

Nov. 11, 1952

J. W. THATCH

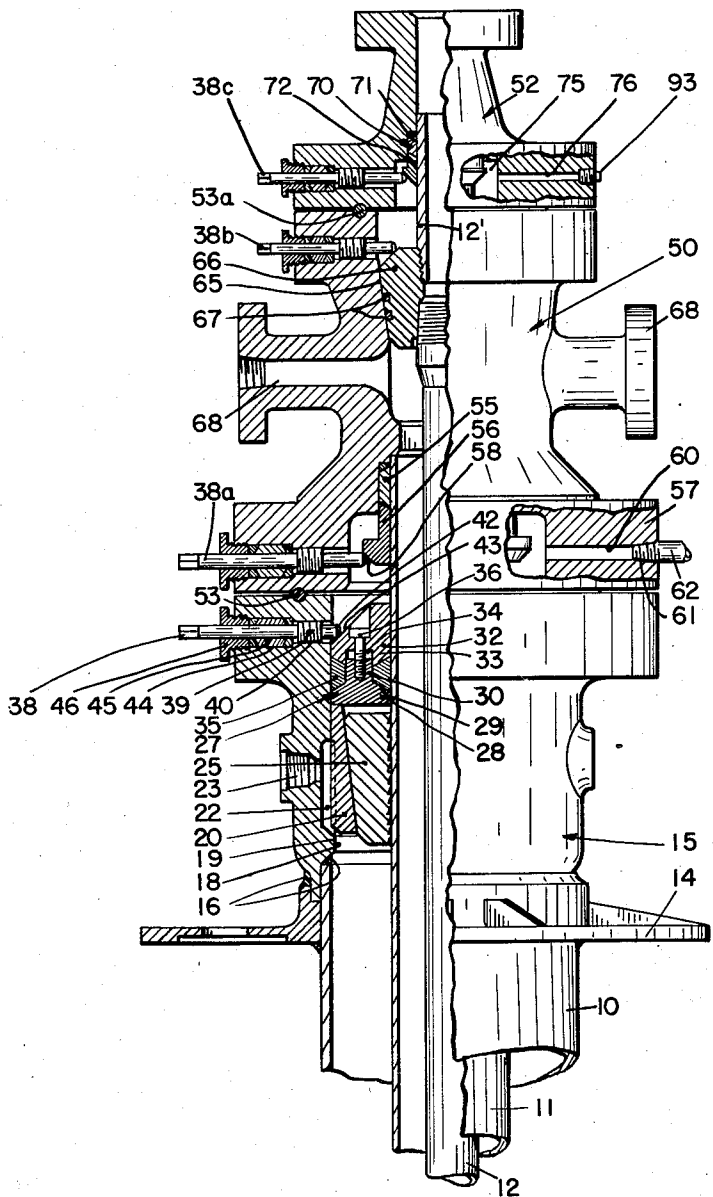
2,617,485

CASING HEAD

Filed March 11, 1947

2 SHEETS—SHEET 1

FIG. 1.



INVENTOR.  
JOHN W. THATCH  
BY  
*Mason & Gisham*  
ATTORNEYS

Nov. 11, 1952

J. W. THATCH

2,617,485

CASING HEAD

Filed March 11, 1947

2 SHEETS—SHEET 2

FIG. 2.

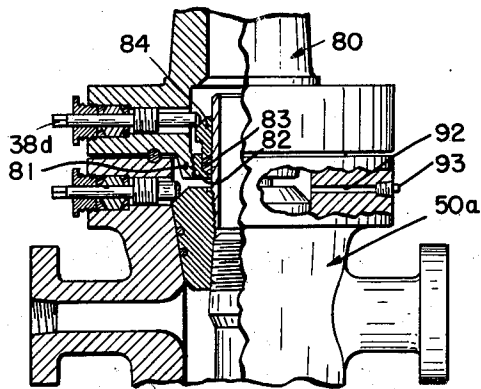
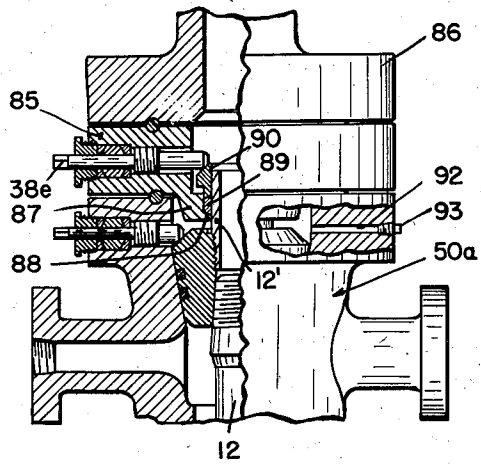


FIG. 3.



INVENTOR.

JOHN W. THATCH

BY

*Mason & Chatham*

ATTORNEYS

# UNITED STATES PATENT OFFICE

2,617,485

## CASING HEAD

John W. Thatch, Wilmington, Calif., assignor to  
Regan Forge and Engineering Company, San  
Pedro, Calif., a corporation of California

Application March 11, 1947, Serial No. 733,780

3 Claims. (Cl. 166--14)

1

This invention relates generally to casing and tubing heads used in oil wells.

It is an object of this invention to provide a novel casing and tubing head means particularly suitable for use in producing wells where high fluid pressures are present, either from natural causes or as a result of artificial causes, such as in the production methods utilizing high pressure fluids injected into the wells.

It is a particular object of the invention to provide a casing and tubing head structure embodying means for effecting a seal between the head structure and the outer surface of an inner string of casing at two spaced points located one in each of two adjoining head members in which the sealing means is so related to the other parts of the structure that it is readily accessible. In this connection it is an object to provide a casing and tubing head structure embodying means for suspending an inner casing from a point in the lowermost of the two heads at a point below the seal means therein.

More particularly, it is an object to provide a casing head structure embodying adjoining connected head members and having a sealing or packing means in the lower part of the uppermost of the two head members and a sealing or packing means in the upper part of the lowermost head member, together with means in the lowermost head member below the sealing means therein for suspending the inner casing against which the seals pack off.

It is also an object to provide a construction of the type indicated wherein it is possible to test the effectiveness of each seal means for the casing and additionally the effectiveness of the joint between the two head members.

It is a further object of the invention to provide a casing head structure of the type indicated which may readily be assembled about the upper end of a casing or tubing.

It is also an object of the invention to provide, in a head of the type indicated, means for adjusting the sealing means within the head from a point outside the head.

These and other objects will be apparent from the drawings and the following description thereof. Referring to the drawings, which are merely for illustrative purposes:

Fig. 1 is an elevational view partly in section of a casing and tubing head structure embodying the invention;

Fig. 2 is a fragmentary elevational view, partly in section, of a tubing head structure embodying a different form of the invention; and

2

Fig. 3 is an elevational view, partly in section, of a tubing head structure embodying another form of the invention.

More particularly describing the invention, reference numeral 10 generally indicates the upper end of the outer string of a well casing. Inwardly of this is an inner casing 11 and inside the inner casing the tubing 12.

Supported on the upper end of the casing 10 is a landing base 14 above which is a casing head 15. The parts are secured together by means of welds 16.

The casing head 15 is tubular, being provided with a central opening 18, and is formed to provide an inwardly extending shoulder 19 which forms a support for a slip bowl 20. Suitable recesses 22 are provided in the wall of the casing head to establish communication between the lower end of the casing head and the threaded openings 23 to which may be connected lateral flow lines.

The slip bowl 20 supports the usual slips 25 which have serrated inner faces for engaging and supporting the casing 11.

Mounted in the upper part of the bore of the casing head 15 is an annular packing or sealing means generally indicated by numeral 27 which, in the form shown, comprises a metal ring 28 adapted to rest on the upper end of the slip bowl. This ring is provided with a pair of tapered shoulders 29 and a central upstanding flange 30. Above the ring 28 there is positioned a packing compressing ring 32 provided with two depending flanges 33 defining a central recess 34 of a size to receive the upstanding flange 30 on the ring 28. Suitable packing of any well known type is positioned between the two rings and is indicated by the numerals 35, the packing being divided into an inner and an outer ring, one being adjacent the inner surface of the bore 18 of the bowl and the other being adjacent the outer surface of the casing 11. A plurality of screws 36 are provided for initially compressing the packing.

Means are provided for holding the compression ring 32 in place and for urging the ring toward the ring 28. This means comprises a plurality of lock screws 38, preferably three in number, which are located 120° apart. The screws each have an enlarged threaded portion 39 which is threadedly received in a bore 40 extending radially of the casing head. The inner ends of these screws are provided with a beveled head 42 adapted to bear against the tapered upper surface 43 of the compression

ring 32. Outwardly of the threaded bore 40 is a counterbore 44 which receives a packing gland comprising the packing 45 and a threadedly mounted bushing 46.

Mounted on the casing head 15 is a tubing head 50 and on this an adapter 52. The casing head, tubing head and adapter are provided with appropriate end flanges as shown through which, it will be understood, bolts (not shown) extend for fastening the elements together in the customary manner. Between each pair of flanges is an annular deformable packing ring element 53.

The casing 11 extends through the casing head 15 and up into the tubing head 50 for a limited distance. Means are provided for packing off or sealing between the inner wall of the tubing head 50 and the upper end of the casing 11, such sealing means including an annular packing 55 and a packing compression ring 56. Extending radially of the lower flange 57 of the tubing head are a plurality of lock screws 38a which are similar to the screws 38 described in connection with the casing head. The lock screws in the tubing head bear against a tapered surface 58 at the lower outer portion of the packing compression ring 56 so that the screws can be utilized to compress the packing 55 and hold the packing means in sealing engagement with the casing and head.

This construction provides a double seal for the casing 11, the upper seal located in the lower portion of the tubing head serving to prevent escape of fluid pressure from interiorly of the casing 11 to the annular space surrounding the casing and the lower seal 39 serving to prevent escape of fluid pressure upwardly from the annular space between the outer casing 10 and the inner casing 11. The seals thus prevent high pressure fluid reaching the flanged joint between the two head members, with the result that this joint is not subjected to high pressures which would leak past seal 53.

In order to provide for testing the effectiveness of the two seals against the casing and the seal 53 between the heads, the tubing head 50 is provided with a radially extending passageway 60 to the outside of the head. This passageway may be screw threaded at 61 to accommodate a pipe 62 and suitable test equipment which has not been shown.

The tubing head 50 is provided with a tapered seat 65 which accommodates and supports a tubing hanger 66 threadedly secured at the upper end of tubing 12. Mounted in the hanger is a short extension of the tubing indicated by 12' which projects into the adapter 52. The tubing hanger 66 has peripheral grooves which carry external packing rings 67 which are compressed against the face 65 of the tubing head and serve to effect a seal between the head and the tubing above the vents 68. The tubing hanger is held down by lock screws 38b which are in all respects except size similar to the lock screws 38 heretofore described.

Mounted in adapter 52 is a packing or seal means 70 which comprises the annular packing 71 and a packing compression ring 72. The ring is made to compress the packing by the lock screws 38c.

With this construction the high pressures which may exist in the interior of the tubing 12 and in the annular space between the tubing and the casing 11 are prevented from reaching the interior of the tubing head and adapter in the region of the flanged joint between the mem-

bers, with the result that the packing 53a is not subjected to these high pressures, nor are the bolts extending through the flanges placed under an unnecessary strain.

The annular space at the top of the tubing head, indicated by numeral 75, may also be tapped by means of a passageway 76 extending through the lower flange of the adapter, as shown, or a similar passage may be provided in the upper flange of the tubing head.

It will be apparent that the above described construction provides a casing and tubing head structure in which the elements may be readily assembled about the upper end of the pipe and in which the high pressures of the inner casing and tubing are prevented from reaching the flange joints between the individual head elements. At the same time the packing or sealing means may be adjusted from a point outside of the head and, if necessary, the packing means sealing the inner casing is readily accessible without disturbing the casing. In addition, the seals as well as the flanged joint may be tested.

In Fig. 2 there is shown a modified form of the invention wherein the tubing head member, which is similar to the tubing head shown in Fig. 1 indicated by numeral 50a, supports an adapter head 80 having a depending inner threaded flange 81 in which is mounted a packing retaining ring 82 which supports packing 83. Above the packing is a packing compression ring 84 which is urged against the packing by a lock screw 38d.

In Fig. 3 there is shown another form of packing means for sealing off the upper end of the tubing or short section of tubing 12' which comprises a plate-like member 85 which is bolted (not shown) to the tubing head 50a and between it and any suitable coupling 86. This plate element 85 has a depending annular flange or ring 87 provided with a seat 88 for accommodating packing 89. The packing is compressed by a packing compression ring 90 which is urged against the packing by a screw lock 38e.

In the forms of the invention shown in Figs. 2 and 3, the tubing head 50a is provided with a passage 92 providing communication between the exterior of the head and the annular space between the seals interiorly of the head for test purposes. A plug 93 is shown closing the passage. The constructions shown in Figs. 2 and 3 provides two constructions for sealing off the tubing above the lower seal at the tubing hanger in which the overall height of the head structure is reduced relative to the construction shown in Fig. 1. The plate 85 of Fig. 3 may be used in place of a special adapter head.

Although the invention has been particularly shown and described, it is contemplated that various changes and modifications can be made without departing from the scope thereof as set forth in the following claims.

I claim:

1. In a casing and tubing head structure, a tubular casing head, a tubular tubing head mounted on said casing head, a tubular adapter mounted on said tubing head, seal means between said heads and adapter, a casing extending upwardly through said casing head and terminating in the lower portion of said tubing head, a tubing extending upwardly inside said casing and into said adapter, suspension means in said casing head for said casing, sealing means in said casing head above said suspension means between the inner wall of said casing head and

5

the casing, sealing means in the tubing head between the inner wall of said head and said casing, suspension means in said tubing head above said casing for said tubing, sealing means in said tubing head between the inner wall thereof and said tubing, and sealing means in said adapter between the inner wall thereof and said tubing.

2. In a casing and tubing head structure, a tubular casing head, a tubular tubing head mounted on said casing head, a tubular adapter mounted on said tubing head, seal means between said heads and adapter, a casing extending upwardly through said casing head and terminating in the lower portion of said tubing head, a tubing extending upwardly inside said casing and into said tubing head, suspension means in said casing head for said casing, sealing means in said casing head above said suspension means between the inner wall of said casing head and the casing, sealing means in the tubing head between the inner wall of said head and said casing, a tubing hanger at the upper end of said tubing within said tubing head and in sealing engagement therewith, a tubing nipple threaded into the upper part of said hanger and extending upwardly into said adapter, sealing means in said tubing head between the inner wall thereof and said tubing, and sealing means in said adapter between the inner wall thereof and said tubing nipple.

3. In a tubing head structure, a tubular tub-

6

ing head member, a tubular fitting member mounted on said tubing head member, a tubing extending upwardly into said tubing head member, tubing suspension means in said tubing head member suspending said tubing and providing a seal between the same and said tubing head member, a tubing nipple detachably mounted in said suspension means and extending into said tubular fitting member, seal means in said fitting member between the inner wall thereof and said tubing nipple, and means in said fitting member extending to the exterior thereof adjustably to position said seal means in operative or inoperative position.

JOHN W. THATCH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,976,238	Long et al. ....	Oct. 9, 1934
2,094,690	Wickersham et al. ....	Oct. 5, 1937
2,178,700	Penick et al. ....	Nov. 7, 1939
2,187,839	Penick et al. ....	Jan. 23, 1940
2,232,884	Penick et al. ....	Feb. 25, 1941
2,284,983	Minor .....	June 2, 1942
2,306,102	Penick et al. ....	Dec. 22, 1942
2,357,411	Leman et al. ....	Sept. 5, 1944
2,456,081	Penick .....	Dec. 14, 1948