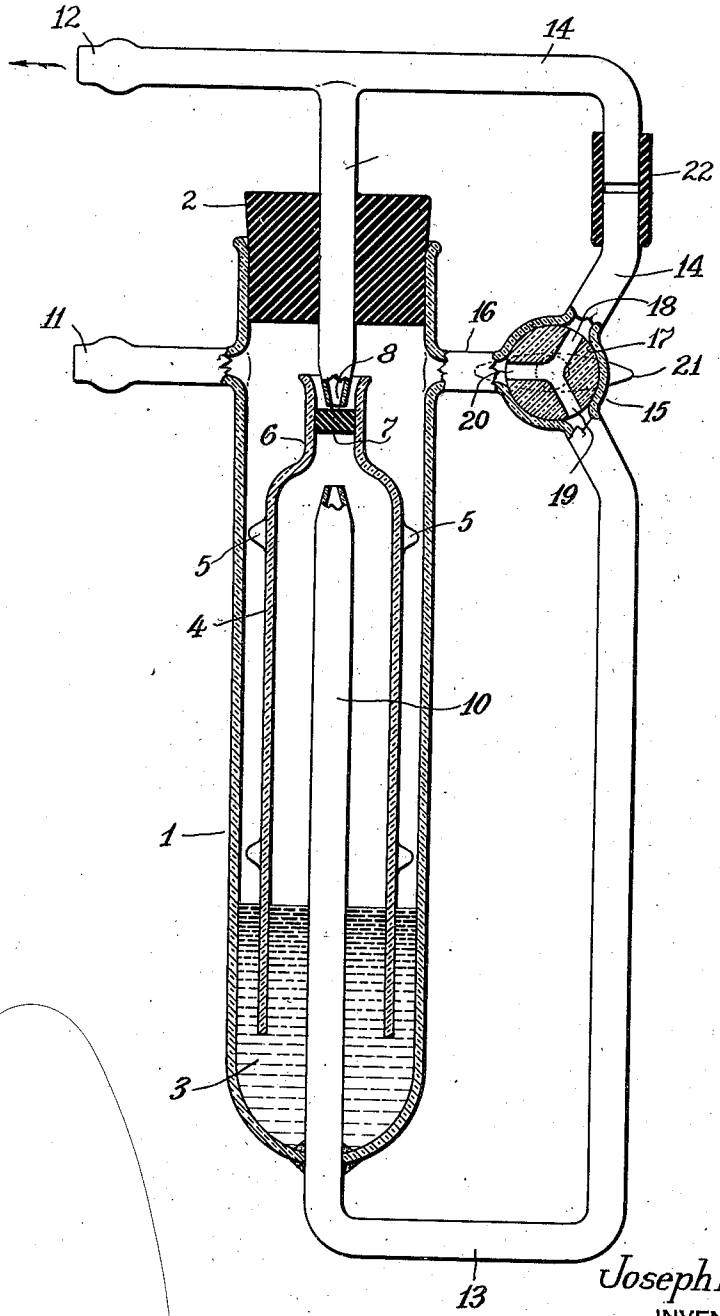
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MANOSTAT

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MANOSTAT

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4 Claims. (Cl. 230—2)

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The invention here disclosed is a manostat.

Objects of the invention are to provide apparatus for controlling pressure in vacuum distillations, vapor-liquid equilibria determinations and the like, in which sub-atmospheric pressures ranging from zero to 760 mm. Hg are to be maintained, which will be of simple, inexpensive construction, readily adaptable to various specific requirements and which will be entirely reliable, practical and efficient in operation.

Special objects are to provide apparatus of the character indicated which can be quickly put together or taken apart and be adjusted to suit different conditions or requirements.

Other desirable objects attained by the invention will appear in the course of the following specification.

The drawing accompanying and forming part of the specification illustrates a present commercial embodiment of the invention. Structure, however, may be modified and changed as regards the immediate illustration, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

The single figure in the drawing is a broken vertical sectional view of the manostat.

The body of the device is shown in the form of a vertically extended cylindrical container 1, closed at the top by a removable and vertically adjustable resilient plug or stopper 2.

This container holds a body of mercury 3 in which floats an inverted tubular member 4, guided for free rising and falling movements by lugs or projections 5 slidingly engageable with the inner wall of the container.

At the top the open ended inverted tubular float has a restricted neck portion 6 carrying a resilient valve or sealing disc 7, cooperative with the restricted lower end 8 of the throttling tube 9 which extends down through the top cover 2.

A pressure equalizing tube 10 extends up through the center of the holder into the tubular float above the mercury level. The system in which the pressure is to be maintained is connected into the upper portion of the holder by the side tube 11.

The valve tube 9 is shown equipped with a side extension 12 for connection with a vacuum pump or equivalent.

The center pressure equalizing tube 10 and the vacuum line 12 are shown equipped with extensions 13, 14, respectively, brought together in a union at 15 which is tapped into the side of the container at 16.

The union 15 is shown formed as a casing for a

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rotary three-way valve plug 17, having Y ports 18, 19, 20, which, by means of handle 21, can be lined up with the manifolding connections 14, 13, and holder connections 16, or be closed off from all these connections.

The vacuum line 14 at the top is shown as made in separate sections coupled by rubber sleeve 22 or the like to permit removal and adjusting movements of the T formed by the valve tube 9 and lateral extensions 12 and 14.

The parts may be made of glass tubing, as indicated, with the valve casing 15 welded in place at the junction of the three lines of tubing 13, 14 and 16.

In setting up the device, enough mercury is used to just float the disc 7 into sealing engagement with the throttling orifice 8 of the upper tube 9, when pressure inside and outside of the float is equalized, as it will be with the valve in the open position shown.

The line 11 is usually connected with the system in which pressure is to be controlled by way of a large reservoir and a suitable manometer. With the valve open as indicated, pressure is reduced through vacuum line 12 until the desired value, as read on the manometer, is reached. The compound valve is then closed to shut off the suction applying and equalizing connections 14, 18, and 19, 20, 16 and 13 about the exterior and interior of the tubular float. After this the device will then automatically maintain the desired pressure, operating on the Cartesian principle.

If the system is vacuum tight the pressure will maintain itself. A slight leak, which may be introduced intentionally, will cause the pressure to rise slightly. This will effect a displacement of the mercury level downward outside the float and a corresponding displacement upward inside the float. The buoyant force on the float is thereby diminished and when sufficient to overcome that at the orifice, due to the pressure differential, the disc will break away from the orifice and permit the pump to evacuate sufficient gas from the system to restore the original pressure.

When the original pressure is restored the float will return the disc to its former seated position, sealing the orifice. This cycle may repeat indefinitely, with the proper size orifice and pump rating sufficient to carry the load.

The size of the orifice limits the capacity of gas removal from the system. Increased sensitivity is obtainable by decreasing the size of the orifice.

The invention provides simple, positive means for setting and maintaining any desired vacuum in a system. Particularly it avoids the need for electrical appliances or additional accessories.

By making the unit of heavy glass or metal it may be adapted for super atmospheric pressures. Also, it may be used for large industrial applications where constant pressure conditions must be maintained automatically. Further, the device may be arranged for very low pressures and as a direct reading semi-vacuum guage.

Properly assembled and adjusted, smooth, accurate control is obtainable with no visible fluctuations.

Fine adjustment of pressure settings are readily obtainable by shifting the orifice tip, pulling it up slightly to reduce pressure and lowering it to increase pressure, the slip mounting in the plug 2 and the rubber coupling 22 permitting such adjustments to be readily made.

What is claimed is:

1. A manostat comprising a holder, a body of mercury or equivalent sealing medium in said holder, an inverted tubular float supported in said sealing medium and carrying a valve element, a vacuum applying connection entered in said holder and having an orifice disposed to be closed by said valve element in the rising movements of said float, means for connecting the holder with a system to be pressure controlled, means for connecting said vacuum applying connection to a vacuum producing source, a manifolding connection extending from said vacuum producing connection into the interior of the inverted float and into the holder outside the float, and a single valve for opening and closing said manifolding connections.

2. A manostat comprising a holder containing a sealing liquid, an inverted tubular float supported in said sealing liquid and carrying a valve element, a suction line entered in said holder and provided with an orifice positioned to be closed by said valve element, a by-pass connection between the inside of the tubular float and the interior of the holder outside of the float, means for connecting the interior of the holder with a system to be pressure controlled, means for connecting said suction line with a vacuum pump or the like and with said by-pass connection, and a single valve for closing said by-pass connection and for disconnecting the same from said vacuum pump connecting means.

3. A manostat operating on the Cartesian principle and comprising a holder arranged for connection with a system to be pressure controlled and containing a sealing liquid, an inverted tubular float supported in said sealing liquid, pressure equalizing connections between the interor of the holder and the interior of said float, a valve element carried by the float, a suction tube having an orifice positioned to be closed by said valve element, suction connections to said tube and to said pressure equalizing connections and a valve interposed in said connections for opening said pressure equalizing connections to suction or for closing said equalizing connections and disconnecting the same from suction.

4. A Cartesian manostat comprising a holder arranged for connection with a system to be pressure controlled and containing a body of sealing liquid, an inverted tubular float supported in said liquid and provided with a valve element, a suction connection having an orifice positioned to be closed and opened by said valve element in the rising and falling movements of said float, pressure equalizing connections between the interior of the holder and the interior of the tubular float, a suction connection to said pressure equalizing connections and a valve at the junction of said suction connection with said pressure equalizing connections and arranged to open or to close said connections.

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