SAFETY FILLING DEVICE

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1 Claim

ABSTRACT OF THE DISCLOSURE

A device for preventing the introduction of an incorrect liquid into a container having a telescoping interlock with a portion thereof on the container being filled and a portion on the container being emptied. Check valves are employed to prevent liquid flow until the interlock is telescoped at which time actuators open the check valve.

BACKGROUND OF THE INVENTION

This invention relates to the field of filling and emptying containers. It is of particular pertinence for use with vaporizers, wherein the employment of an incorrect liquid can be hazardous. A typical example is a vaporizer for use with anesthesia apparatus. It occasionally happens that such a vaporizer will be charged with a liquid other than the liquid anesthetic which the operator believes to be present. Under such circumstances grave harm may be done to a patient. In conventional prior art vaporizers such as that shown in L. E. Morris Patent No. 2,890,696 issued June 16, 1959, there are no safety devices employed that would prevent such an error from occurring.

SUMMARY OF THE INVENTION

The invention comprises a first container having a liquid inlet opening and an opening for the passage of air, with a check valve controlling the liquid inlet opening. A conduit extends outwardly from the liquid inlet opening. A second container is provided with an opening for the passage of a liquid controlled by a check valve and an opening for the passage of air with a conduit extending outwardly from the opening for the passage of liquid and extending into the conduit of the first container. Telescoping interlocking means are provided with a portion thereof associated with the first container and another portion thereof associated with the second container. Actuators are provided to open the check valves when the interlocking means is telescoped.

Additionally, when desired, the first container is provided with a liquid discharge opening controlled by a check valve with a conduit extending outwardly from the said opening. An interlocking means portion identical with the interlocking means portion adjacent the conduit associated with the inlet opening of the first container is provided. This structure is adapted to cooperate with the second container with the conduit at the discharge opening of the first container telescoping within the conduit associated with the second container and the opening of the check valves being carried out in the same manner when the second container is connected to the inlet opening of the first container. When the second container is to be used for both filling and emptying the first container, it is provided with a valved conduit to provide for the flow of air during the emptying and filling of the second container.

DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a front elevation of a vaporizer in accordance with the invention;

FIGURE 2 is a front elevation of a container associated with the vaporizer of FIGURE 1;

FIGURE 3 is a vertical section, partially broken away, of the device of FIGURE 1 showing details of the inlet opening and associated parts;

FIGURE 4 is a front elevation, partially broken away, of the vaporizer of FIGURE 1 and the container of FIGURE 2 operatively connected;

FIGURE 5 is an enlarged view, partially broken away, of a valve associated with the container of FIGURE 2;

FIGURE 6 is a horizontal section taken on the plane indicated by the line 6—6 in FIGURE 4;

FIGURE 7 is a vertical section, partially broken away, of the vaporizer of FIGURE 1 showing details of the discharge opening and associated parts;

FIGURE 8 is a front elevation, partially broken away, of the vaporizer of FIGURE 1 operatively connected to the container of FIGURE 2 for the discharge of liquid from the vaporizer; and

FIGURE 9 is an enlarged view, partially broken away, of the air conduit valve arrangement of the container of FIGURE 2 in the liquid receiving position.

DESCRIPTION OF PREFERRED EMBODIMENT

While the invention can be employed with a wide variety of containers, it will be described with respect to an anesthesia vaporizer by way of illustration. As shown in FIGURE 1 a vaporizer 2 for anesthesia apparatus is identical with the vaporizer 33 disclosed in L. E. Morris Patent No. 2,890,696 issued June 16, 1959 with the exception of the filling opening and associated parts and the drain opening and associated parts. As in the case of the device of Patent No. 2,890,696, vaporizer 2 has a line 4 for the inflow of oxygen and a line 6 for the outflow of the vaporized anesthetic to a conventional mixing chamber.

Referring to FIGURE 3, the removable top 10 of vaporizer 2 is provided with an opening 12. A collar 14 secured to top 10 extends outwardly from opening 12.

A tube 16 is secured by a pressed fit within collar 14 with a gasket 18 being provided between collar 14 and tube 16 to prevent any leakage. Tube 16 has a reduced portion 20 which, in effect, acts as a liquid inlet opening into vaporizer 2 which is controlled by a ball check valve 22 spring-biased upwardly by a compression coil spring 24 retained in tube 16 by a pressed fit cap 26. Openings 28 and 30 in the wall of tube 16 below reduced portion 20 provide passages for the flow of liquid into the interior of collar 14 and thence through opening 12.

An enlarged portion 31 of tube 16 forms a conduit extending upwardly from the reduced portion 20. A pair of pins 32 and 34 are secured by a pressed fit in openings 36 and 38 respectively in tube 16. The upper end of tube 16 is provided with a plurality of grooves 39.

A removable cap 40 is secured by a pressed fit on tube 16 and is provided with a stopper member 42 which extends downwardly through portion 31. Member 42 has a chamfered end 44 which abuts against the upper end of reduced portion 20 to prevent the passage of any liquid should any pass by ball check valve 22.

Adapted to cooperate with the aforementioned structure is a container 50 (FIGURE 2). As best seen in FIGURE 4, container 50 has a body portion 52 and a threaded neck 54. A cap member 56 is threadably secured to neck 54, a ring gasket 58 being interposed therebetween to form a leak proof seal. Cap member 56 is provided with an opening 60. A conduit portion 62 of cap member 56 extends outwardly from opening 68.

A sleeve 64 is threadably secured at 66 to cap member 56 and seals tightly against cap member 56 at 68. An extension portion 69 extends outwardly from a reduced opening 71. Openings 72 and 74 in sleeve 64 are provided
for the reception of pins 32 and 34. As seen in FIGURE 4, pins 32 and 34 fit loosely in openings 72 and 74 to permit the passage of air therethrough. A ring-shaped check valve 76 is spring-biased to close openings 72 and 74 by a coil compression spring 78. Openings 72 and 74 are in communication with a tube 80 inserted by a pressed fit in passageway 82 in cap member 56. Tube 80 is connected by a pressed fit to a tube 84 which in turn is threadably connected at 86 to a cup-shaped member 88 (FIGURE 5). A disc 90 is threadably connected to the interior of cup-shaped member 88 at 92 and is threadably connected to a vent tube 94 at 96. Disc 90 is provided with openings 98 which are adapted to be closed by a washer 100 which fits slidably about tube 94. A bead 102 on tube 94 limits the travel of washer 100. Tube 94 preferably terminates near the bottom of container 50.

In conduit 62 of cap member 56 there is provided a compression coil spring 110 which is seated in a cup-shaped base 112 of valve stem 114 which coats with ball check valve 22. Face 116 of base 110 is adapted to seat against sleeve 64 adjacent reduced opening 71 to block the flow of liquid through passage extension portion 70.

As seen in FIGURE 6, base 112 is rectangular in shape to provide for accurate centering and also permit the flow of liquid through passage 62. Container 50 is provided with a cap 120 of, for example, plastic which has a snap ring 122 which engages a groove 124. A gasket 126 provides a tight seal.

OPERATION

When it is desired to fill vaporizer 2 with the proper anesthetic liquid, cap 120 is pulled off container 50 and cap 40 off vaporizer 2. The container 50 is inverted. Pins 32 and 34 in association with openings 72 and 74 act to form telescoping interlocking means which insures that the proper liquid container has been selected to fill the vaporizer in question with the desired anesthetic liquid. That is to say the supply container is keyed to the container which it is to be emptied into. It will be evident that a wide variety of keying arrangements can be employed. The one specifically shown being merely by way of illustration. Thus, where a supply container is filled with a different liquid for use with other than the vaporizer 2, it would not interlock with vaporizer 2 since, for example, the openings 72 and 74 would be spaced 180° apart rather than 180° in order to interlock only with the container containing its specific liquid. In any event, the container 50 with openings 72 and 74 is always filled with the anesthetic liquid desired to be used in vaporizer 2 and, hence, assures that the correct liquid will always be charged into vaporizer 2.

As container 50 is brought towards vaporizer 2, extension portion 69 of sleeve 64 is inserted into conduit 31 preceded by valve stem 114. Only if, as is the case here, openings 72 and 74 line up with pins 32 and 34 respectively, the container 50 can be advanced towards vaporizer 2 to cause valve stem 114 to urge ball check valve 22 downwardly against the force of spring 24 to open opening 20. Spring 110 exerting less initial force than spring 24 is not moved until there has been substantial movement of ball check valve 22 and spring 24. At a predetermined force exerted by spring 24, when it becomes substantially solid if desired, the continued movement of container 50 causes spring 110 to compress and base 112 to move away from its contact with sleeve 64 to permit the passage of liquid downwardly through reduced portion 71. Since the movement of container 50 causes the pins 32 and 34 to move valve 76 to permit the flow of air into container 50. At this stage, liquid freely runs from container 50 downwardly through opening 60 past base 112 through reduced opening 71, extension portion 69, opening 20 and openings 25 and 30 and thence through opening 12 into vaporizer 2. At the same time, air flows freely through grooves 39, openings 72 and 74, within sleeve 64, around valve 76, through tube 80 and tube 84, cup-shaped member 88 and tube 94.

It is equally important that when the liquid anesthetic is drained from vaporizer 2 at the end of its operation, that the liquid anesthetic is not drained into a container having a different liquid therein. To this end, the invention also provides a safety discharge.

Referring now to FIGURE 7, vaporizer 2 is provided with a discharge opening 132 which receives a flange 134 of a collar 136 secured to the exterior of vaporizer 2. A tube 138 is threadably connected at 140 to collar 136, a gasket 142 is provided between collar 136 and tube 138 to prevent leakage. A reduced portion 144 of tube 138 extends into vaporizer 2 spaced from flange 134 and is provided with openings 146, 146 for the passage of liquid. A cap 148 is threadably connected at 150 to tube 138 and acts to contain a compression spring 152 which bears against a ball check valve 154. Check valve 154 is adapted to seal against the upper end of a tube 156 threadably connected at 158 to the interior of tube 138 and spaced from the interior wall 160 of tube 138. Pins 162 and 164 which are identical with pins 32 and 34 are secured by a pressed fit in openings 166 and 168 in tube 138. A cap 172 is threadably connected at 174 to tube 138 and is provided with a stopper member 176 having a chamfered face 178 for sealing engagement with the lower end of tube 156.

Referring now to FIGURE 8, container 50 is employed to drain liquid from vaporizer 2 by inserting valve stem 114 within tube 156 with extension portion 69 surrounding tube 156 and passing inwardly of wall 160. If, as is the case here, container 50 is a proper one into which to drain the liquid contained in vaporizer 2, pins 162 and 164 will match openings 72 and 74 permitting container 50 to be further advanced so as to provide for the opening of ball check valve 154 by valve stem 114 and the subsequent movement of base 112 against spring 110 to permit the flow of liquid downwardly past the base 110. Finally, pins 162 and 164 act to lower valve ring 176 compressing spring 78 to clear openings 72 and 74 for the passage of air. In the position shown in FIGURE 8, washer 180 drops clear of openings 98 permitting the passage of air therethrough.

OPERATION

With the elements positioned as shown in FIGURE 8, liquid is free to flow through openings 146, the interior of tube 156 about valve stem 114, through the interior of sleeve 64, through the interior of cap member 56 and through opening 60 into the lower portion of the container 50. Air is exhausted from container 50 passing through openings 98 in disc 90, through cup-shaped member 88, tube 84, tube 80 through the interior of member 64, past valve ring 76 and through openings 72 and 74 and, thence, through grooves 39 to the atmosphere.

What is claimed is:

1. In the combination of an anesthesia vaporizer and a supply container for a liquid anesthetic, means forming an inlet passage in the vaporizer, normally closed valve means to control the flow of fluid through said inlet passage, means forming an outlet passage in the lower portion of the vaporizer, normally closed valve means to control the flow of fluid through the outlet passage, means in the supply container forming a passage for liquid, normally closed valve means controlling said passage for liquid, means in the supply container forming a passage for air extending from a point near the bottom of the container to a point near the top of the container, said last mentioned means having at a point intermediate the ends thereof a passage communicating with
the interior of the container at a point remote from the bottom of the container,
gravity actuated check valve means closing the last mentioned passage when the supply container is inverted,
means secured to the supply container to alternatively engage and open the normally closed valve in the inlet passage and the normally closed valve in the outlet passage,
means secured to the vaporizer adjacent each of the valve means of the vaporizer to open the normally closed valve means in the passage for liquid in the supply container, and
interlocking means to connect the means forming the passage for liquid of the supply container alternatively to the means forming the inlet passage and the means forming the outlet passage of the vaporizer to provide for the actuation of the normally closed valves in said passages.

References Cited
UNITED STATES PATENTS
2,307,427 1/1943 Smith et al. ———— 141—294
2,401,674 6/1946 Vizay ———— 141—294
2,890,696 6/1959 Morris ———— 128—188
3,171,448 3/1965 Fromm ———— 141—346 X

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