July 6, 1948. F. B. ALLEN 2,444,717

MEANS OF INFLATION

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Fig. 1.

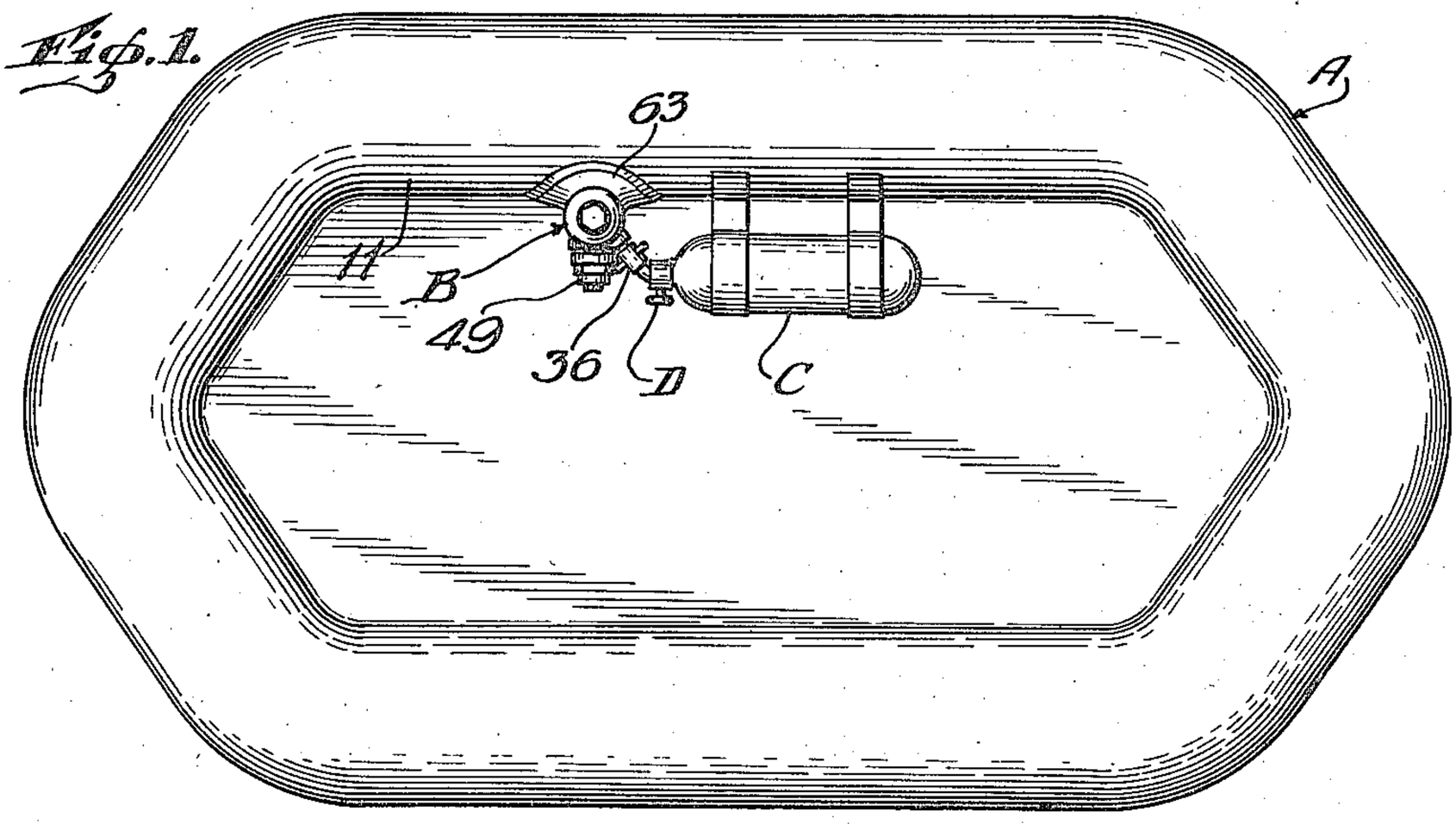


Fig. 2.

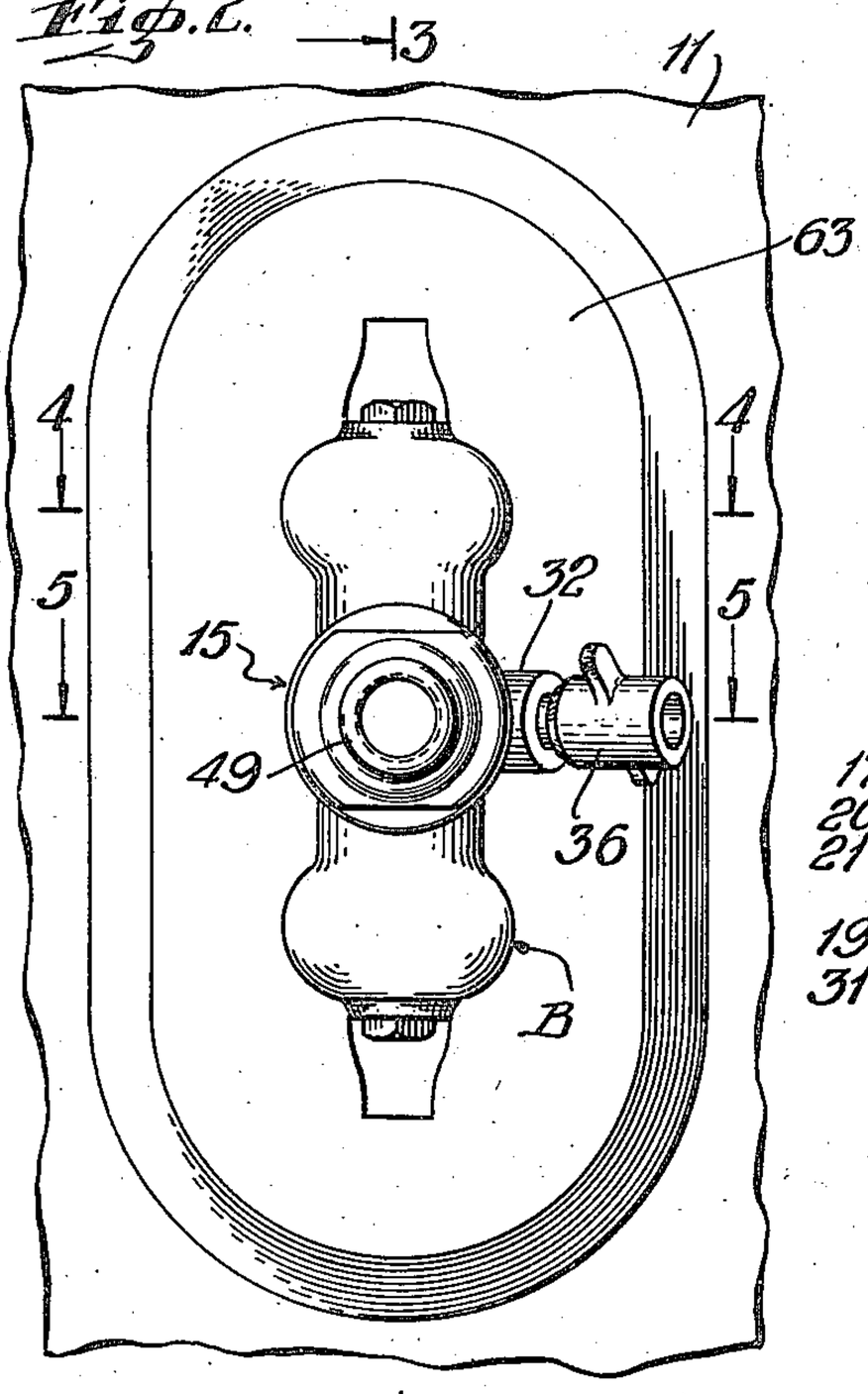
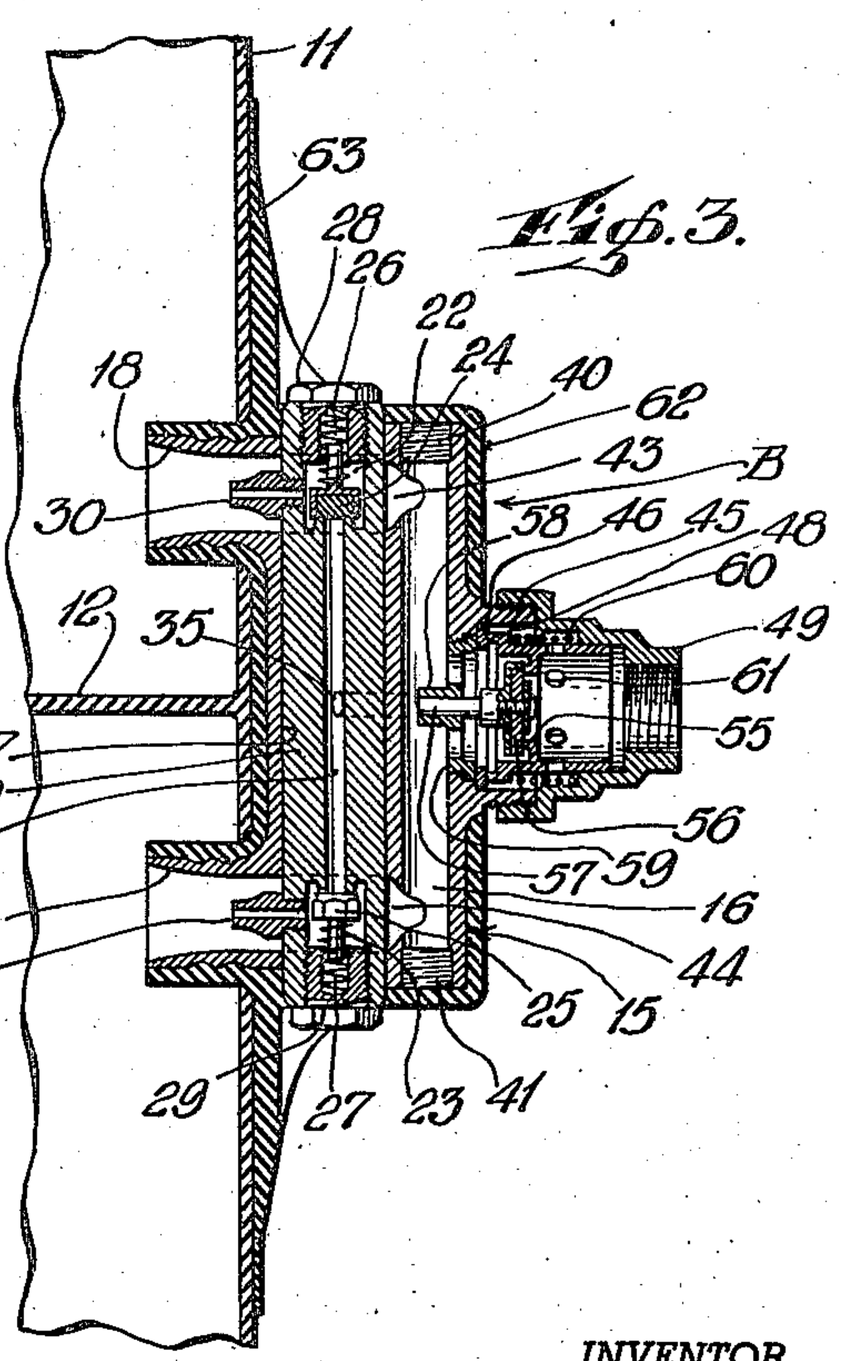


Fig. 3.



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MEANS OF INFLATION

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Fig. 4.

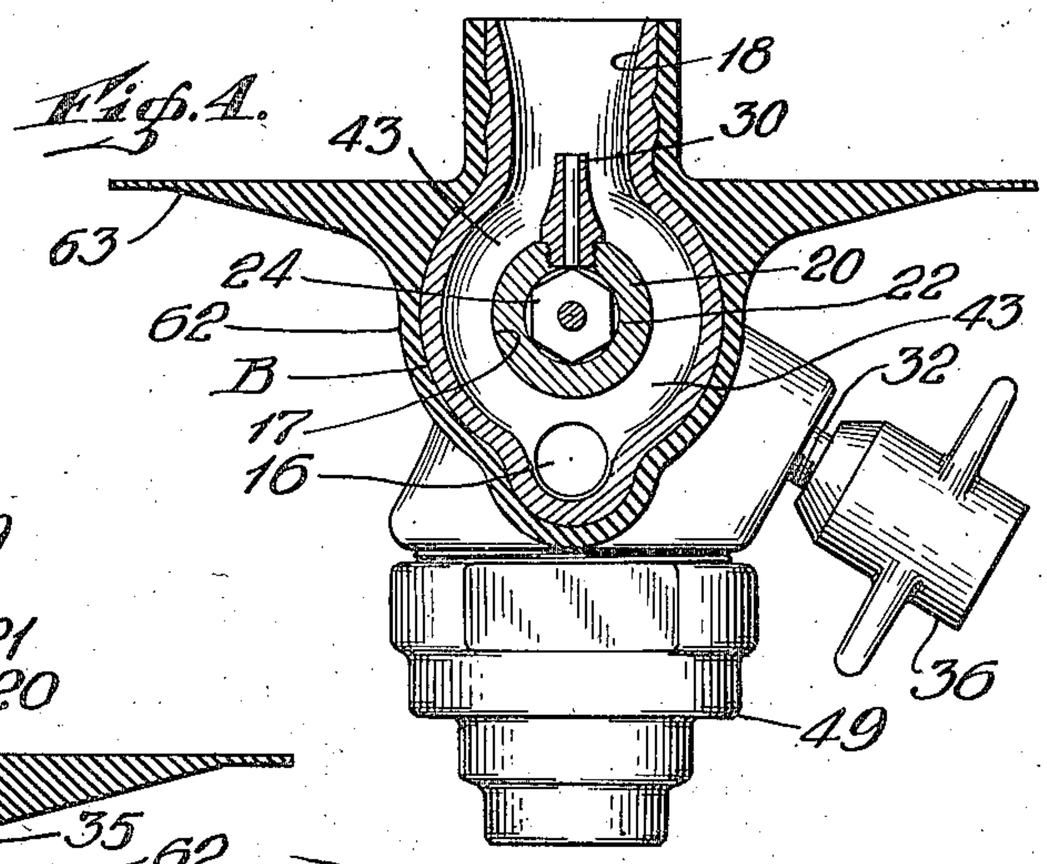


Fig. 5.

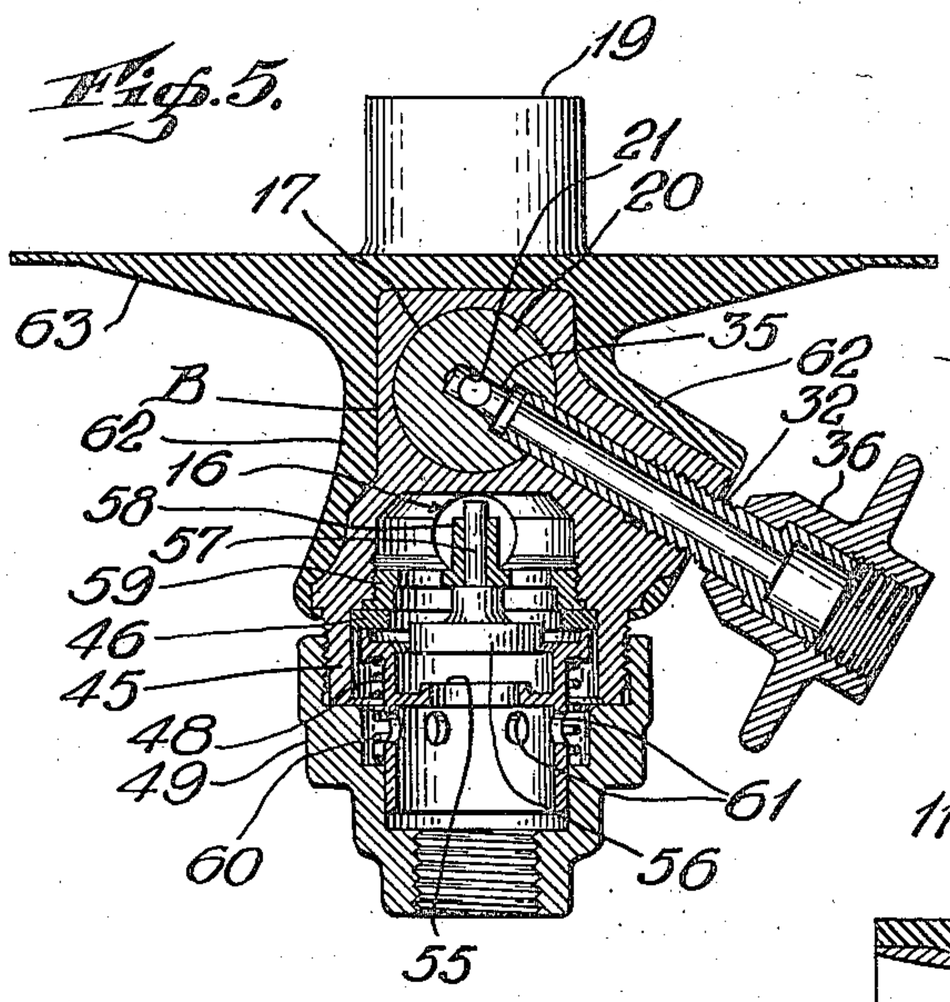
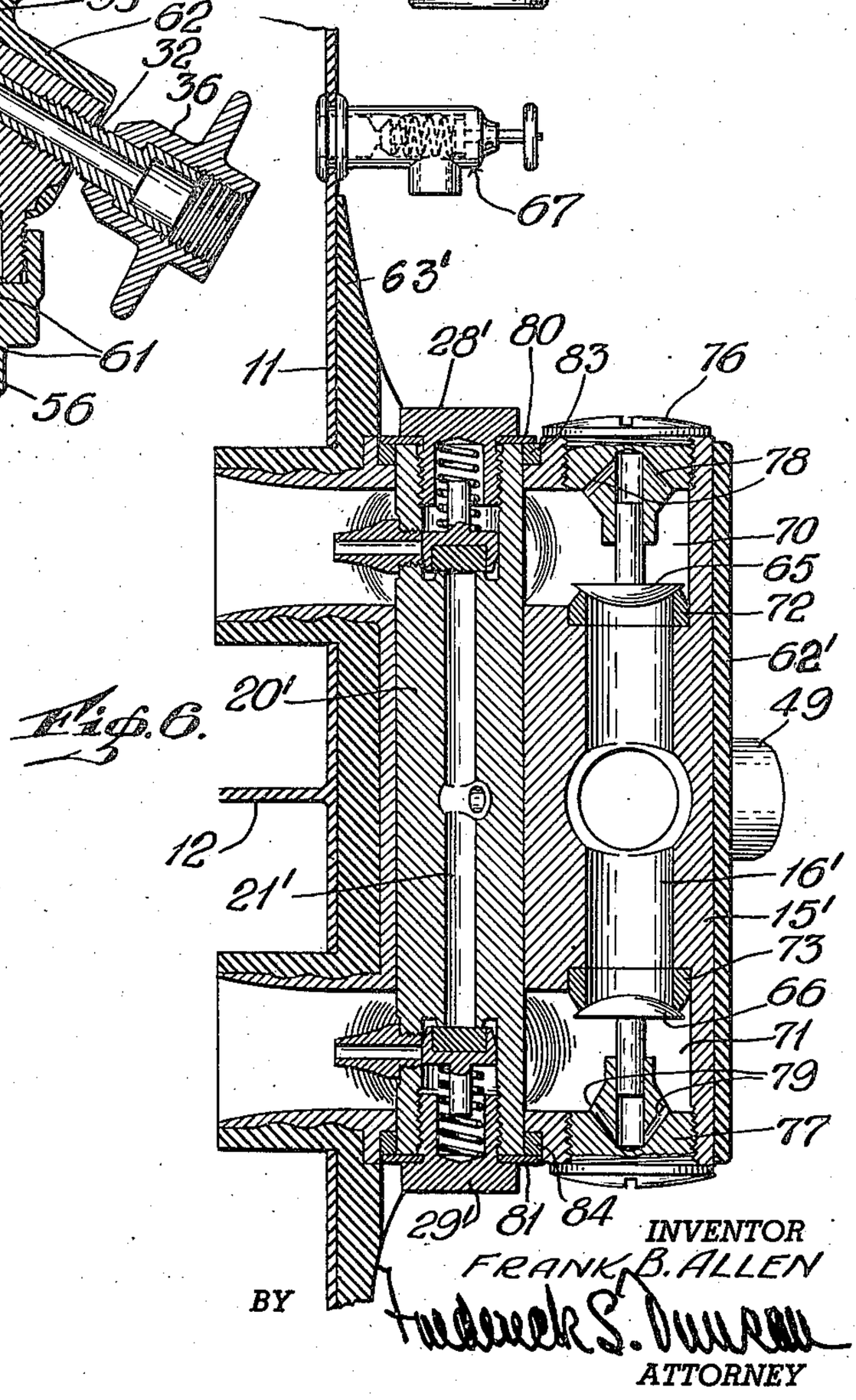


Fig. 6.



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Patented July 6, 1948 2,444,717

UNITED STATES PATENT OFFICE

2,444,717

MEANS OF INFLATION

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Application January 11, 1944, Serial No. 517,895

2 Claims. (Cl. 9—2)

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This invention relates to method and means of inflation generally, and more particularly to the inflation of life rafts and the like by the use of carbon dioxide as the inflating medium.

Carbon dioxide has been used extensively for inflation purposes and particularly for inflating life rafts. A supply of liquid CO_2 is stored under high pressure in a container preferably mounted on the deflated life raft with its discharge tube connected to a nipple on a distributing device in communication with the inflatable compartments of the life raft to inflate the same upon release of the CO_2 liquid from the container. It is most desirable that the proper inflation be effected in all cases and in the least possible time and that the supply of CO_2 liquid be just enough to accomplish this so as to keep the weight of the CO_2 and container as low as possible. Heretofore a certain amount of the CO_2 liquid turned to snow during inflation in increasing amounts proportionate to the decrease in atmospheric temperature, with the result that a CO_2 liquid supply that would normally inflate a life raft satisfactorily at a temperature of 70° F. or above would not provide proper inflation at lower temperatures ranging down to as low as 40° F. below zero. While the CO_2 snow will sublime and form gas and complete the inflation, this may be of no value as life rafts must be inflated immediately and CO_2 snow does not sublime quickly. My invention provides a method and means for inflating a life raft immediately upon release of the CO_2 liquid and inflating it properly at temperatures as low as at least 40° F. below zero.

One of the objects of this invention, therefore, is to provide an improved method of inflating life rafts or the like with CO_2 or its equivalent as the inflating medium, more particularly by entraining the CO_2 gas as it is being formed at the nozzle within the compartment of the life raft with atmospheric air in sufficient quantities to substantially prevent the formation of CO_2 snow.

Another object of this invention is the provision of means for entraining the CO_2 gas with air as the CO_2 gas is formed and preferably as it enters the inflatable compartment of the life raft.

A more specific object of this invention is to provide means for so inflating a life raft having a plurality of inflatable compartments.

Other objects of this invention will appear from the following description taken in connection with the drawings, in which:

Fig. 1 discloses a life raft and an inflation medium container and one form of my improved distributing device mounted on the rim of the life raft;

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Fig. 2 is a view of the distributing device looking upwardly in Fig. 1;

Fig. 3 is a longitudinal central section through the distributing device on the line 3—3 of Fig. 2;

Fig. 4 is a transverse section on the line 4—4 of Fig. 2;

Fig. 5 is a transverse section on the line 5—5 of Fig. 2; and

Fig. 6 shows a modified form of a distributing device in longitudinal central section corresponding to that shown in Fig. 3.

For the purposes of disclosure of my new method and means of inflation, I have chosen to show the same used in inflating a life raft generally designated as A (Fig. 1) which includes an inflatable rim 11 which may be divided by a partition 12, as shown in Fig. 3, into upper and lower compartments. My invention in its broad aspect is applicable to the inflation of a single compartment.

My invention in the embodiment disclosed in Figs. 1 to 5 comprises a distributing device generally indicated at B suitably mounted on the inner side face of the rim of the life raft and to which CO_2 inflating liquid is delivered from a CO_2 liquid container C also suitably mounted on the inner side face of the rim of the life raft.

The distributing device B comprises a block 15 which is provided with two longitudinally extending bores 16 and 17 and with two hollow projections 18 and 19 which extend into the compartments in the rim 11 and through which the inflating CO_2 gas and air enter the compartments within the rim.

Mounted within the bore 17 is a member 20 provided with a through bore or inflating liquid manifold 21 which is enlarged at its ends as indicated at 22 and 23, to provide valve chambers in which operate valves 24 and 25 which are spring pressed by springs 26 and 27 against valve seats formed in the inner ends of the valve chambers. The springs are retained in position by plugs 28 and 29 threaded into the outer ends of the valve chambers. The valve chambers communicate with the interior of the projections 18 and 19 through nozzles 30 and 31. As disclosed in Fig. 2, the block 15 is provided with a nipple 32 which is ported and in communication with the through bore or manifold 21, as indicated at 35, Fig. 3. The inner end of the nipple extends into the member 20 and holds it in position in the block 15.

In order that the inflating CO_2 liquid may be instantly available for inflation purposes, the container C is provided with any suitable form of quickly operable discharging means indicated at D, the discharge port of which is connected by a coupling member 36 to the nipple 32.

The bore or air intake manifold 16 is closed at its ends by plugs 40 and 41 and each end of the bore communicates by passageways 43 and 44 extending around the member 20, Figs. 3 and 4, with the interior of the projections 18 and 19 in the vicinity of the bases of the nozzles 30 and 31.

In order that air may be excluded from the bore or air intake manifold 16 normally but be admitted during inflation, the block 15 is provided with a hollow projection 45 provided with a seat for a valve gasket 46 with which cooperates a hollow composite valve construction comprising a relief valve 48 which is guided in its movements and retained in position by means of a coupling member 49 threaded onto the projection 45 and provided with a screw thread for connection thereto of a hose or the like for drawing air from a space above the water.

The interior of the relief valve 48 is provided with a valve seat 55 with which cooperates an air intake valve 56 provided with a stem 57 slidable in a guiding element 58 carried by a ported member 59 threaded in the block 15 at the lower end of the bore in the projection 45. The relief valve 48 of the composite valve member is held on its seat by means of a spring 60 the tension of which may be predetermined or may be adjusted by means or the coupling member 49 so that it will leave its seat when the pressure within the inflated compartment or compartments is too high, permitting escape of the inflating gas and air through apertures 61 in the side wall of the relief valve 48 out into the atmosphere.

As disclosed, I may substantially enclose the distributing device in a rubber member 62 which also surrounds the projections 18 and 19 and may be secured in position by cement or vulcanization and which is provided with a horizontally extending flap or shoe 63 by means of which the distributing device may be secured either by vulcanization or cement to the side wall of the rim of the life raft.

In the modification disclosed in Fig. 6, the distributing block 15' is of substantially the same construction as in the first embodiment as to the member 20' and the manifold 21' and ports through which the CO_2 is discharged into the compartments in the life raft. The air intake, however, is modified and instead of using a single air intake and relief valve as in the first embodiment, I employ separate intake valves 65 and 66 and a separate relief valve 67 for each compartment of the life raft.

The through bore or air intake manifold 16' which is in communication with the atmosphere, as before, through the ported projection 45 and coupling 49, is enlarged at its ends to provide valve chambers 70 and 71 and shoulders for valve seat rings 72 and 73 with which cooperate the valves 65 and 66 which are provided with stems slidably guided in openings in plugs 76 and 77 screw threaded in the outer ends of the valve chambers. The inner ends of the openings in

the plugs are in communication with the valve chambers through bores 78 and 79, as indicated, to facilitate movement of the valves into open and closed positions during inflation and at the end of the inflating operation.

The distributing block 15' may be encased in a rubber casing 62' provided with an attaching flap 63'.

The plugs 28' and 29' threaded in the ends of the members 20' preferably bear on washers 80 and 81 which in turn bear on sealing rings 83 and 84.

For purposes of disclosure I have described the use of CO_2 as the inflating medium. In so far as the prevention of snow is concerned, it is also obvious that my invention is applicable to inflation by any snow forming liquid where the amount of snow formed can be reduced substantially by the entrainment of atmospheric air. In the claims I employ the expression CO_2 to cover carbon dioxide and its equivalents.

While I have described my invention with particularity as to two preferred embodiments of the device that may be employed, it is to be understood that I reserve the right to all such changes in the method and device as fall within the scope of the appended claims.

I claim:

1. A distributing device for inflating two compartments comprising a manifold block provided with inflating CO_2 fluid and air distributing bores the ends of which are provided with valve chambers, valves closing the ends of said bores, and nozzles in communication with the valve chambers for the inflating fluid, said block being ported to connect the valve chambers for the valves controlling the air distributing bore to regions at the bases of said nozzles.

2. A distributing device for inflating a plurality of compartments comprising a block provided with an inflating CO_2 liquid manifold and with a port communicating with said manifold through which inflating liquid may be injected, the ends of said manifold being provided with valve seats and valve chambers, valves normally seated on said valve seats, nozzles communicating with said valve chambers and projecting into said compartments, said block also being provided with an air intake manifold in communication with the regions around the bases of the nozzles, and a combined intake and release valve on said air intake manifold comprising a spring pressed pressure release valve element and an air intake valve cooperating with said pressure release valve to permit air to enter said air manifold during inflation and to prevent the escape of air and gas after inflation has been effected.

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