

May 9, 1939.

K. T. PENICK ET AL

2,157,496

COMBINED TUBING HEAD AND BRADEN HEAD

Filed Dec. 16, 1935

2 Sheets-Sheet 1

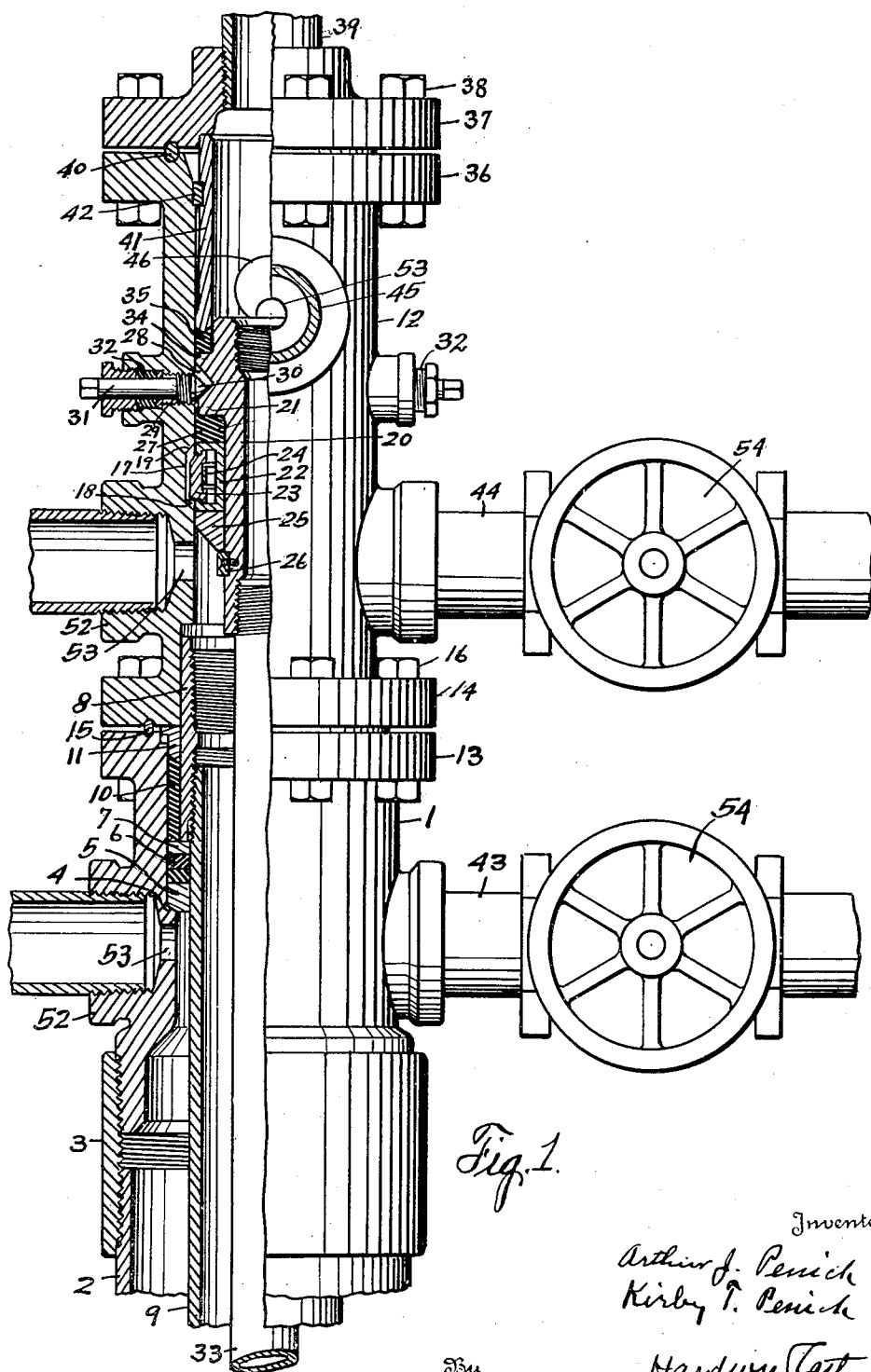


Fig. 1.

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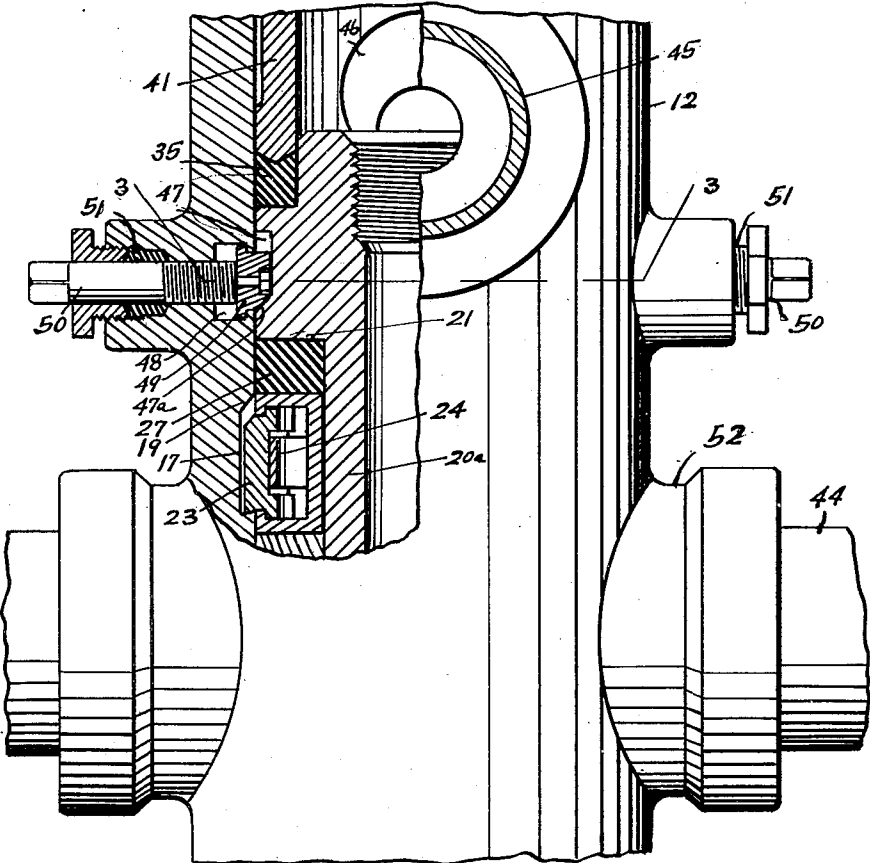


Fig. 2.

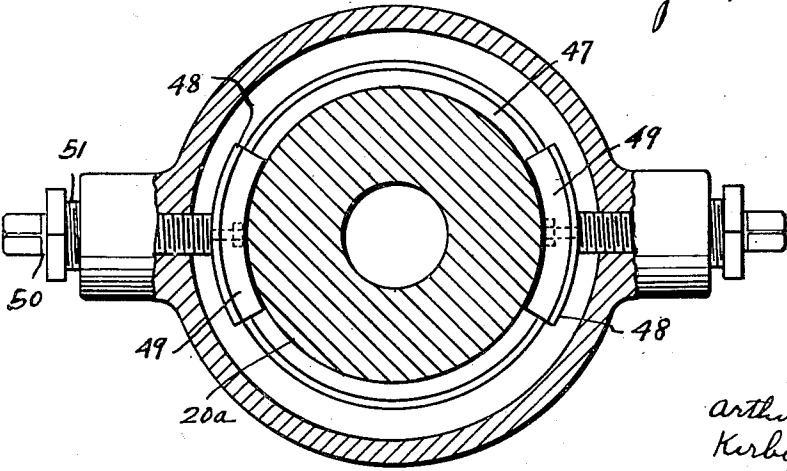


Fig. 3.

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UNITED STATES PATENT OFFICE

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COMBINED TUBING HEAD AND BRADEN
HEADKirby T. Penick and Arthur J. Penick,
Houston, Tex.

Application December 16, 1935, Serial No. 54,685

8 Claims. (Cl. 285—22)

This invention relates to a combined tubing head and braden head.

An object of the invention is to provide a well head of the character described wherein the tubing head is connected with the braden head without the use of interconnecting threads, but at the same time having a fluid-tight joint at the connection.

Another object of the invention is to provide a well head of the character described wherein an inner string of pipe commonly known as the water string may be suspended by means of a coupling forming a hanger which is completely inclosed within, and breaks the joint between the casing head and tubing head.

A further object of the invention is to provide a well head provided with packing about the upper end of the tubing hanger maintained in place in a novel manner.

It is another object of the invention to provide novel means for locking the tubing hanger in place.

The invention also comprehends, in a well head, novel connections for flow lines leading from the casing head and tubing head, said connections having restricted, or choke, outlets for a purpose to be hereinafter explained.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, arrangement of parts and use, examples of which will be given in this specification and illustrated in the accompanying drawings wherein:

Figure 1 shows a side view of the combined head, partly in section.

Figure 2 shows a fragmentary side view of a modified form of the head, shown partly in section, and,

Figure 3 shows a transverse sectional view taken on line 3—3 of Figure 2.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates a tubular casing head attached to the upper end of the well casing 2 by means of the coupling 3. The casing head has an inside annular seat 4 on which the lower ring 5 is mounted. On this ring is the annular packing 6 supported on which is the upper ring 7. Supported on the ring 7 there is the coupling 8 which is attached to the upper end of an inner string of pipe 9 which extends downwardly in the well to the oil-bearing stratum. Surrounding the lower end of the coupling 3, which forms a hanger for the string 9, there is the packing

10 which rests on the upper ring 7 and is retained in place by the gland 11 which closely surrounds the hanger 8 and fits closely within the head 1 and abuts the upper end of the packing. Mounted on the casing head 1 there is a tubular tubing head 12, which abuts the gland 11 to compress the packing 10.

The adjacent ends of the heads 1 and 12 have the external annular flanges 13, 14, with a gasket 15 between them, and these flanges are secured together by the usual bolts 16.

The tubing head 12 has an inside annular groove 17 whose lower side is abrupt, forming a shoulder 18, and whose upper side tapers upwardly, as at 19.

Within the tubing head 12 there is a tubular tubing hanger 20 whose upper end is enlarged forming the downwardly facing shoulder 21.

Around the tubing hanger 20 there is an annular cage 22 in which is mounted the radially movable dogs 23 which, when in their outward position, rest on the shoulder 18, and which are normally held in their outward position by springs, as 24. The cage 22 is supported on the hanger 20 by means of a ring 25 which surrounds said hanger and is retained in place by the annular key 26 which surrounds and is countersunk into the hanger 20. The type of hanger support, for the hanger 20, hereinabove described is of that general type illustrated in our Patent No. 2,016,454 for Well head, issued on the 8th day of October, 1935, and is also illustrated in our co-pending applications, Serial No. 751,156 filed November 2, 1934, for improvements in a Tubing head, Serial No. 15,174 filed April 8, 1935, for improvements in a Well head assembly, and Serial No. 26,453 filed June 13, 1935, for improvements in a Seal-off tool, the invention herein disclosed including certain improvements over those disclosed in the patent and applications referred to.

On the cage 22 there is an annular packing 27 which fits closely within the head 12 and around the hanger 20, and the shoulder 21 of the hanger rests on the packing 27 and a fluid-tight joint is thus formed between the hanger 20 and the head 12. The enlarged portion of the hanger 20 has a V-shaped annular, external groove 28 therearound and threaded through the wall of the head 12 there are the hold-down bolts 29 whose inner ends 30 are pointed to engage the lower side of the groove 28 and whose outer ends are extended forming the shanks 31 whose outer ends are polygonal to receive a wrench. Stuffing boxes 32 surround said shanks to form a fluid-tight joint. When it is desired to remove

the hanger and the tubing 33 connected to and supported thereby, the hold-down bolts 29 may be screwed outwardly clear of the hanger. When the hanger is in position these bolts may be

5 screwed inwardly and their pointed ends will ride against the lower sloping face of the groove 28 and force the hanger downwardly closely against the packing 27 to expand the same to form a close fitting joint.

10 At its upper end the hanger 20 is reduced in diameter forming an external annular shoulder 34 on which the annular packing 35 is seated, said packing forming a close fit within the head 12 and around the hanger.

15 The upper end of the head 12 is formed with an external annular flange 36 and a flanged pipe connection 37 is bolted thereto by the bolts 38. A Christmas tree may be mounted above the head 12 and connected thereto by the pipe coupling 39 attached to the flange connection 37. Between the flange 36 and the connection 37 there is a suitable gasket 40 to form a fluid-tight joint.

There is a compression sleeve 41 fitted in, but 25 spaced from, the upper end of the head 12. The upper end of this sleeve abuts the connection 37 and at its lower end abuts the packing 35 to the end that when the connection 39 is bolted into place, the end thrust against the sleeve 41 will expand the packer 35.

30 The upper end of the sleeve 41 is surrounded by an annular packer 42 which fits closely between said sleeve and the upper end of the head 12.

35 Suitable flow lines 43 and 44 lead out from the heads 1 and 12 and leading out from the last mentioned head above the hanger 20, there is a similar flow line 45.

The oil flowing out of the well through the pipe 40 33 may pass out through openings, as 46, in the sleeve 41, and thence on out through the flow lines 45.

In the form shown in Figures 2 and 3, the hanger 20a has an external annular groove 47 45 therearound whose lower margin 47a is downwardly and outwardly flared. In the head 12 opposite the groove 47 there are the inside oppositely disposed arcuate grooves 48, 48, in which are mounted the oppositely disposed arcuate dogs 49, 49. These dogs have swiveling connection with the inner ends of the actuating shafts 50 which are threaded through the wall of the head 12 and whose outer ends are surrounded by the stuffing boxes 51 and are formed polygonal 55 to receive a wrench. The under sides of the dogs 49 are beveled to conform to the beveled lower side 47a of the groove 47. When the dogs 49 are actuated inwardly, they will engage the beveled face 47a and force the hanger 28 downwardly to compress the packing 27 beneath, and the hanger will thereby be locked in position; when the dogs 49 are actuated outwardly, they will release the hanger so that upon removal of the connection 37 and the sleeve 41, the hanger 60 may be elevated and removed. The inner ends of the pipes 43, 44, 45, are provided with male threads to be screwed into corresponding female connections 52 formed on the respective heads 1, 12. These connections have restricted, or 65 choke, openings 53 through which fluid may pass from within the respective heads outwardly. This fluid will usually flow under strong pressure and the openings 53 are restricted so as to reduce the pressure so that in case it is desired 70 to make a connection while the fluid is flowing,

the pressure of the fluid being discharged will not be sufficient to interfere with the work of making the connection. The flow lines referred to may be equipped with suitable gate valves 54 5 of conventional construction.

The drawings and description disclose what are now considered to be preferred forms 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. In combination, a well head having a seat therein, a tubular hanger in said head outwardly movable means on the hanger whereby the hanger is supported by the seat, a pipe connected 15 to the hanger, a tubing head fitted closely around the upper end of the hanger and incorporated into the well head.

2. In a well head assembly, a tubing head, a removable support therein, a tubing hanger on the support, retractable means on the tubing head engageable with the hanger for securing it on the support, packing around the tubing hanger above said retractable means, and a compression sleeve in the tubing head mounted 20 to exert endwise pressure on the packing.

3. In a well head assembly, a tubing head, a removable support therein, a tubing hanger on the support, retractable means on the tubing head engageable with the hanger for securing it on the support, packing around the tubing hanger above said retractable means, and a compression sleeve in the tubing head mounted to exert endwise pressure on the packing, said head and sleeve having outlets above the hanger.

4. In combination, a casing head having a seat therein, a tubular hanger in the casing head, supported by said seat, a pipe connected to the hanger, packing in the head around the hanger, a gland around the hanger abutting the 40 packing, a tubing head around the upper end of the hanger and abutting said gland and abutting the gland to compress the packing solely by the weight of the tubing head and connected to the casing head.

5. In a well head assembly, a tubing head having an inside support, a tubing hanger shaped to enter the tubing head and having an inwardly movable dog engageable with said support, a retractable dog in the tubing head, said hanger 50 having a recess to receive the last mentioned dog when the latter is in its inner position and sealing means around the hanger between said dogs supporting and being compressed by the hanger.

6. In a well head assembly, a tubing head having an inside recess whose upper end is tapered, a tubular tubing hanger shaped to enter said head, an outwardly movable dog on the hanger engageable in said recess to support the hanger, said dog being retractable by said tapering upper end upon upward movement of the hanger, said hanger having an external tapering face, retractable means on the tubing head, movable inwardly into engagement with said face to impart a downward movement to the hanger, said 65 means, upon retraction, releasing the hanger to permit its upward movement, sealing means around the hanger arranged to be compressed by the hanger upon said downward movement of the hanger.

7. A well head assembly comprising a casing head having an inside seat, a tubing head thereon, a tubular hanger enclosed by, but unattached to, said heads and supported by the former and breaking the joint between them, pack- 75

ing around the hanger above said seat and means
around the hanger whereby the weight of the
hanger will be rendered effective to compress
said packing, a second packing around hanger
5 between the hanger and the casing head and a
gland around the hanger arranged to be moved
downwardly by the weight of the tubing head to
exert endwise compression on said second pack-
ing.
10 8. A well head assembly comprising a casing
head having an inside seat, a tubing head there-
on, a tubular hanger inclosed by but unattached
to said heads and supported by the former and
breaking the joint between them, packing around
15 the hanger above said seat, means around the
hanger whereby the weight of the hanger will
be rendered effective to compress said packing,
a second packing around the hanger between the

hanger and casing head, a gland around the
hanger arranged to be moved downwardly by
the weight of the tubing head to exert endwise
compression on said second packing, a tubing
hanger within the tubing head, retractable 5
means supported on the tubing hanger and en-
gageable with the tubing head to support the
tubing hanger in the tubing head, packing
around the tubing hanger and arranged to be
compressed thereby to form a seal between the 10
tubing hanger and the tubing head and retract-
able means on the tubing head engageable with
the tubing hanger to prevent upward movement
of the tubing hanger and being releasable from 15
the tubing hanger to permit such upward move-
ment.

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