Mar. 27, 1923.

1,449,674.

A. G. HEGGEM.

WELL CLEANING SWAB.

FILED FEB. 13, 1922.

Fig. 1.

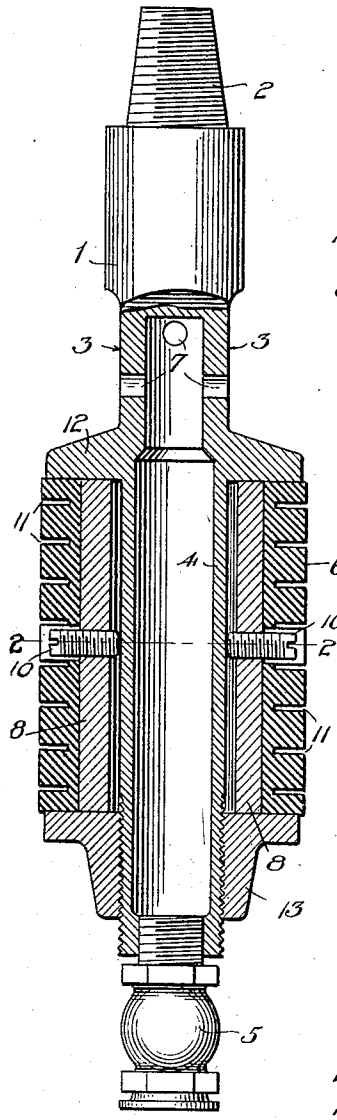


Fig. 2.

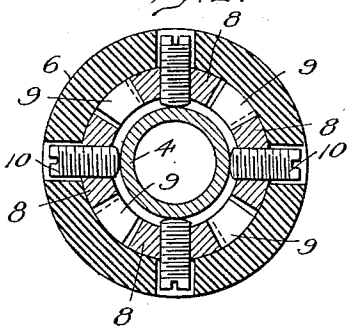


Fig. 3.

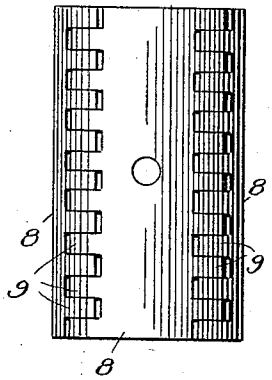


Fig. 4.

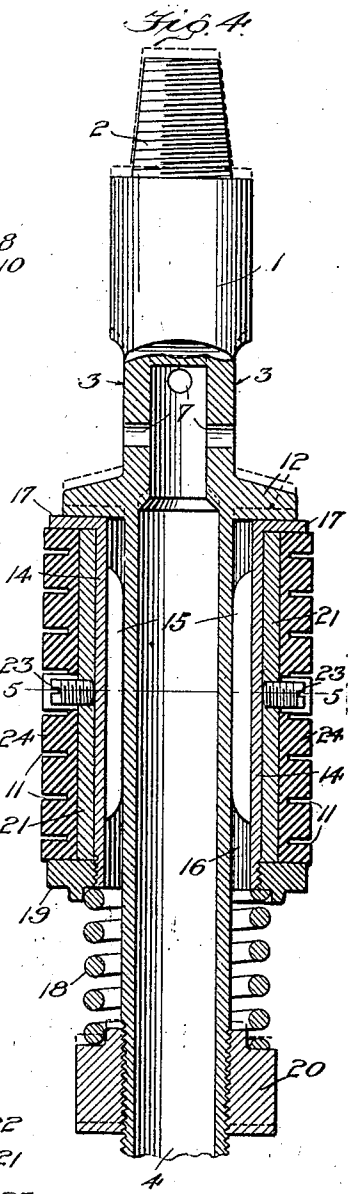
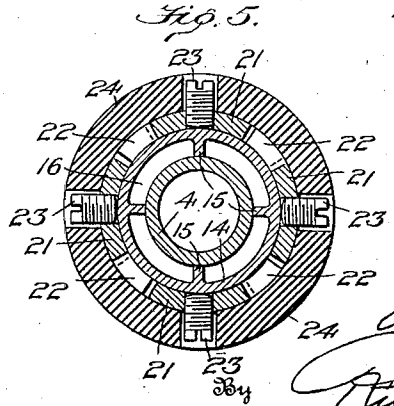


Fig. 5.



Witness

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UNITED STATES PATENT OFFICE.

ALFRED G. HEGGEM, OF TULSA, OKLAHOMA.

WELL-CLEANING SWAB.

Application filed February 13, 1922. Serial No. 536,321.

To all whom it may concern:

Be it known that I, ALFRED G. HEGGEM, a citizen of the United States, residing at Tulsa, in the county of Tulsa and State of Oklahoma, have invented certain new and useful Improvements in Well-Cleaning Swabs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the construction of well cleaning swabs for withdrawing oil or water from a well. The primary object of the invention is to provide a swab which will be efficient in operation and will give long service without requiring renewal of the elastic packing member that comes in contact with the well casing from which the fluid is to be withdrawn.

Stated generally, the principal feature of the invention consists in constructing a well cleaning swab with a body provided with means affording a passage for fluid in the well when the swab is being lowered therein and in supporting upon said body an annular elastic packing which is adapted to be expanded radially by means movably mounted on said body and movable radially with respect to the packing.

Another feature of the invention consists in constructing a well cleaning swab with a body affording a passage for fluid in the well when the swab is being lowered therein, and combining the same with an annular elastic packing which encircles a plurality of intermeshing segmental followers adapted to be moved radially with respect to the packing so as to expand the latter.

A further feature of the invention consists in forming a well cleaning swab with a body portion affording a passage for fluid in the well when the swab is being lowered therein and in mounting thereon an annular elastic packing adapted to move longitudinally with respect thereto, means being provided for permitting the fluid in the well to pass from the upper side to the lower side of the swab when the annular packing moves longitudinally in one direction with respect to the body.

Other features of the invention, residing in details of construction and in special relations of parts, will hereinafter appear.

In the drawings illustrating the invention, the scope whereof is pointed out in the claims,—

Figure 1 is a view, partly in elevation and partly in vertical section, of a swab embodying the invention.

Figure 2 is a section on the line 2—2, Fig. 1.

Figure 3 is a detail view showing the assembled relation of the intermeshing segmental followers by which the annular elastic packing is expanded.

Figure 4 is a view corresponding to Fig. 1, but illustrating a modified form of the invention.

Figure 5 is a sectional view on the line 5—5, Fig. 4.

The body 1 of the swab is preferably provided at its upper end with the usual tapered threaded pin 2 whereby the swab may be connected to means for lowering it into and withdrawing it from the well, and it may also be provided with the customary wrench seats 3. The lower portion of the swab body is formed as a tubular member 4 which, as shown, may if desired be integrally united to the upper portion of the body 1. Mounted on the lower end of the swab body is the usual check valve 5 through which the fluid of the well is permitted to enter the tube or conduit 4 when the swab is being lowered in the well. The oil or water thus passing the check valve 5 is allowed to pass to the exterior of the swab above the annular elastic packing 6 through outlets 7 in the swab body.

Encircling the tubular portion 4 is a plurality of segmental followers 8, preferably four in number, whose edges may advantageously be provided with a series of spaced lugs or projections 9 adapted to have meshing or overlapping engagement when the parts are in assembled position. These followers may be moved radially to effect an expansion of the annular packing 6 by means of radially extending adjusting screws 10 whose outer ends project into openings in the packing through which they may be manipulated to cause the desired movement of their respective followers. These screws 10 have threaded engagement with the corresponding followers 8 and their inner ends bear against the tubular member 4 of the swab. The outer ends of the adjusting screws terminate, as shown,

somewhat inwardly of the external periphery of the annular packing memebr 6, thus allowing for suitable compression of the latter against the interior of the well casing.

The annular elastic packing 6 which encircles the followers 8 may be made of rubber, as usual, and preferably is provided on its exterior with a series of circular grooves 11 extending circumferentially of the packing. To prevent relative movement of the packing 6 and followers 8 the swab body may conveniently be formed with an integral flange 12 and with a detachable flange member or collar 13 preferably threaded upon the lower end of the tubular member 4. Between these flanges or collars 12 and 13 the followers and the elastic packing member are confined against movement longitudinally of the swab.

In the modified form of the invention illustrated in Figs. 4 and 5 the annular elastic packing 6 is mounted upon the body 1 of the swab with capability of moving longitudinally with respect thereto. The purpose of this relative movement of the swab body and annular packing is to permit fluid in the well to pass from the upper side of the swab to the lower side thereof so as automatically to relieve the device of a greater load or column of well fluid than can be withdrawn from the well. In this form of the invention the tubular portion 4 of the swab is encircled by a sleeve 14 having interior webs or flanges 15 which, by engaging the tube 4, act to center the sleeve and also to afford a passage or channel 16 between these two parts through which the fluid in the well may pass. At its upper end the sleeve is formed with an annular flange 17 adapted to contact the under surface of the annular flange 12 with which the body of the swab is furnished, thus affording a valve or closure controlling the passage of the well fluid through the channel 16. The sleeve 14 is normally maintained in a position for closing the passage 16 by means of a spring 18 which presses upwardly against a collar or flange 19 threaded upon the lower end of the sleeve, the lower end of said spring being preferably supported upon a collar 20 having threaded engagement with the exterior of the tubular member 4 above the usual check valve (not shown). It will be understood that by manipulating the collar or nut 20 the tension of the spring 18 may be adjusted to press the sleeve 14 upwardly with the desired force.

Encircling the yieldingly supported sleeve 14 and located between the flanges 17 and 19 thereof are a plurality of segmental followers 21 which preferably are provided with intermeshing lugs 22, the said followers corresponding in form and function to the followers 8 heretofore described and being adapted to be moved radially by means of adjusting screws 23 having threaded engagement with the respective followers and bearing at their inner ends against the sleeve 14. The outer ends of the adjusting screws 23, as is the case with the similar adjusting screws 10, project into openings in the elastic packing member 24 making them accessible from the outside of the packing.

The annular packing 24 which encircles the radially movable followers 21 and which is mounted upon the sleeve 14 so as to be movable therewith, is preferably provided on its exterior with a series of circumferential grooves 11 like those formed in the packing 6 heretofore described. It will be observed that the provision of the grooves 11 in the exterior of the annular packing enables the latter to cooperate most efficiently with the interior of the well casing, while at the same time permitting the packing to yield so as to relieve it of undue wear.

In well cleaning swabs commonly in use, the packing sleeve or rubber is expanded by forcing the ends of the packing toward each other in the direction of length of the swab. In this type of swab the ends of the packing adjacent the collars between which it is confined are subject to rapid wear and a new packing, which is expensive, must be substituted after comparatively little use if a high degree of efficiency of operation is to be maintained. But by my invention the annular elastic packing is so supported and adjusted that a very large proportion of it may be worn away before a replacement is necessary, and throughout its life it forms an effective packing contact with the well casing.

The extent of the column of fluid which can be lifted by the form of swab illustrated in Figs. 4 and 5 is controlled by the initial compression imparted to the spring 18 when the device is assembled. In this construction if the column of fluid sought to be lifted is heavier than that for which the swab is adjusted the upward pull upon the swab body 1 produces a compression of the spring 18 permitting the annular flange 12 of the body to move away from the flange 17 at the upper end of the slidable sleeve 14 by which the packing 21 is carried. This movement of the valve body 1 with respect to the sleeve 14, as indicated in dotted lines in Fig. 4, places the upper end of the channel or passage 16 in open communication with the interior of the well casing above the packing member 21, thus allowing oil or water which is above the swab to pass from the upper side to the lower side thereof. The swab is thereby unloaded until the weight of the column of oil or water to be lifted has been decreased sufficiently to enable the spring 18 to force the sleeve 14 into engagement

with the flange 12 of the swab body, thus closing the channel 16 against further passage of the fluid. It will be perceived that the unloading accomplished by this form of the device is rapidly effected and the construction is such that no clogging is apt to occur.

I claim:—

1. A well cleaning swab comprising an annular elastic packing, a tubular member encircled by said packing, and means movable radially with respect to said packing for expanding the latter.

2. A well cleaning swab comprising an elastic packing having an aperture therethrough, a tubular member projecting into said aperture, and means extending into said aperture between said tubular member and said packing for expanding said packing, said means being movable transversely with respect to said tubular member.

3. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing supported by said body and adapted to engage the casing of the well, and means movably mounted on said body and movable radially with respect to said packing for expanding the latter.

4. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing supported by said body and adapted to engage the casing of the well, and a plurality of segmental followers engaging said packing and adapted to expand the same, said followers being encircled by said packing and being movable radially with respect to said packing.

5. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing supported by said body and adapted to engage the casing of the well, and a plurality of followers adapted to expand said packing, said followers being provided with intermeshing lugs.

6. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing supported by said body and adapted to engage the casing of the well, a plurality of segmental followers movable radially with respect to said packing and adapted to expand the same, and means accessible from the exterior of said packing for moving said followers radially.

7. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing supported by said body and adapted to engage the casing of the well, a plurality of followers encircled by said packing and adapted to expand the same, and adjusting screws respectively adapted to actuate said followers.

8. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, and an annular elastic packing supported by said body and adapted to engage the casing of the well, said packing being provided on its exterior with a series of circumferentially extending grooves.

9. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing and means for yieldingly supporting said packing on said body so as to permit it to slide longitudinally with respect to said body, said last named means constituting a valve device controlling the passage of the fluid in the well from the upper side to the lower side of said swab.

10. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing yieldingly supported by said body and adapted to move longitudinally with respect thereto, and means for permitting the fluid in the well to pass from the upper side of the swab to the lower side thereof when said annular packing moves longitudinally in one direction with respect to said body.

11. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with means affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing supported by said body and adapted to engage the casing of the well, a spring operatively interposed between said packing and said body, and means for permitting fluid in the well to pass from the up-

per side of the swab to the lower side thereof when said spring is energized by movement of said packing with respect to said body.

12. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with a tubular member affording a passage for fluid in the well when the swab is being lowered therein, an annular elastic packing encircling said tubular member, a plurality of followers adapted to expand said packing, said followers being interposed between said tubular member and said packing and being adapted to move radially with respect to the latter, and means for preventing relative movement of said followers and packing longitudinally of the latter.

13. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with a tubular member affording a passage for fluid in the well when the swab is being lowered therein, a sleeve slidably mounted on said tubular member, said sleeve and said tubular member affording a passage for the fluid in the well, an annular elastic packing encircling said sleeve, means for maintaining said packing upon said sleeve, a spring operatively interposed between said sleeve and said tubular member, a plurality of followers interposed between said sleeve and said packing and encircled by the latter, and means for moving said followers radially with respect to said packing for expanding the latter, said body having a flange adapted to be engaged by said sleeve to close the passage between said sleeve and said tubular member against the passage of the fluid in the well.

14. A well cleaning swab comprising a body adapted to be connected to means for lowering it into and withdrawing it from a well and being provided with a tubular member affording a passage for the fluid in the well when the swab is being lowered therein, a check valve controlling the passage of the fluid through said tubular member, an annular elastic packing encircling said tubular member and adapted to engage the casing of the well, and a plurality of followers adapted to expand said packing, said followers being interposed between said packing and said tubular member and being movable radially with respect to said packing.

In testimony whereof I affix my signature.

ALFRED G. HEGGEM.