding head (Fig. VII), engages the tip of tripping rod 62. Due to the taper of the cam block 580a thus moving across the tip of rod 62, the lower portion 580 of the lever is thrust aside (cf. the dotted line position 580b, Fig. IV), and freed of engagement with the finger 61 of the advancing bottle support 22. As is shown in Fig. IV, a spring 63 is organized with the lever structure, and such spring is adapted normally to maintain the lower portion 580 of the lever in alignment with the upper portion thereof, so that the distal end of the lever remains in the path of the fingers 61, save only when the tripping rod 62 effects the lateral swinging alluded to.

Thus, the squeegee device 4 is automatically oscillated, and reciprocated across the upper face of screen 1 in synchronism with the rolling of bottles against the nether face of the screen. The stop 60, 60a is adjustable longitudinally of the frame 53 in which the sliding head moves, and, accordingly, it is a simple matter so to regulate the "dead" position of the arm 5 that the sweep of the squeegee device 4 is properly synchronized with the advance of the bottles. Additionally the tripping rod 62 is adjustable in a direction parallel to the line of reciprocation of the sliding head 52, the supporting block 64 of the tripping rod being adjustably secured to the guiding flange 24b for such purpose. So it will be understood that the sweep of the squeegee device may be regulated to suit the application of a particular decoration upon bottles of a particular size. It will also be readily realized that the structure is of such nature that, when it has been once adjusted, the rotary advance of the bottles beneath the screen is positively and accurately synchronized with the movement of the self-feeding squeegee device 4.

Upon passing from beneath the screen 1, the chains 15, 16 carry each bottle-supporting device downward and around the sprocket wheels on shaft 18. Due to the outward flaring of the guiding flanges (23c and 24c) at the right-hand end of the machine (Fig. I), the springs 32 become effective to shift the stems 26, 30 outward—withdrawing the socket member 27 and conical element 33 from engagement with the bottle, whereby the bottle is released as indicated at D in Fig. II. Any convenient conveyor or receptacle may, of course, be organized at the right-hand end of the machine, to receive the discharged bottles.

In Fig. VIII a modification in the means for applying the decoration is shown. Here the design is adapted to be printed upon the bottles by means of type 80 (say rubber type set in or integrated with a block 80a of rubber) secured in any convenient frame 81. The travelling conveyor and its rotary supports comprise, as in the structure already described, a pair of chains 15a, 16a adapted to travel continuously upon the sprocket wheels on shafts 17a, 18a. And such chains are provided with the bottle-supporting devices described above. In brief, the modified machine may be substantially identical with the machine illustrated in Figs. I to V, except that the decorating means include a printing device instead of a stenciling device. The means for supplying the type 80 with the color material to be applied to the bottles include a platen 82 organized beneath the lower reach of the conveyor chains; upon the upper face of the platen is spread a supply of the color material, as printing ink is spread upon the platen of an "offset" printing press. Secured to the conveyor chains 15a, 16a is a plurality of rollers 83, and such rollers, during the travel of the chains through their lower reach, roll across the face of the platen 82. During their travel through the upper reach of the conveyor, the rollers 83 roll across the face of type 80.

In rolling across the platen 82 the surfaces of rollers 83 are coated with films of color material, and during their travel through the upper reach of the conveyor the rollers 83 apply the color material to the type 80. Thus, the modified decorating device is intermittently supplied with the color material to be applied to the bottles.

Advantageously, the rollers 83 are located intermediately of the successive bottle-supporting devices on the chains. Opposite roll-supporting brackets 84 are secured to the chains 15a, 16a for mounting the rollers upon the chains, as indicated diagrammatically in Fig. IX.

In the modified machine, as in the first described machine, the bottles moving beneath the decorating device are positively rotated with a velocity at the line of contact equal to and in direction opposite to the velocity of the conveyor. As has been already described, (cf. Fig. IV), a rack 45 cooperates with gears 42, 43 of the bottle supports, to effect the rotation of the bottles in positive synchronism with the rotation of the sprocket wheels.

Referring to Fig. X, velocity vectors indicate the relative movements effected in accordance with the invention. During the advance of each bottle B beneath the type 80 (or screen 1), the

velocity 91. The parts of the machine are so designed that the angular velocities 90 and 91 bear a definite relation to one another, and this relation is such that the surface velocity 92 of the bottle at the point or line 93 of contact between the bottle and the decorating device is equal and opposite to the effective tangential velocity 94 of the sprocket wheels. Accordingly, the velocity 92 of the bottle is equal and opposite to the linear velocity 95 of advance of the conveyor chains.

We claim as our invention:

1. In a stenciling machine, the combination of a stencil screen impervious in main and pervious in pattern, a squeegee device movable across one face of the screen, means for rolling round objects across the opposite face of the screen, and means for automatically moving said squeegee device in synchronism with the advance of said objects.

2. In a stenciling machine, the combination of a flexible stencil screen impervious in main and pervious in pattern, means for rolling a round object across one face of said screen, a movable squeegee device adapted to bear upon the opposite face of said screen, flexing it from the plane of its expanse and into engagement with said object, and means for moving said squeegee device across said opposite face of said screen in synchronism with the advance of said object.

3. In a stenciling machine, the combination of a stencil screen impervious in main and pervious in pattern, a squeegee member movable across one face of the screen, means organized with said squeegee member for automatically feeding decorating material upon said screen in advance of or during the movement of said squeegee member, means for rolling round objects across the opposite face of said screen, and means for moving said squeegee member in synchronism with the advance of said objects.

4. In a stenciling machine, the combination of a stencil screen impervious in main and pervious in pattern, a plurality of traveling supports including each a pair of opposed members movable on common axis into supporting engagement with an object to be marked, means for moving said members into said engagement with said objects, means for producing the travel of said supports to move said objects across one face of said screen, a squeegee member movable across the opposite face of the screen, and means for moving said squeegee device in synchronism with the advance of said objects.

5. In a stenciling machine, the combination of a stencil screen impervious in main and pervious in pattern, a squeegee member movable across one face of the screen, means for automatically feeding decorating material upon said screen in advance of or during the movement of said squeegee member, a plurality of traveling supports including each a pair of opposed members movable on common axis into supporting engagement with an object to be marked, means for moving the paired members of said supports into such engagement with the objects, means for producing the travel of said supports to move the engaged objects across the opposite face of said screen, and means for moving said squeegee device across said screen in synchonism with the advance of said objects.

6. In apparatus for decorating a rigid cylindrical object, the combination of a flexible stencil impervious in main and pervious in pattern and adapted to receive decorating material on bottle is rotated with an angular velocity 90 and the sprocket wheels are rotated with an angular one face, a squeegee movable across such face of the stencil, means for moving said squeegee in pressure engagement with said face of the stencil, means for holding said flexible stencil taut, said stencil being subject to displacement in response to said pressure engagement, and means for rolling said object across the opposite face of said stencil in unison with the movement of said squeegee.

7. In a decorating machine the combination of a decorating device, a conveyor movable in linear course relatively to said decorating device, means carried by said conveyor adapted to support the objects to be decorated, means for automatically shifting said object, supporting means transversely of the path of travel of the conveyor for engaging and releasing said objects, whereby, during the travel of the conveyor, the objects are engaged, moved automatically in linear course across the effective face of said decorating device, and released.

8. In a decorating machine for bottles the combination of a decorating device, an endless traveling conveyor adapted to move in linear course relatively to said decorating device, rotary supports for said conveyor, bottle supports carried by said conveyor, said bottle supports being relatively expansible and contractable transversely of the conveyor, automatic means for contracting and expanding said bottle supports temporarily to unite the objects to be decorated with the conveyor, whereby, during the travel of the conveyor, the objects are moved automatically in linear course across the effective face of said decorating device, driving means for rotating said conveyor supports, and means for producing such positive rotation of said objects that the surface velocity of each object, at the line or point of contact of the object with the face of said decorating device, is equal and opposite to the effective linear velocity of advance of said conveyor.

9. In a decorating machine, the combination of a stencil screen impervious in main and pervious in pattern, means for supporting the screen, an endless conveyor adapted to present round objects in succession to said stencil screen, means for rotatably supporting the successively presented objects in rolling engagement with one face of said stencil screen, and means operative on the opposite face of the screen for forcing decorating material through the pervious area of the screen and upon the surface of the rolling objects, said supporting means including two rotary, axially aligned, object-engaging members relatively movable transversely of the path of travel of the said conveyor for engaging and releasing said objects.

10. In a decorating machine, the combination of a stencil screen impervious in main and pervious in pattern, means for supporting the screen, an endless conveyor adapted to present round objects in succession to said stencil screen, means for rotatably supporting the successively presented objects in rolling engagement with one face of said stencil screen, and means operative on the opposite face of the screen for forcing decorating material through the pervious area of the screen and upon the surface of the rolling objects, said supporting means including two rotary, axially aligned, object-engaging members relatively movable transversely of the path of travel of the said conveyor for engaging and re-

leasing said objects, and means operable in coordination with said conveyor for automatically shifting said members between object-engaging and object-releasing positions.

11. A decorating machine including a stencil screen impervious in main and pervious in pattern, means for supporting said screen, an endless conveyor adapted to travel in linear course for presenting round objects in succession to said stencil screen, means for rotatably supporting the successively presented objects in rolling engagement with the face of said screen, said supporting means including two rotary, axially aligned, object-engaging members relatively movable transversely of the path of travel of the conveyor for engaging and releasing said objects.

12. A decorating machine including a stencil screen impervious in main and pervious in pattern, means for supporting said screen, an endless conveyor adapted to present round objects in succession to said stencil screen, means for rotatably supporting said objects, said supporting means including two rotary, axially aligned, object-engaging members relatively movable transversely of the path of travel of the conveyor for engaging and releasing said objects, and means for positively rotating the successively presented objects in rolling engagement with said stencil.

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