Nov. 28, 1939. P. F. JENNINGS 2,181,187

WELL FISHING TOOL

Filed Aug. 26, 1938

Fig. 1.

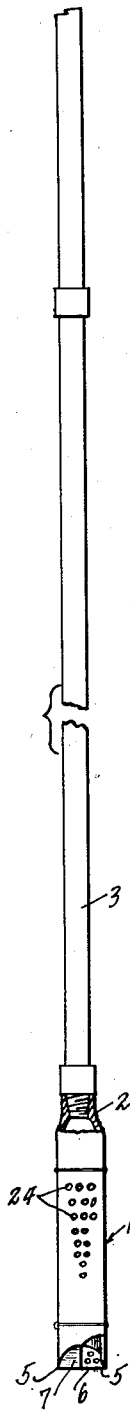
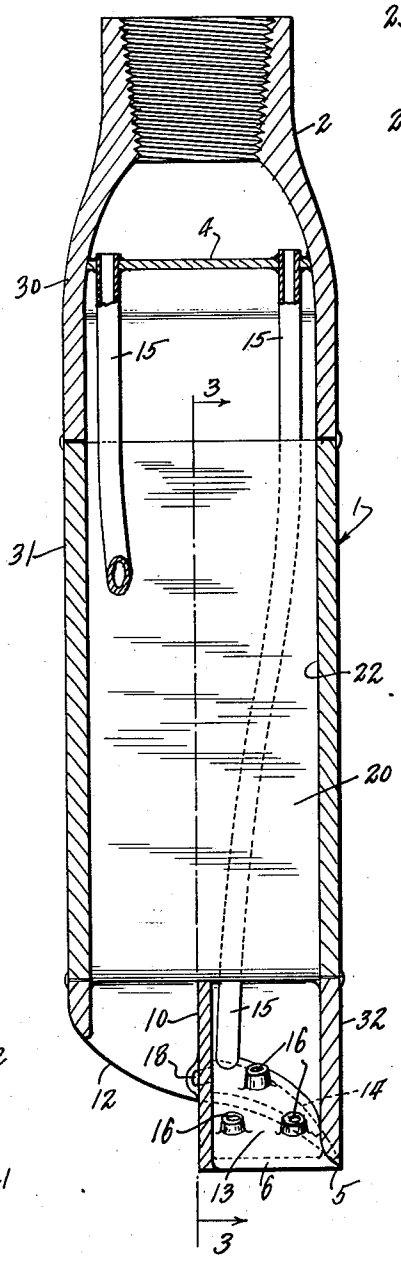


Fig. 2.



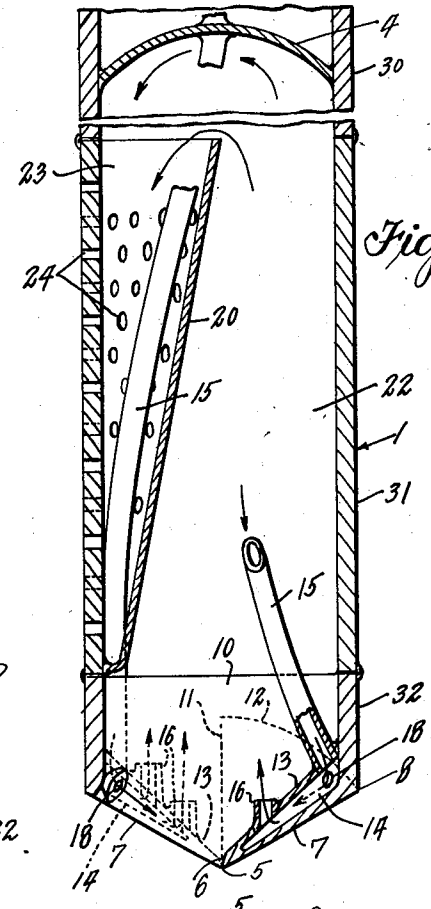


Fig. 3.

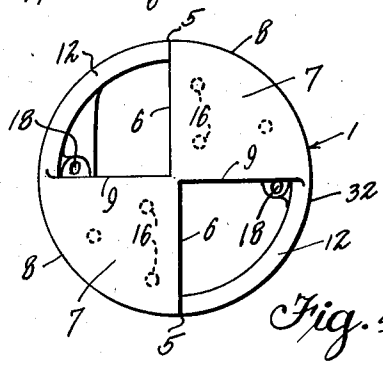


Fig. 4.

Inventor

Paul F. Jennings

By Lyon & Lyon

Attorneys

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## WELL FISHING TOOL

Paul F. Jennings, Alhambra, Calif.

Application August 26, 1938, Serial No. 226,935

6 Claims. (Cl. 294—1)

This invention relates to devices for removing solid objects from drill holes and particularly to devices capable of picking up and retaining relatively small, loose objects, as distinct from fishing tools intended to seize and withdraw relatively large objects stuck in a well hole.

An object of the invention is to provide a simple, inexpensive, and particularly effective, tool for removing small, loose objects from drill holes.

Other more specific objects and features of the invention will become apparent from the detailed description of a particular embodiment thereof to follow:

Briefly, the invention comprises a device which is lowered to the bottom of the well and supplied with fluid under pressure, the device defining a chamber or trap in which loose objects in the well are washed by suitably positioned jets of fluid. The device may be secured to the lower end of a drill pipe and rotated by the drill pipe in contact with the bottom of the well, the pressure fluid being applied through the drill pipe.

Referring to the drawing, which depicts one form that the invention may take:

Fig. 1 is a side elevation view of my device, with parts broken away, shown secured to the lower end of a drill string;

Fig. 2 is a vertical sectional view through the device;

Fig. 3 is a vertical sectional view, taken at right angles to the view of Fig. 2, and substantially in the plane III—III of Fig. 2; and

Fig. 4 is a lower end view of the device.

As shown in the drawing, my device comprises a tubular shell 1, the major portion of which is substantially cylindrical in shape, and preferably diametrically dimensioned to substantially fill the bore hole to be cleaned. The upper end of the shell 1 may be provided with a reduced neck 2 internally threaded to receive the threaded lower end of a drill pipe 3. An upper end wall 4 is provided in the shell 1 immediately below the neck portion 2 so that except for fluid passages to be hereinafter described the space within the shell below the wall 4 is segregated from the space within the neck portion of the shell, the latter being in communication with the drill pipe connected thereto.

The shell 1, at its lower end, has the general configuration of a twist drill. Thus the cylindrical wall of the shell terminates in two diametrically spaced apart tips 5, which points are interconnected along a diametrical line by a pair of oppositely directed lips 6, the two lips merging into each other at the central axis of the shell and each extending therefrom to one of the points 5. Each of the lips 6 merges into an inclined wall 7. Each inclined wall 7 merges at its peripheral edge 8 into the cylindrical wall of the shell, and also has a straight edge 9 extending substantially at right angles to the edge 6. The two edges 9 of the inclined wall 7 merge into a diametrically extending partition wall 10 extending upwardly into the shell 1 for a short distance. The shell 1 is cut away immediately in front of each lip 6 to provide an opening into the shell of liberal dimensions. Thus extending upwardly from each point 5, the edge of the shell is defined by a vertical line 11. This vertical edge 11 merges at its upper end into a curved edge 12 which extends to the juncture of the inclined wall 7 with the shell.

Positioned within each of the inclined bottom walls 7 is a false bottom 13 defining a fluid passage 14 which is communicated with the neck portion of the shell above the partition 4 by a tube 15 which extends upwardly closely adjacent the wall of the shell. Each of the false bottoms 13 is provided with a plurality of upwardly directed nozzles 16 from which fluid is projected when the device is in operation. Each of the passages 14 also communicates with a nozzle 18 positioned closely adjacent the junctures of the partition wall 10 with the inclined wall 7 and the cylindrical wall of the shell. These nozzles 18 are so directed as to project a stream of water downwardly at an angle toward the adjacent lip 6. The direction of each nozzle 18 is preferably such as to strike the bottom of the well on which the tool is resting at a point immediately in front of the lip 6 so as to urge any loose object in the path of the jet upwardly along the false bottom 13, where it will be entrained in the stream of fluid produced by the jets from the nozzles 16 and carried upwardly into the shell.

To retain objects carried up into the shell by the flow of fluid thereinto, a trap is provided. This trap is defined by a portion of the shell 1 and a partition wall 20. The partition wall 20 is substantially flat and merges at its side and lower edges into the cylindrical wall of the shell 1. Thus the upper edge of wall 20 extends substantially diametrically across the shell at a level substantially below the partition wall 4. The wall 20 is inclined from the vertical so that its extreme lower end merges into the shell 1 at a level closely adjacent the upper edge of the partition 10. As shown in Figs. 2 and 3, the plane of the wall 20 is perpendicular to the plane of the wall 10.

It will be observed that the wall 20 divides the space within the shell 1 into two main chambers 22 and 23, respectively, the chamber 22 having cross sectional dimensions substantially equal to the full cross sectional dimensions of the shell, at the lower end of chamber 22, but diminishing to a cross sectional area equal to substantially half the cross sectional area of the shell 1, at the upper end of partition 20. The chamber 23 at its upper end has cross sectional area substantially equal to the cross sectional area of chamber 22,

but the chamber 23 converges downwardly as the partition 20 approaches the wall of the shell. That portion of the shell 1 defining the chamber 23 is provided with numerous small perforations 24 for the escape of fluid.

The wall 4 is preferably of cylindrically curved shape, with its concave side down, as shown in Fig. 3, so that the passage between the upper end of the partition 20 and the under surface of the wall 4, is smoothly curved to facilitate fluid flow from chamber 22 to chamber 23.

The device described functions as follows:

Assume that the device is secured to the lower end of a drill string 3, as shown in Fig. 1, and is lowered to the bottom of a well containing loose objects (for example, small parts of a broken roller bit), to be removed. With the device resting on the bottom of the well, the drill string is slowly rotated clockwise while water or drilling fluid under pressure is circulated down through the drill pipe. The scraping action of the lips 6 on the bottom of the well tends to collect any loose objects on the bottom of the well. At the same time, the pressure fluid supplied through the drill pipe is forced through the tubes 15 into the passages 14 and thence at high velocity out through the nozzles 16 and 18. The streams issuing from the nozzles 18 tend to wash any loose objects adjacent the lip 6 up onto the inclined false bottom walls 13. At the same time jets of fluid issuing from the nozzles 16 produce a rapid circulation of fluid upwardly through the chamber 22, down into the chamber 23 and thence out through the holes 24. Any solid object of size small enough to enter into the tool through the opening defined by the edges 11 and 12, and the partition 10, are carried with the stream of fluid into the chamber 23, where they are retained, if they are larger than the holes 24. After the operation of rotating the shell while supplying pressure fluid thereto has been continued for a short time, the tool is withdrawn from the well with the foreign objects trapped in the chamber 23.

The jets issuing from the nozzle 16 have an injector action which draws in substantial additional quantities of fluid through the openings in the lower end of chamber 22. The rush of fluid into the chamber created in this way has a strong tendency by itself to carry any loose foreign objects on the bottom of the well into the tool.

The particular device shown in the drawing is constructed from several separate elements, by welding them together. Thus the shell 1 comprises upper, intermediate and lower sections 30, 31 and 32 welded together. The partition 20 is welded to the intermediate member 31; the partition 4 is welded to the upper member 30, and the wall members 7, 13 and 10 are welded to the lower section 32 prior to the welding together of the sections 30, 31 and 32 themselves. However, it will be obvious to those skilled in the art that the tool can be made in other ways, as, for instance, by casting.

For purposes of explanation, a specific embodiment of the invention has been described in detail, but numerous possible changes from the specific structure will appear to those skilled in the art, and the invention is to be limited only as set forth in the appended claims.

I claim:

1. A fishing tool of the type described comprising, a hollow body member adapted to be lowered into a hole to be cleaned, said member defining therewithin two chambers interconnected at their upper ends, one of said chambers being permanently closed at its lower end, and the other being open at its lower end, nozzle means adjacent said lower open end, and means for supplying fluid under pressure to said nozzle means, the latter being so positioned as to direct a jet of fluid issuing therefrom upwardly into the other of said chambers.

2. A fishing tool of the type described comprising, a hollow body member adapted to be lowered into a hole to be cleaned, said member defining therewithin two chambers interconnected at their upper ends, one of said chambers being permanently closed at its lower end and the other being open at its lower end, nozzle means adjacent said lower open end, and means for supplying fluid under pressure to said nozzle means, the latter being so positioned as to direct a jet of fluid issuing therefrom upwardly into the other of said chambers, said one chamber being provided with openings for the escape of fluid therefrom while retaining solid objects entrained in said fluid.

3. A fishing tool of the type described comprising, a hollow body member adapted to be lowered into a hole to be cleaned, said member defining therewithin two chambers interconnected at their upper ends, one of said chambers being permanently closed at its lower end, and the other being open at its lower end, nozzle means adjacent said lower open end, means for supplying fluid under pressure to said nozzle means, the latter being so positioned as to direct a jet of fluid issuing therefrom upwardly into the other of said chambers, said body member comprising a substantially cylindrical exterior wall with a partition extending diagonally therewithin and constituting the separating wall between said two chambers whereby said one chamber diminishes in cross sectional area from top to bottom, and the other chamber increases in cross sectional area from top to bottom.

4. A fishing tool as described in Claim 3, in which the lower edge of said partition wall merges into said cylindrical wall above the lower end of the latter, whereby the lower portion of said other chamber occupies substantially the entire lower end of said cylindrical wall member.

5. A fishing tool as described in Claim 1, in which the lower end of said body member has an inclined lip portion, the lower edge of which is adapted to scrape against the bottom of a hole in response to rotation of the tool thereon and scoop up objects on said bottom, said lower edge in part defining the open lower end of said other chamber and said nozzle means being positioned adjacent said edge and directed upwardly to create a flow of fluid into said other chamber over said lip portion.

6. A fishing tool as described in Claim 1, in which the lower end of said body member has an inclined lower portion, the lower edge of which is adapted to scrape against the bottom of a hole and scoop up objects on said bottom in response to rotation of the tool, said lower edge in part defining the open lower end of said chamber and additional nozzle means positioned above and in front of said lower edge and directed theretoward, whereby a stream of fluid issuing from said nozzle tends to wash loose objects positioned against said lower edge thereover and into said other chamber.

PAUL F. JENNINGS.