Nov. 5, 1940. S. P. TSCHAPPAT 2,220,359

WELL DEVICE

Filed April 7, 1938 2 Sheets-Sheet 1

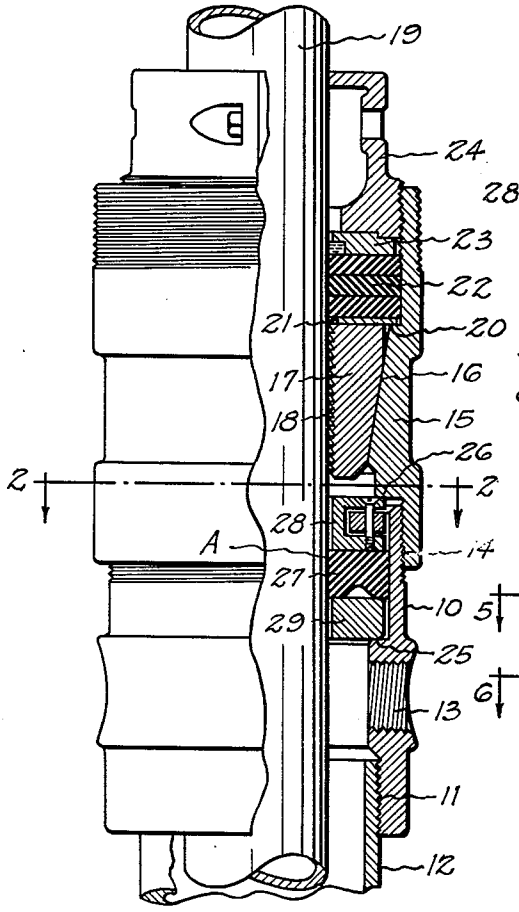


Fig. 1.

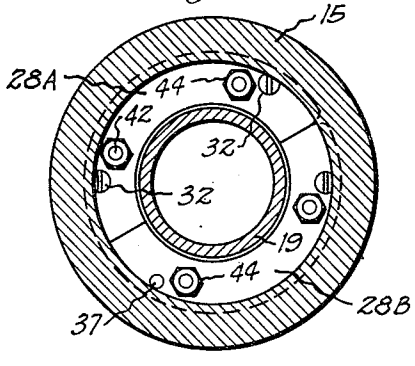


Fig. 2.

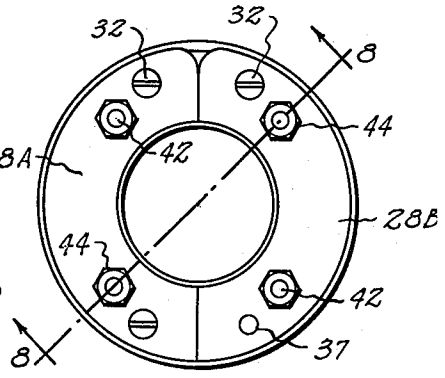


Fig. 4.

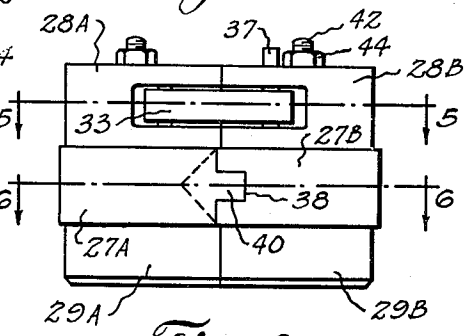


Fig. 3.

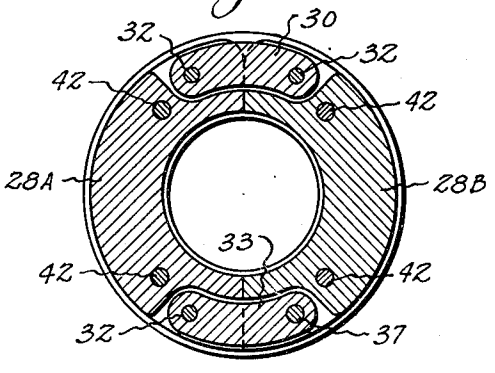


Fig. 5.

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WELL DEVICE

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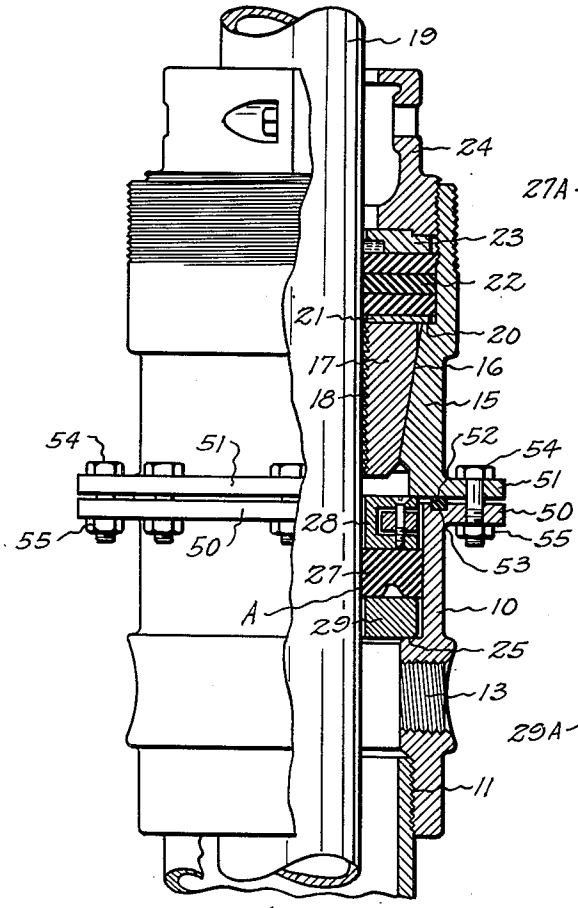


Fig. 10.

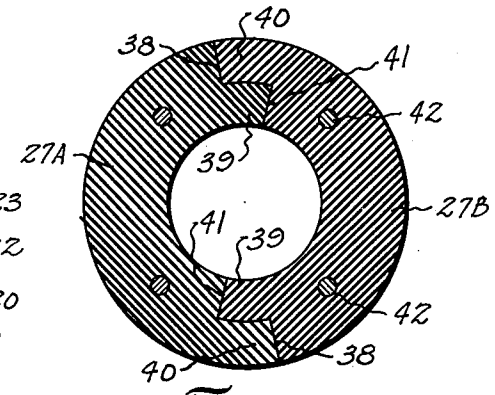


Fig. 6.

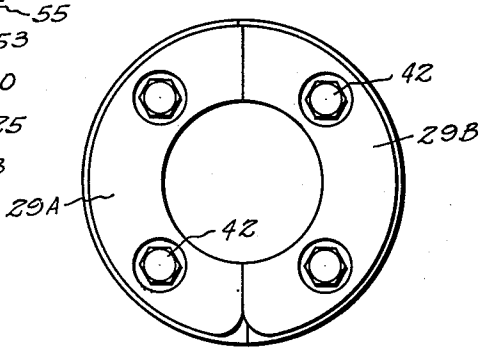


Fig. 7.

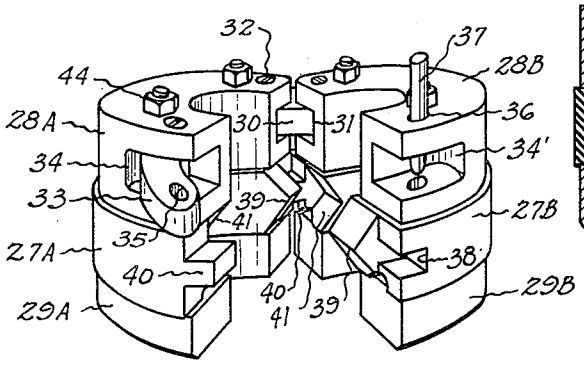


Fig. 9.

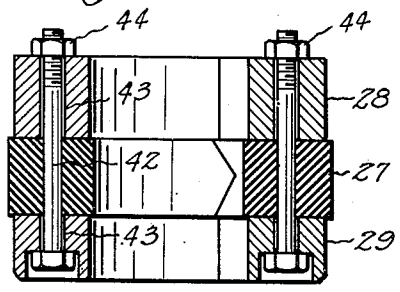


Fig. 8.

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UNITED STATES PATENT OFFICE

2,220,359

WELL DEVICE

Sheridan P. Tschappat, Tulsa, Okla.

Application April 7, 1938, Serial No. 200,585

2 Claims. (Cl. 166—14)

This invention relates to new and useful improvements in well devices.

One object of the invention is to provide an improved well device having means for supporting a well tubing and also having means for packing off around the pipe below the supporting means, whereby the device may be employed on high pressure wells without danger of such pressures forcing or blowing the tubing from the well.

An important object of the invention is to provide an improved blowout preventer which is adapted to be mounted within a tubing head so as to pack off around the tubing extending through said head, said preventer being rigidly anchored within the head so as to resist relatively high well pressures.

A further object of the invention is to provide an improved tubing head which will readily accommodate a blowout preventer without any material change; the preventer including hinged swinging sections which permit said preventer to be readily engaged around or removed from the tubing.

A further object of the invention is to provide an improved blowout preventer including a split packing ring or member which is adapted to be fitted together in an improved manner, whereby all the advantages of a solid annular packing member are had.

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 view, partly in elevation and partly in section of a well device, 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 an elevation of the blowout preventer, which is mounted within the head,

Figure 4 is a plan view thereof,

Figure 5 is a horizontal, cross-sectional view, taken on the line 5—5 of Figure 3,

Figure 6 is a horizontal, cross-sectional view, taken on the line 6—6 of Figure 3,

Figure 7 is a bottom view of the blowout preventer,

Figure 8 is a transverse, vertical, sectional view, taken on the line 8—8 of Figure 4,

Figure 9 is a perspective view of the preventer swung to its open position, and

Figure 10 is a view similar to Figure 1, showing a slightly modified form of the invention.

In the drawings, the numeral 10 designates an annular base which has the lower end of its bore internally screw-threaded at 11, whereby said base may be mounted on the upper end of a well casing 12, or other support. The base is formed with the usual lateral outlet ports 13 which extend through the wall of the base above the screw-threaded portion 11 and these ports are adapted to receive outlet pipes (not shown) for conducting the well fluid flowing upwardly through the casing outwardly from the base. The upper end of the base is externally screw-threaded at 14, whereby an annular body 15 may be mounted on said base. An annular inclined slip bowl 16 is formed within the body 15 and gripping slips 17 are adapted to seat within said bowl. The inner faces of the slips are provided with the usual teeth 18 and these teeth are adapted to engage the outer surface of the well tubing 19 which extends axially through the well casing 12. Manifestly, the slips 17 serve to support or suspend the tubing within the well casing.

An internal annular shoulder 20 is formed within the body 15 above the bowl 16 and a metallic ring 21 rests on this shoulder as well as upon the upper end of the slips 17. A plurality of elastic packing rings 22 are supported on the ring 21 and a second metallic ring 23 is disposed on the uppermost elastic ring 22. A packing gland or collar 24 is threaded into the upper end of the body 15 and engages the ring 23, whereby when said gland or collar is screwed downwardly against the ring, the elastic packing rings 22 are deformed or distorted into packing position with the bore of the bowl and the outer surface of the well tubing 19. Although the lowermost metallic ring 21 is shown as resting on the upper end of the slips 17, it is manifest that said slips might move downwardly within the bowl, whereby the ring 21 will be supported solely on the internal shoulder 20. With the above arrangement, the well tubing 19 is suspended from the slips 17 and the space between the well tubing and the bore of the body 15 is sealed off by the packing ring 22, whereby escape of pressure past the well tubing is prevented. It is preferable that the rings 21, 22 and 23, as well as the gland or collar 24, be split so that the same may be readily engaged around the tubing 19 after said tubing has been run through the body 15 and into the well casing.

An internal annular shoulder or seat 25 is formed within the base 10 above the lateral outlet ports 13 and a blowout preventer A is arranged to be supported on this seat. The blowout preventer is maintained in a seated position by an overhanging shoulder 26 which is formed internally at the lower end of the body 15, said shoulder engaging the upper end of the preventer, whereby the preventer is confined between the shoulder 26 and the seat 25. The blowout preventer includes a split packing element or collar 27 which is confined between an upper member 28 and a lower member 29, as is clearly shown in Figure 9.

The upper confining or retaining member 28 takes the form of a split ring which includes two semi-circular sections 28*a* and 28*b*. The sections are hinged together by a link 30 which extends into recesses 31 formed in two of the abutting faces of the section. The ends of the link 30 are secured to the section by screws 32 (Figure 5). With this arrangement, it is manifest that the sections 28*a* and 28*b* are hinged together and may be swung to an open position so as to be readily disengaged from around the well tubing 19. The hinging of the sections also permits the same to be readily engaged around the tubing. For locking the sections together, the section 28*a* is provided with a pivoted latch member 33 which is disposed within a recess 34. The outer end of the latch member is provided with a vertical opening 35 and when the sections are swung together so that their inner faces abut, this outer end of the latch member 33 is adapted to swing into a recess 34' formed in the section 28*b*. When the latch member 33 swings into the recess 34', the opening 35 in said member registers with openings 36 provided in the section 28*b* above and below the recess 34', whereby a latch pin 37 may be passed downwardly through the opening 36 and the opening 35, thereby locking the sections 28*a* and 28*b* together. The sections cannot be swung apart until the latch pin 37 is removed to permit the latch member 33 to be disengaged from the recess 34' and, therefore, a positive means of locking the sections 28*a* and 28*b* around the well tubing 19, is provided.

The packing element 27 is located immediately below the upper confining member 28 and is constructed of two sections 27*a* and 27*b*, which sections are substantially semi-circular in cross-section and complementary to the sections 28*a* and 28*b* of the member 28. Each section of the packing element 27 is constructed in exactly the same manner and it is believed that a description of one will suffice. One end or abutting face of the section 27*b* is formed with a recess or groove 38, which recess is substantially rectangular in cross-section. The recess extends from the outer surface of the section 27*b* to a point midway of the width thereof. The other half of the end or abutting face of said section is formed with an outwardly extending projection 39 and this projection is substantially V-shaped in vertical section. The base of the V-shaped projection 39 is substantially equal to the height of the section 27*b*. The opposite end or abutting face of the section 27*b* is formed with an outwardly extending tongue 40, said tongue having a rectangular shape in cross-section and being of substantially the same height and width as the groove 38 provided in the opposite face. The tongue 40 extends from midway of the width of the abutting face to the outer surface of the section 27*b* and the other half of said abutting face is formed with a recess 41 having substantially a V-shape in cross-section. The V-shape recess is of substantially the same size and shape as the projection 39 which is formed on the opposite end of the section 27*b*.

The section 27*a* is constructed in the same manner as is the section 27*b* being provided in one end or abutting face with the rectangular recess 38 and V-shaped projection 39, while its other face is formed with the rectangular tongue 40 and V-shaped recess 41. With this arrangement, when the sections 27*a* and 27*b* are swung together so that their end faces abut each other, the tongue 40 on one section engages the recess or groove 38 on the other section, while the V-shaped projection 39 on one section engages within the V-shaped recess 41 on the other section. With this arrangement, the projections 39 and the tongues 40 provide an overlapping engagement between the sections 27*a* and 27*b*, whereby a leakage past the abutting faces of the two sections is positively prevented.

The lower confining member 29 which is disposed below the packing element 27, is constructed in the form of a split ring or collar whereby said member includes a pair of semi-circular sections 29*a* and 29*b*, said sections being complementary to the semi-circular sections 27*a* and 27*b* of the packing elements, as well as complementary to the semi-circular sections 28*a* and 28*b* of the upper confining member 28. For securing the confining members and the packing element together, elongate vertical bolts 42 extend through openings 43 formed in the members and the packing element. These bolts have their heads countersunk in the lower member 29 (Figure 8), while their upper ends receive nuts 44, whereby the sections of the members and the packing element are secured together. Manifestly, since the sections 27*a*, 28*a* and 29*a* are fastened together, with the sections 27*b*, 28*b* and 29*b* fastened together and a pivotal connection through the links 30 therebetween, the blowout preventer comprises a pair of end sections which may be separated to permit said preventer to be engaged around the well tubing 19 or to be removed therefrom.

In operation, the base 10 is first mounted on the well casing 12, or other support, and the blowout preventer is then engaged around the well tubing 19, after which the latch member 33 is swung into the recess 34' and the latch pin 37 lowered through the opening 36 and the opening 35 in said member, whereby the preventer is locked around the tubing. The preventer is then lowered onto the seat 25 and the body 15 is then screwed onto the base so that the shoulder 26 overhangs the upper member 28 of said preventer. It is pointed out that the internal diameter of the packing element 27 is such that said element packs off around the well tubing. Upward displacement of the blowout preventer is obviated because the preventer is confined between the shoulder 26 and the seat 25. It is, therefore, impossible for any pressure to escape between the bore of the base 10 and the well tubing 19.

After the blowout preventer A is in its proper place, the slips 17 are dropped into the bowl 16 of the body 15 and these slips grip the tubing to suspend the same from the body. After the slips are in position, the rings 21, 22 and 23 are inserted into the upper end of the body, after which the gland 24 is threaded therein to distort the rings 22 and pack off between the well tubing and the body 15.

With such an arrangement, it is manifest that a tubing supporting means is provided with a blowout assembly located below the supporting means for said tubing. The provision of the blowout assembly at this point prevents the well pressure from acting against the slips and therefore danger of the tubing being blown from the well is eliminated. If it is desired to remove the blowout assembly, it is only necessary to remove the body **15** from the base **10**, whereby access to the preventer assembly may be had.

In Figure 10, a slightly modified form of the invention is shown. In this form the upper end of the base **10** is formed with an outwardly directed annular flange **50**. The body **15** is formed with a complementary flange **51** on its lower end and when the body is placed on the base, the flanges are co-extensive. A suitable packing ring **52** is disposed in a recess **53** formed in the top of the base **10** and bolts **54** pass through the flanges and receive nuts **55** to securely fasten the flanges together. With this arrangement, it is not necessary to rotate the body **15** in order to remove the same from the base **10**. This rotative movement is necessary in the form shown in Figure 1 because of the screw-threaded connection between the base and the body. In the form wherein the flanges are employed, the bottom or lower edge of the body overhangs the blowout assembly to prevent upward displacement therefrom, whereas in the first form the shoulder **26** is formed internally of the body. The operation of both forms is substantially identical with the exception that the use of the flanges facilitates separation of the base and body.

The description which has been given recites more or less detail of a particular embodiment of the invention, which is set forth as new and useful; however, I desire it understood that the invention is not limited to such exact details of construction, because it is manifest that changes and modifications may be made, within the scope of the appended claims, without departing from the spirit of the invention.

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

1. The combination of a hollow cylindrical base having an outlet and provided with an annular shoulder therein above said outlet and a substantial distance below its upper end, a split annular blowout preventer housed in the upper portion of said base and carried by said shoulder, a cylindrical body having its lower end screwed onto the base and having a slip bowl therein, said body overhanging the blowout preventer in such close relation as to hold it in the base, separable slips mounted in the bowl of the body, a split packing in the body immediately above the slips, the blowout preventer and the packing co-acting to pack off immediately above and below the slips, and means for distorting the packing, the packing co-acting with the slips to prevent the well pressure which expands the blowout preventer from dislodging the slips from the bowl of the body.

2. As a sub-combination in a well device of the character described, a blowout preventer including a pair of hinged semi-circular sections, each section comprising upper and lower metallic members and an elastic member confined therebetween, the lower metallic member having its edge portion substantially right angular in cross-section so as to seat upon a transverse shoulder, the elastic members having complementary V-shaped intermeshing portions and a mortise and tenon joint to form a seal, and means for latching the sections together.

SHERIDAN P. TSCHAPPAT.