

Sept. 4, 1962

R. S. KAESER

3,052,064

GLASSBLOWER'S SAFETY MANOSTAT AND SYSTEM

Filed June 8, 1959

2 Sheets-Sheet 1

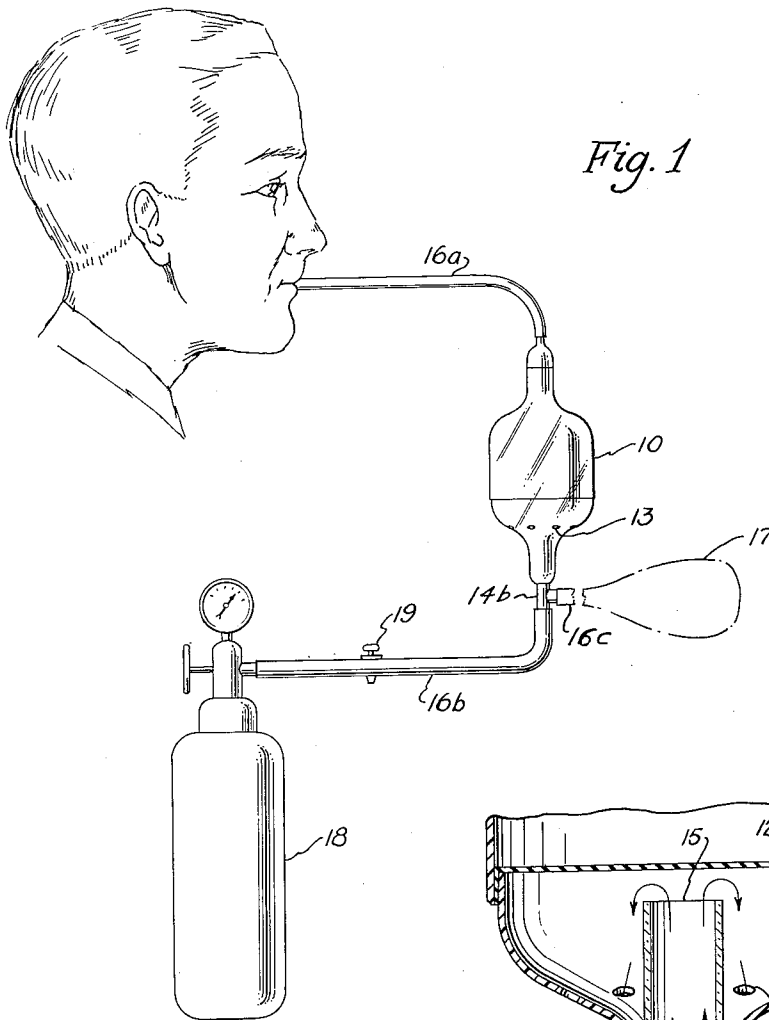


Fig. 1

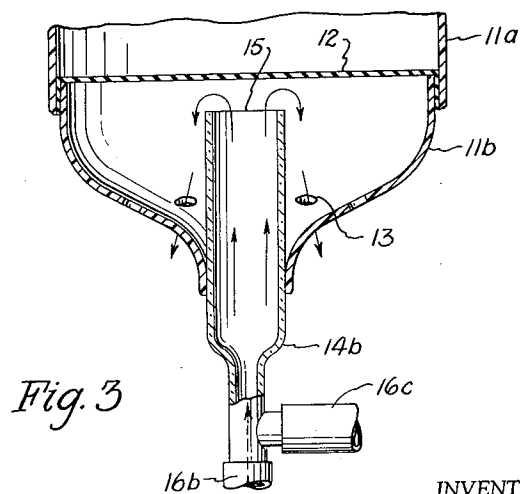


Fig. 3

INVENTOR

Robert S. Kaeser

BY

Arthur Vinograd
John C. Stahl

ATTORNEYS

Sept. 4, 1962

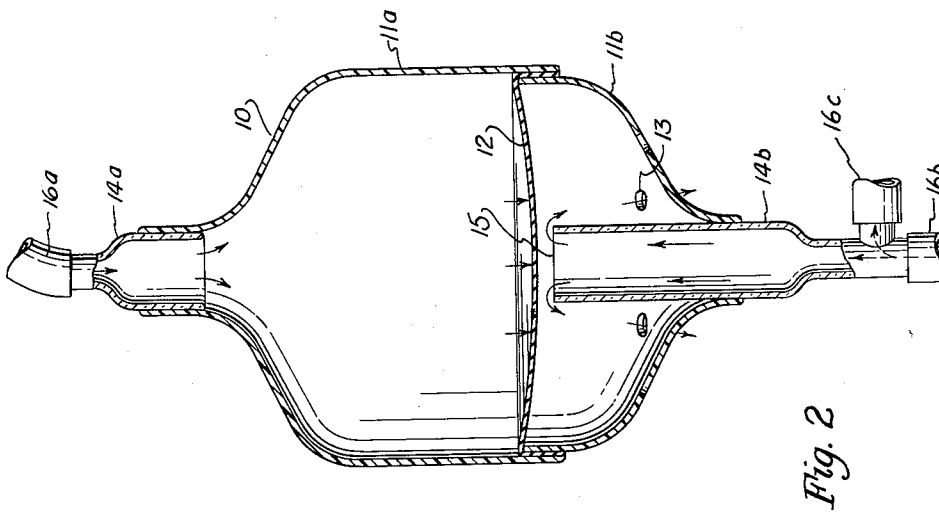
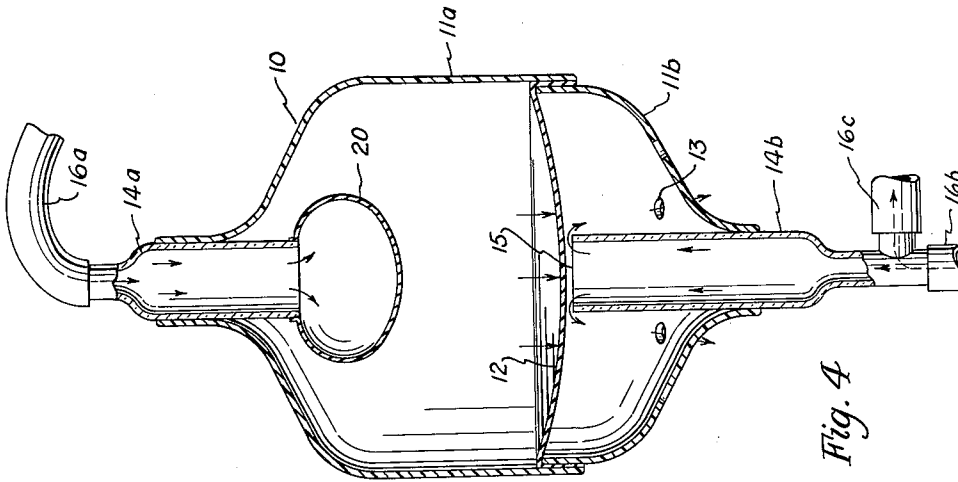
R. S. KAESER

3,052,064

GLASSBLOWER'S SAFETY MANOSTAT AND SYSTEM

Filed June 8, 1959

2 Sheets-Sheet 2



INVENTOR

Robert S. Kaeser

BY

Arthur Vinograd
John C. Stahl

ATTORNEYS

1

3,052,064

GLASSBLOWER'S SAFETY MANOSTAT AND SYSTEM

Robert S. Kaeser, Rockville, Md., assignor to the United States of America as represented by the Secretary of Commerce

Filed June 8, 1959, Ser. No. 820,568

6 Claims. (Cl. 49—21)

This invention relates to a glassblowing system and particularly contemplates an improved pressure control mechanism and associated system which enables glassblowers to use a secondary gaseous medium for glassblowing while preserving the characteristic sensitivity and control inherent in an oral glassblowing apparatus.

Prior systems which have attempted to use auxiliary sources of gas under pressure for glassblowing employ manual or foot operated valves between the pressure tank and the article being processed.

As is peculiar to the art of glassblowing, however, the glassblower is enabled to properly control his work by an automatic reflex between the hardness with which he blows and the observed dimensional change in the work. Accordingly, the sensitivity of control necessary, particularly for laboratory work, is difficult to achieve in a system employing manually operated valves.

In addition, glassblowing on contaminated equipment may constitute an extreme health hazard. Glassblowers are often asked to repair glass systems and apparatus which are contaminated with mercury, poisonous gases, or radioactive material. The safety manostat of this invention enables the glassblower to immediately repair contaminated equipment with complete personal safety and without the tedious and costly procedures involving apparatus dismantling and cleaning.

Alternatively, the apparatus of this invention may be used on systems which may only be exposed to special atmospheres, such as inert or vapor-free atmospheres, and systems containing easily oxidizable substances.

It is accordingly an immediate object of this invention to provide a glassblowing system which preserves the sensitivity and control advantages inherent in orally-operated systems and yet which permits glassblowing with an intermediate gas.

A further object of this invention is to enable a glassblower to repair contaminated glass apparatus with complete personal safety.

Another object of this invention is to provide a device for isolating the glassblower's breath from the glass article being blown.

Still another object of this invention is to provide a device which permits glassblowing in an inert or vapor-free atmosphere.

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of a preferred embodiment of the invention, as illustrated in the accompanying drawings in which:

FIG. 1 is a diagrammatic view of the apparatus of this invention as employed in a typical glassblowing operation;

FIG. 2 is a vertical sectional view of a preferred embodiment of the manostat constructed in accordance with the principles of the invention;

FIG. 3 is a fragmentary vertical sectional view of the lower chamber of the manostat of FIG. 2, and

FIG. 4 is a vertical sectional view of a modified manostat.

Referring now to the drawings, FIGS. 2 and 3 show the structural features of the safety manostat of this invention. The manostat comprises a housing 10 of hollow form. The housing can be constructed of poly-

2

ethylene, glass, or other suitable material. The housing 10 (see FIGS. 2 and 3) may preferably be made in two sections for convenience of construction and includes an upper chamber 11a and a lower chamber 11b separated by a diaphragm 12 of flexible material, such as rubber or the like. Diaphragm 12 may conveniently be secured between the opposite edges of the upper and lower chamber walls respectively by spreading the diaphragm over the open end of the lower chamber 11b and then clamping the upper chamber 11a to the lower chamber. The lower chamber 11b contains a plurality of vents or ports 13.

As shown in FIG. 2, the end of the upper chamber 11a is terminated by a nipple 14a. The lower chamber 11b includes a coupling assembly comprising a tube 14b having an orifice 15. The tube is positioned within the lower chamber so that the orifice 15 is at an optimal distance below diaphragm 12 and may be adjustably positioned to correct the equilibrium pressure, hereinafter to be discussed. The end of the tube comprising orifice 15 is ground smooth or fire polished to provide a gas-tight seal for diaphragm 12. The various parts such as the nipple 14a and tube 14b may be secured to the housing 10 by friction or through the use of suitable adhesives or by plastic welding.

A mouthpiece hose 16a, through which the glassblower exerts the desired pressure, is attached to nipple 14a while hoses 16b and 16c are provided for connecting the manostat to the pressure source 18 and the object to be worked upon 17, respectively, as shown in FIG. 1.

FIG. 1 shows the general arrangement of the glassblowing system of the present invention. The manostat 10 is shown connected by hose 16b to a pressure source represented by tank 18. The work article 17 is connected to the referred-to tube 14b through hose 16c. The mouthpiece hose 16a is shown in position for operation by the glassblower.

In accordance with the principles of this invention, as will be described, the force with which the glassblower blows on the mouth-piece 16a determines the amount of pressure of gas applied from pressure tank 18 to the work article 17. That is, the pressure applied to the work article 17 is directly proportional to the pressure exerted by the glassblower on mouthpiece 16a. A suitable throttle valve 19 may be provided to limit the maximum pressure of gas from source 18.

Alternatively, other compressed gases, such as helium, neon, argon, or nitrogen, may be utilized instead of compressed air if an inert or vapor-free environment inside the apparatus undergoing repair is desired.

The manner in which the above-outlined control over the blowing pressure is achieved is illustrated in the detailed views of the manostat 10 shown in FIGS. 2 and 3.

If the glassblower does not exert a pressure on the diaphragm by blowing on hose 16a (see FIG. 3), the gas from source 18 flows through the unrestricted orifice 15 and out ports 13 to the external environment, as diagrammatically illustrated by the arrows in FIG. 3.

However, when the glassblower blows on the mouth-piece hose 16a, the resulting pressure exerted on diaphragm 12 causes it to distend (see FIG. 2) and partially close or restrict the passage of gas through orifice 15. As a result, there is a transfer of gas pressure to the outlet 16c and to the work object 17. In FIG. 2 the broken line arrows indicate the division of gas flow through tube 16c upon partial constriction or orifice 15.

When the diaphragm is further distended (see FIG. 4) by the pressure exerted by the glassblower, a greater proportion of the incoming gas from the pressure source 18 will flow through line 16c, as schematically shown by the broken arrow in FIG. 4. It will be clear that the magnitude of gas pressure from cylinder 18 to the work piece

is a function of the force with which the operator blows in the mouthpiece tube 16a and the described control system therefore provides the same degree and sensitivity of control that is obtainable in connection with direct action glassblowing.

Upon releasing the pressure on hose 16a, the diaphragm 12 is released to the position of FIG. 3 and the gas from pressure source 18 is dissipated through ports 13.

In a modified version of the safety manostat, FIG. 4, a gas-impervious flexible diaphragm 20 is attached to the lower portion of nipple 14a to further isolate the glassblower's breath from the system undergoing repair. The air entrapped in the upper chamber 11a between diaphragms 12 and 20, respectively, causes the diaphragm 12 to respond to pressure variations exerted by the glassblower through hose 16a on diaphragm 20 in the same manner as described in connection with FIGS. 2 and 3.

In either modification, the glassblower's breath is at all times completely isolated from the system being worked by the diaphragm 12. All toxic gases from the apparatus being worked on are expelled through ports 13. The safety manostat may be placed under a hood, or otherwise isolated from the vicinity of the operator. If required, the vented gas can be passed through a purification trap before being released in order to prevent the escape of poisonous fumes.

It will be clear from the above description that the manostat shown in either of the embodiments of FIGS. 2, 3, and 4, respectively, is in the nature of a valve controlling the flow of gas between the pressure source 18 and the work article 17. Specifically, the diaphragm 12 acts as a closure member for the orifice 15 and, in such manner, regulates the flow of gas through outlet conduit 16c to the work article.

It will be apparent that the manifold can be made in a wide variety of configurations. For example, the diameter of the chamber or housing 10 will, to a large extent, determine the pliability of the diaphragm 12, as well as the nature of the material forming the diaphragm, and the thickness thereof.

The pliability of the diaphragm 12 will also determine, to a large extent, the initial spacing between the orifice 15 and the diaphragm. However, the design of the manostat facilitates adjustment of such spacing. The tubular member 14b may be functionally fitted in the lower chamber 11b and the proper spacing of the orifice from the diaphragm can then readily be determined by adjusting the tube 14b relative to the diaphragm as pressure is applied. The tube may then be locked into position by cementing.

In a particular embodiment of the above-described manostat, a housing of approximately 5 inches was employed. The diaphragm was made of rubber and had a thickness of approximately $\frac{1}{32}$ inch. The initial spacing between the orifice 15 and the unflexed diaphragm was approximately $\frac{1}{8}$ inch.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of invention as defined in the appended claims.

What is claimed is:

1. A glassblowing apparatus for subjecting a work-object to gas pressure under oral control of an operator comprising: a source of gas under pressure, conduit means connecting said pressure source to said work object, a valve in said conduit for controlling the amount of gas pressure applied to said work object from said pressure source, said valve comprising a housing, fluid impervious flexible partition means dividing said housing into a first and second chamber, means for permitting an operator to apply oral pressure to said first chamber to flex said partition means, means coupling said conduit to said second chamber, said coupling means including an orifice, positioned in proximity to said partition means, and means for venting said second chamber to the atmosphere.

2. The invention of claim 1 in which said coupling means is adjustable and extends into said second chamber whereby said orifice may be selectively positioned relative to said flexible partition means.

3. In a glassblowing system including a source of gas under pressure, an orally-operated manostat for controlling the gas pressure applied to a work object and for isolating the glassblower's breath from the gas and work object comprising a housing, a gas-impervious flexible partition mounted in said housing to form first and second compartments, breath operated means connected to said first compartment enabling a glassblower to orally control the pressure therein, and means extending into said second compartment for connecting said gas pressure source to said work object comprising a tube having an orifice, said tube mounted in said second compartment with said orifice extending into and positioned adjacent said partition whereby the flexing of said partition consequent to changes in pressure in said first compartment regulates the pressure of gas applied to said work object.

4. The invention of claim 3 in which said second compartment includes an opening for venting said second compartment to the atmosphere.

5. The invention of claim 4 in which said breath operated means comprises a mouthpiece connected to the upper compartment of said housing.

6. The invention of claim 3 in which said housing comprises a pair of cup-shaped members dimensioned for nesting engagement one within the other and said flexible partition comprising a sheet of resilient, gas-impervious material, stretched over one of said members and functionally secured by the nesting engagement of the received member.

References Cited in the file of this patent

UNITED STATES PATENTS

900,914	Clarke	Oct. 13, 1908
1,722,666	Keith	July 30, 1929
2,659,391	Berger	Nov. 17, 1953

FOREIGN PATENTS

11,362	Germany	Feb. 11, 1880
502,300	Belgium	Apr. 30, 1951