Sept. 15, 1936. A. J. PENICK ET AL 2,054,336

BLOW-OUT PREVENTER

Filed Jan. 31, 1935 2 Sheets-Sheet 1

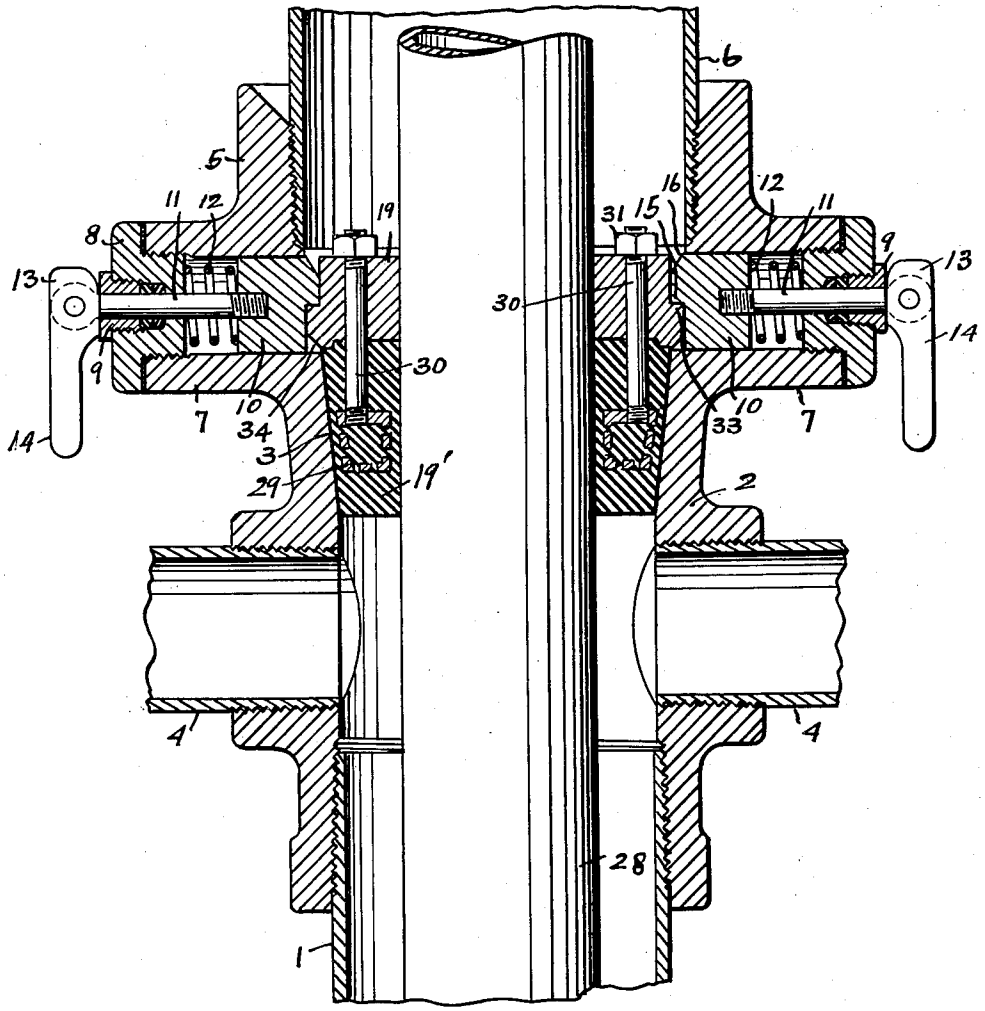


Fig. 1.

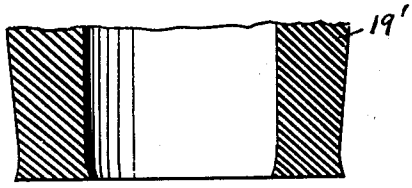


Fig. 2.

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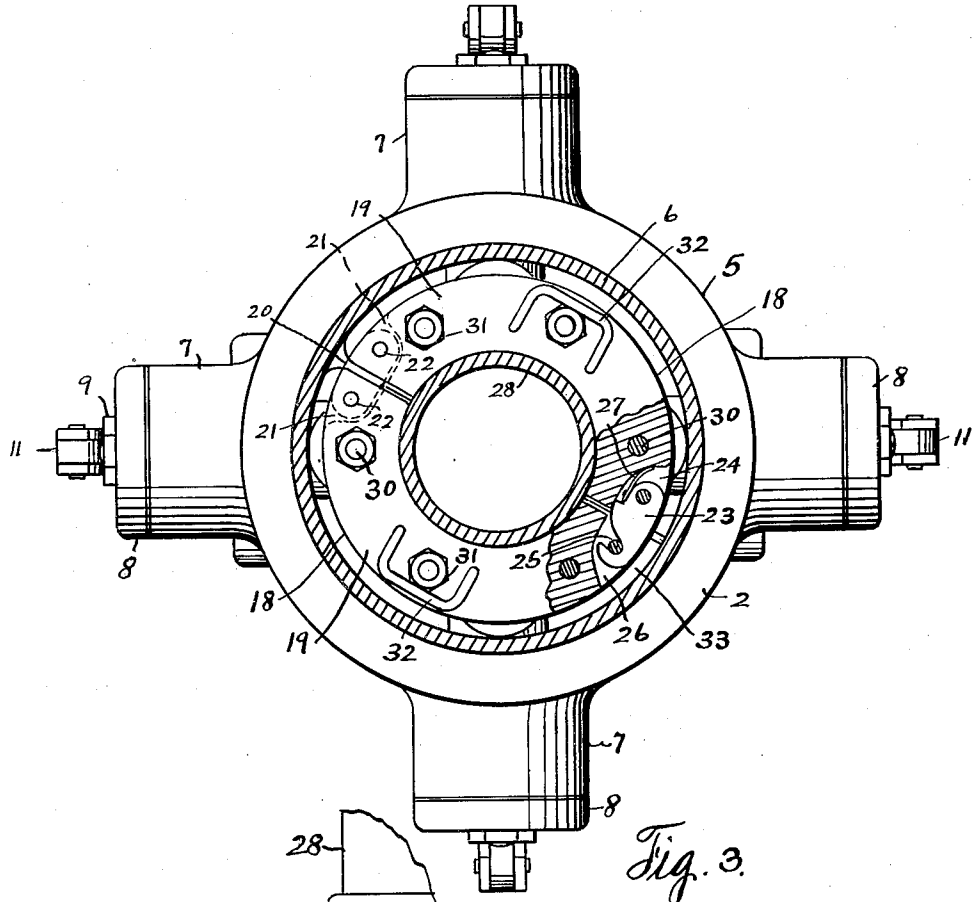


Fig. 3.

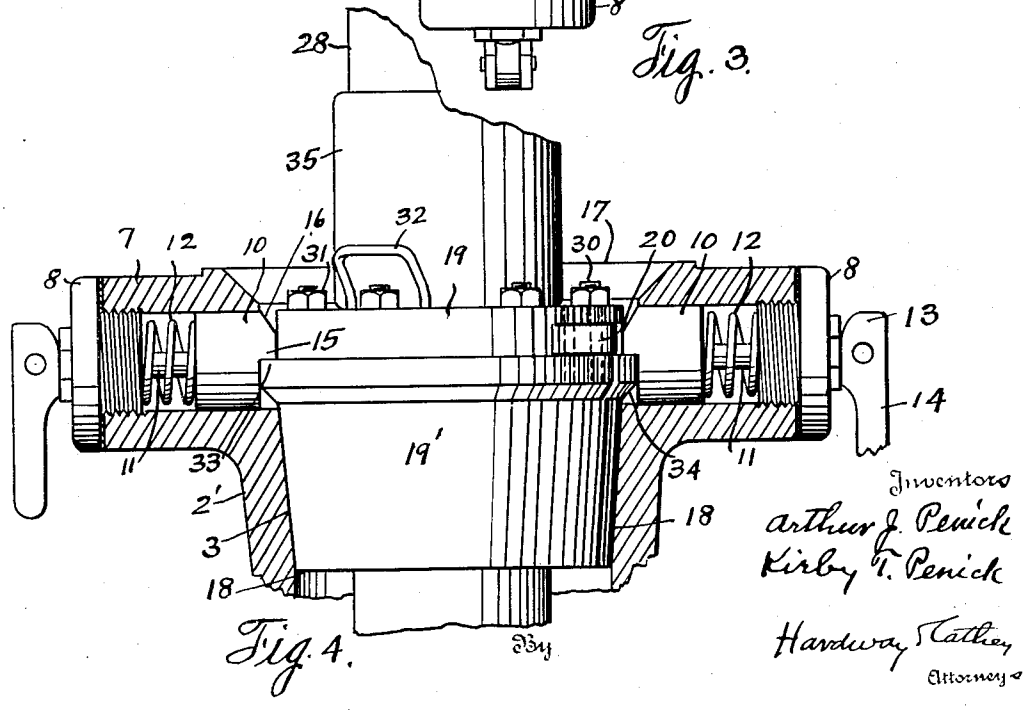


Fig. 4.

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UNITED STATES PATENT OFFICE

2,054,336

BLOW-OUT PREVENTER

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Application January 31, 1935, Serial No. 4,258

5 Claims. (Cl. 285—22)

This invention relates to a blow out preventer.

An object of the invention is to provide a blow out preventer particularly adapted for use in carrying on drilling operations in the presence of gas pressure in the well and to prevent the escape of oil or gas under pressure from the well; the apparatus is also useful when it is desired to retain the drilling fluid or other fluid in the well under pressure.

The invention also comprehends a novel type of packing unit with novel means for securing the unit in place.

This invention also embodies certain improvements over that type of combination casing head and blow out preventer disclosed in our co-pending application, filed in the United States Patent Office on June 26, 1933, under Serial No. 677,656.

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

Figure 1 shows a vertical sectional view of the apparatus.

Figure 2 shows a fragmentary vertical sectional view of the packing of the pressure head.

Figure 3 shows a transverse sectional view shown partly broken away, and

Figure 4 shows a side view of the pressure head as located in the seat of a modified form of the casing head.

Referring now more particularly to the drawings wherein line numerals of reference designate the same parts in each of the figures, the numeral 1 designates a well casing having the casing head 2 secured to the upper end thereof. The casing head is provided with an inside downwardly tapering seat 3 and has the lateral flow-lines 4, 4, leading therefrom beneath said seat through which the fluid in the well may be led off, or fluid under pressure may be forced into the well as desired.

At its upper end, the casing head has the tubular upward extension 5 which is internally threaded to receive the pipe 6 to which the Christmas tree or other flow connections may be connected. Above the seat 3 the casing head has the radial cylinders 7, whose outer ends may be closed by the caps 8, which are screwed therein and which are provided with the stuffing boxes 9. Cylindrical dogs 10 are mounted in said cylinders and are attached to the inner ends of the rods 11 which work outwardly through the corresponding stuffing boxes. Between the caps 8 and the corresponding dogs 10 are the coil springs 12 which surround the corresponding rods 11 and which normally act to hold said dogs in their inward positions.

Pivoted to the outer ends of the rods 11 are the cams 13 having the handles 14. The handles 14 may be moved outwardly and thereupon the cams will operate against the outer faces of the stuffing boxes to pull the dogs 10 outwardly, placing the springs 12 under compression when said handles are moved inwardly to the position shown, to release the cams from said faces, the springs 12 will operate to force the dogs inwardly into active position. The inner ends of the dogs have the transverse downwardly facing shoulder 15, and above said shoulders have the downwardly and inwardly converging faces 16.

In the form shown in Figure 4, the casing head 2' has the inside downwardly converging seat 3, but does not have the upward extension 5, or the pipe 6 connected thereto, but above the seat 3 has the upwardly and outwardly flared face 17. There is a packing unit, or assembly, formed of arcuate confronting segments indicated generally in Figures 3 and 4 by the numerals 18, 18. Each segment is composed of an arcuate metallic anchor 19, and an arcuate packing 19' secured to the under side of said anchor. The anchors 19 are hinged together at one side by the hinge-plate 20, whose ends are fitted into slots 21 at adjacent ends of the anchors and pinned therein by the pins 22. At the opposite side of the packing unit, there is the latch 23, hook-like in form, one end of which is pivoted in the slot 24 in one of said anchors, and whose hook end is adapted to engage a pin 25 extending through the slot 26 of the adjacent end of the other anchor. Said hook is maintained in engaging position by means of a flat spring 27 which is attached to the latch and which bears against the opposing wall of the slot 24. The packing unit is so shaped that when latched around the drill stem or other pipe 28, it will completely surround said inner pipe and the outer surface of the packing 19' is tapered to conform to the shape of and to fit within the seat 3. Embedded within the material of the packing 19' of each segment, there is a rigid reinforcing member 29 preferably formed of metal and of hollow cage-like construction and upstanding from the reinforcing member of each segment are the anchor rods 30, 30, which extend up through the anchors 19 above and whose upper ends are threaded to receive the nuts 31 whereby the packing may be maintained in place. In case the packing should become worn so as not to form

a tight fit within the seat 3, the nuts 31 may be tightened up to draw up the reinforcing members 29 to thus effect the expansion of the corresponding packing 19' so that a tight fit will be secured between the packing and the seat 3. As shown, the lower end of the packing presents an annular flat face and is flared outwardly and inwardly as shown in Figure 2 so that the lower end of the packing will be compressed when seated in the seat 3 around the pipe 28 to form a very tight fit.

The segments 18 have the handles 32, by means of which the packing unit may be handled.

The upper end of the anchors 19 of the packing unit is reduced forming an annular external shoulder 33, and beneath said shoulder the anchors are upwardly and outwardly beveled forming the face 34.

The casing head 2 will usually be located beneath the derrick floor and when, for any reason, it may be desired to seat the packing unit in the casing head, the segments of the packing unit may be swung open and then closed around the inner pipe or tubing 28 above the derrick floor and latched and the inner pipe then lowered and the packing unit will be carried downwardly into the casing head and seated therein with the packing seated securely in the seat 3 and completely closing the space between the inner pipe or tubing 28 and the casing head.

As the packing unit is lowered, the beveled face 34 will engage the beveled face 16 of the dogs 10 and force said dogs outwardly and when the shoulders 33 pass beneath the shoulders 15, the springs 12 will force said dogs inwardly and the shoulders 15 will engage over the shoulders 33 and lock the packing unit in place. When the form shown in Figure 1 is used, pipe 16 will guide the packing unit downwardly into position, and when the form shown in Figure 4 is employed, the upwardly flared face 17 will act as a guide for the packing unit.

With the packing unit seated in place in the packing head, the inner pipe or tubing 28 may be further lowered until the coupling 35 thereof lands on the packing unit and said unit will then serve as a hanger for the tubing and the Christmas tree may be connected to the tubing.

When it is desired to remove the packing unit, the handles 14 may be swung outwardly to withdraw the dogs 10 into their outer or inactive position to release the shoulders 15 from the shoulders 33, and the unit may then be readily withdrawn.

The drawings and description disclose what is now considered to be a preferred form 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 having an inside seat and having an approximately radial cylinder above the seat, a dog in the cylinder movable into inner or active position and into outer, or inactive position, a pressure head adapted to surround an inner pipe and shaped to fit said seat, means on the pressure head engageable with the dog to lock the pressure head on the seat; yieldable means normally holding the dog in said active position, and handles having cam faces operative against the outer ends of the cylinders for manually moving the dog into outer or inactive position to release and permit the removal of the pressure head.

2. A blowout preventer comprising a casing head having a radial cylinder and an inside seat beneath the cylinder, a dog movable in the cylinder, a pressure head shaped to surround a pipe through the casing head and to fit onto said seat, said dog and pressure head having means adapted to interlock to maintain the pressure head on the seat, a yieldable member arranged to act against the dog to maintain said interlocking means in interlocking position, a handle operatively connected with the dog and provided with a cam face arranged to bear against the outer end of the cylinder whereby the dog may be moved to inactive, or retracted position by an appropriate movement of the handle.

3. A blowout preventer comprising a casing head having a radial cylinder and an inside seat beneath said cylinder, a dog movably mounted in the cylinder and whose inner end is formed with a transverse downwardly facing shoulder, a pressure head shaped to surround an inner pipe in the casing head and to fit said seat, said pressure head having an external upwardly facing shoulder, a yieldable member normally holding the dog in inner or active position with its shoulder in engagement with the shoulder of the pressure head, and means for retracting the dog and for locking it in retracted position, said retracting means comprising a handle connected to the dog and having a cam face which bears against the outer end of the cylinder, and which is operative to retract the dog upon an appropriate movement of the handle.

4. A blowout preventer comprising a casing head having a radial guide and an inside seat beneath the guide, a pressure head shaped to surround a pipe through the casing head and to fit into said seat, a locking device movable in the guide, said locking device and pressure head having means adapted to interlock to maintain the pressure head on the seat, a yieldable member arranged to act against the locking device to maintain said interlocking means in interlocking relation, a handle operatively connected with the locking device and provided with a cam face arranged to bear against the outer end of the guide whereby the locking device may be moved to inactive or retracted position by an appropriate movement of the handle.

5. A blowout preventer comprising a casing head having a radial guide and an inside seat beneath the guide, a pressure head shaped to surround a pipe through the casing head and to fit into said seat, a locking device movable in the guide, said locking device and pressure head having means adapted to interlock to maintain the pressure head on the seat, a yieldable member arranged to act against the locking device to maintain said interlocking means in interlocking relation, a handle operatively connected with the locking device and provided with a cam face arranged to bear against the outer end of the guide whereby the locking device may be moved to inactive or retracted position by an appropriate movement of the handle, and means for preventing the escape of fluid from the well through said guide.

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