

1,411,486.

FIG. 1 is a longitudinal cross-sectional view of a mechanical assembly. It shows a central shaft (8) passing through a housing (1). The shaft has a central section (7) and a lower section (2). A component (3) is located between the shaft and the housing. A dashed line (2') indicates a lower section of the shaft. A component (4) is shown at the bottom of the shaft, with a dashed line (4') indicating its internal structure. A component (5) is shown at the bottom of the housing. A component (6) is shown at the bottom of the shaft. A component (10) is shown at the bottom of the housing. A component (2'') is shown at the bottom of the shaft. A component (2''') is shown at the bottom of the housing.

FIG. 2 is a top-down view of a circular component (8). It shows a central hole (7) and a dashed line (8') indicating a central section. A component (9) is shown at the bottom of the component. A component (10) is shown at the bottom of the component.

FIG. 3 is a perspective view of a mechanical component. It shows a central shaft (8) passing through a housing (1). The shaft has a central section (7) and a lower section (2). A component (3) is located between the shaft and the housing. A dashed line (2') indicates a lower section of the shaft. A component (4) is shown at the bottom of the shaft, with a dashed line (4') indicating its internal structure. A component (5) is shown at the bottom of the housing. A component (6) is shown at the bottom of the shaft. A component (10) is shown at the bottom of the housing. A component (2'') is shown at the bottom of the shaft. A component (2''') is shown at the bottom of the housing.

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DOUBLE PACKER FOR LINERS.

1,411,486.

Specification of Letters Patent.

Patented Apr. 4, 1922.

Application filed August 1, 1919. Serial No. 314,714.

To all whom it may concern:

Be it known that I, THOMAS H. GALLAGHER, a citizen of the United States, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Double Packers for Liners, of which the following is a specification.

This invention relates to packing means, and more particularly to a packer specially adapted for use in connection with oil and gas wells.

One of the main objects of the invention is to provide a packer of the character stated of simple construction and operation which may be produced at small cost and may be readily applied. A further object is to provide a packer so constructed as to insure a tight closure between the liner and the well tubing, and which will serve to effectually prevent entry of sand, gravel, and other foreign material into the liner, while also preventing escape of gas from the liner through loose earth and sand between the liner and the well casing. Further objects will appear from the detailed description.

In the drawings:—

Figure 1 is a fragmentary sectional view of a well with a packing device constructed in accordance with my invention applied thereto.

Figure 2 is a section taken substantially on line 2—2 of Figure 1.

Figure 3 is a section through the upper or plug member of the packer, the tubing being shown in elevation.

In drilling oil and gas wells, it is the common practice to place the casing 1 of the well in position, after which the well is bored to a greater depth, the lower portion A of the bore being of less diameter than the upper portion in which the casing 1 is positioned. After this has been done, the liner 2 is placed in the lower portion of the well, leaving a space 3 between the lower end of casing 1 and the upper end of this liner. The liner illustrated is of usual type and has its lower portion perforated as at 2^a in the known manner. It very frequently happens that the soil between the lower end of casing 1 and the upper end of liner 2 is of unstable formation such as sand, gravel, and other materials which tend to easily cave in and either partially or completely fill up and close the liner 2 thus seriously interfering

with the flow of oil or gas from the well. To clean out a well which has thus been filled is very expensive and, for this reason, it frequently happens that wells which have caved in in this manner are plugged. It is the primary object of this invention to provide simple and efficient means whereby the upper end of the liner 2 may be effectually closed so as to prevent the entry of foreign materials into the liner, thus insuring free flow of gas or oil from the well while also preventing escape of gas, in the case of a gas well, through the loose sand, gravel or other material which may occur in the space between the casing and the liner.

In putting my invention into practice, I secure a relatively broad and thick annular member or collar 4 of any suitable material such as cast iron or steel, in the upper end of the liner by means of screw threads or in any other suitable manner. The upper inner portion of this collar is beveled downwardly and inwardly as at 4^a, and the inner surface of the collar is provided with a thick covering or layer 5 of comparatively soft rubber secured thereto, the coating conforming in shape to the inner surface of collar 4 so as to provide at the upper end portion of the collar, a downwardly tapering seat 6. This seat is adapted to receive an inverted frusto-conical plug 7 secured upon the well tubing 8 which extends into the liner 2 in the known manner. The member 7 is composed of a body 8^a formed of cast iron or other suitable material and provided adjacent its larger end or base with an outwardly projecting peripheral flange 9; and a thick covering 10 of relatively soft rubber which is secured about the lower portion of the body beneath the flange. This flange acts to reinforce the covering 10 so as to prevent distortion thereof while also effectually preventing movement of this covering upwardly of the body. The body 8^a is centrally bored and threaded and is adapted to be secured upon the screw threaded portion 8^b of the tubing 8.

In practice, the plug member 7 is of such size that, when the tubing 8 is in lowered position, the lower portion of this plug member is seated tightly upon the seat 6 of collar 4. The weight of tubing 8 which is supported by the plug member 7 serves to hold this member tightly seated, and the two relatively soft elastic coverings 5 and 10 of the collar and the plug member, respectively,

cooperate to provide a fluid tight closure for the upper end of the liner about the tubing. This serves to effectually prevent entry of foreign materials into the liner 2 while also preventing escape of gas or oil from the upper end of this liner, the gas or oil being removed from the well through tubing 8 by any suitable or well known means.

I am aware that it has been proposed to employ packers of various sorts for forming tight joints between the well casing and the tubing but, so far as I am aware, a packer has never been employed in connection with a liner which is positioned at the bottom of the well for effecting a tight closure between the liner and about the tubing to prevent filling in of the lower part of the well due to cave-ins between the casing and the liner. There are many wells which have been abandoned due to these cave-ins, and these wells could be made good producers if the filling in of the lower portion of the well could be prevented. By employing my packer in connection with the liner, it is possible to clean out and reopen these old wells, and to effectually prevent filling in of the same after they have once been opened, thus rendering available a great amount of oil and gas which has heretofore been inaccessible. I do not claim as my invention a packer only, but so far as I am aware the use of a packer in connection with a liner for an oil or gas well for the purpose stated is new and heretofore unknown in this art.

What I claim is:

1. In combination in an oil well, a casing, a liner, the upper end of the liner being spaced away from the lower end of the casing, tubing extending through the casing and into the liner, a packing member carried by said liner, and a packing member carried by the tubing and cooperating with the

effecting a fluid tight closure of the upper end of the liner and about the tubing.

2. In combination in an oil well, a casing extending a predetermined distance into the upper portion of the well, a liner in the lower portion of the well and having its upper end spaced away from the lower end of the casing, tubing extending through the casing and into the liner, a downwardly tapering seat member secured in the upper end of said liner, and a plug member fitting snugly about and secured on the tubing, said plug member fitting tightly into the seat member and supporting the tubing so as to be held seated by the weight thereof.

3. In combination in an oil well, a casing extending into the upper portion of the well, a liner in the lower portion of the well and having its upper end spaced away from the lower end of the casing, tubing extending through the casing and into the liner, a downwardly tapering substantially frusto-conical seat member secured in the upper end of said liner, and a frusto-conical plug member fitting snugly about the tubing and secured thereon, said plug member fitting snugly into said seat member and being provided with a thick covering of elastic material for effecting a fluid tight closure with the seat member and with a peripheral flange above said covering to prevent displacement or distortion thereof.

4. In packing means for oil and gas wells, a packing member adapted to fit into a seat of a cooperating packing member and comprising a substantially frusto-conical body having a peripheral flange adjacent its base, and a covering of relatively soft elastic material secured tightly about the body below the flange and in contact therewith, so as to be reinforced and secured against upward movement, by the flange.

In testimony whereof I affix my signature.

THOMAS H. GALLAGHER.