W. GOODCHILD.

APPARATUS AND PROCESS FOR FILLING AND CLOSING CAPILLARY CONTAINERS.

APPLICATION FILED MAY 15, 1919.

1,397,631. **Patented Nov. 22, 1921.**

Fig. 1,

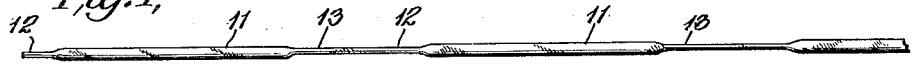


Fig. 2,

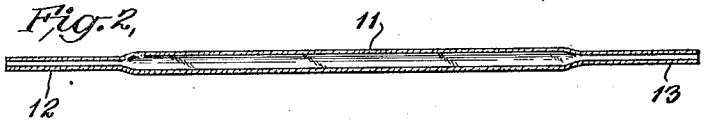


Fig. 3,

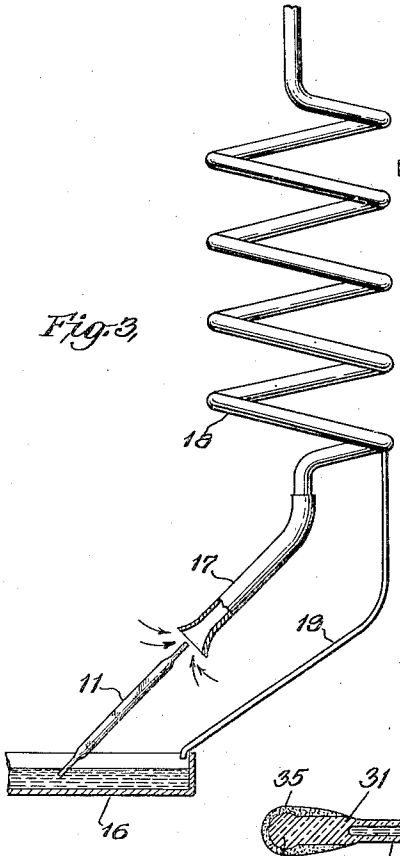


Fig. 4,

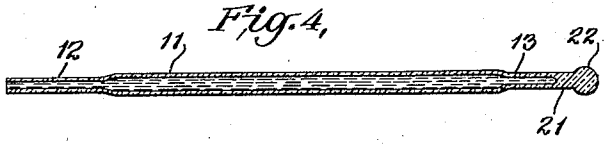


Fig. 5,

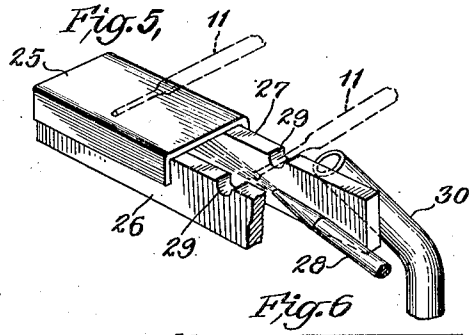
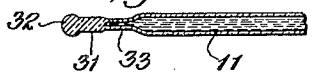


Fig. 6



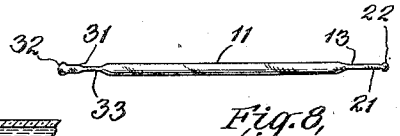


Fig. 8,

Fig. 7,

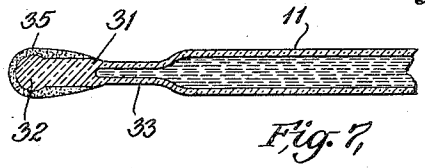
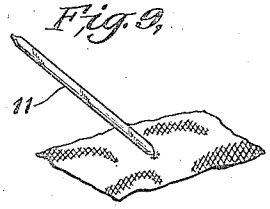


Fig. 9,



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UNITED STATES PATENT OFFICE.

WALTER GOODCHILD, OF HOBOKEN, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NIPS, INCORPORATED, A CORPORATION OF NEW JERSEY.

APPARATUS AND PROCESS FOR FILLING AND CLOSING CAPILLARY CONTAINERS.

1,397,631. Specification of Letters Patent. Patented Nov. 22, 1921.

Application filed May 15, 1919. Serial No. 297,424.

To all whom it may concern:

Be it known that I, WALTER GOODCHILD, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented a certain new and useful Apparatus and Process for Filling and Closing Capillary Containers, of which the following is a specification.

This invention relates principally to sealed vessels of restricted capacity designed to hold and distribute predetermined quantities of various liquids, such as perfumes, oils, chemicals, medicaments, etc., and further it has relation to apparatus and processes for making the same.

Primarily, the invention has for its object to provide a practical way of putting up select and costly goods of the classes referred to for sale in fractional amounts, which shall admit of a fair profit to the dealer in each case and yet enable persons of limited incomes to purchase the goods in such quantities as will temporarily supply their wants and meanwhile relieve them from incurring a needless expenditure.

A secondary object is the provision of a receptacle of the nature set forth adapted to contain an average portion of the said goods, that is, neither more nor less than is required for any given purpose, so that the goods shall not only keep fresh until released for use by unsealing the receptacle, but none will be left over to evaporate through exposure to the air, or become contaminated with floating impurities, and therefore go to loss or considerably depreciate in value.

Another object is to produce for the goods aforementioned a light and portable container of such dimensions as will permit a number of the filled receptacles to be packed together in a slender case, convenient to carry in a purse or on the person, and affording an ever-ready supply of the goods available for use when and where wanted.

A further object is the production of a truly hermetic container of the character described, capable of maintaining the goods in prime condition always, and also provided with frangible extremities of peculiar formation serving to unseal it in a safe manner, that is, without injuring the hand that effects the fracture, or wasting the contents.

Still another object is to devise a receptacle of the type specified, adapted to discharge its contents gradually in a manner that will insure the most economical use thereof and operate to distribute the same to the fullest advantage.

Other objects and advantages of the invention will in part be obvious and in part be brought out in the description hereinafter contained.

Referring to the drawing hereto annexed, for a detailed description of the invention,—

Figure 1 is a side view, showing a line of capillary tubing composed of a series of tubes of uniform size connected to one another at the ends, and intended to be evolved each into a container and dispenser embodying the principles of the invention in its best known form; Fig. 2 is an enlarged longitudinal section of a single tube, severed from the said series; Fig. 3 is a side elevation, partly in section, of a filling apparatus for the detached tubes; Fig. 4 is an enlarged longitudinal section of a filled tube, with one end thereof sealed in the ordinary manner; Fig. 5 is a perspective view of a device adapted to effect a reliable seal at the other tube end; Fig. 6 is a longitudinal section, on approximately the same scale as Fig. 4, showing part of a filled tube with the said other end sealed; Fig. 7 is a similar section, on a much larger scale, disclosing an additional means of producing an effective seal at the latter-named end of the tube; Fig. 8 is a side view of a finished container and dispenser of normal dimensions; and Fig. 9 is a perspective view, illustrating the most approved manner of unsealing a filled tube and drawing out its contents.

The improved container and dispenser forming the subject-matter hereof is conveniently made from glass tubing, drawn down to a very light caliber, as indicated in some of the figures above described. In order to expedite the manufacture, many tubes are formed at one continuous operation, as Fig. 1 shows, each tube comprising a body of substantially uniform cross-sectional area throughout, designated by the reference numeral 11, and oppositely directed ends 12 and 13, of capillary diameter. Naturally, the adjoining ends of the several tubes are interconnected during the drawing process, but they are severed according to predetermined measurements to constitute separate units, as represented in Fig. 2, when about to be filled.

There are various ways of filling the tubes

aforesaid, one of which is exemplified in Fig. 3 of the annexed drawing. As illustrated in this view, the filling may be readily effected by suction, although it will be observed that it could be accomplished as well by pressure. In the example given, it will be seen that a filling liquid, for instance, some choice perfume, is poured into a vessel, as 16, into which either end, 12 or 13, of a tube 11 may be dipped, as shown. Preferably, the tube is held at an incline, with its upper end in proximity to the mouth of a suction-pipe 17, which may be connected with any suitable form of vacuum-pump (not shown). This pipe may also be the terminal of a condensing coil 18. A dextrous operator, of course, removes the tube from the suction end of the apparatus at the very instant it is sufficiently filled, but the excess or overflow, if any, will be received in the condenser-coil 18, and thence returned to the vessel 16, by means of a drip-pipe 19, or other suitable conduit, whenever the pumping ceases.

A number of tubes 11 may be filled at one time and laid out flat without danger of emptying the same, owing to the capillary character of their opposite extremities, which retain the filling in the respective tubes until ready to be sealed. Fig. 4 shows a tube thus filled, and with one of its ends still remaining open. The farther end of this tube is represented as having been provided with a seal 21, terminating in a spherical protuberance 22. The latter affords a favorable hold in breaking the seal, previously to dispensing the contents of the tube, when used as hereinafter described. The protuberant seal 21—22 may be produced in a simple manner, well-known to every competent glass-worker.

The sealing of the near end of the tube, that is, the second to be sealed, requires special care and attention, inasmuch as it is found difficult, in practice, to make a perfect closure at this end, on account of the filling substance present in the tube. Therefore, in accordance with the present invention, the second seal is produced, preferably, in the manner represented in Fig. 5, which shows a conveniently arranged device for the purpose. The device, it will be seen, includes a plate 25, overlying a pair of parallel supports 26, 27, between which is placed a gas-jet 28. The flame from the ignited gas is caused to impinge against the under side of the plate 25, or otherwise heat the same. Now, by resting part of the tube adjoining the latter-named end thereof upon the surface of the plate for a moment, in the manner illustrated it will become heated so as to displace the filling substance therewithin, preparatively to forming the seal. This step in the sealing operation may be termed the pre-heating of the tube end. Immediately thereafter, the same end of the tube is placed across either of the supports 26, 27, within a notch 29 in the upper edge thereof, and subjected to the combined action of the flame from the gas-jet 28, and of an air-blast supplied by a pipe 30. As illustrated, the flame is directed against the extremity of the tube, to close it by fusing the glass at that point, and in the meantime the jet of air cools off the preheated portion adjacent to the tubular body. The cooling of this intermediate portion contracts the tube end, while it is relieved of internal pressure from the filling substance, so that the melting glass at the extremity to be sealed is practically driven inward, owing to the external atmospheric pressure, to the extent of closing all pores or interstices that would permit leakage. The second seal may consist of a solid stem 31, with a spherical enlargement 32, and may also be separated from the tubular body 11, by a slightly contracted portion 33, as shown in Figs. 6, 7 and 8. Both the stem and the adjoining contraction, it will be noted, facilitate the breaking of the second seal, when the contents of the tube are to be discharged.

As a measure of precaution, the said second seal, and in fact either or both of the seals may be rendered more secure or dependable by providing the same with an outer covering 35. This may consist of a suitably thick coating of collodion, or other matter capable of making the tube thoroughly impervious, and serving also to ward off injury to the fingers when breaking the ends of the tubes.

In order to utilize the full contents of a tube to best advantage, both ends of the tube must be severed from the body, to obtain the necessary air pressure, and the tube thus opened should be drawn over the article intended to receive the substance therefrom, as suggested in Fig. 9. The substance will flow out readily, if one of the open ends of the tube be maintained in actual contact with the article mentioned.

Having now described my invention, what I claim, and desire to secure by Letters Patent of the United States, is:

1. The process of sealing the open end of a capillary tube filled with liquid, which consists in cooling a portion of the tube inwardly from the open end thereof to contract the said end and to relieve the same of internal pressure of the tube contents, and simultaneously closing said end.

2. The described process of forming a seal on a capillary dispensing tube, consisting in preheating the part thereof adjoining the end to be sealed, and thereafter subjecting the preheated part to the combined action of a flame and an air-blast.

3. The process of sealing the open end of a capillary tube filled with liquid, which

consists in cooling a portion of the tube inwardly from the open end thereof to contract the latter and relieve it of internal pressure of the tube contents, and fusing the said end while in a cooled state.

4. The process of introducing liquid into a tube having capillary open end sections which consists of placing one open end of the tube in the liquid and exposing the other open end adjacent the mouth of a tube through which a suction is maintained.

5. The process of filling with liquid a capillary tube open at both ends which consists in immersing one end of the tube in liquid and disposing the other end of the tube in a suction pipe of substantially larger diameter than the adjacent end of the tube.

6. In an apparatus for filling capillary tubes with liquid, a stationary suction pipe, and a receptacle for the liquid disposed below the said pipe, the capillary tubes being adapted to be positioned for filling between the pipe and the receptacle.

7. In an apparatus for filling capillary tubes with liquid, a receptacle for the liquid wherein the said tubes are dipped, and a suction pipe fixed above the said receptacle, the distance between the suction end of the pipe and the liquid level at the dipping point being substantially equal to or slightly greater than the length of the tubes.

In testimony whereof, I have signed my name to this specification this 8th day of May, 1919.

WALTER GOODCHILD. [L. S.]