Oct. 12, 1948. R. L. MANEGOLD 2,451,231

MAGNET

Filed Dec. 11, 1944

FIG. 1.

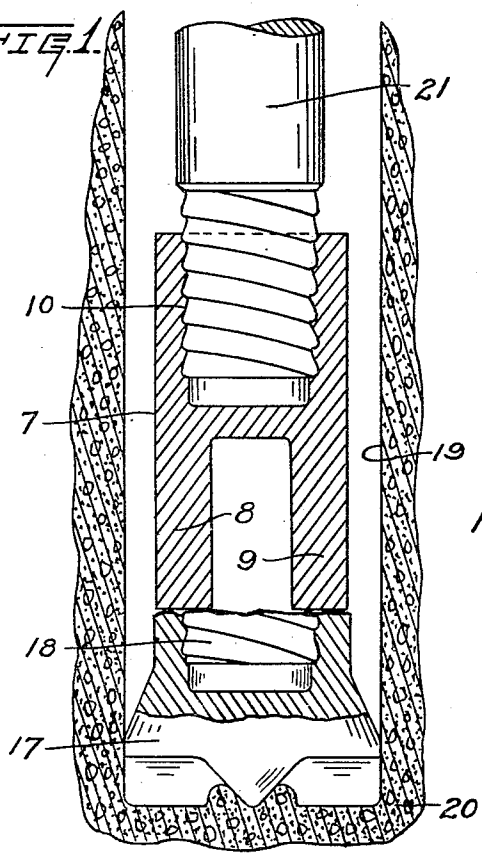


FIG. 4.

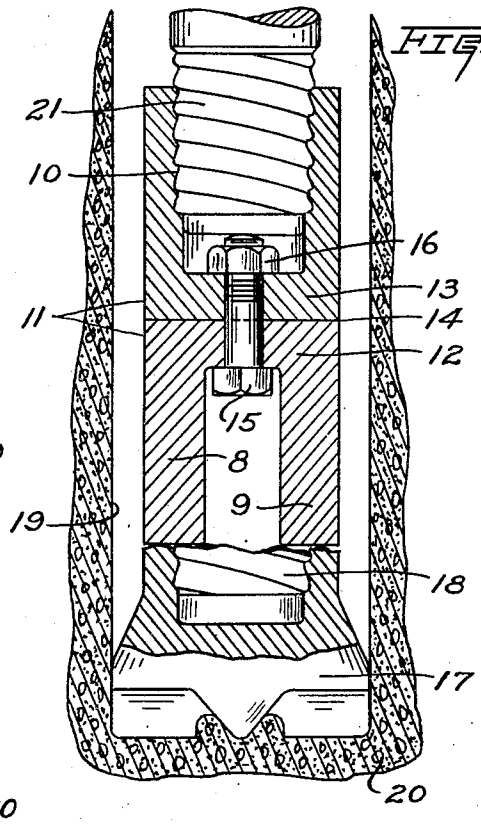


FIG. 2.

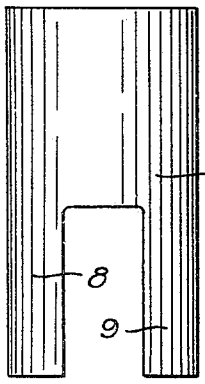


FIG. 5.

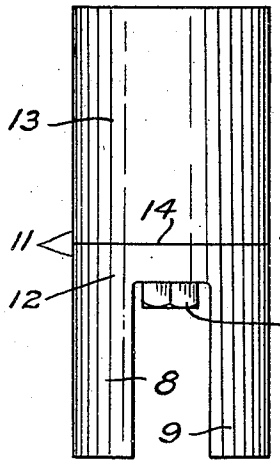
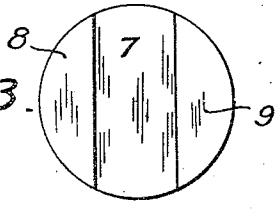


FIG. 3.



INVENTOR.
Robert L. Manegold
BY
Lieber & Lieber
ATTORNEYS

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MAGNET

Robert L. Manegold, Milwaukee, Wis., assignor to Dings Magnetic Separator Co., Milwaukee, Wis., a corporation of Wisconsin

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5 Claims. (Cl. 294—65.5)

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This invention relates in general to apparatus for removing undesirable metallic objects from cavities, and relates more specifically to an improved magnet for effecting withdrawal of broken drill bits or the like from deep holes in which the defective bits have become lodged during formation of the holes.

The primary object of my invention is to provide an improved simplified and highly efficient magnet for effecting ready removal of broken drill rods, bits or the like from holes within which the broken parts have become lodged.

When drilling holes in rock, concrete, ore, and the like, with the aid of so-called rock drills, it frequently happens that the drill rods or bits break away from the drill rod and become lodged in the bottoms of the holes after considerable drilling depth has been attained. In such cases, it is necessary in order to continue the drilling operation in the same holes, to remove the obstructing broken off bit points, and if this cannot be done, new holes must be drilled at considerable expense and effort. While various methods of removing such broken drill bit fragments from the holes within which they are confined, have heretofore been proposed, these prior methods and apparatus were so ineffective and complicated, that the trade would usually resort to the drilling of new holes rather than attempting to salvage the plugged ones.

Recent developments in the production of permanently magnetic alloys, such as a mixture of aluminum, nickel, cobalt and iron, have made it possible to produce very compact and powerful U-shaped magnets, and I have discovered that such a permanent magnet can be utilized to great advantage for the removal of magnetic objects such as drill bits fragments from deep cavities or the like. Such permanently magnetic compositions are however extremely hard and cannot be machined by ordinary methods, and since it is necessary to insert and to manipulate the bit removing magnets within the holes, some means must be provided for such purposes. The most convenient manner of thus handling the U-shaped magnet, is to make the same readily detachably applicable to the threaded end of an ordinary drill rod, and I have found that this may be done by providing the permanent U-shaped magnetic body with a threaded end socket the same as that which is formed in the ordinary standard drill bit. Such a socket may either be cast directly within the magnet when the latter is being initially formed, or it may be produced in a separate socket element secured to the cast

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magnet body by a single bolt or the like, thus avoiding necessity of machining the hard magnetic material.

It is therefore a more specific object of the present invention to provide a new and useful permanently magnetic and powerful drill bit remover, having magnetic poles of opposite polarity at one end, and being provided at its opposite end with a socket formed for detachable attachment to an ordinary drill rod, either by screw threading or otherwise.

Another specific object of this invention is to provide an extremely simple, compact, and efficient drill bit removing magnet adapted to be readily inserted and manipulated within a hole containing a broken bit or other obstruction, with the aid of a standard drill rod.

Still another specific object of my invention is to provide an improved drill bit removing implement comprising a hard permanently magnetic prismatic body formed by casting and having a U-shaped permanent magnet at one end and a screw threaded socket at its opposite end, and adapted to be conveniently inserted within and removed from relatively deep holes drilled in rock, concrete or the like.

These and other specific objects of the invention will be apparent from the following detailed description.

A clear conception of the features constituting my present improvement, and of the mode of constructing and of utilizing several types of my improved drill bit removing magnet, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a central longitudinal section through a one-piece drill bit removing magnet embodying the invention, showing the same in the act of removing a broken drill bit and rod end from a hole formed by the bit;

Fig. 2 is a side elevation of the one-piece bit removing permanent magnet of Fig. 1;

Fig. 3 is an end view of the same magnet looking toward the magnetic poles;

Fig. 4 is a central longitudinal section through a modified two-section drill bit removing magnet also embodying the invention, likewise showing the same in the act of removing a broken drill bit and rod end from a hole previously formed by the bit; and

Fig. 5 is a side elevation of the compound magnetic bit remover shown in Fig. 4.

While the invention has been shown and de-

scribed herein as having special utility for the removal of broken drill bits from holes, it is not my desire or intent to unnecessarily restrict the scope or utility of the improvement for other purposes.

Referring especially to Figs. 1 to 3 inclusive, the improved drill bit remover shown therein comprises in general a one-piece prismatic body 7 formed of hard material adapted to be intensely permanently magnetized, having parallel laterally spaced poles 8, 9 of opposite polarity at one end, and also having an internally screw threaded socket 10 provided in its opposite end.

Referring more particularly to Figs. 4 and 5, the modified improved drill bit remover shown therein, comprises generally a prismatic body 11 formed of one end section 12 of hard material adapted to be intensely permanently magnetized and having laterally spaced poles 8, 9 of opposite polarity formed integral therewith, and another end section 13 of ordinary machineable material provided with a screw threaded socket 10, the sections 12, 13 coacting with each other along plane intervening surfaces 14 and being firmly united by means of a bolt 15 and nut 16 coacting therewith.

The bodies 7, 11 may be cylindrical as shown, or of any other suitable prismatic shape, and the body 7 and the end section 12 of the body 11 are preferably formed by casting, of very hard and relatively non-machineable metal composition such as "Alnico" comprising in general a combination of aluminum, nickel, cobalt and iron. Such material while being most difficult to machine or finish with the aid of cutting tools, is adapted to be intensely permanently magnetized, so as to provide U-shaped magnets having powerful magnetized poles 8, 9 of opposed polarity. When the one-piece body 7 of Figs. 1, 2 and 3 is cast, the relatively rough internal screw threads of the socket 10 thereof, are preferably formed during the initial casting operation; but in the modified two-section body 11 of Figs. 4 and 5, the section 12 may be cast with a central hole for receiving the bolt 15, while the other section 13 may be formed of softer metal in which the screw threads of the socket 10 may be readily cut and the bolt receiving hole may be easily drilled. Both types of prismatic magnetized bodies 7, 11, however function and are usable in like manner, so that a description of the normal use of one will suffice for the other.

During normal use of the improved drill bit removing magnet, and assuming the same to have been properly constructed as above described, either device may then be utilized to quickly and effectively remove a drill bit fragment 17 and broken rod end 18 embedded therein, from a deep hole 19 previously formed by the drill bit in a bed of rock or concrete 20, in the following manner. Loose debris should preferably be initially flushed from within the hole 19 in a well known manner, so as to leave the broken surfaces of the fragment 17 and rod end 18 exposed, whereupon the body 7 may be applied to the threaded end of a drill rod 21 in an obvious manner. The drill rod 21 may then be utilized to insert the magnet body 7 within the hole 19 so as to bring the prongs or poles 8, 9 of the magnet in contact with the broken surfaces of the fragment 17 and rod end 18, after which the drill rod 21 may also be utilized to withdraw the broken bit and rod fragment from within the hole 19. Because of the great power exerted by the poles 8, 9, this fishing operation

may be most effectively performed, and the drill bit and rod fragments can be quickly and conveniently removed so as to permit further drilling operations to be carried on.

From the foregoing detailed description it will be apparent that my present invention provides an extremely simple, compact and highly efficient appliance for effecting quick and convenient removal of drill bit fragments or the like from drilled holes of any depth. The improved drill bit removing magnet may be quickly associated with a standard drill rod 21, and conveniently manipulated to perform its function, and the improved device can also be manufactured and sold at moderate cost and may be readily manufactured in quantities to fit various sizes of drill rods 21. While the one-piece magnet assemblage of Figs. 1 to 3 inclusive is simpler than the two-section structure of Figs. 4 and 5, accurate manufacture of the device may be facilitated by forming the body of two sections, and in both cases the U-shaped magnet provides powerful instrumentality for effecting removal of the metal fragments from within the holes. While the two sections of the composite body 11 have been shown as being rigidly interconnected by means of a bolt and nut, any other suitable type of fastener may obviously be substituted for these clamping elements. It is also noteworthy that in actual practice, either the bit 17 or the threaded lower end of the drill rod 21, or both may break away from the remainder of the drill rod proper, and the improved magnet may be utilized to remove any metallic parts which may become lodged in either shallow or deep holes.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of use, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. A drill bit removing magnet, comprising, a U-shaped powerful magnet having a flat end surface and an opening therethrough between the magnetic poles thereof, an internally threaded socket having a flat end surface coacting with said magnet surface and being provided with an opening alineable with said magnet opening, and a fastener rigidly uniting said magnet and socket at said openings.

2. A drill bit removing device, comprising, a powerful U-shaped magnet of substantially cylindrical contour having an open slot in one end forming magnetic poles and being provided at its opposite end with an opening between the poles, a socketed member having internal attaching screw threads within the socket thereof and also having an opening through the bottom of the socket alineable with said magnet opening, and a fastener rigidly uniting said magnet and member at said alined openings.

3. A drill bit removing device, comprising, an intensely permanently magnetized U-shaped magnet having an opening therethrough between the poles thereof, an internally threaded socket member having an opening alineable with said magnet opening, and a fastener firmly but detachably uniting said magnet and member at said openings.

4. A drill bit removing device, comprising, an intensely permanently magnetized U-shaped magnet having an opening therethrough between the poles thereof, a socketed member having in-

ternal attaching screws within the socket thereof and also having an opening through the bottom of the socket alineable with said magnet opening, and a fastener firmly but detachably uniting said magnet and member at said openings.

5. A drill bit removing device, comprising, an intensely permanently magnetized U-shaped magnet having an open slot in one end forming magnetic poles and being provided at its opposite end with a central opening between the poles, a socketed member of approximately the same transverse cross-section having internal attaching screw threads within the socket thereof and also having a central opening through the bottom of the socket alineable with said magnet opening, and a fastener firmly uniting said magnet and member at said openings.

ROBERT L. MANEGOLD.

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