Sept. 27, 1955 C. L. DAY ET AL 2,718,989

APPARATUS FOR REMOVING EXCESS OF MATERIAL FROM PORTABLE CONTAINERS

Filed Sept. 19, 1951 4 Sheets-Sheet 1

Fig. 1.

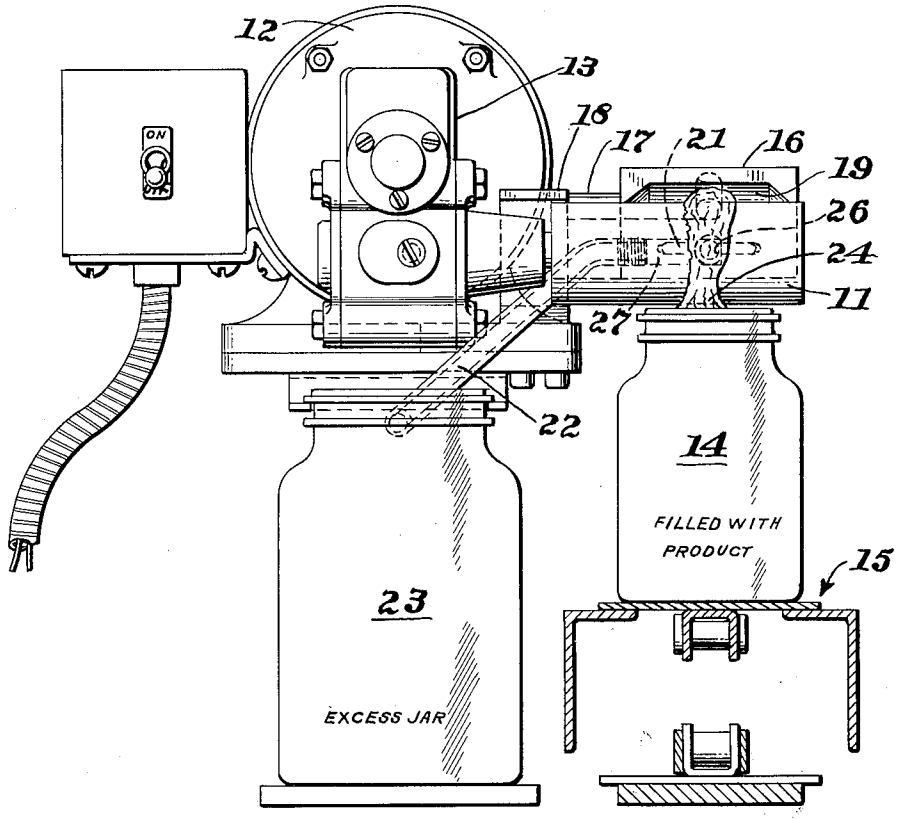
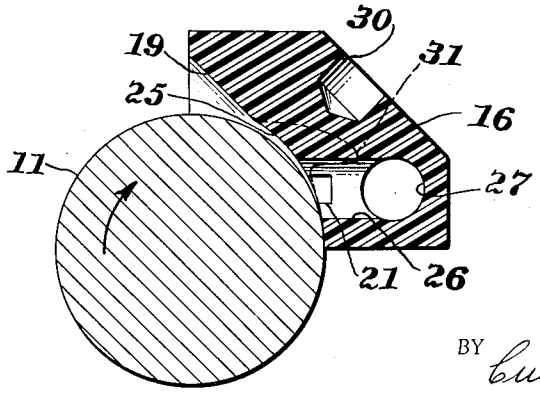


Fig. 14.



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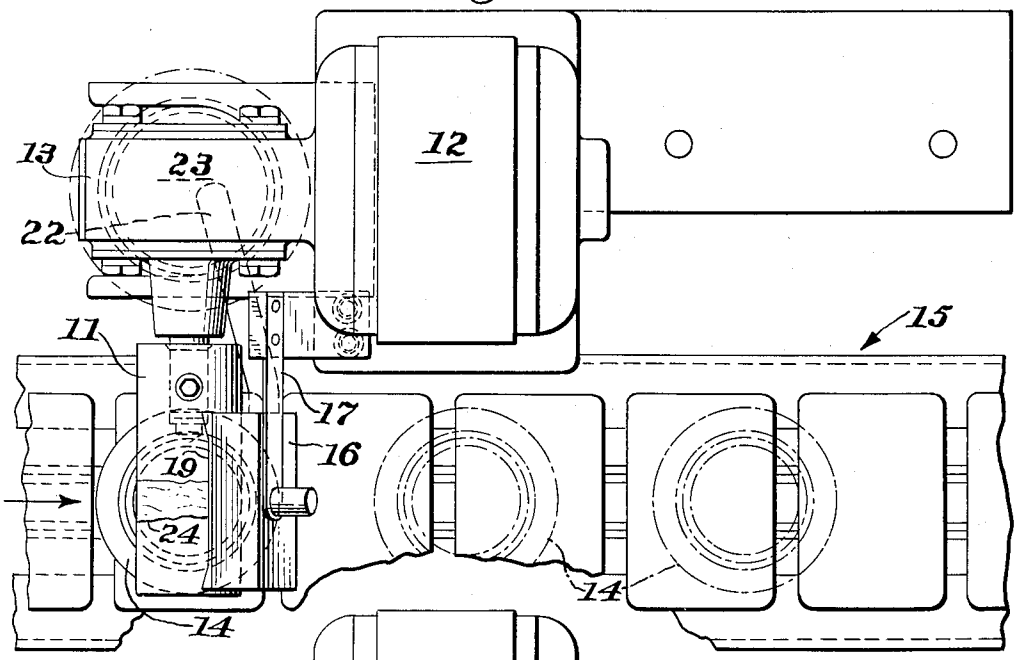
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APPARATUS FOR REMOVING EXCESS OF MATERIAL FROM PORTABLE CONTAINERS

Filed Sept. 19, 1951 4 Sheets-Sheet 2

Fig. 2.



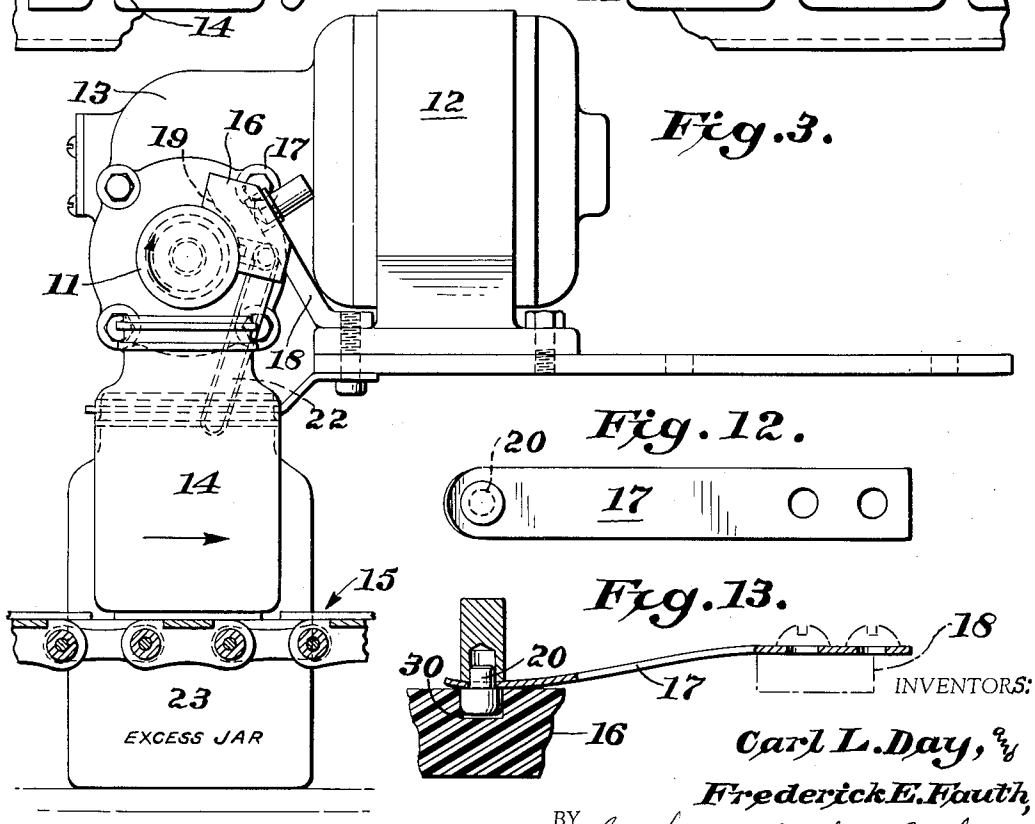


Fig. 3.

Fig. 12.

Fig. 13.

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APPARATUS FOR REMOVING EXCESS OF MATERIAL FROM PORTABLE CONTAINERS

Filed Sept. 19, 1951 4 Sheets-Sheet 3

Fig. 4.

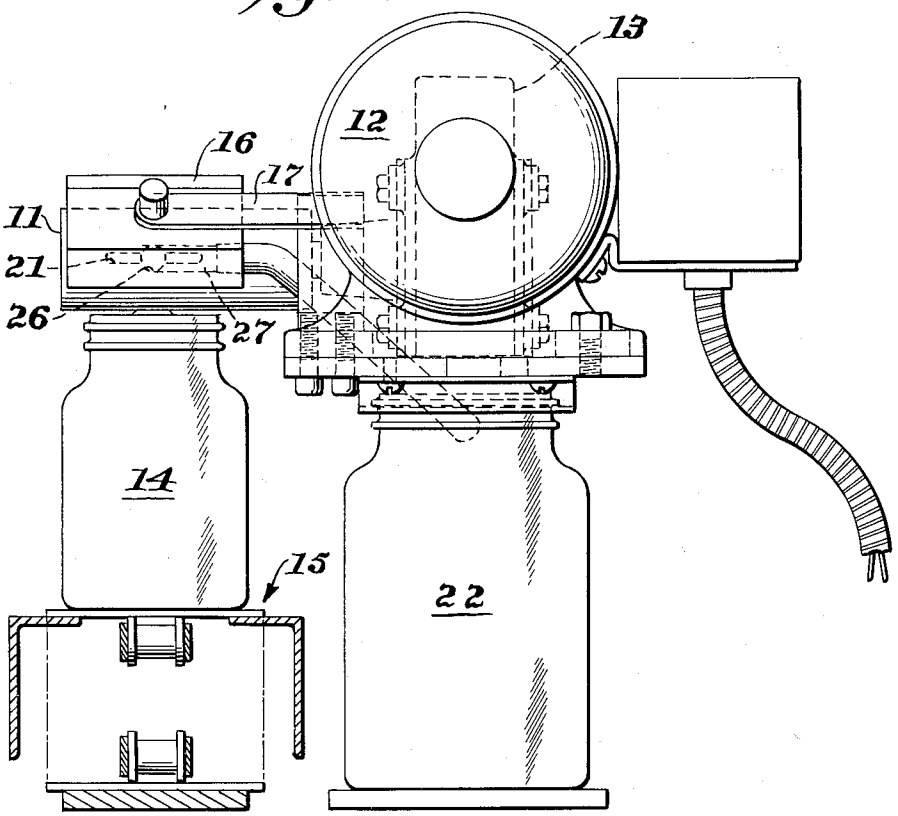
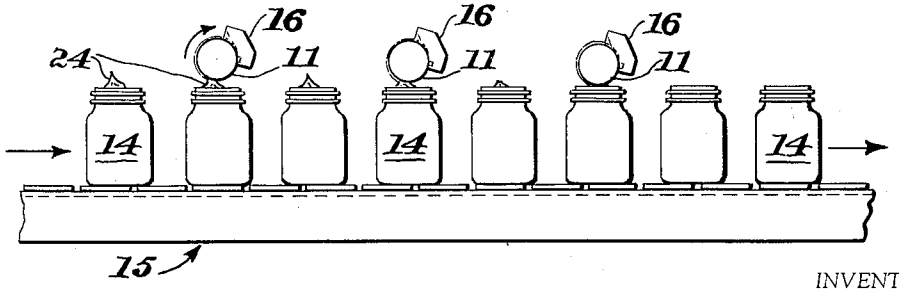


Fig. 5.



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Sept. 27, 1955 C. L. DAY ET AL 2,718,989

APPARATUS FOR REMOVING EXCESS OF MATERIAL FROM PORTABLE CONTAINERS

Filed Sept. 19, 1951 4 Sheets-Sheet 4

Fig. 6.

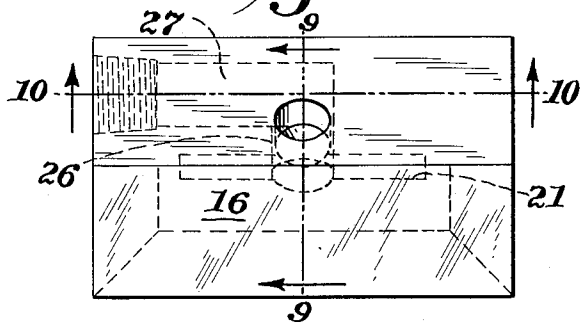


Fig. 7.

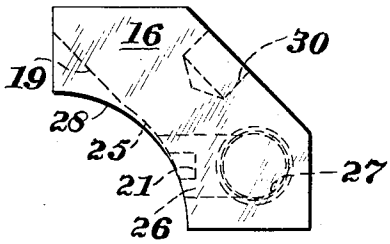


Fig. 8.

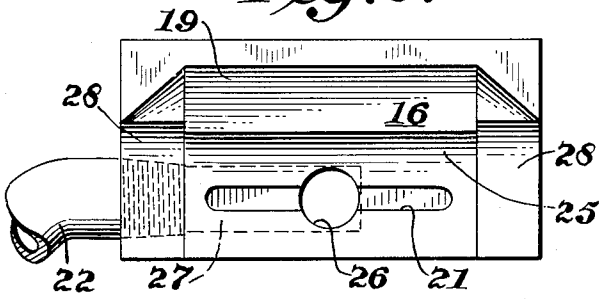


Fig. 9.

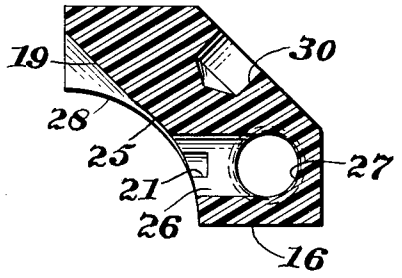


Fig. 10.

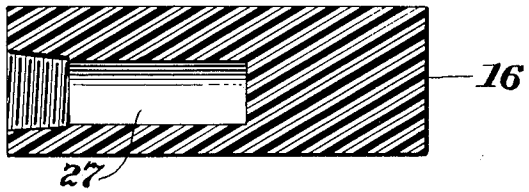
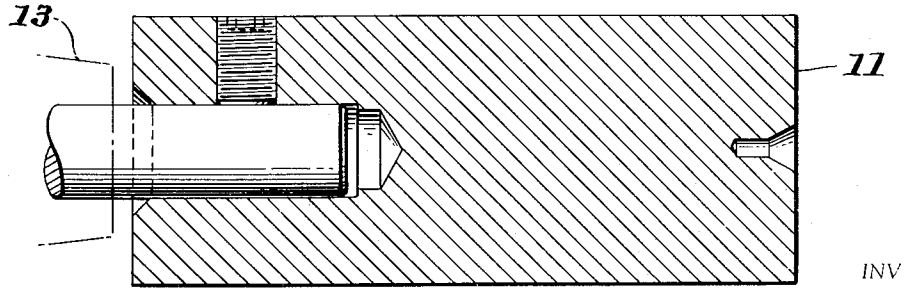


Fig. 11.



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United States Patent Office 2,718,989 Patented Sept. 27, 1955

2,718,989

APPARATUS FOR REMOVING EXCESS OF MATERIAL FROM PORTABLE CONTAINERS

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Application September 19, 1951, Serial No. 247,346

10 Claims. (Cl. 226—22)

Our invention relates to a device for the removal of an excess of product or "overfill" deposited in containers during the filling of the same with heavy viscous fluids, such as mayonnaise, apple butter or creams and the like.

More specifically, our invention relates to a device for removing excessive product of a heavy viscous nature extending above the mouth of a container wherein a rotating element contacts the overfill, collecting the same upon its peripheral surface and the principles of a hydrodynamic bearing are employed for removing the material from the element and pumping this overfill into a collecting chamber.

After the filling valve of a filling machine has been closed, a "tail" or peak of these heavy viscous fluids frequently is left standing above the surface of a container mouth and is usually centrally located and often extends an inch or more in height.

The presence of this "tail" or peak presents certain difficulties which affect the quality and appearance of the sealed product. One of these difficulties results from the fact that containers holding products of this nature are usually provided with a vacuum seal obtained by filling the container headspace with steam and then cooling the headspace. To effect the steam or hot gas treatment for sterilization and vacuum sealing, a steam screen or similar device necessarily must come in close proximity to the container mouth. Heretofore, the presence of these peaks of the product fed into the container frequently have resulted in an overfilled condition and have contacted and adhered to the treating apparatus, to subsequently dry and cake on the apparatus and then fall into succeeding containers passed below the filling apparatus. The presence of small particles of caked material in the product naturally is not desirable and has resulted in unfavorable consumer reaction and a belief that foreign materials have adulterated the product.

In addition to the foregoing difficulty, the seal produced by the aforementioned method frequently has been rendered defective by the presence of product between the sealing surfaces of the closure and the container mouth.

Another unsatisfactory condition resulting from applying a closure to a container having an excess of product in the form of a "tail" or peak has been that the fluid, after overflowing the container mouth sealing surfaces, occasionally has run onto the closure retaining portions where it subsequently came into contact with the surrounding air and became rancid and acquired disagreeable odors.

Previous methods for removing this product overfill known to us have not been entirely successful. One such method has involved use of a jet of air to blow off the overfill, but adequate control of the blown-off excess has never been completely attained and the difficulties hereinbefore mentioned are not entirely eliminated. The employment of a doctor blade on a rotating frame has been attempted for the purpose of wiping off the excess product, but it has been found that such an arrangement is not

satisfactory for the reason that it becomes clogged and must be periodically cleaned. Again, this method does not insure efficient removal of the material and the foregoing difficulties are present.

With the above and other difficulties of the removal of product overfill in mind, it is, therefore, an object of our invention to provide means for effectively removing undesirable product overfill from a container without causing the product to run over the sealing surface or onto the closure retaining portion of the container mouth.

Another object of our invention is to provide a rotating element for contacting and removing product overfill from a container and subsequently utilizing the pumping characteristics of a hydrodynamic bearing or bearings for removing the excessive product from the element and delivering the same to a collecting receptacle.

Still another object of the present invention is to provide a device for removing product overfill from containers prior to the sealing thereof and which may be driven either by a shaft of other driven mechanisms or by an independent source of power.

Another object of the instant invention is the provision of a new and improved method of removing product overfill from containers prior to the sealing thereof with a closure.

Other objects of our invention reside in the provision of an apparatus for removing product overfill from unsealed containers which requires low operating power, is sanitary, easily inspected and cleaned, simple in nature, inexpensive to manufacture, and pleasing in appearance.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is a front elevation of the apparatus of the present invention as viewed from the direction from which filled containers approach the device;

Figure 2 is a top plan view of the apparatus shown in Figure 1;

Figure 3 is a front side elevation of the apparatus of Figure 1 as viewed from the filled container side thereof;

Figure 4 is a rear elevation of the device of Figure 1 as viewed from the direction in which the containers move away from the apparatus of Figure 1;

Figure 5 illustrates a manner in which a plurality of such units as illustrated generally in Figures 1, 2, 3 and 4 may be successively employed in the event the quantity of excessive material is too great to be removed by a single unit within the time interval allowed by a passing container.

Figure 6 is a rear elevation of the collecting shoe as viewed from the side thereof which is opposite the side at which the overfill enters the shoe;

Figure 7 is an end elevation of the collecting shoe as viewed from the right end of Figure 6;

Figure 8 is a front elevation of the collecting shoe as viewed from the side thereof from which the product overfill approaches the shoe;

Figures 9 and 10 are vertical section views of the collecting shoe or block as viewed from section lines 9—9 and 10—10, respectively, in Figure 6;

Figure 11 is a longitudinal section view of a journal and the mode of securing the same to the driving shaft of a prime mover;

Figures 12 and 13, respectively, are plan and cross-sectional views of the leaf spring structure and securing means therefor which are utilized to exert the necessary operating pressures for the pumping bearing and collecting shoe arrangement of the present invention; and

Figure 14 is a vertical section view of the rotating element and collection shoe of the present invention illus-

trating the manner in which the collecting shoe rides upon the element, the broken line indicating the build-up of pressure by reason of the hydrodynamic bearing principle advantageously utilized by the present invention.

Referring now to Figures 1, 2, 3 and 4, it will be observed that a rotating cylindrical element **11** of stainless steel is disposed above and approximately normal to the path of travel of the containers carried by a conventional flat top conveyor. Although this element may be driven by any adjacent rotating element of a machine, preferably it is driven by a small electric motor **12** through a suitable reduction gearing **13**. With particular reference to Figure 1, the rotating element is shown supported at such an elevation that a jar is just provided adequate clearance for passing beneath the element. As viewed in Figure 1, the rear side of the element **11** travels upwardly and the container or jar **14** supported on the conveyor, generally denoted by numeral **15**, moves into the plane of the paper. Thus it will be seen that excessive product extending above the container mouth will come into contact with the rotating element and in adhering to the same will be carried upwardly as the element rotates.

For removing this excessive material adhering to the rotating element, a collecting shoe **16** formed of transparent acrylic plastic (to facilitate cleaning, inspection and improve appearance) is utilized and is directly associated with the rotating element. In the assembly views of Figures 1–4, the collecting shoe **16** is shown in bearing contact with the element, on the upper rear face thereof and is held in place and under operating pressure by a flat spring **17** carried by an angle bracket **18** mounted upon the motor base support. The flat spring **17** maintains the collecting shoe **16** in a substantially stationary position with respect to the rotating element during the normal operation of the apparatus. As is best indicated in Figures 12 and 13, one end of spring **17** is provided with a lug **20** carried by the spring in any convenient manner and is received within a slot **30** in the outer surface of collecting shoe **16**. This arrangement of lug **20** and slot **30** assures the provision of a constant length spring arm acting upon the collecting shoe **16**, a uniform bearing pressure, and a uniform pumping rate for a constant rotational velocity of the rotating element.

The particular design of the collecting shoe and rotating element of the present invention constitutes a unit which provides the pumping action of the present invention and will be discussed in detail hereinafter. It will suffice to mention here that the collecting shoe essentially includes a tapering throat having an opening **19**, as is best shown in Figures 1, 7, 8 and 9. The tapering throat terminates in a collecting slot **21** in fluid communication with a discharge tube **22** leading to a waste receptacle or jar **23** which is offset from the path of the moving filled container.

During the operation of the unit of the present invention, the peak **24** of any viscous or highly cohesive product, such as mayonnaise, shown in Figure 1, is removed from the container **14** by adhering to the rotating element **11** and is carried upwardly and enters the mouth or maximum clearance opening **19** of the throat of the collecting shoe **16** where it is forced down to a high pressure low clearance sector **25**, Figures 7, 9 and 14, by molecular friction and the high pressure acting upon the viscous material just in front of the entrance to the collecting slot **21** as best viewed in Figure 14. While passing through sector **25**, the pressure attains a high value, and the combination of this high pressure, the molecular friction within the product overfill, and the rotation of element **11** effect a pumping action to force the overfill into the collecting slot **21** and ports **26** and **27** which lead to a discharge tube **22** and a waste collecting receptacle or jar **23**. The pumping action of the rotating element and shoe unit of the present invention functions in a manner similar to a conventional hydrodynamic journal bearing. As shown in Figures 7, 8 and 9, the collecting shoe **16** is provided with bearing lands **28** on either side of the throat, for guiding the material and preventing it from escaping out of the sides of the throat, and for establishing a fixed diminishing height of sector **25**, which would not be possible in a normal journal bearing in this low velocity range.

In a normal journal bearing the journal center and bearing center will not coincide, and the offset of the centers as well as the high pressure area location are functions of velocity, lubricant viscosity, unit load and bearing diametral clearance.

In contradistinction to the normal journal bearing, the unit employed in our invention is intended to operate at a low velocity, on fluids of average or high viscosity or cohesiveness, low load, and a fixed offset and bearing clearance. The fixed clearance, which is the diminishing height of sector **25** is established by the bearing surfaces or lands **28** which are resiliently biased in intimate contact with element **11** by spring **17**. The total developed pressure, as shown at **31** in Figure 14, is lower than the spring pressure developed by spring **17**, which assures continuous contact of bearing surfaces **28** with the element **11** and prevents side leakage of the product.

The actual value of the pressure developed within the high pressure area **25** is a function of the rotational speed of element **11** and the clearance between the upper wall surface of sector **25** and the element **11**, each of which is of low value.

While the unit described hereinbefore is usually carried upon the head of a capping and sealing machine and is automatically adjusted for various sizes of containers when the capping and sealing machine head is adjusted, it will be obvious to those skilled in the art that a separate vertically adjustable mounting for our unit may be easily provided. Such an arrangement is schematically illustrated in Figure 5 which shows the use of a plurality of independent units each intended to be vertically adjustable to meet various operating requirements.

We have found the capacity and operating characteristics of the collecting shoe of the units vary somewhat with element and shoe design and size, operating speeds, and product viscosities, so that various modifications within the scope of our invention may be necessary for particular adaptations to meet various operating requirements. The capacity of the unit is increased substantially proportional to an increase in the operating speed of the element for a given product discharging pressure. Obviously, therefore, a variable speed source of power may be desirable in certain installations wherein the quantity of product overfill is variable due to filling machine operations used with various container sizes.

When our invention is utilized with containers having extremely wide mouths or in other instances where a wide coverage is desired, the rotating element may be extended in length and, if necessary, supported at its free end. The shoe design in such a situation may comprise a collecting shoe having multiple pump structures discharging individually or collectively through a manifold for delivery to a collecting receptacle.

For increasing the capacity of the present invention and the speed container travel, the overfill removing operations may be accomplished in the manner shown in Figure 5. Here the use of a plurality of units, similar to that in Figures 1–4, are employed to successively operate at decreasing heights each removing a portion of the container overfill.

Additionally, it is envisioned to increase capacity for removing product overfill by using a plurality of individual collecting shoes angularly spaced about a high speed rotating element. In this manner, successive collecting shoes would ultimately clean the element surface prior to its coming into contact with more of the product overfill held by a container.

While the invention has been described with reference

to certain preferred examples thereof which give satisfactory results, it will be understood by those skilled in the art to which the invention pertains that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is our intention, therefore, to cover in the appended claims all such changes and modifications.

We claim:

1. In the art of filling containers with highly viscous or cohesive material, apparatus for removing upstanding overfilled material from an open-mouthed filled container comprising a container supporting conveyor, a smooth-surfaced cylindrical element supported above said conveyor and rotatable about a horizontal axis, said element being positioned at such height with respect to said conveyor that the lower peripheral surface of said element will contact upstanding overfilled material of a container supported on said conveyor, means for rotating said cylindrical element at such speed that upstanding overfilled material contacted by said cylindrical element will adhere thereto and be carried upwardly therewith, and means substantially stationarily positioned with respect to said cylindrical element for removing the adhered material from the peripheral surface of said cylindrical element.

2. The apparatus described in claim 1, said means for removing viscous material from said cylindrical element comprising a collecting shoe in intimate contact with said cylindrical element, said collecting shoe cooperating with said cylindrical element for receiving and pumping the viscous material adhering to said cylindrical element and discharging such material to a collecting point.

3. The apparatus described in claim 1, said means for removing viscous material from said cylindrical element comprising a collecting shoe in intimate sliding engagement with said cylindrical element, said collecting shoe having a first surface portion thereof nearest the cylindrical element having a throat opening for receiving viscous material, and a second surface portion defining a high pressure area between the collecting shoe and said cylindrical element.

4. The apparatus described in claim 1, said means for removing viscous material from said cylindrical element comprising a collecting shoe in intimate sliding engagement with said cylindrical element, said collecting shoe having a first surface portion thereof nearest the cylindrical element having a throat opening for receiving viscous material, and a second surface portion defining a high pressure area between the collecting shoe and said cylindrical element, said shoe having a pair of bearing lands respectively providing side wall surfaces for the throat opening of said first surface, each of said bearing lands being in slidable engagement with said cylindrical element for guiding the viscous material carried on said cylindrical element into the throat opening and for establishing a fixed diminishing height of said high pressure area.

5. The apparatus described in claim 1, including means for carrying the viscous material to a predetermined position on the path of rotation of said cylindrical element.

6. The apparatus described in claim 1, said means for removing the viscous material from said cylindrical element comprising a collecting shoe in sliding engagement with said cylindrical element and having conduit means disposed therein for establishing fluid communication between the surface of the cylindrical element and a collecting receptacle, a portion of said conduit means defining a high pressure area wich cooperates with said cylindrical element for pumping the viscous material from said cylindrical element to said receptacle.

7. The apparatus described in claim 1, said means for removing viscous material from said cylindrical element comprising a hydrodynamic bearing adapted to cooperate with said cylindrical element for receiving and pumping the viscous material to a collecting point.

8. The apparatus described in claim 1, said means for removing viscous material from said cylindrical element comprising a hydrodynamic bearing of the pumping type having the inlet side thereof positioned for initial contact with the viscous material and the outlet side thereof in fluid communication with a material collecting point.

9. The apparatus described in claim 1 wherein the horizontal axis of said cylindrical device is adjustably fixed with respect to said conveyor.

10. The apparatus described in claim 1, said means for removing the viscous material from said cylindrical element comprising a hydrodynamic bearing of the pumping type resiliently urged against said cylindrical element and having a recess on the surface engageable with said cylindrical element, one end of said recess being at the leading edge of said bearing, said recess decreasing in depth from the leading edge thereof and having a discharge port communicating with the portion of the recess of decreased depth.

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