Nov. 22, 1932. W. L. CHURCH 1,888,550

CONTROL HEAD

Filed March 6, 1930

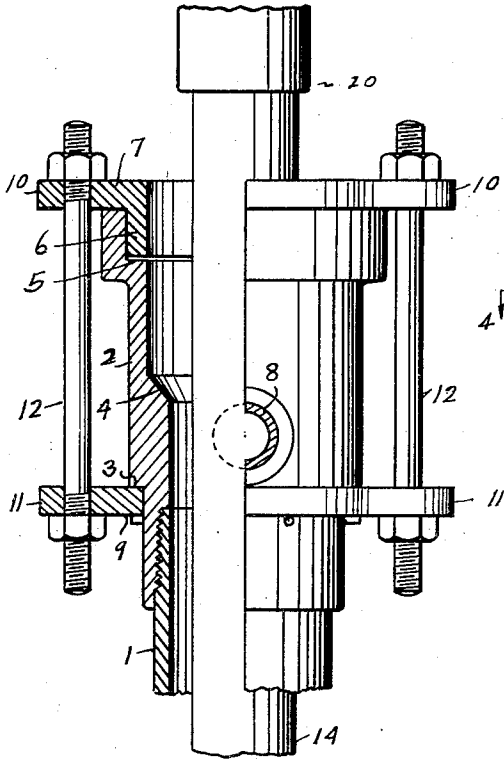


Fig. 1.

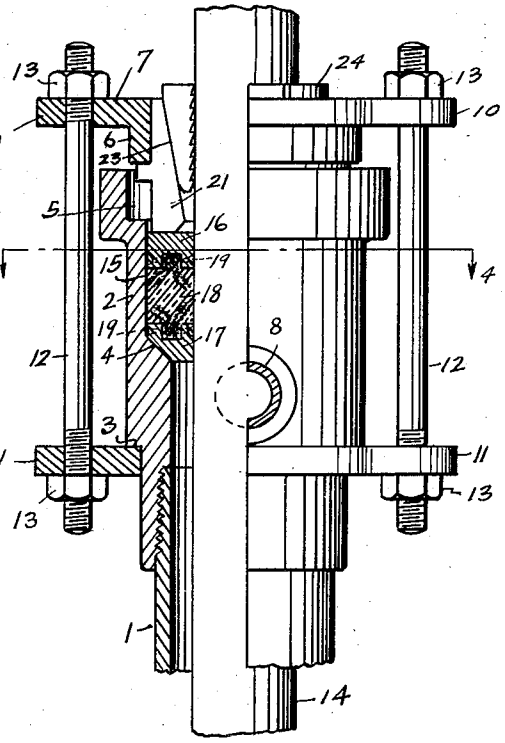


Fig. 2.

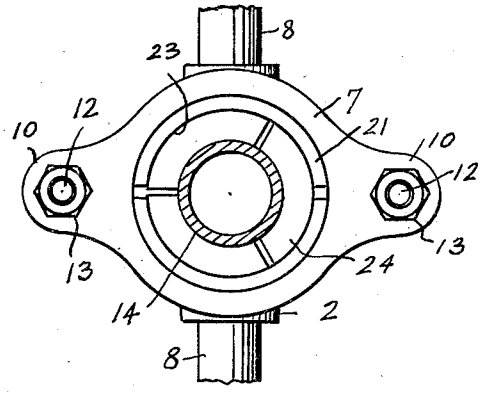


Fig. 3.

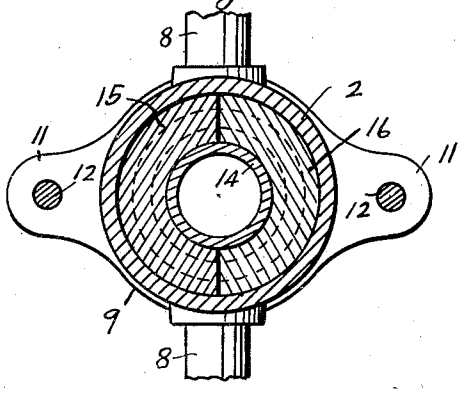


Fig. 4.

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UNITED STATES PATENT OFFICE

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CONTROL HEAD

Application filed March 6, 1930. Serial No. 433,595.

This invention relates to new and useful improvements in a control head.

One object of the invention is to provide a control head, and in combination therewith a means for forming a seal between the casing, to which the head is attached, and an inside pipe in the well.

Another object of the invention is to provide, in a device of the character described, sealing means formed to be engaged by the inner pipe and thereby held securely seated in the bowl of the control head to prevent the escape of gas or other fluid up through the control head around the inner pipe; and the invention further comprehends additional means for holding the sealing means securely seated in the control head bowl.

A further feature of the invention resides in the novel combination with a control head bowl, of a sectional packer, of novel formation, comprising the sealing means referred to, a sectional spider mounted on the packer engaging slips in the spider with which the inner pipe is adapted to be engaged and clamp means for additionally securing said spider in clamping relation with said packer; the device being thus capable of use either as a casing head, or as a blow out preventer.

With the above and other objects in view this 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 drawing, wherein:

Figure 1 shows a side view, partly in section, of the device, showing the packer and packer retaining means removed.

Figure 2 shows a side view, partly in section, of the complete device.

Figure 3 shows a plan view and

Figure 4 shows a cross sectional view taken on the line 4—4 of Figure 2.

Referring now more particularly to the drawing, wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 refers to a casing set in a well bore and the numeral 2 designates a bowl secured to the upper end thereof. This bowl has the external annular shoulder 3, the internal, annular, downwardly tapering seat 4, above said shoulder, and is enlarged at its upper end forming a seat 5 to receive the annular lower end 6 of the yoke 7. The bowl also has one or more lateral flow lines, as 8, through which the fluid in the well may flow out and these lines 8 have the usual control valves (not shown).

There is an annular yoke 9 around the lower end of the bowl against the shoulder 3 and the yokes 7 and 9 have the lateral, vertically aligned ears 10, 11 provided with bearings to receive the corresponding ends of rods 12, 12. The ends of these rods are threaded to receive the nuts 13, 13. The numeral 14 designates the inner pipe in the well bore.

While drilling or during other operations in the well, the yoke 7 is seated in the seat 5 and the opening through this yoke is large enough to permit the unobstructed carrying on of the desired operations.

In case it be desired, for any reason, to form a seal between the inner pipe and the bowl a packer, as 15, may be inserted through the yoke 7 into the bowl and landed on the seat 2. This packer is formed of two confronting sections, arcuate in horizontal cross sectional contour, and thus formed to completely surround the inner pipe. In a preferred form of the packer each half, or section, is composed of the upper and lower arcuate ferrules 16, 17 whose facing sides are arcuately grooved. Between said ferrules are the confronting resilient packing members 18 formed to fit snugly in the bowl and around the inner pipe and whose upper and lower ends are reduced and fitted into the corresponding grooves. These reduced ends are preferably reinforced, by fabric or otherwise and are secured to the respective ferrules, as by transverse rivets 19.

Under ordinary conditions the inner pipe 14 may be raised, if necessary, before inserting the packer to bring a collar, as 20, above the packer. When the packer is inserted the inner pipe may then be lowered and said collar 20 seated on the packer to expand the same and form a tight seal between the casing and inner pipe. The oil or gas may now flow out through the lines 8 and the

flow controlled by the valves of said lines. If desired the lines 8 may be closed, by said valves, and the oil or gas forced out through the inner pipe 14. The control head may thus be used as a casing head.

In case the inner pipe is stuck in the well, or is so located that the collar thereof cannot be utilized to hold the packing in the bowl, or in case the weight of the inner pipe is not thought to be sufficient to restrain the internal pressure, the yoke 7 may be removed and the sectional spider 21 seated around the inner pipe and on the upper end of the packing and the yoke 7 then replaced. This spider has an external annular rib 22 on which the lower end of the yoke 7 is adapted to rest when the spider is in place on the packer. The spider is formed of confronting sections, preferably two, and has the inside downwardly converging seat 23 in which the tapering, wedge shaped, slips 24, are adapted to seat. These slips are arcuate in cross section, to fit around the inner pipe, and the inner sides are toothed to engage said pipe. As stated if a collar is not available, that is, is not so located as to rest on the packing, the spider and slips may be assembled about the inner pipe as described above, and as shown in Figure 2, and they will carry the weight of the inner pipe on the packing. In such case, if the inner pipe should be stuck in the bore an upward pull may be exerted on said pipe and the slips 24 then inserted and the pipe released and its elasticity will hold the spider 21 firmly against the packing. If additional security be necessary to prevent the packing from blowing out, as in case of strong internal gas pressure the nuts 13 may be tightened up to draw the yoke 7 down against the spider after the fashion of a jack, and the device will then be used as, and for the purpose of, a blow out preventer.

During the carrying on of ordinary operations in the well, the packer, the spider 21 and the slips 24 are removed, leaving the yokes 7, 9 assembled with the bowl as shown in Figure 1. In case of a threatened blow out, or in case it be for any reason desired to close the space between the bowl and inner pipe the packer, spider and slips may be readily inserted in place and these parts are formed of sections for convenience in insertion, and, as hereinabove explained. The yokes 7 and 9 are turnable about the axis of the bowl so the bearings for the rods 12 may be easily kept in alignment.

The drawing 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 I claim is:—

1. A control head for forming a seal between an outer and inner pipe in a well bore, including a bowl attached to the outer pipe and having an inside seat and an outlet beneath said seat, a sectional packer formed to fit within the bowl and rest on said seat, said packer being shaped to closely surround the inner pipe, a sectional spider on said packer and having an upwardly flared seat around the inner pipe, pipe engaging slips in the spider seat and formed to engage the inner pipe and means for maintaining said spider in position on said packer, said spider maintaining means comprising a yoke around and interlocked with the spider and means for securing the yoke to said bowl.

2. A control head for forming a seal between an outer pipe and an inner pipe in a well bore, including a bowl attached to the outer pipe and having an inside seat and an outlet beneath said seat, a sectional packer formed to fit within the bowl and rest on said seat, said packer being shaped to closely surround the inner pipe, a sectional spider on the packer having an inside seat around the inner pipe, pipe engaging slips in the spider seat in engagement with the inner pipe, connected yokes, one in engagement with the spider and the other anchored to said bowl.

3. A control head for forming a seal between an outer pipe and an inner pipe in a well bore including a bowl attached to the outer pipe and having an inside seat and an outlet beneath said seat, a sectional packer formed to fit within the bowl and rest on said seat, said packer being shaped to closely surround the inner pipe, a sectional spider on the packer having an inside seat around the inner pipe, pipe engaging slips in the spider seat in engagement with the inner pipe, connected yokes, one in engagement with the spider and the other anchored to said bowl, said yokes being turnable about the bowl.

4. A control head for forming a seal between an inner pipe and an outer pipe in a well bore and including a bowl having an inside seat, an expansible packer formed of confronting sections shaped to fit within the bowl and closely surround the inner pipe, a spider, formed of sections, seated on said packer and having an inside seat and an external abutment, pipe engaging slips in said spider seat and in engagement with the inside pipe, a yoke around the spider in engagement with said abutment, and releasable means for anchoring said yoke to said bowl.

5. A control head for forming a seal between an inner pipe and an outer pipe in a well bore and including a bowl having an inside seat, an expansible packer formed of confronting sections shaped to fit within the bowl and closely surround the inner pipe, a spider formed of sections on said packer and having an inside seat, pipe engaging slips in the spider seat in engagement with the inner pipe, and a releasable ring like member

around the spider and forming means for anchoring the spider in place.

6. A control head for forming a seal between an inner pipe and an outer pipe in a well bore and including a bowl having an inside seat, an expansible packer shaped to fit within the bowl and closely surround the inner pipe, a spider formed of sections on said packer and having an inside seat, pipe engaging slips in the spider seat in engagement with the inner pipe, and an annular member around and in engagement with the spider and releasably attached to the bowl for anchoring the spider in place, said anchoring means being adjustable and being thus effective to operate, through the spider, to vary the expansion of said packer.

7. A control head for forming a seal between an inner pipe and an outer pipe in a well bore and including a bowl having an inside seat, an expansible packer formed of confronting sections shaped to fit within the bowl and closely surround the inner pipe, a sectional spider on the packer having an inside seat and an outside abutment, pipe engaging slips in the spider seat in engagement with the inner pipe, said bowl having an external abutment, yokes in engagement with said respective abutments and adjustable means connecting said yokes.

8. A control head for forming a seal between an inner pipe and an outer pipe in a well bore and including a bowl having an inside seat, an expansible packer shaped to fit within the bowl and closely surround the inner pipe, a sectional spider on the packer having an inside seat and whose lower end fits within the bowl, pipe engaging slips in the spider seat in engagement with the inner pipe and an annular member adjustably and releasably secured to the bowl and in interlocking engagement with the spider.

In testimony whereof I have signed my name to this specification.

WALTER L. CHURCH.