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G. D. JOHNSON

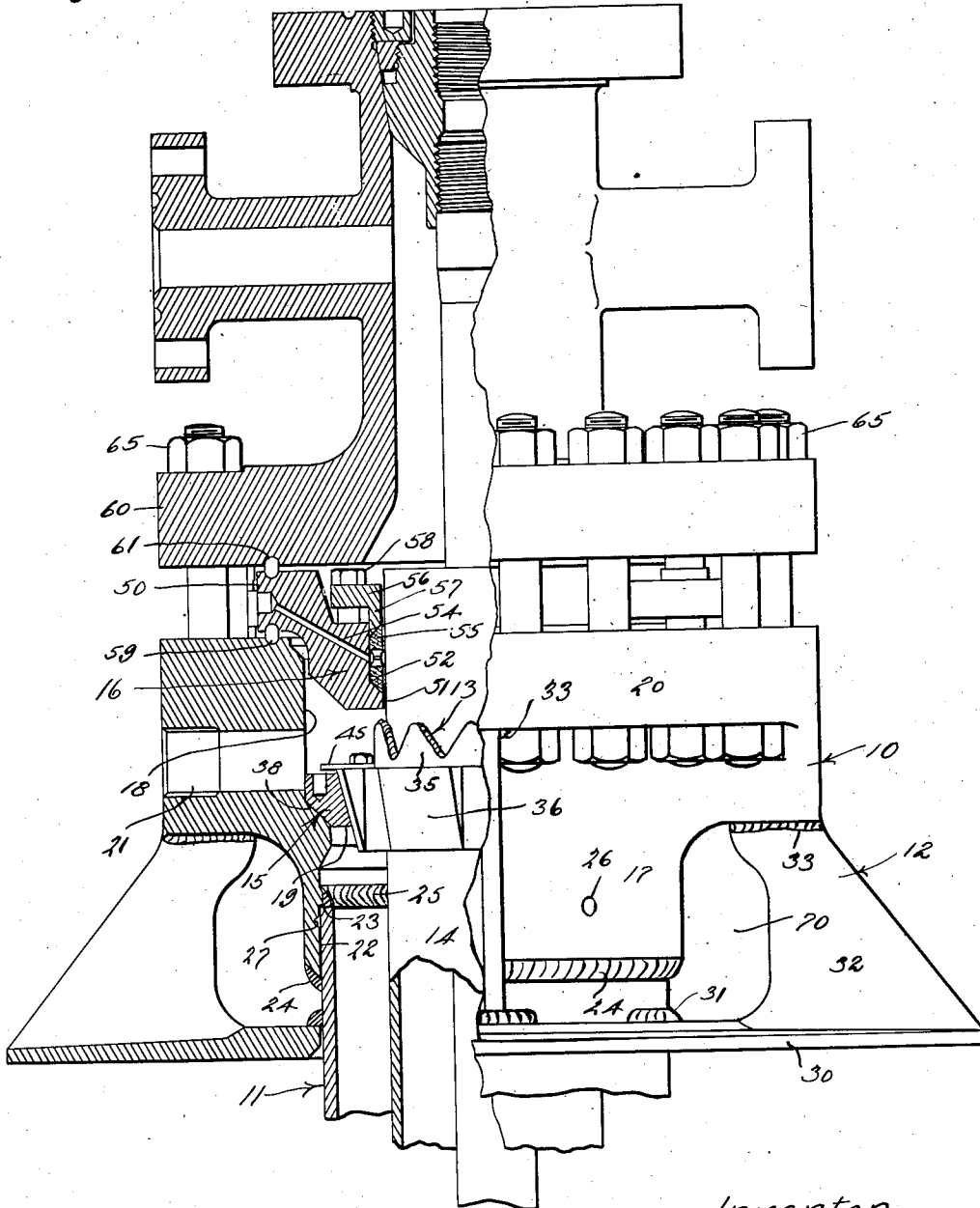
2,469,772

CASING HEAD

Filed Dec. 22, 1943

2 Sheets-Sheet 1

Figure.1.



Inventor
Glenn D Johnson
by *[Signature]*
Attorney

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CASING HEAD

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2 Sheets-Sheet 2

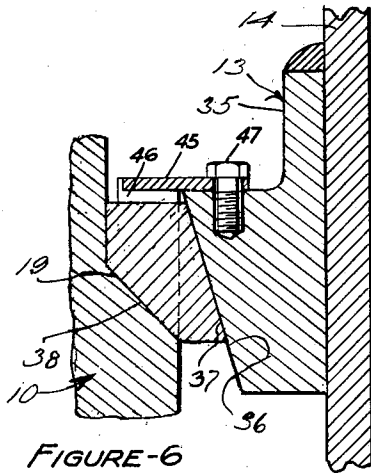


FIGURE-6

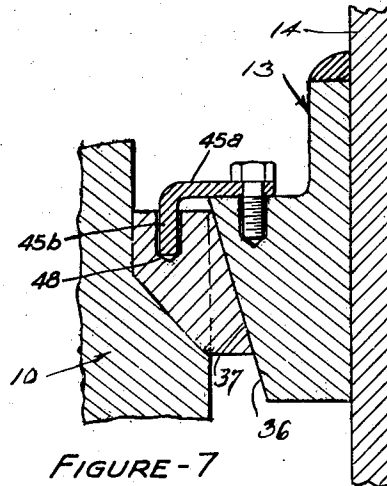


FIGURE-7

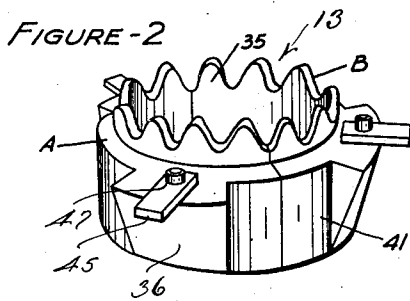


FIGURE-2

FIGURE-4

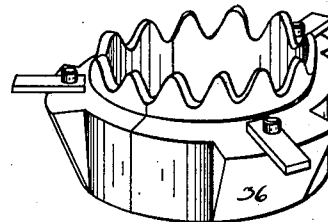
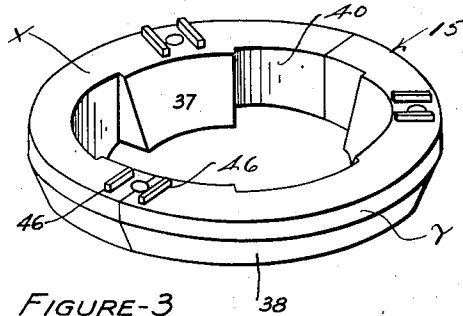


FIGURE-3

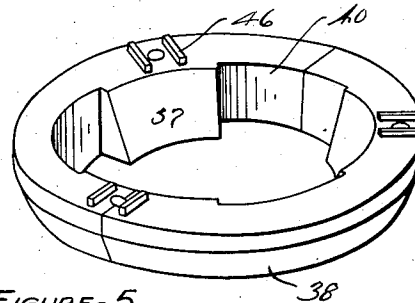


FIGURE-5

INVENTOR
GLENN D. JOHNSON
BY

✓ All apulll

HIS ATTORNEY

UNITED STATES PATENT OFFICE

2,469,772.

CASING HEAD

Glenn D. Johnson, Compton, Calif., assignor to
Baash-Ross Tool Company, Los Angeles, Calif.,
a corporation of California

Application December 22, 1943, Serial No. 515,223

4 Claims. (Cl. 166-14)

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This invention relates to a casing head, and it is a general object of the invention to provide an improved, simple, inexpensive and practical casing head construction for use on wells.

A wide variety of structures have been proposed and used in the finishing of wells, these devices being commonly termed casing heads. In many situations it has been found desirable and practical to use certain welded constructions in such situations. However, such constructions have presented certain limitations and difficulties.

A further object of the present invention is to provide improvements in a casing head of the character referred to which results in a compact arrangement of parts and which will accommodate an ordinary or standard companion flange of a fitting, or the like, that may be applied to the head. Heretofore, in welded head constructions, it has been common to employ arrangements and combinations of parts which made special companion flanges necessary on parts to be attached to the head.

Another object of this invention is to provide a construction whereby an inner casing is effectively dependably supported from the head during normal well operations and is releasable therefrom to facilitate dismantling or possible repairs, etc.

Another object of my invention is the provision of a well head construction whereby it is possible to quickly and effectively connect an inner casing with the head and when desired to release the inner casing.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms of apparatus and manners of carrying out the method practiced by my invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side view of a head construction embodying the present invention, the parts shown at the left of the figure being in section and those at the right of the figure being in elevation. Fig. 2 is a perspective view of the shoulder for the inner casing, showing it independent of the casing and showing it immediately above Fig. 3 wherein is shown a perspective view of the support for the shoulder, the rotative positions of the parts shown in Figs. 2 and 3 being such as to cause the shoulder to be supported by the support upon being lowered into it. Fig. 4 is a view similar to Fig. 2 showing the shoulder in a different rotative position and located immediately above Fig. 5 wherein the support is shown, Figs. 4 and

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5 showing these parts related so that the shoulder will pass through the support upon being lowered from the position illustrated. Fig. 6 is an enlarged detailed sectional view taken through the shoulder and support illustrating one form of lock means that can be used in connection with these parts, and Fig. 7 is a view similar to Fig. 6 showing another form of lock means that can be used.

The construction provided by my invention involves, generally, a body 10 which is the principal part of the head and which is adapted to be applied to an outer casing 11, a base 12 that may be used in connection with the body 10 and casing 11, a shoulder means 13 adapted to be applied to an inner casing 14 arranged through the body, a support 15 carried in the body 10 to support the shoulder 13, packing means 16 for sealing between the inner casing 14 and the body 10 and various other features, the details of which will be hereinafter described.

The body 10 is adapted to be secured to the upper end of the casing 11 and in its preferred form it has an annular skirt 17 depending downwardly to receive the upper end portion of the casing 11, a bore or cavity 18 extending downwardly into it from its upper end to accommodate other parts, as will be hereinafter described, and terminating in a seat 19 which carries the support 15 and a flange 20 at its upper end projecting radially beyond the other parts and serving as a means whereby the body can be coupled with other parts or fittings that may be applied to the head. The body has one or more fluid connections 21 located immediately below the flange 20 and communicating with the cavity 18.

The skirt 17 at the lower part of the body 10 has a bore 22 to receive the upper end portion of the outer well casing 11. The bore terminates in a suitable stop shoulder 23 which serves to limit the insertion of the casing into the skirt. I prefer to employ welding to join or connect the body 10 and casing 11 and it is advantageous to employ two entirely independent seams of welding, both of which extend entirely around the connected parts and each of which is, in and of itself, a secure, dependable connecting means. One of the welded connections is an exterior weld and is provided at 24 and joins the lower end of the skirt 17 with the exterior of the well casing 11. The other welded connection is an interior weld and is provided at 25 between the upper end of the well casing 11 and the interior of the skirt 17. Both welds extend continuously and entirely around the casing and skirt.

I preferably form the skirt 17 so that it has a

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thin or light wall. It is preferred to form it so that its wall is about equal in thickness to that of the casing 11. This proportioning of the skirt 17 is important as it greatly facilitates the obtaining of proper welds 24 and 25. Heretofore, in constructions of this general character, attempts have been made to weld casing to bodies or heads of substantial mass and the results have not been altogether satisfactory. Parts such as a casing head or body are usually made of materials that do not lend themselves readily to welding, and if an attempt is made to weld a thin-walled part to a thick-walled body the welding difficulties are aggravated. By providing a thin-walled skirt 17 I am able to obtain dependable and satisfactory welds 24 and 25.

It is preferred, in practice, to provide one or more openings 26 in the skirt 17 to communicate with the bore 22 between the welds 24 and 25 so that tests can be made to determine whether or not the welds are tight. Tests can be made at any time through the openings 26 and, if necessary, suitable plastic packing can be inserted through the openings 26 to seal slight leakage that may occur should the welds prove defective. To facilitate the application of packing an annular channel 27 may be provided between the skirt and casing to carry packing.

The base 12 is in the nature of an attachment to be applied to the other parts and may or may not be used, as circumstances require. A feature of the construction shown is the fact that the base is a simple construction readily applicable to the other parts and when applied serves as an effective tie between the body 10 and casing 11.

In its preferred form the base 12 includes a base plate 30 which may be a flat member arranged around the casing 11 and designed to rest on the floor of the cellar or on any other suitable support. I prefer to fit the base plate 30 closely around the casing 11 and to provide suitable welds 31 between the base plate and the casing 11. Through this construction the base plate 30 is independently and effectively joined with the casing 11 at the desired point. I further provide upstanding ribs 32 on the peripheral portion of the base plate 30. The ribs are designed to engage under overhanging or downwardly facing parts of the body 10 and their upper ends are joined with such parts by welding 33. In the particular construction illustrated the ribs 32 engage under the flange 20 and are welded thereto.

The ribs 32 are spaced outwardly from the skirt 17 of the body 10 leaving a substantial space 70 between the ribs and the skirt. This construction allows free access entirely around the skirt to facilitate convenient welding of the lower end of the skirt to the casing 11.

In practice the base construction hereinabove described can be welded to the body 10 in a shop when it is known that the base is desired, in which case the welds 31 are the only operations required at the well, or, if convenient, the body 10 and base 12 can be handled as separate parts and the welds 31 and 33 can both be made at the well.

The construction thus far described is set forth and claimed in my application entitled "Casing head," Serial No. 570,694, filed December 30, 1944.

The shoulder means 13 provided by my invention is normally located within the body 10 and is an element which is secured to the inner casing 14. In the preferred construction the shoulder means 13 is in the form of a split ring having two sections A and B. The sections A and B are di-

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vided or split longitudinally of the head construction and form halves of an annular shoulder to be engaged around the casing 14. I prefer to secure the sections A and B in assembled position around the upper end portion of the casing 14 through welding. In practice I provide an upwardly projecting flange 35 on the means 13 to be welded to the exterior of the casing 14. The upper edge of the flange is preferably collapsed, as shown throughout the drawings, to materially lengthen the welded connection and thereby add to its strength.

The shoulder means 13 is fixed or welded on the inner casing 14 so that when the casing 14 is in the desired vertical position in the body 10 the shoulder means 13 is located at or in a position to be supported by the support 15 carried on the seat 19. In accordance with my invention the shoulder means 13 is proportioned to freely pass through the body 10 and it may also be made to pass through the casing 11 if desired. The exterior or outer face 36 of the shoulder means 13 is tapered to cooperate with the support 15. As shown in the drawings, the exterior of the shoulder 13 is tapered downwardly and inwardly.

The support 15 provided to carry the shoulder means 13 is in the form of an annular ring designed to rest on the seat 19 in the body 10 and its bore or inner surface 37 is tapered to correspond to the surface 36 of the shoulder and is adapted to receive the shoulder as clearly shown in Figs. 1, 6 and 7 of the drawings.

The means 15 is a split ring construction, that is, it is divided into two semi-circular sections X and Y to facilitate insertion into or removal from operating position in the body around parts arranged in the body. In the case illustrated the seat 19 is shown downwardly and inwardly tapered and, therefore, the exterior of the support 15 has a downwardly and inwardly tapered part 38 designed to fit the seat 19.

In accordance with my present invention vertical or longitudinal channels 40 are formed in the inner portion of the support 15 and similar channels 41 are formed in the exterior of the shoulder 13. The channels 40 and 41 are made of sufficient circumferential extent and are made deep enough so that the shoulder 13 can be rotatively positioned with reference to the support 15, as shown in Figs. 4 and 5, so that the shoulder can be passed through the support. When the shoulder and support are rotatively related, as shown in Figs. 2 and 3, the exterior faces 36 of the shoulder will rest on the interior faces 37 of the support, but when the parts are related, as shown in Figs. 4 and 5, the faces 36 and 37 will not register, but rather the channels 40 and 41 will allow free passage of the shoulder through the support. It is to be noted that when the surfaces 36 and 37 of the shoulder and support are fully engaged the channels 40 and 41 register or are in corresponding rotative positions so that there are vertical channels through the structure formed by the shoulder and support, so that fluid from the casing 11 can pass upwardly through the structure and readily discharge from the body 10 through the fluid connections 21, the openings 43 of which open into the cavity 13 at a point above the seat 19 which carries the support 15.

In the preferred form of the invention I provide a lock means in connection with the structure just described to normally hold the shoulder 13 against rotation relative to the support 15, such as would disengage the surfaces 36 and 37.

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In the form of the invention shown in Figs. 1 to 6, inclusive, the lock means includes one or more arms 45 projecting radially from the shoulder 13 to engage between lugs 46 projecting upwardly from the support 15. In the case illustrated there are three arms 45 and three corresponding pairs of lugs 46 and the arms 45 are detachably connected to the shoulder 13 through screws 47.

It will be noted from the drawings that the arms 45 not only serve to cooperate with the lugs 46 to prevent rotation of the shoulder 13 relative to the support 15, but that they will also serve to prevent passage of the shoulder 13 through the support. When it is desired to move the shoulder through the support the arms 45 are removed by disengaging the screws 47. In the form of the invention shown in Fig. 7 the lock means includes arms 45^a the outer ends 45^b of which are turned downwardly to engage in sockets 48 provided in the support 15, the sockets taking the place of the lugs 46.

The packing means 16 provided by the body 10 and the inner casing 14 may include a plate 50 designed to rest on the inner peripheral portion of the body flange 20 and having an opening 51 receiving the upper end of the casing 14. A recess 52 is provided in the plate 51 to carry packing and a port 54 extends from the recess 52 to the marginal portion of the plate 50 so that a test can be made to determine whether or not the packing in the recess is leaking or so that plastic packing material can be inserted, if desired. In the case illustrated spaced bodies of packing 55 are carried in the recess at either side of a spindle ring 56 and a gland 57 is carried by the plate operable by screws 58 to compress the packing in the recess 52. It is to be noted that the plate 50 is shaped so that it extends downwardly into the cavity 18 in the body 10 and that the various parts just described are arranged and related so that they are all confined between the upper and lower extremities of the plate 50.

The plate 50 is preferably sealed to the body 10 by a sealing ring 59 arranged between the plate and the top of the flange 20. In a similar manner the upper end of the plate 50 may be sealed to the flange 60 of a fitting applied to the head through a sealing ring 61, as shown in Fig. 1.

In practice various fittings or attachments may be applied to the head provided by my invention. In the drawings I have shown a typical fitting applied to the head and including the companion flange 60 which is adapted to be secured to the flange 20 of the body 10 by bolts 65. Particular attention is called to the fact that the companion flange 60 is a plain, straight flange and that the construction which I have provided makes it unnecessary to recess or specially form the flange 60 to accommodate other parts.

In accordance with the method that I have provided the body 10 is applied to the casing 11 through the exterior and interior welds 24 and 25 and, if desired, the base 12 is applied to the body and to the casing 11.

The support 15 is arranged in the body 10 and the shoulder 13 is assembled around the upper end portion of the casing 14, and is then welded at the desired point along the casing 14. The casing 14 is trimmed or cut so that a suitable length thereof projects above the shoulder 13 to receive the packing means 16.

During normal operation the faces 36 and 37 of the shoulder and support are in cooperative engagement and the lock means hold the parts in

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that position. Fluid from the casing 11 is free to flow up through the registering channels 40 and 41 to discharge through the fluid connections 21. The packing means 16 is held in place in connection with the body 10 by means of the bolts 65 which clamp the flange 60 toward the flange 20, the plate 50 being clamped between the flanges and the packings 59 and 61 serving to prevent leakage between the plate 50 and the flanges. The packing means 16 is made tight around the upper or projecting end of the casing 14 and serves to prevent leakage between the casing and the plate.

In accordance with the invention, when it is desired to disengage the inner casing from the head or body 10 for any reason, as for instance, when the well equipment is being dismantled, a spear or other tool may be inserted in the upper end portion of the inner casing 14 and the arms 45 being removed, the shoulder 13 can be lifted slightly from the support 15 whereupon the support can be freely rotated so that the surfaces 36 and 37 are disengaged and the channels 40 and 41 positioned to allow the shoulder 13 to pass through the support 15. This operation can be performed either to allow the casing 14 to be lowered in the head or to allow the body 10 to be lifted up off the casing 14.

Having described only typical preferred forms of the apparatus of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art which fall within the scope of the following claims.

Having described my invention, I claim:

1. A casing head for use with inner and outer casings including, a body to be secured on the outer casing and having an internal seat, a support carried by the seat, and a shoulder located entirely within the body and having a part welded on the inner casing so the shoulder rests on the support, the shoulder and support having co-engageable inclined surfaces positioned in co-operative engagement and also having channels formed in them whereby the shoulder and support can be positioned relative to each other so that the shoulder will pass through the support.

2. In combination, an inner casing, an outer casing, and a casing head including, a body to be secured on the outer casing and having an internal seat, a support carried by the seat, a shoulder located entirely within the body, welding securing the shoulder on the inner casing to rest on the support, the shoulder and support having co-engageable inclined surfaces positioned in cooperative engagement when in one relative position and having channels formed in them whereby the shoulder and support can be positioned so that the shoulder will pass through the support, and means for holding the shoulder and support in position where the engaging faces cooperate.

3. In combination, an inner casing, an outer casing, and a casing head including, a body to be secured on the outer casing and having an internal seat, a support carried by the seat, a shoulder located entirely within the body, and welding securing the shoulder on the inner casing to rest on the support, the shoulder and support having co-engageable inclined surfaces positioned in cooperative engagement when in one relative position and having channels formed in them whereby the shoulder and support can be positioned so that the shoulder will pass

through the support, the said channels being located to register when the engaging faces are in cooperative engagement to form fluid passages through the structure formed by the shoulder and support.

4. In combination, an inner casing, an outer casing, and a casing head including, a body to be secured on the outer casing and having an internal seat, a support carried by the seat, a shoulder located entirely within the body, and welding securing the shoulder on the inner casing to rest on the support, the shoulder and support having co-engageable inclined surfaces positioned in cooperative engagement when in one relative position and having channels formed in them whereby the shoulder and support can be positioned so that the shoulder will pass through the support, the said channels being arranged to register when the engageable faces are in cooperative engagement to form fluid passages through the structure formed by the shoulder and support, there being a lateral outlet in the body located above the support.

GLENN D. JOHNSON.

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