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H. K. MULFORD ET AL

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CLOSURE FOR DISPENSING CONTAINERS

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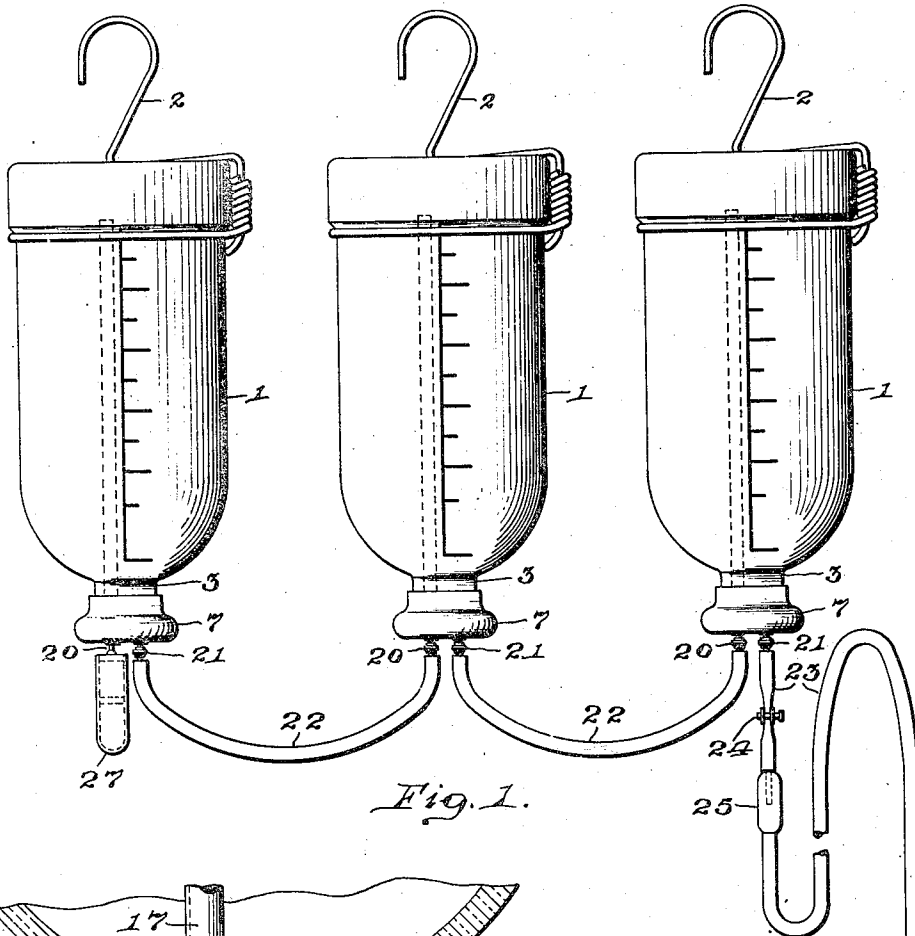


Fig. 1.

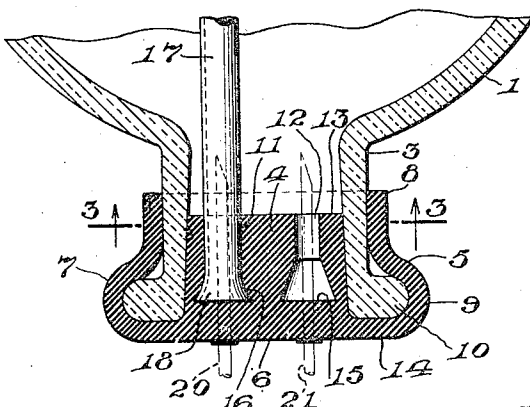


Fig. 2.

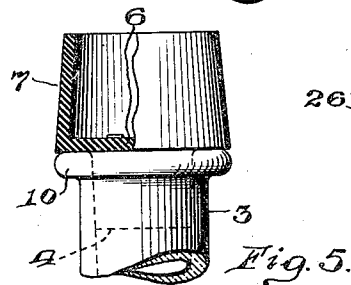


Fig. 5.

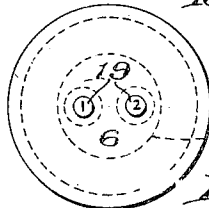


Fig. 4.

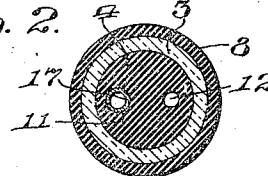


Fig. 3.

INVENTORS
Henry K. Mulford.
Ellwood S. Paisley.
Allen F. Peters.
BY
J. Stuart Freeman.
ATTORNEY.

UNITED STATES PATENT OFFICE

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CLOSURE FOR DISPENSING CONTAINERS

Henry K. Mulford, Ellwood S. Paisley, and
Allen F. Peters, Philadelphia, Pa., assignors to
The National Drug Company, Philadelphia,
Pa., a corporation of Pennsylvania

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5 Claims. (Cl. 128—214)

The object of the invention is to provide improvements in reservoir-containers, but more particularly in the closures by which they are hermetically sealed, and maintained in that condition from the time that the containers are filled, throughout their repeated connection with filtering inlet and outlet or dispensing apparatus, and until they are finally emptied, the broad object also comprising a plurality of operatively connected containers in a reservoir system.

Another object is to provide a unit closure, which acts simultaneously as a stopper and as a resilient cap, while at the same time operatively supporting an air-inlet tube within and independently of the container walls, as well as affording an automatic closure through which pointed canulas or styli may be inserted and withdrawn, for the operative connection of various types of inlet and outlet or dispensing devices.

A further object more specifically is to provide a closure of this general type, comprising a stopper portion provided upon its inner side with an inwardly extending cylindrical bore, terminating abruptly short of the outer surface of the stopper portion, and the inner part of said bore increasing in diameter inwardly, the first or cylindrical portion of said bore yieldingly surrounding and supporting a preferably glass air-inlet tube, while the larger inner portion of said bore yieldingly receives the adjacent funnel-flared end portion of such tube, which operates to direct the pointed end of a hollow stylus or canula towards and into the relatively narrower tube.

Still another object is to provide a stopper of this type, embodying one or more bores of the form described, and indicating means formed in or upon the external surface of the stopper, to show the location of the hidden inner ends of the one or more bores upon the opposite side of the stopper.

And a still further object is to provide a reservoir, comprising a plurality of containers, each of which may be a unit in itself, and each of which is provided with one of the improved stopper cap closures, while the interiors of said containers are connected together in series, so that the contents of the unit farthest from the dispensing apparatus (usually comprising a hypodermic needle, valve and flow indicator) passes first through the intervening units before being dispensed, and air to replace the liquid in such units first entering said farthest unit, and then passing therethru and into the others of said units, as the liquid is withdrawn therefrom.

With these and other objects in mind, the invention comprises further details of construction, which are hereinafter fully brought out in the following description, when read in conjunction with the accompanying drawing, in which Fig. 1 is an elevational view showing a plurality of reservoir-container units operatively connected together in a reservoir system; Fig. 2 is an enlarged fragmentary sectional view of the lower portion of one of said units; Fig. 3 is a transverse section on the line 3—3 of Fig. 2; Fig. 4 is a bottom plan view of the improved closure cap per se; and Fig. 5 is a fragmentary side elevation of the mouth end of the container in filling position, with the improved closure partially in section in its original form, before the cap portion is reversely folded so as to surround the adjacent end of the container.

Referring to the drawing, there is shown a plurality of reservoir-containers 1, which, when in operative position, supported by suitable hangers 2, have their discharge outlets 3 directed downwardly and spanned by an improved type of stopper-cap closure, hereinafter described.

This closure comprises a central stopper portion 4, which is adapted to extend as a plug into the discharge neck or mouth of one of said containers, while the surrounding cap portion 5 is adapted to extend around the outside of and contact radially with, in order to tightly, yet yieldingly, grip the adjacent portion of the container outlet, by reason of the fact that this improved closure is preferably made of relatively highly elastic rubber, or equivalent material.

The improved closure is initially formed as shown in Fig. 5, the stopper portion 4 being squeezed to the desired degree within the container opening, and terminates outwardly in a planular portion 6, surrounded by an integrally connected annular flange portion 7, which preferably tapers slightly towards its free end.

If a reservoir-container unit is filled in the position indicated by Fig. 5, and the stopper portion of the closure inserted into the neck of such container, as shown, the annular flange portion 7 is reversely folded about the exterior of the container neck 3, so that it surrounds and tightly grips said neck, as shown in Fig. 2. It is for this purpose that the annular portion 7 is preferably tapered initially, namely in order that its free edge portion 8 will positively grip the neck 3, while its wider portion 9 surrounds and grips the neck flange or lip 10, which is of greater diameter than the neck itself.

The stopper portion 4 of the improved closure is

provided with preferably two bores 11 and 12, which extend from the inner face 13 of the stopper portion 4, towards the outer surface 14, but terminate abruptly, as at 15, in spaced relation with said outer face, the innermost part 16 of each of said bores increasing in diameter inwardly.

Having a construction of the closure as thus described, the larger bore 11 has inserted into it, and thereafter firmly, though yieldingly, grips one end portion of a preferably glass tube 17, the outer end of said tube being funnel-flared at 18, and said flared terminal portion being positioned within the enlarged part 16 of said bore. Such an arrangement aids in preventing the otherwise relative ease with which said tube might be accidentally removed from the supporting walls of the bore 11, especially when the container is in inverted position, as when being filled, re-filled, or stored.

Also, it will be noted that the outer face 14 of the closure is provided with integrally formed means 19 for indicating to the operator the approximate region, through which a pointed canula or stylus 20 must be inserted through the closure in order to approximately align with the tube 17. Said indicating means 19 may be raised above, or recessed below the plane of the outer face 14, and may carry or embody, by means of particular shapes, colors, or otherwise, any desired means for indicating the respective inlet and outlet bores of said closure, as represented by the "1" and the "2," shown in Fig. 4. However, it will be noted that, if in haste an operator inserts his canula or stylus slightly to one side of such indicating means, the point of the instrument will enter the funnel-flared portion 18 of the tube, and be guided into the body of said tube, substantially as indicated in Fig. 2, where the instrument and the tube are shown in preferred co-axial alignment.

With regard to the outlet of the container, no tube need be used, as the liquid or fluid contents of the container unit will obviously flow downwardly into the bore 12, and the enlarged portion 16 thereof. However, in this case also, it is desirable to have the innermost part of said bore enlarged, so that the pointed canula or stylus 21 may be hastily inserted through the resilient material of the closure, either centrally with respect to the external indicating means, the "2" in this case, or slightly to one side thereof, but in any such case will be guided by the inwardly tapering sides of said enlarged part 16, towards and through the body portion 12 of the outlet bore, though both the inlet and outlet instruments need not extend into and through their respective bores as far as is indicated in the drawing.

In the case of a plurality of container units forming a reservoir system, as shown in Fig. 1, it will be noted that the outlet instrument 21, extending through one closure, is connected by means of a tube 22 with the inlet means 20 of the next adjacent closure, also that the outlet instrument of the last closure of the system has connected to it a tube 23, which may carry a suitable valve clamp 24, a flow-indicating means 25 and a hypodermic needle, or other discharge device 26, while the inlet instrument at the opposite end of the system is provided with a suitable air filter 27.

By this construction, as liquid is drawn from the last container of the system, the contents of the same are replenished by the liquid in the

middle container, which, in turn, is replenished by the liquid in the container at the opposite end of the system, as air, passing through said filter, enters said last-mentioned container. Finally, as the end container is emptied of its liquid contents, and the level of the contents of the intermediate container is being lowered, by the withdrawal of the contents of the discharge container through the tube 23, air entering through the filter continues to pass into the adjacent container, and thence through the neighboring connecting tube 22, into the region of the intervening container, above the level of the liquid therein, and so on until the several containers of the reservoir are emptied, or are replaced independently of one another with filled containers of the same type, or of any other type which may co-operate with and as a unitary part of such improved system.

In interpreting the appended claims, it is to be understood that the particular form of the device hereinbefore described, and illustrated in the accompanying drawing, is merely illustrative of one embodiment of the invention, and that said invention is capable of being modified in many ways, as to the exact details of its construction and operation, without departing from the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent of the United States is:

1. A closure for reservoir-containers, comprising a stopper provided with a bore extending from its inner face towards and terminating short of its outer face, in combination with a tube having a funnel-flared terminal portion positioned within said bore, and operative to guide a stylus inserted through the outer wall of said stopper into the bore of said tube.

2. A closure for reservoir-containers, comprising a stopper having an air inlet bore and a liquid outlet bore extending from its inner face towards but terminating short of its outer face, at least one of said bores being eccentrically positioned in said stopper, and differentiating indicia carried by the outer face of said stopper, both to identify and to indicate the respective positions of said bores upon the opposite side of the stopper.

3. A closure for reservoir-containers, comprising a stopper provided with a plurality of bores extending from its inner face and terminating short of its outer face, the inner part of each bore increasing in diameter inwardly, and the enlarged part of one of said bores having conical sides to guide a stylus inserted through the outer wall of said stopper into said last-mentioned bore.

4. A closure for reservoir-containers, comprising a stopper provided with a plurality of bores of different diameters extending from its inner face and terminating short of its outer face, the inner part of each bore increasing in diameter inwardly, and the enlarged part of the smaller of said bores being of greater longitudinal extent than the corresponding part of the other bore, and its tapering walls being operative to guide a hollow stylus inserted through the outer wall of said stopper into said smaller bore, and a tube having a funnel-flared end portion extending into the larger of said bores, with said end portion in the enlarged part of said last-mentioned bore.

5. A reservoir system, comprising a plurality of container units having their discharge ends

directed downwardly, an elastic closure for each of said discharge ends, an inlet and an outlet normally extending through each of said closures, the outlet of one closure being normally connected to the inlet of another closure to form a continuous series, means to discharge a fluid from each of the containers of said system in sequence through the outlet of the end closure, a filtering device connected to the inlet of the closure farthest removed in the system from said dispensing means, an inlet tube also connected with the inlet of each closure and extending to-

wards the normal upper inner portion of its respective container, and the openings through said closures being adapted to close automatically upon the withdrawal of said filter, said connecting means and said dispensing means, to maintain a hermetic sealing of each closure when the system is not in use.

HENRY K. MULFORD.
ELLWOOD S. PAISLEY. 10
ALLEN F. PETERS.