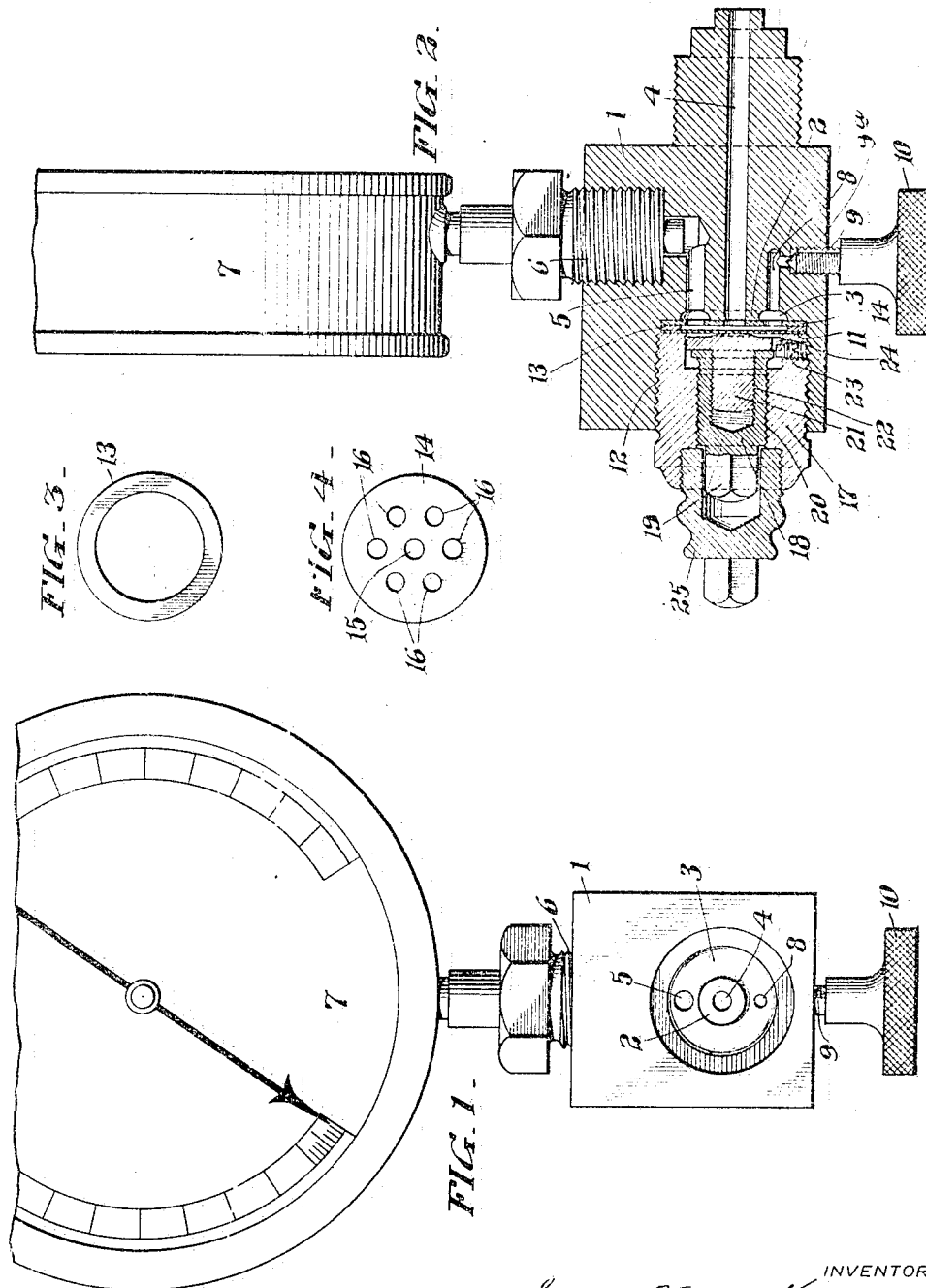


1,121,105.

Patented Dec. 15, 1914.



WITNESSES
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DIAPHRAGM-VALVE.

1,121,105.

Specification of Letters Patent. Patented Dec. 15, 1914.

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To all whom it may concern:

Be it known that I, GUSTAF VICTOR KARLSON, a subject of the King of Sweden, and a resident of the city of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Diaphragm-Valves, of which the following is a specification.

This invention relates to diaphragm valves, and more particularly to valves of this character which are adapted to be used in connection with pressure gages, and has for an object to provide a valve wherein the construction is such that the pressure may be controlled or regulated and not permitted to rush into the gage under full head.

It has been found in practice that diaphragm valves as heretofore constructed, and as used in connection with gages or like indicating mechanisms, have some disadvantages. The principal trouble which has developed in the commercial use of such valve mechanism has been, especially where high pressures are used, that the fluid surges into the gage with such force as to deflect the indicating needle to a greater degree than the actual number of pounds pressure upon the fluid. This action soon causes the delicate mechanism to get out of order or unbalanced so that it will not correctly indicate the desired information. By my present invention I have devised a construction wherein the foregoing defects have been overcome and eliminated, and whereby the pressure fluid may be so throttled and regulated as to render its admission to the gage a gradual one, free from shock but increasing in pressure in such a manner that the indicating needle moves promptly and without vibration or oscillation to the point indicating the pressure desired.

It has for a further object also to provide a novel structure wherein the pressure in the gage may be relieved after a reading has been taken.

It further consists of other novel features of invention, as will be hereinafter fully discussed in the accompanying specification and claims.

In the drawings:—Figure 1 is a view in front elevation of a gage and valve body embodying my invention, certain parts of the latter being removed for clearness of illustration; Fig. 2 is a view showing a

gage in side elevation and also showing the valve body in transverse section; Fig. 3 represents a plan of a spacing element employed in the valve structure; and Fig. 4 represents a plan of an apertured disk also embodied in the valve structure.

Similar numerals of reference designate corresponding parts in the drawings.

1 designates the valve body provided with the valve seat 2 which, in the present instance, is encircled by a groove 3 serving the purpose of a channel for communication between the valve inlet passage or conduit 4 and the outlet channel 5, the latter serving as a means to conduct pressure fluid to the fitting 6 of the gage 7 or like device. The groove 3 also serves at certain times to direct the pressure fluid to an exhaust channel 8, which is controlled in the present instance by a needle valve 9, operable by the thumb screw 10, the said valve having a longitudinal groove 9^a along which the fluid travels in leaving the channel 8.

11 designates a diaphragm positioned adjacent the valve seat 2 and adapted to move toward and away from said seat in order that the valve opening may be opened and closed as desired. The diaphragm 11 in the present instance, is seated within a threaded recess 12 of the valve body, and spaced by means of a ring 13 from the disk 14, which is seated upon the wall of the valve seat 2, and provided with apertures 15 and 16, the former normally alining with the inlet conduit 4, while the latter serve as a means of communication with the aforesaid groove 3. 17 designates a screw threaded tubular closure fitting the recess 12 and having threaded engagement with the valve body 1 in such a manner as to clamp the diaphragm 11, ring 13 and disk 14 in proper operative position.

18 designates a bushing provided with a square or hexagonal head 19 and having threaded engagement as shown at 20 with the closure member 17, the relation between these parts being such that the bushing 18 may be moved relative to the closure and thus bring the diaphragm operating plug 21 into engagement with the diaphragm 11, or vice versa. In connection with this construction it will be noted that the plug 21 is screw threaded at 22 into the bushing 18 and is furthermore held against rotation

relative to the closure 17 by providing a set screw 23, the end of which enters a slot or recess 24, formed at a suitable point in the plug 21. In connection with the threads 20 and 22 it will be noted that the former are of larger pitch than the latter, so that as the bushing 18 is rotated, its lineal movement will be correspondingly greater than the lineal movement of the plug 21, this action being substantially a differential one whereby a very delicate adjustment of the plug may be effected. It will be further understood that the end 19 of the closure 13 is adapted to receive a socket wrench or like tool whereby the bushing may receive the necessary rotary movement to effect the proper movement of the plug 21.

25 designates a cap having threaded engagement with the closure 17 and adapted to fit over the end 19 so that the latter, as well as the bushing 18, is normally protected.

In the operation of the device the bushing 18 is normally advanced into the valve body 1 in such a position that the plug 21 engages the diaphragm 11 and holds the latter firmly to the disk 14 so that the inlet opening 4 is maintained closed and leakage of pressure to the groove 3 is prevented. Should it be desired to admit the fluid under pressure to the gage 7 for the purpose of taking a reading and determining the pounds pressure existing in the line, the cap 25 is removed so that a suitable tool may be placed in position upon the end of the bushing 18. The bushing 18 is now rotated so that it is drawn away from the diaphragm 11, and in view of the fact that the plug 21 is in screw threaded engagement with the bushing and further held against rotation by the set screw locking device, there will be relative movement between the bushing 18 and the plug 21 with the result that the latter, non-rotatable part is moved lineally, thereby permitting the diaphragm 11 to be actuated by the pressure and consequently communication established between the conduit 4 and the outlet channel 5. By thus gradually opening the passage for the fluid under pressure the gage is not subjected to a sudden hammering action of the intruding high pressure fluid, and it is thereby possible to control the fluid so that no damage is done to the gage, but at the same time an accurate registering of the pressure is obtained. After the desired reading the bushing 18 may be returned to normal position so that the diaphragm 11 closes the inlet conduit 4 and the pressure in the gage may then be released by opening the needle valve 9 so that the fluid may readily escape through the channel 5, groove 3, and exhaust passage 8. It is desirable that the pressure fluid be released from the gage otherwise when the diaphragm valve is subsequently opened

to take a reading of the gage, such reading if taken immediately would not indicate correctly the actual pressure. It would be necessary to defer the reading for a time until the confined fluid within the gage had combined with the fluid last admitted and until pressure effect of the unreleased fluid had lost its effect upon the gage.

It will now be apparent that I have devised a complete unitary structure, simple in construction, effective in operation, and well adapted for the purpose intended. Furthermore, it will be apparent that by my novel control mechanism gage pressure may be gradually determined without subjecting the delicate mechanism of the gage to the sudden impact of an intruding fluid under high pressure. Further, it will be apparent that by providing a means for exhausting the gage after the fluid under pressure has been admitted thereto and after the diaphragm valve has been closed I am enabled to secure more quickly and immediately readings showing the exact pressure exerted by a fluid under pressure at subsequent times when the same is admitted to the gage. It will be understood that previous to opening the diaphragm valve for the purpose of taking a reading of the pressure the needle valve 9 should be closed.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description; and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

I claim:—

1. In a device of the character described, a valve body having an inlet channel and an outlet channel, a gage having communication with said outlet channel, a valve-plug adapted to control communication between said inlet channel and said outlet channel, a closure secured to said valve body and adapted to contain said valve plug, and means embodying a differential action to shift said valve plug from one position to another.

2. In a device of the character described, a valve body having an inlet channel and an outlet channel, a gage having communication with said outlet channel, a valve plug adapted to control communication between said inlet channel and said outlet channel, a closure having screw threaded connection with said valve body and adapted to contain said valve plug, a bushing threaded

into said closure and also having threaded engagement with said valve plug by threads of a different pitch from threads connecting said bushing to said closure, whereby said valve plug moves toward or away from said inlet channel at a different speed than said bushing.

3. In a device of the character described, a valve body having an inlet channel and an outlet channel, a gage having communication with said outlet channel, a valve plug adapted to control communication between said inlet channel and said outlet channel, a closure secured to said valve body and adapted to contain said valve plug, means embodying a differential action to shift said valve plug from one position to another, and means to exhaust fluid pressure from said discharge channel.

4. In a device of the character described, a valve body having an opening therein and an inlet channel and an outlet channel communicating with said opening, a closure removably secured in said opening, a diaphragm mounted between said closure and said valve body and transversely disposed with respect to said channels, a bushing threaded into said closure, a valve plug adjacent said diaphragm and threaded into said bushing with threads of a different pitch from the threads by which the bushing is connected to the closure, and means to prevent rotation of said plug, whereby

rotary movement of said bushing causes said valve plug to move toward or away from said diaphragm at a reduced speed from the corresponding movement of said bushing.

5. In a device of the character described, a valve body having an opening therein and an inlet channel and an outlet channel communicating with said opening, a closure removably secured in said opening, a diaphragm mounted between said closure and said valve body and transversely disposed with respect to said channels, a bushing threaded into said closure, a valve plug adjacent said diaphragm and threaded into said bushing with threads of a different pitch from said closure threads, means to prevent rotation of said plug, whereby rotary movement of said bushing causes said valve plug to move toward or away from said diaphragm at a reduced speed from the corresponding movement of said bushing, and means to exhaust the pressure in said discharge channel after said inlet channel is closed.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 28th day of August, A. D. 1913.

GUSTAF VICTOR KARLSON.

In the presence of—

CHAS. H. CLAPHAM,
CRAWFORD HILLMAN.