

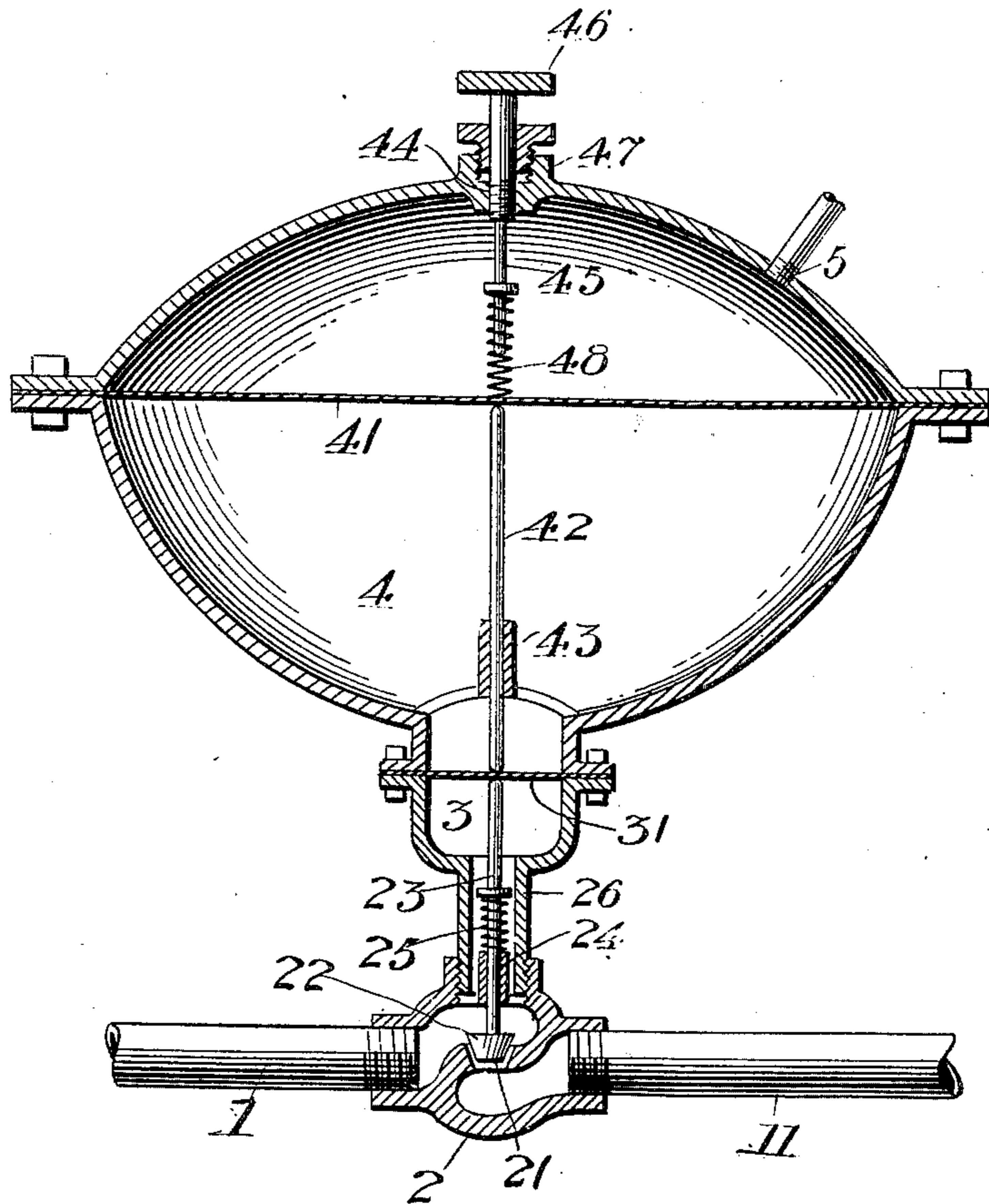
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Patented Apr. 15, 1902.

W. F. SINGER.  
VALVE.

(Application filed May 1, 1901.)

(No Model.)



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## VALVE.

SPECIFICATION forming part of Letters Patent No. 697,680, dated April 15, 1902.

Application filed May 1, 1901. Serial No. 58,343. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM F. SINGER, a citizen of the United States, residing at Fourth avenue and Twenty-eighth street, in the city, county, and State of New York, have invented a new and useful Improvement in Valves, of which the following is a specification.

My invention relates to that class of valves in which the flow of a fluid is controlled by variations of pressure on a diaphragm. It is intended to so balance such a valve as to make it sensitive, while providing against the escape of any fluid in case of a rupture of the diaphragm.

The accompanying drawing represents in vertical section a valve embodying my invention and adapted to use in a refrigerating system. The pipe 1 11 leads from the condenser or pressure-reservoir of such a system to the refrigerating-coils or brine-tank. In the pipe is interposed a valve-body 2, having seat 21, valve 22, provided with stem 23, passing through a suitable guide 24, the valve being normally lifted from its seat by the action of a light spring 25. The valve-stem 23 passes up through a pipe 26 into a diaphragm-chamber 3 and bears against the lower side of a diaphragm 31, located therein. Above the chamber 3 and tightly secured thereto is a second and larger diaphragm-chamber 4, in which is secured a diaphragm 41. Between the diaphragms 31 41 and bearing against both is a rod 42, held in position by a guide 43, through which it may move freely. Directly above the diaphragm 41 is a threaded aperture 44 in the case 4, through which passes a rod 45, on the outer end of which is a handle 46. A stuffing-box 47 surrounds the rod 45 and prevents the escape of gas or other fluid from the upper portion of the chamber 4 above the diaphragm 41. The rod 45 carries on its lower end a thrust-spring 48, which presses on the upper face of the diaphragm 41. The pipe 5, shown as connected with the upper portion of the chamber 4, leads from the refrigerating-coil.

The operation of my device will be readily understood from an inspection of the drawing. When the refrigerating fluid is admitted to the pipe 1, its full pressure will be exerted on the lower face of the small diaphragm 31,

so as to permit the spring 25 to raise the valve 22 from its seat 21. The fluid will then pass the valve and through the pipe 11 to the refrigerating coil or coils. This coil is connected by means of the pipe 5 with the upper portion of the large diaphragm-chamber 4, so that the reduced or coil pressure is exerted on the upper face of the diaphragm 41. As the proximate faces of the diaphragms 31 41 both bear against the vertically-movable rod 42, the reduced coil-pressure on the large diaphragm 41 acts to close the valve 22. If we assume a pressure of sixty-six pounds to the square inch in the pipe 1 and that it is desirable to carry an average pressure of three pounds in the refrigerating-coils, it is evident that the effective sizes of the diaphragms 41 and 31 should be to each other approximately as twenty-two to one. It is evident that by properly proportioning the diaphragms any desired pressure may be maintained in the refrigerating-coils. To secure either greater exactness or a desired variation in the ratio of the condenser and coil pressures, the rod 45 may be turned by means of its handle 46, so as to vary the pressure of the spring 48 on the diaphragm 41.

It will be particularly noted that my entire device is, in effect, a single gas-tight chamber having no openings to the outer air and divided into three portions by means of the two diaphragms 31 41. It is advantageous that these diaphragms should be made of thin metal plates, rubber fabric, or the like, for which reason they are liable to be ruptured by the gas-pressure. As the gas used is expensive, noxious, and under some circumstances dangerous, the great advantage of preventing its accidental escape into the surrounding atmosphere will be very apparent.

What I claim is—

1. In a valve, the combination with a valve-body and connected pipe, of a fluid-chamber connected with the valve-body, a diaphragm therein, a valve, a valve-rod bearing against said diaphragm, means for lifting said valve from its seat, a diaphragm-chamber beyond the fluid-chamber, a diaphragm in said diaphragm-chamber and of greater area than said first diaphragm, a rod interposed between said diaphragms, regulatable means for ex-

erting pressure upon the outer diaphragm and a pipe communicating with the outer portion of the diaphragm-chamber, substantially as set forth.

5 2. In a valve, the combination with a valve-body and connected pipe, of a fluid-chamber connected to the valve-body, a diaphragm therein, a valve, a valve-rod which at its upper end bears upon said diaphragm, a spring  
10 around the valve-rod interposed between the valve and diaphragm for lifting the valve from its seat when fluid-pressure is exerted upon the diaphragm, a diaphragm-chamber beyond the fluid-chamber, a diaphragm divid-  
15 ing the same and of larger area than the afore-said diaphragm, a rod interposed between the diaphragms, regulatable means for exerting pressure upon the outer diaphragm and a pipe communicating with the portion of the cham-  
20 ber beyond the diaphragm, substantially as set forth.

3. A valve-regulating device comprising with a valve-body and connected pipe, a valve and valve-rod, adjacent superposed fluid-  
25 chambers, diaphragms dividing the same and differing from one another in area, means for communicating the movement of one diaphragm to another, means for connecting the pipe and distant diaphragm-chamber where-  
30 by the reduced pressure upon the diaphragm of greater area is employed for closing the valve, and a spring around the valve-rod and

interposed between the valve and the first diaphragm for lifting the valve from its seat when fluid-pressure is exerted upon said first  
35 diaphragm, substantially as set forth.

4. In a valve, the combination with a valve-body 2 and connected pipes 1 and 11, of a fluid or diaphragm chamber 3 connected to the valve-body, a diaphragm 31 therein, a valve  
40 22, a valve rod or stem 23 at its upper end bearing upon the diaphragm 31, a spring 25 around the valve-rod and interposed between the valve and diaphragm for lifting the valve  
45 from its seat when fluid-pressure is exerted upon the diaphragm 31, a large diaphragm-chamber 4, a diaphragm 41 extending substantially centrally through the same, the  
said diaphragm-chamber opening into the outer end of the diaphragm-chamber 3, a rod  
50 42, a guide 43 therefor, said rod 42 extending between and connecting with the said diaphragms, an adjustable rod 45, a stuffing-box 47 and threaded aperture 44 through which  
the said rod 45 passes, a thrust-spring 48 be-  
55 tween the diaphragm 41 and the rod 45, and a pipe 5 opening into the diaphragm-chamber 4, substantially as and for the purposes set forth.

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Witnesses:

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