July 19, 1966 A. A. LONG 3,261,734

METHOD AND APPARATUS FOR APPLYING INDICIA TO PLASTIC BOTTLES AND THE LIKE

Filed Aug. 13, 1962 2 Sheets-Sheet 1

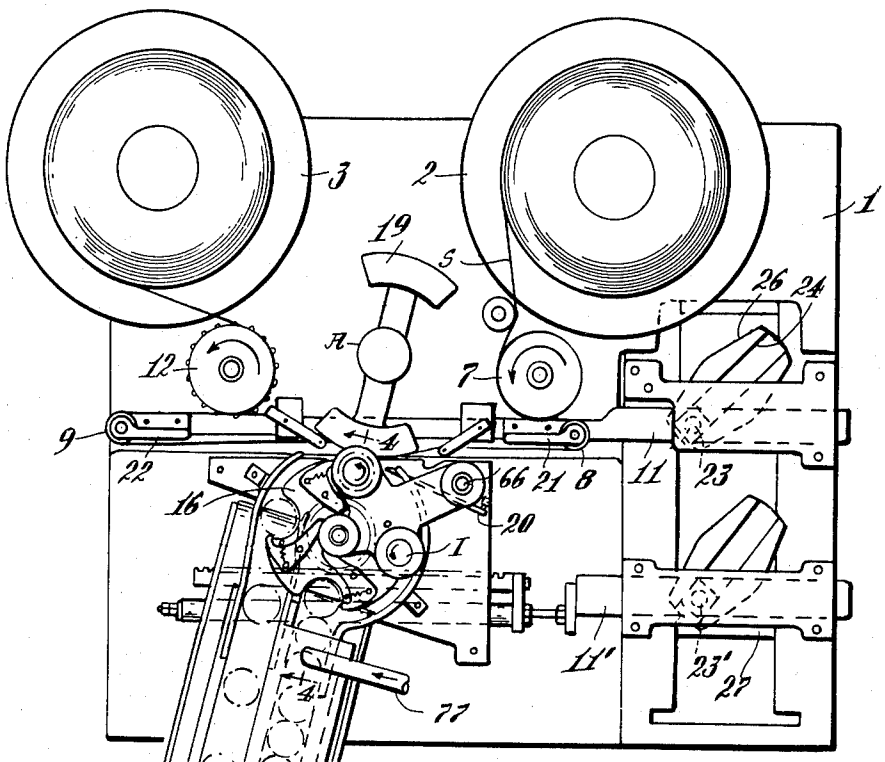


Fig. 2

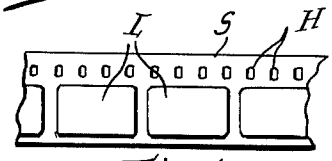
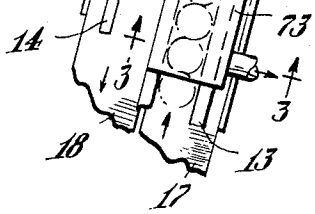


Fig. 1



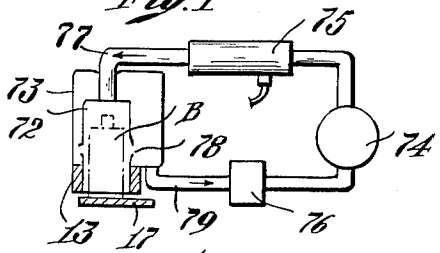


Fig. 3

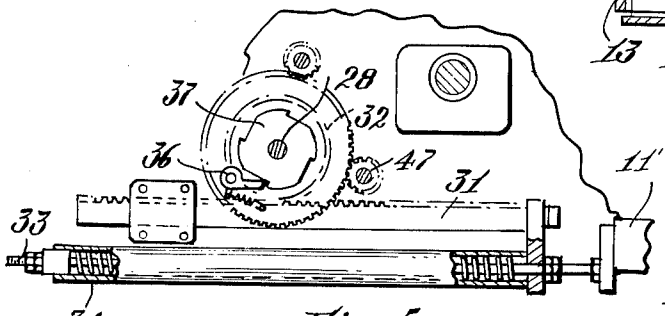


Fig. 5

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METHOD AND APPARATUS FOR APPLYING INDICIA TO PLASTIC BOTTLES AND THE LIKE

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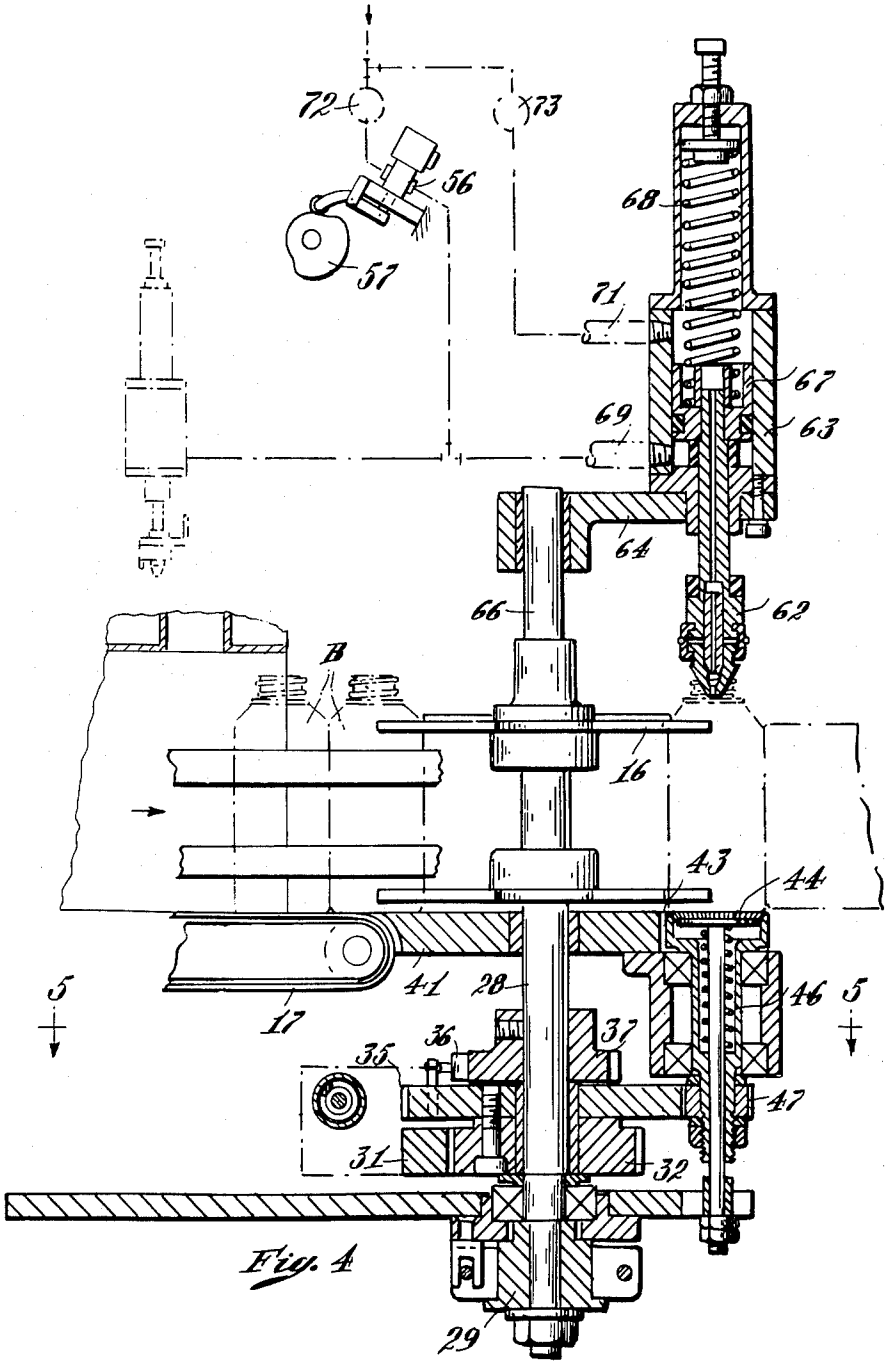


Fig. 4

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3,261,734

METHOD AND APPARATUS FOR APPLYING INDICIA TO PLASTIC BOTTLES AND THE LIKE

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4 Claims. (Cl. 156—156)

While this invention is particularly useful in applying heat-transfer labels to plastic bottles with apparatus such as disclosed in the patent of Carl A. Flood, 2,981,432, granted April 25, 1961, it may be used in applying any kind of indicia to containers of stiff flexible material which can be softened with heat.

In printing containers of the type referred to it is essential that the container make good contact, throughout the entire area being printed, with the printing medium, whether it be a heat-transfer label or type; an air space of one or two thousandths of an inch between the container and the printing medium is enough to cause imperfections in the printing. However plastic bottles, as well as other articles of stiff flexible material which can be softened with heat, are subject to irregularities in contour and wall thickness. In areas where the wall is thin it is more flexible than in areas where it is thicker.

Objects of the present invention are to provide a method and apparatus for producing good printing on all articles of the character referred to, whether or not they have any of the aforesaid imperfections.

In one aspect the present invention involves a method which comprises feeding the containers along a predetermined path, applying indicia to surfaces of successive containers at one location along the path, subjecting each container to inflation while the indicia is being applied to it, and in advance of the aforesaid location heating each container so that the inflation presses outwardly on the aforesaid surfaces and causes all of them to make good contact with the indicia-applying medium. Preferably the indicia is applied by pressing heat-transfer labels against the heated surfaces. The temperature to which the containers should be heated varies, depending upon the composition of the containers, etc., but for most plastic containers the temperature is preferably about 160° to 180° F. or just below the flow point.

By heating the containers as aforesaid the temperature of the applicator may be lowered; and by also heating the labels before transfer the temperature of the applicator can be reduced still further.

In another aspect the invention involves apparatus comprising means for feeding bottles or other containers along a predetermined path, an applicator at one location along the path for applying indicia to successive containers, means for subjecting each container to inflation while the indicia is being applied to it, and heating means in advance of the aforesaid location for softening each container so that the inflation presses outwardly on the surface of the container and causes the applicator to make uniform contact with the container throughout the area to which indicia is applied. In the preferred embodiment the applicator comprises a heated roller to press a heat-transfer label against the container. The heat-transfer labels are preferably of the type described and claimed in the patents of R. G. Shepherd, Jr. 2,862,832, granted December 2, 1958 and 2,990,311, granted June 27, 1961.

For the purpose of illustration a typical embodiment of the invention is shown in the accompanying drawings in which:

FIG. 1 is a plan view of a label strip for use in the apparatus;

FIG. 2 is a plan view of the apparatus;

FIG. 3 is a section on line 2—2 of FIG. 2;

FIG. 4 is a section on line 4—4 of FIG. 2; and

FIG. 5 is a section on line 5—5 of FIG. 4.

The particular embodiment of the invention illustrated in the drawings is especially adapted to transfer labels from a strip S to bottles B. While any heat-transfer label strip may be employed, the strip is preferably made as illustrated in FIG. 1 where the label strip comprises a paper backing S having a marginal row of sprocket holes H, the backing being coated with oxidized wax adhesively to hold the labels L printed on the wax coating with ink which is heat activatable so that when a label is pressed against a bottle or other article by means of a hot applicator engaging the back of the strip the label is transferred from the strip to the article.

As illustrated the machine comprises a main frame 1 carrying the mechanism for feeding the label strip S from a feed roll 2 to a take-up reel 3 past an applicator A. The label strip feeds over an idler roll 7, thence over two rolls 8 and 9 at opposite ends of a reciprocating carriage 11 and thence over a feed roll 12 to the take-up reel, the carriage being reciprocated back and forth to synchronize the speed of the portion of the strip S between the rolls 8 and 9 with the speed of the applicator A and the surface speed of the bottles at the label-applying station.

The bottles B are fed to and from the label-applying station through chutes 13 and 14. At the label-applying station is a turret 16 having peripheral recesses to receive the individual bottles. In the feed chute 13 the bottles are pressed against the turret so that a bottle enters each empty recess as the recess passes the chute and as each bottle reaches the delivery chute 14 it is discharged through that chute. The bottles are fed to and from the turret by conveyor belts 17 and 18. The applicator A has two raised portions 19 the circumferential lengths of each of which is preferably equal to the length of each label and the labels are fed to the label-applying station in synchronism with the rotating applicator so that the leading edge of each raised portion 19 engages the leading edge of the label and as the two move in unison the label is pressed against the bottle at the label-applying station, the bottle being rotated in synchronism with the applicator. At the label-applying station there is a gap between the guides 13 and 14 through which the labels are applied and to keep the bottles from moving through the gap a leaf spring 20 projects into the gap (FIG. 2).

When the carriage 11 is stationary the label strip S is advanced by the drive roll 12 at a constant continuous speed. However the advance of the label strip past the label-applying station should be arrested after each bottle has been labeled while the next bottle is being brought into position to be labeled. This is accomplished by moving the carriage back and forth lengthwise of that portion of the path of the label strip extending from the roller 8 to roller 9.

As shown in FIG. 2 the carriage 11 carries brackets 21 and 22, upon which the rollers 8 and 9 are mounted. Mounted on the rear side of the carriage is a cam follower 23 sliding in a slot 24 on the front side of an adjustable cam 26 which is rotatably mounted on a slide 27 which slides horizontally in a U-shaped guideway in the frame 1. The turret 16 is actuated by a similar carriage 11′ similarly mounted on the lower end of the slide 27 and carrying a similar cam follower 23′.

This mechanism is described and claimed in the aforesaid patent and the description need not be repeated for a full understanding of the present invention.

The turret 16 is mounted on a shaft 28 journaled in the main frame 1 (FIG. 4). Engaging the lower end of the shaft is a friction brake 29 to prevent overthrow of the turret as it is advanced step by step. The shaft 28 is rotated step by step by a rack 31 and pinion 32 (FIG. 5).

The rack 31 is reciprocated by the carrier 11' (FIGS. 1 and 5) through the medium of a plunger 33 and spring 34. Fast to the pinion 32 is a gear 35 upon which is mounted a dog 36 engaging a ratchet 37 fast to the shaft 28. When the rack reciprocates to the right it advances the turret one step and as it reciprocates to the left the dog 36 slides over the ratchet 37. Should the turret jam on the advance stroke the spring 34 is compressed without advancing the rack 31.

Under the turret 16 is a table 41 having two openings 43 at an indexing station I (FIG. 1) and the applicator station respectively. As the bottles are pushed over the table 41 by the turret they are moved into the openings in the table when the turret pauses between steps. In the opening at the applicator station is a rotor 44 which is pressed upwardly against the bottom of the bottle by means of a spring 46. The cup 44 is rotated by means of a pinion 47 meshing with the gear 35 fast to the shaft 28. In the opening 42 at the applicator station is a similar rotor rotated by another pinion meshing with the gear 35. Thus as the carriage 11' reciprocates to the left during each pause of the turret the bottles at the indexing and applicator stations are rotated in the direction of the arrows in FIG. 2, the rate of rotation being equal to that of the applicator A and the speed of the label strip past the applicator station. The upper surface of the cup 44 is knurled to prevent slippage but the cup 49 should be smooth to permit slippage when the cup is indexed to the proper position.

In labeling collapsible bottles they should be inflated while the labels are being applied and this may be accomplished as shown in FIG. 4 by an air nozzle 62 reciprocable in a casing 63 mounted on an arm 64 fast to a post 66 (FIGS. 2 and 4). The upper end of the nozzle 62 carries a piston 67 slidable in the casing 63, the nozzle being pressed downwardly to the operative position shown in FIG. 4 by means of a spring 68. The casing 63 has two inlets 69 and 71, the inlet 69 being supplied through a valve 56 and a pressure reducing valve 72 and the inlet 71 being supplied through a pressure reducing valve 73. The pressure at the inlet 69 should be greater than that at 71 so as to lift the nozzle against the action of the spring 68 and the air pressure above the piston 67. The cam 57 opens the valve 56 during each advance of the turret to lift the nozzle and close the inlet 71. When the turret stops the valve 56 is closed thereby permitting the spring 68 to move the nozzle to operative position in which air enters the bottle through inlet 71 and nozzle 62.

The aforesaid apparatus is described and claimed in the copending application of Carl A. Flood, Ser. No. 1,376, filed January 8, 1960.

According to this invention the bottles B are heated just before being inflated. While they may be heated in any suitable manner, in the illustration they are heated by passing them through a tunnel comprising inner and outer walls 72 and 73 through which a current of heated air is circulated through a circuit including a blower 74, a heater 75 and a filter 76. The heated air is introduced to the interior of the inner wall 72 through a conduit 77 near the exit end of the tunnel, thence flows through the interior of the inner wall to the entrant end of the tunnel, thence

flows through openings 78 to the space between the two walls 72 and 73 and thence flows out through conduit 79.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. For applying indicia to preformed containers made of stiff flexible material which can be softened with heat, the method which comprises feeding the containers successively along a predetermined path, at one location along said path applying indicia to surfaces of successive containers, subjecting each container to inflation while the indicia is being applied to it, and in advance of said location heating each container so that said inflation presses outwardly on said surfaces.

2. For applying a label to preformed containers made of stiff flexible material which can be softened with heat, the method which comprises feeding the containers successively along a predetermined path, at one location along said path pressing labels against surfaces of successive containers, subjecting each container to inflation while a label is being applied to it, and in advance of said location heating each container so that said inflation presses outwardly on said surfaces.

3. For applying indicia to preformed containers made of stiff flexible material which can be softened with heat, apparatus comprising means for feeding the containers successively along a predetermined path, at one location along said path an applicator for applying indicia to successive containers, means for subjecting each container to inflation while the indicia is being applied to it, and heating means in advance of said location for softening each container so that said inflation presses outwardly on the surface of the container and causes the applicator to make uniform contact with the container throughout the area to which indicia is applied.

4. For applying a label to preformed containers made of stiff flexible material which can be softened with heat, apparatus comprising means for feeding the containers successively along a predetermined path, at one location along said path an applicator for pressing labels against successive containers, means for subjecting each container to inflation while a label is being applied to it, and heating means in advance of said location for softening each container so that said inflation presses outwardly on the surface of the container and causes the applicator to make uniform contact with the container throughout the area of the label.

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