Dec. 29, 1959 L. A. JONES 2,918,880

SAFETY SAND SWABS

Filed June 9, 1958

Fig. 1

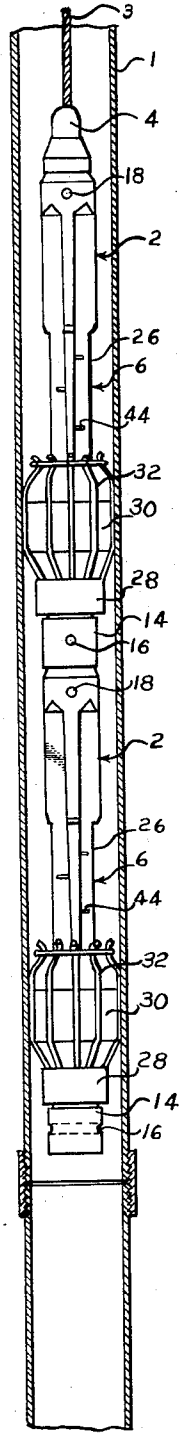


Fig. 2

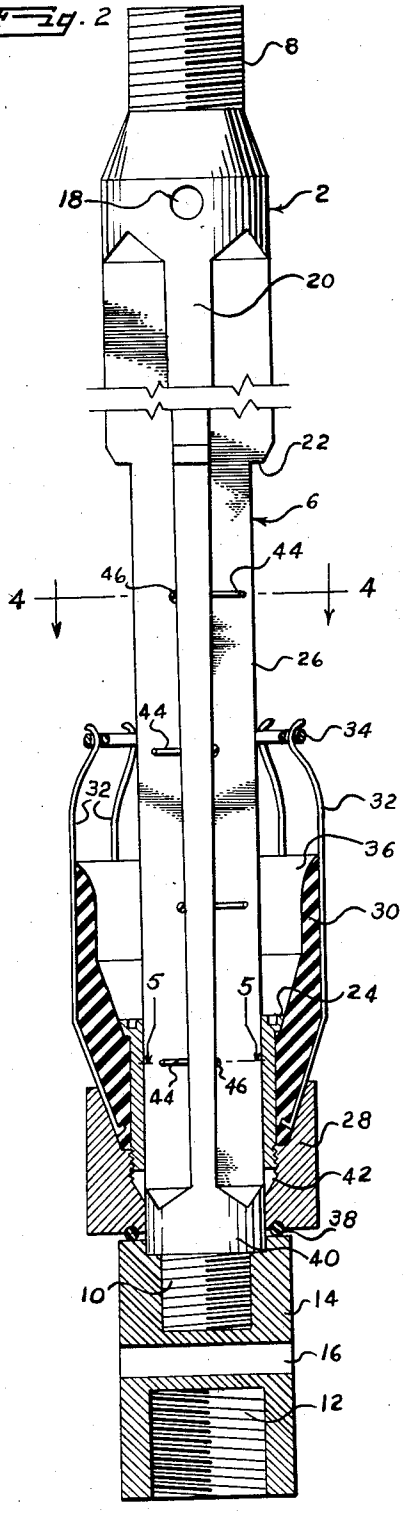


Fig. 3

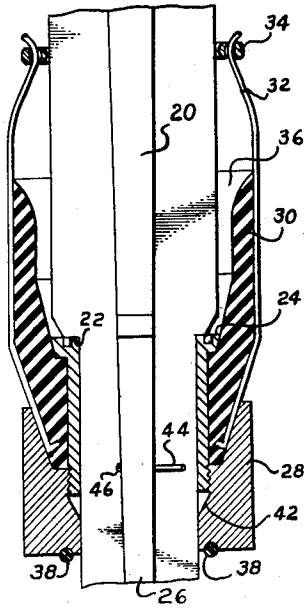


Fig. 4

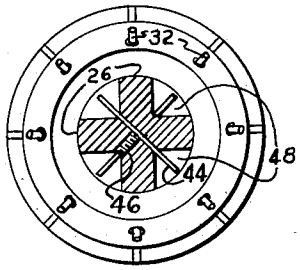
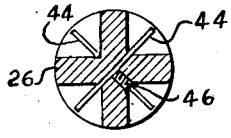


Fig. 5



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SAFETY SAND SWABS

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4 Claims. (Cl. 103—225)

This invention relates to improvements in swabs for oil wells and the like, and more particularly to a safety swab which may be readily unloaded and cleansed of sand and foreign matter, as desired, while being pulled out of the well.

In the swabbing of oil wells, and particularly oil wells which have just been drilled in and which contain a considerable amount of sand and rotary cuttings and the like, the swab is inclined to choke up with sand and cuttings to such an extent that they cannot be readily moved upward in the well, which frequently results in breaking the swab line, which necessitates a fishing job, or such occurrence might even result in the loss of the well.

The present swab is so constructed that part or all of the load, which is being removed upward above the swab, may be dumped, in event it is impossible to move the swab upward, although it is often desirable to dump only part of the load, especially the portion thereof which settles downward within the swab rubber, with the remaining portion of the load being permitted to move upward by the swab line, to be removed from the well.

The present swab is so constructed that sand and debris is prevented from adhering to the stem, and further provision is made to enable the brushing or agitating of the sand and debris within the cup portion of the swab rubber, so as to cause the sand to move downward therethrough.

An object of this invention is to provide a swab which can be used singly or multiple units may be connected together and which swab is so constructed as to enable the ready release of fluid and/or debris therethrough, by manipulation of the swab cable.

Another object of the invention is to provide a swab, the stem of which is so constructed as to prevent the ready adherence of sand and other debris thereto.

Still another object of the invention is to provide agitating means on the swab stem, whereby sand and other foreign matter may be agitated within the cup of the swab rubber.

A further object of the invention is to make provision for the ready insertion and removal of agitating elements within the length of the stem of the swab element.

Yet another object of the invention is to provide a secure anchor means for the swab rubber, yet will permit ready removal of the swab rubber from the stem, when desired.

A still further object of the invention is to provide a valve seating arrangement to provide a positive seal between the swab stem and the swab rubber when the swab rubber holder is in seated position.

With these objects in mind, and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings in which like reference characters designate like parts in the several views thereof, in which:

Fig. 1 is a fragmentary elevational view through a portion of an oil well casing, which is shown in section,

and which shows swab units connected in multiple relation therein and which are suspended from a swab cable;

Fig. 2 is an elevational view of a single unit swab, with parts broken away, with parts shortened, and other parts shown in section to bring out the details of construction, and showing the swab rubber holding element in seated position;

Fig. 3 is a fragmentary elevational view of a portion of the stem of the swab element and showing a swab rubber, swab rubber holding element, and the swab rubber basket and ring in section, and showing the rubber holding element in unseated or dumping position;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2, looking in the direction indicated by the arrows; and

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 2, looking in the direction indicated by the arrows.

With more detailed reference to the drawing the numeral 1 designates a well pipe, which may be casing or tubing within a water well, oil well or the like. A plurality of swab units, designated by the numeral 2, are coupled in end to end relation and are shown with the swab rubber holding element in seated relation, with the swab being suspended on a cable 3. The cable 3 is mounted in rope socket 4 in the usual manner, and while other accessories, such as jars are not shown, it is to be understood that the present device may be used with jars intermediate the rope socket and the swab 2, if so desired, but these are well known in the art of drilling and swabbing.

The swab 2 comprises a body portion 6, the upper end of which has a threaded portion 8, and the lower portion 10, which is threaded. The upper threaded portion 8 is adapted to either engage a rope socket 4 or the like, or the female threaded connection 12 in connector 14. The threaded connector 14 preferably has a transverse opening 16 therethrough to enable the ready tightening of the threaded connections with respect to the stem 6. The upper end of the stem 6 has an opening 18 therethrough, through which a second bar may be passed so as to tighten the threaded connections. The stem 6 preferably is of X-cross section, with the ribs 20 at the upper end being wider than at the lower end, that is, tapering downward to a thinner cross-section, as will best be seen in Figs. 2, 4 and 5. A spaced distance downward from the upper end of the stem, are shoulders 22 which serve as an abutment for swab rubber holding sleeve 24.

The width or diameter of the extremities of the ribs 20, below the shoulders, is reduced, as indicated at 26, and which ribs are of uniform height throughout the horizontal length thereof and serve as a guide for sleeve 24 which is fitted in sliding relation on the reduced portion 26 of the stem.

A swab rubber holding member 28 is threaded interiorly to receive the lower end of sleeve 24, which sleeve has exterior threads thereon. A swab rubber 30, which may be conventionally formed, and which may have wires 32 surrounding the rubber in a conventional manner, is fitted into the tapered bore of swab rubber holding member 28, and the sleeve 24 screwed into binding engagement with the inner shoulder thereof so as to hold the swab rubber in place. The upper end of wire 32 may pass through an apertured ring 34 in the conventional manner, so as to prevent the upper lip 36 of the swab rubber 30 from moving outward beyond a predetermined point. The lower end of swab rubber holding member 28 has an O-ring 38 fitted therein which is adapted to seat against the upper face of threaded connection 14, so as to form a fluid tight seal between the

swab rubber holding member 28 and the connector 14 into which stem 6 is threadably connected.

The lower end of the stem 6 has a cylindrical portion 40 which fits in complementary relation with the smaller bore of the swab rubber holding member 28. A tapered portion 42 is formed between the larger bore of the swab rubber holding member 28 and the smaller bore thereof, so when the swab rubber holding element 28 is moved upward, into the position as shown in Fig. 3, the debris will pass downward between the fluted ribs 20 and the inner bore of swab rubber holding member 28 without the sand or other debris collecting on the tapered surface of the bore 42.

Holes are drilled transversely through the stem 6, at spaced intervals along the length thereof between the shoulders 22 and the cylindrical portion 40 thereof. These holes are drilled at right angles to each other through the valleys formed by the ribs 20, and spring wire elements 44 are positioned therethrough, as will best be seen in Figs. 2, 4 and 5. A hole is drilled and screw threaded at right angles to and to intersect each of the first mentioned holes and a set screw 46 is screw threaded into each of the respective holes, so as to engage the spring wire elements 44 to hold these against relative movement with respect to stem 6. These spring wire elements 44 are positioned sufficiently close together to give the effect of a wire brush between the ribs 20, so when the swab rubber 30 expands outward against the tubing or casing 1 so that it cannot be moved upward because the sand is compacted within the cup portion of the swab rubber 30, the cable is released to move stem 6 downward so that the passages 48 formed between ribs 20 will convey sand and fluid downward through the smaller bore of the swab rubber holding element 28 until such amount of sand and fluid is released as will allow the swab 2 to be moved upward by means of the cable 3.

As shown in Fig. 1, the swab is made up of two single units connected together in end to end relation, therefore if the upper swab leaks liquid thereby, the second of the successive swabs will catch the liquid, thereby giving greater capacity and effectiveness, each time the swab is pulled out of the casing. Having the ribs 20 tapered inwardly and downwardly reduces the likelihood of sand and debris adhering to the ribs, which might occur if the sides of the ribs were parallel, or some other shape, and this would present a definite hazard.

Operation

With the swab unit assembled, as shown in Figs. 1 and 2, and being suspended in the casing or tubing from the cable 3, the swab 2 is lowered into the well, and as the lowering operation progresses, the swab rubber holding member 28, swab rubber 30, retaining ring 32 and ring 34 will move upward on stem 6 until sleeve 24 abuts with shoulders 22, due to the friction of swab rubbers 30 on the inner diameter of casing 1. As the swab moves downward into and below the level of the liquid in the casing 1, the liquid will flow upward through passages 48 above the swab rubber 30, where, upon upward movement of cable 3, the stem 6 of the swab will move upward until the upper face of connector members 14 will move into contact relation with O-ring 38 on the lower end of swab rubber holding member 28, whereupon the swab rubber 30, wire members 32, and ring 34 will be moved upward with the liquid and debris above and within the swab rubber 30 will be moved upward, if the cable is sufficiently strong to lift the load, and sufficient power is available. However, if the load cannot be lifted, the cable 3 may be lowered and the stem 6 moved up and down, which will cause the spring wire elements 44 to agitate the sand within the cup of the swab rubber 30, which sand, when thus agitated and loosened will pass downward through passages 48 to a point below the O-ring seal 38. However, when sufficient sand has been discharged from the

swab, the cable is again tightened so as to cause the cylindrical portion of the stem to move into the smaller bore of swab rubber holding member 28, whereupon, the swab is moved upward in pipe 1, which will cause the fluid and debris above the swab rubber or rubbers 30 to be moved up and out of the upper end of the pipe 1.

While the invention has been illustrated and described in some detail in one embodiment thereof, it is to be understood that changes may be made in the minor details of construction and adaptations made to different installations, without departing from the spirit of the invention or the scope of the appended claims.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. A swab for use in a well pipe comprising; an elongated ribbed body portion, an enlarged head on the upper end of said body portion, a sleeve slidably fitted on said elongated, ribbed body portion, said head at the upper end of said body portion forming a stop for said sleeve, a swab rubber fitted on said sleeve, the opposed faces of each rib of said body portion being tapered inwardly and downwardly throughout the length thereof, and an abutment formed on the lower end of said elongated body to form a seat for said sleeve.

2. A swab as defined in claim 1, wherein resilient, wire members are mounted on said elongated body transversely thereof and mediate the angular divergence of the ribs of said ribbed body.

3. A swab as defined in claim 2, wherein said resilient wire members pass transversely through a portion of said elongated body, and wherein screw means is provided to attachably secure said resilient, wire members in said body.

4. In a swab [illegible]e in a well pipe; an elongated body, which enlonga[illegible]ody comprises an enlarged cylindrical portion at one end and a smaller cylindrical portion at the opposite end, each of said cylindrical portions being threaded, a first ribbed portion of substantially the same size as said enlarged cylindrical portion and being connected thereto to extend toward the opposite end, a second ribbed portion of substantially the same size as the smaller of said cylindrical portions and being connected thereto to extend toward the opposite end, said second ribbed portion being connected to said first ribbed portion to form a shoulder at the juncture of said ribbed portions, the ribs of said ribbed portions being circumferentially spaced at right angles to each other, the respective opposite faces of each of said ribs tapering downwardly toward the opposite face thereof substantially throughout the length thereof, resilient, spring-like wire scratcher members mounted transversely of said elongated body and extending therethrough intermediate the angular divergence of said ribs, a set screw threadably engaging said body and said resilient, spring-like scratcher members, a sleeve having an out-turned flange thereon slidably fitted on said second ribbed portion, a swab rubber fitted on and surrounding said sleeve, a swab rubber holding element threadably engaging said sleeve and receiving said swab rubber, a seat on the lower end of said swab rubber holding element, an abutment member threadably engaging the smaller cylindrical portion of said elongated body, with the face of said abutment member being adjacent said seat when said swab rubber is in one position.

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