

Sept. 2, 1947.

A. J. PENICK

2,426,743

CIRCULATING WELL HEAD

Filed June 24, 1943

2 Sheets-Sheet 1

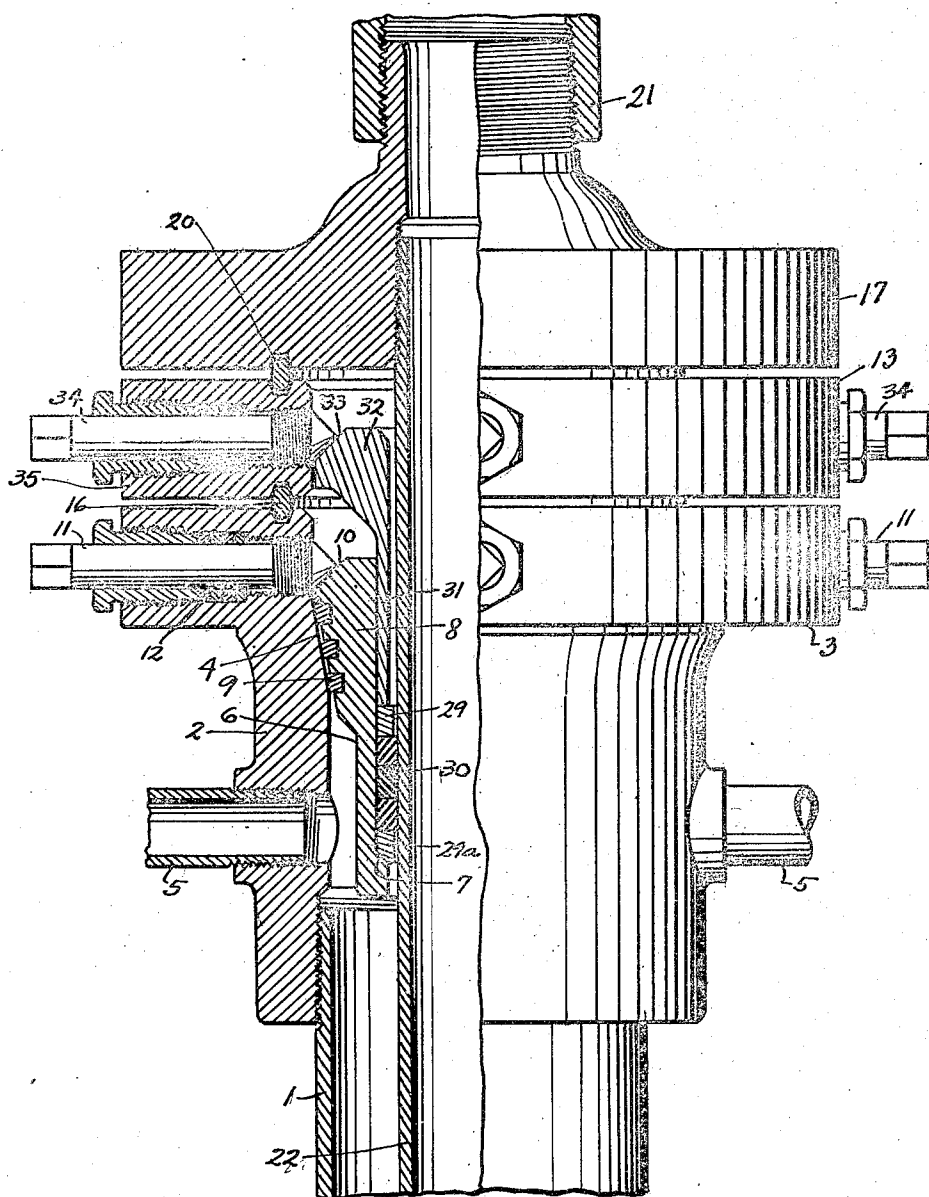


Fig. 1.

Inventor

Arthur J. Penick

By

E. V. Haraway Attorney

Sept. 2, 1947.

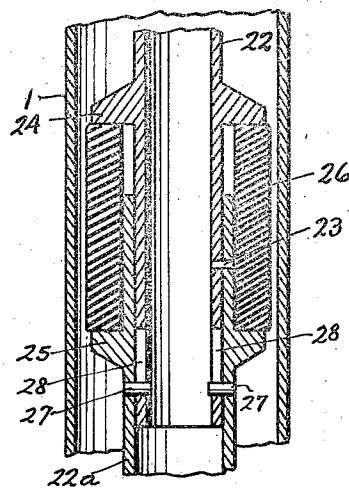
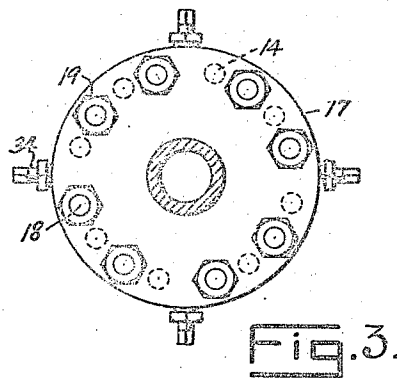
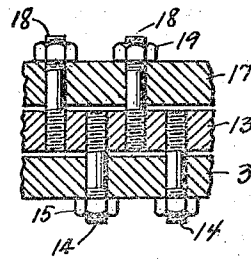
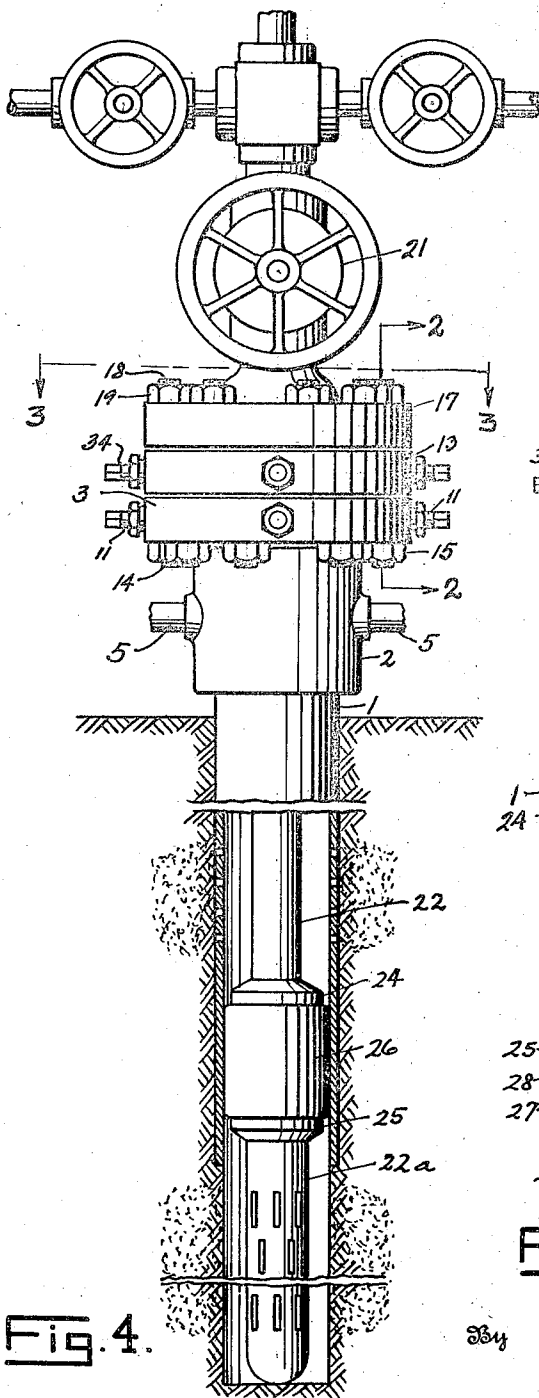
A. J. PENICK

2,426,743

CIRCULATING WELL HEAD

Filed June 24, 1943

2 Sheets-Sheet 2



Inventor

Arthur J. Penick

E. V. Hardaway,
Attorney

334

UNITED STATES PATENT OFFICE

2,426,743

CIRCULATING WELL HEAD

Arthur J. Penick, Houston, Tex., assignor to Oil Center Tool Company, Houston, Tex., a corporation of Texas

Application June 24, 1943, Serial No. 492,152

3 Claims. (Cl. 166—14)

1

This invention relates to a circulating well head.

An object of the invention is to provide well head equipment of such construction that circulation of the drilling fluid or drilling mud may be established when it is desired to "kill" the well, that is, when it is desired to overcome the well pressure so that there will be no danger of a blow out while working on the well.

Another object of the invention is to provide efficient means for maintaining a seal between the well tubing and the well head when drilling fluid is forced down into the well through the tubing and returned back up outside of the tubing and out through the outlet lines or line of the casing head.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings wherein:

Figure 1 shows a side view of the head partly in section.

Figure 2 shows a fragmentary cross sectional view taken on the line 2—2 of Figure 4.

Figure 3 shows a horizontal sectional view taken on the line 3—3 of Figure 4.

Figure 4 shows a side elevation and

Figure 5 shows a vertical sectional view of a type of packer employed, shown collapsed.

In the drawings the number 1 designates the surface casing in the well to the upper end of which the casing head 2 is attached, said casing head having the external annular flange 3 at its upper end and an inside downwardly converging seat 4 beneath said flange and the flow lines 5, 5 beneath said seat.

Within the casing head there is a tubular housing, or jacket 6 whose lower end has an inside seat 7 and whose upper end is formed with an outwardly thickened head 8. The outer surface of the head tapers downwardly within the seat 4 and has the external countersunk packing rings 9 to form a fluid tight seal with the seat 4.

The upper end of the head 8 has a downwardly and outwardly inclined annular face 10 and threaded through the flange 3 are the radial hold down bolts 11 whose inner ends are conical and bear against the face 10. These hold down bolts are surrounded by sealing means 12 within the flange 3. By screwing the bolts 11 inwardly the jacket, or housing 6 may be forced downwardly to compress the packing 9 to prevent leakage.

2

Above and positioned on the flange 3 there is an intermediate annular disc 13 which is fastened to the flange 3 by means of stud bolts 14 which are threaded into the disc 13 and extend through the bolt holes in the flange 3 and whose lower ends are threaded to receive the clamp nuts 15. The joint between the flange 3 and disc 13 is sealed by a gasket 16 which is seated in registering grooves in said flange and disc.

Above and positioned on the intermediate disc 13 there is a top flange 17 which is secured to said intermediate flange by the stud bolts 18 which are screwed into the intermediate disc 13 and extend through the bolt holes in the top flange 17 and whose upper ends are threaded to receive the clamp nuts 19. The joint between the flange disc 13 and flange 17 is sealed by the gasket 20 which is seated in registering grooves in the disc 13 and flange 17.

On the flange 17 there is the flow controlling equipment 21 such as the well known Christmas tree.

Suspended in the well there is the well tubing 22 whose upper end is attached to the Christmas tree flange 17. A lower section, or sections of the tubing is perforated forming a well screen 22a which has a slip joint connection with the adjacent section of the tubing, as shown in Figure 5 and is pinned thereto by a frangible pin 23.

The sections 22, 22a have the upper and lower external abutments 24, 25 and surrounding the tubing between said abutments is an expansible packer 26. The sections 22, 22a are connected for a limited relative longitudinal movement by the pins 27 attached to one section which projects through elongated slots in the other section. A simple form of packer is shown in Figure 5 although any other type of packer adapted for the purpose may be used.

Within the housing 6 there is means for forming a seal between it and the tubing 22. The sealing means referred to is supported on the shoulder 7 and comprises upper and lower metal rings 29, 29a with packing rings 30 between them. Fitted within the head 8 against the ring 29 there is a gland 31 which surrounds the tubing and whose upper end is formed into an outwardly thickened head 32 having a downwardly and outwardly inclined face 33.

Threaded through the disc 13 are the radial lock down bolts 34 whose inner ends are conical and work against the face 33. These bolts are surrounded by sealing means 35 located within the disc 13. By screwing the bolts 34 inwardly the gland 21 may be forced downwardly and the

3

packing 30 compressed to form a fluid tight seal.

As hereinabove indicated it sometimes becomes necessary to force liquid under pressure into a producing well in order to overcome the natural pressure in the producing stratum, that is. to "kill" the well for the purpose of carrying on certain desirable operations in the well. When this becomes necessary it is desirable to establish circulation in the well by forcing drilling fluid down through the tubing and returning it back up to the ground surface around the tubing or vice versa. In order to do this the packer 26 must be collapsed to permit return of the fluid. It may be here stated that when the tubing is lowered into the well and the screen 22a lands on bottom the pin 23 will be sheared and upon further downward movement of the tubing the packer 26 will be expanded to form a seal between the tubing 22 and the well casing as shown in Figure 4 so as to separate the producing stratum above from the one beneath. If the packer 26 is not collapsed when the drilling fluid is forced down through the tubing, or the casing, this fluid will be forced back into the producing strata which is undesirable and which may injure or completely ruin the well and therefore the packer should be collapsed to allow the drilling fluid forced down through the tubing to return back up outside the tubing and out through the flow lines 5 or, if forced down through the casing to return back up through the tubing. However, in this operation it is essential that a seal be maintained between the well head and the tubing and for that purpose the housing 6 and the sealing means therein has been provided.

In establishing this circulation the nuts 19 are removed and the flange 17 and the tubing 22 attached to said flange are lifted so as to permit the packer 26 to collapse and said flange and tubing are maintained in this elevated position to maintain the packer in collapsed position while the circulation referred to is maintained. When the tubing is lifted separation of it from the screen 22a is prevented by the pins 27.

Should any leakage occur between the tubing 22 and the packing 30 the lock down bolts 34 may be screwed inwardly to force the gland 31 downwardly to compress said packing and stop the leakage.

The drawings and description are illustrative merely while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. In well head assembly having a casing head and a tubing support on the casing head with a tubing suspended from said support through the casing head; a tubular housing supported in the casing head and whose upper end is in sealed relationship with the casing head, and the lower end of the housing being spaced inwardly from the casing head, an inside flange on said lower end annular sealing means within the housing on said flange and forming a seal between the housing and tubing, a tubular gland fitted closely into the upper end of the housing against the seal and whose upper end is formed into an outwardly thickened head having a downwardly and outwardly inclined annular face, radial lock

4

down bolts having a threaded connection with the head assembly and whose inner ends are engageable with said face, said bolts being accessible to an operator and having their inner ends tapered to force the gland downwardly, to expand the packing as the bolts are screwed inwardly.

2. In well head assembly having a casing head provided with an outlet and a tubing support on the head with a tubing connected to the support and depending through the casing head; a tubular housing supported in the casing head and in sealed relationship therewith above the outlet and whose lower end is spaced from the casing head opposite the outlet, an annular seal in the housing forming a fluid tight joint with the housing and the tubing, a gland having a telescopic, slip point connection with the upper end of the housing and whose lower end abuts against said seal, means having a threaded connection with the assembly and accessible to an operator and operable against the upper end of the gland, when screwed inwardly, to force the gland downwardly to apply a compressive force to said seal.

3. In combination, a casing head having an external annular flange at its upper end and having an inside seat and an outlet beneath the seat, an intermediate, annular disc superimposed upon the casing head flange, a top flange superimposed upon the intermediate disc and connected to the upper end of a well tubing which extends through the disc and flange beneath and which is suspended by said top flange in a well bore, a tubular housing whose upper end is outwardly thickened forming a head which rests on said seat and whose lower end is reduced in diameter and extended into and spaced from, the casing head, sealing means supported in the housing and adapted to surround said pipe and to form a seal between the housing and pipe, a gland telescoping into the upper end of the housing and whose lower end rests on said sealing means, means extending radially through said intermediate disc, whose outer ends are accessible to an operator and whose inner ends are engageable with the gland and operative to force the gland downwardly to compress the sealing means, means for securing the intermediate disc to the casing head, and separate means for releasably securing the top flange to the intermediate disc beneath whereby the top flange may be released and elevated with the pipe without disturbing said seal.

ARTHUR J. PENICK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,150,887	Mueller et al.	Mar. 14, 1939
2,241,288	Yancey	May 6, 1941
1,719,207	Brauer	July 2, 1929
2,178,700	Penick et al.	Nov. 7, 1939
2,213,503	Penick et al.	Sept. 3, 1940
859,060	Heeter	July 2, 1907
2,354,929	Rector et al.	Aug. 1, 1944