

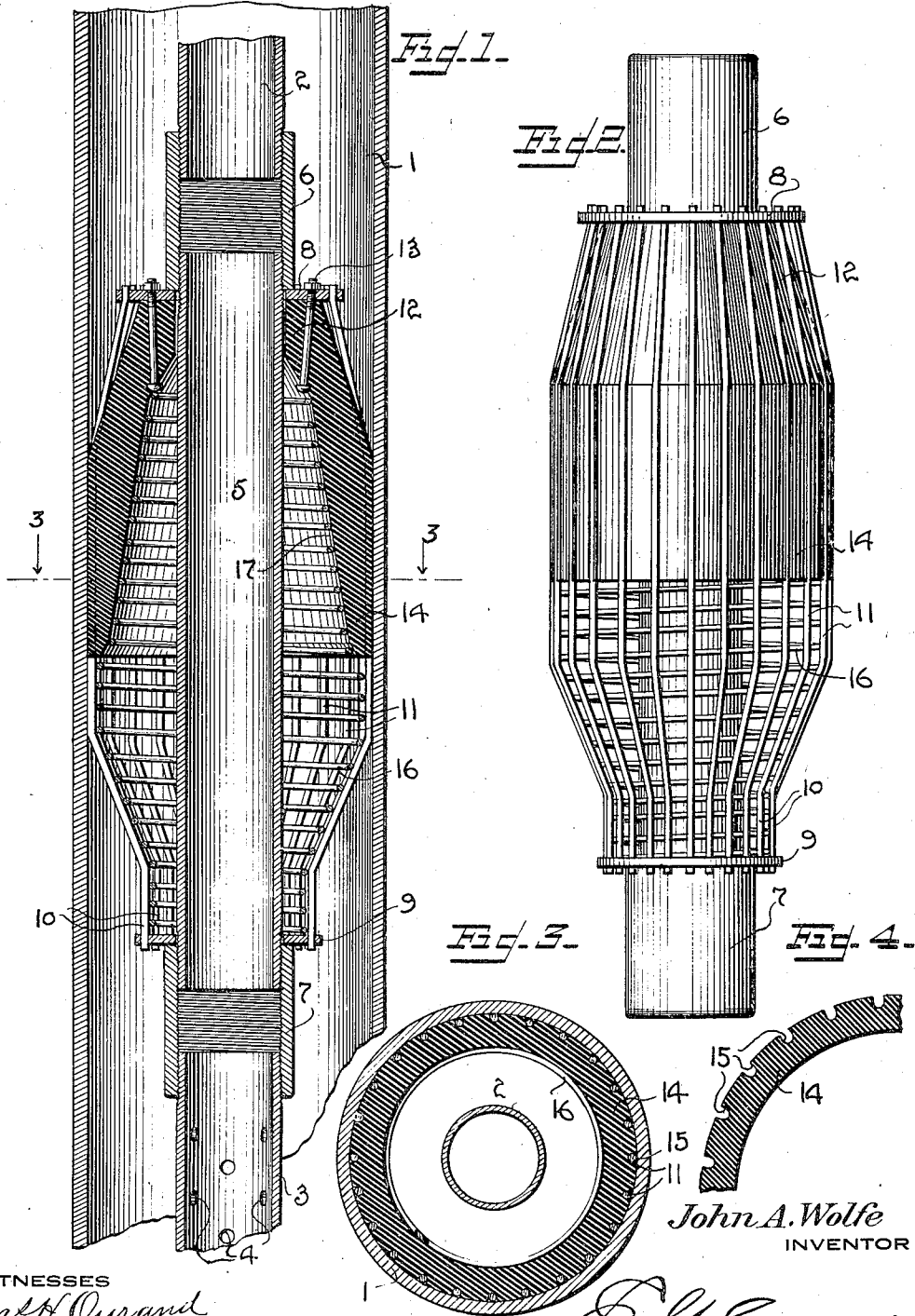
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PUMPING PACKER

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UNITED STATES PATENT OFFICE.

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PUMPING PACKER.

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To all whom it may concern:

Be it known that I, JOHN A. WOLFE, a citizen of the United States, residing at Tulsa, in the county of Tulsa and State of Oklahoma, have invented a new and useful Improvement in Pumping Packers, of which the following is a specification.

My invention relates to a pumping packer for use in deep wells, and is especially adapted for use in oil wells to prevent the escape of gas around the tubing, and to facilitate the flow of the oil through the tubing when there is not sufficient pressure to cause a flow through the casing.

One of the objects of the invention is to provide a packing device which has self-contained means for maintaining a closure at all times between the tubing and the casing without depending upon the weight of the pipe or other external means.

Another object of the invention is to provide a reinforcing means to protect that portion of the packing element which comes in contact with the casing so as to prevent the same from being torn while it is being lowered into the well or withdrawn therefrom.

A still further object of the invention is to construct a packing device of such form that the pressure of the packing element against the casing is responsive to the pressure of gas in the well and substantially in proportion to the same.

With the above and other objects in view, the invention consists in certain features of construction which will be more fully understood from the following detailed description taken in connection with the accompanying drawing.

In the drawing:—

Fig. 1 is a vertical section through the well casing, showing my invention installed therein.

Fig. 2 is a side elevation of the invention.

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal section showing a portion of the packing element with the grooves therein.

Referring more specifically to the drawing, 1 designates the casing of a well, within which is a tubing 2 having a section 3 at its lower end provided with perforations 4, through which the oil may pass into the tubing and be carried to the surface.

In carrying out my invention, I provide a section of tubing 5 of the proper length to

support the packing device, and connected to the upper and lower portions of the tubing by sleeve couplings 6 and 7. Washers 8 and 9 surround the section 5 and are held in abutting relation to the sleeves 6 and 7 by means of a plurality of rods 10, which have their ends secured in perforations in the washers and have their intermediate portions bulged outwardly as indicated at 11 to engage the wall of the casing.

A sufficient number of the rods 10 are used to form a suitable cage to receive a packing member of rubber or other pliable material, which, as shown in the drawing, is substantially of mushroom shape and has its apex 12 fitting around the upper end of the section 5 and secured to the washer 8 by means of bolts 13 or the like. The lower outer portion 14 of the packing element is adapted to engage with the inner wall of the casing, and the intermediate portions 11 of the rods 10 are fitted in the grooves 15 flush with the peripheral portion thereof, as shown in Figs. 3 and 4. Within the cage formed by the rods 10, and extending from the washer 9 upwardly within the mushroom-shaped packing member is a coiled spring 16 which is tensioned so as to press against the inner surface 17 of the lower portion 14 of the packing element and urge the same into contact with the casing.

When using my improved packer, the same may be inserted in the tubing 2 and properly adjusted before the latter is lowered into the well, and the spring 16 will cause the packer to form a tight closure between the tubing and the well at all times, and it will not be necessary to depend upon the weight of the tubing above to expand the packer, as is the case with most of the packers now in use. There is, therefore, no excessive pressure which may cause injury to the packer, and the rubber packing element will be protected by the rods 10 while the packer is being inserted into or removed from the well, thus preventing injury to the same and making it possible to use it over and over again. The tension of the spring 16 will be sufficient, under ordinary conditions, to maintain a suitable joint between the packing element and the casing, and as the gas in the well filters into the casing and the pressure thereof increases, the same will expand within the lower portion 14 of the packer element and cause a pressure against the inner surface 17, which will become

greater and greater as the pressure of the gas increases, so that the contact of the packing element against the casing will become firmer in proportion to the pressure of the gas, and the pressure of the gas which is thus confined will be exerted against the oil to force the same to the surface in a manner well known.

It will be understood that the specific features of construction which I have shown and described merely illustrate one form in which my invention may be embodied, and that various modifications may be made in the details thereof within the scope of what is claimed without departing from the spirit of the invention or sacrificing any of the advantages thereof.

What is claimed is:—

1. The combination with a well tubing, of a collar having an internal diameter sufficient to receive a section of tubing but not large enough to pass over the coupling thereof, and a flexible packer of mushroom shape secured to the collar and operable by gas pressure in the well to form a tight closure between the tubing and casing of the well.

2. The combination with a well tubing, of a collar having an internal diameter sufficient to receive a section of tubing but not large enough to pass over the coupling thereof, a flexible packer of mushroom shape, and means for securing the packer to the collar including bolts passing through the collar and the head of the packer parallel to their longitudinal axes, said packer being operable by gas pressure in the well to form a tight closure between the tubing and the casing of the well.

3. A packer for deep wells comprising a section of tubing, a packing element of mushroom shape closing the space between the tubing and well casing, rigid means for holding the upper portion of said member against the tubing, yieldable means normally urging the lower portion of said member against the casing, and a metallic cage surrounding the packing element for preventing injury thereto when moving it into or out of the casing.

4. A packer for deep wells comprising a section of tubing, a packing element of pliable material closing the space between the tubing and well casing, yieldable means normally urging said member against the casing, and a metallic cage surrounding said element and fitted flush with the peripheral portion thereof for preventing injury thereto when moving it into or out of the casing.

5. A packer for deep wells comprising a section of tubing, a packing element closing the space between the tubing and well casing, rigid means for holding the upper portion of said element against the tubing, yieldable means normally urging said element against the casing, and a metallic cage

surrounding said element and fitted in grooves provided in the peripheral portion thereof for preventing injury thereto when moving it into or out of the casing.

6. The combination with a well tubing, of a collar having an internal diameter sufficient to receive a section of tubing but not large enough to pass over the coupling thereof, a flexible packer of mushroom shape secured to the collar with its open end directed toward the bottom of the well, said packer being operable by gas pressure in the well to form a tight closure between the tubing and casing of the well, and a cage surrounding the packing element for preventing injury thereto when moving it into or out of the casing.

7. A packer for deep wells comprising a section of tubing, a packing element closing the space between the tubing and well casing, and having an inner surface, yieldable means engaging said inner surface to urge the outer peripheral surface into engagement with the casing, said inner surface being in communication with the gas in the well and operable by the pressure thereof to exert further pressure of the peripheral portion of the packing element against the casing, and a metallic cage surrounding the packing element and fitted flush with the peripheral portion thereof for preventing injury to the same when being moved into or out of the casing.

8. A packer for deep wells comprising a section of tubing, a packing element adapted to close the space between the tubing and well casing, rigid means for holding the upper portion of said member against the tubing, the lower portion of said element extending downwardly and spaced from the tubing, yieldable means normally urging said lower portion against the casing, the inner surface of said lower portion being in contact with the gas in the well and operable by the pressure thereof to urge said lower portion more firmly into contact with the casing, and a metallic cage surrounding the packing element and having its intermediate portion fitted in grooves of the peripheral portion of the packing element and flush with the surface thereof for preventing injury to the same when it is moved into or out of the casing.

9. In a packing device for deep wells, the combination with a section of tubing and the adjacent coupling sleeves, of a pair of washers surrounding the section of tubing and abutting the sleeves, rods connecting the washers and having their intermediate portions outwardly bulged to engage the walls of the well casing, a packing member, and rigid means for securing the packing member to one of the washers, said packing member having the bulged portion of the rods

embedded therein and flush with the peripheral portion thereof.

10 In a packing device for deep wells, the combination with a section of tubing and the adjacent coupling sleeves, of a pair of washers surrounding the section of tubing and abutting the sleeves, rods connecting the washers and having their intermediate portions outwardly bulged to engage the walls
15 of the well casing, a packing member of mushroom shape having its apex secured to one of the washers and forming a tight joint with the tubing, the lower portion of the packing member having the bulged portion
20 of the rods embedded therein and flush with the outer surface thereof.

11. In a packing device for deep wells, the combination with a section of tubing and the adjacent coupling sleeves, of a pliable packing element, means for securing the inner
20 portion of the element to form a tight joint with the tubing, resilient means normally urging the outer portion of the packing element into contact with the well casing, and

reinforcing means embedded in the packing element and flush with the peripheral surface thereof to protect the same when being moved into or out of the casing. 25

12. In a packing device for deep wells, the combination with a section of tubing and the adjacent coupling sleeves, of a pliable packing element, means for securing the inner portion of the element to form a tight joint with the tubing, resilient means normally urging the outer portion of the packing element into contact with the well casing, and reinforcing means embedded in the packing element and flush with the peripheral surface thereof to protect the same when being moved into or out of the casing, said packing
30 element having an interior surface in contact with the gas in the well, whereby pressure of the latter urges the packing element into firmer contact with the casing. 35

In testimony, that I claim the foregoing
40 as my own, I have hereto affixed my signature. 45

JOHN A. WOLFE.