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R. W. CATCHING
ELECTROMAGNETIC TOOL
Filed March 12, 1921

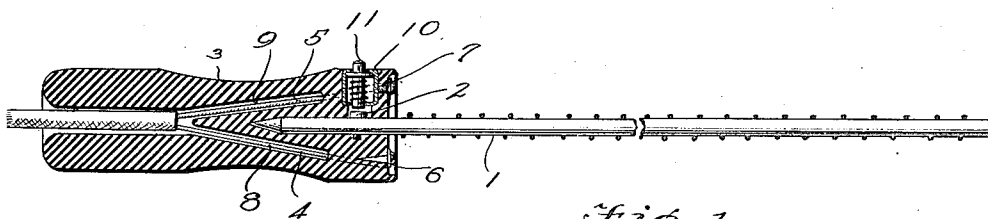


Fig. 1.

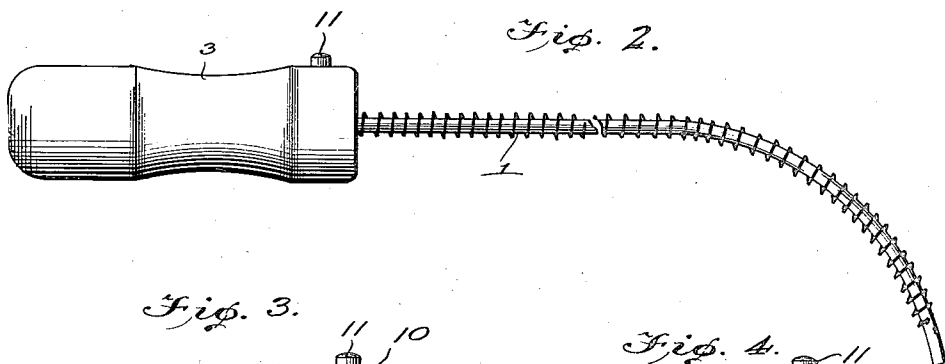


Fig. 2.

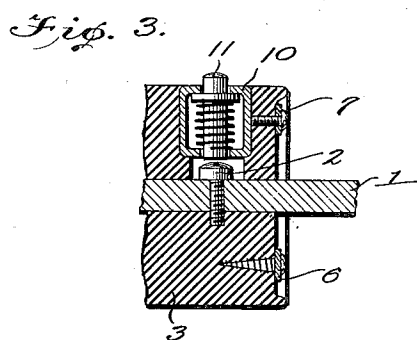


Fig. 3.

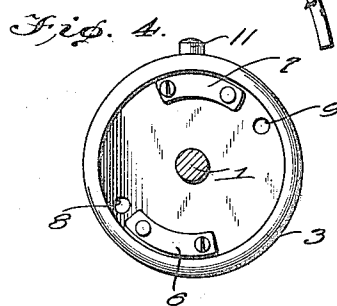


Fig. 4.

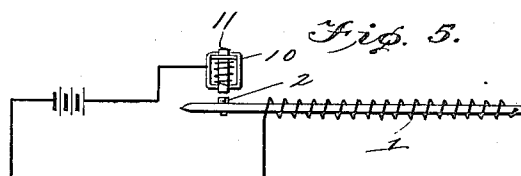


Fig. 5.

WITNESSES

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ROY WEBER CATCHING, OF ROSEBURG, OREGON.

ELECTROMAGNETIC TOOL.

Application filed March 12, 1921. Serial No. 451,833.

To all whom it may concern:

Be it known that I, ROY W. CATCHING, a citizen of the United States, and a resident of Roseburg, in the county of Douglas and State of Oregon, have invented certain new and useful Improvements in Electro-magnetic Tools, of which the following is a specification.

My invention relates to electro-magnetic tools of the kind employed for picking up and recovering articles of magnetic material which have found lodgment in places inconvenient or impossible of access by other means ordinarily available. The invention is particularly designed to be used as part of an automobile equipment for picking up small pieces, such as nuts, bolts, spring locks, small wrenches and other small pieces of iron which have been dropped in and around the motor where they can be reached very inconveniently, or not at all, by the means ordinarily at hand.

An object of the invention is to provide a tool of the above mentioned character which can be easily and quickly adjusted to conform to passages of various forms and to retrieve objects lodged around corners or behind obstacles.

A further object is to provide a tool which will consume electrical energy only when in actual use and which may, therefore, be permanently connected in circuit with a source of electric energy, thus avoiding the annoyance and loss of time caused by having to make the electric connections each time it is desired to use the tool.

Other objects and advantages of the invention will become apparent as the description proceeds.

Referring to the accompanying drawings,

Figure 1 is a longitudinal section of an electro-magnetic tool embodying my invention.

Figure 2 is a side view of the same,

Figure 3 is a fragmentary sectional view through the handle member, illustrating the switch mechanism for controlling the magnet circuit,

Figure 4 is a sectional view looking toward the inner end of the handle, and

Figure 5 is a diagrammatic view illustrating the circuit connections.

The tool consists of a long slender electro-magnet 1, which is fastened by a screw 2 in an axially extending socket of a handle member 3. The magnet winding consists of

a single helix extending from end to end of the core, as shown in Figures 1 and 2. These figures however, show the winding somewhat diagrammatically, as in practice the adjacent turns will be substantially in contact. It is not an essential feature of my invention that the winding extend throughout the core, that is, from the end of the core up to the handle, nor is it essential that the winding consist of only one helix. It is only necessary that the magnet be comparatively slender so as to be able to enter small passages, that the winding should not interfere with the bending or adjustment of the magnet, and, of course, that the number of ampere turns be sufficient to generate the required flux. I have found that these requirements are satisfactorily met by providing a winding of a single helix extending substantially from end to end of the core; but it may be desired for some purposes to provide the core with two or more superposed helices, or to extend the winding only to a point a substantial distance from the handle. The advantage of using a single helix resides in the fact that the turns do not interfere in the least with the bending of the magnet and the winding does not increase the diameter of the magnet to any substantial extent, while by extending the winding throughout the length of the core enough effective ampere turns are provided to create the required flux at the outer end or pole.

Current is conveyed to the electro-magnet from a suitable source of energy, such as a battery, by two insulated conductors 4 and 5. As shown in Figure 1, these conductors are connected to the handle by a flexible cable which enters the handle through an axial bore. At a point about midway the handle, the conductors branch from the cable and extend through channels 8 and 9 out of the inner end of said handle where they are connected to metallic strips 6 and 7. The handle is made of wood, composition, or other suitable insulating material. The strip 7 is electrically connected to a metallic shell 10, set in a radial recess located near the inner end of the handle. The shell has coaxial holes through which pass the ends of a push button 11, which is resiliently held in its upper, or normal, position by a spiral spring 7, said spring being compressed between a collar on the push button and the bottom of the shell. When the push button is depressed, it makes contact with

screw 2 and thereby electrically connects the strip 7 and conductor 5 with the core of the electro-magnet. The outer terminal of the magnet winding is connected with the core, while the inner terminal is connected with the strip 6 and therethrough with the other supply conductor 4. Therefore, when the push button is depressed and makes contact with the screw, the magnet circuit is closed, as clearly shown by Fig. 5.

The core of the electro-magnet is composed of soft annealed iron, and being long and relatively thin, it can easily be bent to various radii of curvature so as to adapt it to reach around obstacles and enter curved or angular passages.

As the circuit of the magnet is normally open at the push button, the tool can be permanently connected with a source of current, thereby avoiding the annoyance and loss of time incident to connecting up the tool and each time it is desired to use it.

While I have described the structural details of my invention with particularity, I do not intend thereby to limit my invention, but what I claim as new and desire to secure by Letter Patent is:—

1. An electro-magnetic tool consisting of a handle of wood or other suitable insulating material, having an axial socket at one end and an axial bore at the other end and having channels branching from said bore and opening at the first mentioned end, a long slender rod of annealed iron having an end secured in said socket, metallic strips attached to the end of said handle adjacent the openings of said channels, a flexible cable carrying supply conductors entering the handle through said bore, the conductors entering the handle through said bore, the conductors branching from said cable and passing through said channels and having their ends attached to said strips, a push button mounted radially of said handle adjacent the inner end thereof and adapted when depressed to make electrical contact with said rod, said push button being electrically connected with one of said metallic strips, and a single helix wound on said rod from a point adjacent its outer end to a point adjacent said handle, the outer terminal of said helix being metalically connected with said rod and the inner terminal thereof being connected with the other of said metallic strips.

2. An electro-magnetic tool consisting of a handle of wood or other suitable insulating material, having an axial socket at one end and an axial bore at the other end and hav-

ing channels branching from said bore and opening at the first mentioned end, a long slender rod of annealed iron having an end secured in said socket, metallic strips attached to the end of said handle adjacent the openings of said channels, a flexible cable carrying a pair of supply conductors entering the handle through said bore, the conductors branching from said cable and passing through said channels and having their ends attached to said strips, a push button mounted radially of said handle and electrically connected with one of said strips, and a helix on said rod having one terminal metalically connected therewith and the other connected with the other of said strips, said push button making electrical contact with said rod when depressed.

3. An electromagnetic tool of the character described, comprising, a handle of insulating material, an elongated rod of magnetic metal extending from the one end of said handle, an insulating wire encircled about said rod and having its outer end electrically connected to the associated end of the rod, and means whereby an electric circuit may be established through said wire and rod.

4. A slender pliable and portable electromagnet adapted to be readily bent to any desired form, substantially as and for the purpose specified.

5. A portable electro-magnet comprising a slender pliable core and a coil surrounding said core, said magnet being adapted to be readily bent to any desired form, substantially as and for the purpose specified.

6. A portable electro-magnet for the purpose described comprising a slender pliable electro-magnet adapted to be readily bent to any desired form; a handle connected to one end of said magnet; and electrical conductors passing through said handle and electrically connected with the terminals of the magnet coils, and adapted to be connected with a source of electricity.

7. A tool for the purpose specified, comprising a tip of magnetic metal and a relatively long flexible core of magnetic metal connected with the tip, and a flexible electric conductor winding carried about the flexible core.

8. A tool for the purpose specified, including a flexible magnetic metal core and an electric conductor wound in a flexible winding about said flexible core to create a magnetic field.

ROY WEBER CATCHING.