P. H. MACK.

DISK AND SCREW PACKER.

APPLICATION FILED NOV. 28, 1919.

1,436,274. Patented Nov. 21, 1922.

Fig. 1.

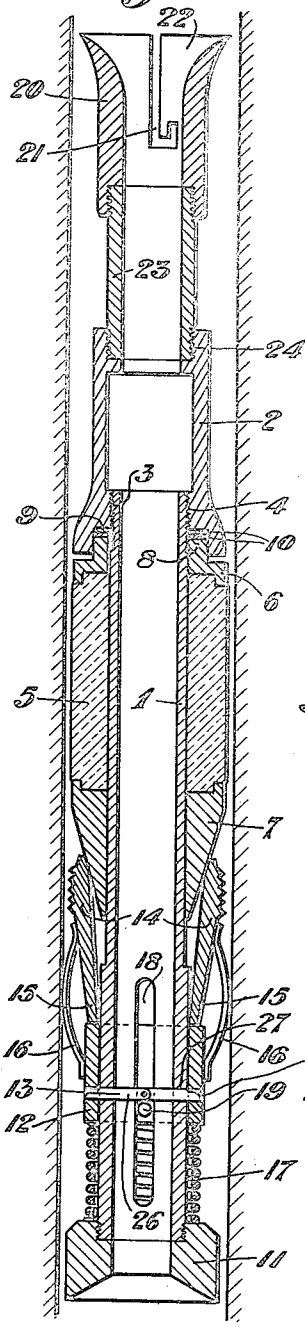


Fig. 2.

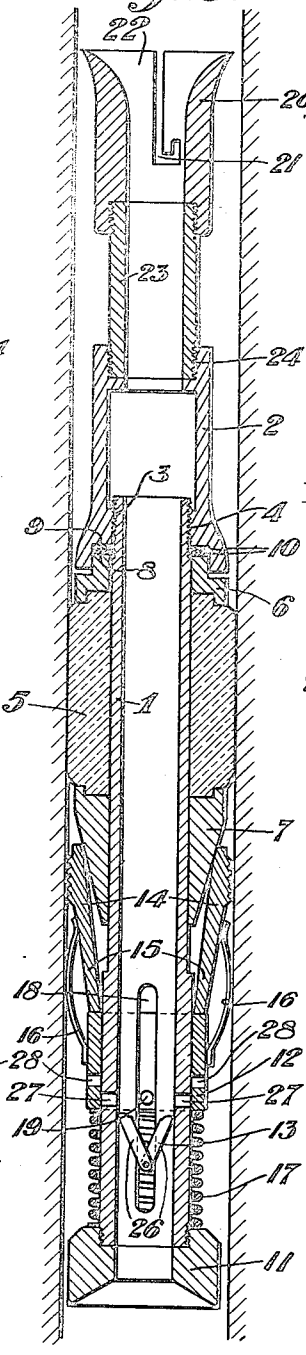


Fig. 3.

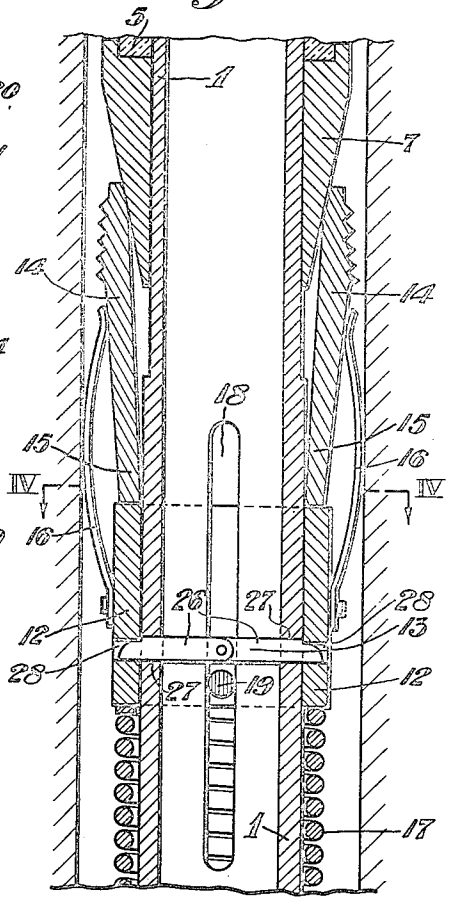
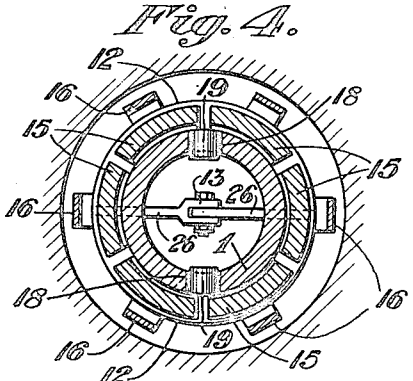


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

PATRICK H. MACK, OF BRADFORD, PENNSYLVANIA, ASSIGNOR TO OIL WELL SUPPLY COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DISK AND SCREW PACKER.

Application filed November 28, 1919. Serial No. 341,174.

To all whom it may concern:

Be it known that I, PATRICK H. MACK, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Disk and Screw Packers, of which the following is a specification.

This invention relates to improvements in well packers, and particularly to an improved packer structure combining what is known commercially as a disk wall packer with threaded or screw means for setting and maintaining the packer in the desired position.

As is well known to those skilled in the art, disk wall and hook wall packers are lowered into position in the well, set, and maintained in operative contact with the wall of the well, by means of a string of casing or tubing, the weight of the superimposed casing or tubing being employed to compress and expand the packing element or elements into contact with the wall of the well. Under the above practice, it will be understood that it is necessary to retain the casing or tubing in the well in order to keep the packing in operative engagement with the wall of the well.

One of the objects of my invention is to provide a simple and efficient packer of the class mentioned designed to be set and maintained in operative engagement by means other than the casing, tubing, or other superimposed weight. By the employment of my invention, the tubing or casing may be removed from the well without affecting the packer structure, or the tubing may remain in the well, as heretofore.

Further objects of the invention are, to provide simple and positively acting means for setting the packer; to provide a combined disk and screw packer; and a new combination and arrangement of parts whereby the packer may be readily set at any desired level in the well.

In the accompanying drawings which illustrate an application of my invention,

Fig. 1 is a central longitudinal sectional view of a packer embodying my invention, showing the position of the parts of the packer and its relation to the wall of the well before the packer is set;

Fig. 2, a similar view showing the positions of the co-acting parts after the packer is set;

Fig. 3, an enlarged detail sectional view of the anchor device and co-acting means; and

Fig. 4, a horizontal section taken on line IV—IV of Fig. 3.

Referring to the drawings, 1 designates a hollow or tubular member constituting the body of the packer; and 2 a cap portion or upper end member of the packer proper. As illustrated and as preferred, the body 1 is threaded at its upper end, as indicated at 3, and is adapted to have its upper end entered in an internally threaded portion 4 of the cap or upper member 2. Surrounding the packer body 1 is a hollow cylinder or annulus 5 made of compressible and expansible material.

Compressible member 5, at its upper end, is in contact with a slidable collar 6, and its lower end is disposed in contact with an annular abutment 7 which is preferably slidable on the lower portion of the body. Member 7 is preferably in the form of a hollow cone, thereby providing a cross section of wedge form adapted to co-act with an anchor structure hereinafter described. Collar 6 is provided with an annular portion 8 adapted to be entered in a recess 9 formed in the cap member 2, and interposed between the upper end of portion 8 and the upper wall of the recess 9, I provide anti-friction bearing members 10. Secured to the lower end of the body 1 is a shoe or other suitable member 11, and 12 designates a telescoping member or sleeve embracing the body 1 and detachably secured thereto by a disk structure 13. The cap or upper end member and the member 11 constitute opposing end members of the packer structure.

On the body member 1, immediately below the abutment 7, anchor means for securing the packer in the desired position in the well are employed. As illustrated and as preferred, these means include a telescoping member, cage or sleeve 12 and slips 14, the latter being movably connected with the member 12 by means of arms 15. Slips 14 are normally held out of engagement with the walls of the well by springs 16, the latter having their lower ends rigidly connected with the cage 12 and their upper ends free and adapted to bear upon the arms 15

of the slips. The function of springs 16, in addition to maintaining the slips out of engagement with the walls of the well, is to prevent the member 12 and the packer structure proper from being rotated in the well.

Surrounding the lower end of the body 1 and disposed between the shoe 11 and the lower end of member 12 is a coiled spring 17; this spring is adapted to exert an upward pressure upon member 12. For the purpose of preventing a rotative movement between the body 1 and the cage or member 12, I form a slot 18 in the body and provide the cage 12 with a projecting element 19 adapted to be entered in said slot 18.

The packer structure, as illustrated and as preferred, is designed to be lowered into the well and to be set by a string of casing or tubing. In practice, a letting-in tool, not shown, is attached to the lower section of the casing. This letting-in tool is adapted to be connected with the packer structure by means of a coupling member, or what is known in the trade as an adapter 20. Member 20, as shown, is provided with a bayonet like slot 21, and its bore 22 at it supper end is tapered outwardly to allow for the easy entrance into and through the packer of the tubing or casing, and also to accommodate the letting-in tool. This member 20, at its lower end, is internally threaded and is adapted to receive a coupling member 23 designed to connect the lower end of member 20 with the upper end of cap 2, the cap for this purpose being provided with an internally threaded portion 24.

The disk structure 13 has arms 26 designed to be entered in openings 27 and 28 respectively formed in the body and the member 12. It will be understood that the function of the disk is to connect the body and member 12 and prevent a relative longitudinal movement between the body and said member until the anchor mechanism is lowered into the desired point within the well. When the packer is lowered into the desired position in the well, a weight is dropped down through the tubing or casing, and in its travel strikes the disk, thus breaking the connection between the member 12 and the body and allowing spring 17 to force the member 12 upwardly on the body member.

In lowering and setting the packer in the well, a letting-in tool is attached to the lower section of the tubing and said tool in turn connected with member 20. The tubing and packer, etc., are then lowered until the packer reaches the desired position, when a weight is dropped through the tubing to set the anchor mechanism, as above described. A rotative movement is then imparted to member 20 and to cap 2, compressing and expanding packing 5 and forcing the abutment downwardly and behind the slips. It will thus be noted that the packer is set by a threading action and not by the weight of the tubing. After the packer is set, the letting-in tool is disconnected and said tool, together with the tubing, withdrawn from the well.

What I claim is:

1. In a well packer, a body member having a threaded upper portion, a telescoping slip carrying member, means for positively preventing relative rotation between the slip carrying member and the body member, a packing member, and a threaded upper member cooperating with the threaded portion of the body to effect an expansion of the packing member.

2. In a well packer, a body member having a threaded upper portion, a telescoping slip carrying member mounted on the body, slips, means on the slip carrying member for preventing it from rotating in the well when in position, means for positively preventing relative rotation between the slip carrying member and the body member, a packing member mounted on the body, and a threaded upper member cooperating with the said threaded portion of the body to effect an expansion of the packing.

3. In a well packer, a one-piece body member, an anchor structure movable longitudinally on the body, means for fixing the anchor with relation to the body and releasing it therefrom while in the well, means for positively preventing relative rotation between the anchor means and the body member, a packing member mounted on the body, and threaded elements cooperating with the body to effect an expansion of the packing.

4. In a combined disk and screw packer, the combination with a body member, an upper threaded member to which the body member is connected, an annular abutment slidable on said body member, a lower telescoping member below the annular abutment, slips carried by the telescoping member and engaging the annular abutment and arranged to be expanded thereby, a disk structure for fixing the telescoping member with relation to the body and for releasing it therefrom while in the well, a packing member on the body extending between the upper threaded member and the annular abutment and adapted to be compressed and expanded by a threading movement of said upper threaded member on the body member, said packing member serving also to urge the annular abutment downwardly when being compressed to thereby force the slips into tighter engagement with the sides of the well.

5. A combined disk and screw packer including a body member, having an upper threaded portion, an upper threaded member to which the body is connected, a lower

telescoping member, slips carried by the telescoping member, springs on the telescoping member engaging said slips and adapted to hold said telescoping member against rotation by engagement with the sides of the well, means for preventing relative rotative movement between the telescoping member and the body, a disk structure for fixing the telescoping member with relation to the body and releasing it therefrom while in the well, a spring surrounding the body and exerting pressure against the telescoping member, a packing member mounted on the body and adapted to be compressed and expanded by a threading movement of said upper threaded member on the upper threaded portion of the body.

6. A well packer comprising a body member formed of a single piece of tube having slots in the lower end thereof, a slip carrying member mounted on the lower portion of said body and having pins engaging in said slots to prevent rotative movement of the slip carrying member on said body, slips carried by the slip carrying member, means for expanding the slips upon longitudinal movement of the slip carrying member, means for effecting a longitudinal movement of the slip carrying member, a packer on said body member, and threaded means at the other end of said body member for compressing the packing.

7. A well packer comprising a body member formed of a single piece of tube having slots in the lower end thereof, a slip carrying member mounted on the lower portion of said body having pins therein engaging in said slots to prevent rotative movement of the slip carrying member on said body, slips carried by the slip carrying member, means for expanding the slips upon longitudinal movement of the slip carrying member, springs on the slip carrying member engaging said slips and adapted to engage the walls of the well to hold said slip carrying member from rotation when said slips have been expanded, means for effecting the longitudinal movement of the slip carrying member, a packer on said body member, and threaded means at the other end of said body member for compressing the packing.

8. In a well packer, a body member having a threaded upper portion, a telescoping slip carrying member mounted on the body, means on the slip carrying member for positively preventing relative rotative movement between the slip carrying member and the body member, slips, a packing member mounted on the body, a threaded upper member cooperating with said threaded portion of the body to effect an expansion of the packing, a coupling member threaded to said threaded upper member, and an adapter threaded to said coupling member.

In testimony whereof I affix my signature in presence of two witnesses.

PATRICK H. MACK.

Witnesses:
RALPH WHEELER,
W. E. BURDICK.