Dec. 15, 1931. W. B. WIGLE 1,836,565

CONTROL HEAD FOR OIL AND GAS WELLS

Filed Dec. 24, 1928

FIG. 1.

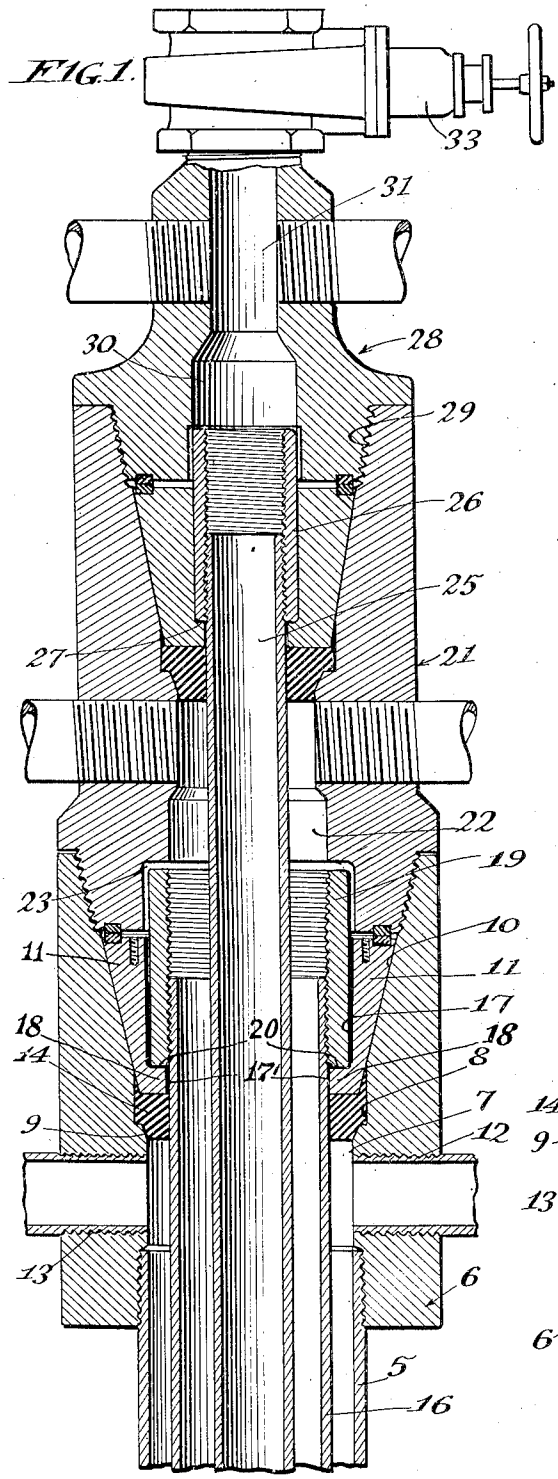


FIG. 3.

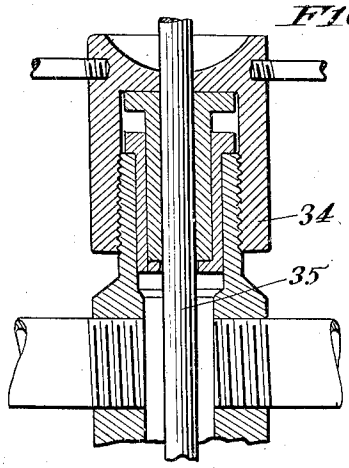
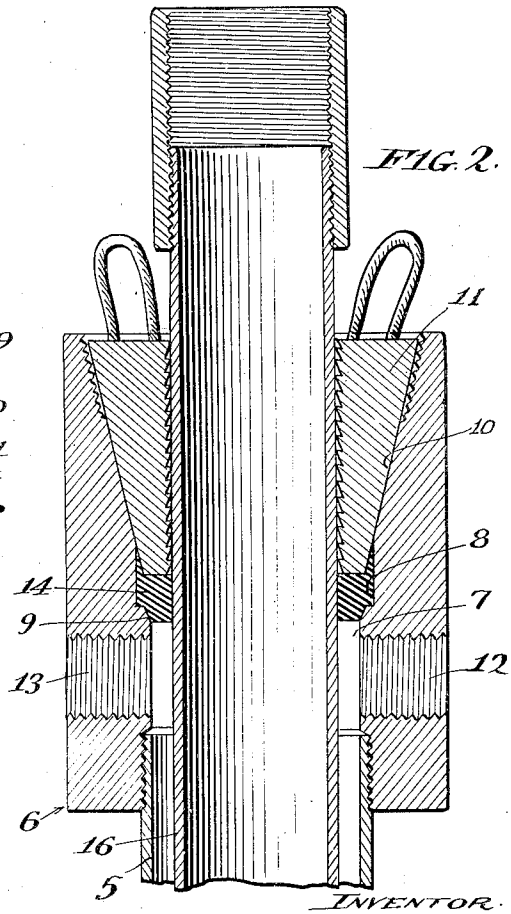


FIG. 2.



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CONTROL HEAD FOR OIL AND GAS WELLS

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This invention relates more specifically to a casing sealing mechanism and its chief object thereof is to provide a mechanism for effectually sealing off the annular channels between a plurality of strings of casing and tubing.

Another object is the provision of a control mechanism that may be readily applied to a plurality of strings of casing to enclose the same securely together without employing anchor bolts, clamps and the like.

Another object is to provide a mechanism in which the weight of the casing or tubing is utilized to seal the channels between a plurality of strings of casing or tubing.

Another object is to provide a control mechanism that will interlock a pair of casing heads in alignment with the casing head spiders in order that no interference will be encountered in the operation of the casing head slips.

A further object is to provide a control mechanism, whereby the casing heads will be interlocked together in such manner as to provide an effectual seal between the same from the largest diameter of casing to the smallest diameter of tubing.

A still further object is to provide a control mechanism that will provide independent outlets between each string of casing for the effectual control of the oil and gas issuing therefrom.

Still another object is to provide a control mechanism for gas and oil wells in which means are provided for maintaining the well under perfect control while bailing or swabbing.

In the preferred form, the mechanism comprises a plurality of control heads provided with bores of different diameters adapted to interlock with each other and to engage the upper ends of strings of casing or tubing, each head being provided with split rubber sealing rings and tapered slips engaging the same for packing off the channels of the strings of casing. The couplings on the upper end of each of the various strings of casing engaging the slips and compressing the sealing rings to pack and seal the lower end of the bore of the heads around the casing passing upwardly therethrough. Each head is provided with vented openings for the passage of the oil and gas from the casing channels, and the uppermost head is provided with a master gate valve which may be readily operated to provide means for maintaining the well under absolute control at all times while swabbing or bailing. If the well is not a flowing one this gate may be quickly removed and a stuffing box of usual form may be substituted therefor, the "polish rod" used in pumping passing therethrough.

The invention resides in such other novel features and combinations as may be elsewhere herein disclosed.

In the accompanying drawings wherein a single embodiment of the invention is disclosed by way of illustration:

Fig. 1 is a central vertical section through the upper ends of a plurality of strings of well casing, the control heads being operatively attached to the strings and showing the means for sealing the channels between the various strings.

Fig. 2 is a central vertical section through one of the control heads in which casing slips are inserted for holding an inner string of suspended casing, the weight of the casing expanding the sealing ring into fluid tight engagement with the inner string.

Fig. 3 is a central section through the uppermost control head showing a stuffing box construction for pumping operations substituted for the master valve.

In the drawings I have illustrated an oil well provided with three strings of well casing, and three control heads secured together in interlocking relation, but it will be understood that any larger or smaller number of concentric casing strings may be employed and sealed from each other with equal facility.

Referring now more particularly to Fig. 1 of the drawings, 5 designates the upper externally threaded end of the largest diameter of casing, to which the lowermost control head 6 is detachably secured. This head is preferably cylindrical in form and is provided in its lower end with a cylindrical bore 7 that extends upwardly to approximately

the middle of the head terminating in a circular seat 8, its lower end being tapered as at 9. From the upper end of the seat 8 the head is provided with a conical cavity 10 for the reception of a plurality of conical casing slip members 11. Midway the upper end of the casing 5 and the seat 8 are lateral control head vents 12, 13, for directing the flow of oil and gas issuing from the well, the vents being provided with the usual pipe lines controlled by valves (not shown). Disposed on the annular seat 8 is a split rubber packing ring 14 for packing the annular space between the bore 7 and the next string of casing 16 that is concentrically mounted in the first string 5 of greatest diameter. Casing slip members 11 when assembled form a cylindrical opening 17, and their lower ends are each provided with a segmental ledge 18 forming, when the slips are assembled, a circular opening. This latter opening 17' is slightly greater than the external diameter of casing string 16 in order that it may freely pass therethrough, and the upper opening 17 is slightly greater than the diameter of the coupling 19 secured to the upper end of string 16, the lower end of the coupling engaging the seat 20 formed by the ledges 18 of the conical slips.

It will be apparent from the above that when the weight of casing string 16 is imposed on the slip members 11 that the packing ring 14 will be greatly compressed and completely fill the space between the bore 7 of the head and the outer surface of the string of casing 16, the lower end of the ring being forced into the tapered portion 9 of the circular seat 8, and thus completely effecting a gas tight seal between the bore 7 and casing string 16.

The upper end of the conical cavity of control head 6 is coarsely threaded for the engagement of the tapered threaded lower end of the control head 21 that provides for the flow of oil and gas from the string of casing 16. This head is quite similar in construction to the head 5 just described with the single exception that the lower end of its cylindrical bore 22 is enlarged as at 23 to provide a chamber for the reception of the upper end of coupling 19 on the end of casing string 16 when the mechanism is in assembled condition. The slips 11 support the innermost string of casing 25, the coupling 26 of said string resting on the seat 27 formed by the two openings in said slip members when assembled.

The uppermost control head 28 is substantially cylindrical in form and provided on its lower end with a conical tapered threaded portion 29 that engages the tapered threaded upper end of the head 21, the threading of the "pin and box" being extremely coarse in order that the head may be quickly secured thereto or detached therefrom. The bore 30 in the lower end of head 28 is slightly larger than the external diameter of the coupling 26 in order that it may not interfere with the attachment or removal of the head to and from the head 21. The upper end of this bore is contracted as at 31, and the upper end of the head is externally threaded for the reception of a master gate valve 33 which is utilized for maintaining the well under perfect control at all times while performing a swabbing or bailing operation.

When the well to which my mechanism is secured is not a flowing one the master valve 33 may be quickly removed and a stuffing box 34 of any preferred construction may be attached to the upper threaded end of head 28, the polish rod 35 of the pumping apparatus passing therethrough.

In Fig. 2 of the drawings I have illustrated the manner of supporting and suspending a single string of casing within the outer string 5. In such case the conical casing slip member 11 is removed and slips 40 of usual form substituted therefor, no alteration of the head being necessary, the split packing ring completely sealing the space between the head and the suspended string of casing.

The mechanism above described may be advantageously used in connection with standard drilling tools where it is necessary to use a circulating system in order to keep the pipe free, as it can be packed at any desired point along the line enabling the operators to force mud laden fluid down between the annular spaces and return to the top again on the inside carrying with the mud laden fluid the sand and drill cuttings to the surface, thus eliminating the use of a stuffing box on the drill line which is usual in such cases.

By the employment of my mechanism all concentric strings of casing are securely connected up, all clamps, anchor bolts and the like which in other constructions have caused a large amount of trouble in forming connections have been positively eliminated, the coarse threading of one head to the other holding the same in gas tight relation, and effectually sealing the various strings of casing from each other against leakage or premature blowouts.

With the mechanism just described the usual "Christmas tree" may be quickly installed on the uppermost head with little or no inconvenience to the operators.

I claim:

1. A control head for wells comprising an outer well casing, a control head having a cylindrical bore at its lower end and a conical bore at its upper end, an annular seat being formed between the bores of said control head, a packing ring mounted on said annular seat, and a plurality of removable slip members disposed in said conical bore adjacent said packing ring, each having an internal ledge, said ledges forming a seat when

in assembled form for engaging and supporting a string of casing, the weight of the casing on said members compressing said packing ring and sealing the space between the outer casing and the suspended string.

2. A control head for wells comprising an outer well casing, a control head including a body member having a cylindrical bore at its lower end and a conical bore at its upper end, an annular seat being formed between the bores of said body member, a packing ring mounted on the annular seat, casing supporting members disposed in said conical bore having in assembled relation a bore therethrough, and an annular shoulder formed in the bore of said casing supporting members for engaging and supporting a string of casing, the weight of the casing compressing the packing ring and sealing the space between the outer casing transmitted through said supporting members and the suspended string.

In testimony whereof I affix my signature.

WILSON B. WIGLE.