Fig. 1

Fig. 2

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This invention concerns deep well equipment for casing and is a stationary rubber or the like packer for closing off fluid flow in the well casing, at will. It has been previously known to mount a substantial mass or body of elastic material of packing efficiency at the head of well installed casing whereby to effect a shut-off of well fluid flow whether or not there is a tool or other use, operational string in the casing chamber. The said body was subjected to piston pressure to make the shut-off. It has been found, however, that when the piston pressure was released the compacted body had lost its resilience and did not expand to its normal open position, as desired.

Therefore an object of this invention is to provide a stationary packer and blow-out preventer incorporated with a safe means for positively drawing the packer, after a compression action, to a normal, open position to again permit fluid to flow past the open packing.

Further, an aim of the invention is to provide a packer positively anchored at one end and whose other end is secured to the compression piston, and which latter has the additional function of drawing its attached end of the packing to its fully open position to provide for flow of fluid in the casing and through the opened packing.

Additionally, an intent of the invention is to provide a reverse-opener packing actuating assembly of simple, practical, reliable, low-cost and easily made up embodiment.

The invention resides in certain advancements in this art as set forth in the ensuing disclosure and having, with the above, additional objects and advantages as will be developed herewith when considered in conjunction with the drawings, and detail of means and manner of operation will be made manifest in the following description of the herewith illustrative embodiment; it being understood that modifications, variations, adaptations and equivalents may be resorted to within the scope, spirit and principles of the invention as it is claimed in conclusion hereof.

Referring to the drawings,

Fig. 1 is a side view of a blowout preventer embodying the present invention with a portion broken away and showing the parts in the normal position; and

Fig. 2 is a fragmentary sectional view showing the packer element in compressed condition.

In the instant adaptation a substantial, heavy duty, mounting flange 2, securely fixable to a casing or other in-place means not shown, has a differential power piston chamber 3 in the lesser bore 3a of which there fits the neck 4a of a piston 4 having large mid-length flange 4f fitting in the large bore 3a of the mounting flange 2. The piston is forced upwardly, as desired at times, by pressure fluid from the respective supply pipe 5.

Upward movement of the piston is limited by means of an intermediate collar 6 in which is fitted an upper body part 4p of the piston and this collar is provided with a reversing, pressure fluid pipe 7 to supply the fluid to the upper face of the differential piston flange 4f. The collar is secured in suitable manner between the casing flange 2 and a main housing 8.

For the purpose of positively and reliably opening or closing the passageway through the hollow piston and the housing there is screwed into the upper end of the piston a ram-and-drawback disc 9 which freely slides in the bore of the housing and has a hub 9b with threads 9t to connect to the piston.

On the large upper face of the disc there is supported a large mass, elastic packer 10 externally fitting the bore face of the housing and in its extended or pulled-back form, as seen in the righthand side of the drawing, forming a flow passage 10p about equal to the area of the bore of the piston neck. In other words the packer is tubular for the internal movement of equipment and of well fluid. To effect the compaction and the extension of the blow-out preventing piston its upper end is provided with a circular set of armor segments 11 which are resorted to on their upper, outward ends in an anchoring ring 12 butted against the crown of the cylindrical housing 8. The ring is fixed in place by suitable, radial, set screws 13.

For the function of extending or drawing back the packer from its compacted position, seen in the lefthand side of the drawing, the lower or bottom end of the packer is harnessed to the ram disc by a suitable number of cables 14 which are fixed at their upper ends to the segments 11 and at their lower ends are fixed to the said disc.

Normally the packing is in an extended or pulled-back position for clearance of the bore and when need arises fluid pressure is turned into the pressure chamber below the piston and the packing is constricted onto interposed equipment if any is present or the packing is completely compacted (lefthand side of the drawing); in either case functioning as a blowout preventer if the emergency arises.

The pivoted anchoring segments are of the general type shown in Schweitzer Patent No. 2,583,497; January 22, 1952.

During compaction of the rubber packer by its piston the armor segments converge concentrically and buttress the closed mass to sustain high pressure of blow out effort in the well casing, and, conversely, when the piston pulls back the harness cables the segments take on the strain and downwardly repress the densely compacted rubber mass; this gives reliability to pull-back by the piston.

What is claimed is:

1. A blowout preventer assembly including a housing and a well casing mounting thereon, a tubular mass of packing in and fixed to the housing, and means for inwardly compaction the packer mass from an open bore position to a flow stopping position and for positively back-drawing the compacted mass to the normal open position for fluid flow; said means including a piston axially below the said mass and having a ram-and-drawback disc, a collar fixed in and across the housing below said disc, said piston working in the housing below said collar and reciprocating the disc, and tension cables connected to said disc and at their upper ends to an anchoring device fixed in the housing.

2. A blowout preventer including a housing, a coaxial, intermediate collar, a double action piston operative in the housing below the collar, a ram disc attached through the collar to the piston, the disc having dual function thereby, and a hollow packer fitted in the housing above the disc and an anchor device affixing it to the housing against bodily shift in the housing and having cables connecting the packer to the housing and the opposite end of the packer to said disc for pull-back by the piston.

3. The preventer of claim 2; the anchoring device including a set of pivoted segments embedded in said packer and pulled to open position by the cables.
4. A blowout preventer, for well casing, including a housing assembly having an axial flow passage, an elastic packing block having an axial flow hole, a double action piston operative in the housing and in tandem position with said block, cables connecting one end of the block to the piston for pull-back operation by the piston, and armor segments anchoring the opposite end of the cables in the housing; the piston in one direction of stroke operating to compact the packer and in the opposite direction expanding the segments.

5. A blowout preventer comprising housing applicable to well casing equipment: a tubular block of elastic packing material within said housing; a power piston operably mounted within the housing and disposed axially below said tubular block; a ram and pullback disc mounted on the upper end of the piston; an anchoring ring fixed in the upper end of the housing above the tubular block; means securing the tubular block to said anchoring ring; and means connecting said block to the ram and pullback disc, said means including a set of cables passing through and embedded longitudinally in the block, movement of the piston in one direction compressing the block and constricting its bore, and movement of the piston in the opposite direction pulling the block back to the normal open position.

6. In a blowout preventer: a housing; an elastic packer in said housing; a power piston operably mounted in said housing; a ram and pullback disc secured to said piston; means for securing one end of said packer to said ram and pullback disc; and anchoring means for securing the opposite end of said packer to said housing, said anchoring means including an anchoring ring secured to the housing, and a set of armor segments embedded in the packer and pivotally connected to said anchoring ring to be expanded by pull action of the ram disc.

References Cited in the file of this patent

UNITED STATES PATENTS

927,874 Robinson July 13, 1909
1,587,441 Taylor June 1, 1926
2,148,844 Stone et al. Feb. 28, 1939
2,287,205 Stone June 23, 1942
2,583,497 Schweitzer Jan. 22, 1952