

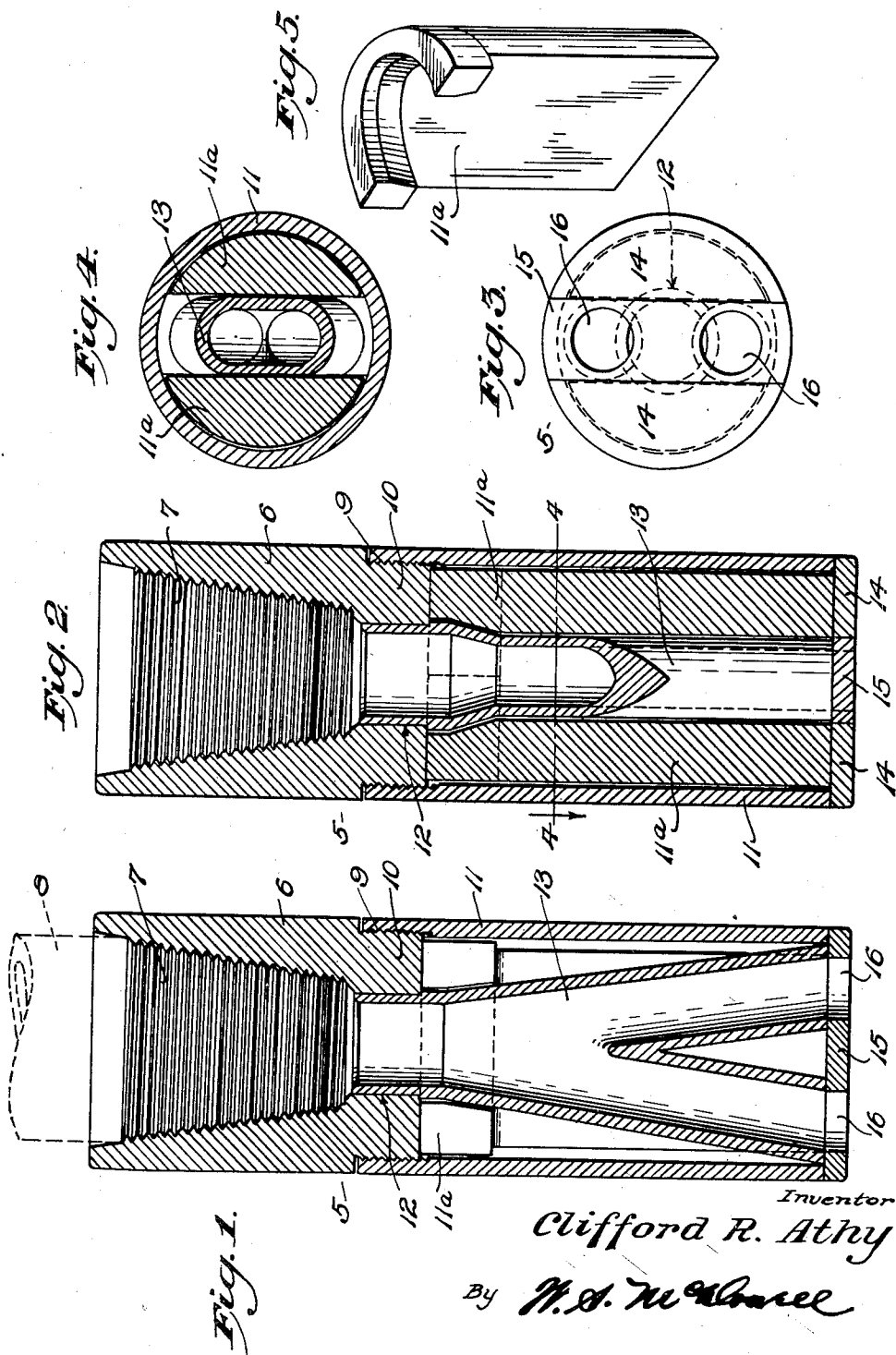
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C. R. ATHY

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RETRIEVING TOOL FOR WELL BORES

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Inventor
Clifford R. Athy

By *W. S. McNamee*

Attorney

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RETRIEVING TOOL FOR WELL BORES

Clifford R. Athy, Columbus, Ohio, assignor to International Derrick and Equipment Company, Columbus, Ohio, a corporation of Ohio

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2 Claims. (Cl. 294—65.5)

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This invention provides an improved tool adapted for use in removing metallic bodies or objects from the bottom of a well bore.

It often happens in the drilling of oil wells and the like that the drilling bits employed in the operation will break, thus leaving fragments of hardened steel in a loose or free state at the bottom of the well bore. To continue further drilling of the well, it is necessary to remove such fragments, since otherwise they would cause damage to other drills contacting therewith. At present the well-drilling art employs quite generally, under conditions of the nature specified, mechanically operating jaw devices which are cable suspended and, through manipulation, are adapted to grip loose solid bodies or objects resting on the bottom of a well bore to admit of the lifting and removal of the same from the bore.

Such mechanical gripping tools, however, cannot be manipulated with any appreciable degree of certainty from the top of a well bore. When it is considered that in oil well drilling particularly, a well bore may possess a depth measured in thousands of feet, the difficulties in manipulating a mechanical gripping tool to cause it to grip the object sought to be retrieved, disposed many feet below and entirely out of sight, are manifest. Their use is entirely a hit or miss in character. If fortunate in gripping the body sought, the operation may be carried out with reasonable promptness, but it is not uncommon for such an operation to require many hours, even days, before the object sought is successfully removed, and, of course, during the operation, well drilling is entirely stopped and the drilling crew and equipment remain idle with accompanying high cost.

Therefore, it is an object of the present invention to provide an improved retrieving tool for rendering the operation of removing loose drilling obstructing ferrous bodies from the bottom of a well bore, and doing so in a more certain and expeditious manner.

Another object is to provide a tool for the purpose set forth in which a permanent magnet is used as the means for effecting adherence thereto of the metallic body or bodies required to be removed from a well bore.

A further object is to provide a retrieving tool of this nature in which provision is made for ejecting a fluid under forced flow therefrom for the purpose of producing a fluid suspension of the fine solids, such as sand or other earthy matter, which are usually present in the bottom of a well bore undergoing drilling so that such par-

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ticles will not interfere with the contacting of the magnetic tool with the metal objects sought to be removed.

With these and other objects in view, the invention consists in the novel features of construction, combinations of elements and arrangements of parts hereinafter more fully described and pointed out in the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view taken through the improved magnetic retrieving tool comprising the present invention;

Fig. 2 is a similar view taken on a plane perpendicular to that of Fig. 1;

Fig. 3 is a bottom plan view;

Fig. 4 is a sectional view on the line 4—4 of Fig. 2;

Fig. 5 is a perspective view of one of the magnet halves.

Referring to the drawings, the numeral 5 designates my improved magnetic retrieving tool in its entirety. In the specific embodiment thereof illustrated, the same is formed to provide a steel head 6, which is formed internally with a conical and threaded socket 7, the latter being adapted for the reception of the correspondingly threaded lower end of a string of drill pipe 8, extending to the top of a well bore in which the tool is used, and through which tubing water, or other liquid, is passed.

The lower end of the head is angularly shouldered, as at 9, and formed with an externally threaded extension 10 of reduced diameter. Adapted for engagement with the threads of the extension 10 are internal threads provided at the upper end of a tubular brass casing 11. The socket 7 terminates at its lower end in a bore 12 in which is positioned and firmly secured the tubular upper end of an inverted Y-shaped water-discharging nozzle 13, formed of a non-magnetic material, preferably of austenitic stainless steel, said nozzle being disposed within the confines of the casing 11.

Positioned in the tool between the casing 11 and the nozzle 13, and arranged below the head 6, is a permanent magnet 11a which may be an iron alloy containing aluminum, nickel and cobalt. However, it will be understood that I may use any other suitable metal or metals having the desired magnetic properties. The magnet is formed in two halves, in order that it may be placed around the nozzle 13 and to be substantially coextensive therewith. The lower end of the casing is closed by a pair of outer, segmental steel plates 14—14 and an intermediate

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brass bar 15, the outer edges of the plates 14 and the bar 15 being brazed or otherwise permanently attached to the adjacent lower edge regions of the casing 11. The bar 15 is provided with a pair of water outlets 16, which are disposed in registration with the lower diverging ends of the nozzle 13.

In the use and operation of the tool, when it is desired to retrieve a loose fragment of steel or the like, such as a rock bit cutter, or part thereof, from the bottom of a well bore, a string of drill pipe having the retrieving tool on the bottom thereof is lowered until the retrieving tool is positioned on or immediately adjacent to the bottom of the well bore. Fluid is then passed through the tubing and issues in a divided stream through the outlet 16 in forceful jets. This produces a turbulent suspension of sand or other fine earthy particles in water so that the magnetic retrieving tool may be brought readily into attracting contact with the metal object or objects sought to be retrieved. When such contact is established, the drill pipe with the retrieving tool and the metal object or objects attracted thereby are elevated through the use of the customary drilling rig or derrick apparatus. The operation may be quickly carried out, as compared with other standard modes of procedure and with complete assurance as to the success of the operation.

The permanent magnet has high magnetic powers, particularly when formed from the alloy described and is capable of attracting and holding on the bottom of the tool metal objects weighing as much as 100 pounds. The use of the permanent magnet is preferable over an electromagnet, since it eliminates the necessity of extending current conductors to the bottom of a well bore. The divided nozzle 13 provides for the issuance of spaced jets of fluid under pressure from the lower end of the tool, which increases the turbulence of the mud-laden fluid so that the tool readily penetrates the formations in the bottom of the well in reaching the metal to be recovered.

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I claim:

1. A magnetic retrieving tool for well bores comprising a casing, a sectional permanent magnet mounted within said casing, means for attaching the upper end of said casing to the lower end of a fluid-supplying pipe system, and a nozzle positioned in said casing between the sections of said magnet, the upper end of said nozzle communicating with said pipe system and the lower portion of said nozzle terminating in diverging fluid outlets opening to the bottom of the casing.

2. A magnetic retrieving tool for well bores comprising a casing, a sectional permanent magnet mounted within said casing, means for attaching the upper end of said casing to the lower end of a fluid-supplying pipe system, a nozzle positioned in said casing between the sections of said magnet, the upper end of said nozzle communicating with said pipe system and the lower portion of said nozzle terminating in diverging fluid outlets opening to the bottom of the casing, and a closure for the bottom of said casing embodying a pair of outer plate sections of magnetic materials and an intervening bar section of non-magnetic material, said intermediate bar section being formed with openings registering with the diverging outlets of said nozzle.

CLIFFORD R. ATHY.

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