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A. J. PENICK ET AL

2,154,408

COMBINATION TUBING HEAD AND BLOW-OUT PREVENTER

Original Filed June 4, 1935

2 Sheets-Sheet 1

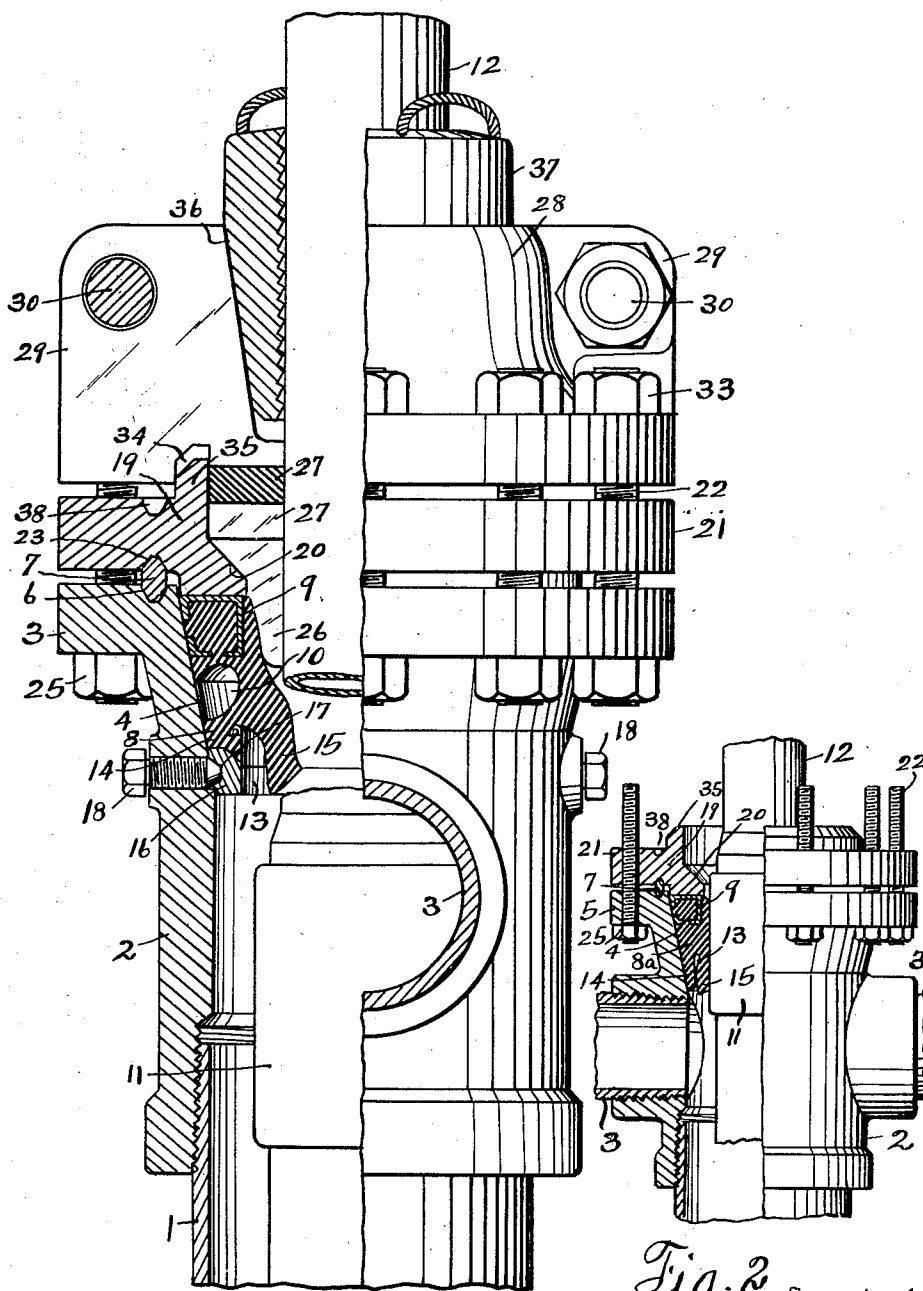


Fig. 1.

By

Fig. 2. Inventors

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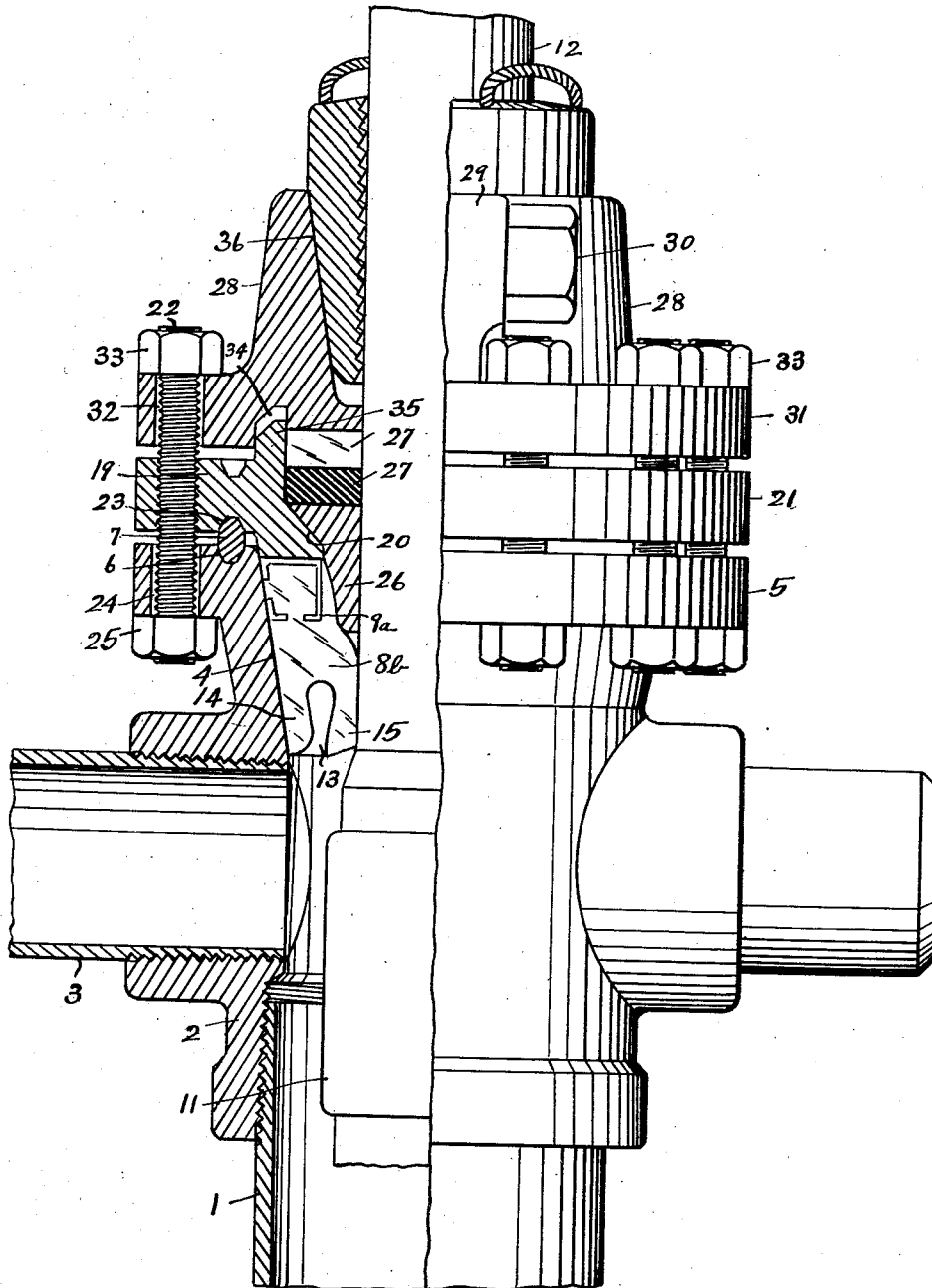
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UNITED STATES PATENT OFFICE

2,154,408

COMBINATION TUBING HEAD AND BLOW-
OUT PREVENTERArthur J. Penick and Kirby T. Penick, Houston,
Tex.Application June 4, 1935, Serial No. 24,838
Renewed June 1, 1937

7 Claims. (Cl. 166-14)

This invention relates to a combination tubing head and blowout preventer.

An object of the invention is to provide a novel type of blowout preventer adapted for use in lowering a tubing, or pipe, into a well, and which will form a fluid-tight seal with the casing head and tubing being lowered so as to prevent the escape of gas or other fluid under pressure between the casing and tubing.

Another object of the invention is to provide the combination with the casing head, of a pressure head of novel construction therein with means for securing the pressure head in place, said pressure head being of such construction as to permit the ready passage of the couplings connecting the tubing sections therethrough and to maintain a fluid-tight seal about the couplings, as well as about the tubing between the couplings.

A still further feature of the invention resides in the provision of a novel combination of blowout preventer and tubing head assembled in a novel manner with means therein for supporting the tubing at any selected elevation, and for at all times forming a fluid-tight seal about the tubing.

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

Figure 1 shows a side elevation, partly in section of one form of the complete apparatus.

Figure 2 shows a side view, partly in section, of the blowout preventer showing a modified form of pressure head, and

Figure 3 shows a side view, partly in section, of the complete combination showing still another form of pressure head.

In the drawings the numeral 1 designates the well casing on the upper end of which the casing head 2 is secured, said casing head having one or more outlet pipes 3 leading outwardly therefrom and having the inside downwardly converging seat 4 above said outlet pipes. At its upper end the casing head has the outwardly extended flange 5 whose upper face has the annular groove 6 to receive the seal ring 7. There is a pressure head 8 composed chiefly of rubber, or similar resilient material whose outer side tapers downwardly to fit into the seat 4. This pressure head may be continuous, and may be molded into the hollow metal cage 9 at the upper end thereof. This pressure head is disclosed and

claimed in our co-pending application Serial No. 74,923, filed April 17, 1936.

In the form shown in Figure 1 the pressure head has a surrounding external groove 10 which gives the body of the pressure head more pliability to facilitate the passage of the couplings 11 of the tubing 12 therethrough. The lower end of the pressure head 8 has a surrounding groove 13 forming the external and internal lips 14 and 15, and moulded onto the lip 14 there is a surrounding annular metal ring 16 which has the external outwardly flared groove 17 to receive the inner ends of the bolts 18 which are threaded through the head 2, thus forming means for anchoring the pressure head in place.

In the form shown in Figure 2, there is a pressure head 8a which is shaped to fit into the seat 4 and is moulded into the cage 9 and which has the lower end, annular groove 13, as in the form shown in Figure 1, but the pressure head 8a does not have the annular groove 10, or the anchor ring 16.

In the form shown in Figure 3, the pressure head 8b may be formed of sections which may be fitted together and seated in the seat 4 to completely surround the tubing 12. In this form the sections of the pressure head are moulded to corresponding sections of the hollow cage 9a. In other respects the type of pressure head shown in Figure 3 is the same as that shown in Figure 2. It is to be noted that either form of pressure head may be employed, one in substitution for the other, in the casing head.

In each form of the apparatus a retainer ring 19 is employed which has the downwardly converging inside seat 20 and which also has the external annular flange 21. Clamp bolts 22 are threaded through the flange 21 and extend above and beneath said flange 21. The under face of the flange 21 has an annular groove 23 to receive the upper end of the seal ring 7. The lower ends of the bolts 22 extend through smooth bores 24 of the flange 5 and receive the retaining nuts 25 which are screwed thereon. The lower face of the retainer ring 19 may thus be clamped securely against the upper end of the pressure head of either form so as to maintain the pressure head in place while lowering or elevating the tubing.

While using the apparatus as a blowout preventer only to prevent the escape of fluid under pressure from the well while the tubing is being lowered, the parts hereinabove described and assembled as shown in Figure 2, only, will be used. In lowering the tubing, the inner lip 15 will closely surround and grip the tubing, as illus-

trated in Figure 2 and if gas pressure is present in the well, the pressure fluid will enter the groove 13 and will hold the lip 15 closely against the tubing. It is to be understood that the outlet pipe leading from the casing head will be equipped with the usual control valve whereby the outflow of the fluid under pressure from the well may be controlled, or prevented.

The pressure head is so constructed that it will be sufficiently pliable to permit the passage of the tubing couplings 11 without injury to the pressure head and will maintain a close seal about either the couplings or the tubing, between the couplings.

There is a slip ring composed of the arcuate sections 26, 26, shaped to be fitted around the tubing and whose outer sides taper downwardly and conform to the shape of and are adapted to seat on the seat 20 with their lower ends extended to fit within the pressure head as more accurately shown in Figures 1 and 3. When the tubing is lowered to the desired location, the slip ring 26 is inserted into place and the annular packing rings 27, 27, are fitted between the retainer ring 19 and the tubing and supported on the upward end of the slip ring 26. These packing rings 27 are preferably formed of arcuate sections or may be split on one side and are arranged so that the joints will be broken as indicated in Figures 1 and 3. The slip ring 26 forms a firm reinforcement for the inner lip 15.

There is a slip bowl formed of the sections 28, 28, which have the coinciding, marginal flanges 29, 29, clamped together by the clamp bolts 30, 30. This slip bowl has the annular outwardly extended flange 31 provided with bores 32 to receive the upper ends of the bolts 22 and the slip bowl is retained in place by means of the nuts 33 screwed onto the said bolts. The underside of the slip bowl has an annular groove 34 and the clamp ring 19 has an upstanding annular flange 35 which is received by the groove 34 when the slip bowl 28 is in place. The lower end of the slip bowl rests on the packing 27, and said packing may be compressed from time to time as required by tightening up on the nuts 33. The slip bowl has the inside, downwardly converging seat 36 to receive the conventional wedge-shaped slips 37 for supporting the tubing at the desired location.

The upper side of the flange 21 has an annular groove 38 therearound. When the apparatus is being used as a blowout preventer only and is assembled as shown in Figure 2 in case the pressure in the well is unusually strong and there is unusual danger of a blowout, an additional blowout preventer of the general type such as is shown in our co-pending application, Ser. No. 716,344 filed on the 19th day of March, 1934, may be mounted on the clamp ring 19 and a seal ring mounted in the groove 38 to form a tight seal therewith, and said additional blowout preventer may be bolted down by means of the bolts 22 and nuts 33, and thus an additional protection against the threatened blowout may be provided.

The drawings and description disclose what are now 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 blowout preventer comprising a casing head adapted to be secured to the top of a casing in a well and having an inside seat through

which an inner tubing may pass and an annular external flange at its upper end, a pressure head shaped to fit said seat and having an annular groove around its lower end forming an inside annular lip adapted to fit closely around the tubing and an outside annular lip adapted to fit said seat, said pressure head being formed of resilient material, a cage of rigid material moulded into the material of the pressure head at the upper end thereof, a retainer ring on the casing head and whose lower end is shaped to seat on the upper end of the pressure head to maintain the pressure head in place a flange on the ring overlying the casing head flange and bolts securing the flanges together.

2. A blowout preventer comprising a casing head adapted to be secured to the top of a casing in a well and having an inside seat through which an inner tube may pass, a pressure head shaped to fit on said seat and having an annular groove around its lower end forming an inside annular lip adapted to fit closely around the tubing and an outside annular lip adapted to fit said seat, said pressure head being formed of resilient material, a cage of rigid material moulded into the material of the pressure head at the upper end thereof, a retainer ring detachably secured to the casing head and whose lower end is shaped to seat on the upper end of the pressure head to maintain the pressure head in place, a metal ring attached to the outer lip of the pressure head and having an external groove and a bolt threaded through the casing head whose inner end projects into said groove.

3. In combination, a tubular casing head adapted to be secured to a casing in a well, and having a downwardly converging seat at the upper end of said head, a pressure head formed of yieldable material shaped to fit said seat and to surround an inner pipe through the casing head, said pressure head having an annular groove around its lower end forming an internal annular lip shaped to fit around the inner pipe and an external annular lip shaped to fit said seat, a retainer ring secured to the casing head and whose lower end is adapted to fit against the upper end of the pressure head, said retainer ring having an inside seat, a slip ring adapted to fit between the inner pipe and the pressure head and whose outer side is shaped to fit the seat in the retainer ring, packing around the inner pipe on the slip ring, a slip bowl resting on the packing and secured to the casing head and having a downwardly converging seat and pipe engaging slips in the last-mentioned seat adapted to engage and support the inner pipe.

4. In combination, a tubular casing head adapted to be connected to the top of a casing in a well and having an inside seat, a pressure head adapted to fit said seat and shaped to surround an inner pipe through the casing head, a retainer ring secured on the top of the casing head and whose lower end is adapted to rest against the upper end of the pressure head, a slip ring fitting through the retainer ring and surrounding the inner pipe, packing within the retainer ring surrounding the inner pipe and resting on said slip ring, a slip bowl secured to the casing head and resting on said packing and having an inside downwardly converging seat and pipe supporting slips in the seat of said bowl and in engagement with, and supporting, the inner pipe.

5. In combination, a tubular casing head adapted to be secured to the top of a casing in a well and having an inside seat, a pressure head

formed of resilient material shaped to fit said seat and to closely surround an inner pipe through the casing head, a retainer ring on the casing head clamping against the pressure head and having an inside seat, a slip ring surrounding the inner pipe and fitted between said inner pipe and the pressure head and resting on the seat of said retainer ring, packing around the inner pipe on said slip ring, a slip bowl on said packing and secured to the casing head and having a downwardly converging seat, pipe supporting slips adapted to fit into the seat of said bowl and to engage and support the inner pipe, said slip bowl and retainer ring being provided, one with an annular groove, and the other with a flange which surrounds said packing and fits into said groove.

6. In combination a tubular casing head adapted to be connected to the top of a casing in a well and having an inside seat, a pressure head adapted to fit said seat and shaped to surround an inner pipe through the casing head, a retainer ring secured on the casing head and whose lower end is adapted to rest against the upper end of the pressure head, the upper end of the casing head having an annular groove, a seal

ring in the groove forming close fitting joints with the casing head and the retainer ring, a slip ring fitted through the retainer ring and surrounding the inner pipe, packing within the retainer ring surrounding the inner pipe and resting on the slip ring, a slip bowl secured to the casing head and resting on said packing and having an inside downwardly converging seat and pipe supporting slips in the seat of the bowl and in engagement with, and adapted to support, the inner pipe.

7. In combination a tubular head adapted to be connected to the top of an outer pipe in a well and having an inside seat, a pressure head shaped to fit said seat and to surround an inner pipe through the head, an annular retainer on the head whose lower end is arranged to abut the pressure head, a packing assembly within the retainer including packing supporting means and packing thereon which surrounds the inner pipe, pipe engaging and supporting means on the retainer and resting against the packing and adapted to engage with and support the inner pipe.

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