Nov. 16, 1954 M. E. LONGEVAL ET AL 2,694,453

PACKER UNIT FOR WELLS

Filed June 2, 1953

Fig. 1

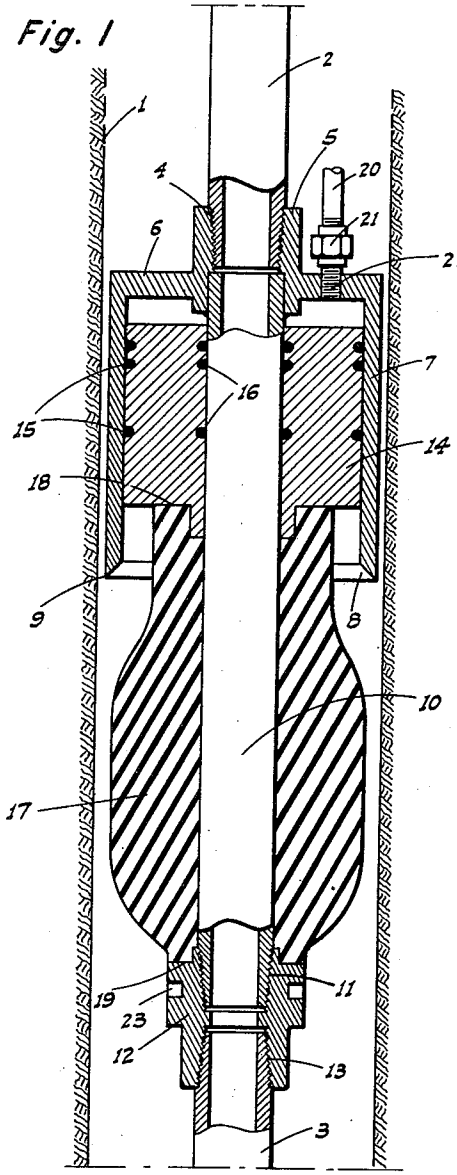
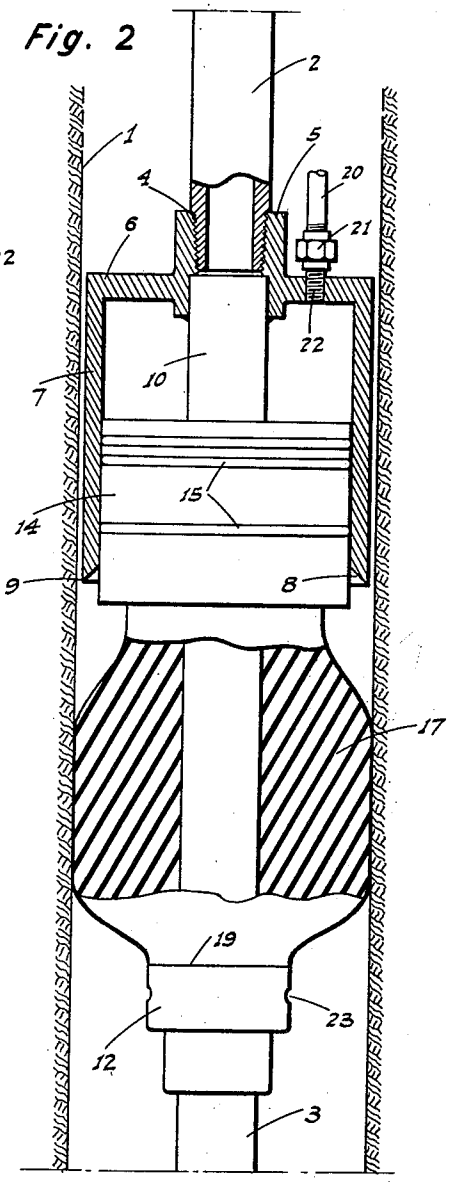


Fig. 2



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United States Patent Office

2,694,453

Patented Nov. 16, 1954

2,694,453

PACKER UNIT FOR WELLS

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Application June 2, 1953, Serial No. 359,089

2 Claims. (Cl. 166—187)

The present invention is directed to, and it is a major object to provide, an improved packer unit for oil, gas, or water wells; the purpose of the device being to seal off the well at a predetermined point so as to isolate one formation or strata from another, or to permit positioning of various types of tools in the well at a selected level, or for operations such as swabbing, washing, cementing, sampling, etc., in the well.

Another important object of this invention is to provide a novel packer unit which includes a normally contracted but expansible packer head, with advantageous fluid pressure actuated mechanism, controlled from the surface, arranged to cause expansion of said packer head.

An additional object of the invention is to provide a packer unit, as in the preceding paragraph, wherein the packer head comprises an initially elongated sleeve-like body of soft, compressible but resilient material, such as rubber; the fluid pressure actuated mechanism including a novel cylinder and piston assembly.

It is also an object of the invention to provide a novel packer unit for wells which is designed for ease and economy of manufacture, convenience of control, and positive action.

Still another object of the invention is to provide a practical, reliable, and durable packer unit for wells, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a sectional elevation of the device as suspended in a well, with the parts in their initial position; i. e. with the packer head contracted.

Fig. 2 is a similar view, but shows the packer head expanded into gripping engagement with the side wall of the well.

Referring now more particularly to the characters of reference on the drawings, the packer unit is here shown as suspended in a well, whose side wall is indicated at **1**; the device being interposed in the string of drill pipe or tubing, particularly between an upper section **2** of the tubing, and a lower section **3** thereof.

At its lower end the upper section **2** of the tubing is threaded, as at **4**, into an upstanding neck **5** formed centrally on the head **6** of a downwardly opening cylinder **7**.

The lower edge of the cylinder **7** is inwardly chamfered, as at **8**, to form a relatively sharp edge **9** whose purpose is to cut away any small obstructions which may be encountered as the cylinder **6** is lowered into the well **1** by the string of the tubing.

A suspension tube **10** is fixed at its upper end centrally in connection with the head **6**, and communicates with the upper section **2** of tubing.

From the head **6** the suspension tube **10** extends downwardly to a lower end termination a substantial distance below the lower end of the cylinder **7**.

At its lower end the suspension tube **10** is threaded, as at **11**, into a coupling **12**, and into which coupling the upper ends of the lower section **3** of tubing is also threaded, as at **13**.

A piston **14** is reciprocably disposed in the cylinder **7** and carries outside piston rings **15** and inside piston rings **16** which run in sealing relation with the cylinder

7 and suspension tube **10**, respectively; rubber O type rings being preferred.

The piston **14** is normally in a raised position, as in Fig. 1, and a packer head **17** surrounds the suspension tube **10** between a shouldered seat **18** on the lower end of the piston **14**, and a shouldered seat **19** on the upper end of the coupling **12**.

The packer head **17** is an initially elongated sleeve-like body of relatively soft, compressible but resilient material, such as rubber.

The packer head **17** preferably is of somewhat enlarged diameter below the cylinder **7**, although such diameter, in the starting shape of said packer head, is of considerably lesser outside diameter than the inside diameter of the well.

A valve regulated, fluid pressure supply conduit **20** leads from the surface downwardly in the well alongside the string of tubing, and at its lower end said conduit is connected by a union **21** with a nipple **22** threaded through the head **6** of the cylinder **7**, communicating with the interior of the latter.

When the packer unit is in use it is lowered by the string of tubing to a predetermined point in the well; the piston **14** normally being held in its raised position by the uncompressed packer head **17**.

After the packer unit is located at such predetermined position in the well, fluid pressure is supplied through conduit **20** into the cylinder **7**, causing the piston **14** to forcefully travel downwardly therein. With such downward travel of the piston **14** the packer head **17** is compressed or reduced in its effective length, causing radial expansion or bulging of such packer head into positive sealing and holding engagement with the side wall **1** of the well in the manner shown in Fig. 2; the pressure being maintained in the cylinder **7** and on the piston **14** during the period that the packer unit is in use.

With radial expansion or bulging of the packer head **17** into positive holding engagement with the side wall **1** of the well, the string of tubing is effectively anchored in the well for the subsequent conduct of operations such as those aforementioned, either above or below the packer unit.

After the operations in the well have been completed the fluid pressure supplied by conduit **20** is relieved, whereupon the packer head **17**—because of its resiliency—resumes its initial elongated condition, and the diameter reduces to lesser than that of the well, whereby the unit may then be readily withdrawn from said well.

In order to permit of ready removal of the packer head from the suspension tube **10**, as for the purpose of replacement, the coupling **12** is formed with opposed spanner wrench holes **23**, so that such a wrench may be employed to easily remove said coupling **12** from the lower end of said suspension tube **10**. The packer head then can be slipped off of the suspension tube without difficulty, and a new head replaced.

From the foregoing description it will be readily seen that there has been produced such a device as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations therefrom may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. A packing unit for a well comprising an elongated tubular member adapted to be interposed between adjacent lengths of drill pipe and to be connected thereto in alinement therewith, a cylinder of smaller diameter than the well surrounding and secured at its upper end to the member at its upper end and concentric therewith, the cylinder being open at its lower end, a piston slidable in the cylinder and on the adjacent portion of the member, means to introduce fluid under pressure into the cylinder above the piston, an elongated packer head of compressible and resilient material surrounding and slidable on the member below the piston, the upper end of the head being connected to the lower end of the

piston, and a stop on the member below and supporting the lower end of the packer head; the head being arranged so that when said head is in its normal uncompressed condition, the piston will be disposed adjacent the upper end of the cylinder.

2. A structure as in claim 1, in which the central portion of the packer head curves at its ends radially inward to provide end portions of smaller diameter relative to the diameter of the central portion of the head.

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