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WELL FLUID STABILIZER

2,641,322

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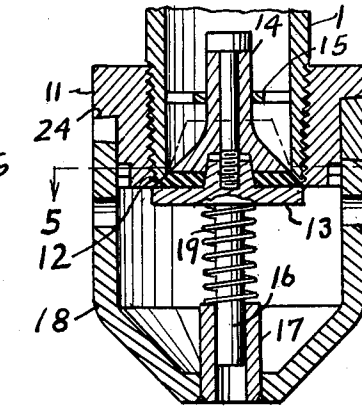
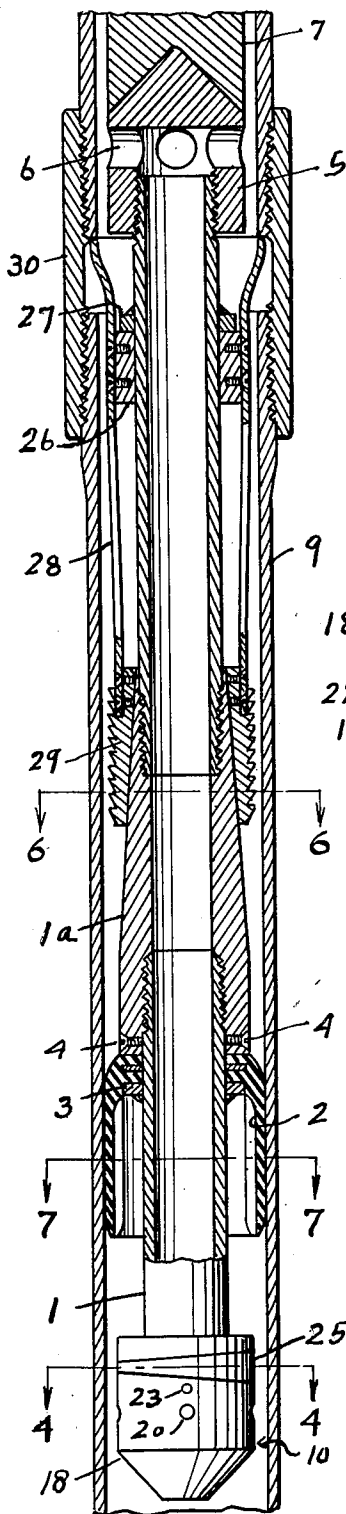


Fig. 3.

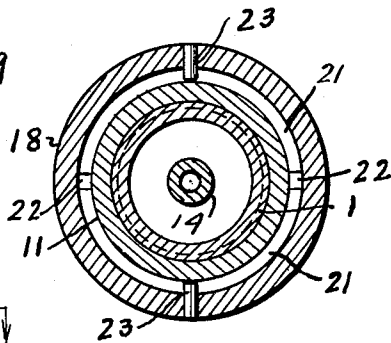


Fig. 5.

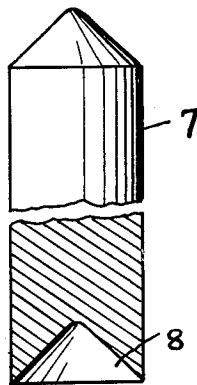


Fig. 2.

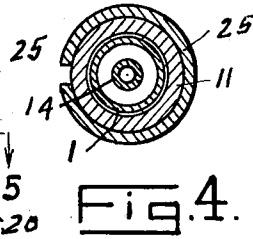


Fig. 4.

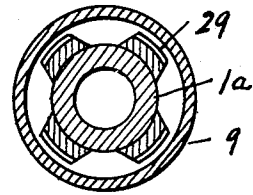


Fig. 6.

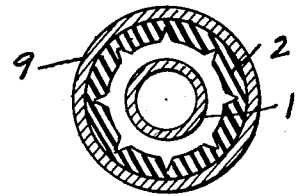


Fig. 7.

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## WELL FLUID STABILIZER

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4 Claims. (Cl. 166—12)

1

2

This invention relates to a well fluid stabilizer.

In pulling pipe from wells the pipe is unscrewed a section at a time in the derrick as the pulling process progresses. In breaking out the pipe on the derrick floor, any liquid that may be within the upper end of the pipe spills out over the derrick to the inconvenience of, and danger to, the workmen. The elevation of the liquid in the pipe being pulled results from various causes, often from a higher pressure existing in the fluid outside the pipe than the pressure within the pipe.

At any rate, it is well known that in pulling pipes from wells and breaking the same out in the derrick, well liquid is drawn up with the pipe and spills out over the derrick floor during the breaking-up process.

It is an object of the present invention to provide a tool that may be inserted into the pipe being pulled and that will assume a selected level in the pipe and will remain at such level while the pipe is being pulled said tool being of such construction that the liquid in the pipe beneath can not escape upwardly above it.

It is another object of the present invention to provide a stabilizer of the type described, which is equipped with a safety device so that it will automatically anchor itself in the pipe in case the liquid in the pipe beneath develops a high pressure to the end that the tool will not be blown from the pipe by said pressure beneath.

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 stabilizer, partly in vertical section, shown located in a well pipe;

Figure 2 is a side view partly in section of a weight employed;

Figure 3 is an enlarged vertical sectional view of a foot valve employed;

Figure 4 is a horizontal cross-sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a horizontal cross-sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a horizontal cross-sectional view taken on the line 6—6 of Figure 1; and

Figure 7 is a horizontal cross-sectional view taken on the line 7—7 of Figure 1.

Referring 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. This coupling connects upper and lower sections of the supporting body 1 by means of inter-connecting threads.

Clamped on the lower section of said supporting body and preferably abutting the lower end of the coupling 1a, there is an inverted cup-shaped plunger 2.

As shown in the drawing, the upper end of this plunger is clamped between the lower end of the coupling 1a and a clamp ring 3 which may be welded to the lower section of the supporting body 1.

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 4.

Screwed onto the upper end of the upper section of the body 1 there is a head 5 which has the inlet openings 6 and whose upper end is of a conical shape.

When in use there is a cylindrical weight 7 which rests on the head 5 and whose lower end is provided with a conical shaped cavity 8 to snugly receive the upper end of the head 5, as shown in Figure 1.

This weight 7 may vary depending on the pressure of the fluid in the well pipe 9 being withdrawn from the well.

Secured on the lower end of the supporting body there is a back-pressure valve assembly 10. This assembly includes a valve body 11 which is screwed onto the lower end of the supporting body and which is provided with a valve seat 12. Co-operating with this seat there is a downwardly opening valve 13 which is provided with an upstanding stem 14, which works through the guide 15 and which is also provided with a depending stem 16, which works through the guide 17 in the lower end of the housing 18, which is secured on the valve body.

There is a strong coil spring 19 around the stem 16 and interposed between the valve 13 and the upper end of the guide 17 and which normally holds the valve closed.

The housing 18 is provided with suitable outlets 20 beneath the valve seat so that fluid forced downwardly through the pipe 9 will open said valve and pass out through the outlets 20.

As is illustrated, in Figures 1, 3, and 5, the housing 18 may be secured on the valve body in a novel manner. The lower end of the body has opposing, circumferential keyways 21, 21, which terminate in opposing, downwardly directed slots 22, 22. The housing 18 has the inwardly extended keys 23, 23 secured thereto, which may be passed upwardly through the slots 22 and then turned into said keyways, as shown in Figure 5. As will be noted from Figures 1

3

and 3, the upper end of the housing 18 is diagonal with relation to the axis of the valve body, and said valve body has an external shoulder 24 therearound, which is also diagonal to said axis, but which is pitched reversely with respect to the pitch of the upper end of the housing 18, and when the housing is applied to the body and the keys 23 are inserted into the keyways 21 an open flexible ring 25, conforming in shape to the space between the shoulder 24 and the opposing end of the housing, may be clamped in said space, and it 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 26 which is slidable on the upper section of the supporting body 1 but is limited in its upward movement on said body by an annular stop 27 which is welded to said body above said collar.

Fastened to the collar 26 there are the flexible arms 28 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 29 which ride against the tapering surface of the coupling 1a. The outer surface of these jaws are toothed so as to engage the pipe 9 when the jaws are expanded.

The sections of the well pipe 9 are connected by conventional couplings 30, whose inside diameter is somewhat greater than the inside diameter of the pipe. As the tool is lowered relative to the pipe 9, the upper ends of the bars 28 will expand out into the coupling 30, as shown in Figure 1, but when a coupling is passed they will be contracted inwardly but will pass on through the pipe. They will hold the jaws 29 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 said bars and jaws 29, but the coupling 1a will be moved on upwardly, thus expanding the jaws into engagement with the pipe 9 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 7 lowered on the tool at the same time the tool is lowered. The size of the weight 7 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 at such point as the pipe 9 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.

During this operation if it becomes necessary to force fluid down through the stabilizer and pipe 9 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 9 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.

What I claim is:

4

1. A stabilizer of the character described comprising, an elongated tubular supporting body adapted to enter a string of pipe in a well, a yieldable plunger around, and supported on, said body adapted to fit into said pipe and expansible into sealing engagement with the pipe by the upward pressure of fluid in the pipe beneath the plunger to support the body in the pipe, a back-pressure valve on the body, closing the body against upward flow of fluid therethrough, pipe-engaging means slideably mounted on the body and moveable into and out of engagement with the pipe, actuating means on the body in engagement with the pipe-engaging means and movable with the body upon upward movement of the body relative to the pipe-engaging means to move the pipe-engaging means into engagement with the pipe to anchor the body in the pipe, and means connected to the pipe-engaging means in position to abuttingly engage an end of a section of pipe in said string to limit upward movement of said pipe-engaging means upon upward movement of said body relative to said pipe upon an increase in said upward pressure and yieldingly engageable with said pipe to support said pipe-engaging means on the body at a point wherein said pipe engaging means are out of engagement with the pipe upon downward movement of said body relative to the pipe.

2. A stabilizer of the character described comprising, a tubular supporting body adapted to enter a string of pipe in a well, an expansible inverted cup-shaped plunger secured around the body adapted to fit into said pipe and expansible into sealing engagement with the pipe by the upward pressure of fluid in the pipe beneath said plunger to support the body in the pipe, a back-pressure valve on the body closing the body against upward flow of fluid therethrough, a head on the upper end of the body having an inlet opening through which fluid may flow downwardly through the body, weight means supported on the head to cause said body to move downwardly against said upward pressure, said body having an external upwardly tapering seat, a pipe-engaging jaw slideable on said seat and movable radially into engagement with the pipe, means slideable on the body yieldingly engaging the pipe and connected to said jaw to support the jaw on the body at a point wherein said jaw is out of engagement with the pipe upon downward movement of the body, said means being engageable with an end of a section of said pipe upon upward movement of the body upon an increase of said upward pressure to cause said seat to force the jaw into engagement with the pipe to lock the body against further upward movement.

3. A stabilizer of the character described comprising, a tubular supporting body adapted to enter a string of pipe in a well, an expansible inverted cup-shaped plunger secured around the body adapted to fit into said pipe and expansible into sealing engagement with the pipe by upward pressure of fluid in the pipe beneath said plunger to support the body in the pipe, a back-pressure valve on the body closing the body against upward flow of fluid therethrough, said body having an external downwardly flaring seat, a collar slideably mounted on the body above the seat, a resilient element carried by the collar and having portions extending above and below the same, a pipe-engaging jaw on said resilient element below said collar in engagement with said seat and movable thereby into engagement with

5

the pipe upon upward movement of said body relative to said collar to anchor the body in the pipe, the portion of said element above said collar being engageable with the pipe to support said jaw on the body at a point wherein said jaw is out of engagement with the pipe upon downward movement of the body relative to the pipe and engageable in a coupling in the string of pipe upon upward movement of said body upon an increase of upward pressure to cause the seat to move the jaw into engagement with the pipe to anchor the body against further upward movement.

4. A stabilizer of the character described comprising, a tubular supporting body adapted to enter a string of pipe in a well, an expansible inverted cup-shaped plunger secured around the body and expansible into sealing engagement with the pipe by upward pressure of fluid in the pipe beneath the plunger to support the body, a back-pressure valve on the body closing the body against upward flow of fluid therethrough, said body having an external downwardly flaring seat, a collar slideably mounted on the body above the seat, a pipe-engaging jaw carried by the collar in slideable engagement with said seat and movable radially into engagement with the pipe upon

6

upward movement of the body relative to said collar, resilient means on the collar extending above the collar and engageable with the pipe to support the jaw on the body at a point wherein said jaw is out of engagement with the pipe upon downward movement of the body in the pipe, said means being positioned to engage in a coupling of the string of pipe upon upward movement of the body upon an increase in said upward pressure to hold said collar against upward movement to cause said seat to move said jaw into engagement with the pipe to anchor the body against further upward movement.

ARLIS C. HARTSELL

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