June 5, 1951 R. A. LILLICH ET AL 2,555,894

PIPE JOINT

Filed June 3, 1946 2 Sheets-Sheet 1

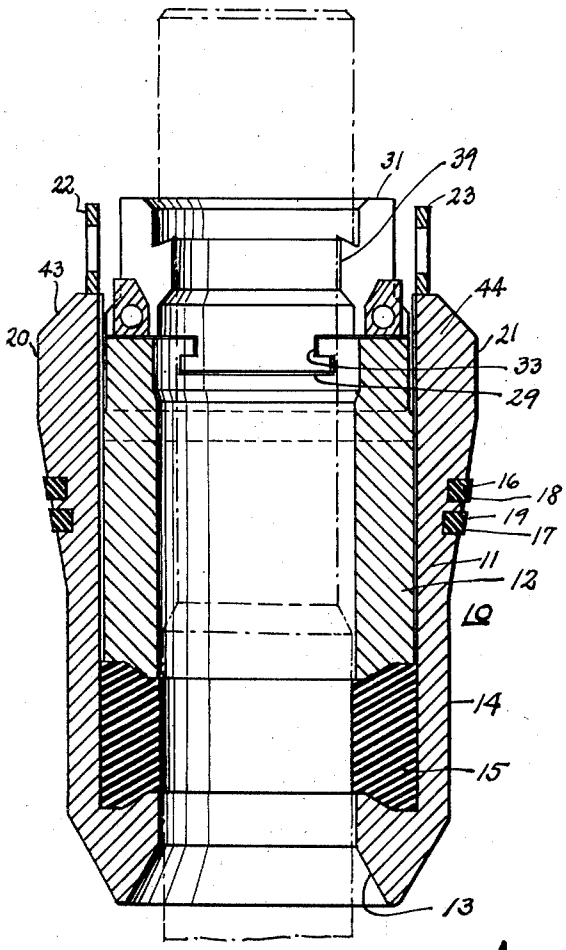


Fig. 1.

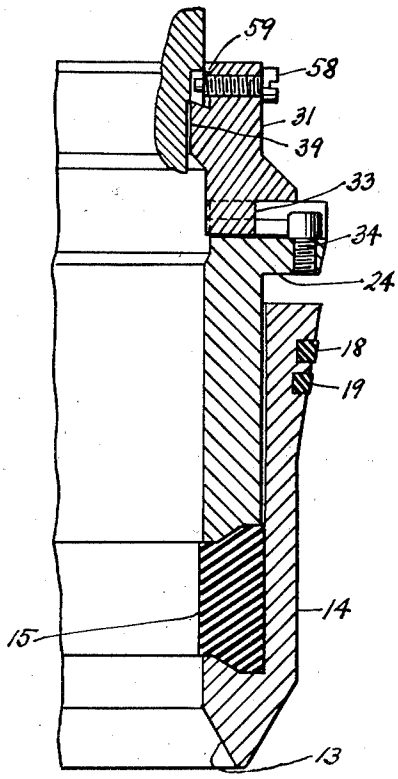


Fig. 3.

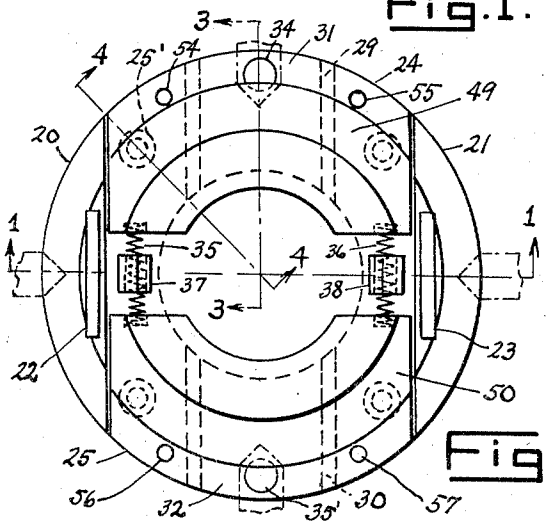


Fig. 2.

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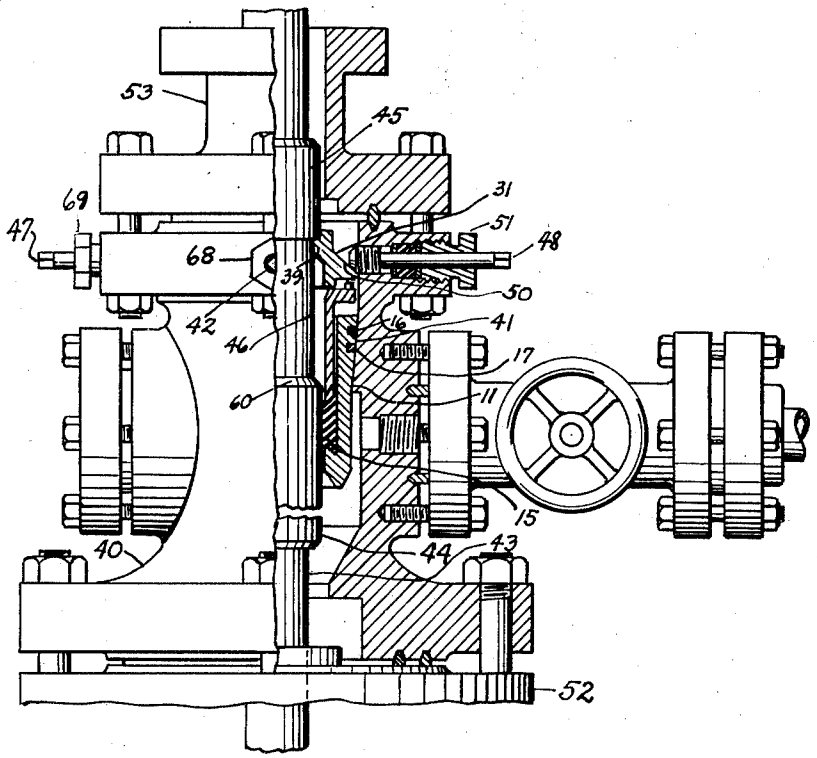


Fig. 5.

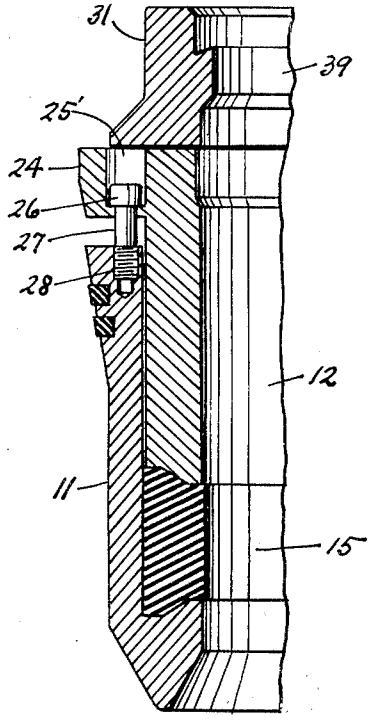


Fig. 4.

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UNITED STATES PATENT OFFICE

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PIPE JOINT

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Application June 3, 1946, Serial No. 673,953

17 Claims. (Cl. 285—22)

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This invention pertains to well completion equipment and more particularly to an assembly of a tubing head, tubing hanger, and hanger nipple for supporting the tubing and sealing between the tubing and casing of an oil or gas well.

In the last stage of completion of such a well after the casing has been set, a tubing head for supporting the tubing is placed on top of the casing head. If this were not done before the tubing was run in, it would be necessary prior to setting the tubing to remove the tubing blowout preventers in order to put the tubing head in place and during this period there would be no control over the well.

After the casing is set and with the tubing head in place, there are a number of operations to be performed which require that the inside diameter of the tubing head be as large as the inside diameter of the casing. For example, in soft sandy formations a screen or liner is placed inside the casing at the point where the well is to produce in order to filter out small particles of sand and to give support to the formation. The tubing head must be large enough to pass the screen.

Since the inner diameter of the tubing head is considerably larger than the outer diameter of the tubing to be supported therein, some member must be provided to bridge this gap. One known construction is similar to the common type of blowout preventer. Movable rams are provided in the tubing head which may be operated from outside the head to move beneath a standard collar or tubing joint. The tubing is thus suspended on a collar. The rams form a seal below the collar between the tubing and the head, the latter in turn being sealed to the casing by its connection with the top of the casing head. Because the weight of tubing to be suspended is so great, and because the rams holding the tubing are unsupported over the distance between the head and the tubing, the rams must be of great strength, and they must be very carefully constructed to avoid binding. For these reasons the construction is very expensive.

A simpler and less expensive arrangement that is known comprises a special hanger which has an outer conical surface adapted to rest upon a conical sloping inner surface of the head. Packing rings around the outer surface of the hanger seal between the head and the hanger. Other packing seals between the hanger and the tubing which is supported by the hanger. In such an arrangement the hanger member holding the tubing may easily be made long enough to have

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sufficient strength to support the tubing. The length of the hanger also gives plenty of room for an adequate packing to seal against the tubing. These are marked advantages over the aforementioned blowout preventer type of construction.

It is desirable that a tubing supporting assembly be capable of adjustment after it has been installed to permit the tubing to be freely raised and lowered past the point where it is ultimately to be placed. This is to permit various operations such as washing the screen and setting the packer which require manipulation of the tubing. The blowout preventer type of tubing support will permit such movement of the tubing but is subject to the difficulties previously mentioned.

A number of hanger type constructions are known which permit manipulation of the tubing but in most of these the movement is limited to the distance between two adjacent collars, that is, the length of one section of tubing. The reason for this lies in the fact that the seal is formed directly around the tubing so that there is no room for a collar to pass. To avoid this limitation, there are known constructions in which a special oversized collar or hanger nipple is used. The seal is formed around the nipple instead of the tubing so that the seal part of the hanger may be of such size as to permit standard collars to pass. However, the cooperating sealing parts of the nipple and hanger and the cooperating supporting parts of the nipple and hanger cannot be made to pass by each other in both directions unless one of such parts is retractable. For this reason constructions using a special hanger nipple arranged so that the tubing may be lowered below its final position do not permit raising the tubing above that position even though the hanger will pass standard size collars.

Another desirable feature of a tubing support is a construction permitting the tubing to be run in and set with the upper Christmas tree manifold in place on top of the tubing head in place of the master valve and blowout preventers used during drilling operations. There are a variety of advantages in such a construction. For example, unless the tree is in place before the tubing is set, a complicated series of operations must be performed to finally close up the well. Thus, the preventers and master valve cannot be removed unless the tubing is locked in place in the tubing head and closed with a back pressure valve. After the tree is

put in place an operation must be performed through the tree to remove the back pressure valve. This operation requires a special tool. On the other hand, if the tree is already in place, the back pressure valve may be put in the handling joint and when it is desired to close the well, it is only necessary to unscrew the handling joint from the hanger nipple and lift the joint through the stuffing box on top of the tree to a point where the master valve of the tree can be closed. The handling joint and stuffing box can then without difficulty be removed completely and the top of the tree closed with a bull plug or otherwise as desired.

With a hanger type of tubing suspension using a special nipple as described above, the nipple must first be inserted on the end of the tubing and the hanger slipped over the top, for as mentioned previously the sealing parts of the nipple and hanger will not pass the support parts. Therefore this type of construction will not permit running the tubing through the tree, for the hanger is too large to pass through the tree.

It is the object of this invention to provide a tubing supporting construction of the hanger type which will permit the tubing to be run with the tree in place, will permit the tubing to be raised both above and below the position at which it is finally to be set in order that the screen may be washed and the packer set, and which finally will support the tubing at the desired level and seal between it and the casing.

It is a further object of the invention to provide such a construction which will be economical to manufacture and simple to operate.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment, reference being had to the accompanying drawings in which:

Figure 1 is a vertical section through a tubing hanger constructed according to the invention, the hanger nipple being shown in phantom outline;

Figure 2 is a plan view of the hanger;

Figure 3 is a section of the hanger taken on the line 3—3 of Figure 2;

Figure 4 is a section of the hanger taken on the line 4—4 of Figure 2;

Figure 5 is an elevation partly in section showing the hanger in place in a tubing head constructed according to the invention, with the tubing supported by the hanger nipple in position within the hanger.

Referring to Figure 1, there is shown the tubing hanger designated generally by the reference number 10. The hanger comprises an outer body 11 and an inner sleeve 12. Supported on an inturned flange 13 on the bottom of the skirt portion 14 of the body of the hanger is an annular resilient packing member 15. The inner sleeve 12 of the hanger fits telescopically within the body 11 and is supported on the packing 15.

The central portion of the body 11 has a conically tapered section within which there are provided annular channels 16 and 17. Within these channels there are rings of packing material 18 and 19.

The uppermost part of the body 11 comprises two upstanding arms 20 and 21 (see Figure 2). These arms carry handling eyes 22 and 23 by means of which the hanger may be lowered into position within the tubing head.

The sleeve 12 is provided on its upper end with two outturned flange portions 24 and 25 which overlie the top of the body 11 between the arms

20 and 21. Each flange portion is provided with an aperture such as aperture 25' shown in Figure 4 large enough to permit the head 26 of a screw 27 to slide freely therein. Threaded holes such as 28 are provided in the body 11 to receive the screws 27. The bottom of each aperture 25' is of reduced diameter smaller than the head 26 so that with the screws 27 in place the sleeve 12 is locked to the body 11. However, there is a certain amount of play provided so that the sleeve 12 may move downwardly within the hanger body 11 to compress the packing 15.

Referring again to Figures 1, 2 and 3, there are provided inverted T-shaped channels 29 and 30 within each of the flange portions 24 and 25. Slideable rams 31 and 32 supported by the flange portions 24 and 25 are provided with keys such as that shown at 33 which fit within the T-shaped channels 29 and 30. Screws 34 and 35' at the outer ends of channels 29 and 30 are inserted after the rams are in place and prevent the rams from sliding out of the hanger. A pair of springs 35 and 36 engage the inner faces of the rams and urge them to their outermost positions. Stops 37 and 38 serve both to limit the inward travel of the rams and to support the springs 35 and 36. The rams 31 and 32 are each provided with an inwardly projecting flange section or shelf such as that shown at 39 in Figures 1, 2 and 4. When the rams are moved into position to support the tubing, the shelves project beneath a protruding portion of the hanger nipple.

Referring now to Figure 5, there is shown a tubing head 40 whose minimum inside diameter is large enough to permit the passage of a screen or liner. The top part of the inner bore of the tubing head has a conical tapered section 41 adapted to receive and support the corresponding section of the tubing hanger. Packing rings 16 and 17 form a seal between the tubing head and the hanger body 11. After the tubing hanger has been placed in the tubing head, it may be locked into position by means of lock screws projecting through the upper flange of the tubing head such as that indicated at 42. These lock screws have tapered ends adapted to engage the conical tapered top surfaces 43 and 44 of the arms 20 and 21 of the hanger body 11 (see Figure 1). When these lock screws are tightened they force the hanger down into the conical seat 41 of the tubing head and compress the resilient packing rings 16 and 17 to form a tight seal.

In order to support a string of tubing such as that indicated at 43 in Figure 5, there is provided a special hanger nipple 44, the bottom end of which is threaded to receive the threaded end of the upper length of the tubing 43. The bottom or seal portion of the hanger nipple is of greater outer diameter than the outer diameter of standard tubing couplings. The seal portion of the hanger nipple may therefore engage the packing 15 which is of large enough internal diameter to pass a standard coupling. The seal portion of the hanger nipple is long enough so that even if the tubing should move vertically to a small extent after it has been set, it will still be in engagement with the sealing ring 15.

The top portion 45 of the hanger nipple is of the same outer diameter as standard coupling so that it too can pass readily through the seal ring 15. The central portion 46 of the hanger nipple is of reduced section so that the rams 31 and 32 may be moved beneath the top portion 45 to support the tubing. As best shown in Figure 1, the bottom of the portion 45 of the hanger nipple

and the top of the shelves 39 of the rams are inwardly and upwardly inclined so that when the tubing is set the weight of the tubing will hold the rams in place with the shelves 39 under the portion 45 of the hanger nipple.

Referring again to Figure 5, there are lock screws 47 and 48 provided in the upper flange of the tubing head at points spaced 90° from lock screws 42. The inner ends of the lock screws 47 and 48 are tapered and adapted to engage conical tapered surfaces 49 and 50 on the rams 31 and 32. By means of these lock screws 47 and 48 the rams 31 and 32 may be moved inwardly into tubing supporting position and after the rams have moved into engagement with the tubing further inward movement of the lock screws will cause the sleeve 12 to be moved downwardly so as to compress the sealing packing ring 15. With this arrangement a good seal may be maintained between the seal ring 15 and the sealing portion of the hanger nipple 44 even though the tubing has risen so that its weight is no longer supported by the rams 31 and 32.

The lock screws 47 and 48 are a little longer than the lock screws 42 in order to engage the rams 31 and 32 which move inwardly to a position further removed from the inside of the tubing head than the arms 20 and 21. If desired, more than four lock screws may be provided. For example, two pairs of lock screws may be used to operate the rams and another two pairs may be used to bear on the arms 20 and 21 to hold the hanger body in place. Each of these lock screws is provided with a stuffing box, such as shown at 51, 68 and 69 in Figure 5, for the purpose of sealing between the lock screws and the tubing head flange.

The assembled construction shown in Figure 5 includes a casing head 52 upon which the tubing head 40 is mounted and an adapter spool 53 mounted on top of the tubing head. Other elements of the Christmas tree manifold may be mounted on the adapter spool 53. The internal diameter of both the adapter and the vertical run of the Christmas tree manifold including the master valve should be sufficiently large to pass standard tubing collars and also the special hanger nipple. With this construction tubing may be run in through the Christmas tree in the manner now to be described.

After the production casing and the screen have been set a few thousand feet of tubing may be run in through the master valve and blowout preventers. The hanger nipple may then be screwed on to the last section of tubing and the hanger placed about the hanger nipple in position so that the rams may be forced by hand pressure beneath the uppermost enlarged section of the nipple. The rams may be thus held in position by means of cotter pins 54, 55, 56 and 57. The hanger may then be locked against rotation around the hanger nipple by means of a small screw 58 in the top of one of the rams, the end of the screw engaging a small hole or slot 59 cut into the side of the hanger nipple. The tubing may then be lowered until the hanger sets within the tubing head. The hanger may be adjusted into position so that the long lock screws 47 and 48 are directly opposite the rams 31 and 32 by rotation of the tubing since, as described previously, the tubing hanger is locked in position on the hanger nipple. The lock screws 42 may now be screwed into position to lock the hanger within the tubing head. If there is any pressure in the well, the lock screws 47 and 48 should also be tightened to insure that the rams 31 and 32 are held in position. The tubing and tubing hanger now being locked in position within the tubing head, the master valve and blowout preventers may be removed. The top of the tubing hanger will then be exposed so that the screw 58 may be removed.

The upper Christmas tree manifold may now be placed on top of the tubing head and bolted into position. The top of the vertical run of the tree is provided with a small stuffing box to seal around the tubing. With the well thus sealed the lock screws 47 and 48 may be released from the rams and the entire tubing raised slightly. This will cause the shoulder 60 on the top part of the sealing portion of the hanger nipple to strike the underside of the rams 31 and 32. The shoulder 60 and the bottom undersurface of the rams are tapered so as to cause an outward wedging action when the shoulder 60 strikes the undersurface of the rams. This will cause the rams to move outwardly and sheer off the cotter pins 55, 56, 57 and 58. With the rams thus moved into inoperative position the tubing may be raised until the hanger nipple is above the tree. The nipple may now be removed and the entire string of tubing run into the well until the desired elevation of tubing suspension is reached.

The hanger nipple may again be attached to the last length of tubing. Since the hanger nipple and any tubing collars on handling sections of tubing above the nipple may pass through both the Christmas tree and the tubing hanger, the tubing may now be lowered and raised in the well to perform any desired completion operations, including washing the screen. After all bottom hole and other completion operations have been accomplished, the tubing may be raised until the hanger nipple is within the tubing hanger and the rams forced in beneath the upper part of the nipple by means of the lock screws. The handling sections of tubing above the nipple may be unscrewed and raised above the master valve. With the master valve of the tree closed, all of the handling joints may be removed through the top of the tree and the stuffing box on the top of the tree may also be removed. The top of the tree may then be closed either by connecting to a flow line or by plugging with a bull plug or by a pressure gage. The well is then ready for production which may be begun by opening the master valve of the Christmas tree.

From the above description of the installation and use of the improved tubing hanger construction according to the invention, it will be apparent that the wellhead equipment may be substantially completely assembled and placed in position prior to the removal of the drilling mud from the well. It is after this mud has been removed that there is the greatest danger of a blowout of the well, and it is clear that by having the wellhead equipment completely assembled the well may thus be brought in under full pressure control.

While a preferred embodiment and use of the invention have been described, it is obvious that many modifications can be made and the apparatus put to other uses without departing from the spirit of the invention. In the appended claims, wherever the term pipe is used it is meant to include both tubing and casing and couplings or nipples.

It is intended to cover by Letters Patent all forms of the invention falling within the scope of the following claims.

We claim:

1. A pipe support comprising a tubular body adapted to be supported within and sealed against the inside of a well head, means carried by said body to support a pipe within the body, said means including a movable portion having a surface radially exposed to the exterior of the body and when said body is seated in the head to the inside of the head and adapted to be contacted and moved by means passing through the side wall of the head controlled from outside the well head between a position in which it supports the pipe and a position in which it is clear of the pipe with respect to repeated unlimited movement of the pipe both upward and downward in the well head, and further means carried by the body for forming a seal between said body and the pipe independent of the weight of the pipe being carried by said supporting means.

2. A tubing hanger comprising a body portion of generally tubular shape having an outer seat adapted to engage with a seat in a tubing head, a shoulder formed on the inner surface of said body portion near the bottom thereof, a packing member supported on said shoulder adapted when compressed to seal with a tubing member, a sleeve supported on said packing member, and means carried by said sleeve including a portion having a surface radially exposed to the exterior of the hanger and when the hanger is seated in the tubing head to the interior of the tubing head and adapted to be moved into a position in which it supports said tubing member and retracted to a position in which said tubing member can pass therethrough freely both upwards and downwards by means actuated from outside the well head and passing through the side wall of the well head.

3. In combination, a tubing head having an internal diameter at least as large as the internal diameter of casing to be used therewith and having a conically tapered seat, a tubing hanger having a body portion with a conically tapered seat on the exterior thereof to engage with the seat in the tubing head, said body portion having a depending skirt at the bottom end of which there is an inturned annular flange, a resilient packing ring carried on said flange, a sleeve supported within said hanger body on top of said packing ring, said hanger body, sleeve, and packing ring having inner diameters larger than the outer diameter of standard tubing collars or the tubing to be suspended in the head, a hanger nipple adapted to be attached to a length of well tubing, one portion of larger diameter than said collars and said nipple being of only slightly smaller diameter than said packing ring of the tubing hanger and adapted to seal therewith when said packing ring is compressed, rams supported on the sleeve in said hanger body movable between an operative position beneath a shoulder formed on said nipple and an inoperative position in which said standard tubing collars and said hanger nipple may pass therebetween, and lock screws projecting through the sides of the tubing head having tapered ends, the upper surfaces of said hanger body and said rams being tapered for engagement with said lock screws, said lock screws being movable between locking positions in which a number of them engage the upper surfaces of said hanger body to force it down in the seat in the tubing head and a number of them engage the rams to force them inwardly into engagement with the hanger nipple and downwardly to compress the packing ring around the hanger nipple and inoperative positions in which said rams move to inoperative positions and said hanger may be lifted from the tubing head.

4. A pipe support comprising a body adapted to be supported within and sealed against the inside of a well head, means to support a pipe within a central aperture in the body, said means including an element carried by said body engageable with an element carried by said pipe, at least one of said elements being movable, said body being shaped so as to expose said movable element radially to the exterior of the body and when said body is seated in the head to the inside of the head, said means being adapted to be moved by means passing through the side wall of the well head and contacting said movable element and controlled from outside the well head between a position in which it supports the pipe and a pisition in which it allows free unlimited movement of the pipe both upwardly and downwardly in the well head, and sealing means carried by the body for forming a seal between said body and pipe, said means being adapted to be compressed into sealing engagement with a surface on the pipe by means passing through the side wall of the well head and actuated from outside the well head independent of the pipe.

5. In combination, a well head having an internal seat, a pipe hanger supported on said seat, and a pipe in said hanger, said hanger and said pipe having interengaging means movable between a position to support the pipe in the hanger and a position in which the pipe can be moved freely through the hanger in both directions, said hanger having a seal member which normally is in a position in which the pipe can be moved freely therethrough in both directions, but which can be moved to a position in which it forms a seal with a surface on the pipe, and a means on the head operable from the exterior thereof for both moving said interengaging means between said positions thereof and moving said seal member between said positions thereof.

6. A hanger comprising an annular body having a tapered outer seat, an inturned integral flange at its lower end, ring packing means disposed in channel means in said seat, packing ring means disposed on said flange, a compression sleeve on top of said packing ring means, and rams having surfaces exposed radially outwardly to the exterior of the hanger and slidably mounted on top of said sleeve and movable in a direction having at least a radial component between a position extending inwardly beyond said packing ring means and a position in which they do not extend inwardly beyond said packing ring means, said exposed surfaces of said rams being adapted to be contacted by means for moving said rams between said positions.

7. A hanger comprising an annular body having a tapered outer seat, an inturned flange at its lower end, ring packing means disposed in channel means in said seat, packing ring means disposed on said flange, a compression sleeve on top of said packing ring means, and rams mounted on top of said sleeve radially movable between a position extending inwardly beyond said packing ring means and a position in which they do not extend inwardly beyond said packing ring means, spring means normally urging said rams outwardly, said rams having external beveled surfaces exposed radially outwardly to the exterior of the hanger and adapted to be contacted and moved by means moving at an angle to the

axis of the hanger to cause the rams to move first radially inwardly and then axially downwardly with said packing ring to compress said packing means.

8. A hanger comprising an annular body having a tapered outer seat, an inturned flange at its lower end, ring packing means disposed in channel means in said seat, packing ring means disposed on said flange, a compression sleeve on top of said packing ring means, said sleeve having an outwardly projecting flange at its top overlying the top of said body, means engageable with said flange and body for limiting upward movement of said sleeve relative to said body, and rams mounted on top of said flange movable between a position extending inwardly beyond said packing ring means and a position in which they do not extend inwardly beyond said packing ring means, said rams having external beveled surfaces exposed radially outwardly to the exterior of the hanger and adapted to be contacted and moved by lock screws outside of the hanger moving at an angle to the axis of the hanger to cause the rams to move first inwardly and then downwardly to compress said packing means.

9. In combination, a well head adapted to be connected to a well casing, a hanger supported therein, a pipe in said hanger, said pipe having a portion of reduced diameter between upper and lower portions of larger diameter, an inturned flange on said hanger, packing means supported on said flange, a compression member supported on said packing means, positioning means on said compression member movable between an extended position adjacent said pipe between said upper and lower portions and a retracted position out of the path of said portions when the pipe is moved axially, said positioning means being adapted to be actuated between said positions by means passing through the side wall of the head and controlled from outside said head independent of the pipe and to be held thereby positively in extended position when desired, said positioning means when held in extended position positively limiting axal movement of the pipe to the distance between said upper and lower portions thereof, said packing means when compressed by said compression ring sealing against said lower portion in all axial positions of said pipe within its limit of movement when said positioning means is in extended position, said compression ring being adapted to be compressed by means independent of the weight of the pipe, the internal diameter of said hanger and all parts thereof when said positioning means is in its retracted position being as large as the internal diameter of said casing and larger than the outside diameter of said portions of the pipe of larger diameter.

10. A pipe support comprising a tubular body adapted to seat within a well head, means carried by said body to seal with the well head, means carried by said body to seal with a pipe in said body and adapted to be moved into and out of sealing position by means independent of the weight of the pipe, means carried by said body independent of the well head movable between an extended position for supporting said pipe and a retracted position in which said pipe can move freely up and down in said body to an unlimited extent, the last said means comprising a plurality of members adapted to engage with a protuberance on the pipe and spring means normally urging said members into retracted position, said members being adapted to be moved into extended position by means passing through the side of the well head.

11. A tubing hanger comprising a tubular body adapted to seat within a well head, means carried by said body to seal with the well head, means carried by said body to seal with a portion of enlarged diameter on a pipe in said body, means carried by said body independent of the well head adapted to be moved by means controlled from outside said well head between a position beneath a protuberance on said pipe to support same and a position leaving a free unlimited path for movement of said pipe axially through said body, said seal means being spaced a substantial distance below said supporting means sufficient to allow said pipe to rise from its support a normal amount without said enlarged portion of the pipe coming up to the level of said support means.

12. A tubing hanger comprising a tubular body adapted to seat within a well head, means carried by said body to seal with the well head, means carried by said body to seal with a portion of enlarged diameter on a pipe in said body, means carried by said body independent of the well head and exposed radially to the exterior of the hanger and adapted to be moved by means passing through the side wall of the well head and controlled from outside said well head between a position beneath a protuberance on said pipe to support same and a position leaving a free unlimited path for movement of said pipe axially through said body, said seal means being spaced a substantial distance below said supporting means sufficient to allow said pipe to rise from its support a normal amount without said enlarged portion of the pipe coming up to the level of said support means and means independent of the weight of the pipe for moving said seal means into and out of sealing position with respect to said pipe.

13. A pipe hanger comprising a body portion of generally tubular shape having an outer seat adapted to engage with a seat in a well head, a shoulder formed on the inner surface of said body portion, packing means supported on said shoulder adapted when compressed to seal with a pipe in said body, a compression member supported on said packing means, means mounted on said member movable radially with respect thereto but held against axial movement, the last said means in one position thereof being adapted to engage means on said pipe to limit axial movement thereof in both directions and in another position to leave a free path for unlimited axial movement of the pipe in both directions.

14. A pipe hanger comprising an annular body having an inturned shoulder near its lower end, an external conical seat near its middle portion, and arms extending upwardly from the top of the body having external bevelled surfaces thereon, packing means on said shoulder, and a compression member on top of said packing means, said member having arms extending outwardly between the arms on said body, the arms on said member being provided with external bevelled surfaces on substantially the same level as those on the arms of said body, said bevelled surfaces on the arms on said body and said member being adapted to engage means movable radially with respect to said hanger to force the seat of the body down into a correlative seat in a well head and to force said member down to move said packing means against a pipe in the hanger.

15. A pipe hanger comprising an annular body

having an inturned shoulder near its lower end, an external conical seat near its middle portion, and arms extending upwardly from the top of the body having external bevelled surfaces thereon, packing means on said shoulder, a compression member on top of said packing means, said member having flanges extending outwardly over the top of said body between said arms, and rams mounted on top of said flanges for movement with respect to said flange in a direction along a radius of the hanger but held against movement with respect to said flange in a direction parallel to the axis of said hanger, said rams being provided with external bevelled surfaces on substantially the same level as those on said arms, said bevelled surfaces on said arms and flanges being adapted to be engaged by radially movable means in a well head supporting said hanger to cause downward movement of the hanger in the head to force the seat on the hanger against a correlative seat in the well head and to cause inward movement of said rams to a position to support a pipe in the hanger and downward movement of said rams and compression member to move said packing means against the pipe.

16. A pipe hanger of tubular shape having conical seat means on the outside of the hanger to support the hanger inside a well head, conical packing means on the outside of the hanger to seal the hanger to the inside of the well head, conical wedge means on the outside of the hanger above said packing means and seat means engageable when said hanger is seated in said well head by means passing through the side wall of the well head to lock the hanger in the well head and to maintain the seal there with independent of the weight of the pipe supported in the hanger, cylindrical packing means on the inside of the hanger to seal with a pipe disposed inside the hanger in one position of the means and to be clear of the pipe in another position of the means, segmental cylindrical ram means on the inside of the hanger carried by said cylindrical packing means to support the pipe in one position of the means and to be clear of the pipe in another position of the means, and wedge means on the ram means engageable when said hanger is seated in said well head by means passing through the side wall of the well head to cause said ram means to move into the desired one of its positions and to maintain the seal between the pipe and hanger independent of the weight of the pipe.

17. A tubing hanger having means on its exterior to seat in and seal with a well head and means on its interior to support and seal with a pipe, the last said means including an annular inturned flange at the bottom of the hanger, an annular packing member supported on the flange, a compression ring supported on the packing member, said ring having a plurality of slots running radially across its top end having an inverted T cross section, a plurality of rams having keys running across their lower faces and having an inverted T cross section adapted to slide in said slots, springs between said rams urging them radially outwardly, screws in said slots adapted to engage said keys to limit outward movement of said rams, bevelled outer surfaces on said rams adapted to be contacted by screws passing through the side wall of the well head to cause the rams to be forced radially inwardly to a position beneath an annular shoulder on the pipe and then to force the rams and ring axially downwardly to compress the packing member.

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