Dec. 25, 1928. 1,696,844

H. S. HAYNES ET AL

CASING HEAD FOR OIL WELLS

Filed Nov. 11, 1925

Fig. 1

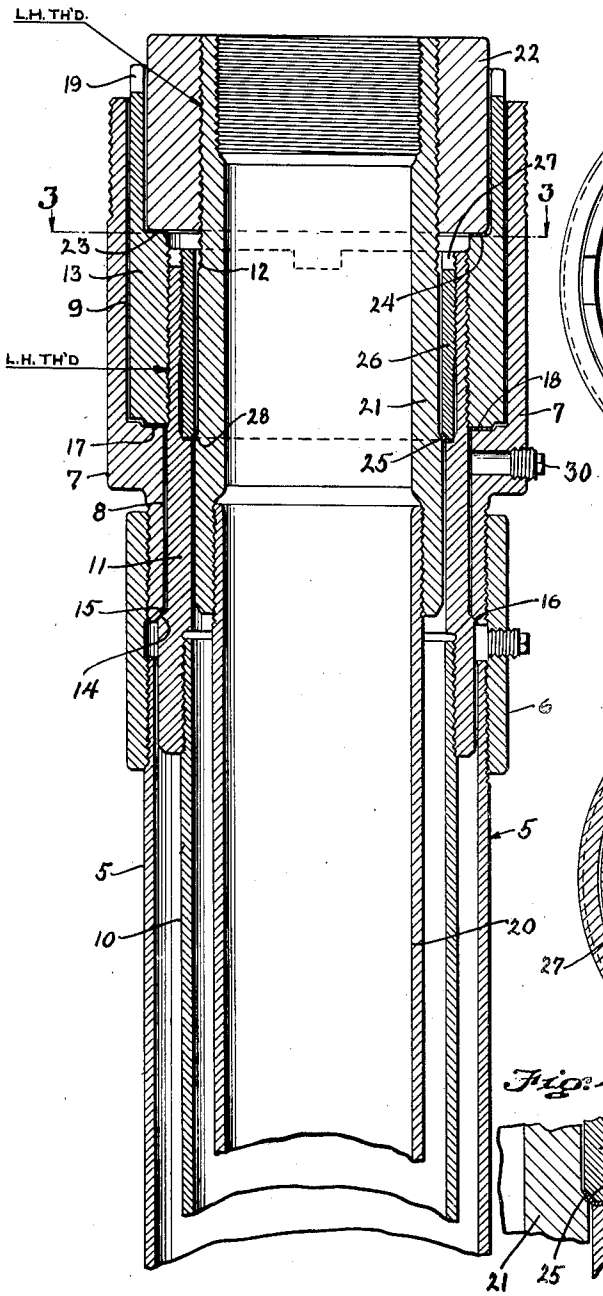


Fig. 2

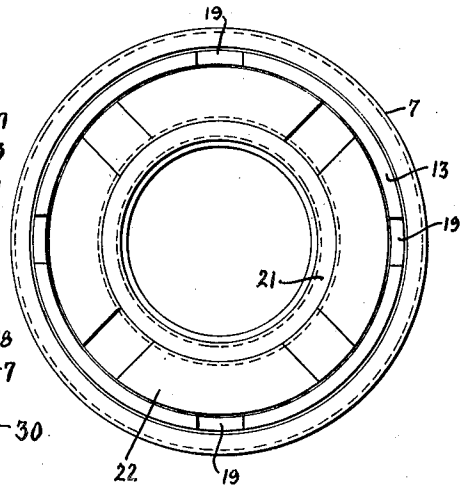


Fig. 3

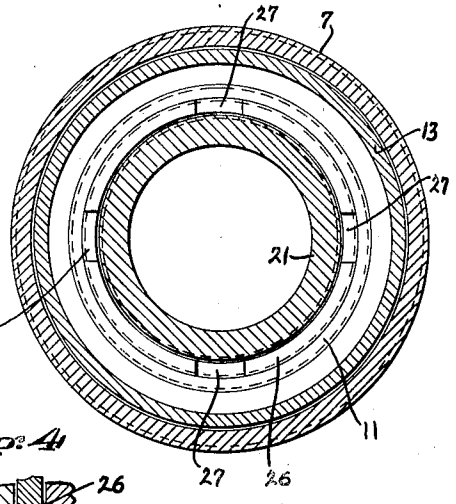
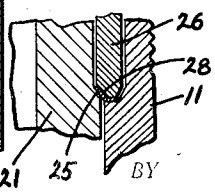


Fig. 4



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UNITED STATES PATENT OFFICE.

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CASING HEAD FOR OIL WELLS.

Application filed November 11, 1925. Serial No. 68,415.

This invention relates more particularly to a casing head construction adapted for securely connecting together at the top of a well a plurality of strings of well casing in gas or fluid tight relation to each other.

It is of the objects of the invention, first to provide a novel form of casing head for securely connecting in concentric relation to each other a plurality of strings of well casing in gas and fluid tight relation to each other. Second, to provide a casing head that will effectually resist, if necessary, unusual pressures developed in the drilling or operating of oil or gas wells. Third, to provide a construction in which it is possible to connect several strings of casing in less time than by existing methods. Fourth, to provide a casing head in which a string of well casing may be readily hung from the upper end with casing shoe off the bottom of the well, and whereby it is also possible to cement the string on the bottom, take the stretch thereon, and then secure the string in the head without danger of releasing the stretch. Fifth, to provide a casing head construction in which it is possible to "land" a plurality of strings of well casing within a small space, that is inexpensive to manufacture, easily handled, and which has no bolts or other small parts that are easily lost or damaged.

This disclosure is to be regarded as descriptive only and not as restrictive or limitive of the invention, of which obviously an embodiment may be constructed including many minor modifications without departing from the general scope herein indicated and hereinafter claimed.

Other objects and advantages will become apparent from the following specification, reference being had to the drawings accompanying the same, in which:

Fig. 1 is a central vertical section through the casing head with a plurality of strings of casings secured thereto.

Fig. 2 is a plan view.

Fig. 3 is a transverse section taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged sectional detail of one of the bushing seats.

Referring now more particularly to the drawings, and especially to Fig. 1, 5 designates the upper stand of an anchored well casing provided with the usual coupling collar 6 at the top thereof. In screw threaded engagement with the collar 6 is a cylindrical head body 7 provided with a bore 8 in its lower end that opens into an enlarged counter bore 9 at the top thereof, the upper end of the head being threaded exteriorly for the reception of a master valve of usual construction (not shown).

As illustrated in the drawings, three strings of casing are shown connected to the casing head body, the means for connecting the 8¼ inch casing 10, preferably consisting of a head bushing 11, cylindrical in form, interiorly threaded on its lower end for the reception of the casing 10, and having an enlarged bore 12 at its upper end, the external surface being threaded left hand for engaging the internal threaded lower end of a locking ring 13 when the parts are in an assembled form. Head bushing 11 is provided just above its lower end with an annular bevelled seat 14 that engages a similar seat 15 formed on the lower circular end of the body 7, a copper gasket 16 insuring a gas and fluid tight seat.

The locking ring 13 engages the left hand thread of the bushing 11, and its lower circular end engages the circular seat 17 formed by the enlarged counter bore 9 of the head member 7, a copper gasket 18 being mounted therebetween to form a gas and fluid tight seat. The upper end of the locking ring 13 is provided with spanner wrench sockets 19 for screwing the ring downwardly against its seat, and at the same time drawing the bevelled seat 14 formed on the bushing into engagement with the seat 15 of the head body.

From the above it will be apparent that the casing 10 will be connected to the head in gas tight relation, the double seats effectually preventing any leakage of gas or oil therethrough.

The string of 6¼ inch casing 20, as shown in the drawings, is connected in gas and fluid tight relation to the first two strings of casing by the head bushing 21, that is of tubular form interiorly threaded at its lower end for the reception of the casing 20, its upper exterior end being provided with a left hand thread for the reception of a 6¼ inch circular locking ring 22. The bore of the 8¼ inch locking ring 13 is enlarged to form a flat circular seat 23 against which the lower end of the ring 22 bears, a copper gasket 24 disposed on the seat serv-

ing to form an absolutely gas and fluid tight joint. A short distance above the lower end of bushing 21 is formed an annular bevelled seat 25 to form a circular space for the reception of a tubular seat bushing 26 provided on its upper edge with spanner wrench sockets 27 for the purpose of inserting or removing the same. The exterior upper surface of this bushing is provided with a right hand thread that engages a similar thread formed on the enlarged portion of the bore of bushing 11 to hold the same in gas tight relation with the bevelled seat 25, a copper gasket 28 serving to form a fluid tight joint. It will be noted that when the bushing 26 has been seated and the locking ring 22 tightened that the bevelled seat 25 of bushing 21 will be drawn in gas and fluid tight engagement with the lower bevelled end of the bushing 26. The upper interior end of bushing 21 is threaded for a standard casing when it is desired to remove the casing from the well.

The operation of assembling an 8¼ inch casing within a 10 inch casing is as follows: Assuming that the 8¼ inch string 10 has been cemented at the bottom of the well, and that the top collar of said casing (not shown) lies a short distance below the collar 6 of the anchored string 5, a distance is measured between the bottom of the head bushing 11 and the top of the 8¼ inch collar. A nipple (not shown) is then cut to this measurement, making an allowance for the threads and the amount of stretch it is desired to take in the string of casing. The 8¼ inch locking ring 13 and the head body 7 are then slipped over a joint of said casing, screwing the top end of the head bushing 11 onto the bottom end of the above mentioned joint of casing, and then screwing the 8¼ inch nipple cut to measure as above set forth into the bottom end of the 8¼ inch head bushing 11. These connections now suspended on a joint of 8¼ inch casing hanging on elevators in derrick are then placed within the 10 inch string 5, and the bottom end of the 8¼ inch nipple is screwed into the top collar of the 8¼ inch cemented string. The head body 7 is then screwed into the 10 inch collar 6 after which a stretch is taken in the 8¼ inch string 10 until the bevelled shoulder 14 on the outer surface of the 8¼ inch head bushing 11 engages the bevelled seat 14 on the bottom end of the head body 7. The locking ring 13 is then screwed down on the outside of the 8¼ inch head bushing 11 until the bottom edge of the ring engages the flat seat inside of the head body 7. The 8¼ inch joint casing which was screwed (for purposes of handling connections only) into the top of the 8¼ inch head bushing 11 is then backed out, and a master valve (not shown) is screwed on the top of the head body 7, together with such other connections fitted above the valve as may be found desirable.

In landing a string of 6¼ inch casing 20 inside of the 8¼ inch casing 10, substantially the same method is employed as in landing the 8¼ inch string, with this exception, that it is necessary to insert the 6¼ inch seat bushing 26 in the top of the 8¼ inch head bushing 11 to form the bevelled seat for the shoulder 25 formed on the exterior surface of the 6¼ inch head bushing 21 to seat on. The locking ring 22 is then screwed down on the outside of the 6¼ inch head bushing 21, its bottom edge forming a gas tight seat when it engages the flat shoulder 23 formed on the inside of the locking ring 13.

Should it be desired for any reason to set a string of 6¼ inch casing inside of the anchor string 5 without connecting to an 8¼ inch string, this can be accomplished by leaving parts 7, 13, and 11 in place, and then setting the string of 6¼ inch casing as above described.

It will be noted that the 8¼ inch locking ring 13 and the 6¼ inch locking ring 22 are provided with left hand threads in order that when any connection is made into the top of the head bushing 21, there will be no danger of backing the bushing out of the locking ring.

Should a 11 or 12½ inch casing be used as an anchor string the casing head above described can be used by merely changing the outside dimensions of the casing head body 7 at its lower end. When it is desired to connect to it or vent between the various strings of casing it can be accomplished in the following manner: To vent between the anchor string 5 and the 8¼ inch string the anchor string collar 6 may be drilled and tapped between the upper end of the casing and the lower end of the casing head body 7. Should it be found for any reason undesirable to vent in the above manner, a special tapped steel collar (not shown) can be used to take the place of the standard collar on the anchor string. When it is desired to vent between the 8¼ inch and the 6¼ inch strings of casing, the vent plug 30 in the lower part of the casing head body 7 may be removed and a hole drilled through the 8¼ inch head bushing 11 before the 6¼ inch head bushing 21 is installed.

It will be apparent to those who are familiar with oil well operations, that the casing head above described possesses all of the essential requisites of other well known constructions, without their disadvantages, this being clearly apparent in the construction known to oil operators as the "swinging nipple" carrying a control valve with a "Braden" head attached thereto. This latter construction, which is exceedingly complicated, carries V-shaped rings designed to

compress and expand inside when the bolts are tightened to form a fluid tight joint against the pipe. Such joints have been found to be neither satisfactory or practical, as under pressure they are liable to leak. Moreover a Braden head is extremely expensive to manufacture, cumbersome to handle, and further they utilize about seven feet of space under the derrick floor, while our improved head only occupies a space approximately not exceeding fifteen inches, all the elements being disposed below the disks of the master valves.

By means of our construction any number of strings of various sized well casings may be quickly secured in position within the anchored casing, the bushing, locking rings, and the gasket seats insuring perfect gas and fluid tight joints between the several strings connected to the casing head. When different sizes and weights of casing are employed to suit varying conditions existing in widely separated oil fields, the heads may be readily changed to adapt them for such conditions.

What we claim is:

1. A casing head construction comprising a body member provided with an interior annular seat, adapted to be detachably secured to the upper end of a well casing, a locking ring disposed within said head and engaging said annular seat, and a casing head bushing for connecting a string of casing detachably secured to said locking ring, said bushing provided with an annular seat adapted to engage the casing head to form a gas tight joint therebetween.

2. In a casing head for oil wells, a cylindrical body member provided with a fluid tight seat, adapted to be secured to a string of well casing, a tubular head bushing provided with a seat engaging the seat of the body member, means formed on said bushing for connecting a string of casing thereto, and a tubular locking ring threadingly secured to said bushing for forcing the seats of the head bushing and the body member into gas and fluid tight engagement.

3. In a casing head for oil wells, a cylindrical body member provided with bores of different diameters, the juncture of said bores forming an annular seat, adapted to be secured to the upper end of a string of well casing, a tubular head bushing having a seat formed on its external surface disposed within said body member, said bushing adapted to connect a string of well casing to the body member, and a locking ring member adjustably secured to the upper end of said head bushing within said body member, the lower end of said ring engaging the annular seat of the body member, the external seat of the head bushing engaging a like seat formed on the body member, whereby when the locking ring is tightened the seats formed on the body member and on the head bushing will engage to form fluid tight joints between the strings of casing.

In witness that we claim the foregoing we have hereunto subscribed our names this first day of October, 1925.

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