July 10, 1928. 1,676,734

N. M. HOPKINS

APPARATUS AND METHOD FOR FILLING COLLAPSIBLE TUBES

Filed Dec. 16, 1922 2 Sheets-Sheet 1

Fig 1.

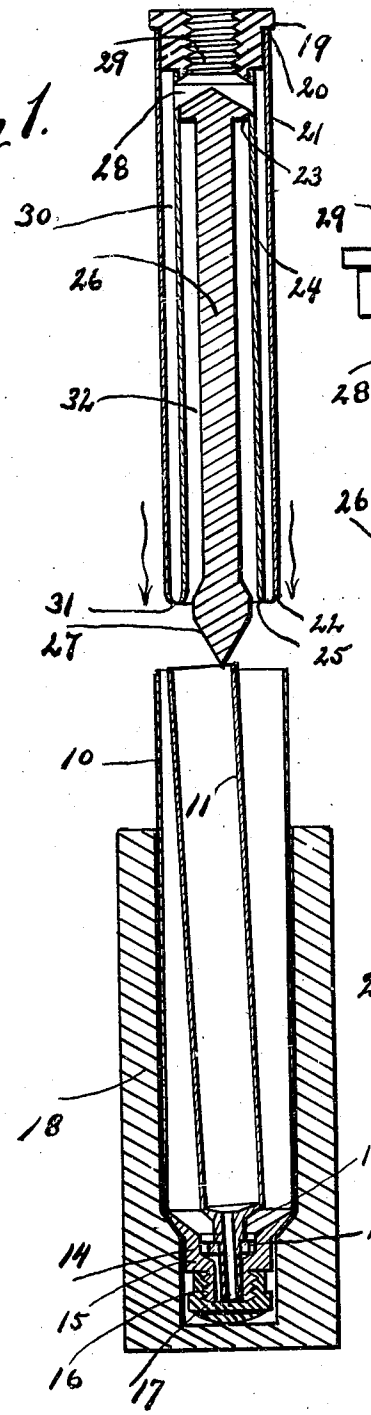


Fig 3.

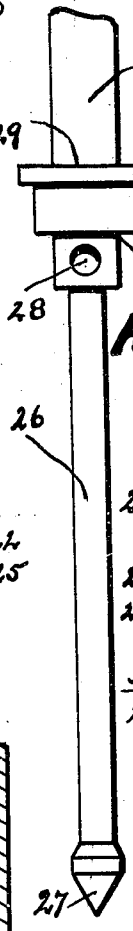
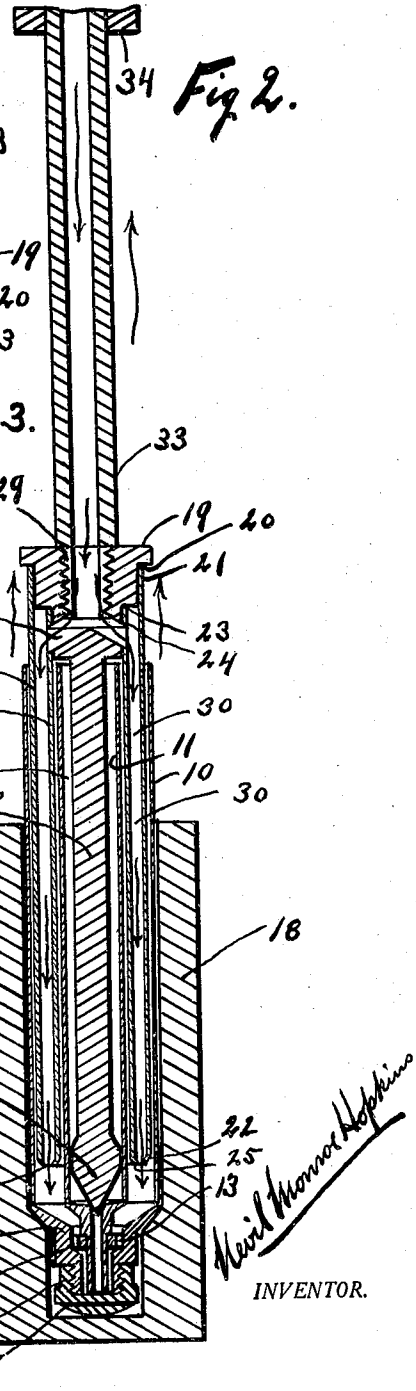


Fig 2.



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INVENTOR.

226-100

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N. M. HOPKINS

APPARATUS AND METHOD FOR FILLING COLLAPSIBLE TUBES

Filed Dec. 16, 1922 2 Sheets-Sheet 2

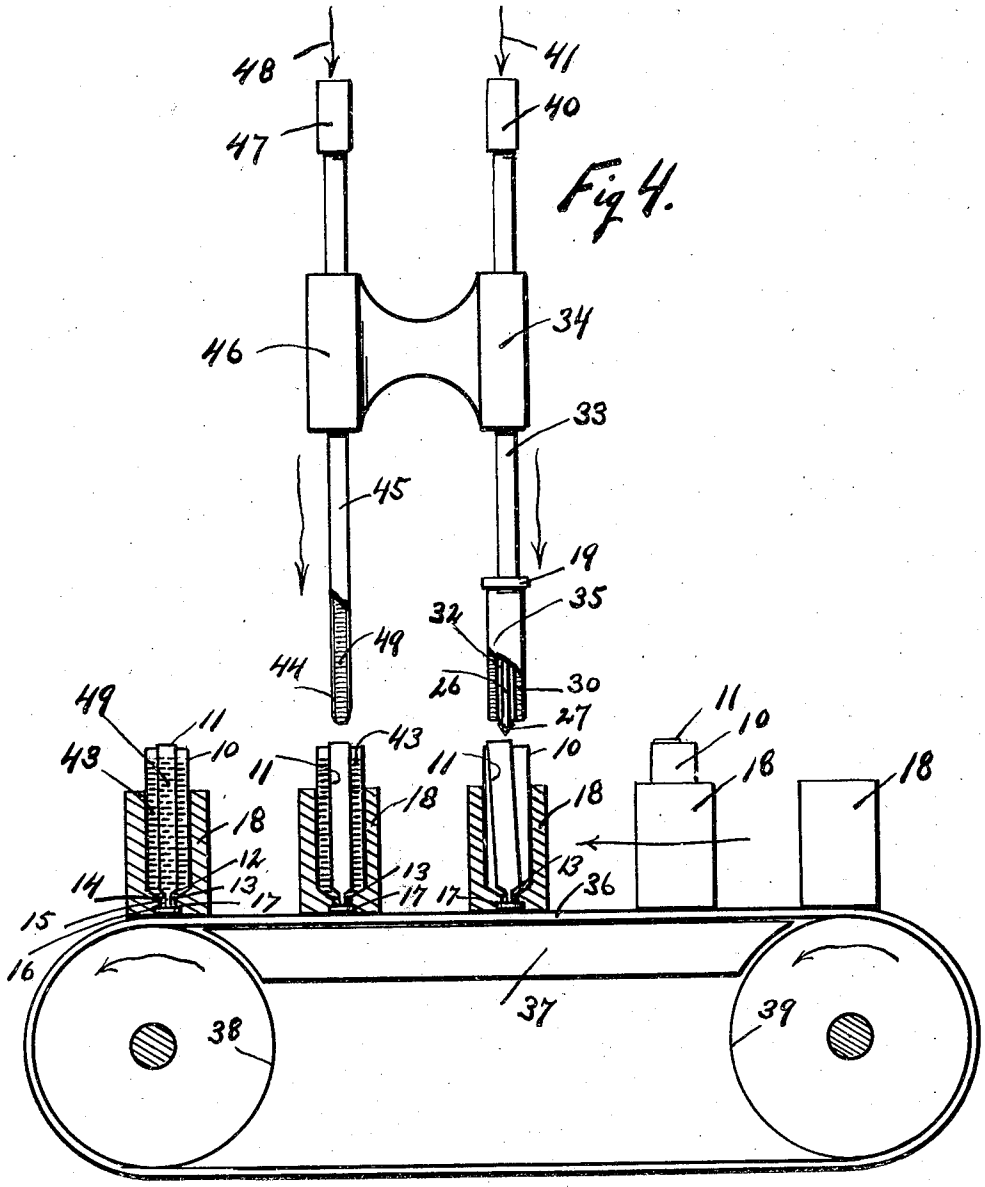

Fig 4.

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UNITED STATES PATENT OFFICE.

NEVIL MONROE HOPKINS, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO GILMONT PRODUCTS CORPORATION.

APPARATUS AND METHOD FOR FILLING COLLAPSIBLE TUBES.

Application filed December 16, 1922. Serial No. 607,338.

The present invention relates to apparatus or equipment and methods for filling collapsible tubes such as are employed in toothpastes, shaving creams, skin foods, cements and many other substances used in the arts and sciences, with special reference to designs of multi-compartment collapsible tubes.

In my several copending applications the earliest of which is "collapsible tubes" filed June 11, 1921, Serial Number 476,746, and more especially in my later application "collapsible tubes with cooperating compartments, contents and orifices" filed November 30, 1921, Serial Number 518,965 together with other applications for tubes and containers pending before the Patent Office I have shown various designs of multi-compartment collapsible tubes of soft or pliable metal or alloy or other suitable material wherein an inner tube is placed within an outer tube, and spaced in a substantially concentric position. In still another copending application "machinery and methods for filling and closing collapsible tubes" filed October 17, 1922, Serial Number 595,146 I have shown broadly machinery or apparatus and methods for filling bi-compartment collapsible tubes, and especially the design wherein an inner tube is placed substantially vertically and concentrically within an outer tube and dependent upon their neck pieces with collar for centering and holding purposes where both tubes are adapted to be filled with different kinds of substances.

The present invention has to do with important details such as automatically centering the substantially concentric inner tube of a bi-compartment collapsible tube combination, and in holding said inner tube in a true vertical and concentric position with reference to the outer tube, in order that the annular space between the two concentric tubes may be first filled with one kind of substance and then permitting of the withdrawal of the centering and annular space filling device leaving the centered inner tube held vertical and concentric by the vertical impact truly imparted to the neck of the inner tube by the cone shaped member of the plunger and the material placed around the same acting as a retaining wall and with the system in position for the filling of the inner tube. I wish to particularly emphasize and point out in my present invention that the filling of such a bi-compartment collapsible soft or pliable metal or alloy tube or other thin suitable material, involves radically and scientifically this salient principle over those involved in the filling of the old-fashioned single types of collapsible tubes. With a simple single type of collapsible tube it may be truly and vertically held in exact position for filling by a jig or deeply recessed receptacle. In my double tube combination, whereas I may hold the outer tube truly and vertically in such a jig or deeply recessed receptacle I must not only depend upon the less reliable workmanship of the two interlocking neck pieces with spacing collar or spider but upon the soft and easily deformed character of the light pieces necessarily involved in the design of the necks and collar for the vertical position and concentric spacing of the inner tube within the outer tube. Any wobble or bending of the neck piece or neck pieces of either or both tubes or of the spider or collar between the two tubes, would be magnified greatly at the upper or open filling ends, and would result in the crushing of one or both of the two tubes during the descent of the hollow plunger or plungers during the filling operation. For this and other reasons the tubes cannot be assembled separately by an attendant outside the machine and be placed in an ordinary jig and be filled by the ordinary machinery apparatus or methods previously employed in the art.

The accompanying illustrations set forth my invention in sufficient clearness to enable anyone familiar with the general art to fully grasp my new principles involved and these illustrations form a part of the present specifications.

In the accompanying drawings, Figure 1 represents a view of my automatic inner tube centering device and the outer or annular space filling nozzle in section, about to descend and center the inner tube of a pair of collapsible tubes held in a jig or deeply recessed guide also in section showing an inner tube which is considerably out of true due to imperfection in the workmanship of the necks or collar or of bending due to careless handling of a pair of collapsible tubes.

Figure 2 shows my centering and filling nozzle after having descended and centered the inner tube of a pair of collapsible tubes

held firmly in the jig or deeply recessed guide and driven down hard against the lower end or shoulder of the inner tube after centering, and not only driving the two tubes together at their neck pieces and collar in a tight fit, but in position for efficiently filling the annular space between the two tubes with material.

Figure 3 is a detailed view in elevation of the centering portion or plunger with cone of my device which will make clear the assembly of the nozzle device.

Figure 4 on the second sheet of drawings represents a number of bi-compartment collapsible tubes in jigs or deeply recessed guides in various stages of being centered and filled with different kinds of material through the agency of my devices and methods. I have not shown a complete system comprising all of the carriers and tubes nor the full length of conveyor I would employ in practice nor the tube closing and clip attaching machinery for purposes of clearness, but I have shown enough to set forth the principles and methods employed.

With reference to Figures 1, 2, 3, and 4, like numerals refer to like parts throughout and with further specific reference to Figure 1, 10 represents an outer collapsible tube of soft or pliable metal or alloy or other suitable composition, and 11 represents an inner soft or pliable metal or alloy collapsible tube, or a tube made of any other suitable material, with a neck 12 surrounded at a shoulder thereon by a centering collar 13, which has been forced on the said neck against its shoulder with a tight fit, said centering collar being notched out and resting in a slightly tapered recess 14 of the neck piece 15 of the outer collapsible tube 10, said neck piece being extended and threaded as shown at 16 and closed by the screw cap 17. Both tubes are here depicted neck end down, the outer of the two collapsible tubes 10 fitting snugly into the jig or deeply recessed centering guide 18. The construction of the collar 13 on the neck piece 12 not only permits of the centering of the said neck piece of the inner tube 11 within the neck piece of the outer tube 10 but is provided with notched passageways to permit of material from the outer tube 10 flowing past and issuing forth upon removing the screw cap 17 simultaneously with the issuing forth of material from the inner tube 11, the precise design of the aforesaid notched collar with the reasons for the simultaneous extrusion of several materials from the system of tubes, are fully set forth in my series of copending applications and especially in the copending applications the serial numbers of which are herein given. 19 is a turned metal member with a shoulder 20 adapted to receive with a drive fit a tube 21 opened at the lower end by chamfered or with a rounded edge 22. Against the shoulder 23 of the member 19 is another metal tube 24 also driven into position with a tight fit and open at the lower end and rounded or chamfered as at 25. Projecting downward and integral with the member 19 is a rigid solid rod portion 26 terminating in the cone shaped guiding member 27. A hole 28 passes entirely through the member 19 near its upper end laterally and communicates with the larger threaded hole 29 adapted to receive a threaded guide and filler tube 33 with a tight fit. It will thus be seen from an inspection of the drawings that material entering through the threaded hole 29 or the tube 33 screwed therein, would pass laterally through the hole 28 and enter the annular space 30 between the tubes 21 and 24 and issue forth at the constricted orifice 31. It is further evident from an inspection of Figure 1 that the above described nozzle has an annular space 32 between the centering member 26 and the inner side of the inner tube 24. It is also evident from an inspection of Figure 1 that the above described hollow nozzle with centering device may be made to descend vertically and that the cone shaped member 27 will automatically center the inner tube 10 placed immediately below it and firmly held in filling position and that the rounded or chamfered ends 22 or 25 of the tubes 21 and 24 will descend without collision with the upper open ends of the tubes 10 and 11.

With further reference to Figure 2 the aforesaid centering device and hollow nozzle have descended and the cone shaped member 27 is forcing the neck and shoulder of the inner tube 11 down against the centering collar 13 and in turn is forcing the centering collar 13 down into the slightly tapered recess 14 of the neck piece 15 of the outer collapsible tube 10 and down against the jig 18 making a tight or drive friction fit which prevents the withdrawal of the inner tube 11 from the outer tube 10 by the sliding friction, when the plunger and centering device is withdrawn. It will thus be seen that I not only provide a centering and filling device for the outer tube or annular space in my bi-compartment collapsible tube system, but I hold the inner tube vertical and concentric after the withdrawal of the plunger and centering device, by the material which has been placed and left packed around it thereby holding the inner tube in a truly vertical and concentric position for the second operation of filling said inner tube by a separate inner tube filling nozzle.

With further reference to Figure 4, second sheet of drawings, a guide is shown at 34 serving to direct the tube 33 in a truly vertical sliding course up and down which may be either manually or mechanically operated. With the completed centering and filling

nozzle for the annular space in my system of collapsible tubes shown partly in elevation and partly in section broken away at 35 with material shown in the annular space 30 betweeen the two tubes and the cone plunger 26 carrying the cone 27 about to descend and center up the inner tube 11 in the outer tube 10 held in vertical position by the jig or guiding member 18 being supported and carried by the belt 36 sliding over the firm plane table 37 in the direction of the arrow and driven by the drum wheels 38 and 39 in the direction of the two arrows upon the said drum wheels. The upper end of the sliding and filling tube 33 is enlarged at 40 and an arrow 41 indicates the feeding of material at this point into the upper end adapted to move up and down either by hand or by machinery.

The jig or guide member 18 is again shown at the left supporting a pair of concentric collapsible tubes after centering and filling the annular space with material 43 and is now shown moving over through the intermittent motion of the wheels 38 and 39 and the conveyor belt 37 where it has been stopped directly under the nozzle 44 of the sliding tube 45 in the guideway 46 and terminating with a top member 47 where an arrow 48 indicates the entrance of material from a different reservoir and of a different composition from that previously supplied to the annular space as received at 43. Material 49 is shown within the broken away section of the nozzle 44. It is now quite evident from an inspection of this device that the nozzle 44 may descend in the centered inner tube which is held truly vertical and concentric by the material 43 and that it may be filled with material 49. With an additional intermittent movement of the conveyor belt 37 we have both tubes shown filled at the extreme left with material 43 and 49 ready for closing and clipping. It is evident that the upper end of the tube 47 communicates with a like reservoir by means of a rubber hose or other suitable sliding or flexible connection and that means for intermittently feeding or forcing the material from the aforesaid reservoirs in conformity with general practice may be introduced and that the entire equipment extruding material from reservoirs may be either manually or mechanically operated.

The arrows at the sides of the Figures 1, 2 and 4 indicate the downward and upward motion of the paste or substance feeding nozzle respectively, and the arrows within the tube 33 and the annular space 30 of the feeding nozzle in Figure 2 indicate the flow of paste or substance. The operation of the machine or apparatus in detail is as follows: The hollow plunger as illustrated and described filled with paste or substance automatically centers and enters the system of double collapsible tubes, and descends to the bottom of said tube system forcing the neck pieces and collar together with a drive fit. Pressure is then put upon the paste or substance column from above in connection with the reservoir (not shown) causing the paste or substance to flow. The plunger is then drawn upward with a steady motion discharging the paste or substance as it travels at the same rate of motion until the plunger reaches a point about an inch from the top, when the discharge of paste or substance is discontinued by releasing the pressure upon said paste or substance column when the hollow plunger is accelerated in its upward movement, and is quickly withdrawn. This accelerating movement near the top after the removal of the pressure on the paste or substance column is for the purpose of breaking off the paste or substance sharply and in preventing it from "stringing" out of the tube. This completes the first stage of my process. The second stage consists of the entrance of the simple hollow nozzle into the centered inner tube which is likewise filled with paste or substance and descends to the bottom of the tube system. Pressure is likewise put upon the paste or substance column of this central nozzle and it is likewise withdrawn, the paste or substance flowing during this withdrawal movement, when likewise about an inch from the top the pressure upon the paste or substance column is removed and the plunger is accelerated and quickly withdrawn to prevent the "stringing" of the paste or substance supplied to the inner collapsible tube.

The establishment of the pressures upon the pastes or substances and the establishment of nozzle motions may obviously be manually accomplished or be mechanically accomplished through the agency of impellers, cams, connecting rods and such other mechanical devices and movements as are naturally employed in universal machinery of this general nature for the filling of simple single collapsible tubes with such substances as toothpastes, shaving creams, cements, etc. etc. It is obvious that I may modify the details of this invention within considerable limits without departing from the spirit thereof.

Having described my invention, I claim:

1. A method of filling a receptacle comprising separated compartments formed by collapsible tubes which comprises introducing matter initially at the bottom of the outer compartment and continuing progressively upwardly to fill the compartment while internally supporting the walls of the inner compartment and subsequently filling the inner compartment.

2. A method of filling a receptacle comprising an inner and an outer compartment formed by collapsible tubes which comprises introducing matter initially at the bottom of

the outer compartment and continuing progressively upwardly to fill the compartment while internally supporting the walls of the inner compartment at points substantially corresponding to the level to which the outer compartment is filled, the point of support of the inner compartment progressing with the filling of the outer compartment, and subsequently filling the inner compartment.

3. A method of filling a receptacle comprising inner and outer compartments formed by collapsible tubes which comprises forcing a supporting plug to the lowermost portion of the inner tube to fix the inner tube firmly within the outer tube, simultaneously projecting an annular filling nozzle into the lowermost portion of the outer compartment and simultaneously withdrawing the filling nozzle and the supporting member from the respective compartments while charging into the outer compartment material at a rate substantially corresponding to the rate of withdrawal of the filling nozzle and progressively supporting the inner tube from within.

4. A receptacle filling device comprising a pair of concentrically arranged tubes with a spacing between, forming a nozzle adapted to discharge material and a centrally associated centering device within the innermost tube.

5. A filling machine for bi-compartment receptacles, comprising a discharge member, consisting of two tubes, one smaller than the other, the smaller placed within the larger concentrically with a spacing between the two tubes forming a discharge nozzle, and a centrally disposed downwardly projecting rod carrying a centering head member said rod and head member being within the inner tube.

Signed at New York city in the county of New York and State of New York this 15th day of December A. D. 1922.

NEVIL MONROE HOPKINS.