Sept. 1, 1931. J. N. HICKS ET AL 1,821,096

DRILLING AND SWABBING HEAD

Filed Oct. 16, 1929

Fig. 1.

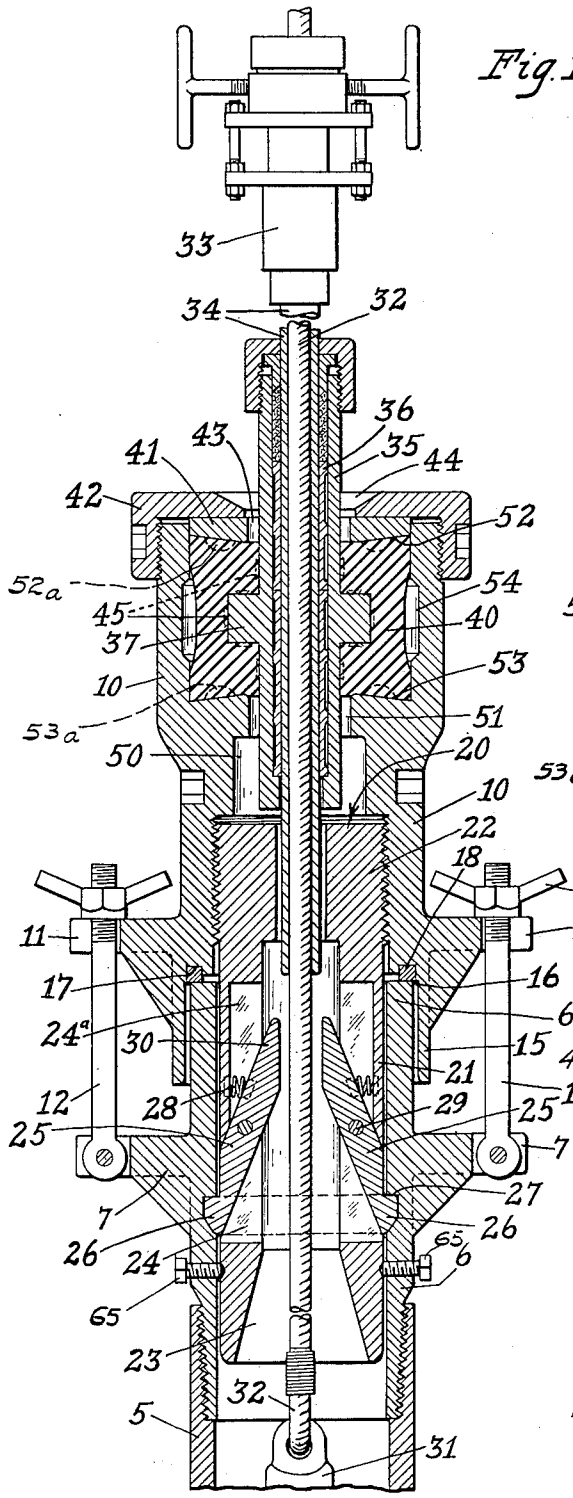


Fig. 2.

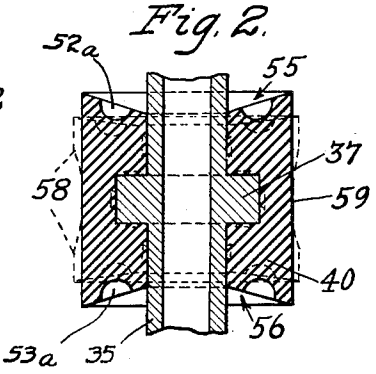
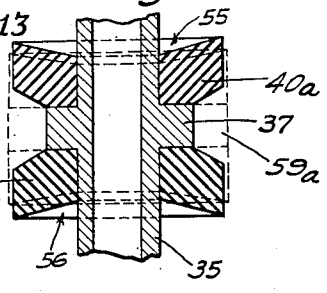


Fig. 3.



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DRILLING AND SWABBING HEAD

Application filed October 16, 1929. Serial No. 400,014.

This invention relates to a high pressure drilling and swabbing head adapted to prevent wasteful and dangerous eruption of oil during the drilling of oil wells.

In devices of the class to which this invention pertains it is desirable to provide yielding means to accommodate the moving and stationary parts to each other in order to avoid unnecessary friction and to accommodate the device to slight irregularities in the movement of the tool head and parts carried thereby with respect to the tubular portion of the device which is secured to the upper end of the well casing. The yielding means employed for the purposes stated, should be of a character which will perform the function of a packing between the movable and stationary parts to keep oil from escaping from the well casing even when subjected to a high degree of pressure therein.

An object of this invention is to provide an improved construction of the above mentioned packing element, and an improved arrangement of parts for holding said packing element in place.

Among the advantages secured by the invention are: the provision of an improved configuration of the elastic packing element in relation to the shape of the metallic elements wherein said packing element is contained and supported in its operative position; and to provide, in conjunction with the improved features just mentioned, a construction of parts which is inexpensive to manufacture, not apt to get out of order, will wear a long time, and which may be readily assembled and disassembled.

A further object of the invention is to provide a device of this character which is peculiarly well adapted to sustain heavy liquid pressure of oil and gas tending to escape from the well casing.

Other objects and advantages may hereinafter appear.

Referring to the accompanying drawings, which illustrate a preferred embodiment of the invention.

Fig. 1 is a longitudinal mid-section of the complete device, the cable clamp at the upper end thereof being shown in elevation.

Fig. 2 is a mid-sectional detail of the resilient packing element together with the metal tube which extends therethrough. This view illustrates in dotted lines the change of outline which the packing may assume when subjected to pressure.

Fig. 3 is a view similar to Fig. 2, showing a modification.

Referring in detail to the drawings, into the top of the wall casing 5 is screwed a tubular base member 6, having desirably four radially extending lugs or short bifurcated arms 7 ranged therearound two of these arms being shown in the drawings. Above said tubular base 6 is a tubular head 10 having a like number of similar radial arms 11. Between the bifurcations of the arms 7 are pivoted the lower ends of clamping links 12, the upper portions of said links being screw-threaded to receive the winged nuts 13 which cooperate with the arms 11.

The lower end of the tubular head 10 is provided with a circumferential skirt 15 within which is a shoulder 16 there being between said shoulder 16 and skirt an annular groove 17. Within said groove 17 is seated the upper portion of a packing ring 18, the thickness of said ring being considerably greater than the depth of said groove in order to provide, in conjunction with said links 12 and the arms with which they cooperate, an efficient packing which is held in place under pressure.

Within the lower portion of the tubular head 10 is screwed a barrel 20 having at its lower end a skirt or sleeve portion 21 and at its upper end a body portion 22. The lower portion of said sleeve 21 is internally bevelled at 23 at its lower end, and between this bevelled portion and the body portion 22 are the longitudinal slots 24, the lower portion of said slots being cut completely through the walls of the barrel and the upper portions thereof being of less depth to form grooves 24*a*.

In each of said slots and grooves is pivotally mounted a dog 25 having a head 26 which cooperates with a shoulder 27 provided upon the inner surface of the tubular base 6. Each of said dogs is normally maintained in its

operative position by its compression spring 28 said spring being located above the pivot 29 whereon the dog is mounted. These dogs are each provided with a tapered heel 30 which is adapted to be engaged by the shank 31 of the upper joint of the tool line which is suspended from the cable 32, and when so engaged said dogs are all moved from the operative to the inoperative position.

Said cable 32 is made fast to cable clamp 33 of well known construction and said clamp carries also the tubular plunger 34 through which said cable extends. Around said plunger 34 there is placed, in radially spaced relation thereto, a tubular guide 35, a stuffing box 36 being interposed between said guide and plunger in order to provide for reciprocatory movement of said plunger within said guide without leakage of oil or gas. Said guide 35 is provided therearound with an extension or thick rib 37, said extension 37 being embedded within a rubber body 40 which is vulcanized thereto and to a portion of the body of the plunger 35 above and below said rib.

Above said rubber body 40 an annular follower 41 is fitted into the upper end of the tubular head 10, and the structure is completed by screwing the cap 42 on to the upper end of the said tubular head. Said follower 41 is provided with a central opening 43 and said cap is provided with a central opening 44, these openings being large enough to provide a clearance between them and the tubular guide 35. A plurality of extensions 45 are provided on said guide 35 and 37 to aid in the vulcanizing process.

When the tubular guide 35 is mounted as stated it is supported entirely by the rubber body 40 which is vulcanized thereto. Around the lower end of said guide is provided the clearance 50 and between said clearance 50 and the rubber body 40 is provided a clearance 51, said clearances 51 and 50 being formed as bores located centrally of the tubular head 10. This construction provides a firm support for said tubular guide and yet permits considerable accommodation to irregularities of movement and angular position of the plunger 34 which operates therewithin.

The parts which contain the rubber 40 are so shaped as to provide a containing chamber having the upper angular recesses 52 and the lower angular recess 53 and there is also provided a broad shallow groove 54 formed within and around the upper portion of the barrel 10 opposite said rib 37.

The rubber body 40 is dished at 55 at its upper end and at 56 at its lower end, and is normally of uniform external diameter. But when said rubber body is subjected to endwise pressure there is caused to form around each of its ends a circumferential enlargement 58 and a resulting circumferential scallop 59 at its midlength.

The follower ring or disc 41 has its lower surface shaped to conform to the dished portion 55 of the rubber body, and said follower is of sufficient thickness to cause the screwing of the cap 42 thereagainst to compress the rubber body 40 to such an extent as to form a dependable fluid-tight closure around the guide 35.

The containing chamber in which the elastic body 40 is located is provided in its bottom with a central convexity 53*a*, and the follower 52 has a like convexity 52*a* in its lower face, causing the compression of said elastic body 40 between said swells to be radially outward. This leaves no additional pressure of the interior portion of said body 40 against the guide 35 when the follower 52 is clamped down against said body. Said guide 35 is therefore more free to deviate laterally when the well tool line is being operated. With respect to vertical pressures, when the follower 41 is forced down, the greatest movement of compression at each end of the elastic body 40 is close to the circumference of said body. Therefore the greatest condensing of the material in the elastic body 40 is produced along the outer portion thereof on all sides thereof, while the portions thereof nearer its axis remain in a less compressed condition and therefore yield more readily to accommodate themselves to changes in the axial position of the tubular guide 35 and its enlarged portion 37.

The recess 52*a* and 53*a* which are provided in the end portions of the rubber body 40 produce a pneumatic cushioning effect which augments and improves the general resiliency of the device.

Fig. 3 shows a modification wherein a rubber body 40*a* is provided at each side of the enlarged portion 37 of the tubular guide 35 thus leaving a clear annular space 59*a* around the enlargement 37 of the tubular guide. The elastic bodies shown in Fig. 3 may be forced over the guide stem 35 so as to be retained thereon friction tight aided by their own contractive elasticity, and therefore vulcanizing is not necessary in this form of the invention. Otherwise the construction shown in Fig. 3 is the same as shown in Fig. 2.

Referring to Fig. 1, it will be seen that the diameter of the openings 43 and 51 around the tubular guide 35 is less than the external diameter of the annular enlargement 37 of said guide. Therefore a volume of rubber of sufficient size to withstand effectively shearing strain is provided both above and below said annular enlargement 37.

In order to keep the barrel 20 from rotating while the tubular member 10 is being screwed thereonto, set screws 65 may be provided as shown to clamp against the lower end of said barrel 20.

Claims:

1. An oil saving device comprising a cable

adapted to support well tools, a plunger through which said cable extends and together with which it reciprocates, a guide around said plunger in spaced relation thereto, a packing in the space between said plunger and the interior surface of said guide and forming a fluid tight fit across said space, a rubber body surrounding said guide and vulcanized thereto, a support having a chamber into which said rubber body is fitted, said body being adapted to sustain said guide and to permit lateral deviation thereof, and means to secure said support to the top of a well casing to form a closure therefor.

2. In an oil saving device, the combination, with a cable and a plunger through which said cable extends and together with which it reciprocates; of a tubular head; means to attach said head to the upper end of a well casing, said head having a chamber therein in communication with the well casing; a tubular guide within which said plunger reciprocates; and an elastic body fitted within said chamber and secured to said guide and forming a fluid tight fit therearound, said elastic body permitting lateral deviations of said guide, there being clearance provided between said guide and hollow head to permit such deviations.

3. In an oil saving device of the character described, in combination, an upright member having a cup-shaped recess in its upper end and an axial bottom opening leading from said recess, means to attach said member to the upper end of a well casing with said bottom opening in communication with the well, an elastic body fitted within said recess, a tubular guide extending axially through said body and having said body secured thereto whereby a fluid tight fit is provided around said guide, means secured to the upper end of the cup-shaped part of said member and comprising a follower portion adapted to compress said rubber body, and well tool carrying means adapted to reciprocate through said guide, there being clearance around said guide to permit it to deviate laterally in opposition to the elasticity of said body.

4. In an oil saving device of the character described, in combination, an upright member having a cup-shaped recess in its upper end and an axial bottom opening leading from said recess, means to attach said member to the upper end of a well casing with said bottom opening in communication with the well, an elastic body fitted within said recess, a tubular guide extending axially through said body and having said body secured thereto whereby a fluid tight fit is provided around said guide, said tubular guide having a circumferential rib embedded in said elastic body, means secured to the upper end of the cup-shaped part of said member and comprising a follower portion adapted to compress said rubber body, and well tool carrying means adapted to reciprocate through said guide, there being clearance around said guide to permit it to deviate laterally in opposition to the elasticity of said body.

5. As a new article of manufacture for use in oil saving devices of the character described, a tubular guide adapted to direct the reciprocatory movements of tool pipe line suspending means, said guide having an elastic body secured thereto and extending therearound, said elastic body having dished end rendering the same thinner to add to the elasticity thereof, and said guide having a circumferential rib around which the central portion of said elastic body is moulded.

6. As a new article of manufacture for use in oil saving devices of the character described, a tubular guide adapted to direct the reciprocatory movements of tool pipe line suspending means, said guide having an elastic body secured thereto and extending therearound, said elastic body having dished end rendering the same thinner with a plurality of recesses formed therein to add to the elasticity thereof, and said guide having a circumferential rib around which the central portion of said elastic body is moulded.

7. As a new article of manufacture for use in oil saving devices of the character described, a tubular guide adapted to direct the reciprocatory movements of tool pipe line suspending means, said guide having an elastic body secured thereto and extending therearound, said elastic body having dished end portions rendering the same thinner to add to the elasticity thereof, and said guide having at substantially its mid-length means extending therearound and projecting outwardly therefrom into said elastic body to anchor said body thereto.

In testimony whereof we hereunto affix our signatures.

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