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L. E. FAGG ETAL

3,393,744

INFLATABLE PACKER

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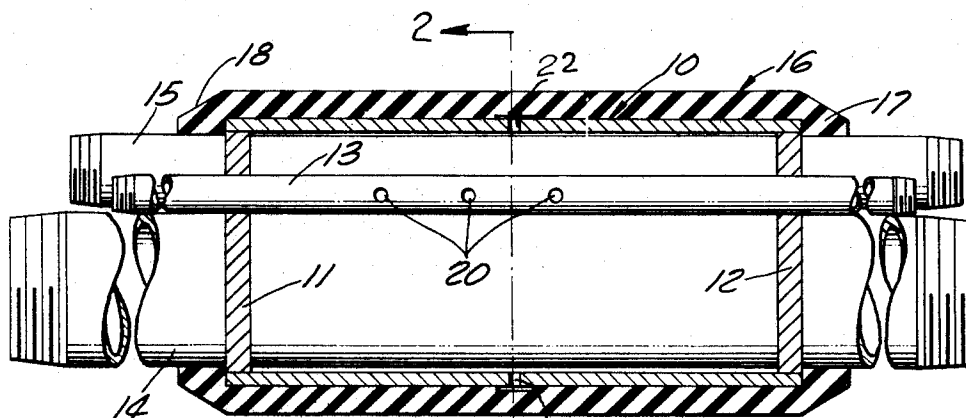


FIG. 1.

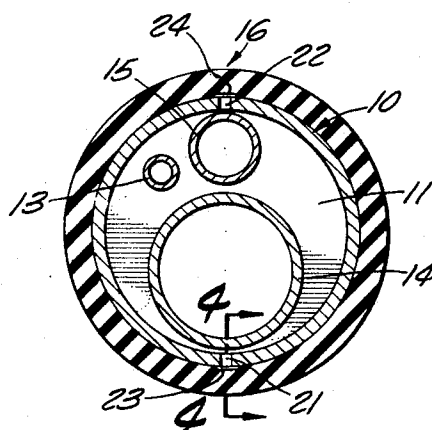


FIG. 2.

FIG. 3.

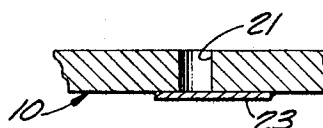
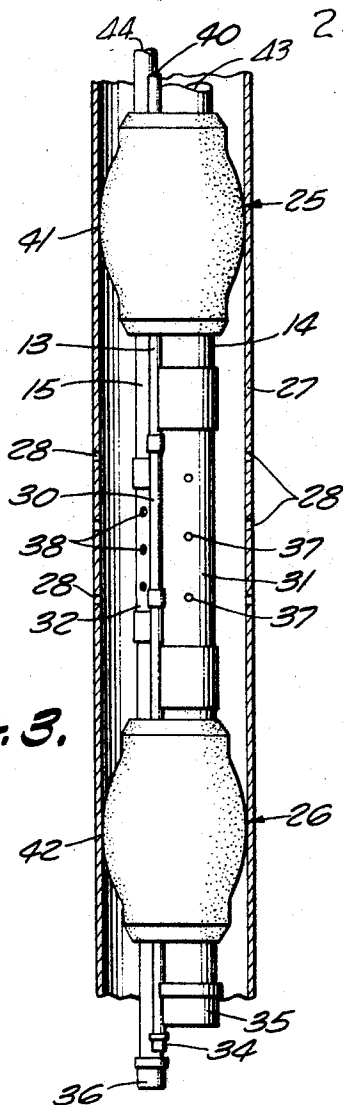


FIG. 4.

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1

3,393,744

INFLATABLE PACKER

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ABSTRACT OF THE DISCLOSURE

An inflatable packer for use in an oil well bore or the like. The packer includes a steel casing having a resilient cover molded thereover and bonded thereto. The steel casing includes one or more apertures through the periphery thereof, and closure means such as clips are secured to the casing to prevent the resilient cover material from flowing into the apertures during molding of the cover, but still allow gas pressure within the casing to cause the cover to inflate.

This invention relates to devices used with oil wells and more particularly to an inflatable packer for use in an oil well. The packer includes a casing having a resilient cover bonded thereto whereby gas pressure within said casing enables the cover to be inflated.

In various instances it is desirable to seal off or isolate a section of an oil well bore or casing. Various devices have been devised for accomplishing this, and typically are called "packers." Such packers generally include a mechanism to expand against and seal with the interior of a well bore. Two such devices may be utilized to seal or isolate a section of the well bore. These packers generally have been characterized by undue complexity.

Accordingly, it is an object of the present invention to provide a new and improved packer.

It is a further object of the present invention to provide a novel inflatable packer.

It is an additional object of the present invention to provide an improved inflatable packer, two of which may be employed to pack or seal off a portion of a well bore.

It is another object of this invention to provide an inflatable packer for use with multiple string installations.

In accordance with an exemplary embodiment of the teachings of the present invention, an inflatable packer is provided having a casing with a plurality of pipes longitudinally extending therethrough, and a bonded resilient inflatable cover arranged over the casing. One of said pipes may include a plurality of apertures within the casing, with the casing including apertures for inflating the cover and causing it to seal with the interior of the well bore. The remaining pipes may be utilized for various purposes, such as injecting fluids or gases into the well bore and receiving fluids or gasses therefrom, respectively.

Other objects and features of this invention will become more apparent through a detailed consideration of the following description taken in conjunction with the drawings in which:

FIGURE 1 is a side sectional elevation of a packer constructed in accordance with the teachings of the present invention;

FIGURE 2 is an end elevation of the packer of FIGURE 1;

FIGURE 3 illustrates a pair of the packers of FIGURE 1 arranged within a well bore; and

FIGURE 4 is a detail sectional view taken along a line 4—4 of FIGURE 2.

Referring now to the drawings, a packer constructed in accordance with the teachings of the present invention includes a cylindrical casing 10 having ends 11 and 12 suitably secured thereto, as by welding. The casing 10

2

preferably is made from metal, such as steel. A plurality of pipes 13 through 15 extend through the ends 11 and 12 of the casing 10 and are sealed therewith to provide an air tight chamber within the casing 10. The pipes 13 through 15 are substantially parallel and non-concentric. A resilient and inflatable cover 16 is arranged over the casing 10 and has its ends 17 and 18 bonded, such as vulcanizing, to the respective ends of the casing 10. The casing 16 preferably is formed from rubber molded over the casing 10. The pipe 13 includes a plurality of apertures 20 communicating with the interior of the chamber 10 and the chamber 10 includes a pair of holes 21 and 22 in the periphery thereof. Preferably, metal clips or reeds 23 and 24 are affixed, as by soldering, to the periphery of the casing 10 to lie over the respective holes 21 and 22 (note FIGURE 4). These clips are provided to prevent the rubber casing 16 from flowing into the holes 21 and 22 during molding of the cover 16 over the casing 10. Air may be supplied under pressure to the pipe 13, and the air passes through the apertures 20, and the apertures 21 and 22 to inflate the cover 16.

FIGURE 3 illustrates a pair of packers 25 and 26 like the packer shown in FIGURE 1 arranged within a casing or well bore 27. The casing 27 includes a plurality of apertures 28 which communicate with an underground oil or gas table. The pipes 13 through 15 of each of the packers 25 through 26 are interconnected by respective pipes 30 through 32. The ends of the pipes 13 through 15 of the packer 26 may be suitably capped by respective caps 34 through 36. The pipes 31 and 32 include respective apertures 37 and 38 for communicating with the interior of the casing 27 between the packers 25 and 26 and thus with the apertures 28 thereof.

The packers 25 and 26 shown in FIGURE 3 are passed down into a casing 27 to the desired level. Typically, the packers 25 and 26 are spaced between approximately 10 and 100 feet apart. Air is applied to an end 40 of the pipe 13 of the packer 25 which causes the covers, such as the cover 16 in FIGURE 1, thereof to inflate and seal with the interior of the casing 27 as illustrated by respective reference numerals 41 and 42. Then, in accordance with conventional practices, a fluid or gas may be applied to an end 43 of the pipe 14, and this fluid or gas passes through the apertures 37 of the coupling pipe 31 and through the apertures 28 in the casing 27. A suitable conventional test instrument or instruments may be connected with the upper end 44 of the pipe 15 to receive and either continuously or intermittently monitor the gasses and fluids present between the two packers whether such is passing inwardly through the apertures 28 of the casing 27 or coming from the apertures 38 in the coupling pipe 32 depending on pressure and flow conditions. After the tests or services have been performed, the two packers may be deflated by releasing the pressure on the pipe 13 and the string of pipes moved to any other desired depth.

A packer constructed in accordance with the teachings of the present invention typically may be approximately 10 inches long (from one end to another of the cover 16), with one to one and one-half inches at the end of the cover 16 being bonded to the casing 10. A typical uninflated diameter for the casing 16 is approximately four and three-fourths inches. The pipe 13 generally may be a one-fourth inch pipe with the apertures 20 therein being one-eighth inch in diameter, and the apertures 21 and 22 also being one-eighth inch in diameter. The pipes 14 and 15 typically are two inch and three-fourths inch pipe, respectively.

It will be understood that although an exemplary embodiment of the present invention has been disclosed and discussed, other configurations, structural arrangements and applications are possible and that the embodiment

disclosed may be subjected to various changes, modifications, and substitutions without necessarily departing from the spirit of the invention.

What is claimed is:

1. A packer for use in a well bore comprising
 - a cylindrical steel casing having at least an aperture through the periphery thereof,
 - a clip attached to the periphery of said cylindrical casing and extending over at least a substantial portion of said aperture,
 - a plurality of tubes extending through said casing, one of said tubes having at least an aperture in a portion thereof within said casing,
 - covers secured to the ends of said casing for rigidly retaining said tubes and sealing said casing to form a chamber therein, and
 - a rubber cover molded over said casing and bonded to the ends thereof whereby gas pressure in said one of said tubes communicates through said apertures to inflate said cover.
2. A device for selectively packing off a portion of a well bore comprising
 - first and second inflatable packers each including a cylindrical casing and a plurality of tubes extending therethrough, means sealing the ends of said casing, and an inflatable cover arranged over said casing and bonded to the ends thereof and capable of being inflated to form a seal with the interior with said bore, the casings of said packers each including at least an aperture therethrough and each of said packers including closure means secured to the casing thereof for substantially closing the aperture to prevent the cover material from flowing into the casing during molding of the cover while still allowing gas pressure within the casing to communicate through the aperture to inflate a respective cover,
 - a like plurality of pipes innerconnecting respective tubes of the packers, at least some of said pipes having apertures therein to enable fluid or gas communication with an interior section of said bore, and
 - cap means sealing the ends of the tubes of the second of said packers.
3. A packer for use in a well bore comprising
 - a cylindrical steel casing having at least an aperture through the periphery thereof,
 - end means affixed to the ends of said casing,
 - a rubber cover molded over said casing and bonded to said casing and said end means, and
 - closure means secured to said casing for substantially

- closing said aperture to prevent rubber from flowing into the aperture during molding of said cover while still allowing gas pressure within said casing to communicate through said aperture to inflate said cover.
4. A packer for use in a well bore comprising
 - a steel casing having a plurality of apertures through the periphery thereof,
 - end means affixed to the ends of said casing, and fluid conveying means coupled to at least one of said end means for allowing fluid to be supplied to the interior of said casing,
 - an expandable cover formed of resilient material mounted over said casing, said cover being secured at its ends at least to said end means, and
 - closure means secured to said casing for substantially closing said apertures to prevent said resilient material from flowing into the apertures during forming of said cover while still allowing fluid pressure within said casing to communicate through said apertures to expand said cover.
 5. A packer for use in a well bore comprising
 - a steel casing having a plurality of apertures through the periphery thereof,
 - end means affixed to the ends of said casing, and fluid conveying means coupled to at least one of said end means for allowing fluid to be supplied to the interior of said casing,
 - an expandable cover formed of resilient material mounted over said casing, said cover being secured at its ends at least to said end means, and
 - clip means secured to the periphery of said casing for substantially closing said apertures to prevent said resilient material from flowing into the apertures during forming of said cover while still allowing fluid pressure within said casing to communicate through said apertures to expand said cover.

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