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A. J. PENICK ET AL

2,178,698

TUBING HEAD

Original Filed May 4, 1936

3 Sheets-Sheet 1

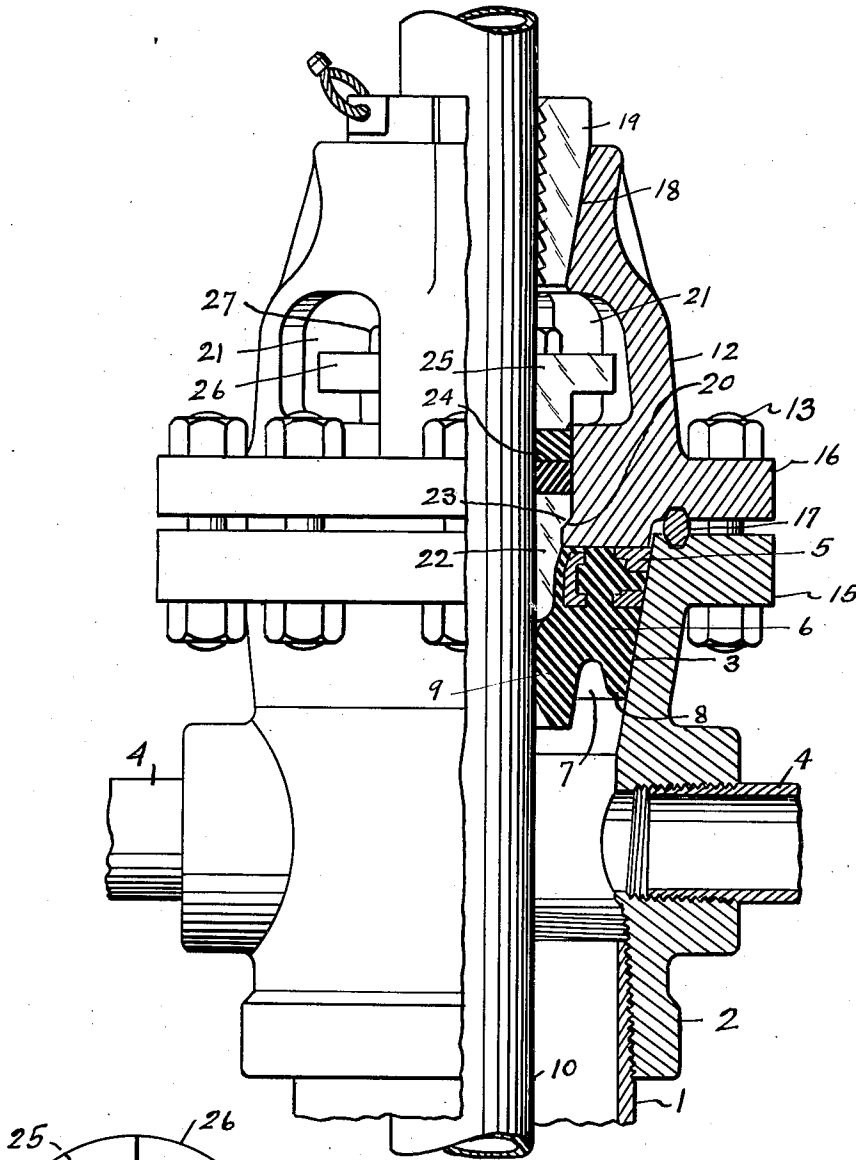


Fig. 1.

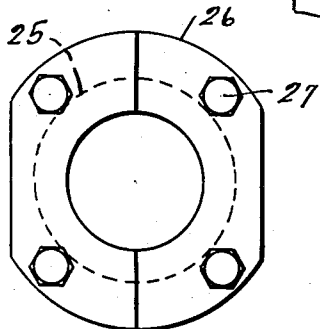


Fig. 2.

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3 Sheets-Sheet 2

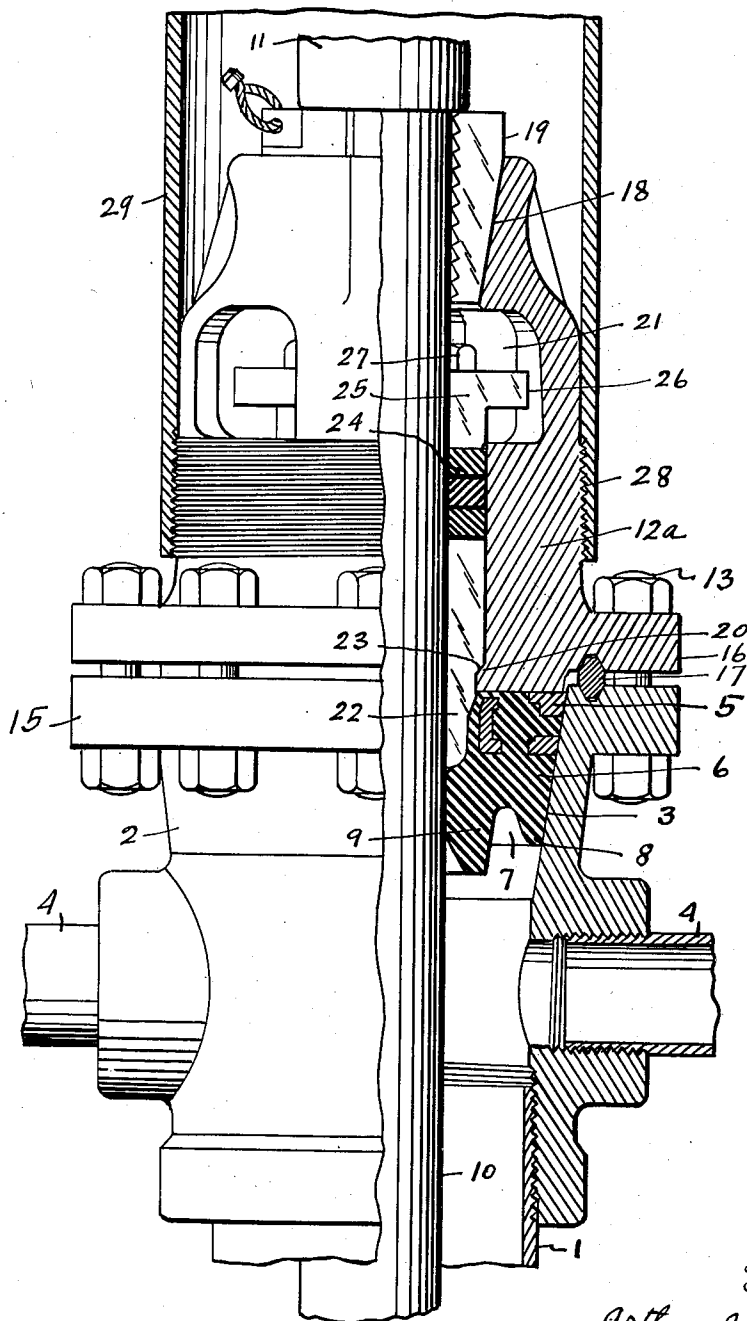


Fig. 3.

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3 Sheets-Sheet 3

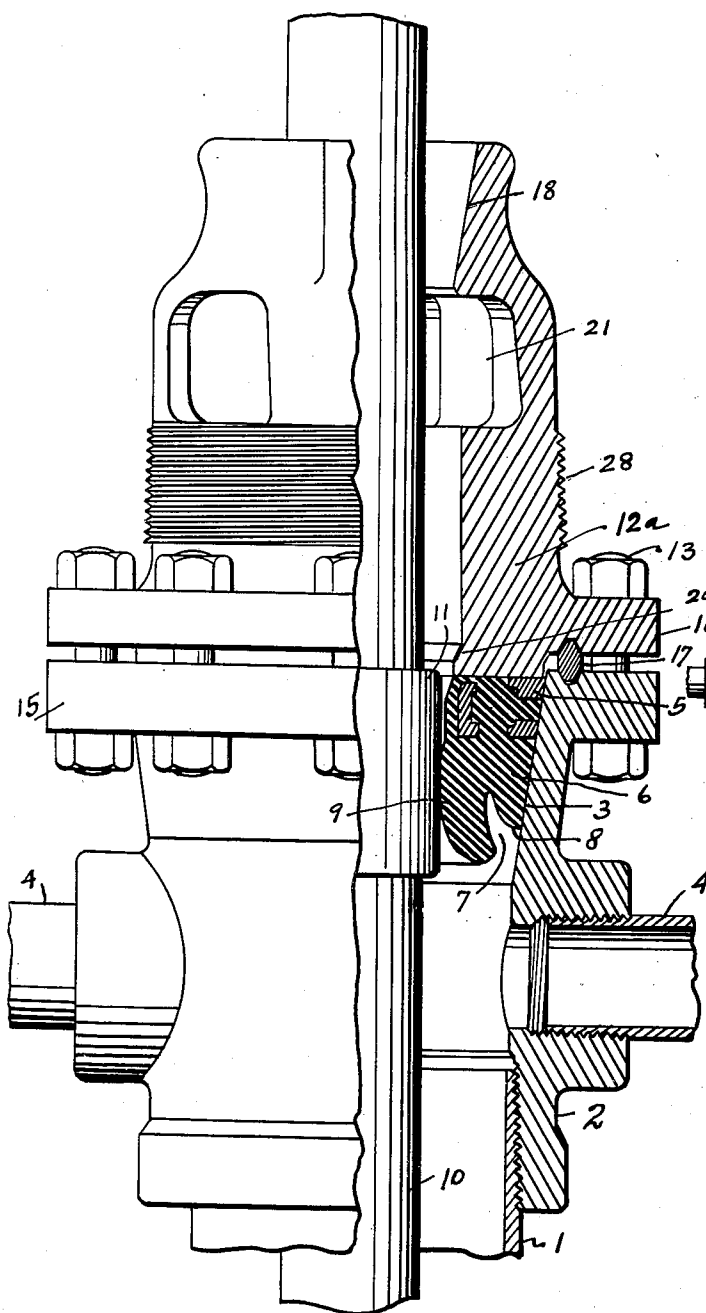


Fig. 4.

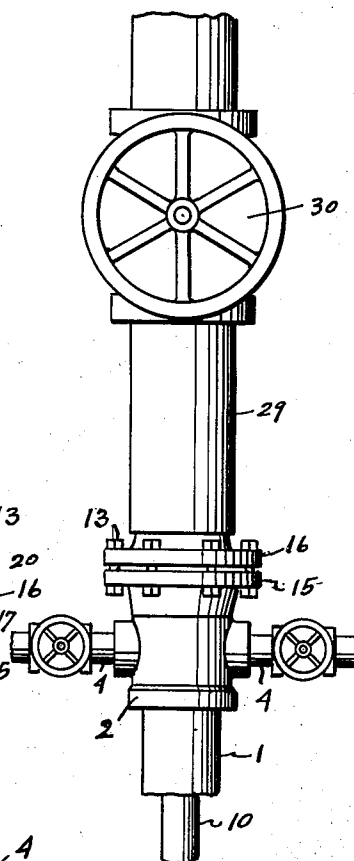


Fig. 5.

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UNITED STATES PATENT OFFICE

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TUBING HEAD

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Application May 4, 1936, Serial No. 77,662
Renewed March 30, 1938

13 Claims. (Cl. 166—14)

This invention relates to a tubing head. The invention includes certain improvements over those shown in our copending application for Blowout preventer filed April 17, 1936, Serial No. 74,923.

An object of the invention is to provide a tubing head for use on oil wells and of such construction that the inner tubing, and its couplings, may be readily run therethrough and a fluid tight seal between the casing head and tubing at all times maintained.

Another object of the invention is to provide a tubing head of the character above specified having means for anchoring the tubing at any desired point and of such construction that additional sealing means about the inner tubing may be readily inserted into place or removed after the tubing has been anchored in place. It is another object of the invention to provide in combination with the tubing head above specified additional means, including a valve, which may be readily anchored to the bonnet and the valve closed to prevent escape of fluid under pressure from the well in case the packing within the tubing head should develop a leak.

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 tubing head, partly in section, showing the tubing anchored in place and showing a packing for the tubing.

Figure 2 shows a plan view of a gland employed.

Figure 3 shows a side view, partly in section, of a slightly modified form of the head, showing the tubing anchored in place and packed, and showing additional means anchored to the bonnet of the tubing head, adapted to be equipped with a valve for closing the head in case the packing should develop a leak.

Figure 4 shows a side view of the form of head shown in Figure 3, partly in section, with the inner tubing being run therethrough, and

Figure 5 shows a side view of the complete device as illustrated in Figure 3.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates the well casing to the upper end of which the casing head 2 is attached, having the inside downwardly converging seat 3 and the outflow lines 4, 4 from the casing beneath said seat.

Located within the casing on the seat 3 there is a pressure head comprising an upper metal cage 5, of open work and annular in shape and a resilient packing 6 of rubber or similar material whose upper end is moulded into the cage and whose lower end has the annular groove 7 forming the outer lip 8 which rests closely against the seat 3 and the inner lip 9 which fits closely about the inner pipe or tubing 10. The packing 6, while maintaining a close fit about the tubing will readily yield to permit the passage of the tubing couplings 11 therethrough as shown in Figure 4 so that the tubing may be run and a seal between the inner tubing and the casing head 2 maintained in the presence of ordinary pressures in the well.

This specific type of pressure head is not claimed as a part of the present invention, as other types of pressure head may be employed. The type of pressure head shown forms the subject matter of, and will be claimed in, our copending application Serial No. 74,923, filed April 17, 1936.

Secured on the casing head there is a bonnet 12. This bonnet is secured in place by means of bolts 13 which are fitted through the coinciding external flanges 15, 16 of the head and bonnet respectively. A conventional gasket 17 is interposed between said flanges and seated in confronting grooves in said flanges. The lower end of the bonnet fits within the casing head and rests against the cap 5 so as to hold the pressure head firmly seated against the downwardly converging seat 3 to the shape of which the outer side of the pressure head conforms as shown. The upper end of the bonnet has the downwardly converging slip seat 18 to receive the conventional slips 19 which may be seated therein around the tubing and whose inner sides have teeth to engage and support said tubing. The minimum inside diameter of the hood, or bonnet 12, is slightly larger than the external diameter of the couplings 11 so that said couplings will pass readily therethrough. The lower end of the bonnet 12 has an inside downwardly converging seat 20 for a purpose to be hereinafter explained.

Beneath the slip seat 18 the bonnet is provided with one or more side openings 21.

When the inner tubing 10 is anchored in place, a sectional slip ring 22 may be inserted, a section at a time, through the opening 21 and fitted downwardly through the lower end of the bonnet 12. The inner sides of the sections of the slip ring 22 are arcuate to fit closely about the tubing

10 and their lower ends are externally tapered to fit snugly between the upper end of the pressure head and the tubing so as to form a reinforcement for the lip 9. The upper end of each section of the lip ring 22 has an external downwardly tapering shoulder 23 which rests on the tapering seat 20 to support the slip ring sections in place. A split packing 24 may then be inserted through the opening 21 and fitted around the tubing and supported on the upper end of the slip ring. There is a gland 25 formed of sections which may be fitted through an opening 21 and assembled about the tubing 10. The upper end of the gland has the external flange 26 and the lower end of the gland is reduced in diameter to fit within the pocket 12 and to rest against the packing 24. The gland may be secured in place to compress the packing 24 by means of bolts 27 which are fitted through the flange 26 and screwed into the bonnet beneath. The tubing 10 may thus be packed in a very efficient manner to prevent the escape of well fluid under pressure up between the tubing and casing head. In case strong pressure in the well should develop and should the ordinary packing above described develop a leak, the section of tubing above the bonnet 12a shown in Figures 3 and 4, may be readily removed. The bonnet 12a has the external threads 28 beneath the opening 21 and should such leak occur, a tubular section of pipe 29 may be fitted over the bonnet and screwed on the section 28. This pipe section 29 has a gate valve 30 incorporated therein which may be closed to control the pressure.

In the absence of strong internal pressure the slips 19 and the slip ring 22, packing 24 and gland 25 may be removed and the inner tubing adjusted or located as desired and the removed parts installed in the manner hereinabove indicated.

As is well known in the well drilling art, casing is often set on the bottom of the bore above the producing stratum and the lower end of the casing is cemented, that is, cement is forced down through the casing in plastic state and surrounds the lower end of the casing and when set plugs up the lower end of the casing. When it is desired to run the tubing 10 into the hole a drill may be attached to the lower end thereof and the cement plug drilled out and the pay sand beneath entered and the tubing left in the well through which the oil may flow to the ground surface. While running this tubing it will be surrounded by the packer 9, the other parts being removed as shown in Figure 4; or the plug may be drilled out and the pay sand entered by using the ordinary drill stem and drill and said drill stem and drill may then be withdrawn and the tubing 10 lowered through the packer 6 to the desired position and then anchored in place as shown in Figure 1 and Figure 3.

The drawings and description now disclose what is considered to be preferred forms of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What we claim is:

1. A head for wells comprising a casing head adapted to be connected to the top of a well casing and having an inside seat, a pressure head on the seat shaped to receive an inner tubing therethrough and forming a close fit around the tubing, a hood on the casing head spaced from the tubing and having an inside seat to receive annular tubing packing and having a side opening through which the packing may be inserted or removed.

2. A head for wells comprising a casing head adapted to be connected to the top of a well casing and having an inside seat, a pressure head on the seat shaped to receive an inner tubing therethrough and forming a close fit around the tubing, said pressure head being yieldable to permit the passage of tubing couplings therethrough, a hood on the casing head spaced from the tubing and having an inside seat to receive annular tubing packing and having a side opening through which the packing may be inserted or removed.

3. A head for wells comprising a casing head adapted to be connected to the top of a well casing and having an inside seat, a pressure head on the seat shaped to receive an inner tubing therethrough and forming a close fit around the tubing, a hood on the casing head spaced from the tubing and having an inside seat to receive annular tubing packing and having a side opening through which the packing may be inserted or removed, and a downwardly converging slip seat on the hood.

4. A head for wells comprising a casing head adapted to be secured to the top of a casing in a well, a pressure head fitted within the casing head and shaped to surround an inner tubing through the casing head, said pressure head being yieldable to permit the passage of the tubing couplings therethrough, a hood on the casing head having a passageway therethrough of an inside diameter to permit the passage of said couplings, said hood having a side opening to permit the passage therethrough of tubing packing means and said hood also having a slip seat above said opening.

5. A head for wells comprising a casing head adapted to be attached to the top of a well casing, a pressure head within the casing head shaped to fit closely against the casing head and to closely surround an inner tubing passing through the casing head, a hood on the casing head having an inside seat, sectional slip wedges fitted around the tubing within the hood, packing on the slip ring forming fluid tight joints with the tubing and hood, a sectional gland secured to the hood and fitted against the packing, said hood having a lateral opening to permit the insertion and removal of the slip ring, packing and gland.

6. A head for wells comprising a casing head adapted to be attached to the top of a well casing, a pressure head within the casing head shaped to fit closely against the casing head and to closely surround an inner tubing passing through the casing head, a hood on the casing head having an inside seat, sectional slip wedges fitted around the tubing within the hood, packing on the slip ring forming fluid tight joints with the tubing and hood, a sectional gland secured to the hood and fitted against the packing, said hood having a lateral opening to permit the insertion and removal of the slip ring, packing and gland, said hood also having a slip seat above the side opening.

7. A well head comprising a casing head, a pressure head within, and forming a close fit with, the casing head and shaped to surround and fit closely against an inner tubing through the head, said pressure head being yieldable to permit the passage of the tubing couplings therethrough, a hood secured on the casing head of an inside diameter to permit the passage of said

couplings, said hood having a lateral opening and a slip seat.

5 8. A well head comprising a casing head, a pressure head within, and forming a close fit with, the casing head and shaped to surround and fit closely against an inner tubing through the head, said pressure head being yieldable to permit the passage of the tubing couplings there-
10 through, a hood secured on the casing head of an inside diameter to permit the passage of said couplings, said hood having a lateral opening and a slip seat, and also having external threads beneath the opening.

15 9. A well head comprising a casing head, a pressure head fitted closely within the casing head and shaped to surround and closely fit against an inner tubing passing through the head, said pressure head being yieldable to permit the passage of the tubing couplings, a hood
20 secured on the casing head having a lateral opening, means on the hood for engaging and supporting the tubing, a tubular member whose lower end is threaded onto the hood beneath said opening and a valve above the hood arranged to
25 open and close said tubular member.

30 10. A well head comprising a casing head, a pressure head in the casing head and forming a fluid tight joint therewith and shaped to fit closely around a tubing through the head and being yieldable to permit the passage of the tubing couplings therethrough, a hood on the casing head abutting the pressure head and of an inside diameter to permit the passage of

the tubing couplings, said hood having a lateral opening and a slip seat.

11. In a well head, a casing head, having an inside seat to receive and support a pressure head, a hood on the casing head having an inside annular seat and a lateral opening above said last mentioned seat, said hood having also a slip seat above the opening. 5

12. A head for wells comprising a casing head, a pressure head within the casing head shaped to fit closely around an inner tubing passing through the casing head, a hood on the casing head having an inside seat, packing supporting means around the tubing on said seat, packing on said packing supporting means forming fluid
10 tight joints with the tubing and hood, means in the hood for applying a compressive force to the packing and tubing supporting means on the hood above the packing. 15

13. A head for wells comprising a casing head, 20 a pressure head within the casing head shaped to fit closely around an inner tubing passing through the casing head, a hood on the casing head having an inside seat, packing supporting means around the tubing on said seat, packing
25 on said packing supporting means forming fluid tight joints with the tubing and hood, means in the hood for applying a compressive force to the packing and tubing supporting means on the hood above the packing. 30

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