

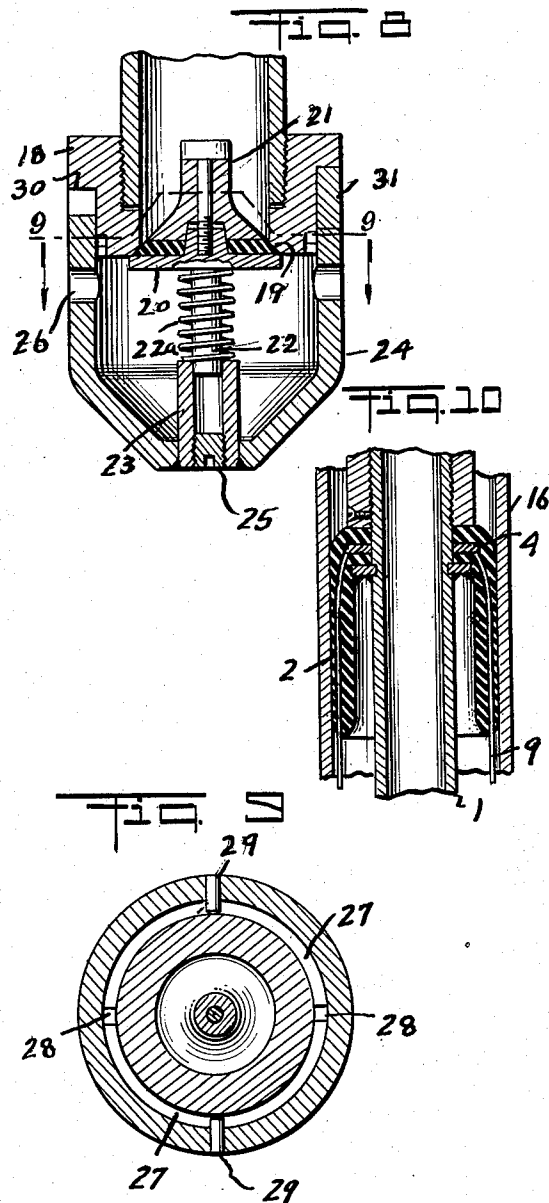
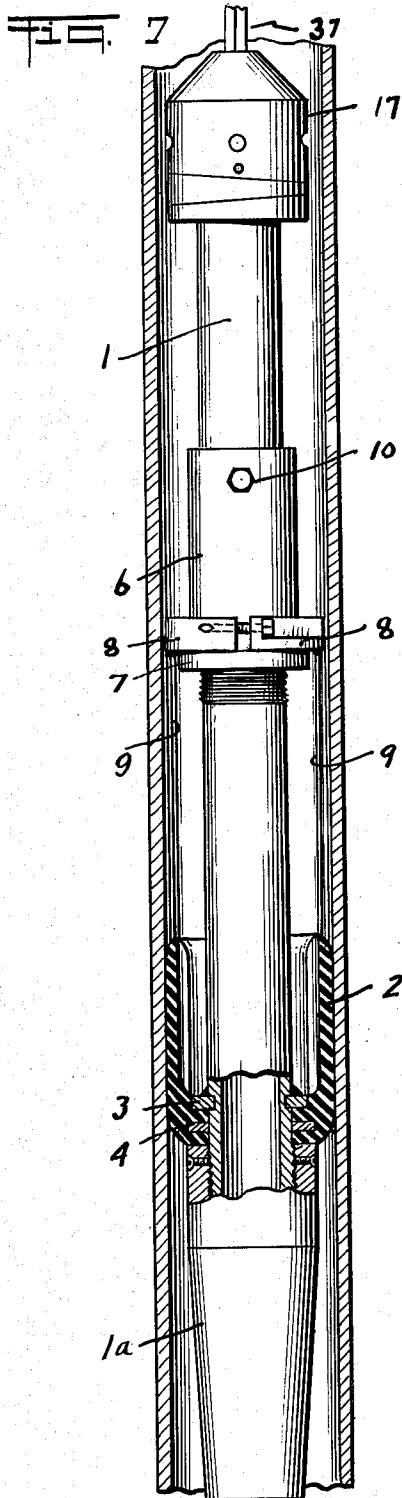
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A. C. HARTSELL
WELL FLUID STABILIZER

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2 SHEETS—SHEET 2



INVENTOR.
Artis C. Hartsell
BY
E. V. Hardway.
ATTORNEY

UNITED STATES PATENT OFFICE

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WELL FLUID STABILIZER

Arlis C. Hartsell, El Campo, Tex.

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5 Claims. (Cl. 166—12)

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This invention relates to a well fluid stabilizer. The invention includes certain improvements over that type of stabilizer disclosed in application filed by this applicant in the United States Patent Office on June 4, 1949, under Serial Number 97,278.

The present invention relates more particularly to certain improvements in the type of packer, or plunger assembly employed.

It is an object of the present invention to provide in a stabilizer a packer, or plunger assembly, of such construction that the transverse diameter of the packer or plunger body may be readily varied depending on the inside diameter of the pipe in which the stabilizer is to be used.

The packer or plunger assembly is also of such construction that it may be inverted and employed as a swab.

Other objects and advantages will be apparent from the following specification which is illustrated by the accompanying drawings, wherein:

Figure 1 is a side view of the upper end of the stabilizer partly in vertical section and shown located in a well pipe.

Figure 2 is a side view of the lower end of the stabilizer partly in vertical section shown located in a well pipe.

Figure 3 is a side view partly in section of a weight employed.

Figure 4 is a horizontal cross-sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a horizontal cross-sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a horizontal cross-sectional view taken on the line 6—6 of Figure 2.

Figure 7 is an elevational view partly in section showing the packer, or plunger assembly being utilized as a swab.

Figure 8 is an enlarged vertical sectional view of a foot valve employed.

Figure 9 is a cross-sectional view taken on the line 9—9 of Figure 8, and;

Figure 10 is a vertical sectional view of the plunger or packer assembly taken on the line 10—10 of Figure 5.

Referring now more particularly to the drawings, the numeral 1 designates the tubular supporting body of the tool which may have incorporated therein an elongated tubular coupling 1a whose outer side is downwardly flared as shown in Figure 1.

This coupling connects the upper and lower sections of the supporting body 1 by means of interconnecting threads.

Clamped on the lower section of the support-

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ing body and preferably abutting the lower end of the coupling 1a there is an inverted, cup-shaped packer or plunger 2.

As shown in the drawing, the upper end of this plunger is clamped between the lower end of the coupling and a clamp ring 3, which may be welded to the lower section of the supporting body 1; and there is also an anchor 4 imbedded within the material of the upper end of the plunger and surrounding said body 1.

As will be noted from an inspection of Figure 5, the plunger has the inside vertical grooves 5 spaced apart.

Threaded onto the body 1 beneath the plunger 2 there is a tensioning sleeve 6 whose upper end has an external annular flange 7, and beneath said flange around said sleeve there are the sectional plate-like anchors 8, 8 which may be releasably secured together.

There are the tension rods 9 whose upper ends are imbedded in the material of the plunger 2, and anchored to the anchor ring 4, and whose lower ends are secured to the anchors 8, 8. As is shown in Figure 5, there are, preferably, two of these tension rods between adjacent grooves 5.

Accordingly, the transverse diameter of the plunger or packer 2 may be controlled by the tension applied to the tension rods 9.

When the sleeve 6 is adjusted to create the desired tension so that the packer or plunger will assume the required transverse diameter, a clamp bolt 10, threaded through the sleeve 6, may be screwed inwardly to engage the body 1 to maintain the desired tension.

As is well known, the inside diameter of well pipes vary, and it is accordingly desired to be able to adjust the packer or plunger 2, so that it will nicely fit within the pipe, neither too tightly nor too loosely.

In order to prevent the inadvertent unscrewing of the coupling 1a from said lower section, these parts may be additionally secured together by means of set screws as 11.

Screwed onto the upper end of the upper section of the body 1 there is a head 12 which has the inlet openings 13, and whose upper end is of a conical shape.

When in use, there is a cylindrical weight 14 which rests on the head 12 and whose lower end is provided with a conical shaped cavity 15 to snugly receive the upper end of the head 12 as shown in Figure 1. The weight 14 may vary depending on the pressure of the fluid in the well pipe 16 being withdrawn from the well.

Secured on the lower end of the supporting

body there is a back pressure valve assembly 17. This assembly includes a valve body 18 which is screwed onto the lower end of the supporting body, and which is provided with a valve seat 19. Cooperating with the seat there is a downwardly opening valve 20 which is provided with an up-standing stem 21. The valve is also provided with a depending stem 22 which works through the guide 23 in the lower end of the housing 24, which is secured on the valve body. The lower end of the guide 23 is internally threaded to receive the plug 25.

There is a strong coil spring 22a around the stem 22 and interposed between the valve and the upper end of the guide 23 which normally holds the valve closed.

The housing 24 is provided with suitable outlets 26 beneath the valve seat so that fluid forced downwardly through the pipe 16 will open said valve and pass through the outlets 26.

As is illustrated in Figures 2, 8 and 9, the housing 24 may be secured on the valve body in a novel manner. The lower end of the body has opposing circumferential keyways 27, 27 which terminate in opposing downwardly directed slots 28, 28. The housing 24 has the inwardly extended keys 29, 29 secured thereto which may be passed upwardly through the slots 28 and then turned into said keyways as shown in Figure 9. As will be noted from an inspection of Figures 2 and 8, the upper end of the housing 24 is diagonal with relation to the axis of the valve body, and said body has an external shoulder 30 there-around which is also diagonal to said axis but which is pitched transversely with respect to the pitch of the upper end of the housing 24, and when the housing is applied to the body and the keys 29 inserted into the keyways 27, an open flexible ring 31, conforming in shape to the space between the shoulder 30 and the opposing end of the housing, may be clamped in said space and will lock the housing and valve body against relative turning so as to maintain the back pressure valve assembly in assembled relation.

There is a collar 32 which is slidable on the upper section of the supporting body 1, being limited in its upward movement on said body by the annular stop 33 which is welded to said body above said collar.

Fastened to the collar 32 there are the flexible arms 34 whose upper ends extend above the collar and diverge outwardly and whose lower ends extend beneath the collar and secured to said lower ends are the wedge-shaped jaws 35 which ride against the tapering surfaces of the coupling 1a. The outer surfaces of these jaws are toothed so as to engage the pipe 16 when the jaws are expanded. The sections of the well pipe 16 are connected by conventional couplings 36 whose inside diameter is somewhat greater than the inside diameter of the pipe. As the tool is lowered relative to the pipe 16 the upper ends of the bars 34 will expand out into the coupling 36 as is shown in Figure 1, but when a coupling is passed they will be contracted inwardly and will pass on through the pipe. They will hold the jaws 35 elevated and thus contracted away from the pipe, but should a high pressure develop in the pipe beneath the tool so as to force the tool upwardly, the upper ends of the bars will engage in the coupling above and stop the upward movement of the bars, but the coupling 1a will be moved on upwardly, thus expanding the jaws into engagement with the pipe 16 so that the tool will be anchored against being blown out of the pipe.

In use, when it becomes desirable to remove a pipe from a well, the stabilizer may be dropped into the pipe to be removed and a weight, as 14, lowered on the tool at the same time the tool is lowered. The size of the weight 14 will depend on the amount of pressure in the well. The tool will move downwardly through the pipe until it reaches the surface of the well liquid in the pipe, and it will be stopped at that point by the cup-shaped plunger 2, and will be maintained in place as the pipe 16 is pulled upwardly and broken out, so that as the pipe above is broken out there will be no well liquid in it to spill out over the derrick floor, but it will be swabbed substantially dry.

From the foregoing it is apparent that the plunger 2 should be adjusted to nicely fit within the pipe to be pulled and in this connection it may be stated that the plunger 2 is provided with the inside vertical grooves 5 so as to facilitate the contraction of the plunger in case it becomes necessary to contract it to any considerable degree.

During the pulling operation, if it becomes necessary to force fluid down through the stabilizer and pipe 16 and back up around said pipe this can be readily done owing to the provision of the back pressure valve at the lower end of the tubular supporting body 1.

The pipe 16 will usually carry some type of well equipment at its lower end so that the tool will be retained in the lower, or last, section of the pipe being withdrawn, and when said section is withdrawn the tool may then be recovered from it.

As illustrated in Figure 7 the packer or plunger is reversed and may be used as a swab. This is accomplished by detaching the coupling 1a from the body section above and reversing the packer or plunger so that the foot valve will be above and the packer will open upwardly.

In such case the plug 25 is removed and a sinker bar 37 is attached to the foot valve assembly and a cable connected to the sinker bar which extends to the ground surface, and by means of which the swab may be operated in the conventional manner. In other respects the construction of the swab shown in Figure 7 is the same as that shown in Figures 1 and 2.

What I claim is:

1. In well equipment, a tubular supporting body, a cup-shaped, flexible plunger secured around the body and having spaced internal longitudinal grooves therein, a tensioning sleeve adjustable on the body and having an external flange, an annular anchor around the sleeve and engageable with said flange to cause the anchor to move with the sleeve away from the plunger and tension rods each embedded at one end in the material of the plunger between adjacent ones of said grooves and connected, at the other end, to the anchor.

2. In well equipment, a tubular supporting body, a cup-shaped plunger on the body and having circumferentially spaced internal longitudinal grooves therein, a tensioning sleeve movably carried on the body spaced from the plunger and having an external flange, an annular anchor surrounding the sleeve and engageable with said flange to cause the anchor to move with the sleeve away from the plunger, tensioning rods imbedded in the plunger between the grooves and anchored to the plunger at one end and whose other ends are connected to the anchor, and means for adjusting the sleeve on the body for varying the tension on said rods and the plunger.

3. In well equipment, a tubular supporting body, a cup-shaped plunger one end of which is

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fitted closely around the body, an anchor located within the material of said end of the plunger, a tensioning sleeve movably mounted on the body and spaced from the plunger, an anchor mounted on said sleeve for movement therewith and in which the sleeve is rotatable, tensioning rods embedded in the plunger and connected at one end to the plunger anchor and at their other ends to the sleeve anchor, and means for adjusting the sleeve on the body to vary the tension on said rods and plunger.

4. In well equipment, a tubular supporting body, a cup-shaped plunger on the body one end of which fits closely about the body, said plunger having internal, longitudinal grooves, an anchor within said end of the plunger, a tension sleeve movably mounted on the body, an anchor mounted on said sleeve and in which the sleeve is rotatable, tensioning bars imbedded, at one end, in the material of the plunger and connected to the corresponding anchor and whose other ends are connected to the sleeve anchor, and means for adjusting the sleeve on the body to vary the tension on the plunger to in turn vary its transverse diameter.

5. In well equipment, a tubular supporting body, a cup-shaped plunger on the body one end of which fits closely about the body, said plunger having circumferentially spaced internal longi-

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tudinal grooves therein, anchoring means located within the material of said end of the plunger, a tensioning sleeve threadably mounted on the body in spaced relation to the plunger and having an external annular flange, an annular anchor formed in segments secured together about said sleeve and in which the sleeve is rotatable, said annular anchor being engageable with said flange to cause the anchor to move with the sleeve away from said plunger, pairs of tensioning bars embedded, at one end, in the material of the plunger between adjacent ones of said internal grooves, and connected to said anchoring means and whose other ends are connected to said annular anchor.

ARLIS C. HARTSELL.

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