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C. C. BROWN ET AL

2,291,143

BRADEN HEAD

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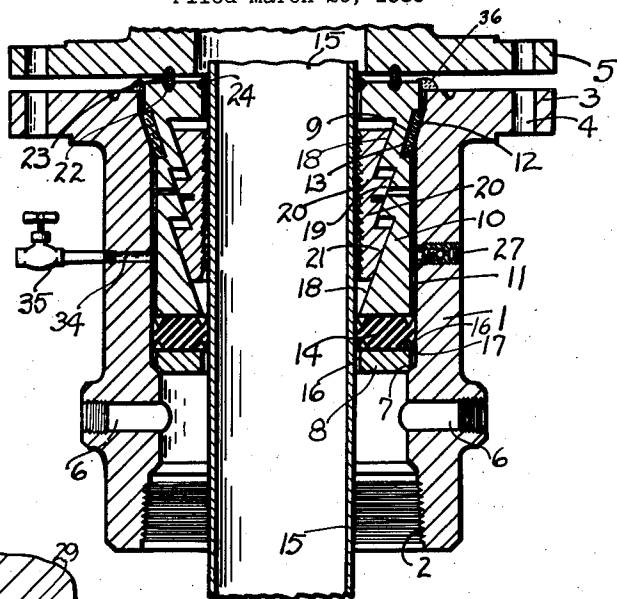


FIG 1

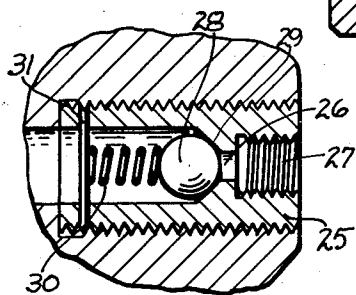


FIG 3

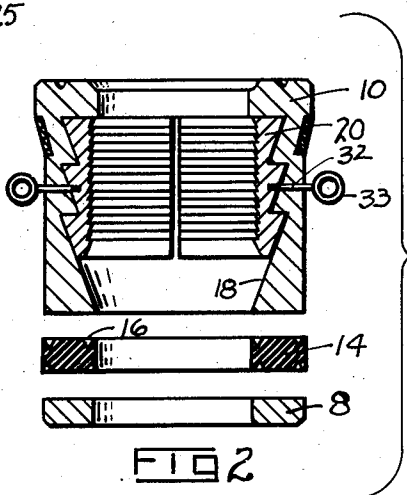


FIG 2

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BRADENHEAD

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3 Claims. (Cl. 166—14)

The invention relates to the construction of braden heads such as are employed to support an interior pipe or tubing within the well casing and to also form a seal closing the well against the escape of fluid under pressure from the well.

Such devices are usually employed upon wells where heavy gas pressures are present and it becomes necessary to provide a secure seal at the well head which will prevent the escape of gas. For if leakage is present, or liable to soon develop when the well is operating, it will be practically impossible to stop the leak or prevent a blowout unless mud can be pumped into the well to fill up the hole and exert a back pressure sufficient to "kill" the well. The operation of killing the well is difficult and expensive and may ruin the well. It is an operation to be avoided wherever possible.

We find that if the braden head is properly placed and sealed, failure of the seal will rarely occur. There is usually no way of ascertaining whether the well head is properly equipped when the head is installed and fixed in position. If it were possible to determine whether the seal were tight before the well is brought in a majority of accidents from blowing out of the well could be avoided.

It is hence an object of our invention to equip the braden head so that a tight seal may be obtained and also to enable the operator to test the seal to ascertain whether a reliable seal has been obtained.

We wish to provide a structure wherein a test of the seal can be made before the well is put into operation.

It is also an object to provide a head which permits the use of fluid under pressure to test the seal at the braden head and also to counteract the well pressure when present at the lower end of the head and assist in expanding the lower packing.

We also desire to provide a secure attachment of the braden head with the inner flow line supported therein.

In the drawing,

Fig. 1 is a central longitudinal section through a braden head employing our invention.

Fig. 2 is a similar view showing certain parts separated slightly from each other for purposes of clearness.

Fig. 3 is an enlarged sectional detail of the pressure fluid transmitting attachment which we may employ.

The invention is adapted for use with casing heads of ordinary construction. Casing heads

of this kind are ordinarily termed "braden heads."

The one which is disclosed herewith has a tubular head member 1, which is threaded interiorly at 2 for attachment to the upper end of a well casing. The upper end of the head is provided with a flared flange 3, which is formed with openings 4 through which it may be bolted to an upper flange member 5 in the equipping of the well. Said upper member may be another casing head, a blowout preventer valve, or the like.

Toward the lower end of the head are provided a plurality of lateral openings or ports 6, 6, which are threaded for engagement with laterally extending pipe through which fluid may enter or be discharged from the well.

The interior of the head is approximately cylindrical. It is enlarged or recessed in its internal diameter somewhat from a level slightly above the port 6 to provide a shoulder 7 at the lower end of said recessed portion, which extends around the interior of the head to form an annular seat to receive a supporting ring or plate 8.

Toward the upper end of the casing head the interior is beveled outwardly to form a shoulder at 9 upon which the interior bushing or hanger 10 may rest.

Said bushing 10 has an outer cylindrical periphery of slightly smaller external diameter than is the internal diameter of the head 1, thus providing a space indicated at 11 between the walls of the head and bushing. Adjacent the upper end of the casing head the interior is beveled outwardly to form a shoulder at 9 upon which the interior bushing or hanger 10 may rest.

At the upper end of the bushing, the outer periphery is flared slightly to provide a tapered shoulder at 12 within which is counter-sunk a packing ring 13 of soft metal, such as bronze. The support of the bushing within the casing head is upon the shoulder 9 and a tight seal is required at this point.

Between the annular plate or ring 8 and the lower end of the bushing 10 is a packing ring 14. Said ring is of rubber or equivalent material and fits closely between the ring 8 and the bushing. Its outer margin contacts tightly against the inner wall of the head 1. The inner surface fits closely about a pipe or casing 15 supported within the bushing. It is to be noted that the packing ring 14 has adjacent its margin notches or recesses 16 which, it will be understood, extend entirely around the ring and act to form lips at 17 behind which the fluid pressure may engage

to maintain the lip forced tightly against the adjacent surface and assure a close seal.

The interior face of the bushing is formed with a plurality of recesses, the lower wall of which is inclined or tapered downwardly, as shown at 18.

These recesses are adapted to receive projections 19 upon slips 20 fitting within the bushing and having tapered outer areas 21 engaging the tapered surfaces 18, so that when the slip is moved downwardly relative to the bushing the slip will be forced inwardly to engage against the pipe 15. The slips have upwardly inclined teeth to engage the casing in the usual manner. It will be understood, therefore, that the slips serve to support the pipe within the bushing and prevent relative downward movement of the pipe therethrough.

The bushing is shown as provided with notches 22, which receive metallic packing rings 23 to engage with the upper member 5 and maintain a seal between the two members.

It will be understood that when the inner casing or pipe 15 is set in the well hole it will be cemented at the lower end and before the cement plug is drilled out of the casing to bring in the well the upper end of the casing will be supported in the slips and bushing, as shown in Fig. 1. This is done by exerting an upward pull upon the casing to stretch the same taut within the well and then fitting the same within the bushing, which is supported within the seat 9 in the casing head. When it is thus hung in position, a bond of welding material indicated at 24 is welded in position around the upper end of the bushing and against the pipe so that the pipe is fixed in position relative to the bushing and a tight and uniform seal against the escape of fluid between the pipe and the bushing is assured.

We form through the wall of the casing head a passage threaded to receive a plug 25, the construction of which is shown best in Fig. 3. This plug is formed with a passage 26 therethrough which is threaded at 27 to connect with the pump or grease gun through which fluid may be forced inwardly to the space 11 between the head and the bushing. A check valve 28 is fitted within a seat 29 in this passage and held resiliently in position by a spring 30, which bears at its inner end against a transverse pin 31. By means of this valve controlled passage, fluid may be forced through the wall of the head into the space 11 under very high pressures so as to make a test of the seal around the bushing. This pressure fluid will engage against the seal packing ring 14 and will tend to expand it against the wall of the casing head so as to determine whether a tight seal is present at that point. Also, it may be noted whether fluid may escape upwardly past the packing 13.

In case a leak is discovered steps may be taken before the well is drilled in to provide a seal which will not leak. It will also be possible in case of a failure of the lower seal ring 14 in use to force pressure fluid through the passage 26 into the space 11 and by pressure against the upper side

of the seal ring 14 assist in expanding such ring so that leakage may be prevented.

Where a more reliable seal is necessary we may weld around the outer margin of the hanger, as shown at 36 in Fig. 1, after the hanger is in its final position. This bond also assists in holding the parts together in rigid assembly.

In Fig. 2 the slips 20 are held in raised position and retracted away from contact with the pipe by means of threaded pins 32 formed with eyelets 33 at their outer end. These pins serve as handles to hold the slips in this position while they are being mounted upon the pipe and before the bushing is fitted within the casing head. As soon as the bushing is properly fitted about the pipe these pins are withdrawn to allow the slips to drop.

A vent passage 34 may be provided through the wall of the casing head and a valve 35 connected therewith, so that when it is desired to open a passage from the chamber 11 it may be accomplished by opening the valve 35 to allow the escape of fluid. This valve is, of course, normally closed.

The advantages of this construction lie in the fact that means are provided for making a test of the packing about the pipe hanger to determine before the pressure is allowed to enter the well whether or not a seal is provided. If this fact is determined before the pressure is allowed to engage against the packing many costly accidents may be prevented. The operator is assured before he brings his well in that there is absolutely no leak around the casing head. The construction also provides a means whereby a seal may be most effectively accomplished. The parts may, however, be easily disassembled whenever necessity arises as will be obvious.

What is claimed is:

1. A tubular well head having an internal seal ring support, an annular seal ring on the support, a slip seat on the seal ring, a pipe engaging slip supported by the slip seat and engageable with an inside pipe and means on the head for supplying additional sealing material to the seal ring.
2. A pipe seal for casing heads having a pipe suspended therein, including means welded to the upper end of said pipe and sealing with said casing head, means to seal between said pipe and said head below said welded means, and additional means to admit fluid under pressure to the interior of said casing head and about said pipe between said welded means and said sealing means to test for leakage.
3. A device of the character described including a casing head, an inner pipe suspended therein, means welded to the upper end of said pipe and sealing with said casing head, a seal ring engaging said pipe below said means, pipe supporting means on said ring, and means through which pressure fluid may be admitted into the space between said sealing members to test for leakage.

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DISCLAIMER

2,291,143.—*Cicero C. Brown*, Houston, and *Robert L. Carruthers*, Beaumont, Tex.
BRADENHEAD. Patent dated July 28, 1942. Disclaimer filed Mar. 6, 1947,
by the assignee, *Cicero C. Brown*.

Hereby enters this disclaimer to claims 2 and 3 of said patent.

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