United States Patent

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[54] APPARATUS FOR AND METHOD OF CUTTING OFF FLOW FROM WILD GAS AND OIL WELLS

6 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **166/285,** 138/92, 166/.5, 166/55.1, 166/90, 166/298
[51] **Int. Cl.** **E21b 35/00**
[50] **Field of Search** ..... 166/.5, .6, 277, 297, 298, 55–55.3, 75, 90, 80, 81, 93; 285/15; 138/92, 97, 98; 169/1 A, 2 R

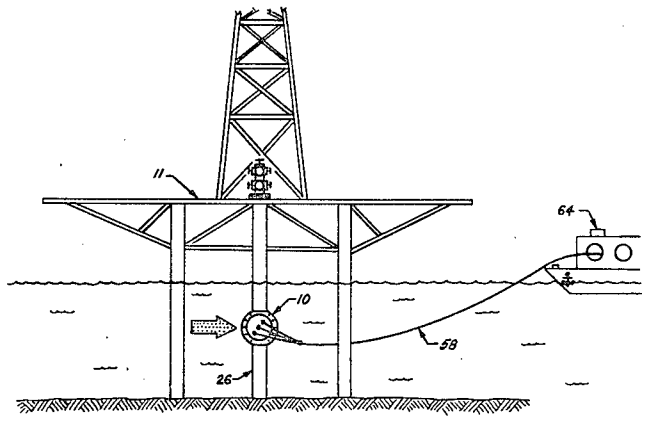
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ABSTRACT: Two hollow hemispheres diametrically drilled to fit around a pipe casing, and exteriorly flanged for bolting together to isolate a section of said casing intermediate its ends, said hemispheres being drilled through in a plurality of places to receive drills for penetrating steel and cement. Respective nipples are exteriorly secured to the hemispheres around each drill hole. A screw cap may be used to close each nipple when not in use. In operation a valve may be attached to the nipple and a drill inserted therein for drilling through the concentric metal and cement casings of the casing pipe and the production tubing strings in the center thereof. If a hollow drill has been used it can remain in place, otherwise it is withdrawn. A plastic snake of a flexibility and size to pack around the tubing strings is forced into the drilled hole to isolate the drilled break in the tubing strings from the rest of the casing and the strings above the break. Cement and mud is pumped through connecting hoses and the installed valve into the drilled hole to stop up the well. If well pressure is great, a plurality of drills up to the number of drill holes in the hemispheres can be used to effect a plurality of penetrations into the pipe casings for pumping a larger volume per minute of stopping material into the casing and the lower part of the tubing strings. A second species of the invention comprises a cylindrical member divided diametrically into halves for bolting together around a pipe casing. Drill holes are defined through the cylinder walls, and nipples are secured therearound similar to the ones described for the hemispheres. Where six or less drill holes are required this species is the preferred one.



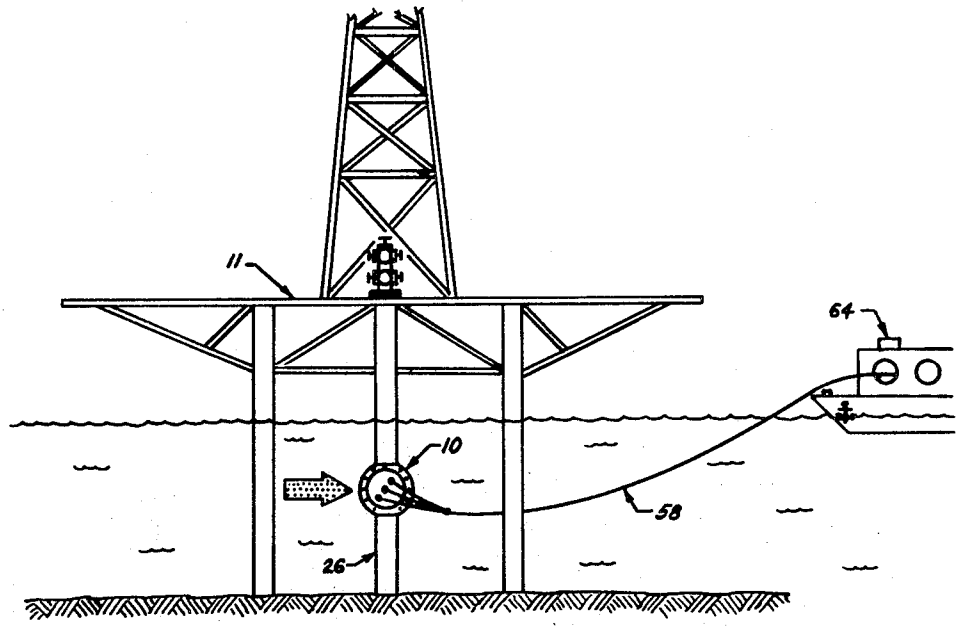


FIGURE 1

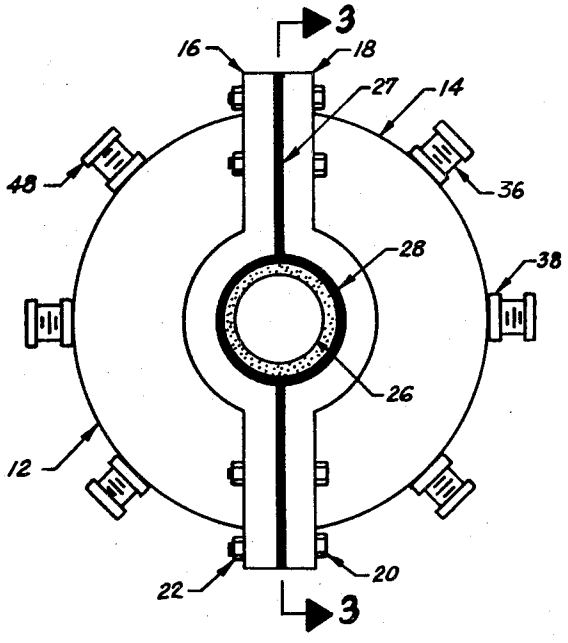


FIGURE 2

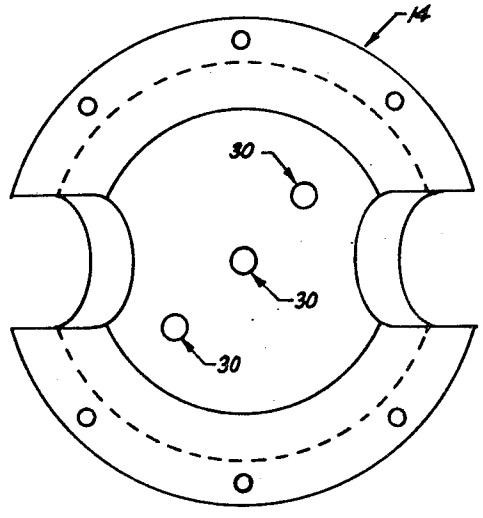


FIGURE 3

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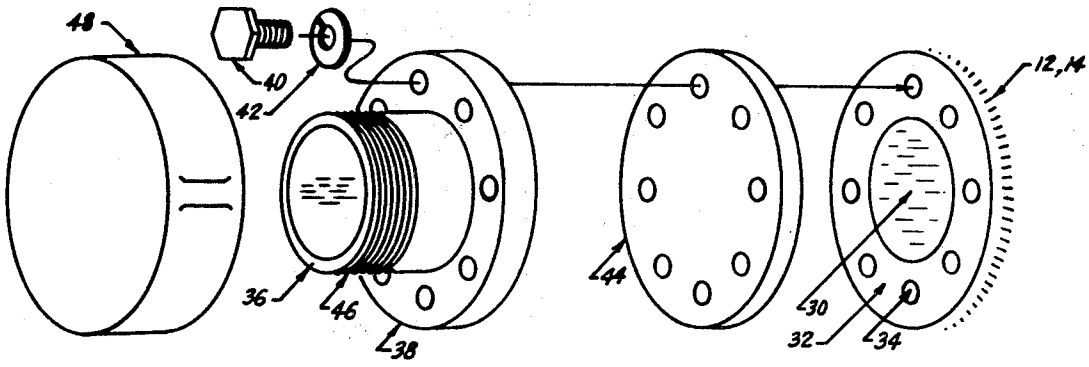


FIGURE 4

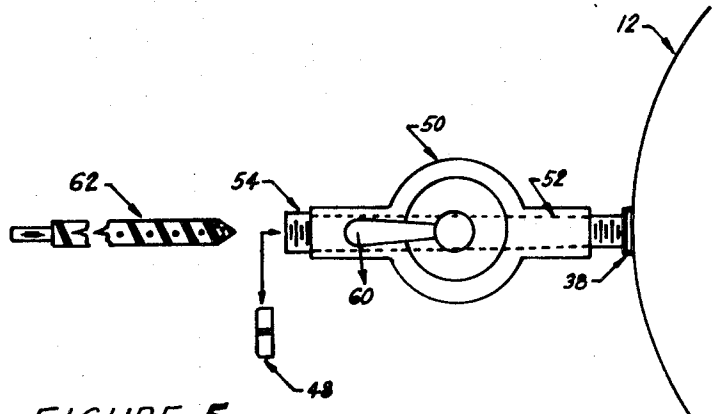


FIGURE 5

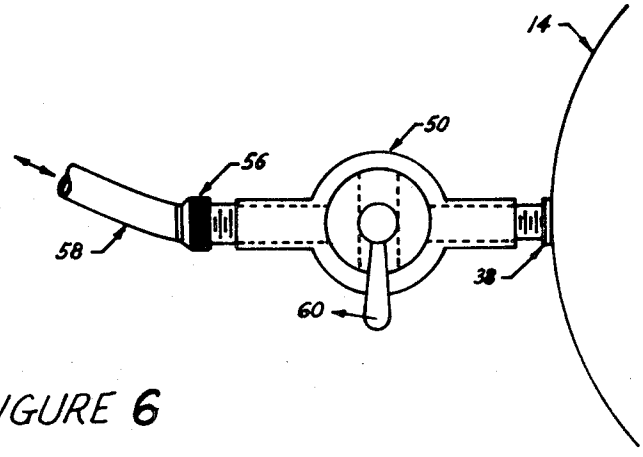


FIGURE 6

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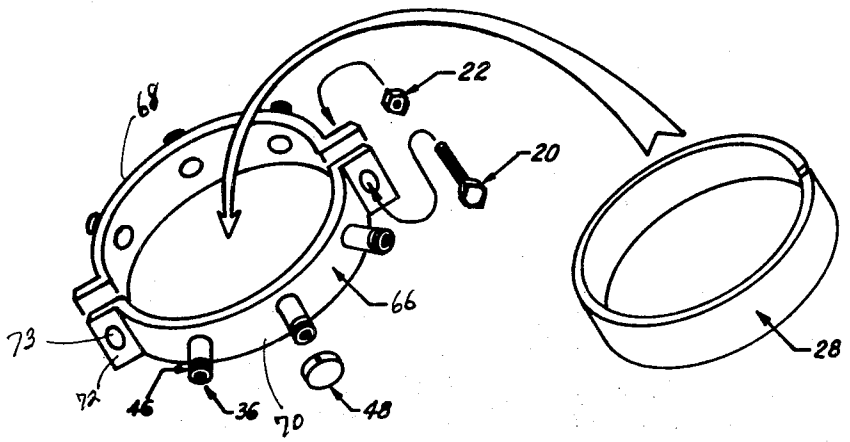


FIGURE 7

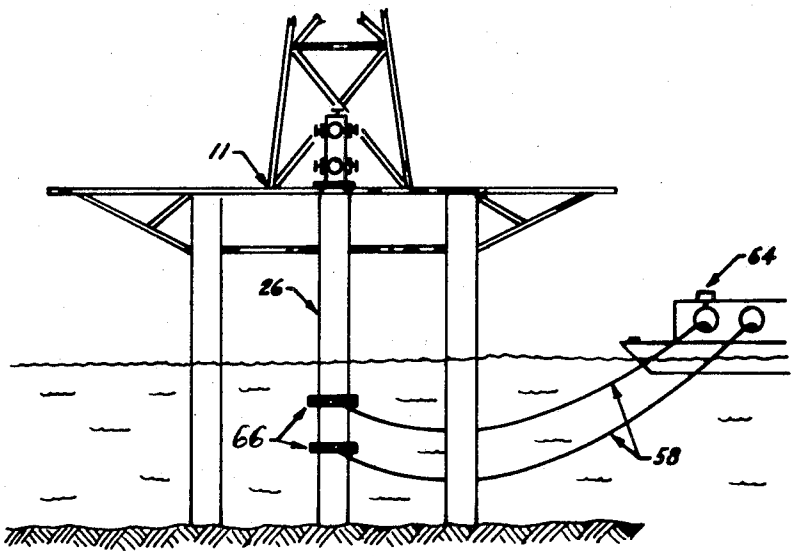


FIGURE 8

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APPARATUS FOR AND METHOD OF CUTTING OFF FLOW FROM WILD GAS AND OIL WELLS

The invention relates generally to the care and maintenance of oil and gas wells, and more particularly to the apparatus for and method of cutting off the flow of a wild well.

Automatic choke valves that cut off flow from wells are often installed intermediate the ends of the tube strings of producing wells. When some catastrophe or failure of the controls at the well head results in the well running wild, the choke valves automatically close the well down. Often, however the choke valves are destroyed or not installed and then there is a great loss of valuable material compounded by liability for any damage caused by the pollution of the environment by the lost material. Presently a plurality of tubing strings, one for each producing well, may be encased in a pipe casing comprising a plurality of concentric metal and cement casings with the tubing strings in the center. The pipe casings are often as large as three feet in diameter and pose a difficult problem to reach a particular tubing string.

It is an object of the invention to provide a means and method for closing the tubing string of a wild well.

Other objects and a fuller understanding of the invention may be had by referring to the following specifications and claims and drawings in which:

FIG. 1 is a side view of an offshore oil well with one species of the invention positioned thereon,

FIG. 2 is a plan view of the invention, the species of FIG. 1,

FIG. 3 is a sectional view along sectional line 3—3 of FIG. 2,

FIG. 4 is an enlarged and exploded view of external fixtures illustrated in FIG. 2,

FIG. 5 is a partial side view of one species operationally rigged for drilling into a casing,

FIG. 6 is similar to FIG. 5 and shows means for control of stopping material,

FIG. 7 is a perspective view of a second species of the invention,

FIG. 8 is a side elevation similar to FIG. 1 showing the second specie of the invention in operational position.

Referring to FIGS. 1 and 2, the invention 10 is shown in place on an offshore working platform 11 and comprises two hollow hemispheres 12 and 14 made of high-strength metal. The hemispheres have peripheral flanges 16 and 18 that are drilled and adapted to bolt together with bolts 20 and nuts 22 to form a hollow sphere. The sphere is drilled to define a diametrical hole 24 to engage around a circular pipe casing 26. Watertight and high-pressure gaskets 27 and 28 seal the joints between the hemispheres and between the sphere and the pipe casing respectively.

Referring to FIG. 3, the hemispheres are radially drilled to define holes 30. These holes are spot faced and the spot-faced areas 32 are tapped to define bolt holes 34. Referring to FIGS. 3 and 4, nipples 36 are mounted on the hemispheres by means of flanges 38 that bolt by means of bolts 40 and lock washers 42 to the respective spot-faced areas 32 through respective intermediate gasket seals 44 that seal each flanged end of a nipple and the corresponding hole 30. External screw threads are provided on the unflanged ends of nipples 36 which may engage a screwcap 48 to close said end when it is not in use.

Referring to FIGS. 5 and 6, a shutoff valve 50 has its oppositely disposed ends 52 and 54 respectively threaded internally and externally for engaging respectively the cooperatively threaded end 46 of a nipple 36, and being engaged by a high-pressure fitting 56 on the end of a hose 58. An operating handle 60 opens and closes the shutoff valve.

In operation, the hemispheres 12 and 14 are bolted together around pipe casing 26 at any convenient place and with gaskets 27 and 28 to seal the joints therebetween. A screwcap 48 is removed from a nipple and valve 50 is screwed thereon. With the valve handle 60 at the open position, a drill 62 may be inserted into the open end of the valve and rotated by any convenient means (not shown) to drill through the seal 44, part of the pipe casing 26 and the tubing strings in the center thereof. After the drilling, the drill 62, if not hollow, is withdrawn and a flexible plastic snake (not shown) inserted into the drilling and through the drill if hollow to pack around the tubing strings and insulate the drilled break in the tubing strings from the upper parts thereof. A hose 58 has a high-pressure fitting 56 secured to an end. The fitting is cooperatively threaded to engage the threaded end 54 of the valve 50. The other end of the hose is connected to pressure source of mud and cement in a control and supply vessel 64 (see FIG. 1). If the well pressure is high a number of holes can be drilled in the pipe casing limited only by the number of nipples that were provided. With a plurality of holes a larger volume of stopping material can be pumped into the tubing stringers against the well pressure on a per unit of time basis.

Referring to FIGS. 7 and 8, the second species of the invention 66 comprises a cylindrical member 67 diametrically divided into semicircular parts 68 and 70. Axially extending exterior flanges 72 form the respective ends, defining bolt holes 73, of the respective semicircular parts. Said flanges when opposed can be bolted together around the pipe casing by bolts 20 and 22. Holes similar to holes 30 are defined in the cylindrical members' walls, and nipples 36 are secured therearound. A gasket similar to gasket 28 is mounted intermediate the cylindrical members and the pipe casing 26. When six or less holes are to be drilled into the pipe casing, this specie is preferred.

What is claimed is:

1. An apparatus for cutting off a flow of gas and oil from a wild producing well having tubing strings encased in a pipe casing, said apparatus comprising in combination: two semiannular means having respective external flanges that are adapted to bolt together for enclosing an area of pipe casing, said semiannular means being diametrically drilled to fit around said pipe casing, and radially drilled to define at least one entrance thereinto for access to said enclosed area of said pipe casings; tubular means for engaging fixtures mounted externally thereon and in line with said entrance; a hollow drill adapted to be received in said tubular means and entrance for drilling a hole in said pipe casing and cutting said tubing strings; flexible snake means of a diameter for inserting through said hollow drill and into said drilled hole in the pipe casing to pack in and around said cut tubing strings and isolate the upper parts of said tubing strings from the lower parts; and hose means connecting said tubular means with a pressurized source of mud and cement for pumping into said drilled casing and tubing strings to stop the well flow.

2. An apparatus as described in claim 1 wherein said semiannular means comprises: two hollow hemispheres whose external cooperating flanges are peripheral.

3. An apparatus as described in claim 1 wherein said semiannular means comprises two semicylinders.

4. An apparatus as described in claim 1 wherein said tubular means for engaging fixtures and reinforcing said semiannular means comprises a nipple having oppositely disposed ends, one of which is flanged with bolt holes defined therein, and the other is exteriorly threaded, said nipple being bolted to said semiannular means through said flange bolt holes and into cooperatively tapped holes in said semiannular means and engaging a fitting threaded to cooperate with its threaded end.

5. A tubular means for engaging fixtures as described in claim 4 wherein said fitting comprises a shutoff valve having an operating handle for opening and closing a through passageway defined in said valve.

6. An improved method of cutting off a flow of gas and oil from a wild well having tubing strings encased in a pipe casing and comprising the steps: isolating an area of pipe casing intermediate the ends thereof; drilling at least one hole through said isolating means into said pipe casing and through the tubing strings therein; inserting flexible blocking means into said drill hole to pack around said cut tubing strings to isolate the upper parts from the lower parts; and pumping mud and cement into said drill hole and lower part of said tubing strings to stop up the well.

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