March 18, 1952 E. O. PRATT 2,589,728

PNEUMATICALLY OPERATED IRRIGATING APPARATUS

Filed Oct. 18, 1947 2 SHEETS—SHEET 1

Fig. 1.

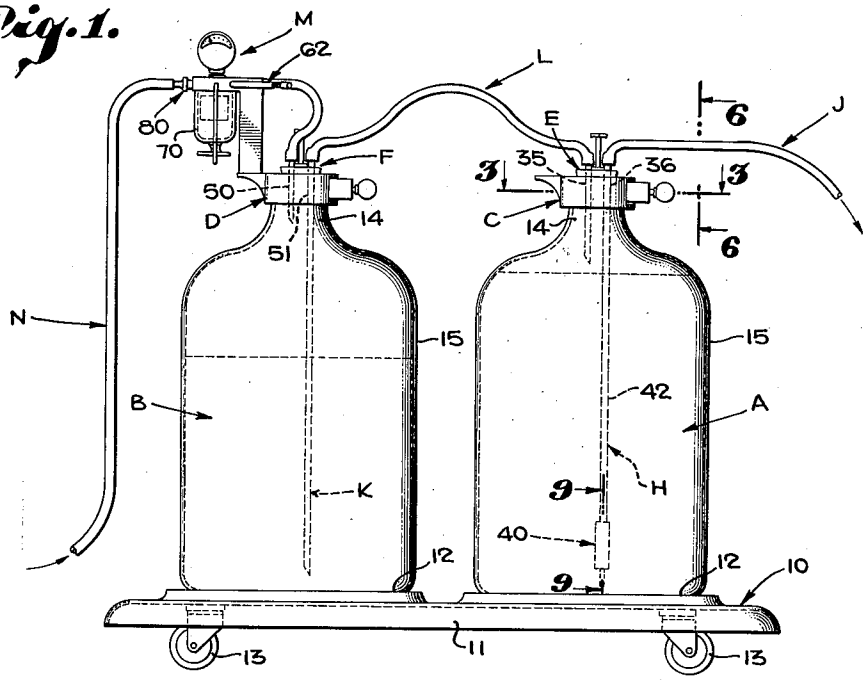


Fig. 2.

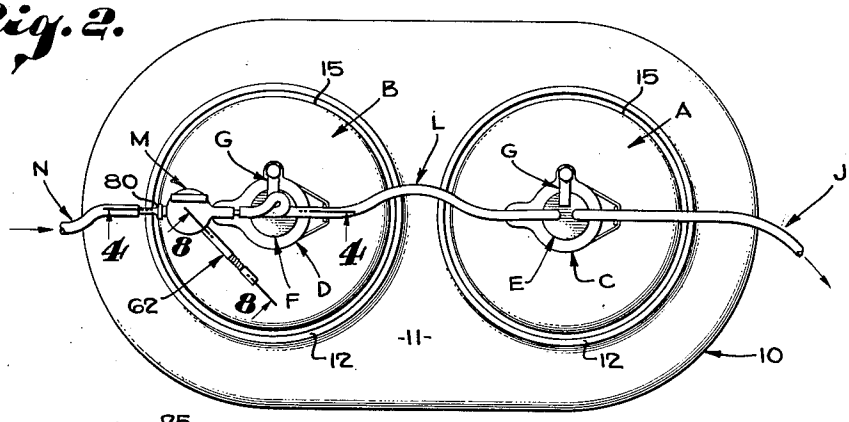
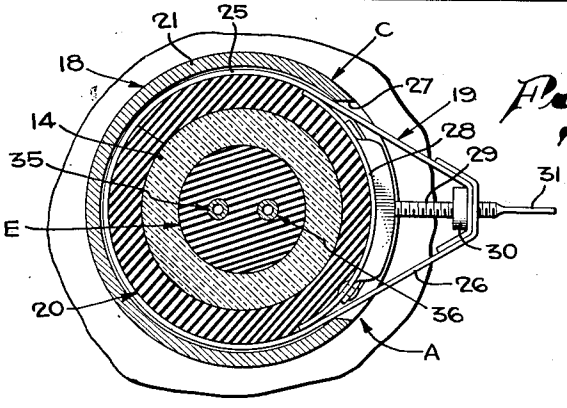


Fig. 3.



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Fig. 4.

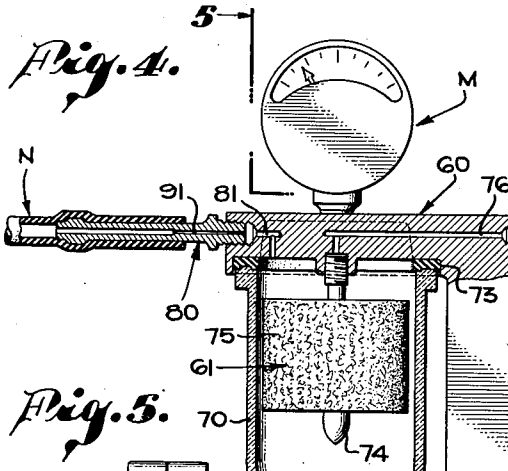


Fig. 5.

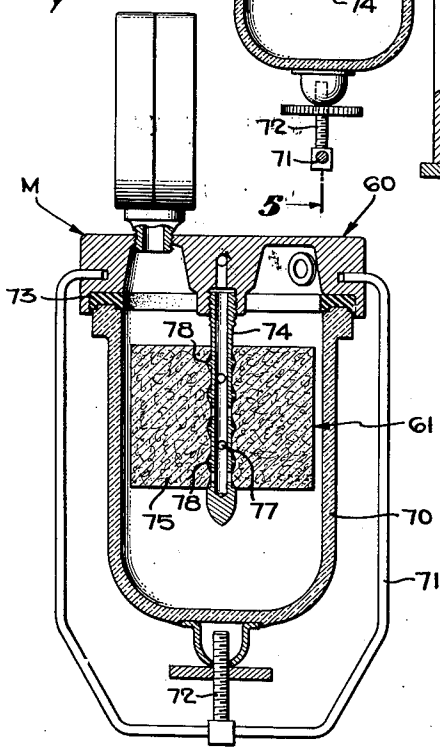
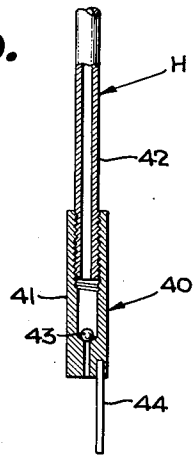


Fig. 9.



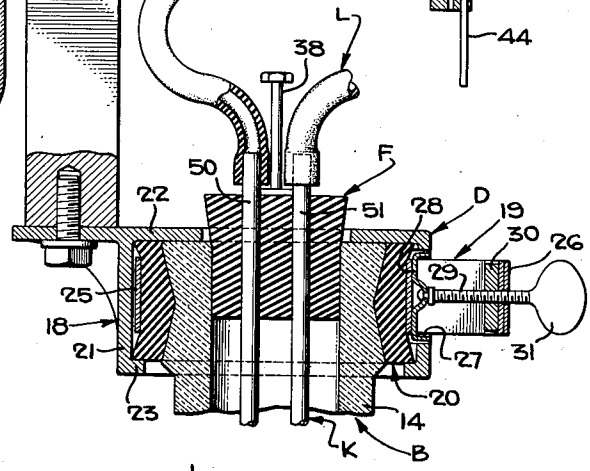


Fig. 6.

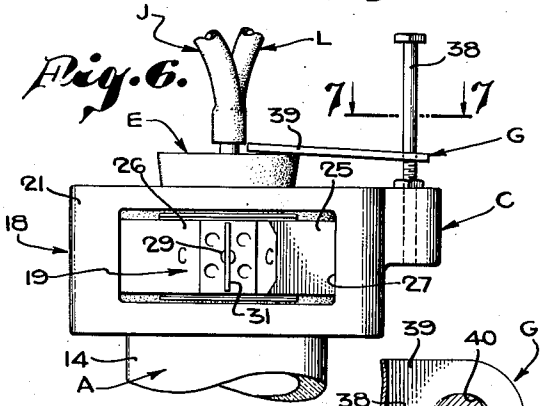
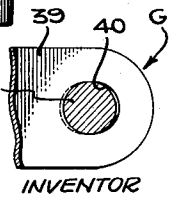


Fig. 7.



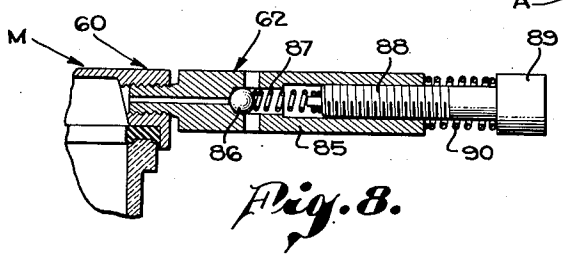


Fig. 8.

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UNITED STATES PATENT OFFICE

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PNEUMATICALLY OPERATED IRRIGATING APPARATUS

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Application October 18, 1947, Serial No. 780,627

5 Claims. (Cl. 128—227)

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This invention has to do with pneumatically operated irrigating apparatus and is more particularly concerned with apparatus that can be used to advantage by doctors or in hospitals, and particularly in operating rooms in the course of or in connection with surgery, examinations, etc. It is a general object of the present invention to provide apparatus of the general character referred to that is simple, convenient and practical to handle and which is effective, and dependable in delivering an adequate steady supply of fluid such as water to be used in flushing or irrigating operations.

There are numerous circumstances under which a constant, dependable supply of liquid such as flushing or irrigating liquid is desired. Such a supply of liquid is required in hospitals or in operating rooms when operations are being performed. In such cases sterile water is usually employed and it has been common to feed such water to the point of use by gravity and it has been necessary to transfer the water from containers in which it is procured to an elevated vessel from which it flows by gravity to the point of use.

It is a general object of the present invention to provide apparatus for effectively and dependably delivering the desired flow of water through a flexible conduit such as a rubber tube or the like, which apparatus employs containers in which the water is procured, making it unnecessary to transfer the water from such containers to other vessels with consequent exposure and possible contamination.

Another object of the present invention is to provide apparatus of the general character referred to including a pneumatic feed by which water is displaced from a container without danger of contamination by the air employed to feed the water and without mixing the air with the water in a manner to have bubbles in the water as it is supplied to the point of use.

Another object of the present invention is to provide apparatus of the character referred to involving a plurality of containers each carrying a supply of water related to a single pneumatic feed so that the water is successfully discharged from the containers without interruption of flow.

It is a further object of the present invention to provide apparatus of the general character referred to applicable to standard containers such as are employed in the handling of distilled water or the like, which apparatus is simple, effective, and such that it can be easily and quickly applied to and removed from the containers.

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Another object of the present invention is to provide apparatus of the general character referred to involving a minimum number of simple, readily cleaned parts contacting water being handled, to the end that the apparatus is safe and practical to use where a sterile condition must be maintained.

A further object of the present invention is to provide apparatus of the general character referred to involving a pneumatic feed which includes regulating means that is simple to operate and which can be manipulated to maintain a flow of liquid at any desired rate. The feed that I provide makes it unnecessary to elevate or otherwise manipulate the liquid supply in order to gain the desired flow.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of apparatus embodying the present invention showing a plurality of standard containers employed in carrying out the invention. Fig. 2 is a plan view of the structure shown in Fig. 1. Fig. 3 is an enlarged view taken as indicated by line 3—3 on Fig. 1. Fig. 4 is an enlarged detailed sectional view taken substantially as indicated by line 4—4 on Fig 2. Fig. 5 is an enlarged detailed sectional view taken substantially as indicated by line 5—5 on Fig. 4. Fig. 6 is an enlarged side elevation of a head on one of the containers, being a view taken substantially as indicated by line 6—6 on Fig. 1. Fig. 7 is an enlarged detailed view taken as indicated by line 7—7 on Fig. 6. Fig. 8 is an enlarged detailed sectional view taken as indicated by line 8—8 on Fig. 2, and Fig. 9 is an enlarged detailed sectional view taken as indicated by line 9—9 on Fig. 1.

The apparatus provided by my present invention involves, generally, a plurality of containers which are preferably in the nature of bottles or the like, and in a typical application there are two containers, a primary or main container A and a supply container B. The invention provides a head C on container A, a head D on container B, a plug E carried by head C, a plug F carried by head D, retaining means G for the plugs, a feed pipe H depending from plug E into container A, a delivery line J conducting liquid from container A through plug E, a feed pipe K extending from plug F into container B, a tubular connection L connecting plug F with

plug E, and a pneumatic feed means M utilizing air from a supply line N to displace liquid from the containers A and B.

The containers A and B employed in carrying out the present invention may, if desired, be specifically constructed or provided containers. However, I prefer to employ or to utilize standard containers such as are commonly employed in the handling of distilled fluids such, for example, as distilled water, and in most applications of the invention I employ five gallon bottles such as are illustrated in the drawings.

In the preferred form of my invention I provide a carrier 10 for the bottles and in most cases it is merely necessary to employ two bottles such as the bottles A and B, although it will be apparent that my present invention may be applied to situations where more than two bottles are used. In the drawings the carrier 10 is shown as involving a flat or horizontally disposed platform 11 with seats 12 supporting the bottles. The platform 11 is provided with a suitable wheel support, preferably through castors 13 so that it can be readily moved about in any desired direction.

Where ordinary bottles are used for the containers A and B the bottle necks 14 are available for the reception of parts of the apparatus, as will be hereinafter described, since an ordinary bottle such as is shown in the drawings, involves a vertically disposed cylindrical body 15 with a flat bottom and with an upwardly projecting neck 14.

The head C applied to the main bottle A serves, primarily, as a mounting or carrier for the means G that retains plug E. The head D applied to the supply bottle B may be substantially the same in construction as head C and it serves not only to carry the retaining means G for plug F, but also as a mounting or support for the feed means M. In the form of the invention illustrated the heads C and D are of like construction and each involves an annular part or collar 18 engageable around the neck 14 of a bottle with substantial clearance, a clamp 19 carried by the collar operable to grip the neck, and a pad 20 interposed between the clamp and the neck.

The collar 18 shown in the drawings has a vertically disposed cylindrical body portion 21 and inwardly projecting upper and lower end flanges 22 and 23, respectively. The clamp 19 is carried by or located within the collar between the flanges 22 and 23, and in the form illustrated it involves a band, preferably a continuous band 25 surrounding the pad 20 and having a laterally projecting portion 26 at one side projecting out through a side opening 27 in the collar. The clamp further includes a shoe 28 engaging the pad 20 where it is exposed by the projecting part 26 of the band, and a screw 29 carried by the projecting part 26 and cooperatively engaging the shoe 28. The screw 29 has threaded engagement with the portion 26 of the band or with a nut 30 carried thereby, and it will be apparent from Fig. 3 how it may be manipulated by rotation as by engaging its head 31 in a manner to tighten the shoe and band onto the pad 20 so that the pad in turn grips the neck of the bottle. The pad is held or confined between the flanges 22 and 23 of the collar 18 so that when it is compressed it is tight in the collar and thus through these parts the collar is detachably, yet firmly, secured on the neck of the bottle. The pad may be of yielding or conformable material such as rubber, or the like.

The plug E at head C does not directly engage the head but rather is carried in the neck of the bottle which is held in the head and it carries inlet and outlet ducts 35 and 36, respectively. The plug E is preferably a rubber plug or stopper with spaced parallel openings carrying tubes forming the ducts 35 and 36.

The retaining means G for the plug E serves to retain the plug in the neck of the bottle A so that it is not dislodged or forced out of the neck by pressure such as builds up within the container A through the action hereinafter described. The retaining means shown in the drawings involves a stem 38 projecting upwardly from the top of head C at a point offset from the central axis of the head and a retainer plate 39 carried by the stem and overlapping the plug or engaging the top of the plug, as shown in the drawings. The plate 39 has an opening 40 slightly larger than the stem 38 allowing the plate to be moved to a position such as shown in Fig. 6, where it is somewhat tilted and at the same time has gripping engagement with the stem 38. The plate can be released from the gripping position where it holds the plug in the neck of the bottle by depressing the outer or projecting portion of the plate.

The feed pipe H is a simple tubular part and may be a continuation of the outlet duct 36. The feed pipe H extends downwardly in the bottle A to a point near or adjacent the bottom of the bottle, where it is provided with a check valve 40. The particular check valve shown in the drawings involves a tubular body 41 threaded on the lower end of the pipe 42 that depends from the outlet duct 36, a ball valve 43 in the body cooperating with an upwardly faced seat, and a stop 44 depending from the body. The valve 40 is a simple check valve allowing free flow upwardly into the pipe 42 but check any down flow therein. The stop 44 engages the bottom of the bottle A thus locating the valve 40 in a suitable position spaced from the bottom of the bottle. The delivery line J in practice is ordinarily a length of flexible tubing such as rubber tubing and it extends from the upper end of the outlet duct 36 to the point at which the liquid is required for use.

The plug F in or at head 21, like the plug in or at the head C, is not in direct engagement with the head, but rather is engaged in the neck of the bottle on which the head is mounted. The plug F carries an inlet duct 50 and an outlet duct 51 which elements may be simple tubular parts extending through the plug, as shown in Fig. 4 of the drawings. Plug F, like plug E, may be a simple rubber plug or stopper. The retaining means G for the plug F is carried by head D and retains plug F in the same manner as the plug E is retained as above described.

The feed pipe K in container B extends from the bottom or lower end portion thereof upwardly to and connects with the outlet duct 51 at or over the plug F. In the case illustrated the pipe K may be a continuation of the duct 51 depending down in the bottle B to a point near the bottom thereof.

The connection L is formed by a simple tube that connects to the upper end of the outlet duct 51 and extends and connects with the inlet duct 35 carried by the plug E. Liquid flowing up through pipe K passes through duct L and is delivered into the bottle A.

The pneumatic feed M that I have provided utilizes air under pressure from any suitable source, as for instance from a pressure line N,

and it involves, generally, a body 60, a filter 61 carried by the body, and regulating means 62.

In the form of the invention illustrated the body 60 of the means M is a horizontally disposed plate-like structure projecting from the upper end of a post or upright 66 attached to and extending upwardly from the head D secured on bottle B. When this form of body 60 is employed it is practical to mount the filter 61 on the lower side of the body and to mount the regulating means 62 on one side of the body to project laterally therefrom.

The filter 61 is shown as including a bowl 70 releasably secured or clamped to the lower side of the head 60 by a yoke 71 and clamp screw 72. A washer 73 is shown interposed between the top of the bowl and the bottom of the body 60 to provide a tight connection at this point. An outlet tube 74 depends from the body 60 into the bowl 70 and has a perforate portion covered by a filter seal or pack 75. The outlet tube 74 is shown at its lower end and connected into the bottom of the body 60 to communicate with an outlet port 76 provided in the body and extending to the outer edge thereof. The pipe 74 is preferably provided with a plurality of side openings 77 so that air after filtering or passing through the filter pack 75 enters the pipe 74 to flow upwardly therein and to discharge therefrom into the port 76. In practice the filter pack may be of any suitable form and construction, for instance, it may be of a body or unit of sterilized material such as gauze, or the like, annular in form and such as to snugly fit around the pipe 74. The pack 75 is made detachable from the pipe 74 so that it can be readily removed and replaced when the bowl 70 is detached from the body. The pipe 74 may be provided with annular ribs 78 that engage and retain the pack 75 in place.

The supply line N connects into one side of the body through a suitable coupling or fitting 80 and supplies air under pressure to a port 81 which opens downwardly at the bottom of the body so that the air is introduced into the bowl 70. The air thus introduced into the bowl finds its way to the port 76 through the filter seal 75 and pipe 74. The outlet port 76 is connected with the inlet 50 by a suitable duct 82 such as a length of tubing, and in the case illustrated the tubing 82 is shown connected with the outlet port 76 by a suitable fitting 83.

The regulating means 62 is preferably in the form of a unit carried by or attached to the body 60 to project laterally therefrom and, as shown in the drawings, it involves a tubular body 85 connected to the body 60 to be in communication with the bowl 70. A ball valve 86 is carried in the fitting 85 where it is normally held against an outwardly facing seat through a spring 87, the action of which is subject to adjustment by a screw 88 threaded in the outer end portion of the fitting. The screw has a head 89 at its outer end and a lock spring 90 acts between the head and outer end of fitting 85 to normally resist rotation of the screw.

By varying the position of the screw the pressure on the spring may be adjusted so that the ball 86 is held on the seat by any desired pressure. In the preferred form of the invention the fitting 80 has a small inlet passage 91 through which the air is admitted to the structure above described in order to place a limit upon the rate at which the apparatus may be operated. It will be apparent that by adjusting the regulator 62 a certain amount of the air admitted through the fitting 80 may be allowed to escape and in proportion as air is allowed to escape the rate of feed of liquid from the bottles is reduced. If the valve 86 is held on its seat against the full pressure admitted through the fitting 80 then the flow will be maximum.

From the foregoing description it is believed that the handling and operation of the apparatus will be apparent. Containers or bottles A and B each filled with water or other liquid to be handled may be mounted on the carrier 10 or may be supported in any suitable manner adjacent to each other, substantially as shown in the drawings. The heads C and D are applied to the bottles and the plugs E and F are inserted in the necks of the bottles. The several connections or parts above described connect the parts that are alike to the bottles, so that the apparatus may be quickly made ready for operation.

To put the apparatus in operation the air supply is opened and air under pressure passes through the fitting 80 into the filter 61 where any dust or foreign matter is trapped. The cleaned air passes through the connection 82 to inlet 50 to be discharged in the upper end of bottle B above the liquid therein. The regulator 62 is adjusted so that the air is admitted into the bottle B at the desired rate. The air admitted into the bottle B displaces liquid therefrom, forcing it up through pipe K and through connection L and into inlet 35 at bottle A. The liquid thus circulated, added to the full bottle A, displaces liquid from bottle A forcing it up through the valve 40 and pipe H so that it discharges through the line J that conducts it to the point of use.

It will be apparent that when the bottle B is finally exhausted of liquid the lower end of pipe K is uncovered and air that continues to be supplied through the means M passes up through pipe K and through connection 11 into the top of bottle A to there act on the top of the body of liquid therein so that it displaces the liquid from bottle A just as it did the liquid from bottle B. It will thus be apparent that through the structure that I have provided the liquid is handled from a plurality of separate bottles so that the bottles are exhausted or emptied one at a time or successively, all without interruption of flow through the final supply or outlet J. It is also important to note that the various units of the apparatus that I have provided are all simple and inexpensive of construction and are such that they can be easily handled or manipulated and can be readily sterilized if desired.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A device applicable to the neck of a bottle having a plug therein including, an annular body having a side opening and surrounding the neck of the bottle, a band within said annular body and surrounding the neck of the bottle, a pad within the band and engaging the neck of the bottle, means acting on the band to tighten it on the pad and having a manually operable portion projecting through the opening to the exterior of the body, a post projecting up from the body and laterally spaced from the central axis of the neck of the bottle when the body is in

operating position on the bottle, and a plate carried by the post and overyling the plug to retain it in the neck of the bottle.

2. A device applicable to the neck of a bottle having a plug therein including, an annular body having a side opening and surrounding the neck of the bottle, a band within said annular body and surrounding the neck of the bottle, a pad within the band and engaging the neck of the bottle, manually operable means acting on the band to tighten it on the pad and projecting through the opening to the exterior of the body, a post projecting up from the body and laterally spaced from the central axis of the neck of the bottle when the body is in operating position, a plate carried by the post and overlying the plug to retain it in the neck of the bottle, a standard projecting up from the body and spaced from the post and having a horizontal arm, a filter carried by the arm and depending therefrom, and a fluid connection from the filter to the bottle and engageable through the plug.

3. A device applicable to the neck of a bottle having a plug therein including, an annular body surrounding the neck of the bottle, said body including a cylindrical side wall having a side opening therethrough and inwardly projecting flanges at the upper and lower ends thereof, a band within said body and surrounding the neck of the bottle, a pad within the band and engaging the neck of the bottle, screw means acting on the band to tighten it on the pad and having a manually operable portion projecting through the opening to the exterior of the body, a post projecting up from the body and laterally spaced from the central axis of the neck of the bottle when the body is in operating position, and a plate carried by the post and overlying the plug to retain it in the neck of the bottle.

4. A device applicable to the neck of a bottle having a plug therein including, an annular body surrounding the neck of the bottle, said body including a cylindrical side wall having a side opening therethrough, and inwardly projecting flanges at the upper and lower ends thereof, a band within said body and surrounding the neck of the bottle, a pad within the band and engaging the neck of the bottle, screw means acting on the band to tighten it on the pad and having a manually operable portion projecting through

the opening to the exterior of the body, a post projecting up from the body and laterally spaced from the central axis of the neck of the bottle when the body is in operating position, a plate carried by the post and overlying the plug to retain it in the neck of the bottle, a standard projecting up from the body and spaced from the post and having a horizontal arm, a filter carried by the arm and depending therefrom, and a fluid connection from the filter to the bottle and engageable through the plug.

5. A device applicable to the neck of a bottle having a plug therein including, an annular body having a side opening and surrounding the neck of the bottle, a band within said annular body and surrounding the neck of the bottle, a pad within the band and engaging the neck of the bottle, the band having a portion thereof spaced from the pad and projecting through said opening, a shoe between the pad and said portion of the band, a thumbscrew in threaded engagement with the said portion of the band and operatively coupled to the shoe to clamp the pad onto the neck of the bottle, said screw projecting through the opening to the exterior of the body, a post projecting up from the body and laterally spaced from the central axis of the neck of the bottle when the body is in operating position, and a plate carried by the post and overlying the plug to retain it in the neck of the bottle.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
193,371	Labwithe	July 24, 1877
312,600	Abbott	Feb. 24, 1885
762,601	Smithson	June 14, 1904
1,356,519	Douglas	Oct. 26, 1920
1,733,875	Guslusky	Oct. 29, 1929
1,915,123	Downs	June 20, 1933
1,919,257	Renzenhausen	July 25, 1933
2,077,977	Ahlquist	Apr. 20, 1937
2,081,029	Young	May 18, 1937
2,100,610	Paisley	Nov. 30, 1937
2,118,704	Grontkowski	May 24, 1938