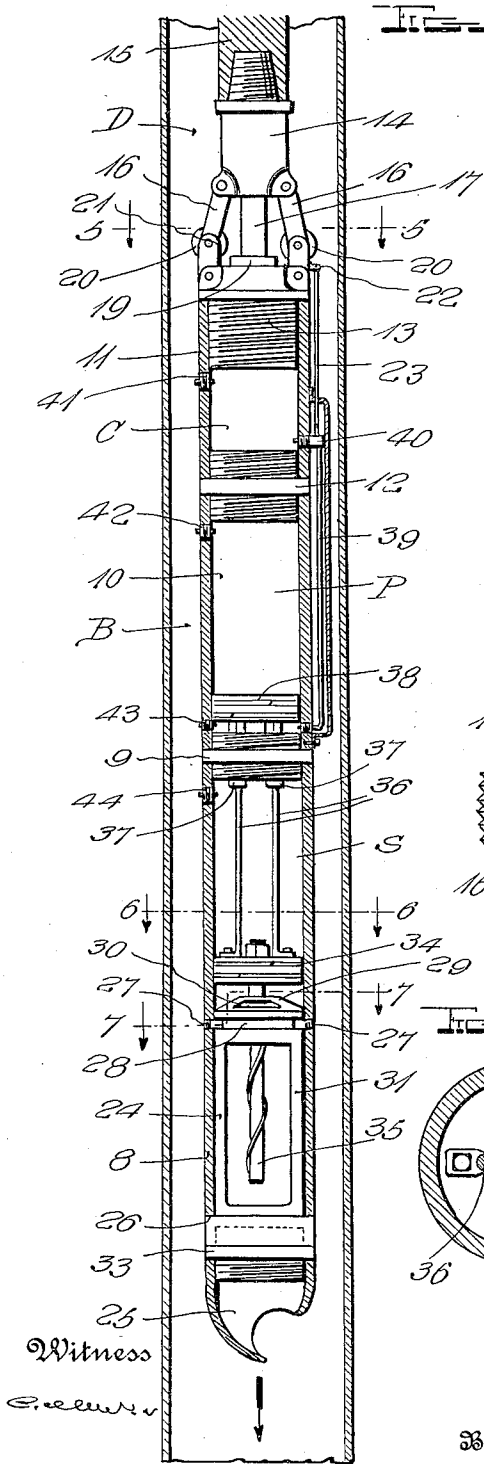
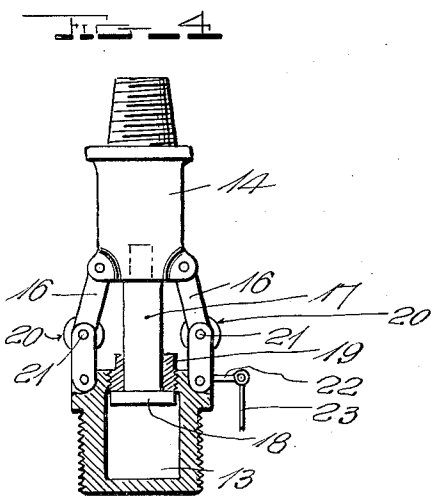
Feb. 18, 1930. P. R. SHORT 1,747,398

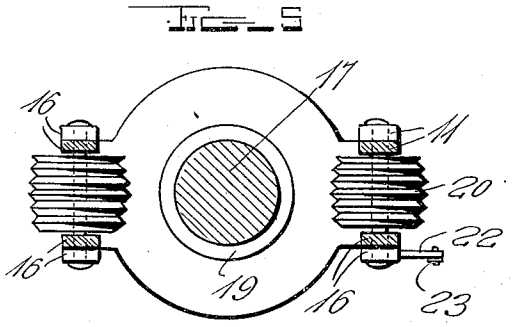
WELL CLEANER

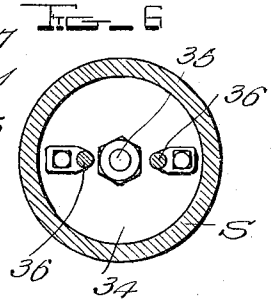
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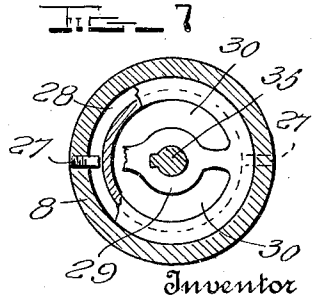


Witness









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WELL CLEANER

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Fig. 2

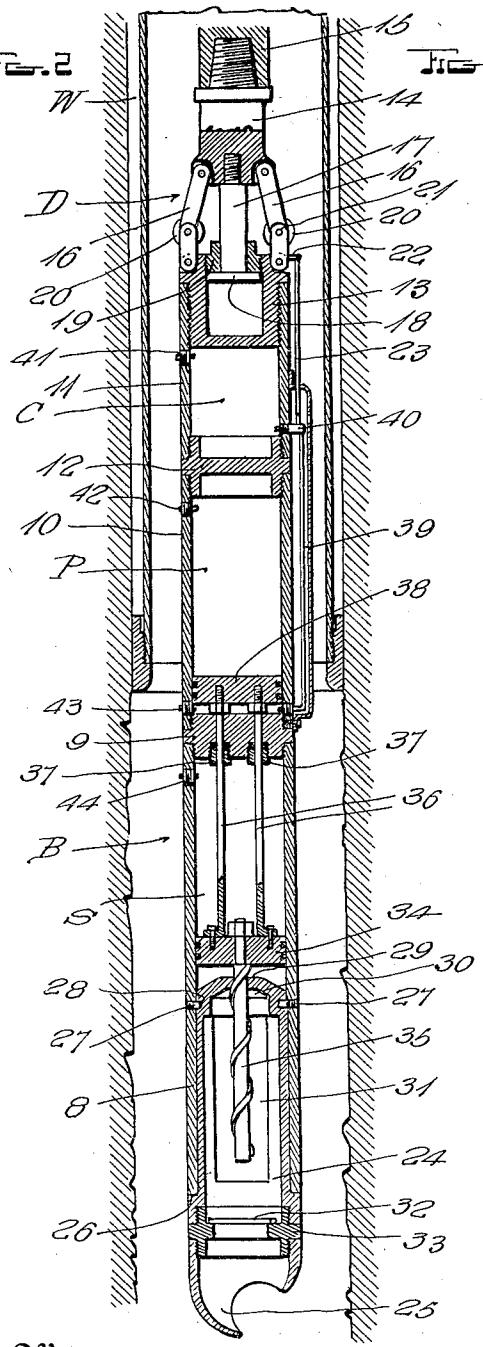
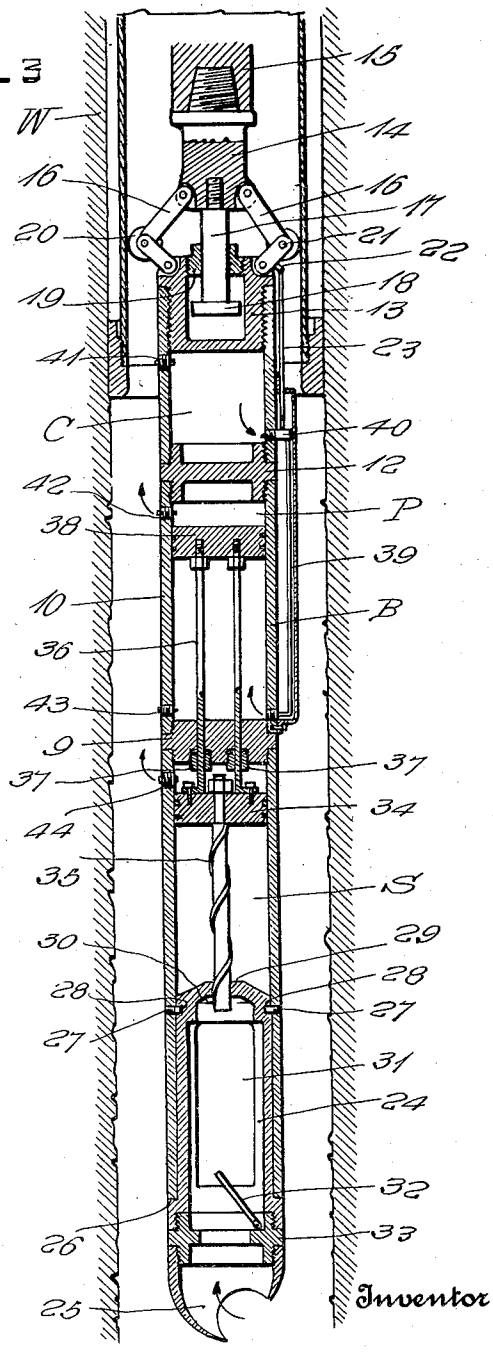


Fig. 3



Witness

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Patented Feb. 18, 1930 1,747,398

UNITED STATES PATENT OFFICE

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WELL CLEANER

Application filed April 19, 1928. Serial No. 271,292.

The invention relates to improvements in devices for cleaning sediment, sand, etc., from drilled wells, whether oil and gas wells or water wells.

One object of the invention is to provide a device which will effectively agitate the sediment and draw it upwardly into the tubular body of the device, by means of which it is elevated from the well.

A further aim is to provide a device in which the sediment agitator is provided with a scoop-like portion which scrapes the bottom of the well incident to rotation of said agitator.

Further aims are to provide novel means for rotating the agitator and creating upward suction therein; to provide unique means, operated by compressed air, for rotating the agitator and creating the upward suction therein; to provide novel operating means for a valve which is instrumental in bringing into play, the pneumatic operating means for the agitator and the suction-creating means; and to make unique provision for holding the body of the cleaner against rotation while the agitator is being rotated.

A still further object is to provide a construction which is rather simple and inexpensive, yet highly efficient, reliable and generally desirable.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a side elevation partly broken away and in section, showing the relation of parts when the cleaner is being lowered into a well.

Fig. 2 is a longitudinal sectional view, the parts being in the relation shown in Fig. 1.

Fig. 3 is a view similar to Fig. 2, but illustrating the relation of parts which takes place when the cleaner is functioning to receive sediment or the like from the well.

Fig. 4 is a side elevation partly in section illustrating the connecting device by means of which a line is connected with the upper end of the tool body, for lowering and raising the same.

Figs. 5, 6 and 7 are horizontal sectional views on the correspondingly numbered lines of Fig. 1.

The main body of the cleaner is of vertically elongated, tubular form adapted to be lowered in to a well casing, said body being indicated in a general way by the reference character B. Body B is provided at its lower portion with a suction cylinder S, above this cylinder, with a pressure cylinder P, and above this pressure cylinder, with a compressed air chamber C. In producing these three portions, I may well form the body B as shown in the drawings, in which 8 denotes a lower length of tubing, 9 has reference to a combined coupling member and closure at the upper end of the tubing 8, 10 denotes an intermediate length of tubing coupled to the member 9, 11 refers to an upper length of tubing, and 12 denotes a combined partition and coupling connecting the tubings 10—11 and cutting off communication between them. A line-connecting device D connects with the upper end of the tubing 11 and embodies a cup-like base 13 in the present disclosure, threaded into and closing the upper end of the tubing 11.

The device D, herein shown, embodies a line coupling 14 spaced above the base 13 and threaded for connection with another coupling 15 carried by a line or rod by means of which the tool is lowered into and elevated from the well W. Connecting the lower end of the coupling 14 with the base 13, are toggle links 16, complete straightening of these links being prevented by limiting means which preferably consists of a shank 17 projecting downwardly from the coupling member 14 into the base 13, a head 18 on the lower end of said shank, and a bushing or the like 19 closing the upper end of the base 13 and disposed in the upward path of said head 18. As these parts 17—18—19 prevent complete straightening of the links 16, that is movement of the upper and lower links into direct alinement with each other, said links are in readiness to buckle outwardly as in Fig. 3, when the cable-connecting device D is free

of strain, that is, when the tool has been completely lowered into the well, as seen in Fig. 3. I utilize this buckling movement of the links, to apply casing-engaging means to hold the body of the tool against rotation, and to also open a valve which permits discharge of compressed air from the chamber C into the pressure cylinder P, to perform work hereinafter described. The casing-engaging means to hold the tool body against rotation, preferably consists of sharp-edged rollers 20 carried by the central pivots 21 of the toggle links 16. The valve-opening means, in the construction herein disclosed, embodies a lateral arm 22 on one of the links 16, and a rod 23 pivoted to and extending downwardly from said arm, functioning as hereinafter described.

Rotatably mounted in the lower end of the suction cylinder S, is a tubular agitator 24 which is also a well bottom scraper, in the present disclosure, the lower end of this agitator and scraper being disposed beyond the lower end of the body B and provided with a scoop-like scraping portion 25. Above this portion 25, the agitator 24 is preferably formed with an external shoulder 26 abutting the lower end of the body B, and suitable provision may be made for holding said agitator against vertical sliding. For this purpose, studs 27 are shown projecting inwardly from the tube 8, into a circumferential groove 28 in the upper portion of the agitator. The upper end of this agitator is provided with a central, steeply pitched nut 29 and with one or more openings 30, said openings serving to place the interior of the agitator in communication with the upper portion of the suction cylinder S. For lightness, the side wall of the agitator 24 may also be formed with openings 31. At its lower end, this agitator is provided with an upwardly opening check valve 32 which may well be embodied in a coupling 33 which connects the scoop-like portion 25 with the body portion of said agitator.

Slidable in the suction cylinder S, above the agitator 24, is a suction piston 34 whose upward movement creates suction through the agitator 24, to draw sediment or the like into the latter, as will be clear from Fig. 3. Rigidly secured to this piston 34 and projecting downwardly from it through the nut 29, is a steeply pitched screw 35. Piston 34 is held against rotation by means hereinafter described, screw 35 is held against rotation with respect to said piston, and it thus follows that upon ascent of this piston, the screw 35 and nut 29 co-operate with each other in effecting rotation of the agitator 24, thus not only agitating any sediment or the like in the bottom of the well, but causing the scoop 25 to scrape the well bottom and assist in elevating the material into the tool, as upward suction is being created by the piston 34.

Two piston rods 36 are shown secured to and rising from the piston 34. These rods pass through stuffing boxes 37 in the member 9 and are secured at their upper ends to a pressure piston 38 which is operable within the pressure cylinder P. This piston 38 and the rods 36 constitute operating means for the suction piston 34 and the rods hold this piston 34 and the screw 35 against rotation.

A tube or other passage 39 leads from the compressed air chamber C into the lower end of the pressure cylinder P, said passage being provided with a valve 40 which is normally closed. The rod 23 above described however, is connected with this valve and when this rod is depressed by movement of the toggle links 16 to the position of Fig. 3, the valve is automatically opened to permit the travel of compressed air from the chamber C into the pressure cylinder P, under the piston 38, thereby effecting upward sliding of the latter.

41 denotes a suitable air-admission valve for the chamber C; 42 has reference to an air-escape valve or the like for the upper end of the pressure cylinder P; 43 denotes an air-escape valve which permits outflow of air from the lower end of cylinder P when piston 38 is being lowered, at which time air may enter the upper end of said cylinder through the valve or the like 42; and 44 has reference to a vent or other suitable means which permits discharge of air from the upper end of cylinder S upon ascent of piston 34 and permits entrance of air into said cylinder, upon descent of this piston. As to the details of the parts 40—41—42—43 and 44, the present application is not concerned, and these or equivalent parts may be of any desired construction.

In operating the device, it is connected with a line or rod and with the parts in the relative positions shown in Figs. 1 and 2, the chamber C is filled with compressed air at appropriate pressure. The entire device is then lowered into the well until it strikes the bottom of the latter, at which time the weight of the coupling 14 and the rod or cable above it, causes outward buckling of the toggle links 16, thus simultaneously depressing the rod 23 and bringing the sharp-edged rollers 20 into contact with the well casing. Depression of rod 23, opens valve 40 and hence compressed air from the chamber C passes through the passage 39 into the pressure cylinder P, beneath the piston 38. The air pressure causes upward travel of this piston as shown in Fig. 3, causing the rod 36 to similarly move the suction piston 34. This piston carries with it, the screw 35 which, through its engagement with the nut 29, effects rotation of the agitator 24. This agitator not only stirs any sediment in the well but its scoop 25 scrapes the well bottom and assists in directing the sediment or the like into the interior of the

agitator while suction is being created in the latter, by means of the ascending piston 34. The check valve 32 opens to permit this entrance of material, but when the entire device is being withdrawn from the well, the valve closes to prevent discharge of such material until desired. Contact of the sharp-edged rollers 20 with the well casing of course holds the entire body B against rotation, while the agitator 24 is being operated. Without these rollers or some equivalent means, there would be danger of the tool body instead of the agitator, rotating.

When the device is withdrawn from the well, the valve 32 may be opened in any desired way, and held open while discharge of material from the interior of the agitator 24 and possibly the lower portion of the suction cylinder S, is being effected. To restore the parts to normal position, air pressure may be introduced either into the cylinder P through the vent or the like 42, or into the cylinder S through the valve or other member 44, it being understood that this pressure must exceed that which has been trapped in the pressure cylinder P under the piston 38, so that the two pistons 38—34 will be driven downwardly to their normal positions. This trapped air may either be permitted to escape through the valve or the like 43 or it may again ascend through the passage 39, into the compressed air chamber C, for further use. It is of course trapped in this chamber C by closing of the valve 40. If air from below the piston 38 be permitted to escape through the valve or the like 43, then, with the valve 40 closed, the chamber C is refilled with compressed air through the valve 41, before again lowering the device into the well. Incident to this lowering, as before, the links 16 of the cable-connecting device D, hold the valve 40 closed, through the instrumentality of the arm 22 and the rod 23. At this time, the rollers 20 are retracted from the well casing, but the links 16 stand in readiness to project these rollers against the casing and to depress the rod 23, when the tool reaches the bottom of the well.

Excellent results are obtainable from the general construction shown and described, and it is therefore preferably followed. However, within the scope of the invention as claimed, numerous variations may be made and it will be understood that the device is usable wherever such use will be of advantage, regardless of the character of the well to be cleaned and the material to be removed.

I claim:—

1. In a well cleaner, a vertically elongated tubular body having a suction cylinder at its lower end, a compressed air chamber at its upper end, and a pressure cylinder between its ends; a vertical tubular agitator rotatably mounted in the lower end of said suction cylinder and having an apertured upper end, the lower end of said agitator being provided with an upwardly opening check valve, a normally lowered suction piston in said suction cylinder above said agitator, means establishing an operative connection between said agitator and said suction piston for rotating the former upon ascent of the latter, a normally lowered pressure piston in said pressure cylinder, means connecting said suction piston with said pressure piston for raising the former upon ascent of the latter, an air passage from said compressed air chamber to the lower end of said pressure cylinder, said passage being provided with a normally closed valve, and means for opening said valve.

2. In a well cleaner, a vertically elongated tubular body having a suction cylinder at its lower end, a compressed air chamber at its upper end, and a pressure cylinder between its ends; a vertical tubular agitator rotatably mounted in the lower end of said suction cylinder and having an apertured upper end, the lower end of said agitator being provided with an upwardly opening check valve, a normally lowered suction piston in said suction cylinder above said agitator, means establishing an operative connection between said agitator and said suction piston for rotating the former upon ascent of the latter, a normally lowered pressure piston in said pressure cylinder, means connecting said suction piston with said pressure piston for raising the former upon ascent of the latter, an air passage from said compressed air chamber to the lower end of said pressure cylinder, said passage being provided with a normally closed valve, a line-connecting device connected with the upper end of said body and embodying a part disposed in one position when said connecting device is under strain, but movable to another position when said connecting device is freed of strain upon complete lowering of the body, and connecting means between said movable part and said valve for opening the latter upon movement of said part to said other position.

3. In a well cleaner, a vertically elongated tubular body having a suction cylinder at its lower end, a compressed air chamber at its upper end, and a pressure cylinder between its ends; a vertical tubular agitator rotatably mounted in the lower end of said suction cylinder and having an apertured upper end, the lower end of said agitator being provided with an upwardly opening check valve, a normally lowered suction piston in said suction cylinder above said agitator, means establishing an operative connection between said agitator and said suction piston for rotating the former upon ascent of the latter, a normally lowered pressure piston in said pressure cylinder, means connecting said suction piston with said pressure piston for raising the former upon ascent of the latter, an

air passage from said compressed air chamber to the lower end of said pressure cylinder, said passage being provided with a normally closed valve, a line-connecting device connected with the upper end of said body and embodying a part disposed in one position when said connecting device is under strain but movable to another position when said connecting device is freed of strain upon complete lowering of the body, connecting means between said movable part and said valve for opening the latter upon movement of said part to said other position, and normally retracted casing-engaging means to prevent rotation of said body, said means being connected with a movable part of said line-connecting device to be projected against the casing substantially concurrently with opening of said valve.

4. In a well cleaner, a vertically elongated tubular body having a suction cylinder at its lower end, a compressed air chamber at its upper end, and a pressure cylinder between its ends; a vertical tubular agitator rotatably mounted in the lower end of said suction cylinder and having an apertured upper end, the lower end of said agitator being provided with an upwardly opening check valve, a normally lowered suction piston in said suction cylinder above said agitator, means establishing an operative connection between said agitator and said suction piston for rotating the former upon ascent of the latter, a normally lowered pressure piston in said pressure cylinder, means connecting said suction piston with said pressure piston for raising the former upon ascent of the latter, an air passage from said compressed air chamber to the lower end of said pressure cylinder, said passage being provided with a normally closed valve, a line-connecting coupling above the body, toggle links connecting said coupling with the upper end of said body and adapted to buckle upon complete lowering of said body, means connecting said links with said valve for opening the latter when said links buckle, and sharp-edged means on said toggle links to then engage the well casing and hold the aforesaid body against rotation.

5. In a well cleaner, a tubular body open at its lower end, a tubular agitator rotatably mounted in said lower end of said body, said agitator having an opening in its upper end and an upwardly opening check valve at its lower end, vertically movable means for rotating said agitator and means for creating upward suction therein said suction means being mounted in said tubular body.

6. In a well cleaner, a tubular body open at its lower end, a tubular agitator rotatably mounted in said lower end of said body, said agitator having an opening and a central steeply pitched nut at its upper end and an upwardly opening check valve at its lower end, a normally lowered suction piston non-rotatable in said body above said piston and passing through said nut, and means for raising said piston to effect rotation of said agitator and produce upward suction therein.

7. In a well cleaner, a tubular body and an upwardly opening check valve at the lower end thereof, said body having a suction cylinder above said valve, a pressure cylinder above said suction cylinder, and a compressed air chamber; a normally lowered suction piston in said suction cylinder to draw sediment into the body upon ascent of said suction piston, a normally lowered pressure piston in said pressure cylinder connected with said suction piston for raising the latter, an air passage from said compressed air chamber into the lower end of said pressure cylinder, said passage having a normally closed valve, and means for opening said valve.

8. In a well cleaner, a tubular body and an upwardly opening check valve at the lower end thereof, said body having a suction cylinder above said valve, a pressure cylinder above said suction cylinder, and a compressed air chamber; a normally lowered suction piston in said suction cylinder to draw sediment into the body upon ascent of said suction piston, a normally lowered pressure piston in said pressure cylinder connected with said suction piston for raising the latter, an air passage from said compressed air chamber into the lower end of said pressure cylinder, said passage having a normally closed valve, a cable-connecting device connected with the upper end of said body and embodying a part movable from a normal position to another position when said connecting device is freed of strain upon complete lowering of the body, and means operatively connecting said movable part with said valve for opening the latter when said part moves to said other position.

9. In a well cleaner, a body, pneumatically-operated cleaning means carried by said body, said means having a normally closed valve, opening of which effects operation of said means, a line-connecting device connected with the upper end of the body and embodying a part disposed at one position when said device is under strain but movable to another position when said device is released of strain upon complete lowering of the body, and means operatively connected with said part and said valve for opening the latter, upon movement of said part to said other position.

10. In a well cleaner, pneumatically-operated cleaning means carried by said body, said means having a normally closed valve, opening of which effects operation of said means, a line coupling above the body, toggle links connecting said coupling with said body and adapted to buckle upon complete lowering of the body, and connecting means

between said valve and said links for opening the latter upon buckling of said links.

11. In a well cleaner having a body to be non-rotatably held when completely lowered into a well; a line coupling above the body, toggle links connecting said coupling with the body and adapted to buckle upon complete lowering of said body, and sharp-edged means on said links to then contact with the well casing and hold the body against rotation.

12. In a well cleaner having a body to be non-rotatably held when completely lowered into a well; a line coupling above the body, toggle links connecting said coupling with the body and adapted to buckle upon complete lowering of said body, and sharp-edged rollers on the central pivots of said links to contact with the well casing upon buckling of said links, thereby holding the body against rotation.

In testimony whereof I have hereunto affixed my signature.

POSEY R. SHORT.