PIPE HANDLING MECHANISM

Filed July 9, 1963 4 Sheets-Sheet 1

FIG_1

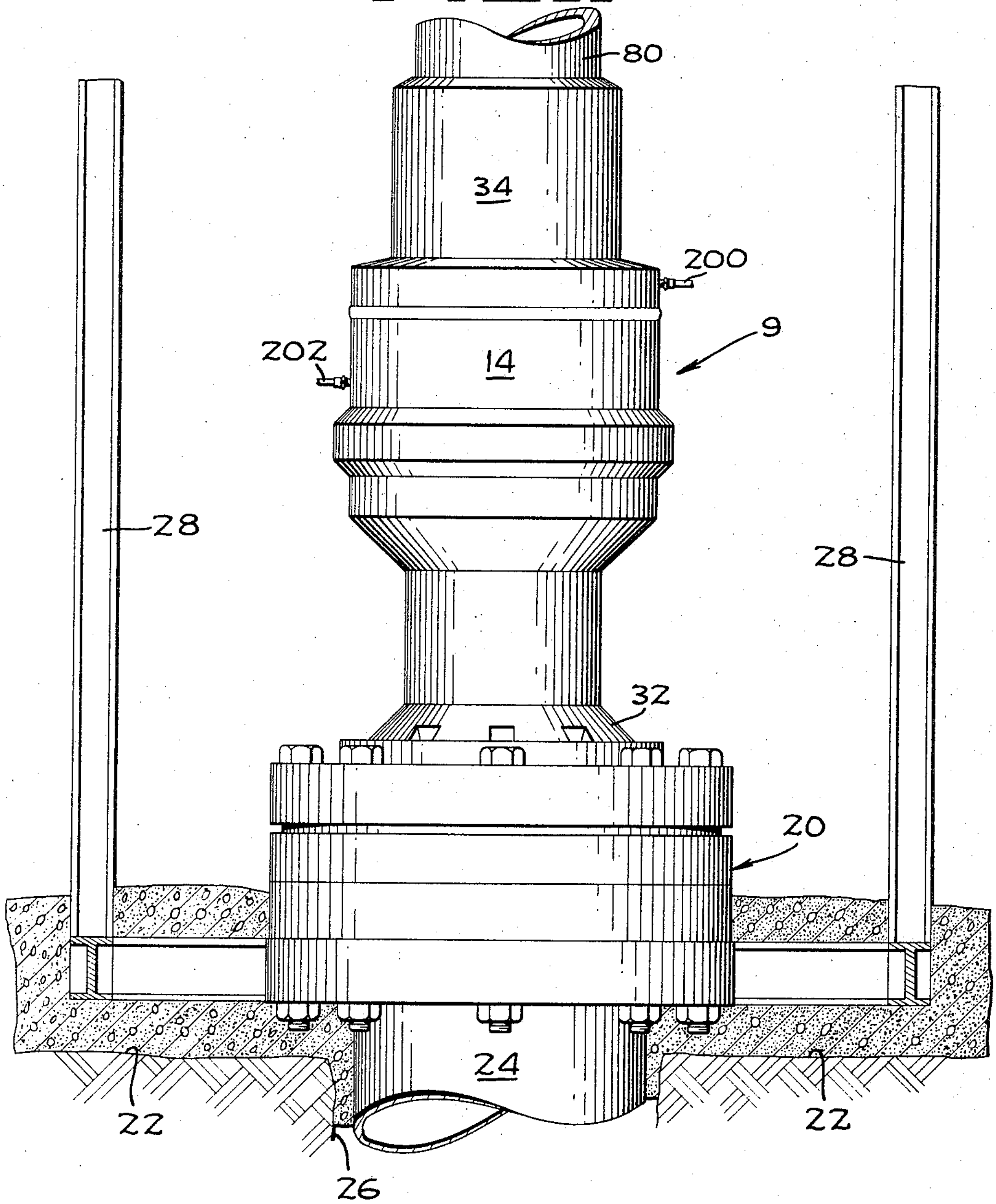

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FIG_2

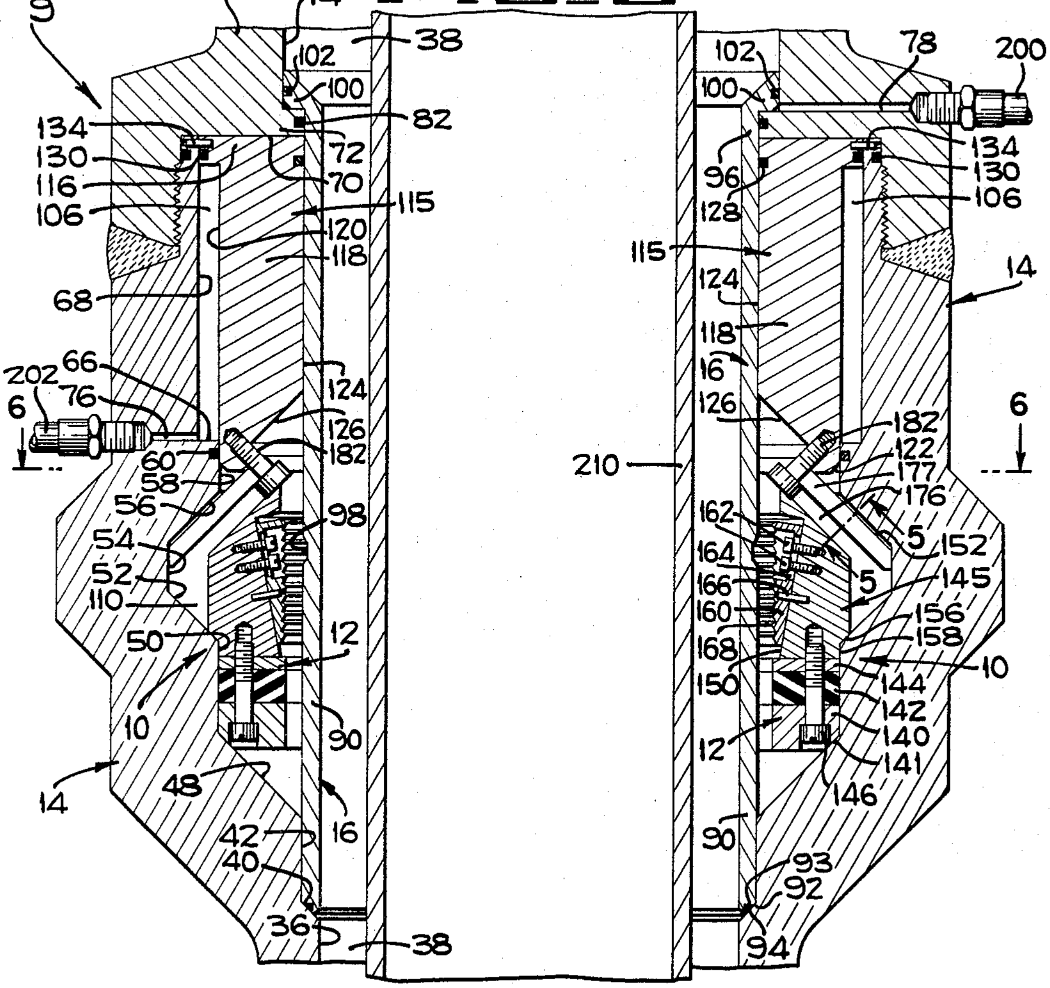

FIG_4

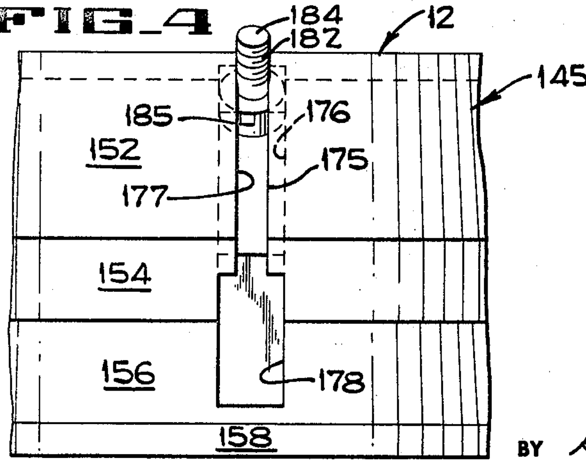

FIG_5

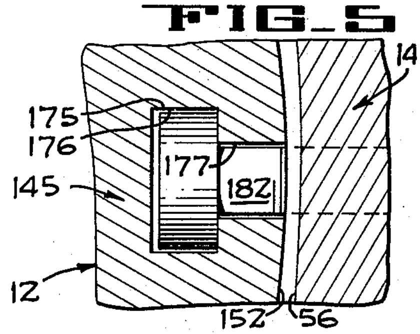

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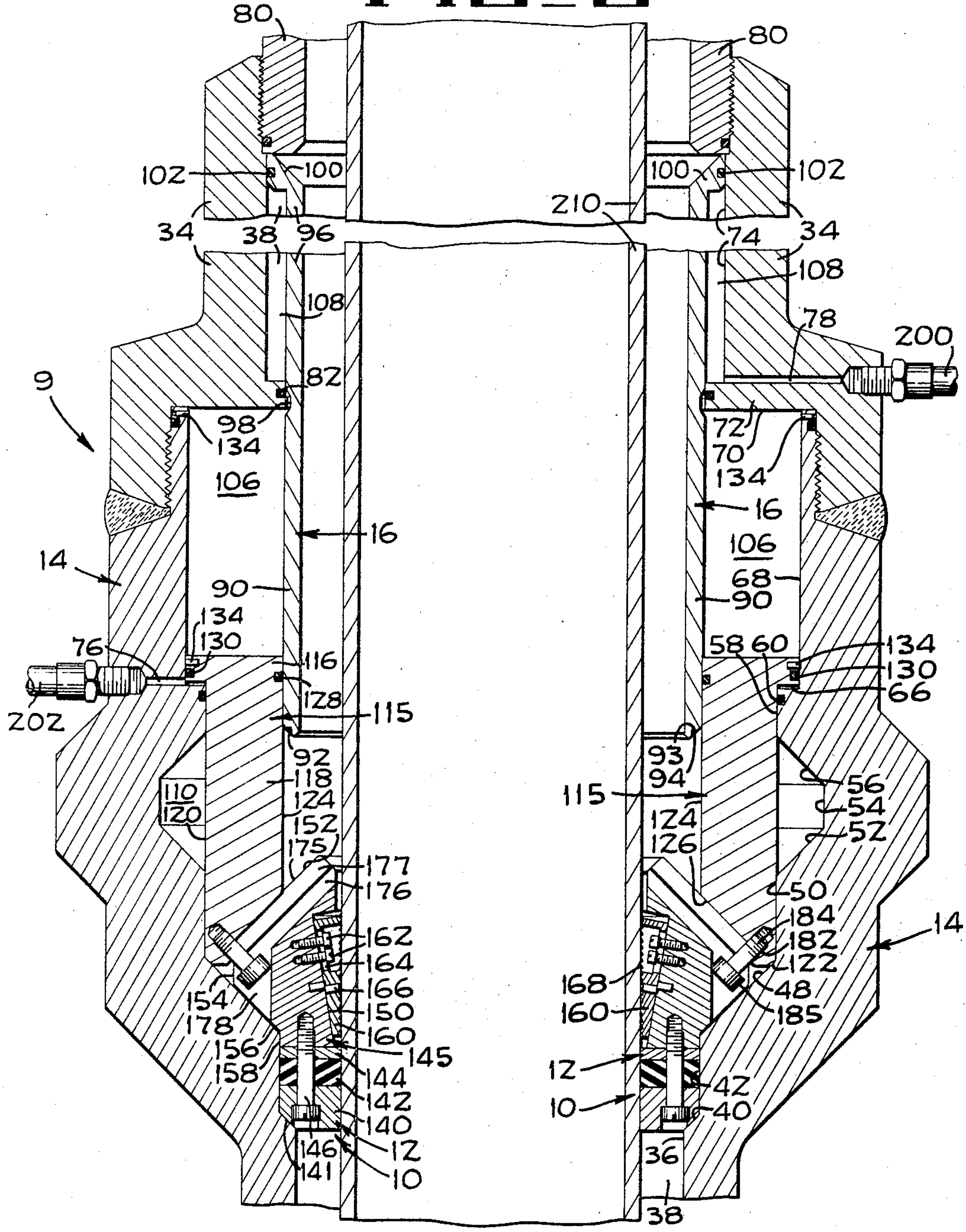
FIG_3



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PIPE HANDLING MECHANISM

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FIG_6

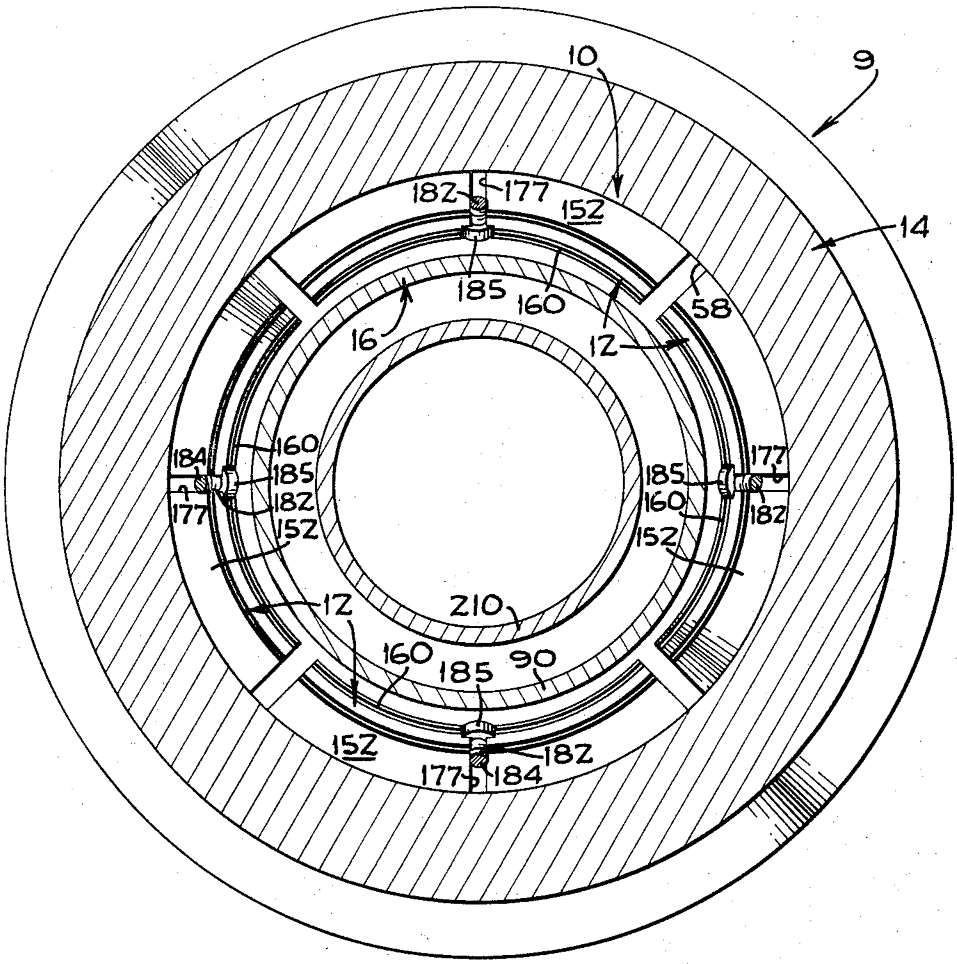
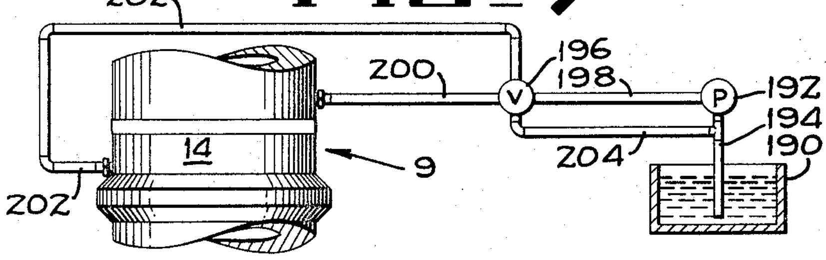


FIG_7



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United States Patent Office

3,334,923
Patented Aug. 8, 1967

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3,334,923
PIPE HANDLING MECHANISM

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Filed July 9, 1963, Ser. No. 293,708
14 Claims. (Cl. 285—18)

The present invention pertains to a well apparatus and more particularly to a remotely controllable pipe hanging mechanism.

In completing an underwater well, it is necessary to perform many of the operations by remote control from a station at the surface of the water. For use in such operations, the present invention provides a pipe hanger that is normally positioned within a wellhead, or the like, in an expanded condition. When it is desired to hang a string of casing within the wellhead, the hanger is contracted by remote control, into engagement with the casing.

The type of hanger employed for this purpose is preferably of the slip type with serrated slips adapted to grip the casing. Since drilling and running of casing must take place through the hanger while it is still expanded, it is necessary to protect the slips from damaging contact by the drill bit, pipe strings, and the like. For this purpose, the present invention provides protection for the expanded hanger and removes such protection only when it is desired to contract the hanger. Furthermore, in order to make the maximum use of remote control, once the protection is removed the hanger is automatically moved into its contracted casing hanging position.

A remotely controllable pipe hanging mechanism of this type must be dependable and yet as simple as possible. It is also desirable to house as much of the mechanism as is possible within the wellhead and to minimize the amount of weight added to the wellhead by the mechanism. Furthermore, since the hanger is expandable and contractible, it must be positively retained in its contracted hanging position or else it will not dependably support the casing. Finally, it is desirable to be able to retract the mechanism from its casing hanging position.

Accordingly, it is an object of the present invention to provide a remotely controllable pipe hanging mechanism.

Another object is to provide a pipe hanging mechanism that includes a diametrically contractible pipe hanger.

Another object is to provide a pipe hanging mechanism that protects a diametrically contractible pipe hanger when the latter is in its expanded condition.

Another object is to provide a pipe hanging mechanism that moves a contractible pipe hanger into a contracted, pipe hanging position by remote control.

Another object is to provide a pipe hanging mechanism that includes a diametrically expanded pipe hanger and a protector therefor, the protector being movable by remote control to a position exposing the hanger whereupon the hanger is automatically moved to its pipe hanging position.

Another object is to minimize the weight and complexity of a remotely controllable pipe hanging mechanism.

Another object is to provide a remotely controllable pipe hanging mechanism that is almost entirely housed within a wellhead or the like.

Another object is to provide a pipe hanging mechanism that dependably retains an expandable and contractible pipe hanger in its contracted position.

Another object is to provide a pipe hanging mechanism that can be retracted out of hanging engagement with a pipe string.

These together with other objects will become apparent upon reference to the following description and accompanying drawings in which:

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FIG. 1 is a side elevation of a well apparatus including a remotely controllable pipe hanging mechanism embodying the present invention.

FIG. 2 is an enlarged, fragmentary, diametrical vertical section of the mechanism illustrated in FIG. 1, showing the pipe hanger in its retracted expanded position, and showing a protector sleeve in its protecting position between the hanger and a casing string within the wellhead.

FIG. 3 is a view similar to FIG. 2 but shows the pipe hanger in its hanging position in engagement with the casing and also shows the sleeve in its exposing position.

FIG. 4 is an enlarged, fragmentary side elevation of one of the hanger units of the subject pipe hanger.

FIG. 5 is an enlarged fragmentary section taken on line **5—5** in FIG. 2.

FIG. 6 is a horizontal section taken on a plane at a position indicated by line **6—6** in FIG. 2.

FIG. 7 is a fragmentary side elevation of the well apparatus and a diagrammatic showing of a fluid system employed in the subject mechanism.

With reference to FIGS. 1 and 2, the mechanism **9** of the present invention provides a diametrically expandable and contractible pipe hanger **10** including a plurality of hanger units **12** positioned within a wellhead **14** for movement between an expanded retracted position (FIG. 2) and a contracted pipe hanging position (FIG. 3), and also including a protector sleeve **16** axially slidably mounted within the wellhead for movement between a protecting position (FIG. 2) in confronting relation to the hanger units and an exposing position (FIG. 3) displaced axially from the hanger units.

The wellhead **14** is supported on a lower casinghead assembly **20** (FIG. 1) that is cemented in position adjacent to the ocean floor **22**. The casinghead assembly supports an outer casing string **24** which projects downward through a borehole **26**. Guide system brackets **28**, for guiding various components of the well apparatus into the well, are mounted on the assembly and extend upward therefrom.

The wellhead **14** has a lower end portion **32** connected to the casinghead assembly **20** and an upper end portion **34** adapted for connection to blowout preventers or a Christmas tree, neither of which is shown. Further, the wellhead has an internal cylindrical main wall **36** (FIG. 2) surrounding a passageway **38** that extends entirely through the wellhead, a frusto-conical seat **40** diverging upward from the main wall, and a cylindrical lower retaining wall **42** projecting up from the seat and being diametrically larger than the main wall.

With continued reference to FIG. 2, the wellhead **14** has a frusto-conical lower guide wall **48** diverging upward from the lower retaining wall **42**, a cylindrical intermediate retaining wall **50** extending upward from the lower guide wall, a frusto-conical upper guide wall **52** diverging upward from the intermediate retaining wall, a cylindrical recessed wall **54** projecting up from the upper guide wall, a frusto-conical connecting wall **56** converging upward from the recessed wall, and a cylindrical upper retaining wall **58** having the same diameter as the intermediate retaining wall and projecting up from the connecting wall. An O-ring **60** is fitted in the upper retaining wall in surrounding relation to the passageway **38**.

Furthermore, the wellhead **14** (FIG. 2) provides a radial annular lower ledge **66** projecting out from the upper retaining wall **58**, a cylindrical lower chamber wall **68** extending up from the lower ledge, a radial annular upper shoulder **70** projecting in from the lower chamber wall, an annular partition **72** extending up from the upper shoulder and having a diameter substantially equal to the diameter of the lower retaining wall 42, and a cylindrical upper chamber wall 74 extending upward from the partition. The wellhead also has a lower duct 76 extending radially through the lower chamber wall and opening into the passageway immediately above the lower ledge, and an upper duct 78 extending radially through the upper chamber wall and opening into the passageway immediately above the partition. An annular stop member 80 (FIG. 3) is threaded into the upper end portion 34 of the wellhead and is axially spaced above the partition. An O-ring 82 is fitted in the partition in surrounding relation to the passageway 38.

The protector sleeve 16 (FIG. 2) has a cylindrical shank 90 whose outside diameter is substantially equal to the diameter of the lower retaining wall 42 and that of the partition 72. The shank is slidably fitted within the partition in slidable, fluid-tight contact with the O-ring 82. The shank has a frusto-conical lower end 92 in which is provided an annular notch 93 receiving an O-ring 94; an upper end 96; and an annular groove 98 intermediate its upper and lower ends. Still further, the sleeve has a cylindrical head 100 radially projecting from the upper end of the shank and slidably fitted within the upper chamber wall 74. An O-ring 102 is fitted around the head and is in slidable, fluid-tight engagement with the upper chamber wall. The sleeve is axially slidably movable between a lower protecting position (FIG. 2) wherein the head engages the partition 72 and the lower end of the shank slidably fits within the lower retaining wall 42 and engages the seat 40; and an upper exposing position (FIG. 3) wherein the head engages the stop member 80, the groove 98 bridges the O-ring 82 in the partition 72, and the lower end of the shank is axially spaced above the seat 40. It is to be noted, especially in FIG. 3, that the shank of the sleeve, the partition, and the lower chamber wall 68 define a lower fluid chamber 106 and that the shank, the head of the sleeve and the upper chamber wall 74 define an upper fluid chamber 108. Furthermore, in the exposing position of the sleeve, the groove establishes fluid communication between the upper and lower chambers. Also, in the protecting position of the sleeve (FIG. 2), the sleeve and the wellhead 14, particularly the walls 48, 50, 52, 54 and 56, define an annular recess 110 concentric with the passageway 38.

The subject pipe hanging mechanism 9 includes an annular piston 115 slidably fitted within the lower chamber 106. This piston has an upper head 116 and a diametrically smaller skirt 118 projecting downward from the head. The skirt has a cylindrical external surface 120 circumferentially spaced from the lower chamber wall 68 and slidably fitted in the upper retaining wall 58, a frusto-conical lower outside shoulder 122 complementary to the lower guide wall 48, a cylindrical internal surface 124 slidably fitted about the shank 90 of the sleeve 16, and a frusto-conical lower inside surface 126. An inner O-ring 128 is fitted in a groove in the internal surface 124 in slidable fluid-tight engagement with the shank, and an outer O-ring 130 is fitted in a groove in the head of the piston in slidable fluid-tight engagement with the lower chamber wall. The piston is axially movable within the wellhead 14 between an upper retracted position (FIG. 2) with the head of the piston engaging the upper shoulder 70 and with the lower end of the skirt spaced just above the annular recess 110; and a lower projected position (FIG. 3) with the head of the piston closely adjacent to the lower ledge 66, with the external surface of the skirt fitted within the intermediate retaining wall 50, and with the outside shoulder 122 of the skirt rested on the lower guide wall 48. The piston is held in its retracted position by shear pins 134 (FIG. 2) that extend from the lower chamber wall into the piston head.

Each of the hanger units 12 includes a lower junk ring segment 140 having a lower outer beveled edge 141 complementary to the seat 40 and to the lower guide wall 48, a resiliently compressible and expansible seal 142 overlying the junk ring segment, a thrust ring segment 144 on the seal, and a bowl segment 145 supported on the thrust ring segment. A bolt 146 is extended upward through the junk ring segment, the seal, and the thrust ring segment and is threaded into the bowl segment for maintaining assembly of the hanger unit.

Each bowl segment 145 (FIG. 2) has an inner oblique face 150, an upper surface 152, an outer surface 154, a shoulder 156, and a lower rim 158. The upper surface, the shoulder, and the inner face each has the shape of a portion of a conical frustrum, whereas the outer surface 154 and the lower rim 158 each has the shape of a portion of a cylinder. The upper surfaces of the bowl segments are complementary to and below the lower inside surface 126 of the piston 115. The shoulders of the bowl segments are complementary to the upper and lower guide walls 52 and 48 and are slidably supported on these walls in the retracted and projected positions, respectively, of the piston.

Each hanger unit 12 also includes a slip 160 slidably mounted on the inner face 150 of its bowl segment 145 by screws 162 threaded into the bowl segment and passing through a slot 164 in the slip. A shear pin 166 releasably holds the slip in an upper position (FIG. 2). As is conventional, the slip has a serrated inside pipe gripping face 168.

In order to mount each hanger unit 12 on the piston 115, each bowl segment 145 has a T-shaped slot 175 (FIGS. 2, 4 and 5) extending through its upper surface 152 and into its outer surface 154. These slots are in substantially normal relation to the upper and lower guide walls 52 and 48. Each T-shaped slot has a wide inner section 176 (FIGS. 4 and 5) and a narrow outer section 177. The T-shaped slot opens into a generally vertical U-shaped slot 178 (FIGS. 2, 4 and 5) partially in the outer surface 154 and partially in the shoulder 156. T-bolts 182 have shanks 184 threaded into the lower end of the skirt 118 and heads 185 individually slidably received in the inner sections 176 of the T-shaped slots. The shanks of these bolts extend through the outer sections 177 of the T-shaped slots and are substantially normal to the inside surface 126 of the skirt of the piston 115. Also, it is to be noted that the shanks of the T-bolts are substantially normal to the upper surface 152 of their respective bowl segments.

The hanger units 12 are movable between outer retracted positions (FIG. 2) in the annular recess 110 with the outer beveled edges 141 of the junk ring segments 140 slidably engaging the lower guide wall 48 and with the shoulders 156 of the bowl segments 145 slidably engaging the upper guide wall 52; and pipe hanging positions (FIG. 3) with the outer beveled edges 141 rested on the seat 40 of the wellhead 14 and with the shoulders of the bowl segments overlying the lower guide wall. In the pipe hanging positions, the lower retaining wall 42 is in surrounding engagement with the junk ring segments, the seals 142, the thrust ring segments 144, and the lower rims 158 of the bowl segments thereby precluding radial outward movement of the hanger units in their hanging positions. In their retracted positions, the hanger units are supported on the upper guide wall (FIG. 2), and because they are connected to the piston 115, they are held in their retracted positions as long as the piston is retained in its retracted position. When the piston is moved to its projected position (FIG. 3), the heads 185 of the T-bolts 182 slide downward and outward through the T-shaped slots 175 thereby forcing the hanger units downward and inward along the upper and lower guide walls into the described hanging positions. In the hanging positions of the units, the heads of the T-bolts slide into the U-shaped slots 178 and the skirt 118 of the piston 115 fits between the bowl segments 145 and the wellhead 14; more specifically, the lower inside surface 126 of the piston engages the upper surfaces 152 of the bowl segments and the external surface 120 of the piston engages the intermediate retaining wall 50.

The present pipe hanging mechanism includes a fluid control system illustrated diagrammatically in FIG. 7. This system includes a reservoir **190**, a pump **192** connected to the reservoir by a sump line **194**, and a two position valve **196** connected to the outlet of a pump by a supply line **198**. The pump, the reservoir, and the valve are at a location remote from the wellhead **14**, usually at a control station at the surface of the water above the well. The valve is connected to the upper duct **78** by a feed line **200**, to the lower duct **76** by an auxiliary line **202**, and to the sump line by a return line **204**. The valve has a first position wherein it connects the supply line to the auxiliary line **202** in order to supply fluid under pressure to the lower chamber **106** under the piston head **116** (FIG. 2), and wherein it connects the feed line to the return line (FIG. 7). The valve also has a second position wherein it connects the supply line to the feed line in order to supply fluid under pressure to the upper chamber **108** (FIG. 3), and wherein it connects the auxiliary line to the return line (FIG. 7). In the first position of the valve, the connections established in the second position are broken and, conversely, in the second position of the valve the connections established in the first position are broken. Although the fluid system illustrated and described herein serves its intended purposes, it is to be understood that other systems, using multiple valves for example, could just as well be employed.

In summarzing the operation of the subject pipe hanging mechanism **9**, the mechanism is in the retracted condition illustrated in FIG. 2 during drilling operations conducted through the wellhead **14**. It is to be noted that fluid under pressure is introduced through the lower duct **76** into the lower chamber **106** under the piston head **116**, in this retracted condition of the mechanism, in order to insure retention of the piston **115** in its retracted position. In other words, if pressure is inadvertently applied through the upper duct **78** or if the mechanism is subjected to severe vibrations during the drilling operation, the pressure in the lower chamber under the piston head counteracts such inadvertently introduced upper pressure or such vibrations and positively prevents movement of the piston out of its retracted position. It is to be understood, however, that in the absence of such inadvertent pressure or vibrations, the shear pins **134** are adequate to hold the piston **115** in its retracted position.

After the necessary hole has been drilled below the borehole **26**, a string of casing or other pipe **210** is run through the wellhead **14** and the outer casing string **24** into the hole. During the drilling operations for such hole, the protector sleeve **16** is in its protecting position in confronting relation to the hanger units **12**. Actually, the protector sleeve isolates the hanger units from the passageway since the O-rings **102** and **94** preclude entry of fluid into the recess **110** where the hanger units are located.

When it is desired to hang the string of casing **210**, the valve **196** (FIG. 7) is shifted into its second position whereupon fluid under pressure is forced through the upper duct **78** (FIG. 2). This fluid pressure is exerted under the head **100** of the sleeve **16** forcing the sleeve to move upwardly into its exposing position (FIG. 3). In its exposing position, the groove **98** establishes fluid communication between the upper chamber **108** and the lower chamber **106** so that fluid pressure from the upper chamber is transmitted into the lower chamber above the head **116** of the piston **115**. This forces the piston from its retracted position into its projected position, during which time fluid is forced out of the lower chamber through the lower duct **76** back into the reservoir **190**. As described above, movement of the piston into its projected position forces the hanger units **12** into their hanging positions wherein they are in circumferential engagement with the casing string **210** (FIG. 3). Adjacent seals **142** of the hanger units are in engagement in these hanging positions so as to form a continuous seal around the casing string and the retaining wall **42** of the wellhead **14**. These seals are initially compressed by the piston **115** as it moves into its projected position. That is, the piston bears down on the bowl segments sliding them downwardly against the thrust ring segments **140** and seals **142**. At this time, the shoulders **156** are not in contact with the lower guide wall **48**. The piston is held in its projected position by the continued application of fluid pressure through the upper duct **78** into the lower chamber **106**.

The string of casing **210** is actually hung by lowering it slightly, breaking the shear pins **166**, and whereby the slips **160** are wedged tightly between the casing string and the inner faces **150** of the bowl segments **145**. Such downward movement of the casing string and the slips also imparts a downward component of force to the bowl segments **145** further compressing the seals between the casing string and the wellhead until the shoulders **156** strike the lower guide wall whereupon no further compression of the seals takes place. It is to be noted that, in their hanging positions, the units **12** center the casing in the passageway **32**. It is also significant that the units are positively retained in their hanging positions by the circumferentially engaging lower retaining wall **42**, the seal **40** and the piston **115**.

If it is desired to retract the hanging mechanism **9**, upward lifting force is applied to the casing string **210**, and the valve **196** is placed in its first position so that fluid under pressure is introduced into the lower chamber **106** under the piston head **116** and fluid is forced out of the lower chamber above the piston head back to the reservoir **190**. During retracting movement of the piston **115**, fluid is maintained under pressure in the upper chamber **108** so that the sleeve **16** remains in its exposing position thereby allowing the piston and hanger units **12** to move into their retracted positions.

From the foregoing, it will be evident that a remotely controllable pipe hanging mechanism has been provided. The subject mechanism protects the pipe hanger during drilling and other operations and, when required, exposes the pipe hanger for movement into pipe hanging position. Of particular significance are the simplicity of construction, the dependability of operation, and the retractability of the mechanism.

Although a preferred embodiment of the present invention has been shown and described, it will be understood that various changes and modifications may be made in the details thereof without departing from the spirit and the scope of the appended claims.

Having thus described the invention, what is claimed to be new and what is desired to be secured by Letters Patent is:

1. In well apparatus, a head means providing a passageway therethrough, an annular seat surrounding said passageway, a retaining wall extending axially away from said seat and surrounding said passageway, and a recess diametrically larger than said passageway and adjacent to said retaining wall; pipe hanger units positioned within said head means about said passageway; means mounting said units for movement from retracted outer positions in said recess wherein adjacent units are in circumferentially spaced relation to each other, to pipe-hanging positions wherein said units are supported on said seat and are circumferentially continuous about said passageway, said retaining wall being in surrounding engagement with said units in said hanging positions and precluding movement thereof radially out of said hanging positions; protector sleeve means axially slidably mounted within said head means for movement from a protecting position confronting said hanger units in their outer positions to an exposing position displaced lengthwise of said passageway from said hanger units; said sleeve means being capable of being moved relative to said head means upon the application of fluid pressure between the sleeve

means and head means; and means for applying fluid pressure to the sleeve means for moving said sleeve means from its protecting position to its exposing position.

2. The apparatus of claim 1 including means for moving said units from their outer positions to their hanging positions automatically in response to movement of said sleeve means into its exposing position.

3. The apparatus of claim 1 wherein said head means provides a first chamber wall extending axially away from said recess on the opposite side thereof from said retaining wall and in surrounding relation to said passageway, a second chamber wall surrounding said passageway and projecting away from said first chamber wall, an annular partition separating said chamber walls, and a fluid inlet opening into said passageway through said second chamber wall; wherein said sleeve means includes a shank slidably fitted within said partition and defining first and second annular chambers respectively with said first and second chamber walls, said shank having an annular groove establishing fluid communication between said first and second chambers in the exposing position of said sleeve means, and said sleeve means having a head slidably fitted within said second chamber wall; and wherein said unit-mounting means includes an annular piston slidably fitted within said first chamber for movement from retracted to projected positions thereby to move said units from their outer to their pipe-hanging positions whereby upon introduction of fluid pressure through said inlet, said sleeve means is first moved from its protecting position to its exposing position and then said piston is moved from its retracted position to its projected position.

4. In a pipe hanging mechanism, a head providing an internal main wall surrounding a passageway through the head, an annular seat projecting outward from said main wall, a retaining wall extending axially away from said seat and surrounding said passageway, and an annular frusto-conical guide wall diverging outward from said retaining wall; pipe hanger units positioned within said head about said passageway; mounting means including an annular piston axially slidably mounted within said head in surrounding relation to the passageway and being connected to said units for sliding movement of said units on said guide wall between retracted outer positions wherein adjacent units are in circumferentially spaced relation to each other, and pipe-hanging positions wherein said units are supported on said seat and are circumferentially continuous about said passageway, said mounting means precluding sliding of said units down said guide wall in the retracted position of the units, said retaining wall being in surrounding engagement with said units in their hanging positions and precluding movement thereof radially out of said hanging positions; and a protector sleeve axially slidably mounted within said piston and head for movement from a protecting position received within said retaining wall and confronting said hanger units in their outer positions to an exposing position withdrawn from said retaining wall and displaced sufficiently from said hanger units to permit movement thereof into their hanging positions.

5. In a pipe hanging mechanism for a well apparatus, head means providing a passageway therethrough, diametrically contractible hanger means concentrically mounted within said head means for movement from an outer expanded position to an inner radially contracted pipe hanging position, sleeve means coaxially slidably mounted in the passageway radially inwardly of said hanger means in its expanded position for movement from a protecting position facing the hanger means wherein said sleeve means separates said hanger means from said passageway to protect the hanger means to an exposing position displaced axially from said protecting position, annular piston means operatively connected to said hanger means and surrounding said sleeve means and axially slidable from a retracted position axially displaced from the hanger means in the expanded position of the latter to a retaining position between the hanger means and the head means in the radially contracted position of the hanger means, and means coacting with said sleeve means and piston means for sequentially moving said sleeve means from its protecting position to its exposing position and said piston means from its retracted position to its retaining position.

6. In a pipe hanging mechanism for a well apparatus, head means providing a passageway therethrough, diametrically contractible hanger means concentrically mounted within said head means for movement from an outer expanded position to an inner radially contracted pipe hanging position, sleeve means coaxially slidably mounted in the passageway for movement from a protecting position facing the hanger means, wherein said sleeve means separates said hanger means from said passageway to protect said hanger means to an exposing position displaced axially from said protecting position, annular piston means surrounding said sleeve means and axially slidable from a retracted position axially displaced from the hanger means in the expanded position of the latter to a retaining position between the hanger means and the head means in the radially contracted position of the hanger means, said sleeve means, piston means and head means defining a first annular chamber, said sleeve means and head means defining a second annular chamber separated from said first chamber in the protecting position of the sleeve means, and means establishing fluid communication between said chambers in the exposing position of said sleeve means.

7. The mechanism of claim 6 wherein said establishing means is a groove in the sleeve means that opens into both of said chambers in said exposing position.

8. In a pipe hanging mechanism for a well apparatus, head means providing a passageway therethrough, diametrically contractible hanger means concentrically mounted within said head means for movement from an outer expanded position to an inner radially contracted pipe hanging position, sleeve means coaxially slidably mounted in the passageway for movement from a protecting position facing the hanger means wherein said sleeve means separates said hanger means from said passageway to protect the hanger means, to an exposing position displaced axially from said protecting position, annular piston means surrounding said sleeve means and axially slidable from a retracted position axially displaced from the hanger means in the expanded position of the latter to a retaining position between the hanger means and the head means in the contracted position of the hanger means, said sleeve means, piston means and head means defining a first chamber, said sleeve and head means defining a second chamber, said head means providing a partition separating said first and second chambers, said head means having fluid conducting ducts respectively opening into said chambers adjacent to said partition in said second chamber and axially spaced from said partition in said first chamber, and said sleeve means providing means for establishing communication between said chambers in the exposing position of said sleeve means.

9. In a pipe hanging mechanism, a head providing a passageway therethrough, hanger actuating means movable axially in said passageway, means for moving said hanger actuating means, hanger means supported in said head and connected to said actuating means, interengaging means between said hanger means and said head to support said hanger means and to provide for movement thereof transversely of said passageway from an outer position to an inner position closer to the axis of said passageway than in said outer position, and fluid activated sleeve means coaxially slidably mounted in said passageway for movement from a protecting position facing said hanger means to a position exposing said hanger means to said passageway, means to move said hanger means from its outer position to its inner position in response

to movement of said sleeve to its exposing position and movement of said actuating means towards said hanger means, said actuating means being sandwiched between said head and said hanger means in said inner position of the latter to hold said hanger means in its pipe supporting position to thereby suspend the pipe from the head.

10. The mechanism of claim **9** wherein said interengaging means comprises a frusto-conical surface formed in said head surrounding said passageway for slidably receiving said hanger means, said hanger means sliding along said surface inwardly toward said axis of the passageway in response to axial movement of said activating means.

11. The mechanism of claim **10** wherein said hanger means has a T-shaped slot substantially normal to said surface and wherein said interconnecting means is a T-shaped member slidably fitted in said T-shaped slot and being in substantially parallel relation to said surface.

12. In a well apparatus including a tubular wellhead having an internal annular seat, an axial retaining wall projecting away from the seat, and a frusto-conical guide wall diverging outward from said retaining wall; an annular diametrically contractible pipe hanger having a lower frusto-conical surface, a lateral surface projecting axially away from said lower surface and a frusto-conical shoulder diverging outward from said lateral surface; and means mounting said hanger in said head for movement radially inwardly and axially downwardly from a diametrically expanded position with said lower surface of the hanger slidably bearing on said guide wall to a diametrically contracted position with said lower surface

rested on said seat, said lateral surface surrounded by said retaining wall and said shoulder resting on said guide wall.

13. The well apparatus of claim **12** wherein said head also has another frusto-conical guide wall above, outward of and substantially parallel to said first mentioned guide wall, and wherein said shoulder slidably rests on said other guide wall in said expanded position of the hanger.

14. The well apparatus of claim **12** wherein said head also has another axial retaining wall above, outward of and substantially parallel to said first mentioned retaining wall, and wherein said mounting means projects between said other retaining wall and said hanger in the contracted position of the latter to retain said hanger in its radially contracted position.

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