Oct. 6, 1931. A. BOYNTON 1,825,774

CASING HEAD

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Fig. 1.

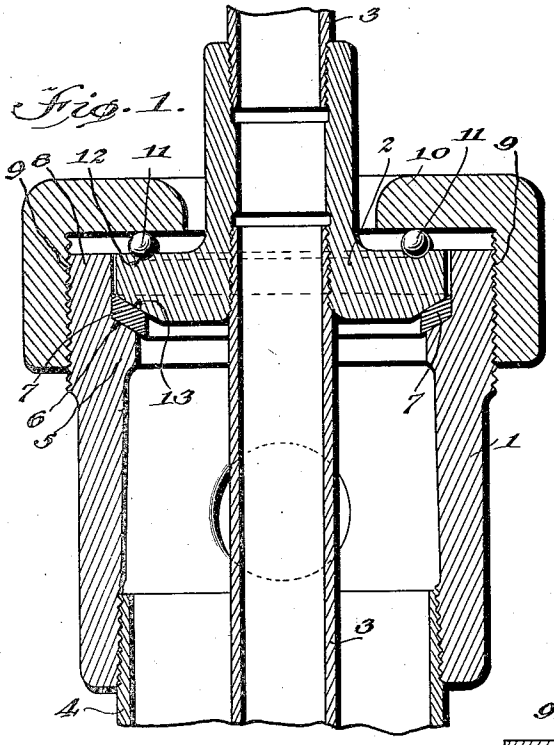


Fig. 2.

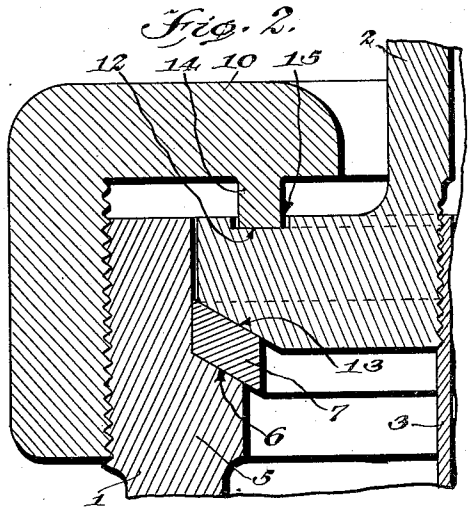


Fig. 3.

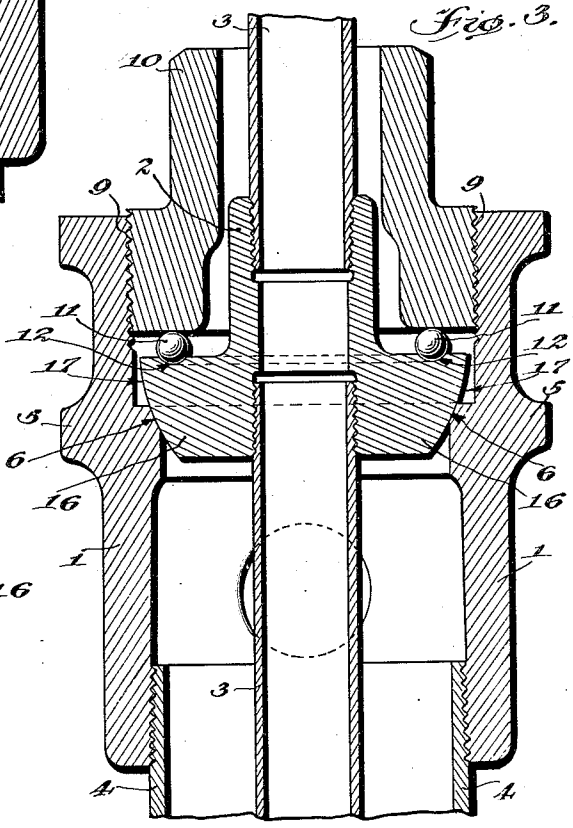
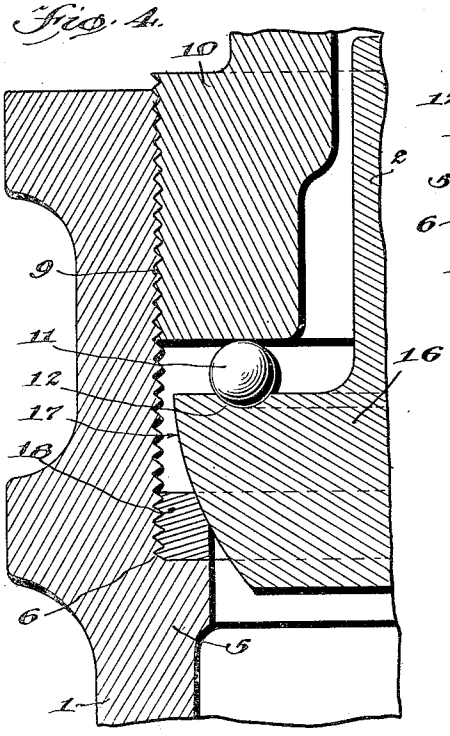


Fig. 4.



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Fig. 6.

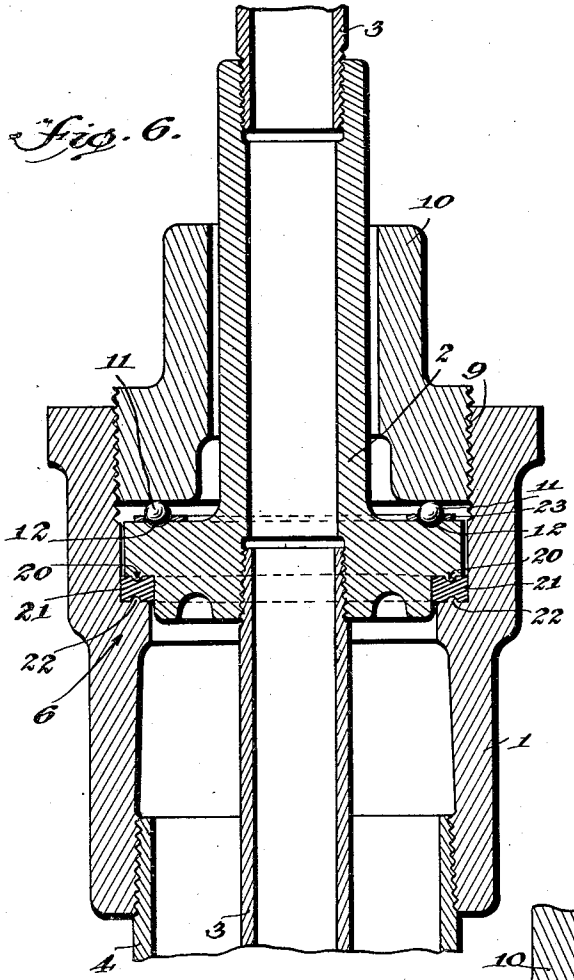


Fig. 5.

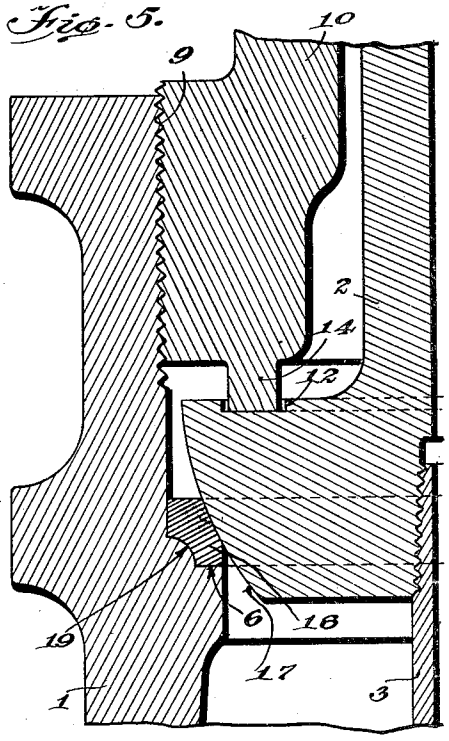
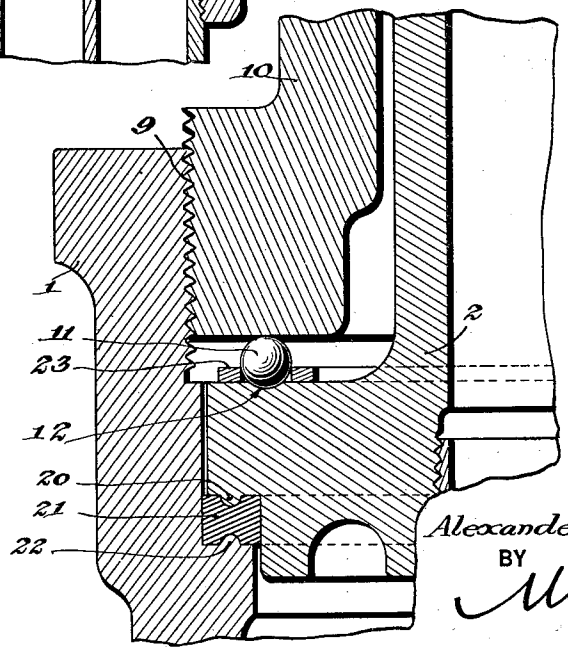


Fig. 7.



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UNITED STATES PATENT OFFICE

ALEXANDER BOYNTON, OF SAN ANTONIO, TEXAS

CASING HEAD

Application filed November 21, 1927. Serial No. 234,777.

This invention relates to improvements in casing heads, and it consists of the construction, mode of operation and advantages herein described and claimed.

One of the important objects of the present arrangement of casing head is to make possible the imposition of great pressure upon the gasket or other packing member by the interposition of anti-friction bearings between the pressure sleeve and the tubing carrier at which a fluid-tight joint is sought.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which;

Figure 1 is a vertical section of a casing head having a simple, yet most effective, embodiment of the particular type of joint dealt with herein,

Fig. 2 is a modification by which substantially the same object is accomplished without the use of the specific ball bearings in Fig. 1,

Fig. 3 is a vertical section making use of an arrangement similar to Fig. 1, but employing a specific ground joint,

Fig. 4 is a fragmentary sectional view wherein a metallic or fiber ring is stationed at the former ground joint,

Fig. 5 is an adaptation of the arrangement in Fig. 2 to the arrangement in Fig. 4, the omission of ball bearings being noted,

Fig. 6 is a vertical section illustrating a further modification, wherein a deformable packing is interposed between the main body and tubing carrier of the casing head,

Fig. 7 is a fragmentary sectional view showing parts of Fig. 6 more in detail.

It is the purpose of the improved casing head to provide, first, a durable structure for the adequate support of the tubing string from the upper end of the casing, and, second, a fluid-tight joint which, when properly assembled, will effectually prevent the escape of internal pressure fluid from the casing. In addition to the foregoing advantages, known in the present series of inventions, the improved casing head introduces anti-friction means for greatly diminishing friction between the parts so that a more powerful pressure may be applied for the making of the foregoing joint.

Corresponding reference numerals refer to similar parts in all of the modifications. In Fig. 1, the main body of the casing head is indicated 1. The tubing carrier 2 supports the tubing string 3 within the well casing 4 to which the main body 1 is attached. The main body 1 is appropriately enlarged at 5 to define a shoulder or base, the uppermost surface of which is, in the present form, downwardly and inwardly inclined at 6 and provides a rest for the gasket 7. This gasket may be composed of an appropriate deformable material, for example, lead, fiber, etc. The remaining upstanding rim 8, as well as the rest of the main body to a point past the base 5 is threaded at 9 to permit screwing on of the pressure sleeve 10.

This pressure sleeve has a pronounced inwardly extending flange which serves the specific purpose of a contacting surface for the anti-friction bearing comprising balls 11 in the present instance. No especial provision need be made in the flange of the sleeve for compelling the balls to run true for these are assembled in an annular concavity or race 12 in the upper surface of said tubing carrier 2. The under and adjoining face of the tubing carrier is beveled at 13 to correspond with the seat 6.

It is self-evident that screwing of the pressure sleeve 10 in the proper direction will impose pressure upon the tubing carrier 2, thus to compress the gasket 7. Ordinarily, this manipulation of the pressure sleeve will engender great friction between the parts so that a point must be reached where the friction becomes excessive. It has been concluded that by interposing anti-friction means, such as the balls 11 between the points where greatest friction will occur, greater pressure may be acquired by reducing the frictional component. The balls 11 solve the problem; the pressure of the sleeve 10 is transferred to the tubing carrier 2 through the balls and, in turn, to the gasket 7 where it is desirably applied.

Fig. 2 illustrates a modification by means

of which the balls 11 of Fig. 1 may be eliminated. A circular depending flange 14 on the under side of the pressure sleeve 10 extends into the annular groove 12 which may be regarded as the equivalent of the ball race in Fig. 1. The contacting surfaces of the flange and grooves must be given a smooth finish for the obvious purpose of reducing friction. The breadth of the groove is greater than the lateral thickness of the flange, thus producing annular spaces 15 defining grease or oil reservoirs.

In Fig. 3 the shoulder or base 5 has a seat 6 (the equivalent of the rest 6 of Fig. 1), with which a ground joint is made by the head 16 of the tubing carrier. The lateral surface 17 of the head is rounded, the radius of curvature being the same as that of the seat 6.

In effect, the foregoing arrangement is that of a ball and socket, any slight deviation of the tubing string 3 from perpendicularity being readily compensated for. The same compensating function becomes evident upon screwing down on the pressure member 10 which is now more in the nature of a plug than a sleeve as in Fig. 1. This member is screwed into the main body 1 as at 9 and bears upon the balls 11 riding in the race 12 in top of the head 16. Screwing down of the pressure member or plug 10 imposes pressure upon the ground joint at 6, excessive friction being reduced by the ball bearings 11.

In Fig. 4, the convex surface 17 of the head 16 bears against a gasket 18 of bronze or other suitable material. The gasket reclines upon the rest 6 of the shoulder or base 5. Fig. 5 illustrates a familiar arrangement which at once will be recognized as a composite of the modifications in Figs. 2, 3 and 4.

The gasket 18 either of bronze (previously mentioned), lead or fiber, is shaped to fit upon a circular protuberance 19 upon the rest 6. The head has the annular groove 12 in which the circular flange 14 of the pressure sleeve 10 rides.

Each of the various foregoing modifications has peculiar advantages that may adapt it to particular conditions. It may be added in connection with Figs. 3, 4 and 5, that an effective joint is obtained by a relatively simple arrangement. A ground joint is easily effected ordinarily by observing nothing more than mechanical precision. After an accurate joint is made, protection against the escape of fluid, whether that be gas or liquid, is assured, the only possible place for such escape being at the seat where the convex surface of the head 16 has contact.

Figs. 6 and 7 illustrate a further modification wherein the tubing carrier 2 is provided with an annular tongue 20 for bearing upon and biting into the gasket 21 upon the rest 6 of the main body. This rest has a similar annular tongue 22 biting into the gasket from beneath, the effect of the two tongues being to expand the gasket in the lateral directions so that the side edges of the gasket tightly engage the adjacent walls of the main body and tubing carrier for the obvious purpose of effecting a sealing-off condition.

The balls 11 run in the race 12 upon the tubing carrier, but the use of the race is optional because, according to the illustration, the balls are held by a spacer ring 23 by which preferably six balls are in practice contained. The pressure member 10, again in the form of a plug as in Fig. 3, screws into the main body 1 and bears upon the balls 11, firmly driving the tubing carrier into sealing-off contact with the gasket 21. The resulting deformation of the gasket makes the desired tight joint.

I claim:—

A casing head comprising a main body, a tubing carrier fitted upon the main body, means to compose a fluid seal at the point of connection of the tubing carrier with the main body, and a pressure member covering the joint between said carrier and body preventing the admission of foreign matter to the sealing means and being operable upon the casing head and against said carrier to tighten said sealing means.

Signed at San Antonio, in the county of Bexar and State of Texas, this 12th day of November, A. D. 1927.

ALEXANDER BOYNTON.