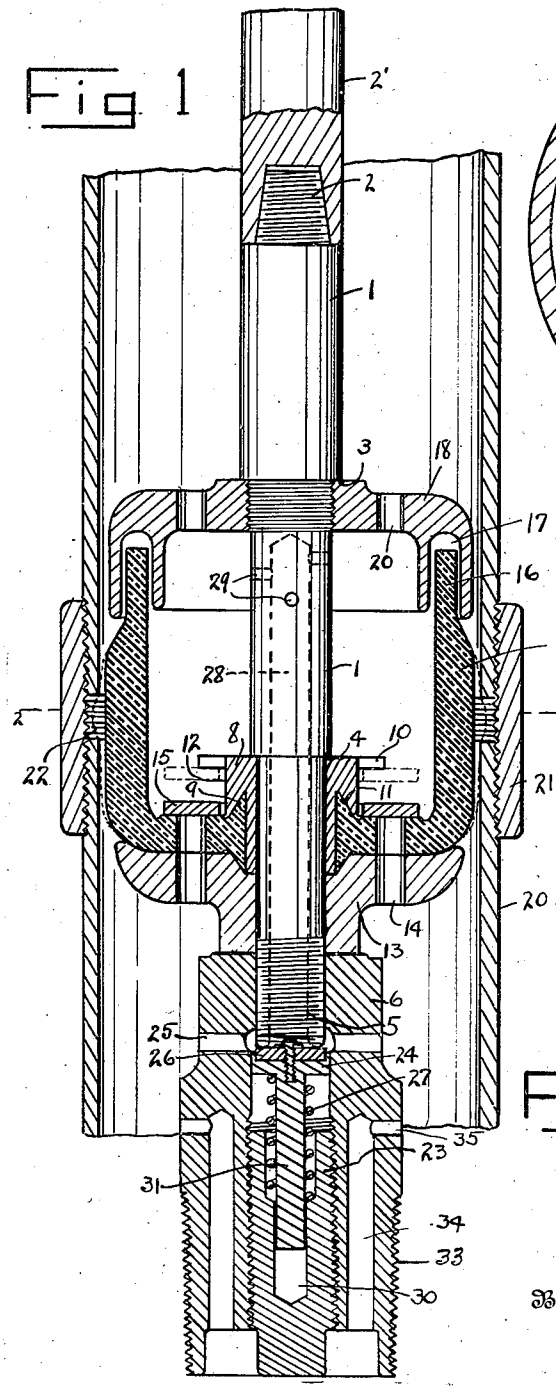
May 3, 1927. 1,626,614

E. KIBELE

WELL SWAB

Filed Aug. 2, 1926

Fig. 1



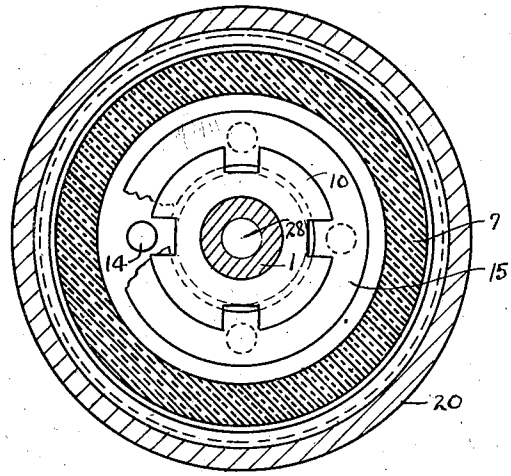


Fig. 2.

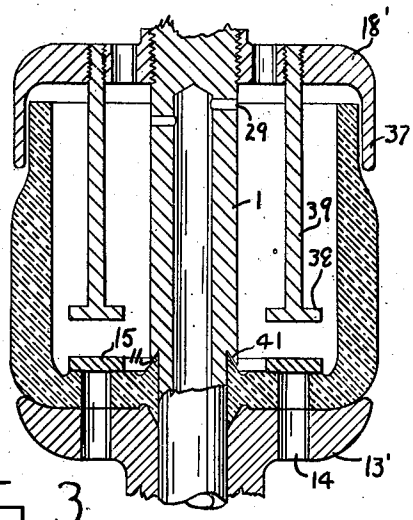


Fig 3

Eugene Kibele Inventor

By Jesse R. Stone

Attorney

Patented May 3, 1927. 1,626,614

UNITED STATES PATENT OFFICE.

EUGENE KIBELE, OF SAN ANTONIO, TEXAS.

WELL SWAB.

Application filed August 2, 1926. Serial No. 126,441.

My invention relates to swabs for use in raising liquid from deep wells.

It is an object of the invention to provide a swab which may be easily introduced into a well which is to be cleared of liquid, and which will not be liable to become stuck in the well when in use.

It is desired to protect the expanding member so that it cannot be injured by contact with the joints in the pipe or by other irregularities in the well casing, and also to provide a release valve to guard against overload on the swab.

It is also desired to produce a swab for use particularly in oil field operations which is simple and economical in construction, and strong in its make-up, so that the devices may be supplied to the trade at a price within the means of the producer.

Referring to the drawing herewith, Fig. 1 is a central longitudinal section through a swab embodying my invention, the tool being shown in position within a well casing. Fig. 2 is a transverse section on the plane 2—2 of Fig. 1. Fig. 3 is a broken vertical section of a slightly different form of swab.

The swab is adapted to be lowered into the liquid within a well at the end of a rod or pipe. It is mounted upon a mandrel 1, the upper end of which is threaded at 2 for connection to the rod or pipe 2′, by means of which it is manipulated. The mandrel may be reduced in diameter from the upper end to the lower end in two stages, thus forming two shoulders 3 and 4. The lower end 5 is threaded to receive a nut 6 forming a guard for the lower end of the swab and also to house a valve chamber, as will be described.

The body of the swab comprises a cup 7 of rubber, or other composition of flexible wear-resisting material, having a central opening in the bottom thereof to fit about the clamping ring 8. The thickness of the wall of the cup 7 is increased or widened adjacent the ring 8, as shown at 9, and the ring, which is slidable on said mandrel, is formed to fit the cup. The upper end of the ring has radial stop fingers 10 and it has an under-cut shoulder 11 to receive the widened edge of the cup. The lower end of the clamping ring is cylindrical at 12.

A clamping plate 13 is shaped to fit below said cup and clamp it to the ring 8, which in turn bears against the shoulder 4. The plate 13 is saucer-shaped and fits against the lower end of the ring 8 and the widened wall of the cup. It has a central downwardly extending hub against which the nut 6 engages, thus clamping the plate, cup and ring together.

The cup 7 and the plate 13 have registering openings 14 therein to allow the passage of fluid upwardly when the device is lowered into the liquid in the well. A ring valve 15 lying in the bottom of the cup, and below the fingers 10 of the clamping ring, covers said openings when the cup is elevated.

The side walls of the cup 7 are thick and strong and the upper end is reduced slightly in outer diameter at 16 so that the edge of the cup may project into the groove or recess 17 within the supporting plate 18 which is screwed upon the mandrel against the shoulder 3 thereon. Said plate 18 has an annular row of openings 20 therein to allow the passage of liquid, and its outer margin is turned down to form a support for the upper edge 16 of the cup 7, as described. It is to be understood, however, that the inner wall of the groove 17 is not necessary.

To provide against an overload upon the swab, I employ a spring tension release valve below the plate 13. The mandrel 1 is provided with a bore 28 extending upwardly from the lower end thereof to a point within the cup 7 where lateral openings 29 are provided into the space within the cup.

The nut 6 constitutes a housing for a valve 24. Said nut has a central chamber therein to house the valve, said chamber being closed at its lower end by a plug 23. The upper end of said plug is recessed at 30 to receive the valve stem.

The valve 24 has a compressible rubber washer 26 to fit against the lower end of the mandrel 1 which forms a seat therefor. A stem 31 extends downwardly from the valve within the recess 30 of the plug. A tension spring 27 about the valve stem bears at its upper end against the valve and tends to hold it seated with a predetermined force. The walls of the valve chamber have lateral outlet openings 25 connecting with said chamber to allow the fluid to escape when the valve is opened by an overload of fluid.

I have shown my swab as adapted to be used with a bailer, if desired, and for this purpose, the lower end of the nut or housing is threaded at 33 to provide attachment for the bailer. Also there are channels 34 ex-

tended upwardly in the body of the housing connecting with lateral vents 35, thus providing a vent when the bailer is attached.

The device is adapted to be used within a well casing shown at 20. Such casing is commonly made up of pipe sections joined together at their ends by pipe couplings or collars 21. A short space 22 is normally left between the meeting ends of the sections of the casing into which the swab rubber may expand and thus be caught and torn.

The exact details of the swab construction are not necessarily to be adhered to. In Fig. 3 I have shown a modified form in which the mandrel 1 is formed so as to do away with a ring 8. Its lower shoulder 4′ is undercut to receive the central ring 9 of the cup. The clamping plate 13′ is formed to fit about the lower side of the cup 7 which bears firmly against the mandrel.

Also the upper supporting plate 18′ may have only an outer flange 37 against which the upper rim of the cup rests. Stop members 38 are formed at the lower ends of rods 39 screwed into openings in the cap 18′ and projecting into the cup a suitable distance to engage and stop the valve 15 on its upward movement.

In the operation of my device, the swab is assembled as shown in the drawing and inserted down into the well and into the liquid a sufficient depth to include above it the desired load of fluid to be lifted. In thus forcing the swab through the liquid, said liquid will pass upwardly through the openings 14 raising the valve 15 against the fingers 10 or the stops 38 and allowing the liquid to pass out through the openings 20 to the space above the swab. There will be a material portion of the liquid pass up outside the cup also as the walls of the cup may contract slightly.

On the upward lift of the swab the valve 15 will close and the load of fluid will expand the walls of the cup tightly against the inner wall of the casing. The plate 18 protects the upper edge of the cup and holds it from being doubled back also. The outer face of the cup will engage along the pipe joints so as to prevent leakage, but the upper edge cannot be mutilated due to my construction. The action will, therefore, be a positive one and the cup will be protected against catching on the walls or mutilation from projections in the casing.

If an overload is taken on by the swab, it is to be understood that the tension to which the spring 27 is set will be exceeded and the valve will open to release a portion of the liquid until the spring will again seat the valve.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A swab comprising a mandrel, a saucer-shaped plate thereon, a cup of flexible material on said plate, the side walls of said cup being parallel with said mandrel, a guard plate above said cup, said guard plate having a downwardly opening annular groove including the upper edge of said cup, and means to allow liquid to pass upwardly through said cup.

2. A swab comprising a mandrel, a saucer-shaped plate thereon, a cup of flexible material on said plate, a stationary guard plate above said cup, said guard plate having a downwardly opening annular groove including the upper edge of said cup, and means to allow liquid to pass upwardly through said cup.

3. A swab comprising a mandrel, a cup made up of flexible material thereon, a clamping ring above said cup, a supporting plate below said cup, means to clamp said plate and cup against said ring, said cup and plate having fluid openings therein, a valve plate in said cup normally closing said openings, and means on said ring to limit the upward movement of said valve.

4. A swab comprising a mandrel, a cup made up of flexible material thereon, a clamping ring above said cup, a supporting plate below said cup, means to clamp said plate and cup against said ring, said cup and plate having fluid openings therein, a valve plate in said cup normally closing said openings, means on said ring to limit the upward movement of said valve, and a rigid guard plate protecting the upper end of said cup.

5. A swab comprising a mandrel having a fluid passage therethrough, a cup made up of flexible material thereon, a clamping ring above said cup, a supporting plate below said cup, means to clamp said plate and cup against said ring, said cup and plate having fluid openings, said cup having its side walls approximately cylindrical, and a rigid plate fixed on said mandrel protecting the upper edge of said cup.

6. In a swab, a mandrel, a cup of flexible material thereon supported to receive the fluid inside thereof, the side walls of said cup being cylindrical, and rigid means fixed on said mandrel to engage the upper end of said cup for the purpose described.

7. In a swab, a mandrel, a cup of flexible material thereon, a supporting plate for said cup, valve-controlled openings in the bottom of said cup, there being a fluid passage in said mandrel from within said cup to the lower end of said mandrel below said cup, and means in said fluid passage to regulate the load of liquid to be supported by said cup.

In testimony whereof I hereunto affix my signature this 23rd day of July, A. D. 1926.

EUGENE KIBELE.