Jan. 26, 1943. P. K. SAUNDERS 2,309,479

DIAPHRAGM VALVE

Filed Oct. 8, 1940

Fig. 2.

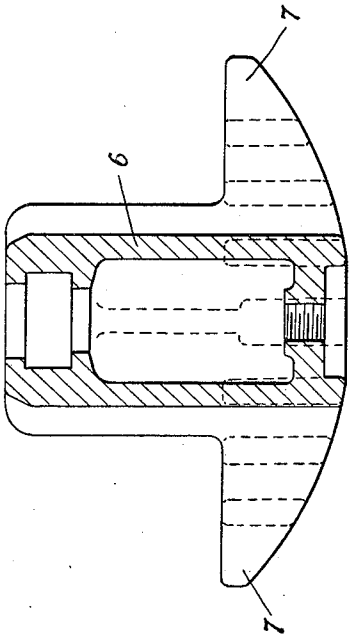


Fig. 3.

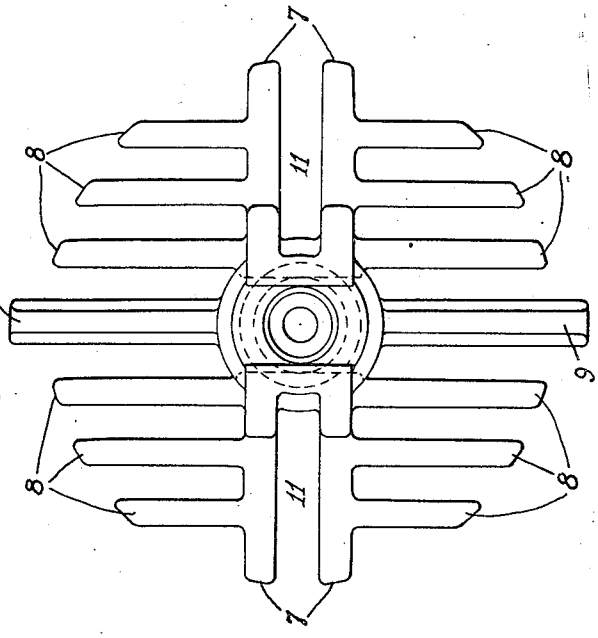
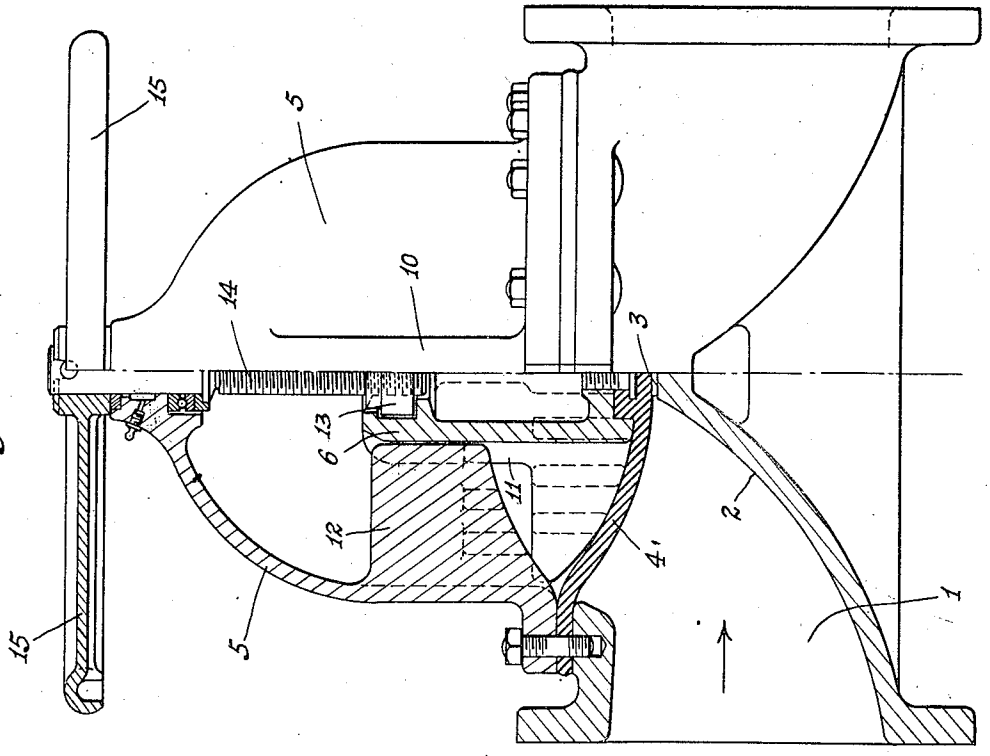


Fig. 1.



INVENTOR.

P. K. SAUNDERS

BY

Simon Broder

Patented Jan. 26, 1943

2,309,479

UNITED STATES PATENT OFFICE

2,309,479

DIAPHRAGM VALVE

Philip Keith Saunders, Cwmbran, England

Application October 8, 1940, Serial No. 360,338
In Great Britain October 10, 1939

6 Claims. (Cl. 251—24)

This invention relates to fluid controlling diaphragm valves of the kind in which the diaphragm is clamped at its periphery between the valve body and a bonnet accommodating the valve actuating gear, and is moved against its seat in the body by a diaphragm compressor having a series of projecting fingers which interengage a series of diaphragm supporting toes projecting inwards from the periphery of the bonnet.

The object of these fingers is to support the diaphragm when the valve is closed, and of the toes to support the diaphragm when the valve is open, thus enabling the diaphragm to withstand pressure which would burst it but for the presence of these fingers and toes.

An object of the invention is to provide adequate means for guiding the diaphragm compressor while operating the valve.

A further object of the invention is to prevent the diaphragm compressor from tilting due to unequal pressures on the portions of the diaphragm open to the up-stream and down-stream sides of the valve when at or near the closed position.

A still further object of the invention is to provide an improved form of construction which is easy to manufacture.

With these and other objects in view the valve has one or more deep toes on the bonnet for guiding the central part of the diaphragm compressor.

One embodiment of the invention is illustrated in the accompanying drawing, in which—

Fig. 1 shows an elevation half in section of a handwheel operated valve in accordance with the invention.

Figs. 2 and 3 show a sectioned elevation and a plan respectively of the diaphragm compressor used in the valve illustrated in Fig. 1.

With reference to the drawing, the valve has a substantially straight through bore 1 intersected by a shallow weir 2 extending across the bore and having a concave face 3 forming a seating for the diaphragm 4. The diaphragm 4 is secured by a bonnet 5 which clamps it around its periphery to the valve body. The bonnet 5 accommodates hand-wheel actuating mechanism for operating the valve.

The diaphragm compressor has, as is usual, a central cylindrical part 6 from which project arms 7 transverse to the plane of the weir 2. Fingers 8, 9 project from these arms 7 on either side parallel to the plane of the weir 2. The central fingers 9 on each side in the plane of the weir 2 engage grooved portion 10 in the sides of the bonnet 5 thus providing a continuous surface right across the compressor in the plane of the weir 2 thus ensuring that the diaphragm 4 is positively clamped from end to end against the weir 2 when in the closed position.

The transverse arms 7 have, in accordance with the invention, slots 11 in the transverse direction and these slots 11 are engaged by transverse toes 12 of considerable depth which guide movement of the diaphragm compressor by contacting its central cylindrical part 6.

The diaphragm compressor has, as is usual a nut 13 loosely located in the central part 6 near the end remote from the diaphragm 4. An actuating spindle 14 engages the nut 13 and projects through the top of the bonnet 5 and carries on its end the handwheel 15.

When the valve is in the closed or nearly closed position, as shown in Fig. 1, the difference in the pressure of the fluid controlled on the up-stream and down-stream sides of the valve will tend to cant the compressor 6 in a clockwise direction (Fig. 1—fluid controlled flowing in direction of arrow). As will be observed this tendency is prevented by the deep toes 12 which engage and guide the central part 6 of the compressor over a substantial part of its length.

What I claim is:

1. In a diaphragm valve, a body having an opening, a diaphragm extending across the opening, a bonnet above the diaphragm having deep diaphragm supporting toes inwardly extending therefrom, a diaphragm backing member comprising a central part with outwardly extending diaphragm supporting fingers interdigitating with said toes which guide the member centrally in the bonnet by contacting its central part, a nut loosely mounted on the backing member, and a threaded spindle co-operating with the nut to actuate the backing member.

2. A diaphragm valve comprising a body having a substantially straight passage intersected between its ends by a transversely extending weir constituting a diaphragm seat, the body having an opening above the weir, a diaphragm extending across said opening, a backing member for said diaphragm having a central part from which project diametrically opposite transverse spaced arms with diaphragm supporting fingers projecting from them perpendicular thereto on either side thereof, a bonnet mounted upon the body and holding said diaphragm in place across said opening and having a plurality of diaphragm supporting toes inter-engaging

said diaphragm supporting fingers and diametrically opposite inwardly projecting deep toes engaging the spaces and contacting in depth said central part, and means for moving said backing member towards said diaphragm for closing the valve.

3. In a diaphragm valve, a body having an opening, a diaphragm extending across the opening, a bonnet above the diaphragm having diametrically opposite inwardly projecting fins, a diaphragm backing member having a central part from which projects a diaphragm supporting surface having diametrically opposite slots engaged by said fins whose inner edges guide said central part, a nut loosely mounted on the backing member, and a threaded spindle cooperating with the nut to actuate the backing member.

4. A diaphragm backing member comprising a plurality of spaced parallel arms and a plurality of spaced parallel arms perpendicular to the first-mentioned arms.

5. In a diaphragm valve, a body having an opening, a diaphragm extending across the opening, a diaphragm backing member, a bonnet above the diaphragm, a nut loosely mounted on the backing member, a threaded spindle cooperating with the nut to actuate the backing member, and means for preventing tilting of the backing member, said means comprising a central part fixed relatively to the backing member, said central part being concentric with the diaphragm, and a plurality of transverse deep toes extending from the bonnet and fixed relatively thereto, the transverse toes contacting the central part along a cylinder of revolution of such an area that tilting of the backing member is substantially prevented.

6. The valve set forth in claim 5, wherein the backing member includes means for supporting the diaphragm against pressure of the fluid passing through the valve, said means comprising a plurality of spaced parallel arms, and a plurality of spaced parallel arms perpendicular to the first-mentioned arms.

PHILIP KEITH SAUNDERS.