May 30, 1950 E. N. PANNER 2,509,839

PRESSURE REGULATOR

Filed Oct. 11, 1948

Fig. 1.

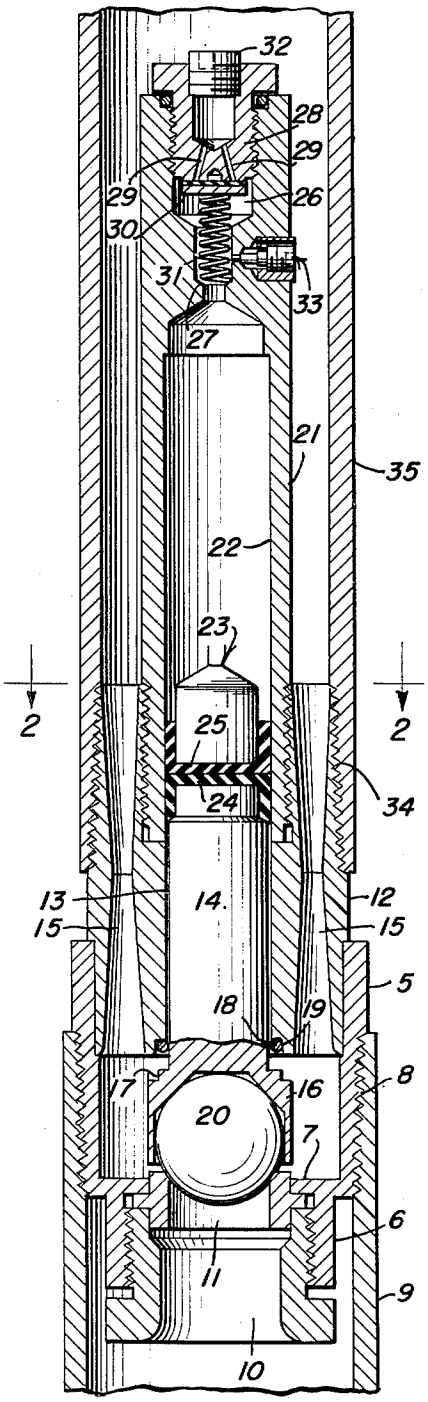


Fig. 2.

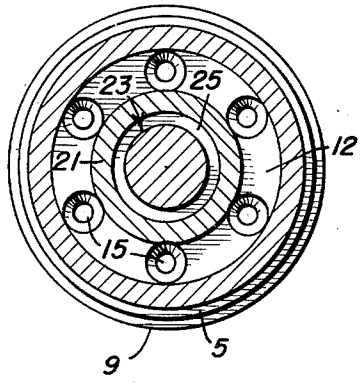
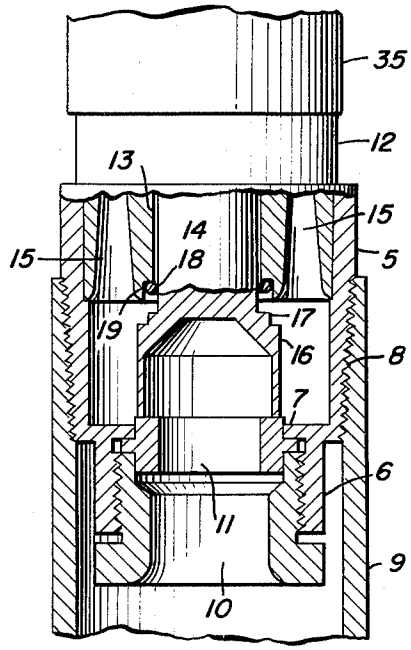


Fig. 3.



Elmer N. Panner

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jackson

Attorneys

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PRESSURE REGULATOR

Elmer N. Panner, Shawnee, Okla., assignor to Owen M. Panner, Shawnee, Okla.

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6 Claims. (Cl. 166—2)

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This invention relates to an improved pressure regulator of the type disclosed in the U. S. Patent to G. C. Stanley, No. 2,251,244, dated July 29, 1941.

The primary object of the present invention is to provide a pressure regulator of the above kind which is very simple and durable in construction and highly efficient in operation.

A further object of the invention is to provide a pressure regulator of the above kind which may be readily and economically manufactured and easily installed between sections of well tubing.

The exact nature of the present invention, as well as other objects and features thereof, will become apparent from the following description when considered in connection with the accompanying drawing, in which:

Figure 1 is a central vertical sectional view of a pressure regulator constructed in accordance with the present invention and installed beween adjacent well tubing sections;

Figure 2 is a horizontal section taken on a line 2—2 of Figure 1;

Figure 3 is a fragmentary view, partly in elevation, and partly in central vertical section, showing a modification.

Referring in detail to the drawing, 5 indicates a valve casing having a reduced internally threaded lower end portion 6 and provided intermediate its ends with an internal annular flange 7, the lower part of the larger upper end portion of said valve casing being externally threaded as at 8 to screw into the upper end of a well tubing section 9. A bushing 10 is screwed into the end portion 6 and clamps a valve seat member 11 against the flange 7. A tubular fitting 12 has a reduced lower end portion tightly fitted and secured in the upper end of the valve casing 5, and this fitting has an axial cylindrical bore 13 through which a plunger 14 is slidably extended. The fitting 12 also has a thick wall through which extend a series of open ended Venturi passages 15 disposed parallel with about the bore 13. At its lower end, the plunger 14 is provided with a valve head adapted to seat downwardly against the seat member 11, said head including a hollow enlarged end 16 of the plunger whose upper reduced portion 17 is adapted to engage and compress an annular gasket 18 when the valve head is raised to open position, whereby to prevent flow of fluid upwardly past the plunger. The gasket 18 is disposed in a counter bore 19 provided in the lower end of fitting 12. The end 16 of plunger 14 may engage the seat member 11 as shown in Figure 3,

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or it may have a ball 20 loosely disposed therein to engage said seat member as shown in Figure 1.

Screwed centrally of and into the upper end of the fitting 12 is a cylinder 21 having a bore 22 of the same diameter as and registered with the bore 13 of fitting 12, and forming a pressure chamber adapted to have gas, air or like fluid placed therein under predetermined pressure. Movable in the bore 22 is a free piston 23 adapted to be forced downwardly against the plunger 14 by the pressure of this fluid to seat the valve head. The plunger 14 and piston 23 have packing cups 24 and 25 on their adjacent ends to respectively prevent upward passage of fluid to and downward passage of fluid from the pressure chamber. At its upper end, cylinder 21 has a valve chamber 26 which communicates with the upper end of the pressure chamber through an axial passage or bore 27 and into the upper end of which is screwed a hollow valve seat plug 28 having openings 29 through the bottom thereof. A valve disc 30 is seated upwardly against the plug 28 to close its openings 29, by a spring 31. Thus, a check valve is provided through which fluid may be forced into the pressure chamber under pressure and by means of which said fluid will be retained in said pressure chamber. A closure plug 32 may be removably screwed into the top of the valve seat plug 28, and a suitable bleed valve 33 controls a lateral passage through the cylinder 21 from the passage 27 to permit bleeding of the pressure fluid from the pressure chamber when desired.

The upper portion of fitting 12 is externally threaded as at 34 to screw into the lower end of a tubing section 35 within which the cylinder 29 is disposed in spaced concentric relation thereto.

It will be seen that the valve head 16 or 16, 20 is subject to the pressure of the fluid column below the regulator, and that the piston 23, the plunger 14 and said valve head are under the fixed pressure of the fluid in the pressure chamber counter to the pressure of said fluid column. Thus, when the pressure of said fluid column exceeds the pressure of the fluid in the pressure chamber, the valve head will be opened and the fluid of said column may flow from tubing section 9 upwardly through casing 5, Venturi passages 15 and tubing section 35. On the other hand, when the pressure of the fluid in cylinder 21 exceeds that of the fluid column below the regulator, the valve head will be seated so as to prevent flow of fluid from tubing section 9 into valve casing 5. The purpose served by the present pressure regulator is clearly explained in the patent mentioned above. In other words, the

pressure regulator maintains equal pressures in all wells drilled into a reservoir of oil or gas, and the bottom hole or reservoir pressure is maintained at or above the saturation pressure in order to increase the flowing life of the wells. In addition, the device decreases the oil-gas ratio by not permitting free flow of fluid and gas from the reservoir to the well or hole.

From the foregoing description, it is believed that the construction, operation and advantages of the present invention will be readily understood and appreciated by those skilled in the art. Minor changes in details of construction are contemplated, such as fairly fall within the spirit and scope of the invention as claimed.

What I claim as new is:

1. A pressure regulator for oil and like wells, comprising a valve casing adapted to be screwed into the upper end of a tubing section and having a valve seat member therein, a tubular fitting attached at its lower end to the upper end of said valve casing and having an axial bore and a series of passages therethrough about and parallel with said bore, the upper end of said fitting being threaded to screw into the lower end of a second tubing section, a plunger slidably extending through said axial bore and having a valve head on its lower end arranged to seat downwardly against the valve seat member, and a pressure cylinder of smaller external diameter than said fitting having its lower end attached to the upper end of said fitting in alignment with said axial bore, said cylinder having a check valve at its upper end to permit introduction of fluid under predetermined pressure into and retain the same within said cylinder to act upon the plunger counter to the pressure of the fluid column below the regulator.

2. The construction defined in claim 1, in combination with a free piston slidable in said cylinder above said plunger.

3. The construction defined in claim 1, in combination with a free piston slidable in said cylinder above said plunger, said plunger and said piston having packing cups on their adjacent ends respectively preventing flow of fluid upwardly into or downwardly from said cylinder.

4. The construction defined in claim 1, wherein said cylinder has a transverse passage therethrough near the top thereof for bleeding fluid from said cylinder, and a valve controlling said transverse passage.

5. A pressure regulator for oil and like wells, comprising a valve casing adapted to be screwed into the upper end of a tubing section and having a valve seat member therein, a tubular fitting attached at its lower end to the upper end of said valve casing and having an axial bore and a series of passages therethrough about and parallel with said bore, the upper end of said fitting being threaded to screw into the lower end of a second tubing section, a plunger slidably extending through said axial bore and having a valve head on its lower end arranged to seat downwardly against the valve seat member, and a pressure cylinder of smaller external diameter than said fitting having its lower end attached to the upper end of said fitting in alignment with said axial bore, said cylinder having a valve chamber in the top thereof, a hollow valve seat plug screwed into the upper end of said valve chamber and having openings through the bottom thereof, a valve disc arranged within said valve chamber and adapted to seat upwardly against said valve seat plug to close its openings, and a spring yieldingly seating said valve disc against said valve seat plug.

6. The construction defined in claim 1 wherein said passages through the tubular fitting are of Venturi form and provide communication between the valve casing and the interior of the second tubing section.

ELMER N. PANNER.

No references cited.