

May 19, 1964

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3,133,496

PRINTING OF CYLINDRICAL ARTICLES

Filed June 20, 1961

2 Sheets-Sheet 1

Fig. 1

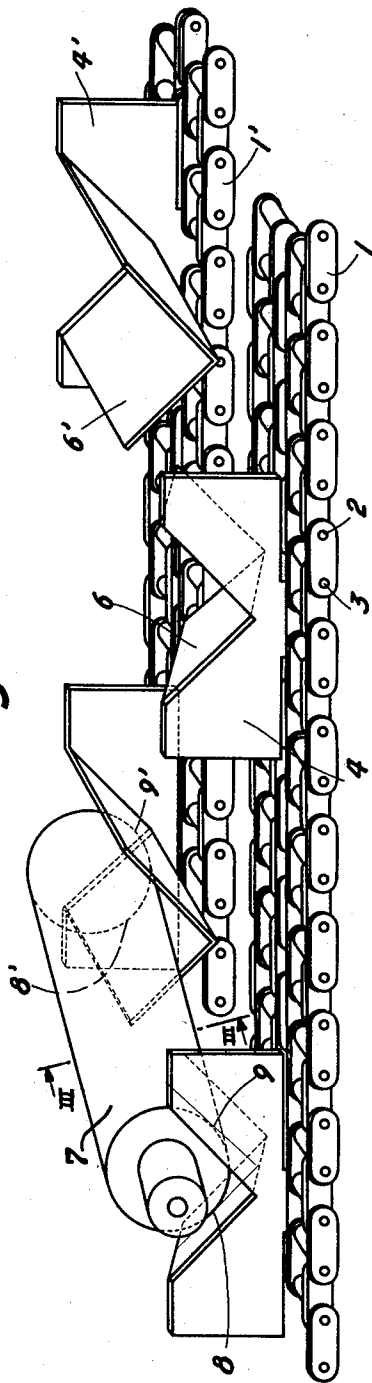
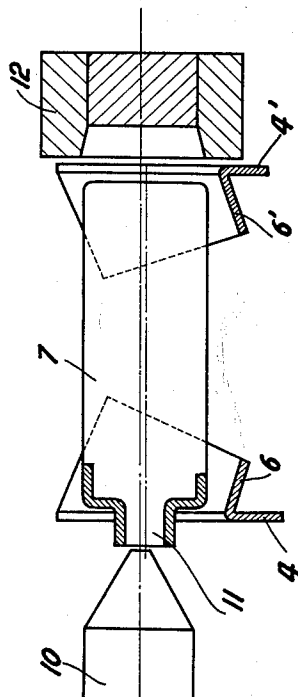


Fig. 2



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FIG. 3

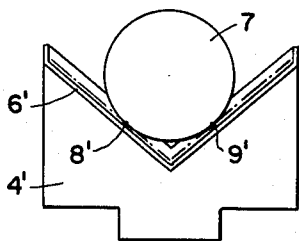


FIG. 4

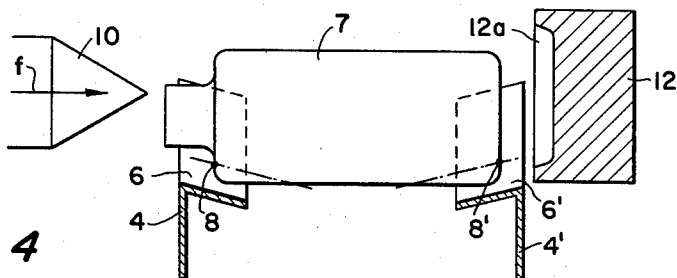


FIG. 5

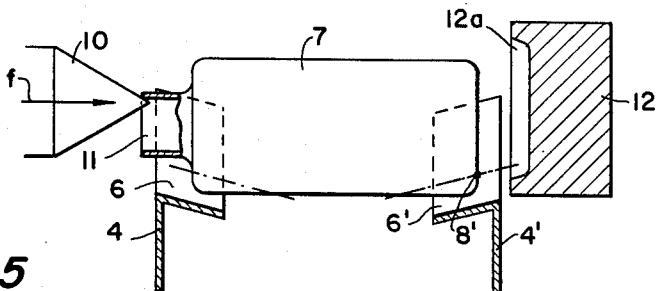
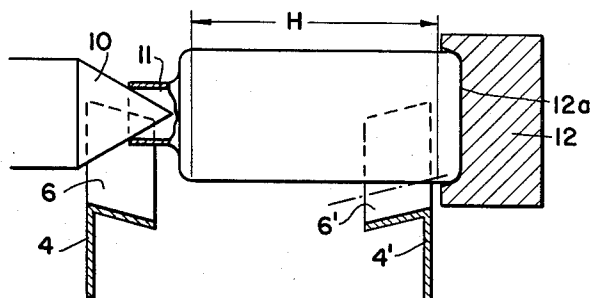


FIG. 6



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PRINTING OF CYLINDRICAL ARTICLES

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4 Claims. (Cl. 101—40)

This invention relates to systems for conveying a plurality of articles of generally cylindrical shape, such as bottles or other containers, past a processing station. The invention is specifically directed to systems for conveying such articles past a printing station at which printed matter, designs and the like are to be impressed around the side surfaces of the articles.

In the printing of legends and patterns upon the side surfaces of cylindrical, e.g. plastic, containers, such as bottles, flasks, tubes, and similar articles, the articles are sequentially positioned in horizontal condition at a printing station which may conveniently comprise a pair of holder members adapted to engage the opposite ends of each article so as to hold it in a centered position and simultaneously impart a rotation to it while the desired matter is impressed on the cylindrical surface of the article from a suitable pattern, e.g. by the so-called "silk screen" process, or other equivalent method. The holder members may include a rotatable recessed member adapted to engage around the bottom end of the article, such as a container, and a conical centering point member insertable into the opening at the opposite end of the container. After insertion of the point member to clamp the article securely against the recessed base member, a revolution is imparted to said base member while the pattern is held in inktransfer engagement with the side surface of the container to print the desired matter thereon. Then the point member is withdrawn, the printed article is discharged from the printing station and a fresh article is inserted in its place.

While the delivery of the articles to and from the printing station is still in some plants effected manually, an advantageous development has been to provide automatic conveyor means for conveying the articles serially past the station. In view of the shape of the articles under consideration, such conveyor means generally include a pair of V-shaped supports in which each article is laid, with the sides of the V-supports or cutouts engaging the cylindrical article near the opposite ends of it. Since on completion of the printing step at the printing station the printed article is immediately re-positioned on a pair of supports of the conveyor in order to be discharged from the station, it has been necessary to reserve two blank spaces during the printing step upon the surface of each article at positions corresponding to the areas of engagement of the V-shaped supports, since otherwise the freshly-printed matter would be liable to be blurred or mackled.

It is an object of this invention to provide improved conveyor apparatus whereby a series of cylindrical articles can be automatically delivered to and from a printing station without any danger of mackles or other blemishes while yet permitting the entire side surfaces of the articles to be printed on. A broader object is to provide improved conveyor means for automatically carrying a series of cylindrical articles through a printing process.

An exemplary embodiment of the invention will be described with reference to the accompanying drawing, wherein:

FIG. 1 is a perspective view of part of improved conveyor apparatus with an article supported on one of the pairs of supporting members shown;

FIG. 2 is a transverse cross sectional view illustrating a pair of supports positioned at the printing station, with

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the article about to be grasped by the holder members provided at said station prior to a printing operation;

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 2; and

FIGS. 4, 5 and 6 are transverse sectional views similar to that shown in FIG. 2 and illustrating successive positions of the lifting and positioning means for the article to be printed upon.

As shown in FIG. 1 conveyor apparatus comprises a pair of endless chain means 1 and 1', only partly shown, each chain means 1 and 1' being in the form of a pair of adjacent chains. It will be understood that both of the transversely spaced chain means 1 and 1' are actually endless loops and are trained at the ends of the loops around suitable sprocket wheels so as to be advanced in unison. Supported at longitudinally spaced positions along the chains, and in mutually facing relation, are pairs of supporting members 4 and 4', two pairs of which are shown. Each member may comprise a sheet metal flange 4 or 4' secured to the chains in upstanding condition, as by being rigidly secured to the pivots such as 2 and 3 of the chain links, through means not shown. In each flange 4 or 4' there is formed a V-shaped cutout, and welded to each flange flush with the edges of the cutout is a flange 6 or 6' bent to the shape of a dihedral angle corresponding to the angle of the cutout in flanges 4 and 4'. Each dihedral flange 6, 6' projects from its associated support 4 or 4' towards the opposite dihedral flange 6', 6, and is downwardly inclined towards the conveyor means, as clearly shown in the drawings, see especially FIG. 2. With this arrangement, a cylindrical container such as 7 (FIG. 1, left) positioned on both dihedral flanges of a common pair, will have each of the end circumferences of the cylindrical body portion of said container engaging in substantially point contact engagement two opposed areas, such as 8—9 and 8'—9', of the respective dihedral flange members. Since the supporting means do not at any time engage the cylindrical surfaces of the articles at any intermediate point between the ends of the articles, as in prior-art conveyor apparatus, it will be evident that there will be no danger of blurring or mackling, and the entire surface of the cylindrical articles is thus made available for printing.

The conveyor chains are intermittently displaced in steps, through conventional means, so as to bring each pair of supports with a container thereon sequentially to the printing station. As shown in FIG. 2 the printing station includes a pair of holder members including a point member 10 adapted to enter into the neck opening 11 of a container and a rotatable base member 12 having a recess adapted to engage around the bottom end of the container. Preferably the V-cutouts in the supports 4' are so formed that their sides are substantially tangent to the outer end circumference of the recess in member 12. Automatic mechanism, not shown, timed in synchronism with the step movement of the conveyor, causes the point 10 to advance into the neck of a container 7 positioned at the station and to clamp said container against the recessed member 12, during which movement the bottom of the container 7 slides up the inclined sides of the dihedral flange 6' and into the recess in member 12, until the container is supported by members 10—12 free of the V-shaped supporting means. These succeeding steps are illustrated in FIGS. 4, 5 and 6. Thereafter the mechanism imparts rotation to the member 12 and hence to the container 7 while a printing pattern is being applied to the side surface of the container and the conventional printing process is carried out. This printing operation having been completed, the member 10 recedes, and the container 7 is restored by gravity to its earlier position supported upon the dihedral flanges 6 and 6', without any risk of blurring as earlier explained. The conveyor is

then advanced to discharge the printed container from the printing station and deliver a further container thereto.

It will be understood that various modifications and additions in and to the single embodiment illustrated and described may be effected within the scope of the invention. Thus, advantageously the lateral spacing between the parallel chain means 1 and 1' is adjustable to cater for various lengths of container. The conveyor means are not necessarily in the form of double chains, nor in fact in the form of chains since e.g. belt or other type conveyors may well be used.

What I claim is:

1. In a system for printing the side surfaces of cylindrical articles including a printing station, conveyor apparatus for delivering said articles to and from said station said apparatus comprising endless conveyor means longitudinally displaceable past said station, and pairs of transversely spaced and substantially aligned supporting members mounted in longitudinally spaced relation on the conveyor means each member having surfaces defining an upwardly-open, V-shaped dihedron extending from each member generally toward the opposite member of each pair, with the ridge-line of the dihedron sloping downwardly and inwardly towards the other member for positive positioning of said articles in line-contact engagement of their opposite end-circumferences with said surfaces.

2. The system claimed in claim 1 wherein each said member comprises an element upstanding from the conveyor means, a V-shaped cutout in said element, and a V-bent flange having one end thereof secured in edge-to-edge relationship with the sides of the V-cutout and constituting said V-shaped dihedron.

3. The system claimed in claim 1 wherein said conveyor means comprise a pair of parallel spaced endless chain members, and each supporting member of each said

pair is upstanding from a respective endless chain member.

4. In a system according to claim 1 for printing the side surfaces of cylindrical articles having circumferential bottom and top portions the further improvement comprising cooperating first and second chuck means for the article mounted at the printing station on opposing sides of and adjacent to the conveyor means with their aligned axes perpendicular to the direction of movement of the conveyor means, at least the first chuck means being rotatable upon its said axis; the first chuck means having an inwardly open circular recess to receive the bottom portion of the article; the second chuck means mounted for reciprocating axial displacement inwardly towards and outwardly away from the top portion of the article to engage and disengage the same and on its said inwardly directed displacement to push the bottom portion of the article into said recess of the first chuck means; the dihedral surfaces of the supporting members passing adjacent the first chuck means being generally contained in planes substantially tangent to said circular recess and the dihedral surfaces of the supporting members passing adjacent the second chuck means being elevationally located to support the top portion of the article in engageable position whenever the ridgeline of the moving dihedrons is contained in a substantially vertical plane also containing the said aligned axes of the first and second chuck means.

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