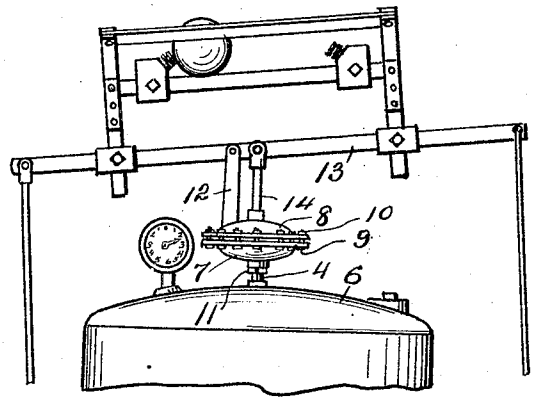
Aug. 11, 1925. 1,549,072

A. C. DOLE, SR., ET AL

VACUUM AND PRESSURE CONTROLLING MECHANISM

Filed March 31, 1924

Fig 1



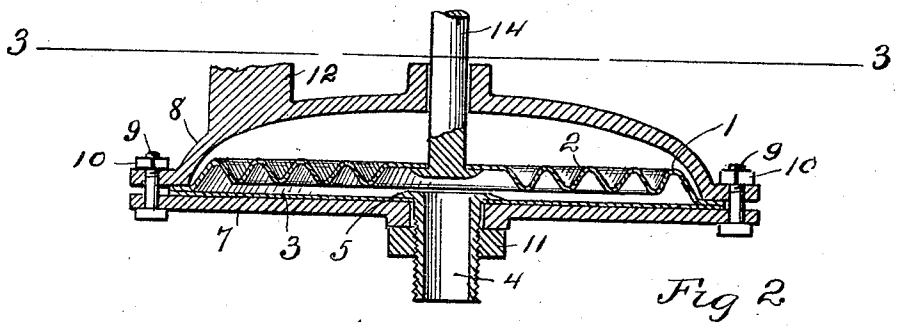


Fig 2

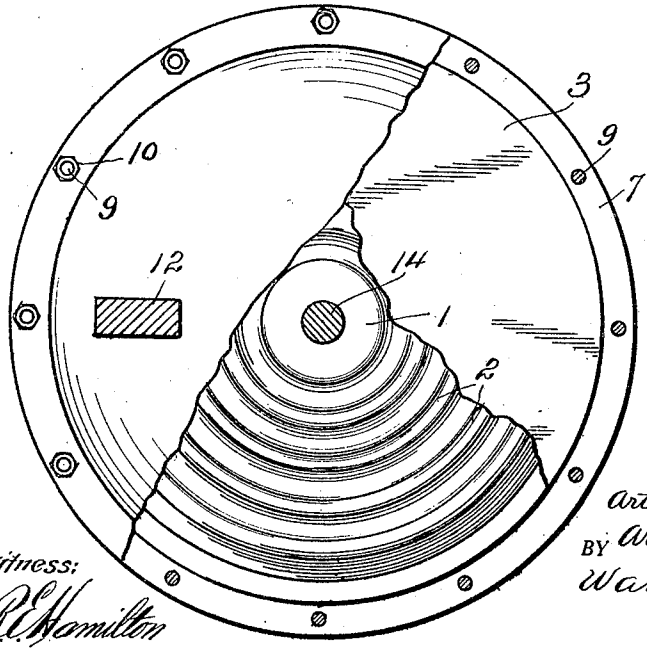


Fig 3

Witness:
R. E. Hamilton

INVENTORS
Arthur C. Dole, Sr.
BY Arthur C. Dole Jr
Warren D. House
Their ATTORNEY.

Patented Aug. 11, 1925. 1,549,072

UNITED STATES PATENT OFFICE.

ARTHUR C. DOLE, SR., AND ARTHUR C. DOLE, JR., OF KANSAS CITY, MISSOURI.

VACUUM AND PRESSURE CONTROLLING MECHANISM.

Application filed March 31, 1924. Serial No. 703,320.

To all whom it may concern:

Be it known that we, ARTHUR C. DOLE, Senior, and ARTHUR C. DOLE, Junior, citizens of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a certain new and useful Improvement in Vacuum and Pressure Controlling Mechanisms, of which the following is a specification.

Our invention relates to improvements in vacuum and pressure controlling mechanisms.

One of the objects of our invention is to provide novel means actuated by internal and external pressure for operating draft controlling mechanism.

A further object of our invention is to provide a novel vacuum and pressure chamber one wall of which is a flexible diaphragm.

A further object of our invention is to provide a chamber of the kind described which is reliably air tight, not liable to leakage, durable, simple, cheap to make and not liable to get out of order.

Still another object of our invention is to provide a structure of the kind described, which eliminates packing, and which is readily assembled and disassembled.

A further object of our invention is to provide a vacuum and pressure chamber of the kind described combined with a casing the walls of which are arranged to engage and limit the expansion movement of the chamber walls so as to eliminate liability of rupture of the latter by internal pressure.

The novel features of our invention are hereinafter fully described and claimed.

In the accompanying drawing which illustrates the preferred embodiment of our invention,

Fig. 1 is a reduced side elevation of our improved mechanism, shown applied to furnace draft regulating means.

Fig. 2 is an enlarged central vertical sectional view, partly broken away, of our improved mechanism.

Fig. 3 is a horizontal sectional view, partly broken away, on the line 3—3 of Fig. 2.

Similar reference characters designate similar parts in the different views.

1 designates a disk diaphragm of sheet metal, preferably provided with concentric corrugations 2. The diaphragm 1 is relatively thin and has its flat peripheral portions integrally connected, as by welding or brazing, to the peripheral portions of a relatively thin flat metal disk 3, which forms with the diaphragm 1 a vacuum and pressure chamber having an inlet for fluid, comprising, preferably, a tube 4, which extends through the disk 3, and which has an annular flange 5 at its inner end, which is brazed or welded to the disk 3.

The tube 4 is externally threaded so as to be adapted to be screwed tightly into a threaded hole of a fluid container, such as a boiler 6.

The peripheral portions of the disks 1 and 3, are held tightly clamped between a stationary lower plate 7 and a stationary upper plate 8, said plates being connected by bolts 9 having nuts 10, by which the disks are firmly clamped between the plates.

Mounted on the tube 4 is a nut 11, which bears against the under side of the plate 7. The latter holds the disk 3 from outward movement due to internal pressure. The plate 8 is disposed so as to limit the upward movement of the diaphragm 1, to prevent liability of rupture of the latter when subjected to high pressure.

The plate 8 is provided with an upwardly extending arm 12, which is adapted to have pivoted to it a lever 13, which may form part of a draft controlling mechanism, of any desired type.

The plate 8 has a vertical hole through which extends a longitudinally movable rod 14, the upper end of which may be pivotally connected to the lever 13, and the lower end of which is fastened, preferably by welding, to the central portion of the diaphragm 1.

By having the flat peripheral portions of the disks 1 and 3 integrally connected, packing between them and the plates 7 and 8 is eliminated, and there is no liability of leakage between the disks.

By having the disks 1 and 3 each of relatively thin sheet metal, such as steel, the peripheral portions may be readily welded together without liability of injury to either disk during the welding operation.

The parts having been assembled as described, fluid under pressure entering the chamber formed by the disks 1 and 3, causes the diaphragm 1 to rise at its central portion, thereby swinging the lever 13 in one direction, by means of the rod 14. The under side of the plate 8 is disposed so as to be engaged by the diaphragm 1 to limit

the movement of the latter beyond a point at which rupture by internal pressure of the diaphragm might occur.

The plate 7 by supporting the disk 3 prevents any downward movement of the latter, and thereby avoids liability of rupture of the disk 3 by excessive internal pressure within the vacuum and pressure chamber.

By having the plate 3 flat and lying with its whole area against the flat plate 7, there can be no movement of the plate 3 under pressure, and as the plate 3 is flat, there can be no substantial change in diameter, so that the entire movement is afforded by the corrugated plate 1, which movement under a given internal pressure is relatively much greater than would be the case, if both plates 1 and 3 moved under pressure. This movement of the plate 1 is further accentuated by reason of the plates 7 and 8 both being stationary. It will be noted that the under side of the plate 8, where it is adapted for contact with the plate 1, is arcuate and this arcuate portion covers the entire expansible portion of the plate 1, so that there is no portion of the plate 1 that is liable to be ruptured when subjected to extreme internal pressure, as the arcuate portion is in the form of the natural curve taken by the plate 1, when the latter is expanded against the plate 8.

When the internal pressure lowers, the external atmospheric pressure will force the diaphragm 1 downwardly an amount corresponding to the internal pressure. The disks 1 and 3 are normally disposed close enough together that the disk 1 will be supported by the disk 3 under a high degree of vacuum, thus eliminating liability of rupture of the disk 1 due to such degree of vacuum.

With our improved manner of integrally connecting the peripheral portions of the disks 1 and 3, such portions need not be provided with the usual holes for receiving the bolts 9.

We do not limit our invention to the structure shown and described, as many modifications, within the scope of the appended claims, may be made without departing from the spirit of our invention.

What we claim is:—

1. In a vacuum and pressure controlling mechanism, two relatively thin metal disks integrally connected at their peripheries, one having an inlet for fluid, and one being flexible so as to form a diaphragm movable outwardly by internal pressure and inwardly by external pressure, and a casing in which the disks are located, opposite walls of the casing being stationary and disposed so as to respectively engage and limit the outward movement of the disks.

2. In a vacuum and pressure controlling mechanism, two relatively thin metal disks integrally connected with each other at their peripheral portions so as to form an air tight chamber having an inlet for fluid, one of the disks being flexible so as to form a diaphragm, and a casing comprising two stationary plates with means for clamping the plates to each other and to the peripheral portions of said disks.

3. In a vacuum and pressure controlling mechanism, two relatively thin metal disks integrally connected with each other at their peripheral portions so as to form an air tight chamber having an inlet for fluid, one of the disks being flexible so as to form a diaphragm, and a casing comprising two plates between which the peripheral portions of the disks are clamped and having means by which the plates are held in clamping relationship with said disks, said plates being disposed to respectively limit the outward movement of said disks.

4. In a vacuum and pressure controlling mechanism, two stationary clamping plates, one having an arcuate inner side and the other having a flat side, two relatively thin disks, one of which is flexible and adapted for expansive bodily movement, one disk being flat and disposed for substantially its entire area against the flat side of said flat sided clamping plate, said disks having flat integrally connected peripheral portions held clamped between said clamping plates, the flexible disk being wholly covered by and adapted to contact with and be held by the arcuate inner side of the arcuate sided clamping plate, and connecting means for holding the clamping plates clamped to said disks.

5. In a vacuum and pressure controlling mechanism, two relatively thin disks having flat peripheral portions integrally connected with each other, one disk being flexible and adapted for bodily expansive movement, two stationary clamping plates which clamp between them said flat peripheral portions of said disks, said plates covering substantially the entire areas of said disks respectively and being disposed so as to respectively limit their outward movement to prevent rupture of the disks under pressure, and means connecting said plates for holding them clamped against said peripheral portions of said disks.

In testimony whereof we have signed our names to this specification.

ARTHUR C. DOLE, SR.
ARTHUR C. DOLE, JR.