

Oct. 28, 1958

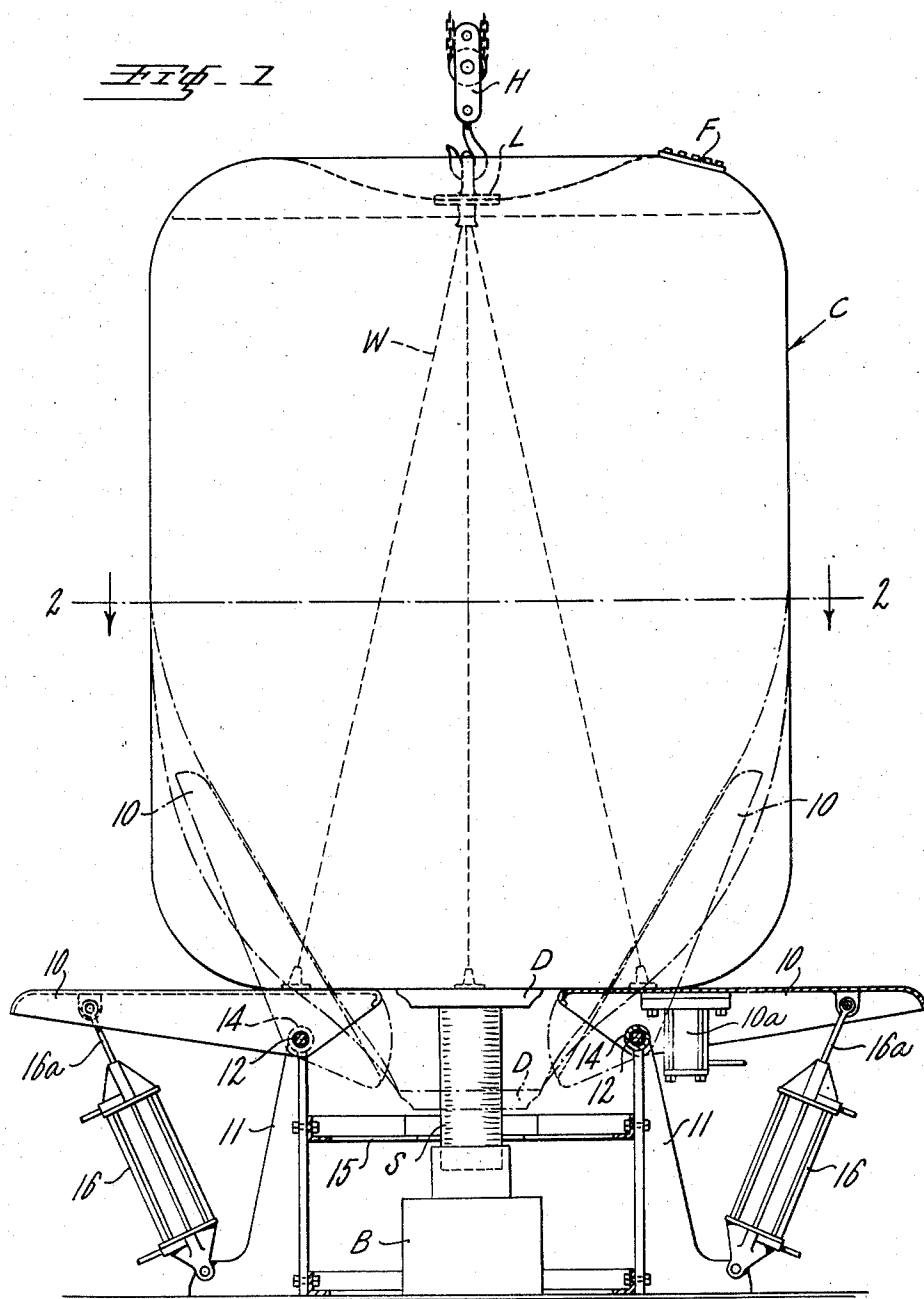
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2,858,051

APPARATUS FOR USE IN EMPTYING COLLAPSIBLE CONTAINERS

Filed June 20, 1955

4 Sheets-Sheet 1



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APPARATUS FOR USE IN EMPTYING COLLAPSIBLE CONTAINERS

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4 Sheets-Sheet 2

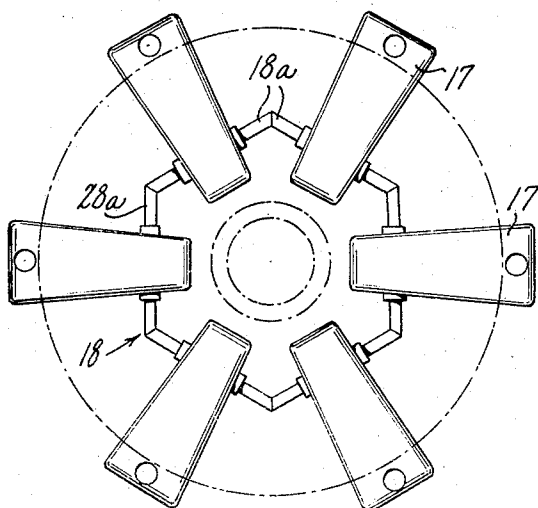
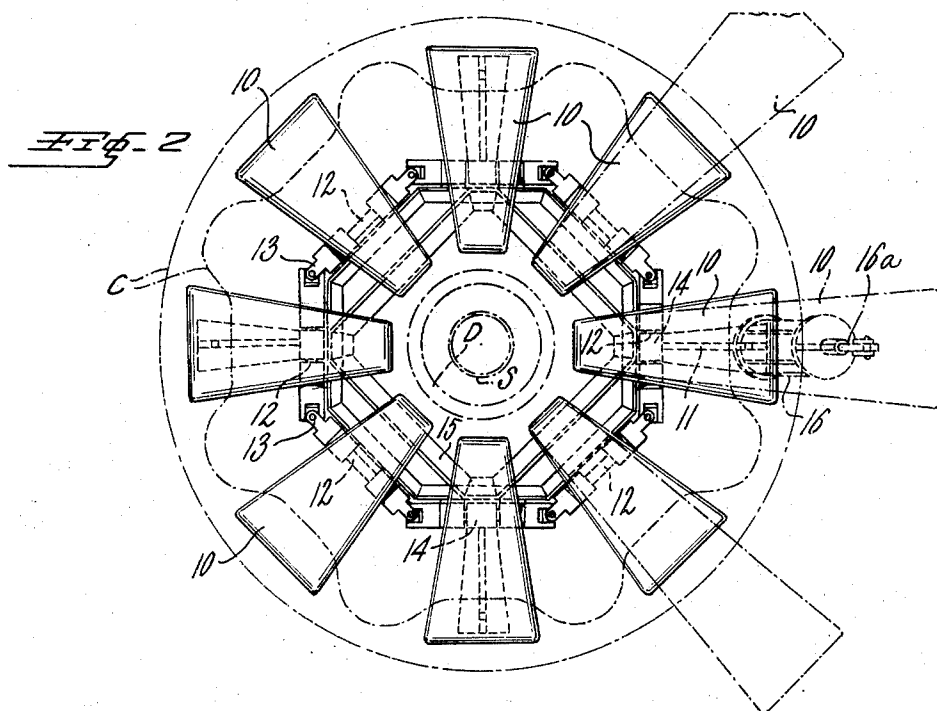


Fig. 4

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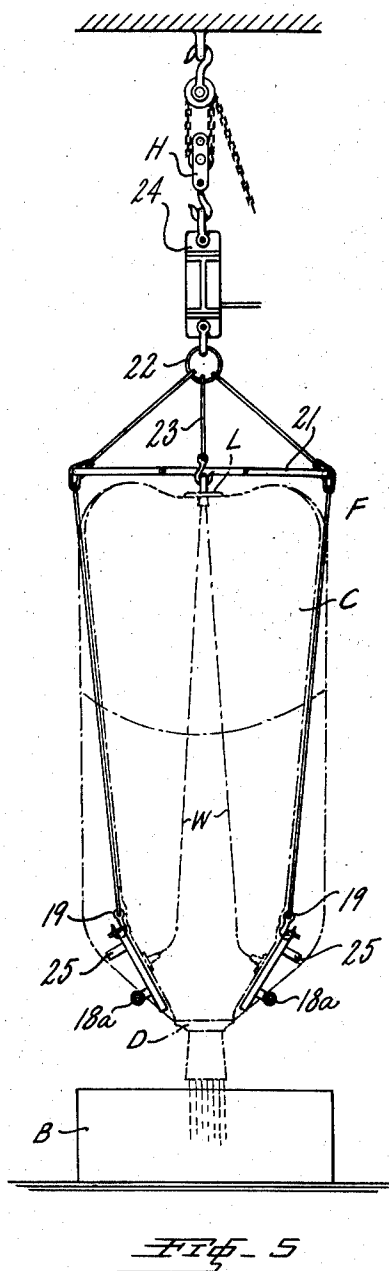
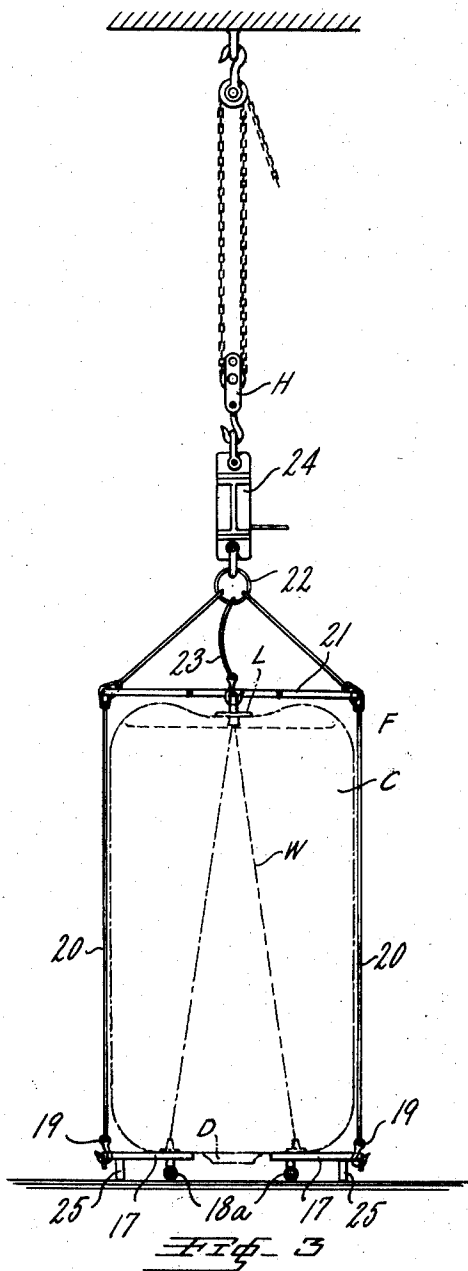
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APPARATUS FOR USE IN EMPTYING COLLAPSIBLE CONTAINERS

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4 Sheets-Sheet 3



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APPARATUS FOR USE IN EMPTYING COLLAPSIBLE CONTAINERS

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4 Sheets-Sheet 4

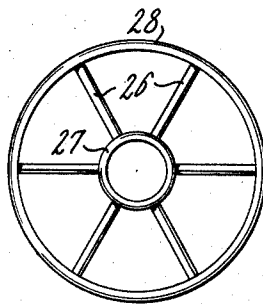
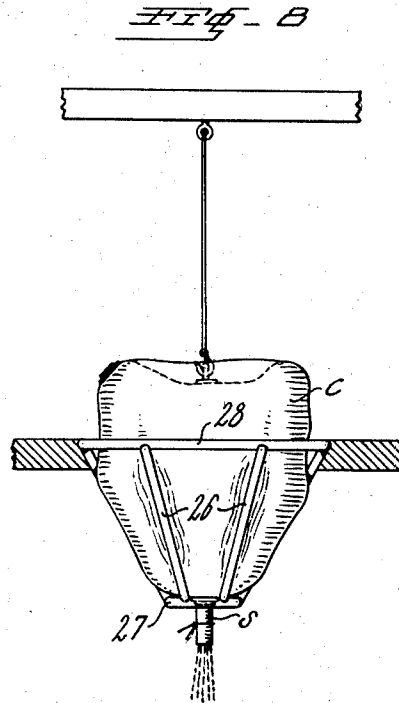
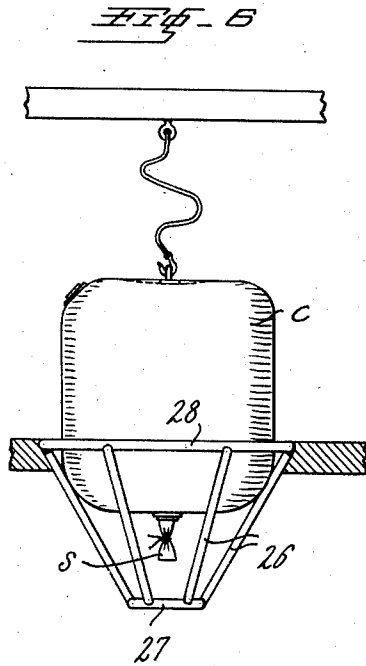


FIG - 7

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APPARATUS FOR USE IN EMPTYING COLLAPSIBLE CONTAINERS

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Application June 20, 1955, Serial No. 516,419

10 Claims. (Cl. 222-103)

This invention relates to apparatus for use in emptying large flexible, collapsible shipping containers of the type having a discharge opening in the center of one of the ends thereof.

In emptying containers of this type, the container is suspended from the end thereof opposite the end having the discharge opening so that the material contained therein will flow by gravity through the discharge opening upon removal of a closure plug. It often happens, however, that all of the material does not flow out of the container, there being a tendency for a part of the material to remain in the lower corner portions of the container.

The object of the present invention is to provide apparatus which will insure complete emptying of the container. To accomplish this object, the apparatus includes a central frame having an opening therethrough adapted to be aligned with the discharge opening in the container and elongated radiating elements or arms secured to the frame and adapted to be pressed against the container to distort the end of the container adjacent the discharge opening to a funnel shape to thereby insure complete emptying of the container.

Other objects and advantages of the present invention will become apparent from the following description when read in conjunction with the accompanying drawings, wherein:

Fig. 1 is a sectional elevational view of one form of the apparatus of the invention, showing in broken lines the actuation of the apparatus to distort the end of a container to funnel shape to insure complete emptying of the container;

Fig. 2 is a top plan view of the apparatus of Fig. 1 showing in solid lines the apparatus in distorting position and in broken lines in non-distorting position;

Fig. 3 is an elevational view of a modified form of the invention;

Fig. 4 is a top plan view of the modification of Fig. 3;

Fig. 5 is an elevational view similar to that of Fig. 3, but showing the apparatus distorting the end of the container to funnel shape during emptying thereof;

Fig. 6 is an elevational view of still another modified form of the invention;

Fig. 7 is a top plan view of the apparatus shown in Fig. 6, and

Fig. 8 is an elevational view similar to that of Fig. 6, but showing the apparatus distorting the end of the container to funnel shape during emptying thereof.

Referring to the drawings and in particular to Fig. 1, there is shown a collapsible container, generally designated by the reference letter C, of the general type with which the apparatus of the present invention is intended to be used. The container is formed of flexible rubberized cord fabric, and when filled is of a generally cylindrical shape. The container is provided at one end with a central lifting eye L by which the container may be lifted by suitable means, such as the chain hoist H, illustrated. A filling opening F is provided in the top of the

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container to one side of the lifting eye L and a discharge opening D is provided in the other end of the container at the center thereof. A flexible fabric sock or sleeve S secured to the fitting of the discharge opening D serves as a spout through which the material may flow from the container into a bin, hopper or conveyor B. A tie-string, clamp, or other fastening device is normally provided to close off the sleeve. When not in use, the sleeve S is tucked into the container and covered by the usual closure plug (not shown).

Steel reinforcing cables W, secured to the lifting eye L at one end and at spaced points to the lower end of a container serve to prevent bulging of the ends of the container and to take the load during lifting of the container. The container is generally of the type disclosed in U. S. Patent No. 2,612,924, which is assigned to the same assignee as the instant application, and reference is made thereto for a more detailed description of the structure thereof.

In accordance with the invention, the apparatus includes a plurality of pairs of diametrically opposed radiating arms 10 pivotally secured to circumferentially spaced vertically extending framework members 11. Each arm 10 is secured to a short shaft 12 and each shaft 12 is connected to adjacent shafts 12 by universal connections 13 so that the shafts must turn in unison. Alternate shafts 12 are journaled in bearings 14. Each bearing 14 is secured to one of the vertically extending supporting framework members 11. The framework members 11 are spaced to provide an opening therebetween through which the emptying sleeve or sock S of the container may extend. The vertically extending frame members 11 are braced by a horizontal framework 15.

Fluid actuated cylinders 16 are pivotally secured to the base of each of the vertically extending supporting frames 11 and the piston rods 16a thereof are pivotally attached to the alternate arms 10. Admission of fluid under pressure to the cylinder 16 to extend the piston rods 16a thereof, therefore, serves to pivot all the arms 10 simultaneously, by reason of the universal connections 13, to the position shown in broken lines in Fig. 1 and in solid lines in Fig. 2, so that the end of the container is distorted to the fluted funnel shape shown in Figs. 1 and 2 as the container empties thereby insuring that all the material is emptied from the container through the emptying sock S into the bin, hopper or conveyor B. The container is placed on the arms 10 while they are in horizontal or planar position.

A conventional fluid pressure actuated vibrator 10a is secured to one of the arms 10 and vibration of the arms 10 thereby is transmitted to the container to provide further insurance of free flow of the material from the container, particularly when the material is of a powdered or granular form which sometimes becomes caked.

While it is within the scope of the invention to pivot the arms 10 directly at the inner ends thereof, they are preferably pivoted, as illustrated, at points spaced outwardly from the inner ends of the arms. By this arrangement some of the weight of the container and contents is utilized to pivot the arms. It also will be noted that the pivot point of each arm 10 is below the upper container engaging surface of the arm so that when the arms are pivoted to the position shown in broken lines in Fig. 1, the inner ends thereof will be adjacent the discharge opening D. This combination of features insures continuity of the fluted funnel shape up to the periphery of the fitting of the discharge opening D so that no pockets are formed adjacent the discharge opening D into which material might be trapped.

Like the form of the invention shown in Fig. 1, the modification shown in Figs. 3-5 also includes a plurality of pairs of diametrically opposed radiating arms 17 piv-

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totally secured at circumferentially spaced points to a frame 18. As best shown in Fig. 4, the frame 18 is formed of a plurality of short sections of shaft 18a which in turn are secured together to form a unitary open frame. Like the form of the apparatus shown in Fig. 1, the arms are pivotally secured to the shafts 18a at points spaced outwardly from the inner ends of the arms 17 and below the outer container engaging surfaces of the arms 17.

Secured to the free end of each arm 17 by means of a hook 19 is a cable 20. The cables 20 are in turn secured at their other ends to a ring 21 having an outer diameter equal to or greater than that of the container. The ring 21 in turn is supported from a ring 22, from which the container is also suspended by a cable 23. The ring 22 is secured to a conventional fluid actuated vibrator 24 and the vibrator is secured to a chain hoist H.

In emptying a container with the apparatus of Fig. 3, the container is placed on the arms 17. Two or more of the cables 20 may be unhooked to permit placement of the container on the arms 17. The arms 17 rest on the ground or floor during placement of the container thereon and each arm is provided with a leg 25 adjacent the end thereof to hold the arms level during placement of the container thereon. The container and apparatus is then raised by means of the hoist H and positioned over the hopper or bin B into which the material is to be emptied. The closure plug (not shown) for the discharge opening D is removed and the sleeve S is pulled out and unfastered. As the container empties the arms press into the container, due to the weight of the container and lading action thereon, thereby distorting the end of the container to a fluted funnel shape to insure complete emptying of the container. The ring 21 holds the cables 20 apart adjacent the top of the container thereby insuring continuity of the funnel shape from the top of the container to the discharge opening D at the bottom thereof. Operation of the vibrator 24 provides further insurance of free flow of the material, particularly when the material is in a powdered or granular form which sometimes becomes caked.

The modification as shown in Figs. 6, 7 and 8, like the forms of the invention shown in Figs. 1 and 4, includes a plurality of diametrically opposed radiating arms 26 which engage and distort the end of the container C to a funnel shape to insure complete emptying of the container.

The arms are secured at one end at circumferentially spaced points to a lower horizontal ring 27 and at the other end to an upper, larger horizontal ring 28 so that the arms together form a rigid substantially frusto-conical frame similar in shape to that defined by the arms of the previously described modifications when in distorting position. The frame may be provided with a suitable supporting framework (not shown) or may be supported in an opening through a floor, as illustrated.

In utilizing this form of the invention, the container is merely lowered into the frusto-conical frame formed by the arms 26 and the weight of the container and contents pressing on the arms 26 distorts the end of the container to a funnel shape as shown in Fig. 8, thereby insuring emptying of the container.

From the above description it can be seen that there is provided a novel apparatus for use in emptying collapsible containers which will insure complete emptying of the container. While certain preferred forms of the invention have been shown and described, it is to be understood that this is for the purpose of illustration only and that changes and modifications can be made therein without departing from the spirit and scope of the invention.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through

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one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated elements pivotally secured to said frame and radiating from said frame at circumferentially spaced points and means for pivoting said elements against the container wall surrounding the discharge opening, said elements when pivoted against said container wall surrounding the discharge opening together defining an inverted substantial frusto-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

2. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough, adapted to be aligned with the discharge opening of the container, a plurality of elongated rigid arms pivotally secured to said frame and radiating from said frame at circumferentially spaced points and means for pivoting said arms against the container wall surrounding the discharge opening said arms when pivoted against said container wall surrounding the discharge opening together defining an inverted substantially frusto-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

3. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated arms pivotally secured to said frame and radiating from said frame at circumferentially spaced points, and fluid actuated means operatively connected to said arms for pivoting said arms against the container wall surrounding the discharge opening said arms when pivoted against said container wall surrounding the discharge opening together defining an inverted substantially frusto-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

4. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated elements pivotally secured to said frame and radiating from said frame at circumferentially spaced points, cables secured to the free ends of said elements for pressing said elements against the container wall surrounding the discharge opening, said elements when pressed against said container wall surrounding the discharge opening together defining an inverted substantially frusto-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

5. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated arms pivotally secured to said frame and radiating from said frame at circumferentially spaced points, and cables secured to the free ends of said arms for pivoting said arms against the container wall surrounding the discharge opening, said arms when pivoted against said container wall surrounding the discharge opening together defining an inverted substantially frusto-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

6. Apparatus for use in emptying collapsible generally

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cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated elements pivotally secured to said frame and radiating from said frame at circumferentially spaced points so that they can be pressed against the container wall surrounding the discharge opening, said elements when pressed against the container wall surrounding the discharge opening together defining an inverted substantially frustro-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

7. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening at one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated arms pivotally secured to said frame and radiating from said frame at circumferentially spaced points, an annular member suspended above the container, and cables secured at one end to said annular member and at the other end to the free ends of said arms by which said arms may be pressed against the container wall surrounding the discharge opening, said arms when pressed against the container wall surrounding the discharge opening together defining an inverted substantially frustro-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape so that flow of material from the container is thereby facilitated.

8. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated arms pivotally secured to said frame and radiating from said frame at circumferentially spaced points, the pivot point of said arms being adjacent to but spaced outwardly from the inner ends of said arms and spaced from the upper container engaging surfaces of the arms, and means

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for pivoting said arms against the container wall surrounding the discharge opening, said arms when pivoted against said container wall surrounding the discharge opening together defining an inverted substantially frustro-conical frame so as to distort said container surrounding said discharge opening to a fluted funnel shape so that flow of the material from the container is thereby facilitated.

9. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, elongated elements secured to said frame and radiating outwardly therefrom, said elements being movable against the wall of the container surrounding the discharge opening said elements when moved against the wall of the container surrounding the discharge opening together defining an inverted substantially frustro-conical frame so as to distort said container wall surrounding said discharge opening to a fluted funnel shape to thereby facilitate flow of stock from the container.

10. Apparatus for use in emptying collapsible generally cylindrical containers having a discharge opening through one end thereof comprising, a frame having an opening therethrough adapted to be aligned with the discharge opening of the container, a plurality of elongated elements secured to said frame and radiating from said frame at circumferentially spaced points and together defining an inverted substantially frustro-conical frame during the emptying of the container adapted to distort the wall of the container adjacent said one end to a fluted funnel shape.

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