June 26, 1962 W. F. WISMAR 3,040,970

DUAL ASPIRATING APPARATUS

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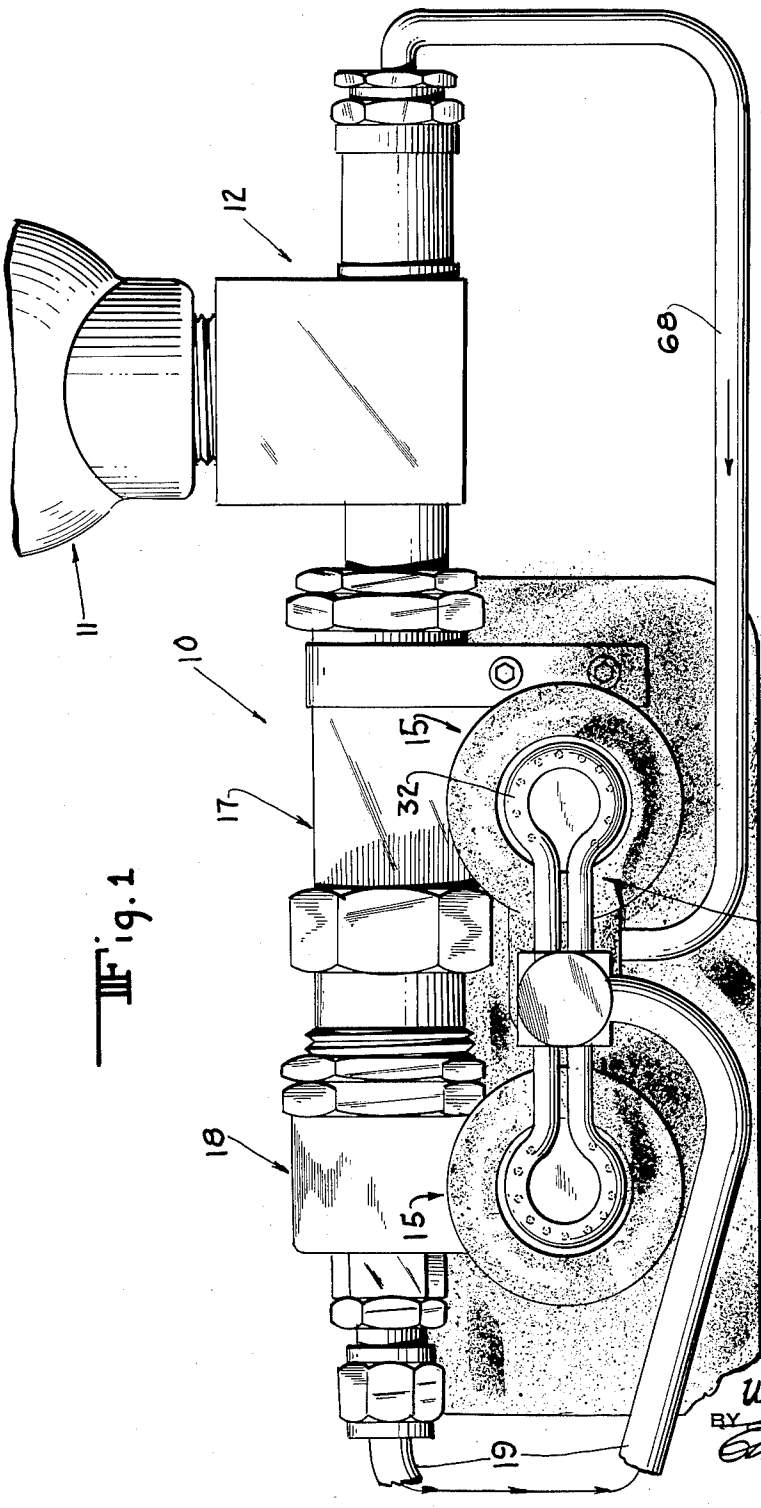


Fig. 1

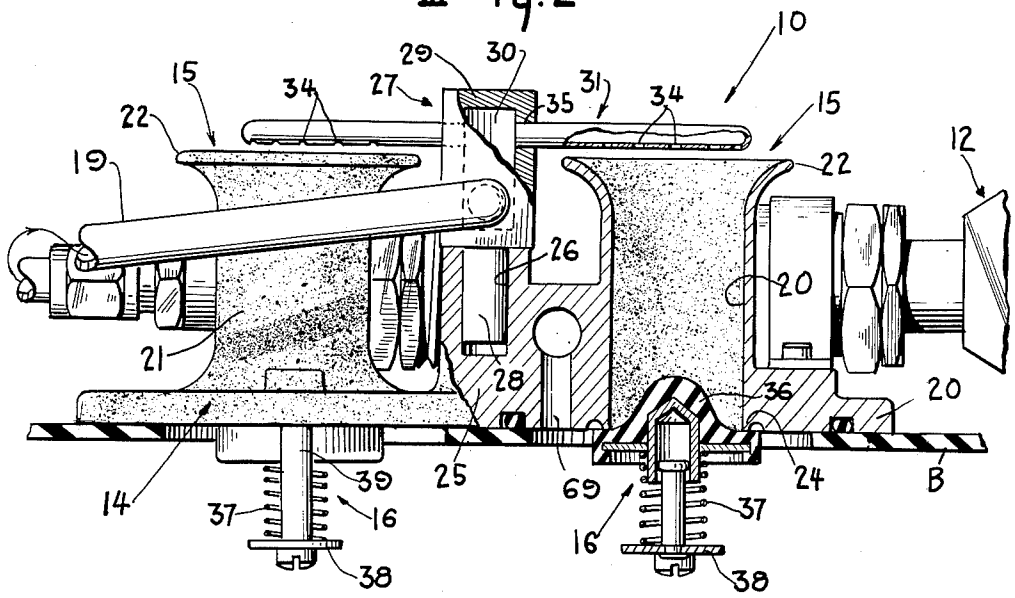
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Fig. 2



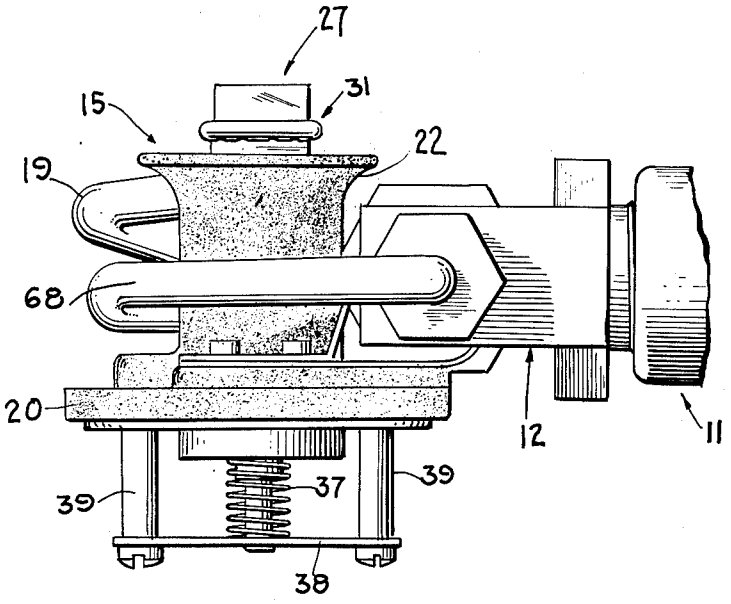


Fig. 3

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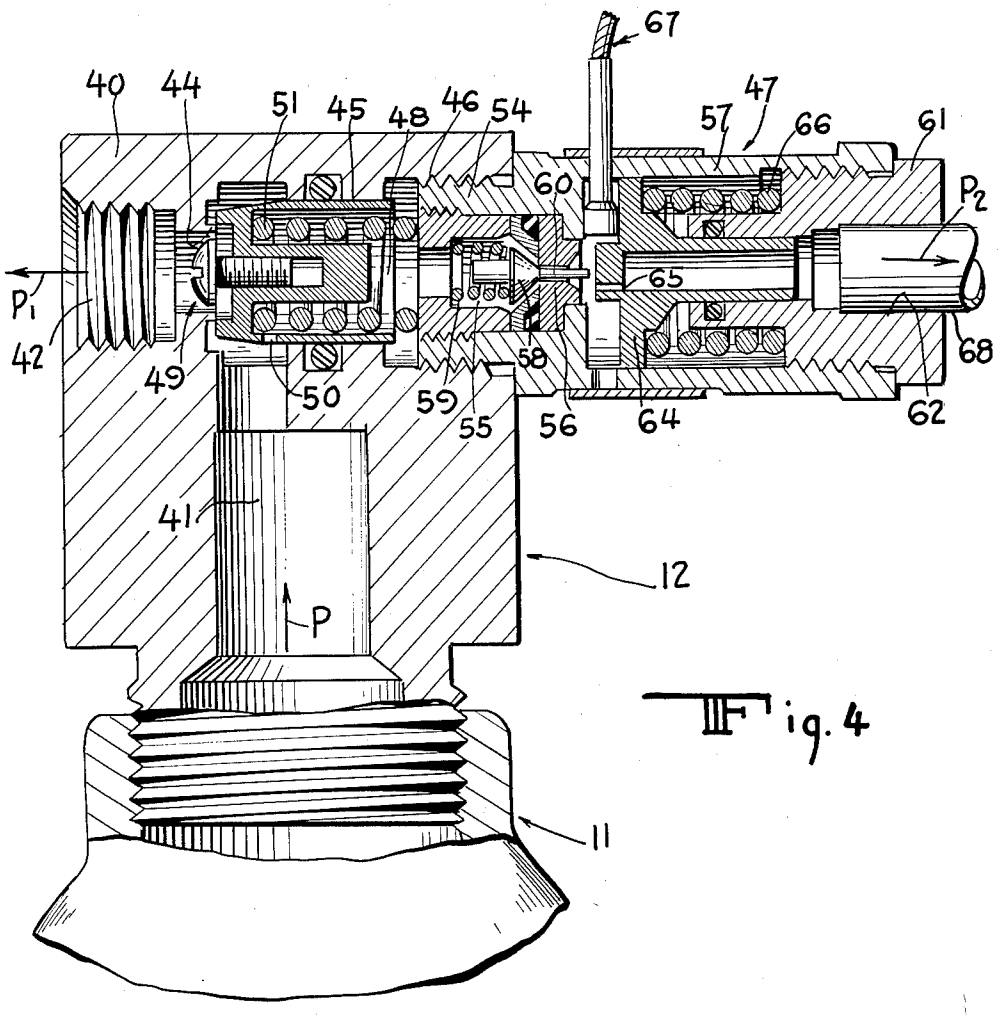


Fig. 4

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DUAL ASPIRATING APPARATUS

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3 Claims. (Cl. 230—103)

The present invention relates to aspirating apparatus, and, more particularly, to such apparatus for inflating the bags of flotation equipment such as collapsible boats, rafts, escape chutes and similar devices.

Heretofore, various types of aspirating apparatus have been utilized to supplement compressed gas or air with entrained ambient air. It has been found that, in cases where the bags to be inflated had a large volumetric capacity, inflation could not be accomplished within the desired period of time with such apparatus; and that, in order to meet the time requirement by increasing the pressure of the inflating media, the bags became vulnerable to physical damage at the commencement of inflation to unfold the bags. While the bags could be made stronger to withstand greater forces exerted thereon, this would require increasing the weight thereof. However, since such flotation equipment is generally airborne, weight penalties cannot be tolerated.

Accordingly, an object of the present invention is to provide apparatus adapted to increase the rate at which the inflating media is introduced into the bag without increasing the pressure thereof.

Another object is to provide such apparatus wherein the flow of high pressure aspirating medium is divided to reduce the pressure thereof to a value whereby the pressure of the aspirating medium will not damage the bags.

Another object is to provide such apparatus which is adapted to cooperate with valving for bleeding low pressure gas or air into the bags after aspiration ceases to main the bags fully inflated.

A further object is to accomplish the foregoing in a simple, practical and economical manner.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a plan view of aspirating apparatus in accordance with the present invention equipped with valving for bleeding low pressure air into the bag from a source of compressed gas or air, the source being partially shown.

FIG. 2 is a front elevational view, partly in section, of the apparatus shown in FIG. 1, the source and the valving being omitted.

FIG. 3 is an end elevational view of the apparatus shown in FIG. 2 as seen from the right side thereof.

FIG. 4 is an enlarged longitudinal sectional view of the valving for controlling aspiration and bleed flow of the compressed medium.

Referring to the drawings in detail, there is shown in FIG. 1 aspirating apparatus **10**, a source of compressed gas or air such as a conventional cylinder **11** partially shown, and valving **12** connected between the aspirating apparatus and the cylinder, the function of which will be described in detail hereinafter.

As shown in FIGS. 1 to 3, the aspirating apparatus generally comprises a body **14**, aspirating nozzles **15** connected to the body, valves **16** mounted on the underside of the body, an inlet tube **17** secured to the body and connected at one end to the valving **12**, a pressure reducer **18** connected at one end to the other end of the tube **17**, and a conduit **19** connecting the other end of the pressure reducer to the body to deliver compressed medium thereto.

The body **14** comprises a plate portion **20** adapted for securement to an inflatable bag B in the usual manner, a plurality of adjacently spaced tubular portions **21**, two being shown by way of example and each having a flared opening **22** at its upper end and a valve seat **24** at its lower end located within the bag B, a formation **25** between the tubular portions having a vertical bore **26** therein which is open at the top and closed at the bottom, and a fitting **27** formed with a stem **28** secured in the bore **26** and having a head **29** formed with a flow dividing chamber **30** at its upper end to which the nozzles **15** and the conduit **19** are connected.

The nozzles **15** are formed of a tube **31** having a generally circular section **32** overlying one of the openings **22** and being provided with a plurality of spaced downwardly facing apertures **34** for directing gas under pressure into the openings **22** to aspirate ambient air therewith. Preferably, the tube **31** is bent upon itself and has parallel adjacent ends connected to apertures **35** provided in pairs in the head of the fitting **27**. As shown herein, the tubular aspirator portions **21** are diametrically opposite the fitting **27** and the apertures are formed at opposite sides of the fitting. The degree of aspiration can be preset by adjusting the distance between the nozzle apertures **34** and the flared openings **22** before securement of the stem **28** into the bore **26**.

The valves **16** are of the poppet type and each comprise a valve member **36** for a seat **24**, and a spring **37** biased between the valve member and a cross-bar **38** supported by posts **39** secured to the underside of the body **14**.

While the valving **12** may be of the type which simply releases the compressed gas at about 3000 p.s.i. from the cylinder and allows it to flow through the pressure reducer **18** and the conduit **19** to the nozzles **15** whereby ambient air is aspirated and the valve members **36** are unseated to admit gas and air to enter the inflation bag B until the pressure in the cylinder drops to about 300 p.s.i. and the valve members reseat, valving can be utilized with the apparatus shown which utilizes the low pressure gas remaining in the cylinder to maintain the pressure in the bag at a desired value and to make up for leakage.

As shown in FIG. 4, such valving comprises a body **40** having an inlet **41** in communication with the cylinder **11**, an outlet **42** connected to the tube **17**, a valve seat **44** between the inlet and outlet, and a valve member slideway **45** and a threaded bore **46** in concentric alignment with the valve seat; a pilot valve and actuator assembly **47** secured in the bore **46** to provide a chamber **48**; and a main valve member **49** having a bleed aperture **50** for conducting gas from the cylinder into the chamber **48** in back of the piston so that the valve member is held on its seat by the gas pressure and the force of a spring **51** biased between the valve member and the portion of the assembly **47** in the bore **46**.

The pilot valve and actuator assembly **47** comprises a body having a threaded plug portion **54** for the bore **46** provided with a pilot valve chamber **55** and a valve seat **56** and having a tubular actuator casing **57**; a pilot valve member **58** in the chamber **55** urged on the seat by a spring **59** and provided with a stem **60**; a plug **61** threadedly secured in the open end of the casing **57** provided with an outlet **62** adapted for connection to the aspirator body as about to be described; an actuator member **64** slidably mounted in the casing **57** for engaging the pilot

valve stem 60 and provided with a bleed aperture 65 for establishing communication between the port of the pilot valve seat 56 and the outlet 62; a spring 66 biased between the actuator member 64 and the plug 61 for effecting movement of the actuator member to unseat the pilot valve member; and a latch 67 for retaining the actuator member.

In operation, the latch is withdrawn to cause the spring 66 to move the actuator member 64 to unseat the pilot valve member 58, whereby compressed gas in the chamber 48 is vented and the main valve member 49 unseats to deliver gas to the aspirator. When the pressure of the gas in the cylinder drops to about 300 p.s.i., the spring 51 reseats the main valve member and aspiration ceases to allow the valves 16 to reclose. Gas is now bled through the apertures 50 and 65 at a low pressure to the outlet 62 from where it is conducted by a conduit 68 to a port 69 in the aspirator body in direct communication with the interior of the inflation bag (FIGS. 1 and 2).

The valving 12 as just described constitutes the subject matter of application for United States Letters Patent Serial No. 26,753, filed May 4, 1960.

From the foregoing description it will be seen that the present invention provides improved aspirator apparatus for rapidly inflating flotation equipment and maintaining the same in proper inflated condition.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. Aspirating apparatus comprising a pair of adjacent tubular elements each formed with an opening, means for delivering gas under pressure positioned between said elements and having a pair of apertures therein at two opposite sides thereof with each pair of apertures facing one of said elements, and a tube for each element, each tube being bent upon itself and having a generally circular section overlying one of said openings and formed with a plurality of holes for directing gas under pressure into said openings to aspirate ambient air therewith and each tube having two parallel adjacent ends connected to one of said pairs of apertures.

2. Aspirating apparatus comprising a body having a pair of adjacent tubular elements each formed with an inlet opening at one end and an outlet opening at the other end, means for delivering gas under pressure including a nozzle overlying each of said inlet openings and formed with a plurality of apertures for directing gas under pressure into said inlet openings to aspirate ambient air therewith and direct the same through said outlet openings to its point of use, and a normally closed valve at each of said outlet openings operable to be opened by gas under pressure and aspirated air, said body including a passageway connected to said delivering means for by-passing said valves when said valves are closed and directing gas to the point of use.

3. Aspirating apparatus comprising tubular means formed with an inlet opening at one end and an outlet opening at the other end, means for delivering gas under pressure including a source of gas under pressure and a nozzle overlying said inlet opening of said tubular means for directing gas under pressure into tubular means to aspirate ambient air therewith and direct the same through said outlet opening of said tubular means, and a normally closed valve at said outlet opening of said tubular means operable to be opened by gas and aspirated air at a given pressure, passageway means for by-passing said tubular means, and valve means in said gas delivering means for directing gas to said nozzle at a given rate when the pressure of the gas is above a predetermined value, and for directing gas to said by-pass passageway means at a lesser rate when the pressure of the gas is below said predetermined value.

References Cited in the file of this patent

UNITED STATES PATENTS

787,279	Coe	Apr. 11, 1905
923,490	Coe	June 1, 1909
1,484,013	Ehrhart	Feb. 19, 1924
2,866,593	Bowman et al.	Dec. 30, 1958

FOREIGN PATENTS

255,395	Great Britain	July 22, 1926