

Aug. 4, 1970

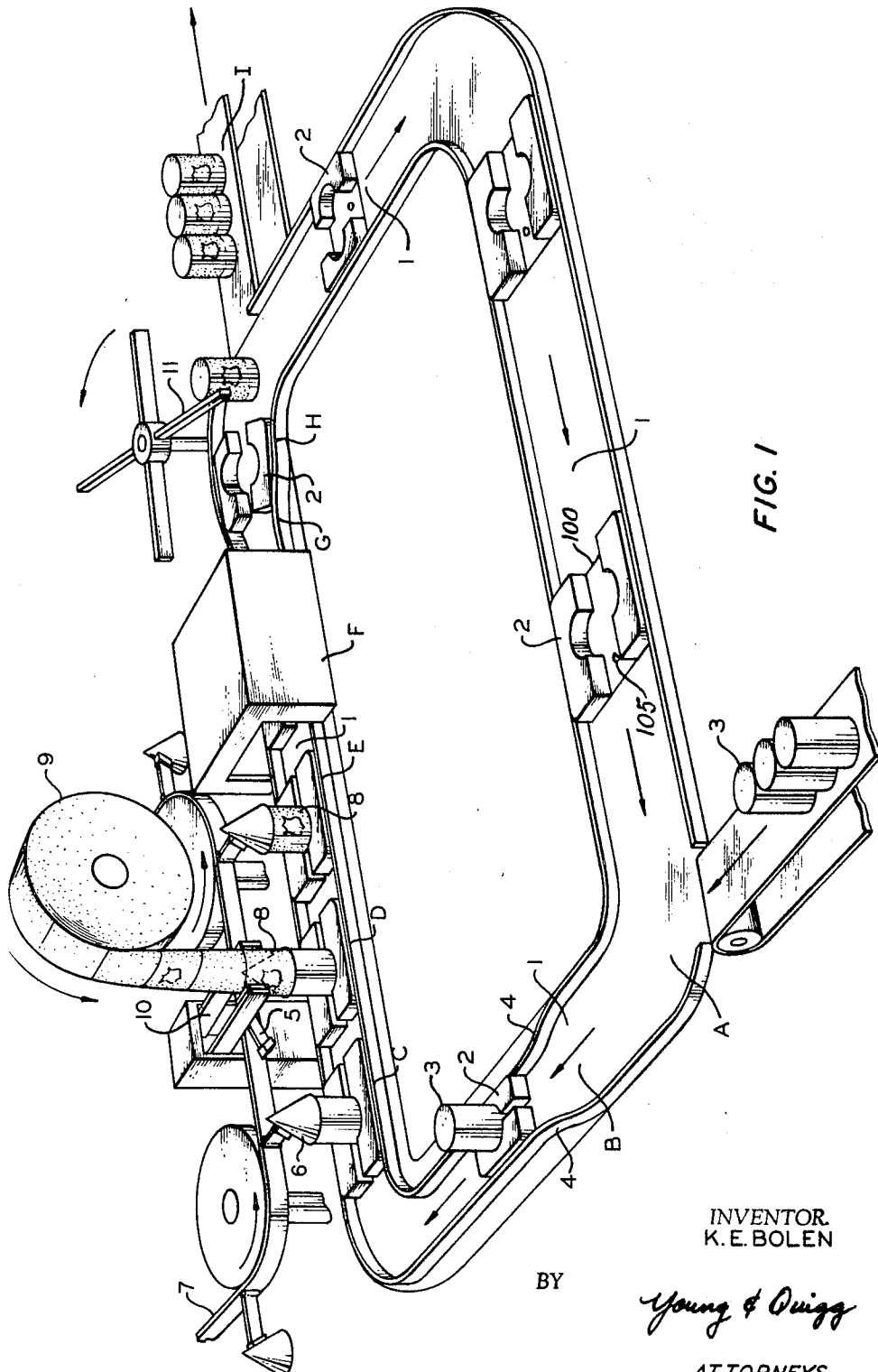
K. E. BOLEN

3,523,052

CONTINUOUS APPLICATION OF HEAT SHRINKABLE LABELS

Filed May 5, 1969

3 Sheets-Sheet 1



3,523,052

3 Sheets-Sheet 2

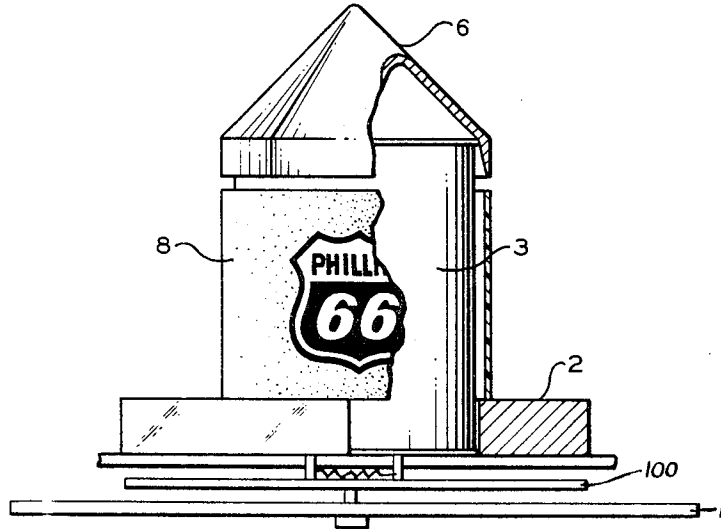


FIG. 2

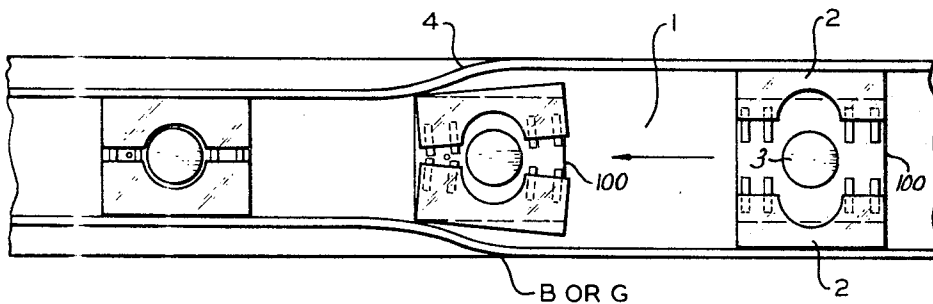


FIG. 3

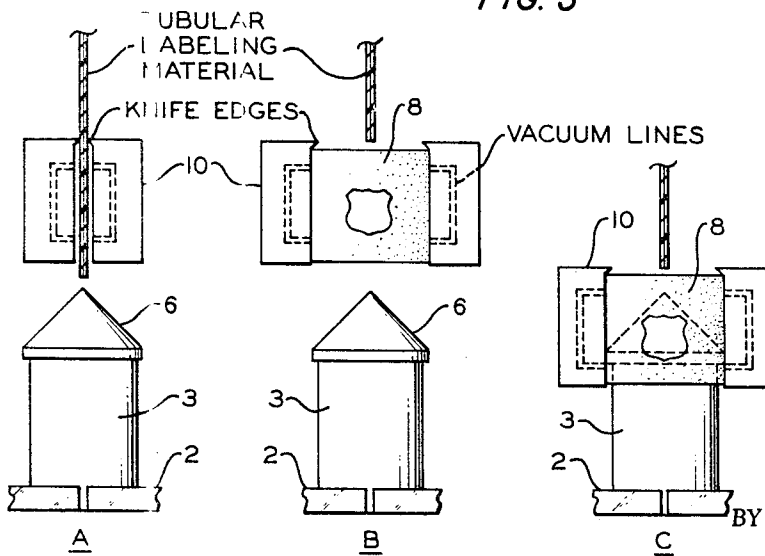


FIG. 4

INVENTOR.
K. E. BOLEN

Young & Quigg

ATTORNEYS

Aug. 4, 1970

K. E. BOLEN

3,523,052

CONTINUOUS APPLICATION OF HEAT SHRINKABLE LABELS

Filed May 5, 1969

3 Sheets-Sheet 3

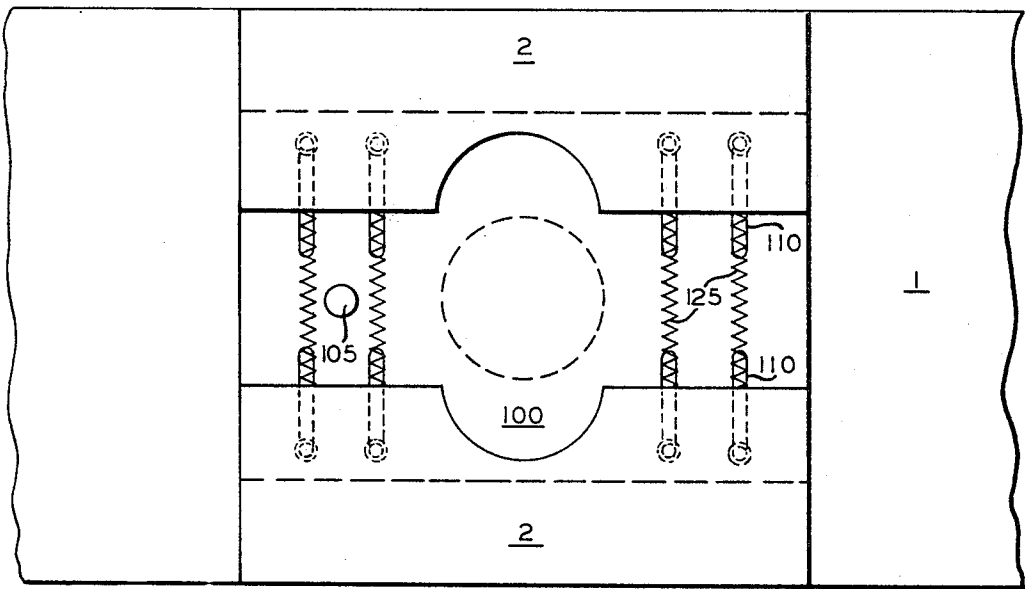


FIG. 5

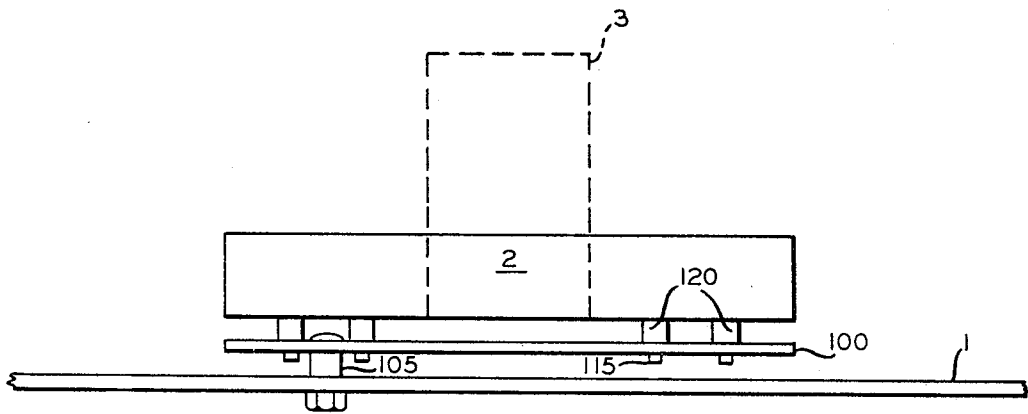


FIG. 6

INVENTOR.
K. E. BOLEN

BY *Young & Quigg*

ATTORNEYS

1

3,523,052

CONTINUOUS APPLICATION OF HEAT SHRINKABLE LABELS

Kenneth E. Bolen, Bartlesville, Okla., assignor to Phillips Petroleum Company, a corporation of Delaware
Continuation-in-part of application Ser. No. 401,186, Oct. 2, 1964. This application May 5, 1969, Ser. No. 824,363

Int. Cl. B32b 31/00

U.S. Cl. 156—521

3 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for applying tubular heat shrinkable labels to containers which includes movable blocks for holding the containers and positioning the labels and guides which are placed on the top portion of and are carried by containers as the label is being placed thereon.

This application is a continuation-in-part of my copending application Ser. No. 401,186, filed Oct. 2, 1964, now abandoned, titled Continuous Application of Heat Shrinkable Labels.

This invention relates to an apparatus for the application of heat shrinkable labels to containers.

Various methods for the labeling of containers are in use today. The most widespread method for labeling containers, particularly cylindrical containers, is the use of printed paper labels. Such labels are often torn or damaged, detracting from the eye appeal of the package. When paper labels are torn completely from the package, it may be impossible to identify the contents without opening the package and thus completely destroying its salability. Moreover, paper labels are hygroscopic and permit the easy corrosion of metal cylindrical bodies of cans, especially along the seams. Another widespread method of labeling cylindrical containers is by printing the external surface of the container. This is a costly operation and has several disadvantages. The printed labels on tin cans are often damaged in the packaging procedure, and the area where both ends of the sheet are sealed together into a soldered seam must necessarily be left unprinted, presenting an effect which is not pleasing to the eye. Also, cans so printed cannot thereafter be employed for contents other than that initially intended. With the recent development of plastic containers added labeling problems have arisen. Printing on plastic containers must be done after the container is fully fabricated. Printing fully fabricated cylindrical cans involves such expensive processes as the "silk screen" process. It is evident that the development of a simple apparatus for the continuous application of inexpensive durable and attractive plastic labels to containers would be a valuable contribution to the art.

It is an object of this invention to provide an apparatus for the continuous application of plastic labels to containers. It is another object of this invention to provide an apparatus for the continuous application of attractive preprinted plastic labels to cylindrical containers. It is still another object of this invention to provide an apparatus for the continuous application of preprinted heat shrinkable labels to containers of novel and irregular shape.

Various other objects, aspects, and advantages of this invention will be apparent to those skilled in the art upon careful examination of the disclosure, the appended drawings and the claims.

I have invented an apparatus that continuously applies heat shrinkable labels to containers. Basically, my apparatus consists of a conveyor belt with a series of carriages attached thereon. Each carriage carries two blocks. The

2

blocks are constructed in such a manner that the containers to be labeled are placed on the carriage and then the blocks mechanically secure the containers in an upright position on the carriage which is attached to the moving belt. The containers secured to the carriage are then moved past a point where a mechanical arm places a conically shaped guide apparatus on top of them. The containers with the conically shaped guide resting on their tops are then moved to a point where tubular section of a preprinted heat shrinkable tubular label is placed over the apex of the cone. The section of the tubular label is cut from a supply of the material and slides downwardly over the conically shaped guide and thus around the containers. The containers are then moved past a point where another mechanical arm removes the conically shaped guide from their tops. The containers with the tubular heat shrinkable labels around them move to a heat shrinking tunnel where heat is applied to the labels. The heat shrinkable labels shrink around the containers, forming smooth, tight, attractive labels. The containers then move past a point where the block releases them from the conveyor belt. After being released the containers are removed from the belt.

To more fully describe my invention, the appended drawings illustrate one embodiment of my unique apparatus. FIG. 1 illustrates an isometric view of an apparatus used to apply labels to cylindrical oil cans. FIG. 2 is a side elevation view showing a block apparatus securing a cylindrical container with the conically shaped guide resting on it and a heat shrinkable label disposed around the container. FIG. 3 is a top view of a portion of the conveyor belt showing the operation of the block apparatus securing the container to the conveyor belt. FIG. 4 is a side view of the label cutter, showing the operations of cutting and positioning a label. FIG. 5 is a plan view of the blocks showing the carriage upon which they are disposed. FIG. 6 is an elevation view of the embodiment of FIG. 5.

In FIG. 1, conveyor belt 1 is disposed in an essentially circular arrangement for continuous operation. A series of split blocks 2 are attached to conveyor belt 1 by a carriage 100. Unlabeled cans 3 are removed from a conveyor as illustratively shown in FIG. 1 and are placed on carriage 100 at point A either manually or by a mechanical arm, not shown. Unlabeled cans 3 are placed on carriage 100 between split blocks 2 in such a position that the semicircular recesses in split blocks 2 will close around cans 3 to secure them to the carriage in an upright position. As shown in FIG. 1, split blocks 2 are spread open when cans 3 are placed on conveyor carriage 100. As conveyor belt 1 moves in a clockwise direction, the outer leading edge of split blocks 2 comes in contact with raised guide rails 4 which are disposed along the path of, but above, conveyor belt 1. Guide rails 4 are disposed above belt 1 in such a manner that they become more narrowly spaced at point B. Thus, when conveyor belt 1 moves the split blocks 2 toward the narrowing width at point B, the movable segments of split blocks 2 move toward the center of the belt and secure unlabeled cans 3 in an upright position. The semicircular recesses in split blocks 2 are adjusted such that they contact the base of unlabeled cans 3 with firm but not crushing pressure. Guide rails 4 are positioned such that they keep split block 2 clamped firmly around the base of cans 3 during the entire labeling cycle. Conveyor belt 1 can comprise any conveyor belt that is capable of conveying a carriage such as carriage 100 around substantially right angle corners. Specifically, the conveyor belt in U.S. 2,627,339 to Whiting on Feb. 3, 1953, or the conveyor belt in U.S. 2,689,638 to Mojonier on Sept. 21, 1954, can be used to practice this invention. As cans 3 move to point C, mechanical arm 5 moves a conically shaped guide apparatus 6 directly over cam 3.

3

Mechanical arm 5 places conically shaped guide 6 on top of can 3 and releases it such that conical guide 6 rests directly on top of can 3. A small electromagnet on the end of mechanical arm 5 is used to support conically shaped guide 6 before it is placed on can 3. By interrupting electrical energy to the electromagnet, conically shaped guide 6 is placed on can 3. Several mechanical arms 5 are positioned on conveyor means 7 which rotates counterclockwise. Unlabeled cans 3 with conically shaped guide 6 resting on top then move to point D where a segment of preprinted tubular heat shrinkable labeling material 8 is placed over the apex of conically shaped guide 6. A supply of preprinted tubular heat shrinkable labels is maintained on reel 9 which is positioned above point D. Segment 8 of the tubular heat shrinkable label is severed from the roll of material by label cutter 10 at point D. This segment is then placed over conically shaped guide 6 and thus around can 3 by cutter 10. The base of segment 8 rests on top of split block 2. Can 3 with the segment of tubular heat shrinkable labeling material then moves to point E where mechanical arm 5 removes conically shaped guide 6 from the top of can 3 by applying electrical energy to the small electromagnet disposed in the end of arm 5. Arm 5 is attached to conveyor belt 7 by a pin arrangement such that arm 5 can fold back out of the path of label cutter 10 and the tubular heat shrinkable material extending downward from reel 9. After mechanical arm 5 passes the tubular heat shrinkable material hanging down it is then extended outwardly to point E where it removes conically shaped guide 6 from the top of can 3. Can 3 with the segment of heat shrinkable label 8 disposed around it then moves to point F which is a heat shrink tunnel. As the can with the label disposed around it moves through the heat shrink tunnel, heat is applied and the label shrinks around the can to form a smooth, durable, tight surface. The can secured between the segments of split block 2 then moves to point G where guide rails 4 widen. As guide rails 4 widen, the two split block segments move outwardly, thus releasing labeled can 3. As labeled cans 3 move to point H, mechanical arm 11 rotates in a counterclockwise position and comes in contact with can 3 and moves it off belt 1 to point I. The fully labeled cans at point I can then be removed for packing and shipping.

FIG. 2 illustrates a side view of carriage 100 and split block 2 disposed around can 3 at a position between points D and E in FIG. 1. The cut-away portion of FIG. 2 shows how the segments of split block 2 contact the base of can 3 and secure it in an upright position on conveyor belt 1. Conically shaped guide 6 rests on the top of can 3. The drawing illustrates the smooth finish of conically shaped guide 6 with small lips in its base to fit over the top of can 3. The segment of tubular heat shrinkable plastic label 8 is shown disposed around can 3 before it is shrunk into position. It is noted that split block 2 serves to both secure can 3 to the conveyor belt and also to position label 8 on the container. Thus, by varying the height of split block 2 the position of label 8 can be varied on can 3.

FIG. 3 shows a top view of a portion of the conveyor belt 1 at either points B or G in FIG. 1. The top view shows can 3 on the conveyor belt before it is secured in place by split blocks 2. Can 3 is positioned essentially between the semicircular recesses in the two segments of split block 2. As the conveyor belt 1 moves to point B where the width of guide rails 4 narrows, the two segments of split block 2 move toward the center of the belt and secure can 3 within the semicircular recesses of the blocks. As the belt moves to point G where guide rails 4 widen, the two segments of split blocks 2 move toward the edge of the belt and can 3 is released from the belt.

FIG. 4 shows a side view of the operation of label cutter 10. In view A, the two opposing jaws of label cutter 10 move toward each other and knife edges along the top portion of the jaws cut a segment of the tubular label material from reel 9. Small apertures inside the jaws of

4

cutter 10 are connected to a vacuum line. The partial vacuum created by these small apertures cause segment 8 of the tubular labeling material to adhere to the jaws of cutter 10. The jaws of cutter 10 are then moved apart as shown in view B. As the jaws spread apart, segment 8 of the tubular labeling material is also spread open into an open cylinder, held securely to the jaws by the small apertures connected to the vacuum line. The jaws then move downward, as shown in view C, over conically shaped guide 6 resting on top of can 3. When label segment 8 is down over can 3, it is disengaged from the jaws of label cutter 10 by interrupting the vacuum in the lines inside the jaws. After label segment 8 is disengaged from the jaws, the jaws return to the position shown in view A and the cycle is repeated. This type of cutter is especially useful when the tubular heat shrinkable labeling material is very thin and light. In some cases, the labeling material may be heavy enough to slide down over cone 6 without having to go through the part of the cycle shown in view C of FIG. 4.

FIGS. 5 and 6 show a plan and elevation view of blocks 2, carriage 100, and belt 1. Carriage 100 is secured to belt 1 by securing means 105. Carriage 100 contains slots 110 which slidably retain blocks 2 thereby by means of connecting means 115. Connecting means 115 are equipped with a spacing stop 120 to position blocks 2 a finite distance above carriage 100. Springs 125 are disposed between connecting means 115 in the finite space between carriage 100 and blocks 2 resulting from the effect of spacing stop 120. These springs spread the blocks apart when guide rails 4 open to their maximum width and contract when guide rails 4 cause blocks 2 to grasp can 3 at point B in FIGS. 1 and 3.

Various changes and modifications can be made on the apparatus as shown in the figures. The size and shape of split blocks 2 can be varied in many ways to enable this apparatus to label a wide variety of containers of various sizes and shapes. In some cases the split block apparatus for securing the container to the conveyor belt may not be used and instead other methods such as recesses in the conveyor belt, raised lugs on the conveyor belt, and other mechanical clamps can be used. The mechanical arm arrangement for attaching the conically shaped guide can be modified in many ways. Mechanical hooks, mechanical fingers, suction cups, vacuum tubes, etc., can be used to handle the conically shaped guide apparatus. The conically shaped guide apparatus must be made of any suitable smooth material that will allow the tubular heat shrinkable label to slip down over it and thus over the container. In some cases, the conically shaped guide apparatus will not be needed in this apparatus. If the container to be labeled is of a unique shape such that it is more narrow at the top than at its base the container itself will act as a guide for the tubular segment of heat shrinkage label. The heat shrink tunnel used in this invention also can be modified to suit the particular needs of the labeling material to be used. The tunnel can consist of radiant electrical heaters, a steam chest, or a gas fired tunnel. The temperatures at which the tunnel will operate will be governed by the speed of the conveyor belt, the type of heat shrinkable label to be used, and the degree of shrink required. The methods for placing cans on the belt and removing cans from the belt are too innumerable to mention here.

The means for cutting the label and pulling it down over the conically shaped guide and container can be modified. Mechanical fingers and air jets can be used as an alternate means of spreading the tubular segment open after it has been cut from the roll of flat tubular stock. The means for cutting the segment of tubular label from the supply roll can be adjusted to accommodate containers of different sizes and heights. The types of containers that can be labeled using this apparatus are not limited to cylindrical containers. Various containers of irregular shapes and sizes can also be labeled using this apparatus. Oval shaped containers and rectangular shaped con-

5

tainers can also be labeled by simply changing the split block apparatus and by changing the conically shaped guide apparaus.

The type of tubular heat shrinkable labeling material that this apparatus is especially suited for is the type that is made from thin thermoplastic materials such as polyethylene, polypropylene, saran, poly(ethylene terephthalate) and the like. The thin materials can be easily printed on in a wide variety of colors making an attractive and inexpensive labeling material. The finished labeled product will have a smooth, durable, attractive finish. Since the labeling material will be of a plastic type material, the label itself will serve to protect the container. Thus, it is possible to use this type of label on cardboard and paper containers to protect them from the damages of water. It is easily seen that this material can be used as a packaging and labeling material. Thus, it decreases expenses normally found in packaging and labeling materials.

I claim:

1. Apparatus for applying labels of a tubular heat shrinkable material which is initially in flattened form to containers, comprising in combination, an endless conveying means; a plurality of pairs of blocks slidably engaged with a carriage means attached to said conveying means at regular intervals, each pair of said blocks being arranged on said carriage and configured so that, as they move toward each other, a container to be labeled is held firmly therebetween; means for moving said blocks so that they engage and disengage said containers as said containers are being moved into and away from a labeling station, respectively; a plurality of guides adaptable to the top portion of said container; means for positioning said guide on said container as said containers are

6

being moved into the labeling station; means for cutting said flattened heat shrinkable material into segments of desired size; means for opening said sgement and placing said open segment over said guide and said container at the labeling station, said blocks being further configured so that said open segment rests thereon and is properly positioned about said container; means for removing said guides from said container as said container is moved from the labeling station; means for applying heat to said segments so that the heat shrinkable material forms a tight label on said container; and means for removing the labeled container from said conveying means.

2. The apparatus of claim 1 wherein said block-moving means comprises guide rails disposed above said conveying means which are arranged to define a passage through which said carriage carrying said slidably engaged blocks passes, said passage being configured so that said blocks are guided toward each other on said carriage upstream of the labeling station and away from each other downstream of the heating means.

3. The apparatus of claim 1 wherein said guides are conically shaped.

References Cited

UNITED STATES PATENTS

1,641,045 8/1927 Oslund et al. ----- 156—485 X
3,110,554 11/1963 Yazumi ----- 156—85

FOREIGN PATENTS

725,093 3/1955 Great Britain.

SAMUEL W. ENGLE, Primary Examiner

U.S. Cl. X.R.

156—86, 443, 494, 499