July 1, 1952 J. G. BLAKEY 2,601,825

PRINTING MACHINE WITH ARTICLE SUPPORTING DEVICE

Filed April 21, 1948 4 Sheets-Sheet 1

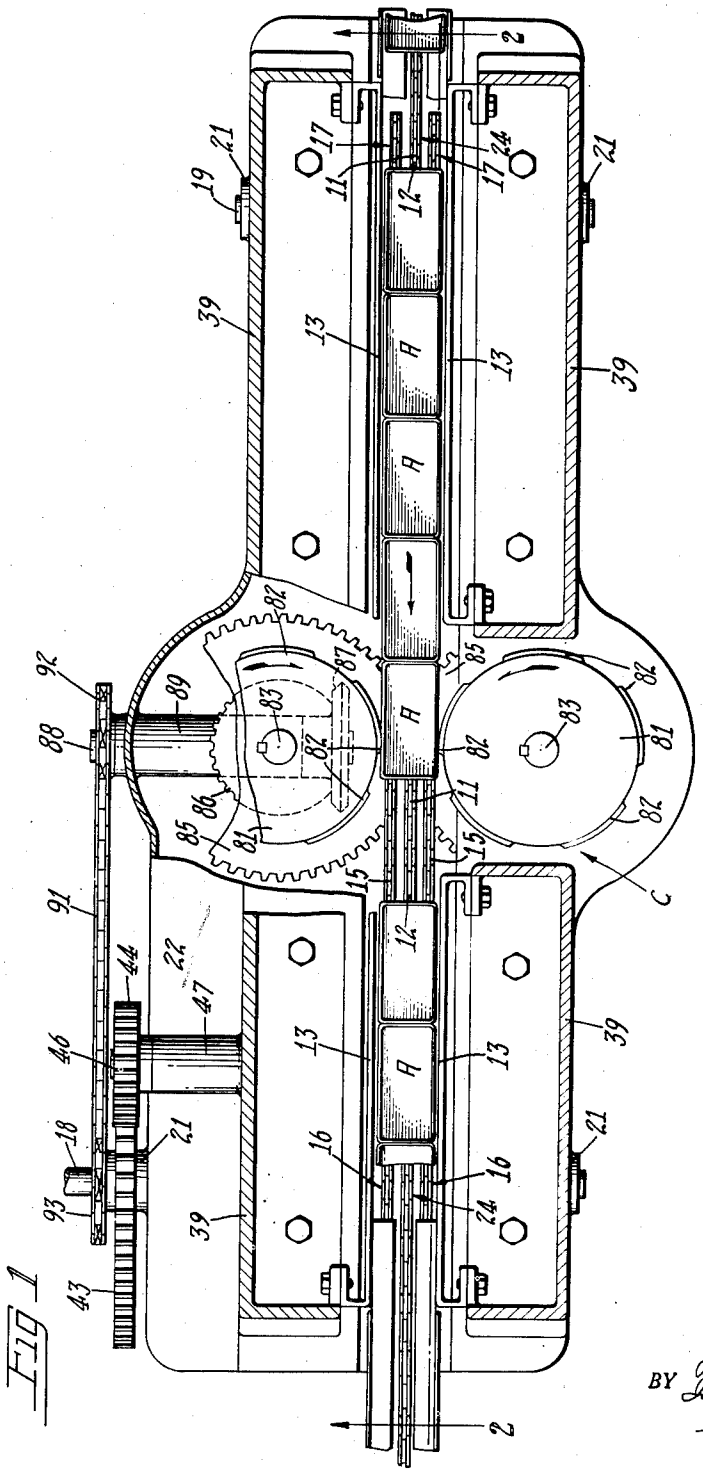


Fig 1

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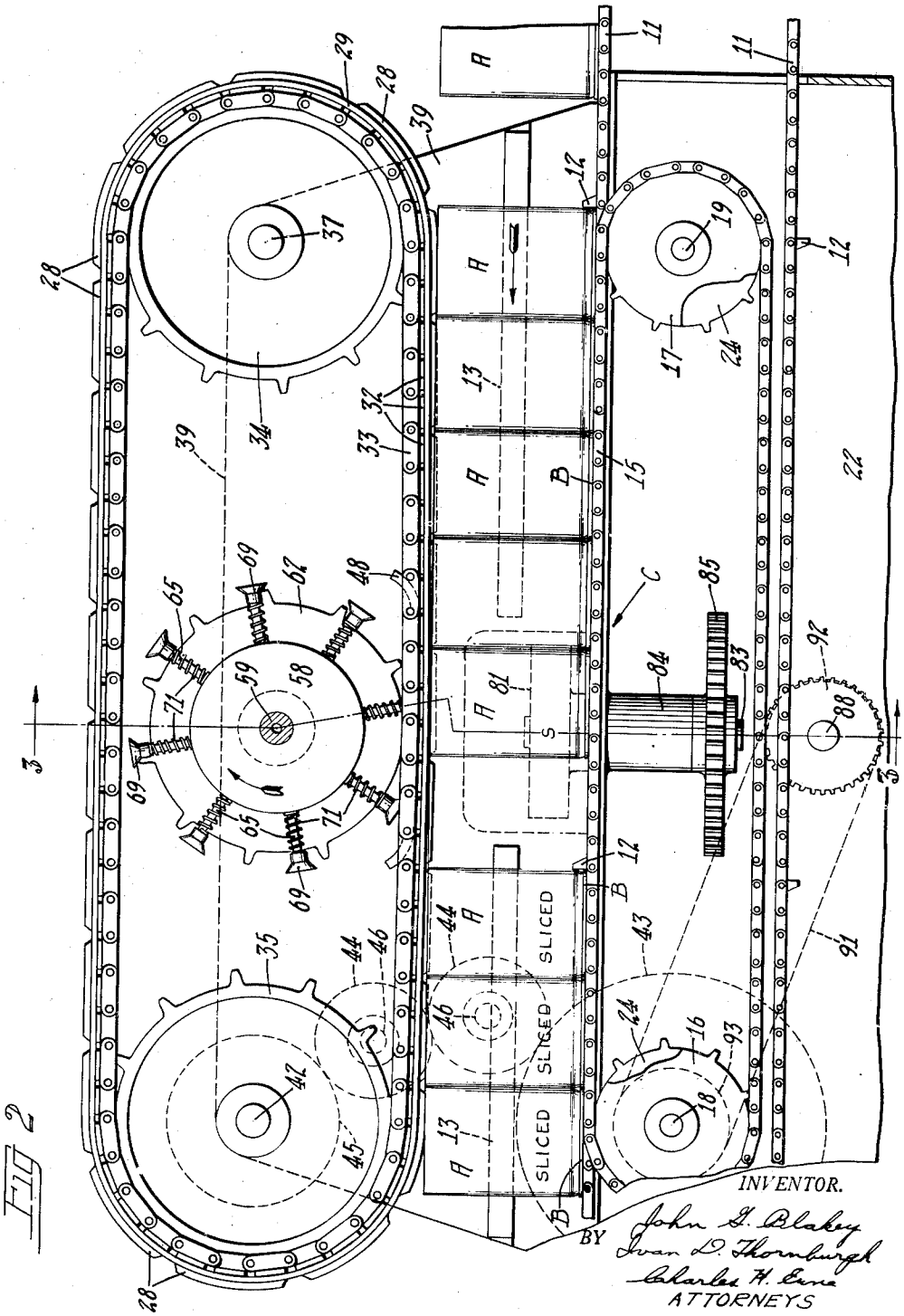


FIG 2

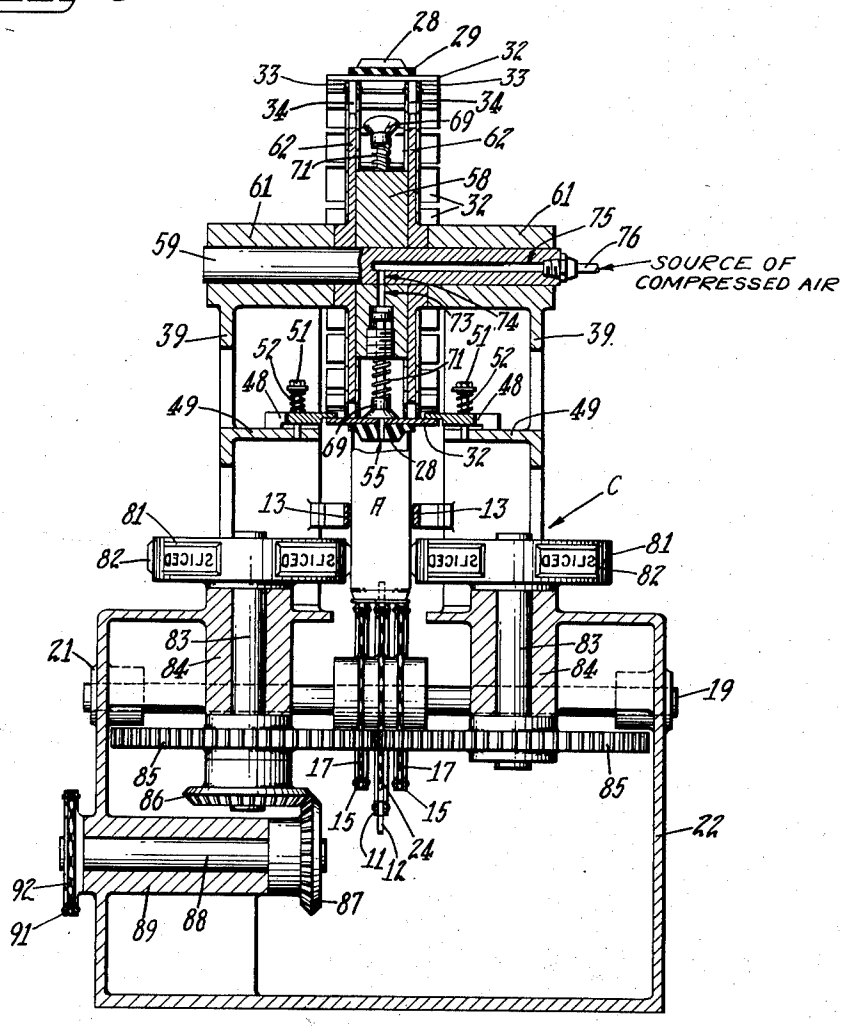
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Fig 3



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PRINTING MACHINE WITH ARTICLE SUPPORTING DEVICE

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Fig 4

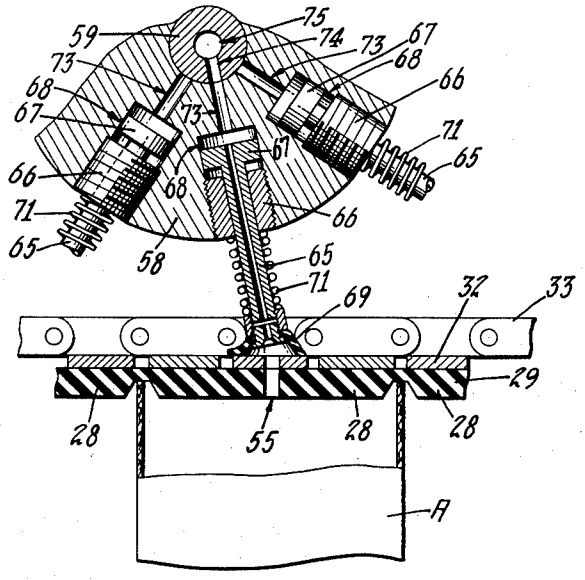


Fig 5

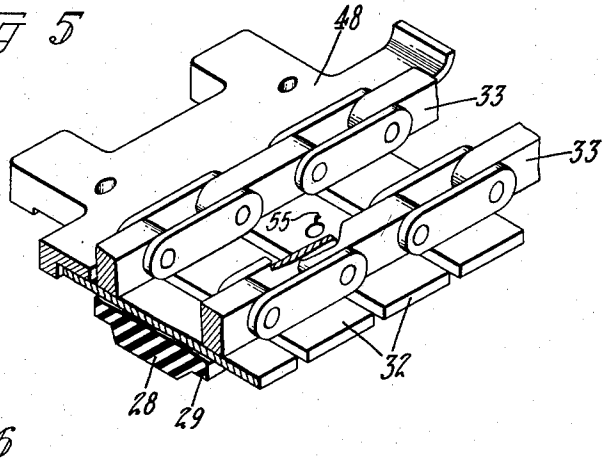
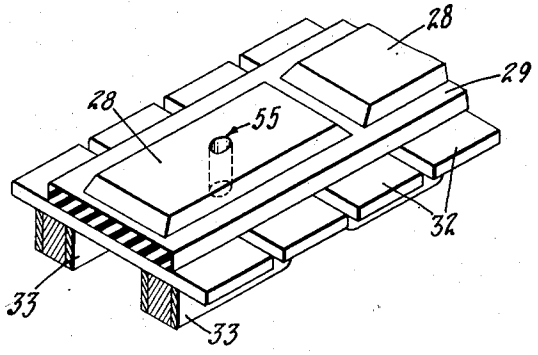


Fig 6



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UNITED STATES PATENT OFFICE

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PRINTING MACHINE WITH ARTICLE SUPPORTING DEVICE

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Application April 21, 1948, Serial No. 22,455

6 Claims. (Cl. 101—35)

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The present invention relates to a machine for printing or marking hollow articles such as empty containers and the like and has particular reference to devices for supporting the portions of the articles to be marked during the printing operation.

In the packaging of frozen foods and certain other products it is sometimes desirable to spot print on the containers, after they are made, identifying marks which signify some peculiarity of the product or the date and place of packing or the name of the packer or other information. Where the containers are made of a flexible or resilient material such as fibre or the like some difficulty has been experienced in marking them due to the lack of rigidity in the walls of the containers.

The instant invention contemplates overcoming this difficulty by providing a support for such flexible walls during the printing thereof.

An object of the invention is the provision in a spot printing machine of article supporting devices wherein flexible or resilient portions of an article to be marked may be supported sufficiently to produce a rigid or solid surface for the reception of the mark during the printing operation.

Another object is the provision of such devices wherein a fluid supporting medium is introduced into the hollow article for supporting portions thereof during the printing operation so that the portion of the article to be printed will present a solid surface with the result that a clear cut, legible mark may be readily imprinted on the supported area.

Another object is the provision of such devices wherein compressed air is utilized as a supporting medium so that articles moving in a procession of such articles may be rapidly and efficiently supported and printed as the articles pass along a predetermined path of travel under high speed rates of production.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a spot printing machine embodying the instant invention, the view showing containers passing through the machine for receiving an imprint thereon, parts of the machine being broken away;

Fig. 2 is a longitudinal section taken substantially along the line 2—2 in Fig. 1, with parts broken away;

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Fig. 3 is a transverse section taken substantially along the line 3—3 in Fig. 2, with parts broken away;

Fig. 4 is an enlarged sectional detail of a portion of the machine and includes the upper end of a container to be printed, parts of the machine and the container being broken away; and

Figs. 5 and 6 are enlarged perspective details of a conveyor used in the machine, Fig. 5 showing the upper side of the conveyor while Fig. 6 illustrates the conveyor inverted for disclosing details of its lower side.

As a preferred exemplary embodiment of the instant invention the drawings illustrate a spot printing machine for marking the word "sliced" or other desirable mark on opposed side walls of empty fibre frozen food containers A moving in processional order through a printing station C in the machine. The containers preferably are rectangular in cross-section and are fitted with metal bottoms B. The upper ends of the containers are open.

The containers A are moved through the machine in an upright position with their bottoms B resting on an endless chain conveyor 11 (Figs. 1 and 2) having feed dogs 12 secured thereto at spaced intervals. This feed conveyor is actuated continuously in any suitable manner for propelling the containers along a straight line path of travel. Guide rails 13 disposed adjacent the conveyor retain the containers in line.

The containers A are placed on the conveyor in any suitable manner in front of the feed dogs 12 and in groups of five as a matter of convenience, although they may be advanced singly or in any other relation as desired. When advanced in groups of five as shown, the space between the groups is equal to one container to preserve the timing of the containers.

As the containers A enter the machine on the feed conveyor 11, they ride onto a pair of auxiliary support conveyors 15, located one on each side of the feed conveyor 11 and extending parallel therewith. These conveyors are endless chain conveyors which operate over pairs of spaced sprockets 16, 17 (see also Fig. 3) mounted respectively on a driving shaft 18 and an idler shaft 19. The shafts 18, 19 are journaled in bearings 21 formed in a frame 22 which constitutes the main frame of the machine. The driving shaft 18 is driven continuously in any suitable manner. Sprockets 24 (see Figs. 1, 2 and 3) mounted on the shafts 18, 19 between the sprockets 16 and the sprockets 17 mesh with the feed conveyor 11 and drive it in time with the auxiliary support conveyors 15.

As the upright containers A move along with the feed conveyor 11 and the auxiliary support conveyors 15, the open upper ends of the containers are engaged by resilient support pads, chucks or toppers 28 (Figs 2, 3, 4, 5 and 6) which move through the printing station C along a path of travel coincident with and above the path of travel of the containers. There is one chuck for each container. These chucks preferably are made of rubber. Each chuck is adapted to fit within the open end of a container as shown in Figs. 3 and 4. For this purpose the chucks have a shape similar to that of the cross-sectional contour of the containers and have tapered edges to facilitate entrance into and removal from the open ends of the containers (Figs. 4, 5 and 6).

The chucks or toppers 28 preferably are formed integrally with an endless belt 29 and are spaced therealong in accordance with the spacing of the containers on the feed conveyor 11. The belt in turn is secured to a plurality of rigid crossbars 32 which are fastened to the links of a pair of spaced and parallel endless operating chains 33 disposed above the path of travel of the containers A on the conveyor 11. There are preferably three crossbars 32 for each chuck 28 and these bars provide a solid backing for the chuck while the latter is on a container.

The operating chains 33 extend parallel with the feed conveyor 11 and operate in the same direction as the feed conveyor, over pairs of spaced sprockets 34, 35. Sprockets 34 are idler sprockets and are mounted on an idler shaft 37 journaled in bearings formed in an upright section 39 of the main frame 22. The sprockets 35 are driving sprockets and are mounted on a drive shaft 42 journaled in bearings formed in the upright section 39 of the frame. This drive shaft 42 is rotated in time with the feed conveyor drive shaft 18 and at a speed which equalizes the lineal speed of the operating chains 33 with the lineal speed of the feed conveyor 11 so that the chucks 28 travel in time with the containers A. For this purpose the driving shafts 18, 42 are connected by a gear train which comprises a driving gear 43 mounted on the driving shaft 18, a pair of intermediate idler gears 44, and a driven gear 45 mounted on the shaft 42. The idler gears are mounted on short shafts 46 carried in bearings 47 formed on the upright section 39 of the main frame.

Hence, as an entering container A approaches the operating chains 33, a chuck 28 as it rotates around the idler sprocket 34 moves down into position within the top of the container and travels with the container as the latter passes under and along the operating chains. During this travel of a container, its chuck 28 is pressed down tight against the top edge of the container to temporarily seal off the interior of the container. This is effected by a pair of stationary shoes 48 (Figs. 2, 3 and 5) which are disposed at the printing station C, adjacent the path of travel of the chucks and which are located one on each side thereof.

The inner marginal edge portions of the shoes 48 overhang and press against the chuck crossbars 32. The outer marginal edge portions of the shoes rest on horizontal webs 49 of the upright frame section 39. Intermediate its edge portions the shoes are yieldably held in place by bolts 51 which extend through the shoes and are threadedly engaged in the webs 49. The bolts 51 extend above the shoes and are surrounded by compression springs 52 which press the shoes against the chuck crossbars 32. It is these springs that press the chucks against the upper ends of the containers as they pass under the shoes 48.

In some cases where the containers have fairly rigid side walls, the chucks 28 alone may be sufficient to support them during a printing operation. In most cases where the container walls lack rigidity a fluid support medium, preferably compressed air, must be introduced into the container to rigidify and thus support the flexible walls of the container for the printing operation, while a chuck 28 is pressed tightly against the upper end of a container A. For this purpose, each chuck 28 is provided with an opening 55 (see Figs 3, 4, 6) which extends up through the middle of the chuck and the adjacent crossbar 32.

The compressed air is introduced into the container through the chuck opening 55, by a rotating wheel 58 (Figs. 2, 3 and 4) which is disposed at the printing station C adjacent the chuck hold down shoes 48 and is located between the upper and lower runs of the operating chains 33. This wheel rotates freely on a stationary cross shaft 59 which is secured in bearings 61 formed in the upright frame section 39. The wheel is rotated on the shaft in time with the moving containers A, by a pair of sprockets 62 which are located one on each side of the wheel and which are secured to the wheel. These sprockets mesh with the lower runs of the operating chains 33 and thus drive the wheel in time with the travel of the chucks 28.

The wheel 58 carries a plurality of radially disposed and yieldably mounted tubes 65 (Fig. 4) which are located around the wheel in spaced relation corresponding to the spacing of the containers A on the feed conveyor 11. These tubes are radially slideable in bushings 66 threadedly secured in the wheel. The inner ends of the tubes are formed with heads 67 which are disposed within clearance recesses 68 formed in the wheel and which limit the outward travel of the tube. The outer ends of the tubes carry resilient cups 69, preferably made of rubber and having an air orifice communicating with the interior of the tubes. The cups are normally pressed outwardly by compression springs 71 which surround the tubes and which are interposed between the cups and the bushings.

The interior of the tubes 65 communicate with radial channels 73 which are formed in the wheel 58 and which extend from the clearance recesses 68 to the stationary shaft 59. These channels 73 are rotated with the wheel, into register with a single stationary radial channel 74 formed in the shaft. The inner end of the channel 74 communicates with a longitudinal bore 75 which is formed in the shaft and which extends from the radial channel 74 to one of the outer ends of the shaft (see Fig. 3). At this end of the shaft the bore communicates with a supply pipe 76 which leads from any suitable source of compressed air. As long as an air cup 69 and its tube 65 are out of register with the channel 74 the air from the bore 75 in the shaft 59 is cut off from the cup.

Hence, as a chuck 28 and its sealed off container A passes through the printing station C, adjacent the chuck hold down shoe 48, the wheel 58 rotates an air cup 69 into place over the opening 55 in the chuck and its adjacent crossbar 32 and holds it there while the chuck and the container pass under the wheel. The spring 71

acting against the cup permits the tube to move inwardly during this passage. While the cup is thus in alignment with the bore 55 in the chuck crossbar 32, the wheel rotates the channel 73 associated with this engaged cup, into reigster with the stationary channel 74. This permits compressed air from the shaft bore 75 to flow through the channels 73, 74, tube 65 and cup 69, into the interior of the container A through the chuck opening 55 and thus fill the container with air. The pressure of the air is regulated in any suitable manner to properly rigidify and hold the sides of the container firm without bulging or bursting the container.

With the sides of the container thus held firm and while the interior of the container is still in communication with the air inlet bore 75 in the stationary shaft 59, the printing of the container is effected. This printing operation may be carried out in any suitable manner, preferably by a pair of rotating printing wheels 81 (Figs. 1, 2 and 3) located at the printing station C and having type elements 82 carried on their outer peripheries. The printing wheels are arranged one on each side of the path of travel of the containers and the type elements are engageable with both supported sides of the containers for imprinting them as they pass between the wheels.

The printing wheels 81 are mounted on the upper ends of vertical shafts 83 journaled in bearings 84 formed in the main frame 22. The shafts are rotated continuously in opposite directions in time with each other and with the travel of the containers, by a pair of meshing gears 85 mounted on the lower ends of the shafts. One of the shafts is a driving shaft and carries a bevel gear 86 which meshes with and is driven by a cooperating bevel gear 87 mounted on a short shaft 88 journaled in a bearing 89 formed in the frame 22. The shaft 88 is rotated continuously by an endless drive chain 91 which operates over a sprocket 92 carried on the outer end of the shaft and over a driving sprocket 93 mounted on the main drive shaft 18.

Upon completion of the printing operation, the wheel 58 rotates the air channel 73 out of registry with the air inlet channel 74 and hence the flow of air into the container is cut off. With further rotation of the wheel and continued advancement of the chuck 28 and its printed container A, the wheel rotates the air cup 69 away from the chuck crossbar 32 and thus uncovers the chuck opening 55. This permits the compressed air within the container to escape.

With the printing and supporting cycle thus completed the printed container rides from under the chuck hold down shoes 48 and continues its travel toward the discharge end of the machine where the chuck is disengaged from the container and carried up along the upper run of the operating chains, to return into position on another container for a repeat operation. The printed container remains on the feed conveyor 11 and is carried by this conveyor to any suitable place of discharge. In this manner each container A in the procession passing through the machine is acted upon individually and is properly supported for the printing operation.

It should be understood that the mechanism hereinbefore described could be readily adapted for operations upon inwardly supported hollow articles such as containers, other than a printing operation. For example, a labeling device could be substituted for the printing rollers.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for printing on hollow articles having flexible walls, the combination of a continuously moving conveyor for supporting and propelling along a predetermined path of travel an article having an opening therein, sealing means engageable with said moving article for sealing the article opening, said sealing means having an opening therein providing communication with the interior of the article through its opening, a supply pipe having connection with a source of fluid medium, means separated from said sealing means and movable relative to both sealing means and said supply pipe for introducing into the moving article a fluid medium for supporting its flexible walls for a printing operation, and a printing element also disposed adjacent said path of travel and engageable with a said fluid supported wall of said moving article for effecting said printing operation.

2. In a machine for printing on hollow articles having flexible walls, the combination of a continuously moving conveyor for supporting and propelling along a predetermined path of travel an article having an opening therein, a traveling sealing chuck engageable with the movable article for sealing the article opening, said chuck having an opening therein providing communication with the interior of the article through its opening, a wheel disposed adjacent the path of travel of said article and rotatable relative to said sealing chuck in time with the advancement of said article, a yieldable member carried on said wheel and movable by the wheel into engagement with said sealing chuck over its opening for introducing into the moving article a fluid medium for supporting its flexible walls for a printing operation, and a printing element also disposed adjacent said path of travel and engageable with a said fluid supported wall of said moving article for effecting said printing operation.

3. In a machine for printing on hollow articles having flexible walls, the combination of a continuously moving conveyor for supporting and propelling along a predetermined path of travel a procession of a plurality of spaced and timed articles having openings therein, a plurality of movable sealing chucks engageable with the moving articles for sealing the article openings, said chucks having openings therein providing communication with the interiors of the articles through their openings, a wheel disposed adjacent the path of travel of said articles and rotatable relative to said sealing chucks in time with the advancement of said articles, a plurality of spaced and yieldable members carried on said wheel and individually movable by the wheel into engagement with said sealing chucks over said openings in said chucks for introducing into the moving articles a fluid medium for supporting their flexible walls for a printing operation, and a printing element also disposed adjacent said path of travel and engageable with a said fluid supported wall of said moving articles for effecting said printing operation.

4. In a machine for printing on hollow articles

having flexible walls, the combination of a continuously moving conveyor for supporting and propelling along a predetermined path of travel an article having an opening therein, a traveling sealing chuck engageable with the moving article for sealing the opening therein, said chuck having an opening therein providing communication, through the opening in the article, with the interior of the sealed article, a wheel disposed adjacent the path of travel of said article and movable relative to said sealing chuck in time with the advancement of said article by said conveyor, a source of fluid medium connecting with said wheel, a valve member carried by said wheel and engageable over the opening in said sealing chuck and moving with said advancing article, said valve member when in such engagement forming communication with said fluid medium source for introducing into the moving article a fluid medium for supporting its flexible walls for a printing operation, and a printing element also disposed adjacent said path of travel and engageable with a said fluid supported wall of said moving article for effecting said printing operation.

5. In a machine for printing on hollow articles having flexible walls, the combination of a moving conveyor for advancing articles, having openings, along a lineal path of travel and in spaced order through a printing station, an endless belt disposed adjacent said conveyor, at least one run of said belt moving parallel to the articles advancing with the conveyor and engaging the open end of each article for sealing the article interior, said belt having an opening for and in communication with the interior of each sealed article, means rotatable adjacent the parallel run of said belt and having connection with a source of fluid medium, a yieldable member carried by said rotatable means and engageable with said belt and surrounding the belt opening, valve means carried by said rotatable means for introducing a fluid medium into the associated sealed article when said yieldable member engages said belt for supporting the flexible walls of said article from the inside, and printing means at said printing station and engageable with said

fluid supported wall for printing on the exterior of the article.

6. In a machine for printing on hollow containers having flexible walls, the combination of a continuously moving conveyor for advancing containers, having openings, along a lineal path of travel and in spaced order through a printing station, an endless belt disposed adjacent said conveyor, resilient chucks carried on one side of said belt at spaced intervals corresponding to the spaced locations of the containers on said conveyor, one run of said belt moving parallel to the containers advancing with the conveyor and in position to engage each chuck within an open end of each container for sealing off the container interior while at said printing station, said belt and each of said chucks having aligned openings in communication with the interior of each sealed container, a rotatable wheel located on the side of said belt opposite said chucks and having resilient cups engageable with said belt and surrounding a said chuck opening for introducing a fluid medium through the aligned chuck and belt openings into the sealed container for supporting its flexible walls from the inside while the container is passing through said printing station, and printing means located at said printing station and engageable with said fluid supported wall for printing on the exterior of the container during its advancement with said conveyor.

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