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3,508,993

METHOD AND APPARATUS FOR APPLYING LABELS TO CONTAINERS

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2 Sheets-Sheet 1

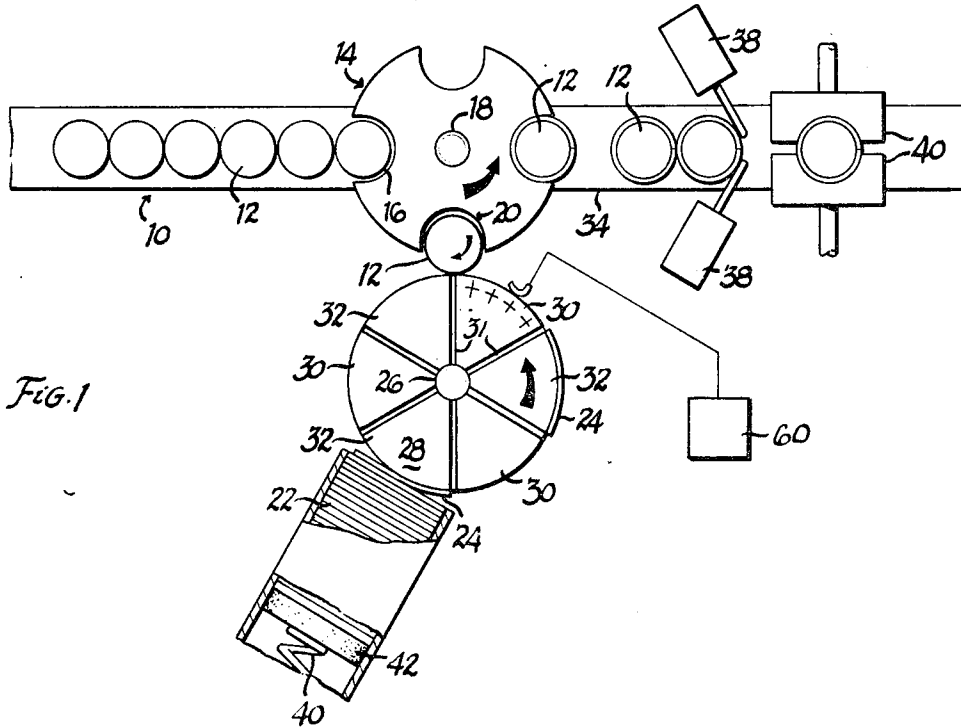
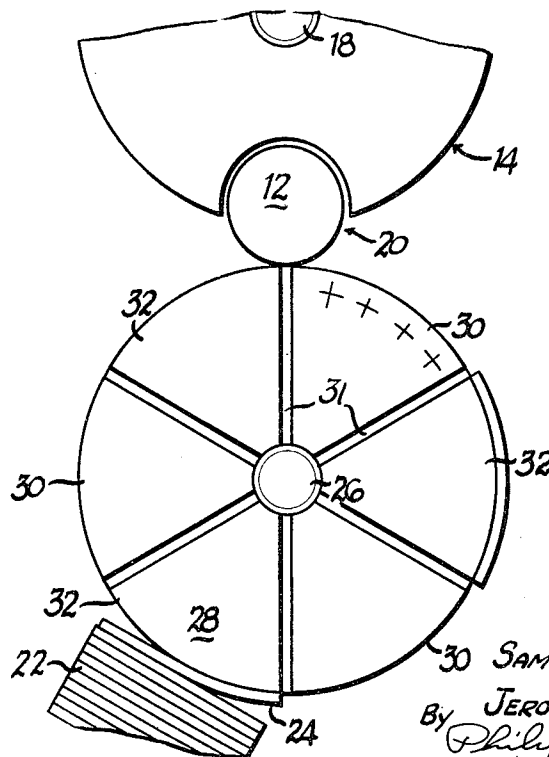


FIG. 2



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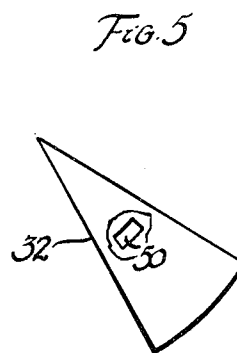
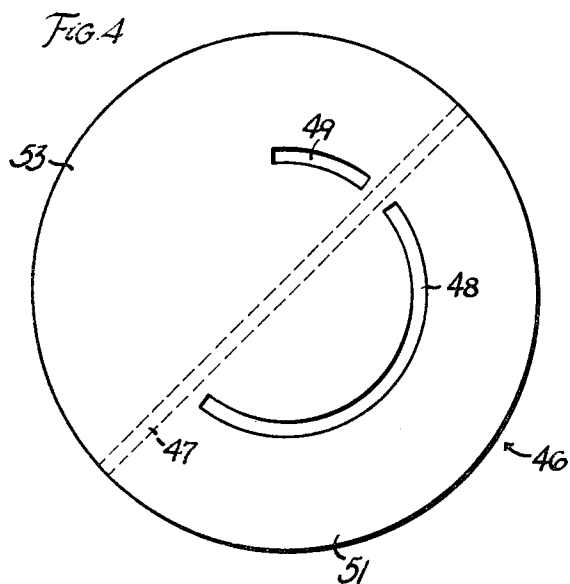
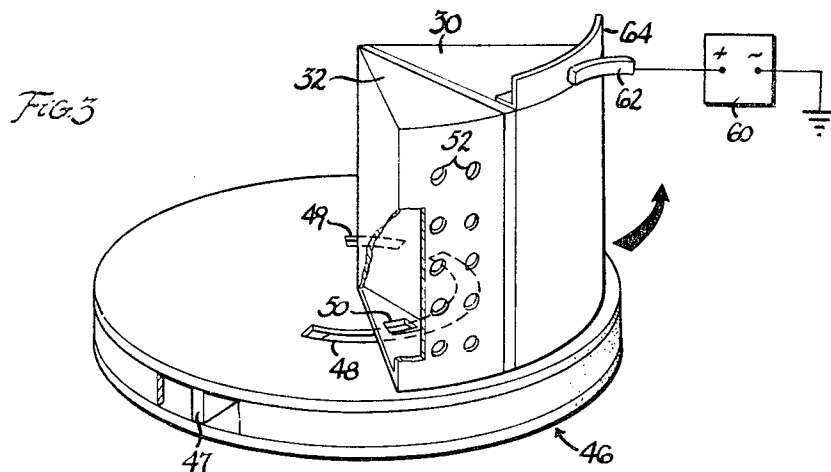
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METHOD AND APPARATUS FOR APPLYING LABELS TO CONTAINERS

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9 Claims

ABSTRACT OF THE DISCLOSURE

The method of applying plastic labels to containers wherein a turntable with adjacent sectors provided with a vacuum and an electrostatic charge is used to pick up labels from a stack, transfer the charge to the container surface and apply the label to the charged surface while simultaneously relieving the vacuum to facilitate the label application. Thereafter the label is bonded to the container surface.

This invention relates generally to methods and apparatus for applying labels to containers, and more particularly to the application of films to containers by electrically charging a container and transferring a film thereto to be held by electrostatic attraction until it is permanently bonded in place.

In the manufacture of certain plastic and glass containers, plastic labels have been applied to the containers while they are being formed. It has been found that if a plastic label is applied to a container during the formation of the container, a relatively thick label is required. It has also been observed that the application of the label takes a significant portion of the overall time expended during the manufacture of the containers.

It is now proposed in accordance with the present invention to apply extremely thin plastic labels or other plastic films to containers after they have been fully manufactured by a process wherein the film is applied to the container and is temporarily held there by electrostatic attraction until it is permanently bonded in place. In general, the method includes steps of applying an electric charge to the surface of the containers, placing the film in contact with the charged surface of the container to transfer the film to the container and hold the film on the container by electrostatic attraction, and subsequently permanently bonding the film onto the container. In a preferred embodiment, the transferring of the film to the container is carried out by picking up a film with a vacuum head to retain the film on the head by a pressure differential, positioning the vacuum head at the charged surface of the container to place the film in contact with the charged surface, and increasing pressure within the vacuum head to release the film and thereby transfer it to the charged surface. The final bonding step may be accomplished by applying heat to the film by thermal conduction or by applying ultrasonic energy to the film, or by shrinking the film on to the container.

The preferred apparatus for carrying out the method of the invention includes a rotary turn-table which has sections for picking up pieces of film by vacuum, and in alternation with the vacuum pick-up sections has charging sections for transferring electric charge to a container. Films are supplied to the turn-table from a stack of films which contacts the circumference of the turn-table, and the vacuum pick-up sections simply take the top film off of the stack when they come into contact with that film. Containers are transported to a place adjacent to the rotary turn-table, and the transporting means includes a rotatable support on which a container rotates as a film is being applied to it from the turn-table so as to wrap

the film around the container. The container is first electrically charged by a charging section of the turn-table, and then a film is transferred from the next vacuum pick-up section to the container. While the film is held in place by electrostatic attraction, the container is transported to a bonding station where the film is permanently bonded in place by one of several available bonding methods, i.e., by thermal conduction or by ultrasonic energy or by shrinking the film onto the container.

Accordingly, it is an object of the present invention to provide an improved method and apparatus for applying plastic labels or other plastic films to containers by a combination of vacuum handling and electrostatic attraction that is efficient, expeditious and economical.

Another object of the invention is to provide an efficient way of electrically charging containers and of applying plastic films to the charged containers where they are held in place by electrostatic attraction.

A further object of the invention is to provide a method and apparatus for picking up plastic films from a stack with a vacuum head and transferring the films to containers which have been electrically charged.

Another object of the invention is to provide apparatus for alternately charging a container and transferring a film to the container at a labeling station so that the container may be transported rapidly along a line leading to and from the labeling station.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

ON THE DRAWINGS

FIGURE 1 is a schematic plan view of a preferred apparatus embodiment of the invention;

FIGURE 2 is a schematic fragmentary view of a label carrying and charging turn-table included in the embodiment of FIGURE 1;

FIGURE 3 is a fragmentary perspective view of the label carrying and charging turn-table together with a plenum;

FIGURE 4 is a top view of the plenum; and

FIGURE 5 is a top view of a vacuum pick-up head.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

AS SHOWN ON THE DRAWINGS

A conveyor 10 or other suitable container transport means is provided to transport containers 12 along a straight path leading to a turn-table 14. The containers 12 may be made of glass or plastic, and at this stage of the processing they have already been formed into their final shape.

When a container 12 reaches the turn-table 14, it enters a scalloped portion 16 of the turn-table and is carried on a rotary support of the turn-table. The turn-table 14 rotates in a counterclockwise direction through 90° and then remains at a labeling station 20 for a predetermined period of time while a label is applied to the container 12. Any thermoplastic type of material conventionally used for labels on containers may be employed, e.g., the materials disclosed in the Patent 3,235,433. After a label

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has been applied, the turn-table 14 rotates another 90° to bring the container 12 to a position where it is transferred to another in-line conveyor 34 which carries the containers with labels on them to a bonding station 40. The containers are gated into the bonding station by means of stops 38. At the bonding station 40, the label or other plastic film which has been applied to each container is permanently secured to the container by any one of several available bonding processes. Specifically, the bonding process may be carried out by heat sealing, by ultrasonic bonding, or by shrinking the label onto the container. It is not essential to seal the entire surface of the label to the container, it being sufficient to seal only the edges of the label to the container.

Referring again to the turn-table 14, when a container 12 is in the position 20 midway between the two conveyors 10 and 34, it is next to another turn-table 28 which rotates about a post 26. The turn-table 28 is divided into six equal sectors. Three of these sectors 30 serve as electrical charging heads and are spaced at angles of 120° from each other. The other three sectors 32 serve as vacuum pick-up heads, and they are likewise spaced 120° from each other but are located in between the charging sectors 30. The charging heads 30 are electrically insulated from each other and from the pick-up heads 32 as by electrical insulation at 31. The turn-table 28 is rotated in a counterclockwise direction so that the charging sectors 30 and the pick-up sectors 32 alternately come into contact with the container 12 at the labeling station 20. As any single sector moves past and in contact with the container 12 at labeling station 20, the container rotates through one complete revolution in a clockwise direction. Thus, when charge is being applied to the container from one of the charging sectors 30, the entire circumference of the container becomes charged due to its contact with one of the charging sectors 30. Similarly, when the container 12 at station 20 is in contact with a plastic film on one of the vacuum heads 32, the container rotates through a full revolution so that the plastic film is wrapped completely around the container as indicated in the drawings.

A label 24 is shown as it is being picked up from a stack of labels by one of the vacuum heads 32 of the turn-table 28. The label 24 is one of a stack 22 of labels which is urged by a spring 40 and head 42 into contact with the vacuum head 32. The turn-table 28 may momentarily be stationary when a head 32 is centered with a label 24 of stack 22. The vacuum in the vacuum pick-up sectors 32 is provided by a suction apparatus which is operatively connected to the pick-up sectors so as to produce a vacuum therein when a given pick-up sector is centered with and in contact with a label of the stack 22.

The suction apparatus may be constructed as shown in FIGURES 3, 4 and 5. In FIGURE 3, two sectors 30 and 32 are shown mounted for rotation on a circular stationary plenum 46 which is divided into two halves 51 and 53 by a partition 47. Plenum half 53 is at atmospheric pressure or higher, but vacuum is applied to plenum half 51 by a pump (not shown). Plenum half 51 has a semicircular slot 48 through its top wall via which vacuum is applied to the pick-up heads 32. Each of the latter heads 32 is hollow and has an opening 50 through its bottom wall which registers with the plenum opening 48 as the head rotates from the label stack 22 to the container 12 at station 20. Thus, vacuum is transferred from plenum 46 through openings 48 and 50 to the pick-up head 32 so long as opening 50 is in registry with semicircular opening 48. The pickup head 32 may have additional small openings 52 through its vertical face for applying vacuum to a label from the stack 22 to hold the label on the pick-up head. When the pick-up head reaches station 20, the opening 50 moves out of registry with the slot 48 and into registry with slot 49, so the vacuum in head 32 is released to allow transfer of the label to the container at station 20. An electric charge is applied to a

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charging sector 30 after that sector has passed the stack of labels 22 and just before it contacts the container 12 at station 20. The charging apparatus 60 is electrically connected to the charging sectors 30, so as to apply charge thereto as a given sector rotates from the stack 22 to the labeling station 20. The charging apparatus 60 may be a power supply or battery having one of its terminals connected to a contact 62 which is adapted to apply charge to the charging sectors 30 but not to the vacuum pick-up sectors 32. For this purpose, each charging sector may be made of metal and may have a metal flange 64 projecting upward from its top edge as shown in FIGURE 3. The contact 62 engages the metal flange 64 as head 30 moves past it but does not engage any part of the vacuum pick-up heads 32.

As the turn-table or head assembly 28 rotates counterclockwise in contact with a container 12, electric charge is transferred from its sector 30 to the surface of container 12 as the container 12 at station 20 rotates on its rotatable support. After the electric charge has been applied to the container 12, the vacuum pick-up sector 32 adjacent the charging sector 30 is rotated into contact with the container 12 at labeling station 20. The container 12 is then rotated through another complete revolution as the surface of vacuum pick-up sector 32 passes by the container, and in this manner a label 24 is rolled onto the container 12. As the label is being applied, pressure within the vacuum pick-up sector contacting container 12 is increased to release the label from the pick-up sector. The pressure is increased at least to the point where no vacuum exists and may be increased to provide a positive pressure which aids in transferring the label 24 to the container.

After the label has been applied to a container at the labeling station 20, the label is held in place by electrostatic attraction of the charged surface of the container for the label. This attraction holds the label in place temporarily until the label may be more permanently bonded to the container. Thus, while the container is being transported from the labeling station 20 to the conveyor 34 and via the conveyor 34 to the bonding station 40, the charge on the container continues to hold the label in place. At the bonding station 40, the label is affixed to the container by heat sealing, or by application of ultrasonic energy, or by shrinking the label onto the container, as previously mentioned.

The invention provides a method of applying plastic labels or other plastic films to containers by a combination of vacuum transfer and charge transfer steps which results in the labels being temporarily held in place by electrostatic attraction until they can be permanently bonded to the container. The invention includes a method and apparatus for picking up plastic films from a stack with a vacuum head and transferring the films to containers which have been electrically charged. The charging is accomplished before the label is applied to the container by means of transferring the charge from a charging head which moves past the container in alternating sequence with the vacuum pick-up head. Thus, the labels are applied in a most efficient manner.

We claim:

1. A method of applying a plastic film to a container comprising the steps of applying an electric charge to the surface of the container, applying a vacuum to a vacuum pick-up head for removing a film from a stack, placing said pick-up head and said film in contact with each other to retain said film on said head by a pressure differential, positioning said head at said charged surface of said container to place said film in contact with said charged surface, increasing pressure within said head to release said film therefrom and transfer said film to said charged surface by electrostatic attraction, and permanently bonding said film to said container.

2. A method of applying a plastic film to a container comprising the steps of electrically charging a surface of

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a charging head, applying a vacuum to a vacuum pick-up head for removing a film from a stack, placing said pick-up head and said film in contact with each other to retain said film on said head by a pressure differential, contacting said container with said charging head to transfer a charge from said charging head to said container, contacting said charged container with the film on said pick-up head, increasing pressure within said pick-up head to release said film from said pick-up head and transfer said film to said charged surface of said container where said film is held in place by electrostatic attraction, and permanently bonding said film to said container.

3. In an apparatus for applying a plastic film to a container, the combination of rotary means mounted for rotation having sections for picking up pieces of film by vacuum and having between and alternating with said vacuum pick-up sections charging sections for transferring electric charge to a container, means for supplying pieces of film to said rotary means to be picked up on said vacuum pick-up sections, transporting means for supplying containers to a place adjacent said rotary means, said transporting means including a rotatable support for providing rotation of a container thereon at said place and in contact with said rotary means so that a container is rotated on said support while in contact with a charging section and is further rotated while in contact with a vacuum pick-up section of said rotary means to transfer a piece of film to said container, and a bonding station in the path of said transporting means where said film piece is permanently bonded to said container.

4. The apparatus of claim 3 in which said rotary means comprises a turn-table having vacuum pick-up sections and charging sections in alternation about the circumference thereof.

5. The apparatus of claim 4 in which said rotatable support is a part of a second turn-table by which said containers are brought into contact with said first named turn-table.

6. The apparatus of claim 5 in which said containers are fed to said second turn-table by an in line conveyor and are fed by another in line conveyor from said second turn-table to said bonding station.

7. In an apparatus for applying a plastic film to a container, the combination of a turn-table mounted for rotation about an axis thereof, said turn-table comprising a plurality of hollow vacuum pick-up sections and a plu-

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ality of charging sections located between and alternating with said vacuum pick-up sections, means for supplying pieces of film to said turn-table to be picked up on said vacuum pick-up sections, each of said vacuum pick-up sections having an apertured face for contacting and receiving a film piece to carry the same thereon, means for applying vacuum to the interior of said vacuum pick-up sections including a plenum having an opening therein to communicate with the interior of each vacuum pick-up section, each said pick-up section having an opening therein to register with said opening in said plenum during a portion of one revolution of said turn-table, transporting means for supplying containers to a labeling station adjacent said turn-table, means for applying an electrical charge to said charging stations at a predetermined position thereof between said film supplying means and said labeling station, and a bonding station in the path of said transporting means.

8. A method of applying plastic labels to containers, comprising the steps of applying a vacuum to one sector of a turntable for picking up labels from a stack, applying an electrostatic charge to an adjacent sector of the turntable, moving the sector with the vacuum, relative to the stack of labels so as to pick up a label, moving the container and the turntable relative to each other so that the electrostatic charge on the charged sector is transferred to the container surface, again moving the container and the turntable relative to each other so that the label is attracted onto the charged container surface from the sector with the label and thereafter permanently bonding the label onto the container surface.

9. The method as described in claim 8, including the further step of relieving the vacuum so as to facilitate the transfer of the label to the charged container surface.

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PHILIP DIER, Primary Examiner

U.S. Cl. X.R.

156—274, 285, 380, 458, 570