

June 8, 1937.

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2,083,089

TUBING HEAD

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2 Sheets-Sheet 1

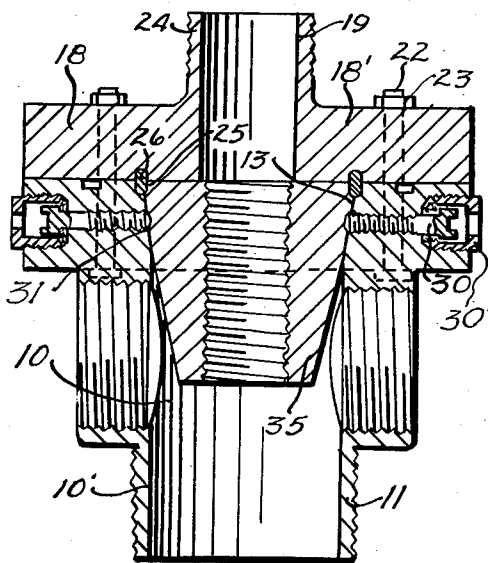
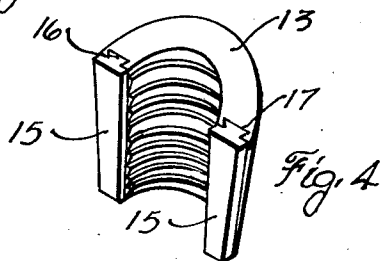
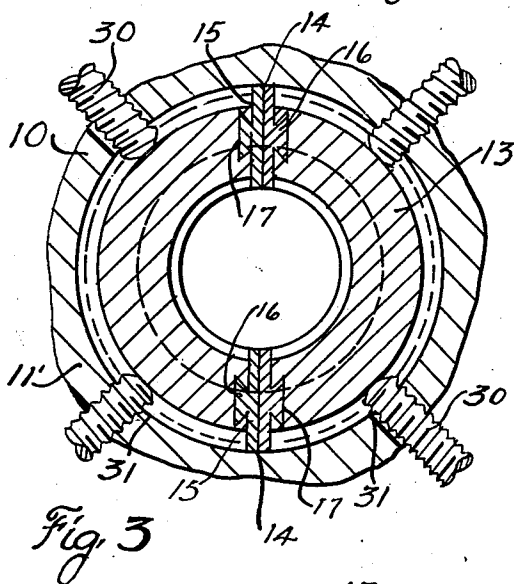
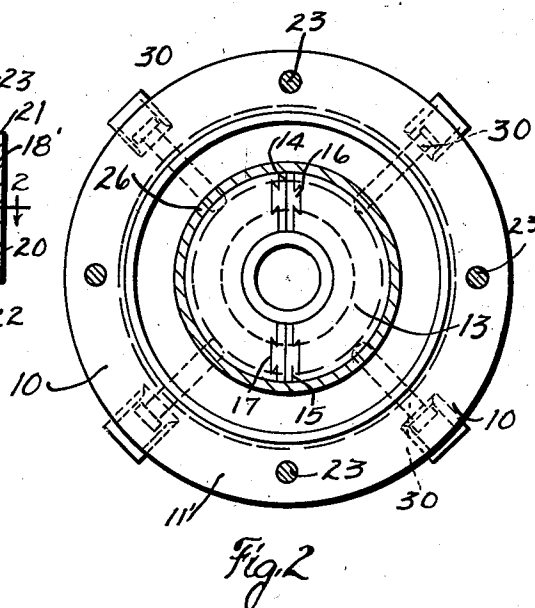
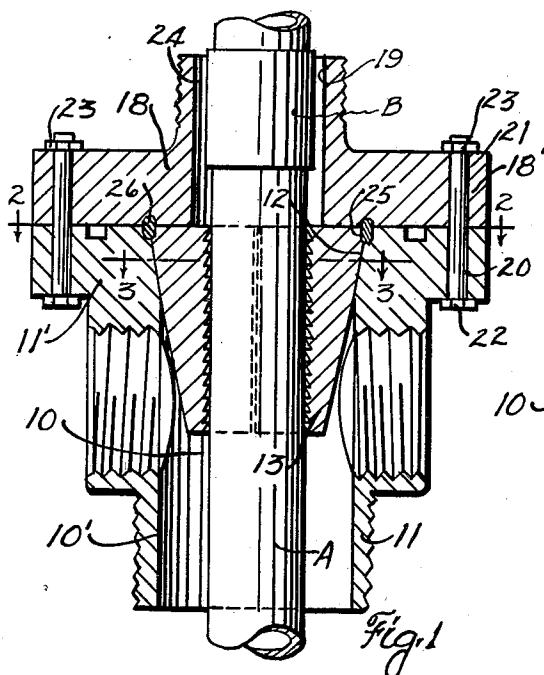


Fig. 5

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2 Sheets-Sheet 2

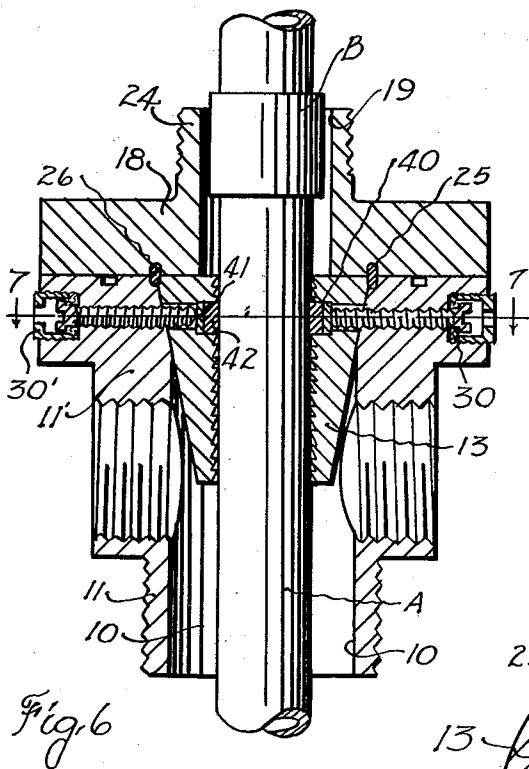


Fig. 6

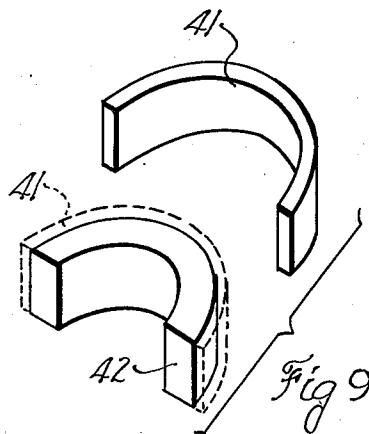


Fig. 9

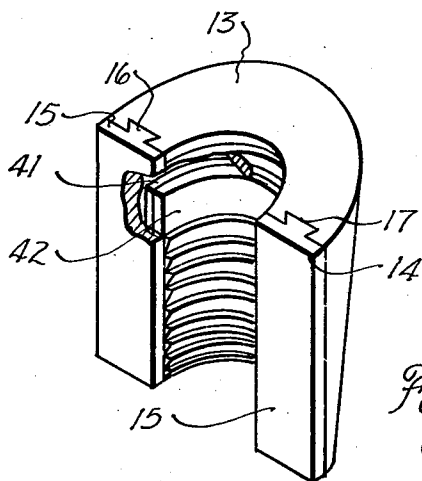


Fig. 8

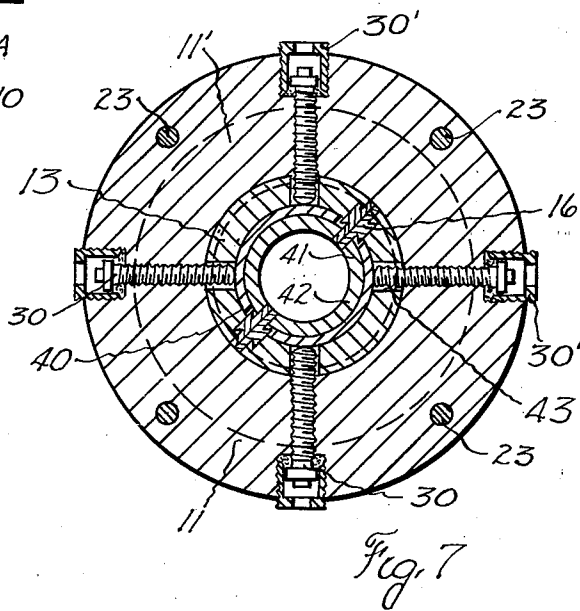


Fig. 7

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TUBING HEAD

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14 Claims. (Cl. 166-14)

This invention relates to new and useful improvements in tubing heads.

One object of the invention is to provide a tubing head having improved means for supporting the well tubing, said means being so arranged as to prevent leakage of the well pressure thereby.

An important object of the invention is to provide an improved tubing head having a ground seat at its upper end for receiving a gripping member which supports the well tubing, and a packing ring at the upper end of the joint between said member and seat, whereby the ground joint together with the ring will positively prevent leakage of the well pressure by the slip when the same is in position.

Another object of the invention is to provide a plurality of gripping slips for supporting a tubing and arranged to be mounted within a tubing head, said slips having their meeting edges faced with packing material, whereby when said slips are mounted in the tubing head and the weight of the well tubing placed thereon, said packing material will be compressed to form leak proof joints between said slips.

A further object of the invention is to provide a tubing head for supporting the well tubing which is so arranged that the blowout preventer, or other safety device, through which the tubing has been run into the well, may be removed from thereabove and said tubing will be retained in the well without danger of being blown therefrom.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is a transverse, vertical, sectional view of a tubing head constructed in accordance with the invention.

Figure 2 is a horizontal, cross-sectional view, taken on the line 2-2 of Figure 1.

Figure 3 is a horizontal, cross-sectional view, taken on the line 3-3 of Figure 1.

Figure 4 is an isometric view of one of the gripping slips.

Figure 5 is a transverse, vertical sectional view of another form of the invention.

Figure 6 is a view similar to Figure 1, showing another form of the invention.

Figure 7 is a horizontal cross sectional view, taken on the line 7-7 of Figure 6.

Figure 8 is an isometrical view of one of the slips, having a portion broken away to disclose the inner packing ring, and

Figure 9 is an isometric view of the inner packing ring and the metal retaining ring.

In the drawings, the numeral 10 designates a cylindrical body which forms the main portion of the tubing head. The lower end of the body is provided with a reduced nipple 11 which is externally screw-threaded, whereby the body may be mounted on a casing head or other support (not shown). The upper end of the body is provided with an outwardly extending annular flange 11', while threaded outlet openings 10' are formed in the sides of the body for receiving the usual outlet pipes (not shown).

The bore 10' of the body is flared at its upper end and this flared portion is machined to form a ground seat 12. Gripping slips 13 having their outer faces beveled to conform to the seat are arranged to be supported thereby. These outer faces of said slips are also machined so that when the slips are seated as shown in Figure 1, a ground joint is provided. This serves to reduce leakage of the well pressure through this joint to a minimum.

The well tubing A, shown in Figure 1, extends downwardly through the bore 10' into the well and the slips 13 engage this tubing to suspend the tubing from the body 10. It will be seen that after the slips and tubing are in position (Figure 1) the well pressure around said tubing will tend to by-pass the slips through the joints. As above pointed out, the leakage between the seat 12 and outer faces is reduced to a minimum due to the ground joint.

To prevent leakage through the joint 14 at (Figure 3) the point where the edges of the slips meet, a packing strip 15 is provided on each edge of the slips. This packing is preferably of a material, which is unaffected by oil or gas, such as duprine, or the like. Each packing strip is formed with a dove-tail 16 which is arranged to engage in a vertical dove-tail groove 17 in the edge of the slip. It is obvious that with this arrangement, the packing strips are readily replaceable.

With each edge of the slips 13 provided with the packing strips 15, it is obvious that when the slips are seated to support the tubing these packing strips on the edges of one slip will engage those on the other slip (Figure 3). Since the entire weight of the tubing is upon the slips, said slips are forced to their lowermost position within the flared seat 12, which will cause the

slips to be forced inwardly toward each other. This action will compress the packing strips 15 at the edges of the slips and will thereby form a fluid tight seal at the joints between the edges of the slips, whereby the well pressure beneath the slips is prevented from escaping through these joints.

A flanged member 18, having an axial bore 19, is disposed on top of the body 10 and the well tubing A extends upwardly therethrough. The bore 19 is slightly larger than the inner diameter of the slips so that a collar B may be secured on the tubing, supported by said slips, directly above said slips. The flange 18' of said member is provided with openings 20 which register with openings 21 in the flange 11' of the body when said member is in position thereon. Bolts 22 pass through these registering openings and receive nuts 23 to fasten the member on the body. The member is provided with a central upwardly extending nipple 24 which is externally screw-threaded whereby any suitable safety, or other device may be mounted thereon.

As has been pointed out, the packing strips 15 positively prevent any leakage of well pressure through the joints between the slips. The ground seat reduces the leakage between the seat and outer face of the slips to a minimum. However, some pressure does escape and to make this joint positively leak proof, the outer edge of the upper end of the slips and the inner edge of the upper end of the seat are cut to form an annular groove 25. The underside of the member 18 is formed with a complementary annular groove, whereby an annular packing ring 26 may be mounted at the upper end of the joint between the seat and slips. This ring is preferably of metal but may be of any suitable material. It is obvious that the member 18 holds the ring in position, and the particular location of said ring positively prevents leakage of the well pressure at this point. So long as said member is in position on the body, all leakage of well pressure is prevented and the well tubing A is suitably supported.

In using the tubing head, the body 10 is screwed onto the upper end of the casing head (not shown) or other support the flanged member 18 and slips 13 being removed. A gate valve (not shown) is bolted to the flange 11' at the upper end of the body and a blowout preventer or other device (not shown) is mounted on the gate valve. The drilling may then be done through the body 10 and when it is desired to run the tubing A into the well, said tubing is first blanked in the usual way and run through the safety devices and body 10. When it is desired to suspend the tubing, the slips 13 are dropped thru any safety devices secured to the upper end of the body and it is obvious that they will seat within the ground seat 12 at the upper end of the bore of said body. The teeth of the slips will, of course, engage the tubing, whereby the same is supported.

The gate valve and other safety devices (not shown) may then be disconnected and removed from the body and it is obvious that the pressure can escape only by seeping by the ground seat. The pressure thus escaping under most conditions, is practically negligible. However, in some cases the well pressure is exceptionally great and there is a possibility of blowing the slips from the seat when the gate valve is removed. To prevent such an occurrence radial screws 30 are threaded through the body 10 and

have their inner ends engaging in an annular groove 31 in the outer face of the slips. A packing gland 30' surrounds the outer end of each screw to prevent any leakage through the threads of said screws. After the tubing and slips are in position, these screws are tightened to engage the slips to prevent upward displacement thereof.

The metal ring 26 and flanged member 18 are then positioned on top of the body, the latter being postured by the bolts 22 and nuts 22. It is obvious that with the above arrangement, the well tubing A is suitably supported in the well and leakage of any well pressure is positively prevented. The flanged member 18 may be substituted for a safety device after the tubing has been run into the well without the loss of any pressure. There is no danger of the well tubing being blown out at any time. The ground joint and seat, together with the metal packing ring 26 at the top of this joint, as well as the packing strips 15 between the edges of the slips provide a leak proof seal when the device is assembled. Although only two slips 13 are shown; it is pointed out that any desired number may be employed so long as each has the packing strips 15 along its vertical edges.

In Figure 5, I have shown another form of the invention. In this form, instead of the slips, an internally screwthreaded collar 35 is provided. This collar seats in the flared ground seat 13 and the operation of this form is the same as the first form, the collar being threaded on the tubing before the same is run into the well. It is pointed out that in both forms, the ground joint and annular packing ring 26 prevent leakage of the pressure between the seat and the tubing supporting element.

In Figures 6 to 9, I have shown still another form of the invention. In using the device in wells having extremely high pressures, it has been found that pressure will escape by the threads of the slips, that is, between the bore of said slips and the outer periphery of the tubing. To prevent this escape of pressure, the form shown in Figures 6 to 9 are employed. This form is substantially the same as that shown in Figure 1, except that an annular groove 40 is formed in the inner toothed wall of the slips near the upper end thereof. This groove receives a split metal ring 41 and also a resilient packing ring 42, which is constructed of rubber or other suitable material. The packing ring is located so that when the slips are in position around the tubing, said ring engages the surface of the tubing as clearly shown in Figure 6. The slips are provided with radially extending openings 43 and when the rings and slips are in position these openings are aligned with the screws 30, thus, the screws may be rotated until their inner ends bear against the metal ring 41 to force the same inwardly. This forces the packing ring 42 into intimate contact with the tubing and leakage between said tubing and the threads of the slips is prevented.

What I claim and desire to secure by Letters Patent is:

1. A tubing head including, a body having an axial bore therethrough, said bore having its upper end flared and machined to form a ground seat, a well tubing supporting member arranged to engage in and be supported by said seat, the outer face of said member which engages the seat being machined whereby a ground joint between the member and seat is had, and means at the upper end of said joint and free from

contact with the tubing supported by the member for packing off the joint to prevent leakage of well pressure thereby, said packing means providing a pressure seal between ground surfaces of the seat and the supporting member.

2. A tubing head including, a body having a seat at its upper end, slips arranged to be seated within said seat for supporting well tubing, means at the upper end of the joint between the seat and slips and free from contact with the tubing supported by said slips for packing off said joint to prevent leakage of the well pressure thereby, and packing between the upper edges of the slips, the packing means and the upright packing providing a complete fluid seal from the well between the seat and the tubing support.

3. A tubing head including, a body having a seat at its upper end, a plurality of slips arranged to be seated within said seat and having their vertical edges engaging to form a circular gripping member for supporting a well tubing, means between the engaging edges of the slips for preventing leakage of the well pressure thereby, means at the upper end of the joint between the slips and seat joint to prevent leakage of the well pressure thereby, and means at the upper end of the joint between the slips and seat for packing off said joint to prevent leakage of the well pressure thereby.

4. A tubing head including, a body having a seat at its upper end, a plurality of slips arranged to be seated within said seat and having their vertical edges engaging to form a circular gripping member for supporting a well tubing, and a packing strip disposed along each vertical edge of each slip so that when the slips are seated the packing strips are located between the engaging edges of said slips to prevent leakage of the well pressure thereby, and means at the upper end of the joint between the slips and seat for packing off said joint to prevent leakage of the well pressure thereby.

5. A tubing head including, a body having a seat at its upper end, a plurality of slips arranged to be seated within said seat and having their vertical edges engaging to form a circular gripping member for supporting a well tubing, and a packing strip disposed along each vertical edge of each slip so that when the slips are seated the packing strips are located between the engaging edges of said slips to prevent leakage of the well pressure thereby, an annular metal packing ring located at the upper end of the joint between the slips and seat for packing off said joint to prevent leakage of the well pressure thereby, and means secured to the upper end of the body for retaining said ring in position.

6. A tubing head including, a body having a seat at its upper end, a plurality of slips arranged to be seated within said seat and having their vertical edges engaging to form a circular gripping member for supporting a well tubing, means between the engaging edges of the slips for preventing leakage of the well pressure thereby, means at the upper end of the joint between the slips and seat for packing off said joint to prevent leakage of the well pressure thereby, and means arranged to engage the slips after they have been seated to prevent vertical displacement thereof by the well pressure.

7. A tubing head including a body having an axial bore therethrough, said bore having its upper end flared and machined to form a ground seat, a well tubing supporting member arranged to engage in and be supported by said seat, the

outer face of said member which engages the seat being machined whereby a ground joint between the member and seat is had, means between the engaging edges of the slips for preventing leakage of the well pressure thereby, and means at the upper end of the joint between the slips and seat for packing off said joint to prevent leakage of the well pressure thereby.

8. A tubing head including, a body having a seat at its upper end, a member for supporting well tubing arranged to be supported in said seat, means at the upper end of the joint between said seat and member for preventing leakage of well pressure through said joint, and a split packing ring carried by the member for engaging the surface of the tubing to prevent leakage between said tubing and the gripping surface of said member.

9. A tubing head including, a body having an axial bore therethrough, said bore having its upper end flared and machined to form a ground seat, a well tubing supporting member arranged to engage in and be supported by said seat, the outer face of said member which engages the seat being machined whereby a ground joint between the member and seat is had, means at the upper end of said joint and free from contact with the tubing supported by the member for packing off the joint to prevent leakage of well pressure thereby, and means carried by the member for engaging the surface of the tubing to prevent leakage between said tubing and the gripping surface of said member.

10. A tubing head including, a body having a seat at its upper end, a plurality of slips arranged to be seated within said seat and having their vertical edges engaging to form a circular gripping member for supporting a well tubing, means between the engaging edges of the slips for preventing leakage of the well pressure thereby, means at the upper end of the joint between the slips and seat joint to prevent leakage of the well pressure thereby, means at the upper end of the joint between the slips and seat for packing off said joint to prevent leakage of the well pressure thereby, and means carried by the slips for engaging the surface of the tubing to prevent leakage between said tubing and the gripping teeth of said slips.

11. A tubing head including, a body having a vertical passage provided with an inclined annular seat at its upper end, a tubing support having an inclined outer surface engaging in said seat, and an annular packing at the upper end of the joint between the inclined surface of the seat and the support, whereby a pressure seal between the seat and the support accessible without disturbing either of said elements, is provided.

12. A tubing head including, a body having a vertical passage provided with an inclined annular seat at its upper end, a tubing support having an inclined outer surface engaging in said seat, an annular packing at the upper end of the joint between the inclined surfaces of the seat and the support, whereby a pressure seal between the seat and the support accessible without disturbing either of said elements, is provided, and a closure member fastened on the body and exerting a downward pressure on said packing.

13. A tubing head including, a body having a seat at its upper end, slips for supporting well tubing arranged to be supported in said seat, a split packing ring inserted in the inner faces of the slips for engaging the surfaces of the tubing

to prevent leaking between said tubing and the gripping surface of said slips, and individually operated means extending radially through the body and the slips for forcing said packing ring into engagement with the tubing.

5 14. A tubing head including a body having a seat at its upper end, slips arranged to be seated within said seat for supporting well tubing, means

at the upper end of the joint between the seat and slips and free from contact with the tubing supported by the slips for packing off said joint to prevent leakage of the well pressure thereby, and means arranged to engage the slips after they 5 have been seated to prevent vertical displacement thereof by the well pressure.

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