July 6, 1937. A. J. PENICK ET AL 2,086,431

TUBING HEAD

Original Filed Nov. 2, 1934 3 Sheets-Sheet 1

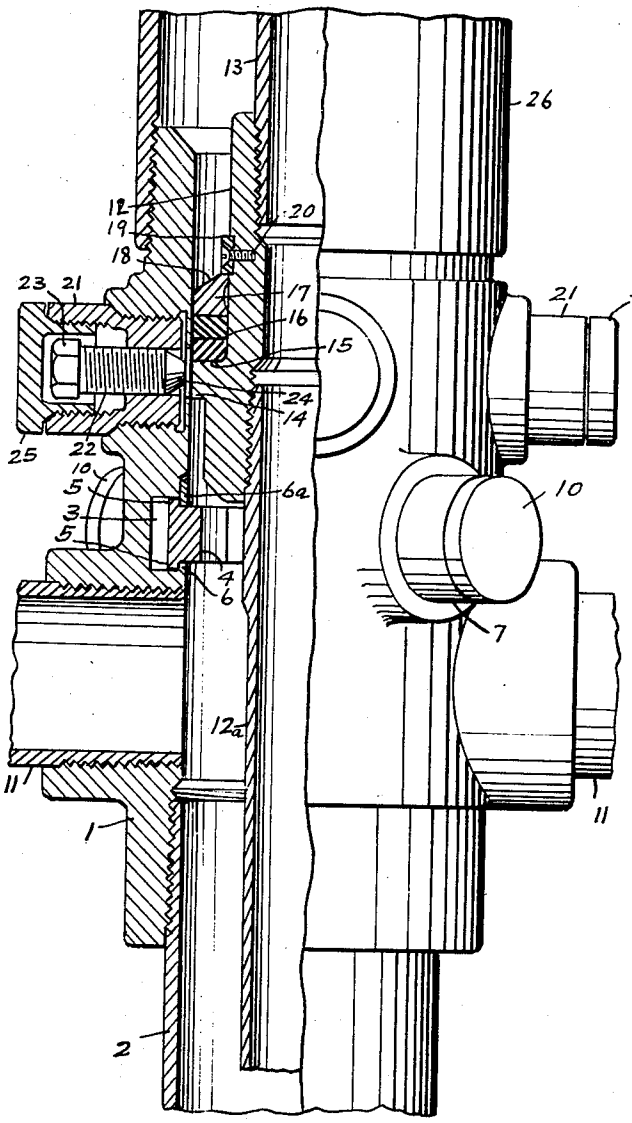

Fig. 1.

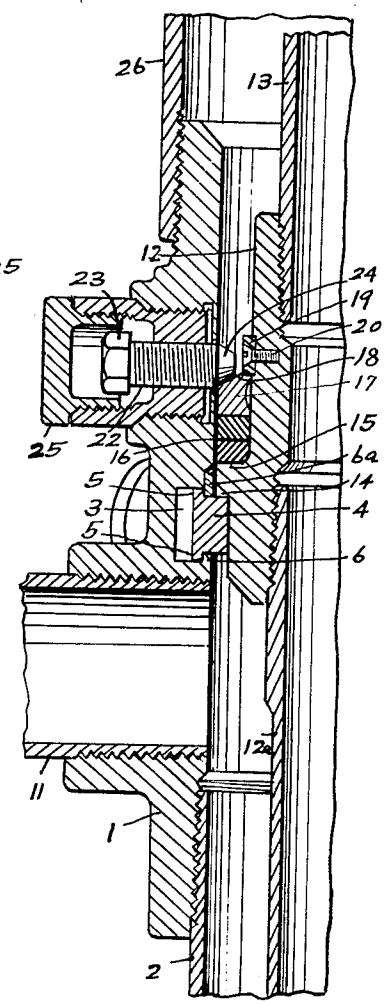

Fig. 2.

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Original Filed Nov. 2, 1934 3 Sheets-Sheet 2

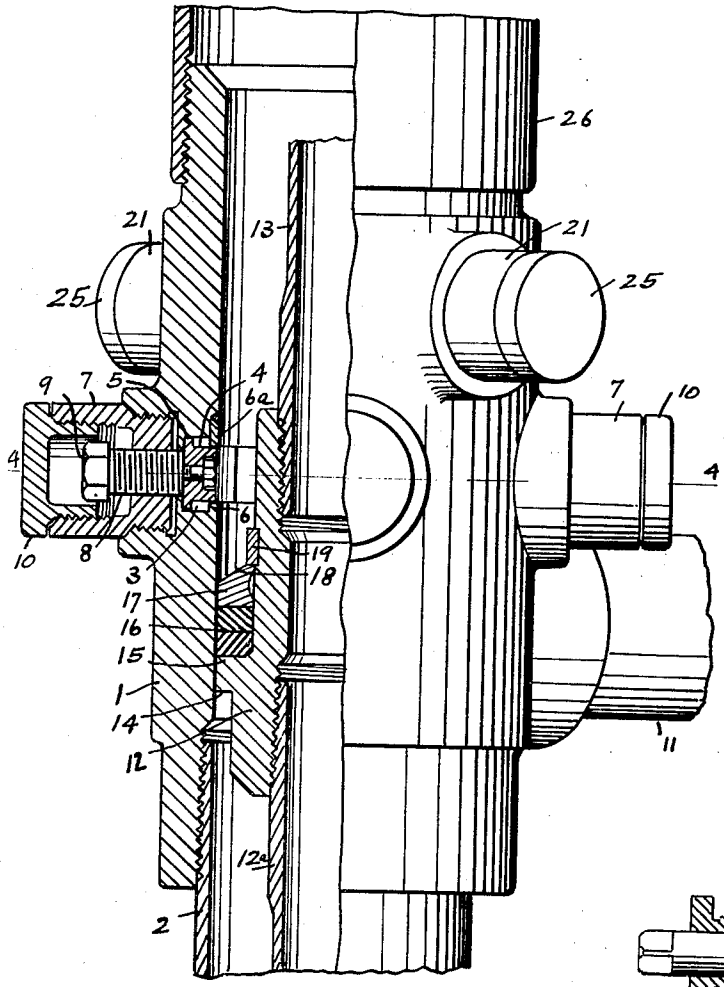

Fig. 3.

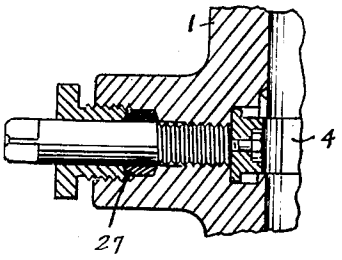

Fig. 5.

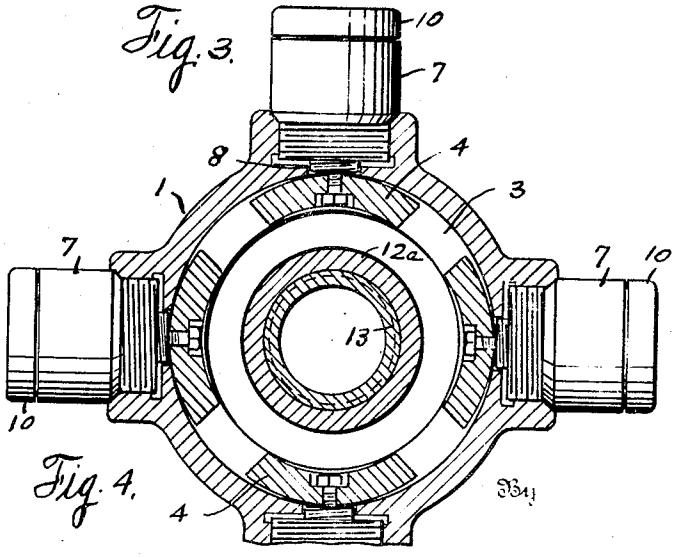

Fig. 4.

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July 6, 1937. A. J. PENICK ET AL 2,086,431

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Original Filed Nov. 2, 1934 3 Sheets-Sheet 3

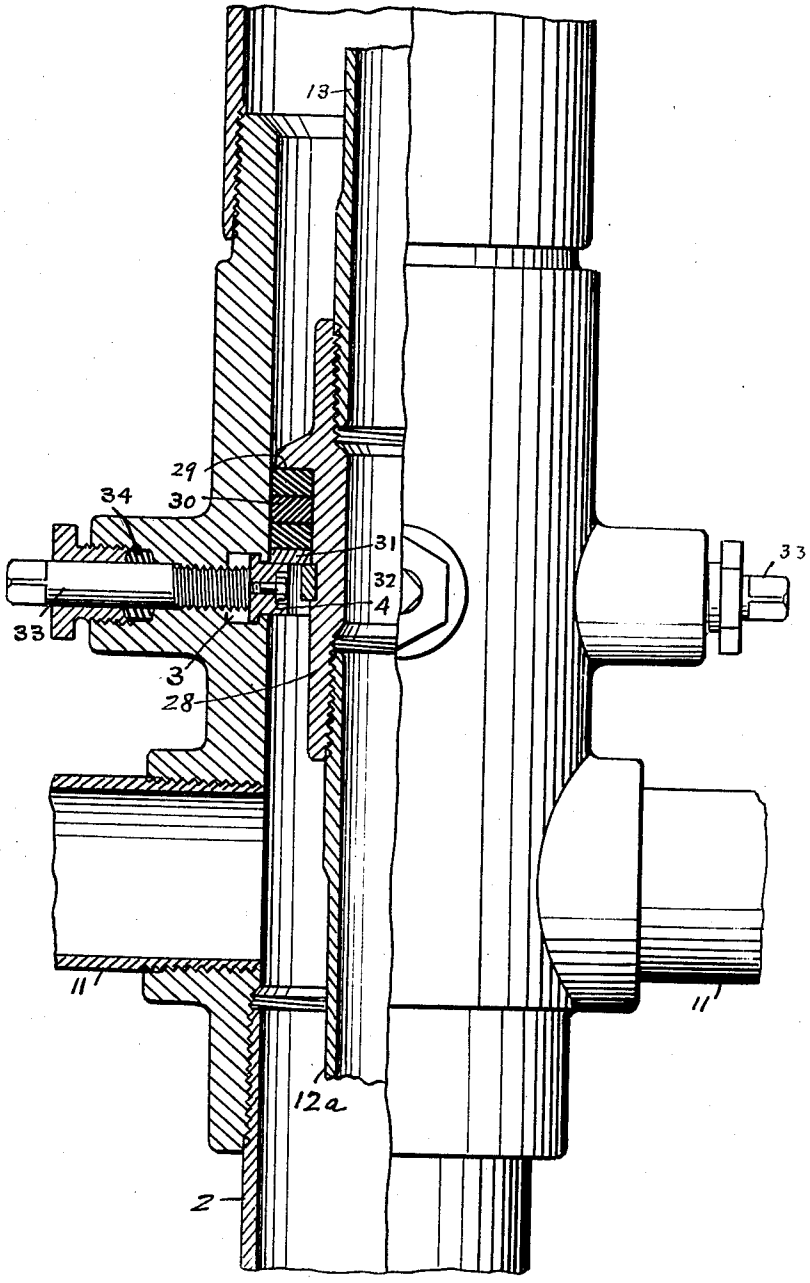

Fig. 6.

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Patented July 6, 1937 2,086,431

UNITED STATES PATENT OFFICE

2,086,431

TUBING HEAD

Arthur J. Penick and Kirby T. Penick,
Houston, Tex.

Application November 2, 1934, Serial No. 751,156
Renewed April 23, 1937

18 Claims. (Cl. 285—22)

This invention relates to a tubing head.

An object of the invention is to provide in combination with a tubular head, a tubing hanger in the head with a novel type of support for the hanger and means for securing the hanger against displacement from the support.

Another object of the invention is to provide in a tubing head a retractable support or seat for the hanger with means accessible to the operator for withdrawing said support, or seat, into inactive position whereby the hanger may be allowed to move downwardly beneath the support and to permit the tubing, carried by the hanger, to be lowered the required distance into the well, while washing fluid is being forced downwardly through the tubing to wash the well and the hanger and tubing thereafter elevated above the seat and the seat moved into active position beneath the hanger to form a support on which the hanger may then be landed to support the tubing at the desired elevation in the well.

A further object of the invention is to provide in combination with a tubular head and a tubular hanger therein, a seat in the head beneath the hanger movable into active or inactive positions and means on the head movable into active position to secure the hanger on the seat and into inactive position to disengage the hanger, with means accessible to the operator for moving said seat and said locking device into active or inactive positions at will.

This invention embodies certain improvements over that type of construction disclosed in our co-pending application for Well head, filed May 25, 1931 under Ser. No. 539,851, and also embodies improvements over the construction shown in our co-pending application for Well head assembly, filed September 17, 1934 under Serial No. 744,354. The construction herein shown also embodies certain improvements over our co-pending applications Ser. No. 744,354 for Well head assembly, filed Sept. 17, 1934; Ser. No. 752,440 for Flow control head, filed Nov. 10, 1934; and Ser. No. 15,174 for Well head assembly, filed Apr. 8, 1935.

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 drawings, wherein:—

Figure 1 shows a side elevation, partly in section, showing the tubing and hanger being lowered on to the seat.

Figure 2 shows a fragmentary vertical sectional view showing the hanger landed and secured on the seat.

Figure 3 shows a side view, partly in section, showing the seat retracted and the hanger lowered beneath the seat.

Figure 4 shows a cross-sectional view taken on the line 4—4 of Figure 3.

Figure 5 shows a fragmentary sectional view showing a modified form of the apparatus for moving the seat into active or inactive position, and

Figure 6 shows a side view partly in section of a modified form of the head.

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 head adapted to be connected to the upper end of the well casing 2.

This head has an inside annular groove 3 to receive the arcuate segments 4. The outer side of each segment is widened, forming the flanges 5, 5, and at the inner side of each groove are the inwardly extended flanges 6, 6a, the latter of which may be welded in place. These flanges 5, 6, and 6a engage to form retainers for the segments 4. Screwed into the head 1 opposite the respective segments, or otherwise secured to the head, are the housings 7 and bolts 8 are located within these housings and have threaded connections therewith, and the inner ends of the bolts have swiveling connections with said respective segments. The outer ends of the bolts are provided with the heads 9 to receive a wrench and the outer ends of the housings are closed by the respective caps 10 threaded to the housings.

The head has the outlet pipes 11, 11, leading therefrom beneath the segments 4.

There is a hanger 12 shaped to fit within the head and depending from this hanger there is a tubing 12a. The upper end of the hanger is internally threaded to receive the lower end of a section of pipe, 13, by means of which the tubing may be handled in lowering or elevating the same in the well. The lower and upper ends of the hanger are reduced, forming the downwardly facing shoulder 14 and the upwardly facing shoulder 15, and supported on the latter and surrounding the hanger are the packing rings 16. Supported on these packing rings and surrounding the hanger there is a metal ring 17 whose upper face 18 is downwardly and outwardly tapered. Around and countersunk into the hanger there is a locking ring 19 which is secured in place by set-screws 20, and said locking ring

abuts the upper end of the ring 17 to secure the same and the packing in place.

Screwed into the head above the segments 4 are the housings 21, and enclosed within these housings are the screw-bolts 22 which have a threaded connection therewith whose outer ends have the heads 23 to receive a wrench and whose inner ends 24 are beveled or tapered to conform to the taper of the face 18. The outer ends of the housings 21 may be closed by the caps 25 which have a threaded connection therewith.

When the tubing has been lowered, the bolts 8 may be adjusted to move the segments 4 inwardly into active position and the shoulder 14 will land on said segments to support the tubing and caps 25 may then be removed and the bolts 22 then screwed inwardly to engage their faces 24 against face 18 of the ring 17, whereby said ring will be forced downwardly and the packing 16 expanded into close contact with surrounding walls of the head 1 forming a fluid tight joint and securing the hanger against displacement from internal pressure in the well, and the caps 25 then replaced. If it be desired to withdraw the tubing and hanger, the caps 25 may be again removed and bolts 22 screwed outwardly to clear the ring 17 and the hanger and tubing then removed. While removing the hanger and tubing in the presence of internal well pressure, one or more conventional blowout preventers, such as 26, may be attached to the upper end of the head, 1, and the tubing withdrawn through the blowout preventer in which case the caps 25 should be tightly screwed into place to prevent the escape of the liquid under pressure past the bolts 22.

The housings 7, or 21, may be made integrally with the head, if desired, in the manner illustrated in the Figure 5, and the bolts inclosed thereby may be surrounded by a gland, as 27, to form a fluid tight joint in which case the housing caps may be dispensed with.

It may sometimes be found desirable to lower the hanger 12 down past the segments 4, as, for example, when it is desired to lower the tubing further into the well for washing the well. In such case the bolts 8 may be screwed outwardly to retract the segments 4 to permit the hanger to pass through and thereafter when the well has been washed, the tubing may be elevated to carry the shoulder 14 above said segments and into position, as shown in Figure 1, and the bolts 8 may then be screwed inwardly to move said segments into active position, as shown in Figures 1 and 2, and the hanger and tubing then lowered until the shoulder 14 lands on said segments to support the tubing, and the bolts 22 may then be screwed inwardly to engage their inner ends above the ring 17, as illustrated in Figure 2, to secure the hanger in place.

In the form shown in Figure 6, the hanger, as 28, has been slightly modified and is provided, at its upper end, with the downwardly facing shoulder 29, beneath which there is the packing 30 around the hanger. A wear ring 31 is disposed beneath the packing and is locked in place by the locking ring 32 which is countersunk into the hanger and engages the lower side of the wear ring 31. This locking ring 32, as well as the locking ring 19 shown in the other figures, is open at one side and may be snapped into a surrounding external annular groove in the hanger. In this form, shown in Figure 6, the head 1 is also provided with the inside annular groove 3 to receive the segments 4 which may be operated by the screw-bolts 33 into active position, as shown, to support the hanger, or into inactive position for the purposes hereinabove specified. The bolts 33 may be surrounded by the packing gland 34 to form a fluid-tight joint.

The drawings 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 we claim is:—

1. In combination a tubular head, a tubular hanger in the head, said hanger having an external shoulder and annular packing on the shoulder, a retractable support for the hanger in the head, a retractable locking device on the head, means accessible from without the head for actuating the support into active position to support the hanger or into inactive position, and means accessible from without the head for actuating the locking device into active position to lock the hanger on the support and into inactive position to release the hanger.

2. In combination a tubular head adapted to be connected to a pipe in a well, a hanger support therein movable inwardly into active position and movable outwardly into inactive position, means accessible from without the head for actuating the support into either of said positions, a tubing hanger shaped to enter the head and having an external, annular, downwardly facing shoulder arranged to land on the support when the support is in active position, the upper end of the hanger being reduced, packing closely surrounding the reduced portion of the hanger and fitting closely in the head and a retainer ring on the packing.

3. In combination a tubular head adapted to be connected to a pipe in a well and having an inside groove, a hanger support in the groove movable inwardly into active position and movable outwardly into inactive position, means accessible from without the head for actuating the support into either of said positions, a tubing hanger shaped to enter the head and land on the support when the support is in active position, the hanger including external annular packing thereon to form a fluid-tight joint between the hanger and head and the hanger and support being of such relative dimensions as to allow the hanger to pass on downwardly through the support when the latter is in inactive position.

4. In a combination a tubular head adapted to be connected to a pipe in a well, a hanger support therein movable inwardly into active position and movable outwardly into inactive position, means accessible from without the head for actuating the support into either of said positions, a tubing hanger shaped to enter the head and land on the support when the support is in active position, annular packing around the hanger and forming seals with the hanger and head, and a locking device on the head and accessible on the outside of the head, said device being movable into active position into engagement with the hanger to prevent upward movement thereof and being movable into inactive position to clear the hanger to allow upward movement thereof.

5. In a device of the character described a tubular head having an inside annular groove, a tubing hanger support in the groove, a tubular hanger in the head on the support and having packing therearound, means working through the wall of the head connected to the support and operable to move the support inwardly into

supporting position or outwardly into inactive position and packing compressing means working through the walls of the head.

6. In a device of the character described, a tubular head having an inside recess, a tubing hanger support in the recess, packing compressing means working through the wall of the head means working through the wall of the head connected to the support and operable to move the support inwardly into supporting position, or outwardly into inactive position, and a housing on the head around and enclosing the support-operating means.

7. In a device of the character described a tubular head having an inside groove, a tubing hanger support in the groove comprising arcuate segments, means working through the wall of the head connected to the segments and operable to move the support inwardly into supporting position or outwardly into inactive position, and means working through the wall of the head and operative into inner position to engage a hanger on the support and into outer position to release the hanger.

8. In combination a tubular head, a tubing hanger therein having an external shoulder and having packing therearound abutting the shoulder, a hanger support in the head movable into active position to support the hanger and into inactive position to permit the hanger to pass through the support means working through the walls of the head to compress packing and means working through the wall of the head by means of which the support may be moved into either of the said positions.

9. In combination a tubular head having an inside annular groove, a hanger support formed of arcuate sections radially movable in the groove, a tubing hanger in the head having an external abutment and packing around and carried by the hanger and located between the said abutment and support said packing forming means for supporting the hanger.

10. In combination a tubular head, a tubing hanger therein having an external shoulder and packing around the hanger abutting the shoulder, a hanger support in the head movable into active position to support the hanger and into inactive position to release the hanger, means accessible from without the head for moving the support into either of said positions and means accessible from without the head for applying a compressive force to the packing.

11. In combination a tubular head, a tubular hanger in the head having an external abutment, packing around the hanger abutting the abutment, a retractable support accessible from without the head and movable into active position to support the hanger and into inactive position to release the hanger and means accessible from without the head movable into active position to apply a compressive force to the packing and into inactive position to release the packing.

12. In combination, a tubular well head, a plurality of inwardly movable supports in the head, a tubing hanger in the head, packing on the supports closing the space between the hanger and head, means accessible from without the head for moving the supports inwardly into active position to support the hanger, a downwardly facing shoulder on the hanger above and in abutting relation with the packing.

13. In combination, a tubular well head, a plurality of retractable supports on the head, a tubing hanger in the head, packing means including a rigid ring and mounted on the supports and closing the space between the hanger and head, means accessible from without the head for moving the supports inwardly into active position to support the packing and outwardly into inactive position, an abutment on the hanger above and in abutting relation with the packing.

14. In combination a tubular head, a tubing hanger therein having an external shoulder and packing around the hanger adjacent the shoulder, a hanger support in the head movable into active position to support the hanger, means accessible from without the head for moving the support into said active position and means accessible from without the head for applying a compressive force to the packing.

15. In a device of the character described a tubing head having an inside recess, a tubing hanger support in the recess, packing compressing means working through the wall of the head, means working through the wall of the head to move the support inwardly into hanger-supporting position.

16. In combination a tubular head, a tubing hanger therein having an external shoulder and sealing means around the hanger adjacent the shoulder, a hanger support on the head movable into active position to support the hanger, means accessible from without the head for moving the support into said active position and means above the sealing means for applying a compressive force to the sealing means.

17. In combination a tubular head, a tubing hanger therein, a hanger support in the head movable into active position to support the hanger, means accessible from without the head for moving the support into said active position, sealing means around the hanger for closing the space between the hanger and head and means accessible from without the head for applying a compressive force to the sealing means.

18. In combination a tubular head, a tubing hanger therein, a hanger support in the head and movable into active position to support the hanger, means accessible from without the head for moving the support into said active position, means around the hanger for closing the space between the hanger and head forming fluid tight joints with the hanger and with the inside wall of the head and means accessible from without the head for engaging the hanger and holding the same against upward movement from the support.

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