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J. F. CAILLOUX

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TUBING HEAD

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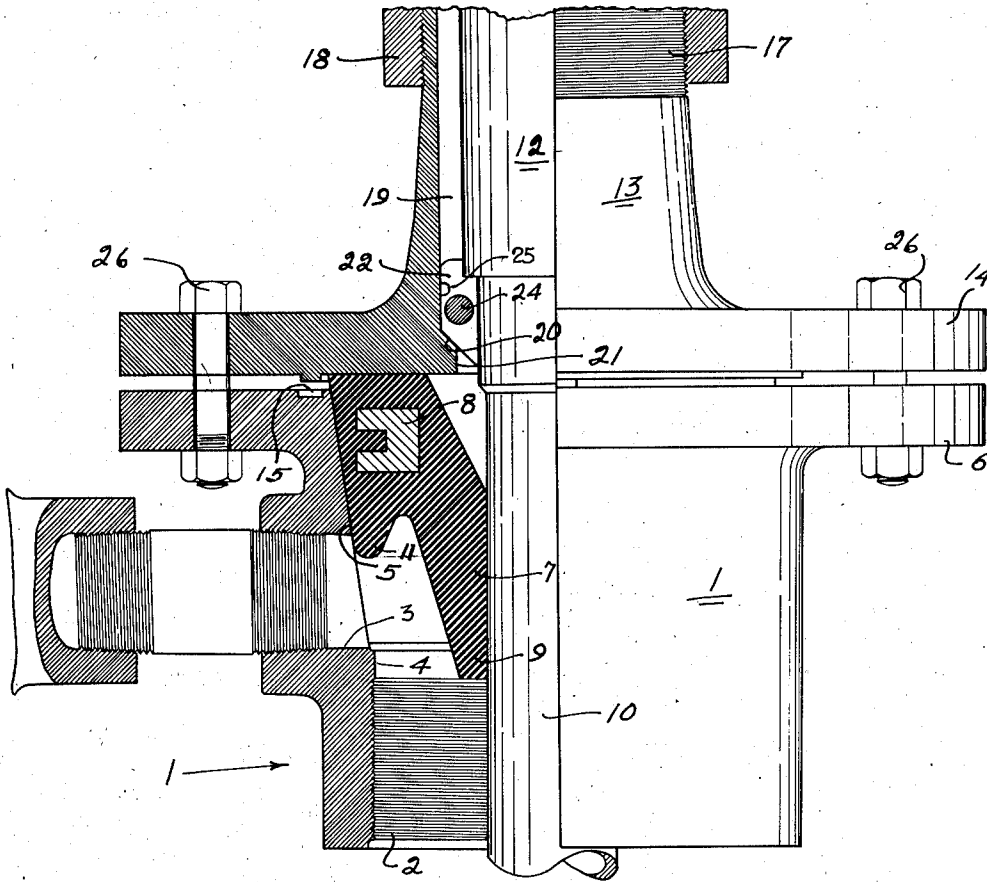


Fig. 1

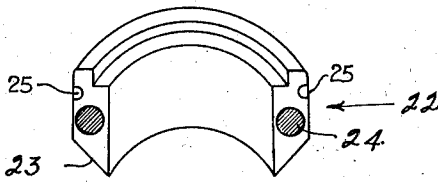


Fig. 2

John F. Cailloux

INVENTOR

BY Bernard P. Miller

UNITED STATES PATENT OFFICE

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TUBING HEAD

John F. Cailloux, Houston, Tex.

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8 Claims. (Cl. 285—22)

My invention relates to a head for the purpose of closing the upper end of an oil well, and for supporting in the cased well an inner string of usual production tubing.

One of the principal objects of the invention is the provision of a novel means for supporting the inner tubing string within the tubing head, and for simultaneously sealing between the string and the head.

A further object is the provision of a combination tubing string supporting and sealing element which embodies, in combination with a deformable body, a safety feature positively precluding the possibility of the string being dropped should the weight thereof be sufficient to shear the supporting element.

Another object of the invention is to provide a supporting and sealing element of this nature which is easily and quickly removable and replaceable.

Further objects will be apparent from the following description taken in connection with the accompanying one-sheet drawing wherein:

Figure 1 is an elevational view, partially in section, of a tubing head embodying the inventive principles; and,

Figure 2 is a perspective view of one segmental section of the combination supporting and sealing element for the tubing string.

Like characters of reference designate like parts in all of the figures.

In the drawing:

The reference numeral 1 indicates as a whole a tubing head body having its lower end threaded as indicated at 2 to connect the upper end of a well casing, not shown, and having intermediate its ends a lateral vent or outlet 3 for fluid. The body 1 has a through bore 4 gradually enlarged in its upper portion to form an annular tapered seating surface 5, and the upper end of the body has an outwardly projecting integral flange 6 whereby the body may be attached to a similarly flanged member thereabove.

Removably seated in the tapered seating surface 5, is a resilient sealing element 7 of rubber or the like, which is preferably reinforced at its upper end by an imbedded steel ring 8. The element 7 has an inwardly and downwardly projecting integral annular skirt 9 adapted to contact and seal against the exterior wall surface of a string 10 of usual production tubing. The skirt 9 is spaced from the inside wall of the body 1 so that fluid pressure between the body and the tubing may act to urge the skirt into its sealing engagement with the tubing. The seal-

ing element 7 is further provided with a second depending skirt 11 at its periphery for sealing against the tapered surface 5 in an obvious manner. The skirt 9 has sufficient elasticity to permit passage therethrough of usual tubing section couplings one of which is indicated by the reference numeral 12.

Seated upon the upper flanged end of the body 1 is a cap or bonnet 13 having at its lower end a flange 14 companion to the flange 6 of body 1. An annular packer 15 is interposed between the two flanges to effect a fluid tight seal. The cap 13 has a substantially tubular body 16 extending upwardly from the flange 14 and having external threads 17 at its upper end to connect with desired well head accessories, for instance, a gate valve 18.

Interiorly, the cap 13 has a through bore 19 reduced in diameter at its lower end to produce an upwardly facing annular tapered shoulder 20. The bore 19 at its smallest point 21 is slightly greater in diameter than the outside diameter of the tubing coupling 12.

As a means for suspending the tubing string 10 within the cap 13, there is provided a deformable soft metal combination supporting and sealing element 22. The element 22 is made in two arcuate semi-annular sections which when placed together combine to form a complete ring, and which have their lower surfaces tapered as indicated at 23 to conform to the tapered shoulder 20 in the cap 13. Each section of the sealing element 22 is formed around an arcuate steel reinforcing member 24 which in cross-section is of a diameter greater than the clearance between the point 21 of the cap 13 and the exterior surface of the coupling 12. A suitable annular steel spring clamp 25 is provided around the two sections of the element 22 in order to hold the two sections against displacement with relation to each other. The clamp 25 is nested in a suitable groove in the outer surface of the element 22.

It is obvious that when the coupling 12 is set down upon the soft metal element 22, the weight of the tubing string deforms the element sufficiently to form a fluid tight seal both with the shoulder 20 and the lower end of the coupling. Should the weight be sufficient to shear the element 22, then the steel ring 24 will wedge between the shoulder 20 and the lower end of the coupling 12, thus stopping further downward movement of the tubing string.

In Figure 1 of the drawing, the cap 13 is shown positioned loosely upon the body 1. When bolts

26 are tightened to draw the flanges 6 and 14 together, the rubber sealing element 7 is compressed upon the seating surface 5, and the packer 15 is forced to seal between the adjacent faces of the flanges 6 and 14.

Obviously the element 22 or its mechanical equivalent could be utilized regardless of the particular type of tubing head it is used upon, so long as a shoulder, such as shoulder 20, is provided for receiving the element 22. It is also obvious that reinforcing ring 24 could be placed in a groove in the upper surface of the element 22, instead of being imbedded therein as shown, and yet act to prevent downward movement of the tubing string should the body 22 become sheared. Further, the ring 24 could be inserted in a groove in the side or the tapered bottom of the element 22.

It will be seen that in providing the present tubing supporting and sealing element 22, and in combining it with a "stripper type" tubing head, I have made it possible to run the tubing string into the well under well pressure, and then suspend the tubing in the head and connect a gate valve or other well accessory without at any time releasing the well fluid. It will be understood of course that the element 22 is of such a dimension that it is installed by merely dropping it into the upper end of the bore 19.

I claim:

1. In a well head for the upper end of a well casing, a tubing support for suspending a tubing string upon a shoulder formed in the head, including: an annular body of a material sufficiently soft to be deformed by the weight of the tubing string, said body formed in segmental sections to surround said tubing string beneath an enlargement thereon, and adapted to seat upon said shoulder for supporting the tubing string; and, non-compressible means carried by the body for wedging between the shoulder and the enlargement to support the tubing string in the event the body becomes sheared by the weight of the tubing string.

2. In a well head for the upper end of a well casing, a support for suspending a tubing string upon a shoulder formed in the head, including: an annular body of soft metal formed in segmental sections for seating upon said shoulder and surrounding said string beneath an enlargement carried thereby; and, non-compressible means carried by the body for wedging between the shoulder and the enlargement to support the

tubing string in the event the body becomes sheared by the weight of the string.

3. In a well head for the upper end of a well casing, a tubing support for suspending a tubing string upon a shoulder formed in the head, including: an annular body of a material sufficiently soft to be deformed by the weight of the tubing string, said body formed in segmental sections to surround said tubing string beneath an enlargement thereon, and adapted to seat upon said shoulder for supporting the tubing string; and, non-compressible means between the shoulder and the enlargement, and adapted to be impinged therebetween, to support the tubing in the event the body becomes sheared by the weight of the tubing string.

4. The combination with a tubing head having an upwardly presented inner shoulder, and with a tubing string extending through the head and having a downwardly presented exterior shoulder, of: an annular body of a material sufficiently soft to be deformed by the weight of the tubing string, said body formed in segmental sections to surround said tubing string between the two shoulders for supporting the string; and, non-compressible means between the two shoulders for preventing downward movement of the string in the event the body becomes sheared by the weight of the tubing string.

5. Organization as described in claim 4, in which the means includes: arcuate segmental sections of hard metal imbedded in the sections of the body and having cross-sectional thickness greater than the clearance between the two shoulders.

6. Organization as described in claim 1, in which the means includes: arcuate segmental sections of hard metal imbedded in the sections of the body and having cross-sectional thickness greater than the clearance between the shoulder and the enlargement on the tubing string.

7. A well tubing support including: an annular body of soft metal formed of segmental sections; and arcuate segmental sections of hard non-compressible material completely imbedded in the body sections.

8. A well tubing support including: an annular body of a material sufficiently soft to be deformed by weight, said body formed of segmental sections; and, arcuate segmental sections of hard non-compressible material completely imbedded in the body sections.

JOHN F. CAILLOUX.