

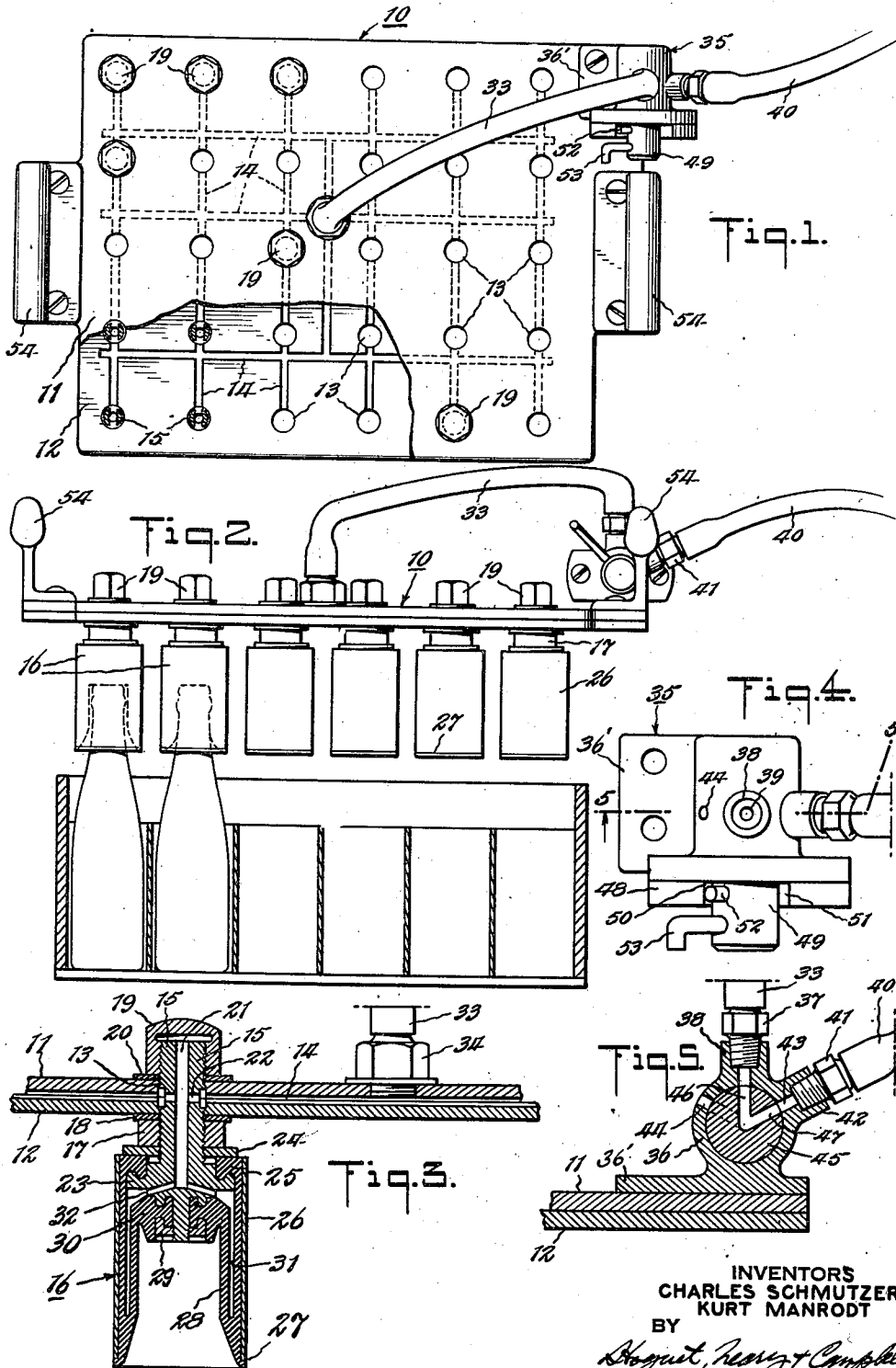
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C. SCHMUTZER ET AL

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ARTICLE TRANSFERRING APPARATUS

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INVENTORS  
CHARLES SCHMUTZER  
KURT MANRODT  
BY  
*August, Neve & Campbell*  
ATTORNEYS

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## ARTICLE TRANSFERRING APPARATUS

Charles Schmutzer, Irvington, and Kurt Manrodt,  
Newark, N. J., assignors to Hoffman Beverage  
Company, Newark, N. J., a corporation of New  
Jersey

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This invention relates to article transferring apparatus, and has particular reference to apparatus for lifting and transferring bottles in prearranged groups from one point to another, such as to or from a bottle carrying case, although the invention is not limited to the transfer of bottles.

Heretofore it has been the common practice to transfer empty bottles one-by-one by hand from a shipping case to a conveyor or the like, for conveying the bottles to a bottle-washing machine or the like. Likewise, it has been the general practice to fill shipping cases with filled bottles by hand. In each instance, the packer grasps one bottle in each hand and transfers them from one point to another, or if the bottles are small he may be able to grasp two bottles in each hand, but in every instance, a number of manual operations are necessary, particularly with large-capacity cases, with the result that much time and an inordinate amount of labor are consumed.

In accordance with the present invention, a bottle-lifting and transferring apparatus is provided whereby an entire case of bottles may be simultaneously emptied or filled by a novel arrangement which grips all of the bottles simultaneously and enables their transfer in a group to or from a shipping case or the like, the bottles being arranged on the apparatus in regular rows in the same positions that they occupy in the shipping case or other carrier.

In a preferred embodiment of the invention, a frame having the approximate shape of the shipping case but somewhat larger, is provided with the same number of gripping devices as there are bottles in the shipping case and they are so arranged on the frame that one gripping device lies in the center of each bottle compartment in the shipping case. Each gripping device comprises a cup or socket formed by a flexible rubber sheath constituting the inner wall of an annular chamber, which communicates with a source of fluid, such as air, under pressure and controlled by a valve manipulated by the operator. Each of the bottle-gripping devices on the frame is connected to this control valve so that they are all simultaneously contracted upon the neck of the corresponding bottles, either empty or filled, so as to grip the same. Then the entire frame is transferred, either manually or by machine, to the place of deposit, and the valve again manipulated to simultaneously release the bottles. Accordingly, an entire case may be simultaneously emptied of bottles in one operation, and when it is desired to fill a case, the bottles

are placed therein by the apparatus in the exact relationship that they occupy within the compartments. Where the transfer of the groups of bottles is performed manually, the frame is provided with two handles and the operating valve is arranged adjacent one of them with its operating lever so positioned that the thumb of the hand grasping the handle may conveniently actuate the operating lever of the valve to grip and release the bottles in the manner described.

It will be seen that the new bottle-transferring apparatus of this invention provides a convenient means for transferring large groups of bottles to or from a shipping case, or other holder or carrier, with a minimum of effort and at a rapid rate.

For a more complete understanding of the invention, reference may be had to the accompanying drawing, in which:

Figure 1 is a plan view of one form of the bottle-transferring apparatus of this invention;

Fig. 2 is an elevation of the same, and illustrates the manner in which the apparatus functions in association with bottles in a shipping case;

Fig. 3 is an enlarged axial section through one of the gripping and transferring devices, as seen along the line 3—3 of Fig. 1;

Fig. 4 is an enlarged plan view of the control valve; and,

Fig. 5 is a transverse section therethrough as seen along the line 5—5 of Fig. 4, and illustrates the valve in the position for actuating the gripping devices to grip the bottles.

Referring to Figs. 1, 2 and 3 of the drawing, the frame 10 is preferably constructed of two superimposed plates 11 and 12 air-tightly sealed together. As shown particularly in Fig. 3, the frame 10 is provided with interconnected air passages 14 formed by registering semi-circular grooves in the abutting surfaces of the two plates 11 and 12. The air-tight seal between the two plates 11 and 12 may be effected by machining their engaging surfaces truly so that there is no leakage from the passages 14, or a sealing gasket, not shown, may be interposed between them in accordance with the well-known practice.

The passages 14 all communicate with each other and lead to a plurality of openings 13 passing through the frame 10 and arranged to conform to the shipping case compartment arrangement. These openings receive the hollow stems 15 of the bottle-gripping devices or heads generally designated 16. As shown in Fig. 3, each stem 15 also serves as the means for securing the

corresponding head to the frame 10 and also serves to hold the two plates 11 and 12 and the frame 10 tightly together. The plates 11 and 12 are clamped between a nut 17 engaging the lower surface of the bottom plate 12 over a gasket 18, and a second nut 19 engaging the upper surface of top plate 11 over gasket 20. In this way the axial passage 21 of the stem 15 communicates throughout the lateral passages 22 with the corresponding passage 14 formed in the frame 10.

The lower end of the stem 15 is provided with a lateral flange 23 between which and a washer 24 engaging the lower surface of nut 17 is clamped a soft rubber sleeve 25 enclosed in a metal protecting tube 26 which is held in place by a lower lateral flange 27 on the rubber sleeve 25. Rubber sleeve 25 is formed with a reversely-turned inwardly projecting sheath 28 which is sealed to the lower end of the stem 15 by means of a locking disc or nut 29 screwed tightly against the closed bottom 30 of the sheath 28.

Accordingly, there is formed between the rubber sleeve 25, the sheath 28 and the flange 23, an expansible, sealed chamber 31, which communicates with the passage 21 in stem 15 through lateral passages 32. The sheath 28 is made sufficiently larger than the neck of the bottle so that the bottle can readily enter it, and is thin-walled and flexible so that when air under pressure is supplied to the chamber 31, through passages 14, 21 and 32, the sheath 28 contracts radially so as to grip the neck of a bottle inserted therein. Conversely, when the air pressure is released, the sheath expands, due to its resiliency, and releases the bottle. It will be observed that because the chamber 31 is sealed, the device is indifferent as to whether or not the bottle is empty or full, which is not the case where open suction ports are relied on to grip and hold the bottle, since the suction must first reduce the air in an empty bottle in order to lift it. Also, because the chamber 31 is sealed, some other pressure fluid, such as steam or liquid may be employed with equal facility.

The passages 14 within the frame 10 are supplied with air under pressure by means of a metal tube or flexible hose 33 suitably connected thereto at a central point by means of a fitting 34 screwed into the top of the plate 11, as shown in Fig. 3. The pipe 33 leads across the top of the frame 10 to the outlet port of the control valve generally designated 35 and secured to the upper surface of the plate 11 in the manner shown in Figs. 1 and 2. As shown in Figs. 4 and 5, the control valve consists of a cylinder 36 mounted on a suitable base plate 36' attached to the plate 11 in the manner described.

The air supply tube 33 is connected to the interior of cylinder 36 by means of a fitting 37 screwed into a boss 38 on the cylinder 36 and leading to the port 39 in the wall of the cylinder 36. Air under pressure is supplied to the cylinder 36 by means of a flexible hose 40 of rubber or the like leading from a suitable source of air under pressure such as a pressure tank supplied by a conventional motor-driven air-compressor, not shown. The hose 40 is sealed to a fitting 41 screwed into a second boss 42 on the cylinder 36 and communicating with the interior thereof by means of port 43. The cylinder 36 is also provided with an exhaust port 44 lying in the same vertical plane with ports 39 and 43 and displaced angularly from port 39 by the

same angle as port 43 is displaced therefrom, as shown in Fig. 5.

Cylinder 36 is fitted with a rotatable valve 45 having two connected passages 46 and 47 arranged radially so as to be in alignment simultaneously with ports 39 and 43, respectively, or ports 44 and 39, respectively. Valve 45 is held in place within cylinder 36 by means of the apertured flange 48 through which the reduced stem 49 of the valve 45 passes. The upper edge of the flange 48 is recessed to expose the valve stem 49 and the end walls 50 and 51 of this recess serve as stops for a pin 52 on the valve stem 49.

The stops 50 and 51 are so arranged that when stop pin 52 is in engagement with stop 51, the valve 45 lies in the position shown in Fig. 5, with supply port 43 in communication with port 39 leading through air supply tube 33 and passages 14 to the several transfer heads 16. When the stop pin 52 is positioned against the stop 50, port 39 is in communication with exhaust port 44, as shown by the dotted lines in Fig. 5, so that the air is exhausted to atmosphere from the several heads 16.

An operating lever 53 is provided on the valve stem 49 for manual operation of the valve to control the bottle-gripping and bottle-releasing operations in the manner described, the operating lever 53 being moved to the right as seen in Fig. 4 to perform the bottle-gripping function of the heads 16, and being moved to the left to perform the bottle-releasing function of the heads 16.

The frame 10 is provided with handles 54 whereby the operator may lift and transfer the entire device with or without appended bottles, as the case may be. The valve 35 is preferably positioned adjacent one of the handles 54, such as the right-hand handle, with the valve operating lever 53 so arranged adjacent the handle 54 that the operator may manipulate the valve 35 merely by movement of his thumb in contact with the operating lever 53.

In operation of the apparatus of this invention, and assuming that it is desired to transfer empty bottles from a shipping case in which they have been collected, the operator grasps the apparatus by its handles 54 and with the operating valve 35 in the open position so that the sheaths 28 are expanded, he places the apparatus in alignment with the bottles in the case, so that each bottle enters one of the heads 16. Each bottle is not only centered in the sheath 28 of each head but properly positioned axially therein as the head descends over the bottle until the bottom of the cup-like sheath 28 engages the lip of the corresponding bottle and rests thereon, the operator making certain that the weight of the plate rests on the lips of the bottles which insures that the bottle necks are all properly positioned within the corresponding heads 16.

The operator then moves the operating lever 53 to the right with his thumb until stop pin 52 engages stop 51. In this position of valve 45, port 39 leading through pipe 33 and passages 14 to the various chambers 31 in the heads 16 is placed in communication with port 43 leading through flexible hose 40 from the source of air under pressure. The air under pressure thus supplied to the chambers 31 in the various heads 16 contracts the corresponding sheaths 28 so that the necks of the bottles are tightly and securely gripped. Inasmuch as the chambers 31 are all

simultaneously connected to the source of pressure in this way, all of the bottles in the case are thus gripped.

The operator then lifts the entire apparatus so that the bottles are removed as a group from the shipping case and transferred either to a conveyor, work table, processing machine, or some other place of deposit where they are released by the operator by movement of the operating lever 53 to the left until stop pin 52 engages stop 51, which places all of the chambers 31 in communication with atmosphere through passages 14, tube 33, port 39, valve passages 47 and 46, and exhaust port 44.

The bottles are accordingly deposited in the exact relative positions that they occupied in the shipping case, and hence the conveyor may be likewise provided with cells or compartments for receiving the bottles in this relationship, which they may maintain throughout the entire bottle-washing operation, so that when they emerge in the washed and sterilized condition, they may be readily transferred without special arrangement from a discharge conveyor to a shipping case by means of the apparatus of this invention. Also, filled bottles emerging from a labelling machine may be arranged in rows properly spaced apart in the relationship which they will bear in the shipping case, so that the apparatus of this invention may be used with the same facility for transferring the filled bottles to a shipping case.

Although the apparatus as illustrated accommodates a thirty-bottle shipping case, it will of course be understood that the bottle-gripping heads may be arranged in any desired way on a frame for transferring one or more bottles in any desired number and arrangement, and that the transfer of the frame and the operation of the air-control valve may be effected by a machine for merely duplicating the manual movements of the operator in the manner described.

We claim:

1. In article transferring apparatus, the combination of a movable frame, a hollow member thereon having a flexible wall for engaging at least part of the article, a source of fluid pressure connected to said hollow member for actuating said wall to grip said article, and means interposed in said connection for controlling the article-gripping action of said member, whereby the article may be transferred upon bodily movement of said frame.

2. In article transferring apparatus, the combination of a movable frame, a member thereon having a fixed portion, a movable wall portion cooperating with said fixed portion to form a chamber, said movable wall portion being shaped to engage the article, a source of fluid pressure, connections between said source and said chamber, and means interposed in said connections for controlling the movement of said wall portion to grip the article, whereby the article may be transferred upon bodily movement of said frame.

3. In article transferring apparatus, the combination of a movable frame, a member thereon having a fixed portion, a movable wall portion cooperating with said fixed portion to form a chamber, said movable wall portion being shaped to engage the article, a source of fluid pressure, connections between said source and said chamber, and a two-position valve in said connections, one valve position affording communication between said source and said chamber for causing said wall portion to grip the article for transfer thereof upon movement of said frame, and the

other valve position disconnecting said source from said chamber and connecting the latter to a discharge for causing said wall portion to release the article.

4. In article transferring apparatus, the combination of a movable frame, a recessed member thereon, a flexible tubular sheath forming the inner wall of a chamber in said member, said sheath having a dimension sufficient to accommodate at least part of the article to be transferred, a source of fluid pressure connected to said chamber for contracting said sheath on said article to grip the same, and means interposed between said source and said chamber for controlling the article-gripping action of said sheath, whereby the article may be transferred upon bodily movement of said frame.

5. In article transferring apparatus, the combination of a rigid tubular member, a cup-shaped sheath within said member and sealed thereto to form an annular chamber therewith, the lateral tubular wall of said sheath being flexible, a source of fluid pressure, connections between said source and said chamber, and a valve in said connections for controlling the supply of pressure fluid to said chamber to contract said sheath on an article inserted therein, whereby the article may be transferred upon movement of said apparatus.

6. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of inverted cups arranged on said frame in said predetermined relation for receiving the corresponding articles, a contractible sheath in each cup for gripping the article upon contraction thereof, and means for simultaneously contracting all of said sheaths to grip the corresponding articles for transferring them from said container upon bodily movement of said frame.

7. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of gripping devices each constituting a contractible chamber shaped to conform to the article for gripping the same, said devices being arranged on said frame in said predetermined relation for engaging the corresponding articles, a source of fluid pressure, a connection between said source and each of said chambers for contracting the same to grip the articles, and means in said connection for simultaneously controlling the article-gripping action of said chambers, whereby the articles may be transferred from said container upon bodily movement of said frame.

8. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of rigid inverted cups arranged on said frame in said predetermined relation for receiving the corresponding articles, a tubular sheath of flexible material sealed in each cup and forming a chamber therewith, a source of fluid pressure connected to all of said chambers for contracting the sheaths thereof to grip the corresponding articles, and means in said connections for controlling the pressure fluid to simultaneously grip all said articles for transfer upon bodily move-

ment of said frame and for simultaneously releasing them at the place of deposit thereof.

9. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of gripping devices each constituting a contractible chamber shaped to conform to the article for gripping the same, said devices being arranged on said frame in said predetermined relation for engaging the corresponding articles, a source of fluid pressure, a connection between said source and each of said chambers for contracting the same to grip the articles, a valve in said connections for controlling the supply of pressure fluid to said chambers and releasing the same therefrom to grip all of said articles simultaneously for transferring them upon bodily movement of said frame and then release them simultaneously at the place of deposit.

10. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of gripping devices each constituting a contractible chamber shaped to conform to the article for gripping the same, said devices being arranged on said frame in said predetermined relation for engaging the corresponding articles, a source of fluid pressure, a connection between said source and each of said chambers for contracting the same to grip the articles, a valve for connecting said chambers to said source, a second valve for connecting said chambers to discharge, and a common operating means for said valves to alternatively supply and release the pressure fluid from said chambers to grip and release said articles at will.

11. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of gripping devices each constituting a contractible chamber shaped to conform to the article for gripping the same, said devices being arranged on said frame in said predetermined relation for

engaging the corresponding articles, a source of fluid pressure, a connection between said source and each of said chambers for contracting the same to grip the articles, a valve in said connections for alternatively connecting and disconnecting said source to and from said chamber to cause them to grip and release said articles, whereby the articles may be simultaneously gripped and transferred upon bodily movement of said frame and then released therefrom at the place of deposit.

12. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of gripping devices arranged on said frame in said predetermined relation for engaging the corresponding articles, a movable part on each device for gripping the corresponding article, means for simultaneously actuating all of said devices to grip the corresponding articles for transferring them from said container upon bodily movement of said frame, and at least one carrying handle on said frame positioned adjacent said means, whereby the means is operable by the hand on said handle.

13. In apparatus for transferring a plurality of articles from a container in which they are arranged in predetermined relation, the combination of a movable frame adapted to be placed in juxtaposition to said container, a plurality of gripping devices each constituting a contractible chamber shaped to conform to the article for gripping the same, said devices being arranged on said frame in said predetermined relation for engaging the corresponding articles, a source of fluid pressure, a connection between said source and each of said chambers for contracting the same to grip the articles, a valve on said frame interposed in said connections for controlling the supply of pressure fluid to and from said chambers, at least one carrying handle on said frame, and means adjacent said handle for operating said valve, whereby the hand gripping said handle may control the article-gripping and releasing action of said devices.

CHARLES SCHMUTZER.  
KURT MANRODT.