

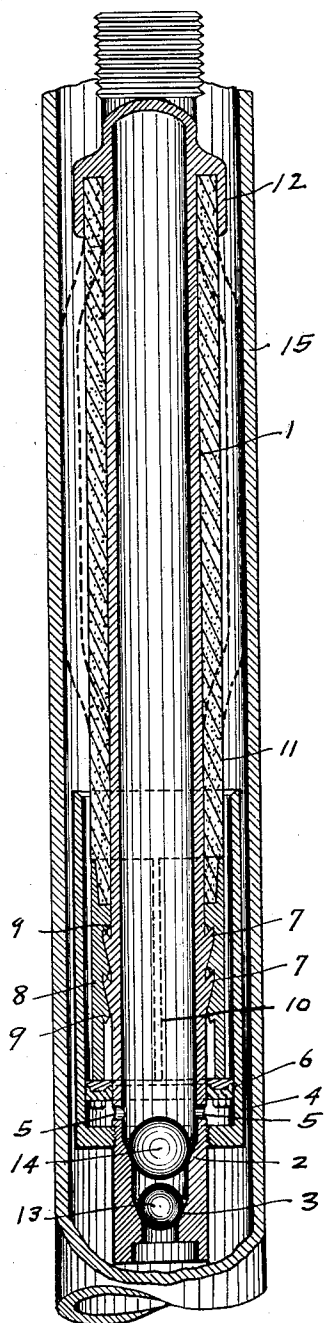
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WELL PACKER

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BY

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UNITED STATES PATENT OFFICE

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WELL PACKER

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This invention relates to new and useful improvements in a well packer.

One object of the invention is to provide a packer adapted to be set in a well between an inner pipe therein and an outer casing or other wall of the well bore, and the invention further comprehends novel means for setting the packer and holding the same in position.

A further feature of the invention relates to means through which the packer may be set by hydraulic or other fluid pressure.

In well drilling operations, it often becomes necessary to set a packer about the inner pipe in a well bore, and between it and the walls of the bore to separate different fluid strata and to seal off one stratum, such as a water stratum, from another stratum, such as an oil stratum, and it may become necessary to set such packer for other purposes.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings wherein:

The figure shows a vertical sectional view of the packer and setting tool in a well with the packer ready to be set.

Referring more particularly to the drawing the numeral 1 designates a pipe in a well bore, whose upper end is threaded to adapt it for connection to a string of pipe extending to the ground surface. At the lower end of this pipe 1 there is a cylinder 4 whose lower end is closed and above the seat 2 there is one or more ports 5 leading from the interior of the pipe 1 into the cylinder 4. Above the ports 5 there is a piston 6 which fits closely around the inner pipe and within the cylinder. Above said piston the inner pipe is provided with the external, annular, upwardly pitched ratchet teeth 7 spaced apart, one above each other. Attached to and upstanding from the piston 6 there is a tubular expander 8, having the internal annular downwardly pitched ratchet teeth 9 spaced apart and engageable with the opposing teeth 7. The upper end of this expander is provided

with slots as 10 so as to make the expander expandible and its upper end is spaced from the inner pipe 1 and upwardly flared to receive the lower end of the expansible packing sleeve 11 which is fitted around the pipe 1. The upper end of this sleeve is retained in place by the surrounding annular flange 12 which fits therearound.

In use the packer and setting tool are assembled as shown in the figure, but without the balls 13, 14 therein, and as so assembled is let down into the well bore to the desired place where it is desired to set the packer. While being lowered, circulation can be maintained through the inner pipe and there will be no danger of the packer becoming prematurely set. When it is desired to set the packer the balls 13, 14 may be dropped down through the string of pipe, to which the device is attached, and they will seat on the seats 3 and 2 in succession and close the lower end of the pipe 1. Fluid under pressure is then forced down through said string of pipe and will pass out through the ports 5 and will force the piston 6 upwardly which, in turn, will move the expander 8 upwardly with the result that the packer will be expanded as indicated in dotted lines out against the walls 15 of the bore. These walls may be a surrounding casing set in the well or the walls of an open hole. The packing sleeve 11 will be maintained in expanded position by the engagement of the teeth 9 with the opposing teeth 7. The balls 13, 14 are preferably formed of some soft material and when the packer is set these balls and the seats 2, 3 may be drilled out and other operations carried on through the inner pipe 1.

The drawings and description disclose what we consider a preferred form of the invention by way of illustration while the broad principle of the invention will be defined by the appended claims.

What we claim is:

1. A packing device for use in a well bore and including an inner pipe having a channel for fluid downwardly therethrough, an expansible sleeve-like packing around said pipe, means for fixing one end of said packing

against movement on said pipe, a movable abutment operable against the other end of the packing, means operable by fluid under pressure and effective to operate said movable abutment against said packing to expand the same and an independent body insertable into said pipe and effective to close said passageway to divert the pressure of the fluid flowing through the channel against said means.

2. A packing device for use in a well bore and including an inner pipe having a channel therethrough, an expansible sleevelike packing around said pipe, means for fixing one end of said packing against movement on said pipe, a movable abutment operable against the other end of the packing, means operable by fluid flowing under pressure through said channel and effective to operate said movable abutment against said packing to expand the same, independent means for closing said channel to apply said pressure to said abutment operating means, and interengaging means carried by said pipe and movable abutment, respectively, and operative to maintain said packing in said expanded position.

3. A packing device for use in a well bore including a pipe having a fluid passageway therethrough, an expansible packing sleeve around said pipe means for securing one end of the sleeve against movement on the pipe, a movable means operable against the other end of said packing, a cylinder on the pipe having an inlet passageway from the interior of the pipe, a piston in the cylinder, arranged to be operated by fluid under pressure entering said cylinder through said passageway, and to operate said movable means against the packing to expand the same.

4. A packing device for use in a well bore including a pipe, having a fluid passageway therethrough, an expansible packing sleeve around said pipe means for securing one end of the sleeve against movement on the pipe, a movable means operable against the other end of said packing, a cylinder on the pipe having an inlet passageway from the interior of the pipe, a piston in the cylinder, arranged to be operated by fluid under pressure entering said cylinder through said passageway, and to operate said movable means against the packing to expand the same, an independent body insertable into said pipe and effective to close the same against the escape of fluid, passing downwardly therethrough, therefrom, except through said passageway.

5. A packing device for use in a well bore including a pipe having a fluid passageway therethrough, an expansible packing around said pipe means for securing one end of the packing against movement on the pipe, a movable means operable against the other end of said packing, a cylinder on the pipe having an inlet passageway from the interior

of the pipe, a piston in the cylinder, arranged to be operated by fluid under pressure entering said cylinder through said passageway, and to operate said movable means against the packing to expand the same, and interengaging means effective to maintain said packing in expanded position.

6. A packing device for use in a well bore including a pipe having a fluid passageway therethrough, an expansible packing around said pipe, means for securing one end of the packing against movement on the pipe, a movable means operable against the other end of said packing, a cylinder on the pipe having an inlet passageway from the interior of the pipe, a piston in the cylinder, arranged to be operated by fluid under pressure entering said cylinder through said passageway, and effective to operate said movable means against the packing to expand the same, an independent body insertable into said pipe and effective to close the same against the escape of fluid, passing downwardly therethrough, except through said passageway, said movable means and pipe being provided, one with means engageable with the other and effective to hold said packing in expanded position.

7. A device for closing a space between a pipe in a well bore and the wall of the bore, including an expansible packer around said pipe, means on the pipe between which the packer is confined, one of said confining means being movable to effect the expansion of said packer, a cylinder associated with said pipe, a piston in the cylinder effective to move said movable confining means, said pipe having a fluid channel therethrough, through which fluid under pressure may be forced through said pipe, said channel having a passageway leading therefrom into said cylinder.

8. A device for closing a space between a pipe in a well bore and the wall of the bore, including an expansible packer around said pipe, means on the pipe between which the packer is confined, one of said confining means being movable to effect the expansion of said packer, a cylinder associated with said pipe, a piston in the cylinder effective to move said movable confining means, said pipe having a fluid channel therethrough, through which fluid under pressure may be forced through said pipe, said channel having a passageway leading therefrom into said cylinder, an independent body insertable into said pipe and effective to divert the fluid flowing through the pipe into said cylinder through said passageway.

9. A device for closing a space between a pipe in a well bore and the wall of the bore, including an expansible packer around said pipe, means on the pipe between which the packer is confined, one of said confining means being movable to effect the expansion of said packer, a cylinder associated with said pipe,

a piston in the cylinder effective to move said movable confining means, said pipe having a fluid channel therethrough, through which fluid under pressure may be forced through said pipe, said channel having a passageway leading therefrom into said cylinder, an independent body insertable into said pipe and effective to divert the fluid flowing through the pipe into said cylinder through said passageway, whereby said fluid is applied to said piston to effect said expansion of said packer, and interengaging means carried by said pipe and movable confining means respectively and effective to hold said packer expanded.

In testimony whereof we have signed our names to this specification.

CHARLES H. LANE.

CHARLES H. REYNOLDS.