Aug. 8, 1950 J. M. GILLESPIE 2,517,655

OIL AND GAS WELL PRESSURE CONTROL

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Fig. 1.

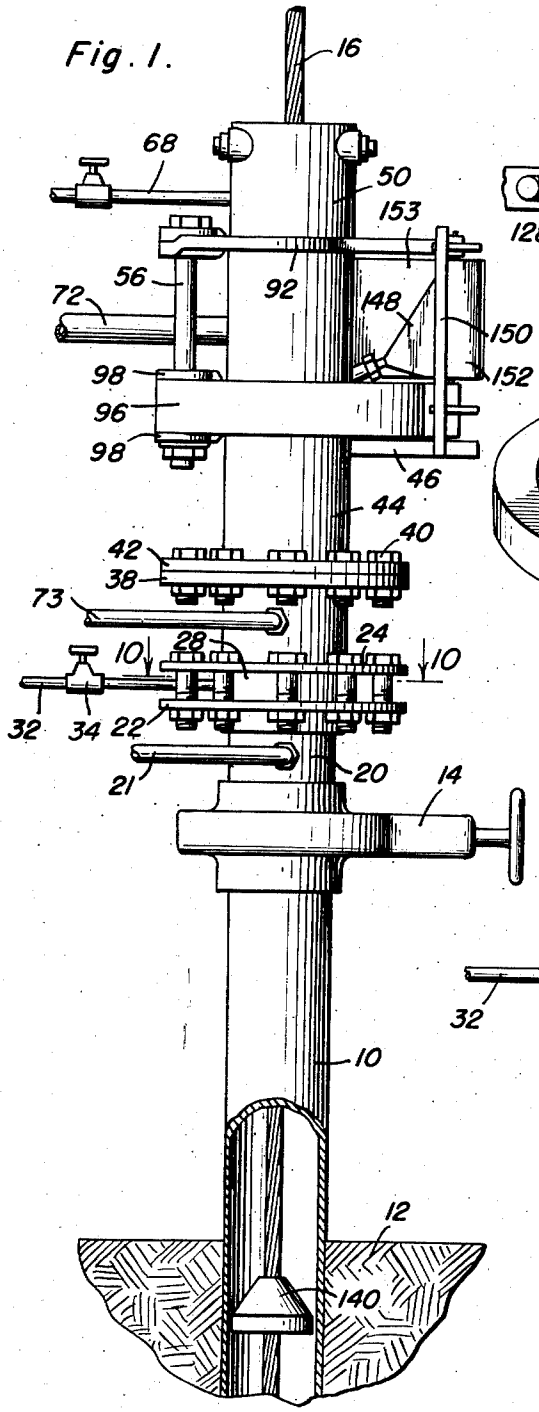


Fig. 8.

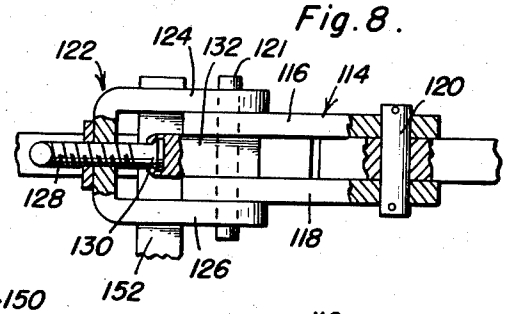


Fig. 9.

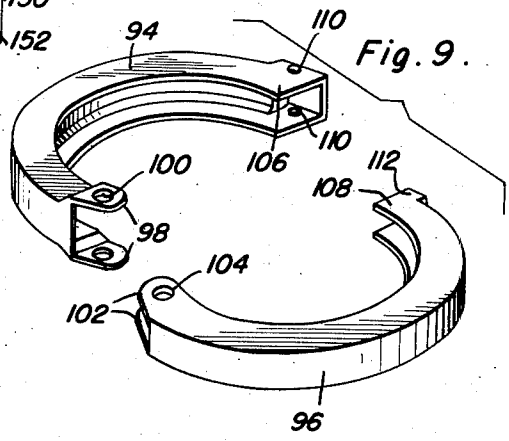
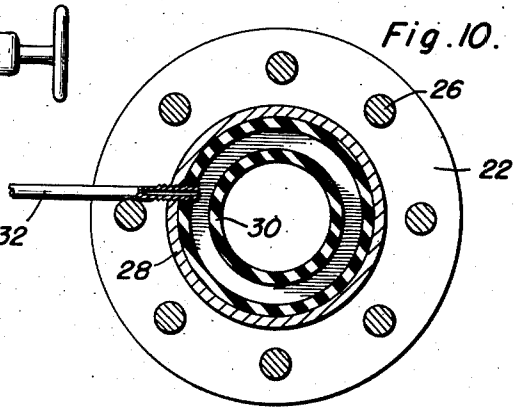


Fig. 10.



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Fig. 2.

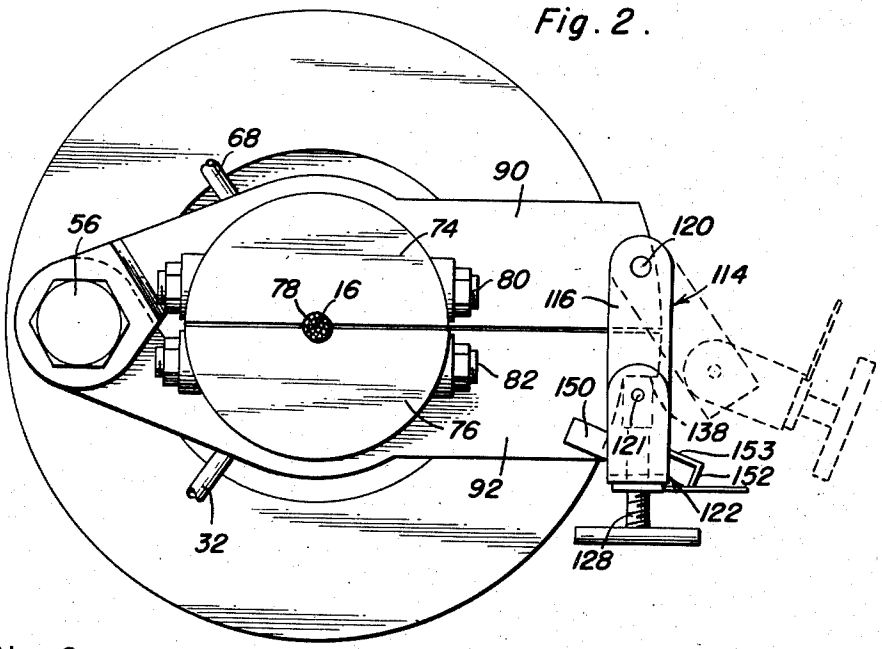


Fig. 6.

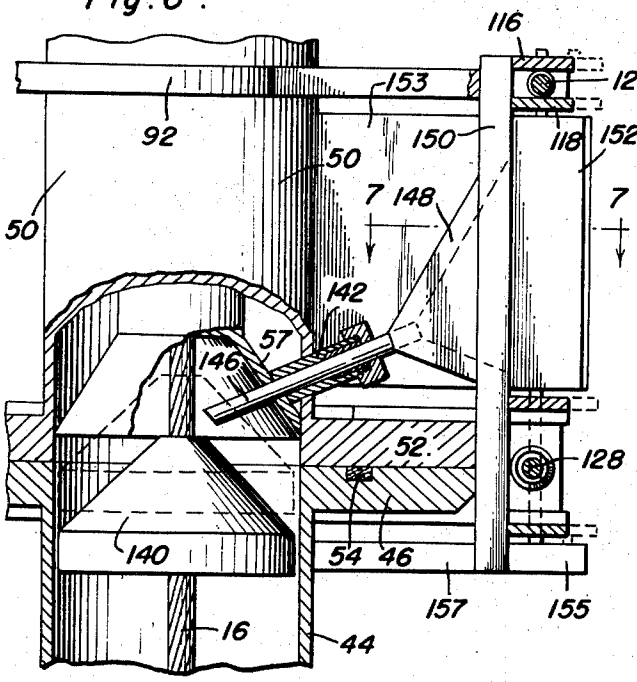
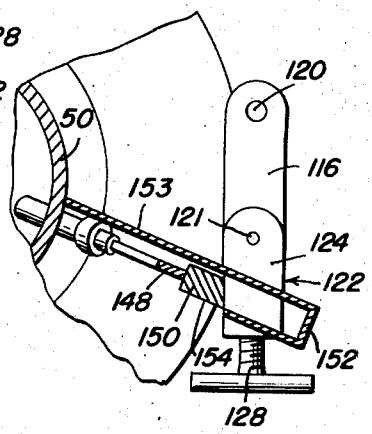


Fig. 7.



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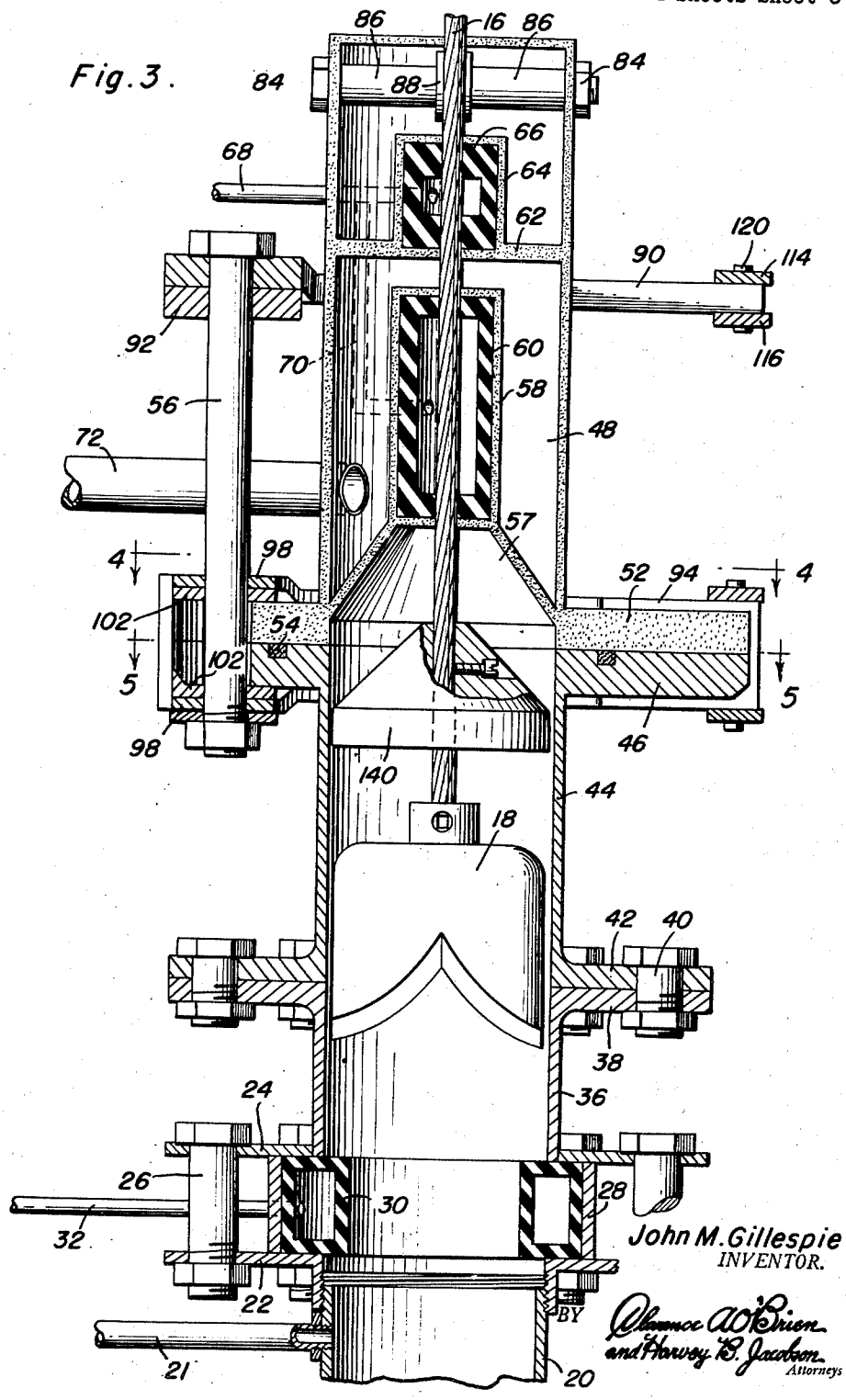
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OIL AND GAS WELL PRESSURE CONTROL

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Fig. 3.



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OIL AND GAS WELL PRESSURE CONTROL

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Fig. 4.

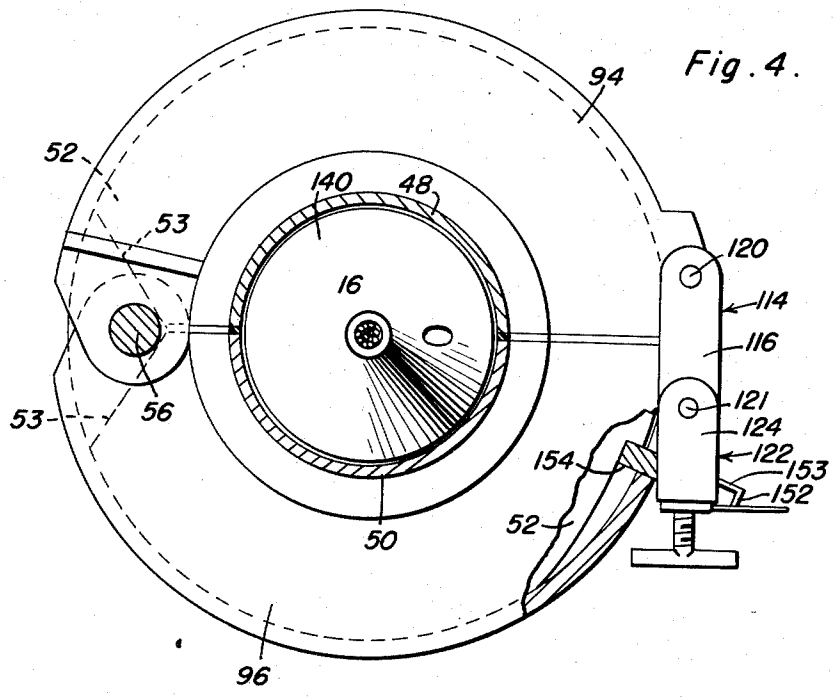
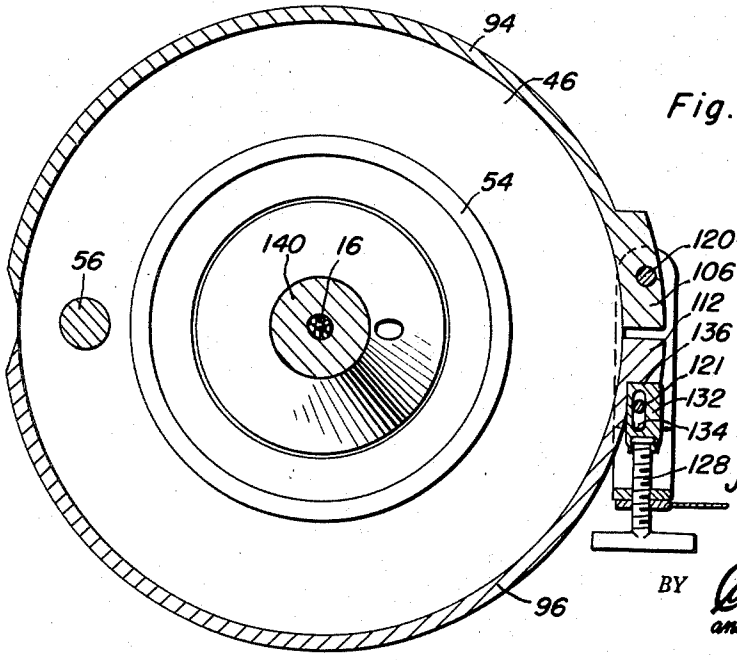


Fig. 5.



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UNITED STATES PATENT OFFICE

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OIL AND GAS WELL PRESSURE CONTROL

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Application October 21, 1948, Serial No. 55,747

9 Claims. (Cl. 166—14)

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This invention comprises novel and useful improvements in an oil and gas well pressure control and more specifically pertains to a device, which may be attached to and form a part of the well casing, and which serves as a pressure seal during operation of the well, and facilitates the insertion into the well and the withdrawal from the well of drilling or other tools carried by the drilling rig, without releasing the pressure maintained in the well.

The primary purpose of this invention is to facilitate the removal of drilling and servicing tools from an oil or gas well, while the well is producing, without releasing the pressure of the well or allowing the well to flow without control, during the removal of tools therefrom.

A further purpose of the invention is to provide an improved sealing means for the drilling cable of a well for preventing the loss of pressure from the well through the cable opening, and yet which will permit the easy withdrawal of the cable and tools from the well as desired.

A further object of the invention is to provide a pressure sealing means which is automatically released when the cable and tools carried thereby are withdrawn from the well, without the necessity for releasing the pressure from the well or permitting the well to flow without control thereof.

These, together with various ancillary features and objects of the invention which will later become apparent as the following description proceeds, are attained by this device, a preferred embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is a fragmentary elevational view, a part being broken away, of a well casing showing the pressure control device applied thereto;

Figure 2 is a top plan view of the pressure control device of Figure 1, the clamp latch being shown in dotted lines in its released position;

Figure 3 is a central vertical longitudinal section through the novel pressure control device;

Figure 4 is a horizontal sectional view, taken substantially upon the plane of the section line 4—4 of Figure 3 and showing the lower clamp and its latch;

Figure 5 is a horizontal sectional view, taken substantially upon the plane of the section line 5—5 of Figure 3 and showing further details of the lower clamp and latch construction;

Figure 6 is a side elevational detailed view of the device, parts being broken away to show the clamp release mechanism;

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Figure 7 is a horizontal sectional detailed view, taken substantially upon the plane of the section line 7—7 of Figure 6, showing details of the latch release mechanism;

Figure 8 is a vertical sectional detailed view through the latch construction;

Figure 9 is a group assembly perspective view of a retaining ring forming a part of the mechanism; and

Figure 10 is a horizontal sectional view taken substantially upon the plane of the section line 10—10 of Figure 1.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, the numeral 10 indicates a well casing or tubing which extends into a formation 12 to form an oil or gas well of any desired type. This casing is provided with a customary gate valve indicated generally by the numeral 14 which likewise may be of any known and conventional design. Operable within the casing 10 and the device attached thereto and forming the subject of this invention, is a conventional well drilling cable 16, which may be provided with a customary drilling head 18, or any other desired tool for operation within the casing and well bore.

Secured to the gate valve 14 is a sleeve 20 forming a continuation of the well casing 10 and which adjacent its upper end is provided with a pipe or conduit 21 by means of which the flow of gas or oil is withdrawn from the well.

Secured to the upper end of the casing 20 is a flanged bushing or coupling member 22 which is secured to a similar flange 24 as by means of fastening bolts 26, a spacing sleeve 28 being positioned between the two flanges 22 and 24, and secured to one or the other of the flanges as by welding or the like, to provide an annularly diametrically enlarged chamber within which is received a hollow rubbing packing ring 30 whose inner diameter when in its collapsed position is not greater than the inner diameter of the casing sections 10 and 20, whereby a string of tools may be passed through the packing 30 as desired.

A fluid pressure supply conduit 32 of any desired construction conducts fluid pressure from any desired source to the interior of the expansible packing member 30, whereby the latter may be radially expanded to reduce its internal diameter until the latter is constricted upon a string of tools as the same are passed upwardly or downwardly in the casing sections.

Integrally carried by the upper flange 24 is a further sleeve 36 likewise of substantially or

slightly greater diameter than that of the casing sections 10 and 20, which has an integral flange 38 at its upper end which by means of fastening bolts 40 is secured to a corresponding similar flange 42 at the lower end of a sleeve 44, whose upper end is provided with a diametrically enlarged annular flange 46. Supported upon the flange 46 is a split sleeve clamping assembly of a construction to be now described and which forms an essential feature of the invention.

As shown in Figure 4, this split clamp sleeve construction comprises a pair of diametrically divided sleeve sections 48 and 50, which at their lower ends are provided with integral semi-circular flanges 52, which overlie and slide upon the upper surface of the flange 46, being sealed thereagainst as by an annular packing ring 54, see Figure 5, which is formed in the annular groove in the upper surface of the flange 46. The flanges 52 are pivotally slidable upon flange 46 about a vertically extending hinge bolt 56 which is offset from and parallel to the central axis of the aligned sleeve sections 18, 20, 36 and 44, the rear ends of the flanges being cut away as at 53 to provide a clearance for the pin 56.

The complementary sleeve sections 48 and 50 have frusto-conical ribs or partitions 57 which support axially disposed drums 58 forming a chamber within which is received a cylindrical extensible rubber seal or sealing member 60. Similarly, a vertically spaced partition 62 supports an axial hollow drum 64, within the interior of which is positioned a second hollow cylindrical rubber seal or sealing member 66. As will be understood, the series of partitions forming and supporting the two chambers for the sealing means are divided along the same vertical, diametrical plane as the sleeves 48 and 50 and the flanges 52 whereby the entire sleeve, flange sleeve and partition assembly may be opened about the hinge 56 to obtain access to the interior of the device.

As will be further understood, the hollow, extensible, rubber or similar sealing members 60 and 66 are likewise split along their vertical central planes, and the individual semi-cylindrical seal sections retained in the corresponding sections of the compartments 58 and 64, whereby the entire assembly may be readily released from or clamped upon the cable 16 which passes therebetween. Fluid pressure is supplied at will by means of a fluid conduit 68 and a branch conduit 70 within the sleeve sections 48 and 50, to apply fluid pressure to the interior of the sealing members 60 and 66, to thereby expand the same into compressive engagement upon the cable 16 to tightly seal the latter against the passage of fluid pressure. A further conduit 72 communicates with the space between the partitions 59 and 62, within the interior of the sleeve sections 48 and 50, to withdraw any leakage of oil or gas which may pass by any of the above mentioned sealing means while a similar conduit 73 extends into the casing section 36 above the seal 30.

As will be more readily seen by reference to Figures 2 and 3, the top of the semi-circular sleeve sections 48 and 50 are provided with semi-circular top closures 74 and 76, having axial openings 78 through which the above mentioned drill cable 16 is passed, and through which this cable reciprocates during operation of the well drilling mechanism.

Extending laterally from each of the sleeve sections 48 and 50 and adjacent their top covers 74 and 76, are shafts 80 and 82, which are screw threaded at their extremities to receive locking

bolts 84 for retaining the shafts in place, there being provided tubular spacers 86 upon the shafts to centrally position guide pulleys 88 for free rotation thereon, these pulleys facing each other to axially guide and retain the cable 16 therebetween.

It will thus be seen that as the two sections are opened by a means to be subsequently set forth, the sections 48 and 50 will open, the packing chambers 58 and 64 will be opened, the expansible packing 60 and 66 will open, while the guide bushings 88 will likewise be opened with their respective sections, to thereby permit the cable and any tools associated therewith to be withdrawn from the open upper end of the device.

As shown in Figure 2, the upper portions of the sleeve sections 48 and 50 are provided with integral or rigidly attached hinge and lever arms 90 and 92, hinged upon the hinge pin 56, and provided at their outer ends with a latch or clamping means for holding the section assembly in its closed position. The construction of this latching means which is identical with the latching means for the lower clamps of the split sleeve construction, will be set forth hereinafter.

Referring now more particularly to Figures 3 and 9, it will be seen that the flange assembly 46 and 52 is provided with a channel-shaped clamping member consisting of the channel-shaped semi-circular sections 94 and 96, the former having laterally enlarged bosses 98 at its rear end, which are apertured as at 100 to receive the hinge pin 56. The other channel member 96 at its rear end is provided with bosses 102 which are apertured as at 104 for similar reception of the hinge pin 56. The bosses 102 are received within the bosses 98 for hinged movement therein as will be apparent from Figure 3, and the channel-like interior of the two members 94 and 96 provides an annular chamber which snugly but slidingly receives the annular flanges 52 and 46 therein, to thereby retain the flanges in assembled position and prevent longitudinal displacement thereof.

At their outer or forward ends, the channel members 94 and 96 are provided with bosses 106 and 108, the former being apertured as at 110 while the latter is provided with a radially extending shoulder portion 112.

The clamping means for retaining the members 94 and 96 together and the members 90 and 92, are of identical construction as set forth hereinbefore, and consist as shown in Figure 8 of a first link member indicated generally by the numeral 114 and which comprises upper and lower links 116 and 118 which are pivotally secured as by a hinge pin 120, to the above mentioned lever arm 90 of the upper clamp and also to the apertures 110 in the lower clamp member 94. At their outer extremities, the link members 116 and 118 are pivotally connected as by a pin 121 with a locking member indicated generally by the numeral 122, which is of U-shaped construction, having upper and lower arms 124 and 126 which respectively embrace the links 116 and 118, and are pivotally connected thereto, the bight or mid-portion of the U-shaped member 122 being internally screw threaded to receive a locking screw 128 which rotatably carries and has affixed to its headed inner end 130, a locking block 132 which is slidably received between the members 116 and 118, and is provided with a longitudinal slot 134 which is slidable upon the above mentioned pin 121. The inner end of the block 32 has a locking surface or shoulder 136

which is engaged with the shoulder 112 of the clamp member 96 or with a similar shoulder 138, see Figure 2, of the upper clamping lever 92.

The arrangement is such that as the upper clamps 90 and 92, together with the lower clamp channel members 94 and 96, are closed as shown in Figures 2, 4, 5 and 8, the locking surface 136 of the locking block 132 engages the locking shoulders 112 and 138 of the clamp members and by means of the thumb screws 128, the clamps are tightened and the split sleeve assembly is retained in tightly closed and sealed position.

Obviously, the clamping device could be loosened by merely reversing the procedure, and releasing the thumb screws of the upper and lower clamp members, whereupon the clamp sections could be pivoted about the hinge pins 120 and 121, to manually release the clamp at any time the said is desired. However, it is preferred to provide a means which is automatically actuatable by upward movement of the drill stem cable and the tools carried thereby, for releasing the latching clamps. For this purpose, a clamp releasing element is provided in the form of a frusto-conical member 140, see Figures 4, 5 and 6, which is attached to the cable 116 in any convenient manner and at any desired point along its length but preferably in close proximity to the drilling head 18 or other tools carried by the cable, for a purpose to be now set forth.

As will be seen in Figure 6, the member 140 provides a cone-shaped cam surface which upon upward movement of the cable and member 140 constitutes a cam operating means for releasing by means of a mechanism to be now described, the above mentioned upper and lower latch assemblies.

Extending through the wall of the frusto-conical partition member 57 and of the upper split sleeve section 50, is a tubular guide bushing 142 provided with a sealing and packing gland construction indicated generally by the numeral 144, and through which is slidably disposed an actuating plunger 146 positioned, as shown in Figure 6, in the path of upward movement of the cam actuating member 140 whereby as the member 140 passes the end of the plunger 146, the latter will be urged radially outwardly of the tubular guide bushing 142.

At its outer end, the plunger 146 has rigidly attached thereto an appropriately shaped plate 148 which has a vertically disposed latch release bar 150 carried thereby. This release bar 150, see Figures 6 and 7, loosely received but guided for a combined radial and axial movement in the open upper guide channel portion 152 of a radially and longitudinally extending web 153 carried by the sleeve 50, and a lower channel 155 of a web 157 carried in the section 44, and in corresponding notches 154 in the peripheries of the flanges 46 and 52, these notches being positioned adjacent the latch members 122, whereby upon radial and axial movement of the latch release bar 150, the U-shaped sections 122 will be pivoted about their pins 121 as shown in dotted lines in Figure 2, to thereby cause disengagement of the locking block 132 from the locking shoulders 138 and 112, whereby the entire split sleeve assembly may be opened about the hinge 56.

From the foregoing, the construction and operation of the split sleeve clamping assembly will be readily understood and further explanation relative thereto is believed to be unnecessary.

The operation of the device, when it is desired to withdraw a drill stem with its associated tools

from a well bore, is as follows: It is assumed that the well is flowing, the product thereof being withdrawn through the outlet conduit 21 in the usual and customary manner. As the cable 16 with the associated tools is raised from its operative position within the casing 10, the expansible packings 66 and 60 and the member 30 are expanded by admitting fluid pressure into their hollow interiors by means of the conduits 68 and 32. Thus, the packings tightly grip the cable 16 to prevent loss of pressure, oil or gas through these openings as the cable is withdrawn and the tools are raised. During this time, the oil or gas as above mentioned is being withdrawn through the conduit 21 to storage tanks, separators or any other desired location.

After the tools, such as the drill head 18 as shown in Figure 3, have passed the gate valve 14, the latter is closed to prevent any further upward flow of gas or oil from the well casing. At this time, the pressure supplied to the expansible seal 30 by the conduit 32 under control of the valve 34 may be released. The cable and tools continue their upward motion until the actuating or release cam 140 now engages the plunger 146, and causes the associated mechanism to release the upper and lower clamps of the split sleeve construction, whereupon the entire upper assembly is released and may be opened by engagement of the cam 140 with the partition 57, to permit the removal of the cables and tools from the upper casing section. Of course, it is to be understood that the pressure supplied to the sealing members by the conduit 68 is released just prior to the actuation of the clamp releasing mechanism by the conical cam cone 140.

The procedure is reversed when desired to introduce the cable and a string of tools into the well bore.

It is to be particularly noted that any desired number of the expansible sealing means may be employed wherever desired, and further that the upper expansible sealing members 64 and 60 may be employed at all times if desired to prevent leakage of fluid and pressure from a well bore through the sliding connection of the cable 16 with the associated casing parts.

From the foregoing, it is thought that the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary.

However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and the accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A safety drilling-in head for well casings comprising a well casing sleeve extension mounted on a well casing, said extension including relatively movable semi-cylindrical sleeve sections joining on a diametrical plane of the casing extension, upper and lower pairs of clamp members carried by each sleeve section, a common hinge for one end of said clamp members and a clamp latch mechanism for the other ends of said clamp members, said clamp latch mechanism having a latch releasing actuator extending into said extension for operation by a predetermined position of the drilling cable therein.

2. The combination of claim 1 wherein said

clamp latch mechanism includes a clamp latch for each of said upper and lower pairs of clamp members and a latch release mechanism actuated by said releasing actuator for simultaneously releasing the latches of said upper and lower clamp members.

3. The combination of claim 2 wherein one clamp member of each pair has a first link pivoted thereto, a second link terminally pivoted to said first link, a shoulder on the other clamp member of each pair, a latch block slidably and pivotally carried by one of said links for engagement with said shoulder, said latch release mechanism being operatively engageable with said second link.

4. The combination of claim 1 including complementary sealing partitions carried by said sleeve sections, expansible complementary sealing elements mounted in said partitions and fluid pressure means for actuating said sealing elements.

5. The combination of claim 4 including parallel anti-friction cable guide members mounted one in each of said sleeve sections.

6. The combination of claim 1 including parallel anti-friction cable guide members mounted one in each of said sleeve sections.

7. In combination, a well casing having a drilling cable reciprocable therein and a pair of complementary casing sections including a horizontally swingable casing section pivoted to the other of said complementary casing sections for movement about a hinge parallel to the longitudinal

axis of said casing to open and closed positions, cable packing and pressure sealing means in said casing including complementary portions carried by said pivoted section, a latching mechanism for retaining said pivoted section in its closed position, a latch release cam secured to said cable and a release actuator connected with said latching mechanism and slidable through said casing for actuation by said release cam.

8. The combination of claim 7 wherein said latching mechanism includes a horizontally movable latch member pivoted to said pivoted section, a vertically movable latch release bar engageable with said latch member for causing release thereof, said release actuator being connected with said release bar.

9. The combination of claim 8 including a longitudinally disposed guide channel carried by said casing for guiding said release bar for longitudinal and outward movement relative to said casing.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,369,913	Brunhoff	Mar. 1, 1921
1,986,284	Penick et al.	Jan. 1, 1935
2,054,337	Penick et al.	Sept. 15, 1936
2,306,617	Dick	Dec. 29, 1942
2,353,412	Miller	July 11, 1944