LE ROY T. BONSALL.

ELECTROMAGNETIC CUTTING TOOL.

APPLICATION FILED MAR. 22, 1909.

998,564. **Patented July 18, 1911.**

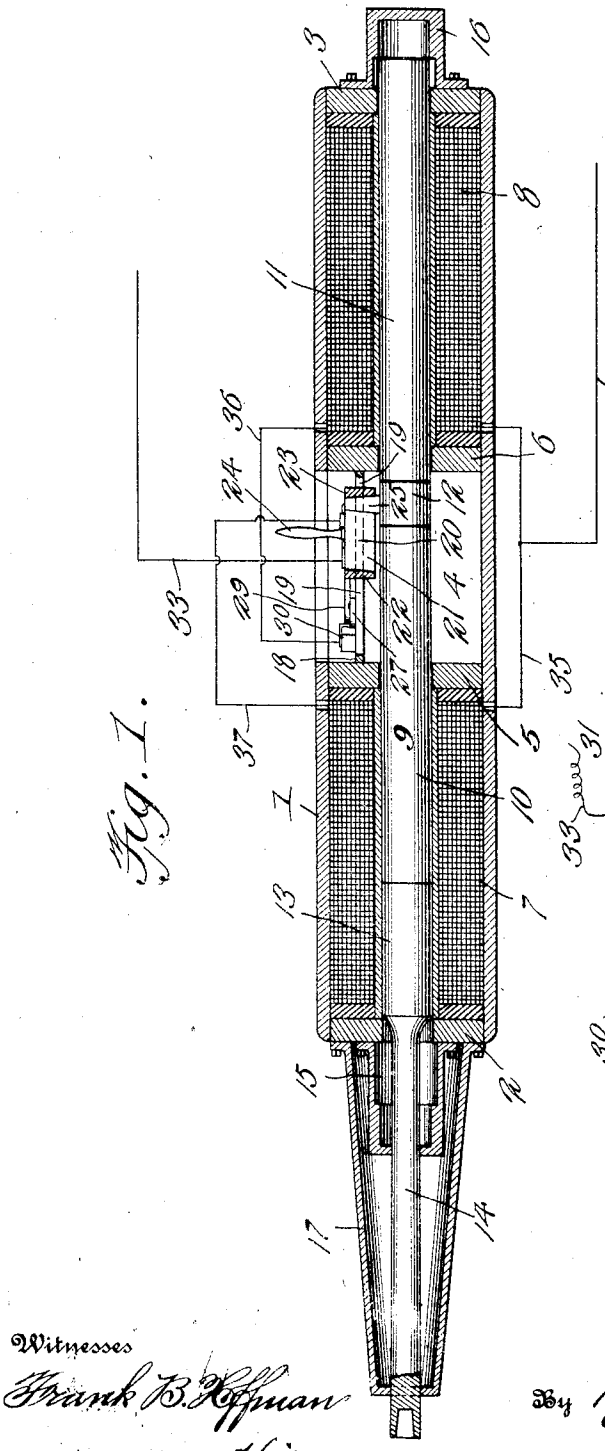

Fig. 1.

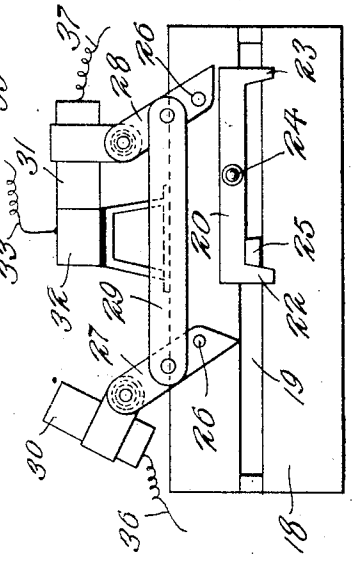

Fig. 2.

Witnesses

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LE ROY T. BONSALL, OF CHARLESTON, WEST VIRGINIA, ASSIGNOR OF ONE-THIRD TO ARCHIBALD A. KRIEG, OF CHARLESTON, WEST VIRGINIA.

ELECTROMAGNETIC CUTTING-TOOL.

998,564. Specification of Letters Patent. Patented July 18, 1911.

Application filed March 22, 1909. Serial No. 485,060.

To all whom it may concern:

Be it known that I, LE ROY T. BONSALL, a citizen of the United States, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented new and useful Improvements in Electromagnetic Cutting-Tools, of which the following is a specification.

This invention relates to electro-magnetically-operated tools, and particularly to a coal pick or cutter adapted to be actuated by electro-magnetic operating means.

One object of the invention is to provide a simple, strong, durable, and comparatively inexpensive construction of tool of this character which is efficient in action and under the thorough control of the operator.

Another object is to provide a tool which when set in action will continue to operate automatically until thrown out of action, or until the bit strikes an unusually hard object through which it cannot cut without liability of injury thereto, when the motion of the tool will be arrested and its action may be manually controlled as circumstances require.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a longitudinal section of a tool proper, its supporting truck or carriage being omitted. Fig. 2 is a bottom plan view of the switch mechanism thereof.

Referring to the drawing, 1 designates a suitable frame or casing of magnetic material, including in its construction front and rear end heads 2 and 3 and a central chamber or compartment 4, the latter being formed between spaced magnetic partitions 5 and 6.

Within the forward portion of the casing between the head 2 and partition 5 is inclosed a solenoid 7, and similarly arranged within the rear portion of the casing between the head 3 and partition 6 is a solenoid 8.

The heads and partitions are perforated for the passage of a reciprocating plunger 9 composed of a pair of cores 10 and 11 of iron or other suitable material which are suitably mounted in the usual manner in the solenoids 7 and 8 and influenced when said solenoids are energized to move the plunger forwardly and backwardly. The two cores 10 and 11 are connected by an interposed section or coupling 12 of non-magnetic material, and upon the forward end of the core 10 is suitably secured a non-magnetic head or portion 13 with which is connected the cutter-bit carrying shank or stem 14. Secured upon the heads 2 and 3 are air cushion chambers 15 and 16 or equivalent cushioning devices which check and limit the movements of the plunger at the ends of its working and return strokes, and also secured upon the head 2 is a frusto-conical tube or sleeve 17 having an opening in its outer end for the passage of the stem 14, and which serves as a guide and brace or support for said stem in its reciprocating motion.

Supported within the chamber 4 by the partitions 5 and 6 is a guide bar or bracket 18 having a longitudinal guide slot 19, which slot supports a reciprocating shifter 20 having a guide portion 21 movable within said slot and terminal tappets or projections 22 and 23. The said shifter is also provided with an outwardly projecting handle 24 by which it may be manually adjusted and controlled. Extending from the coupling member 12 of the tool plunger is a tappet or projection 25 which is movable in the slot 19 and adapted to engage the said tappets or projections 22 and 23 upon the shifter, to automatically and alternately slide the latter backward and forward in the chamber 4.

Pivotally mounted at their inner ends upon the bracket plate, as at 26, are swinging circuit closing levers or terminals 27 and 28, which are coupled to move in unison by a link 29, the inner ends of said levers being beveled or rounded for contact with the opposite ends of the switch shifter, by which they are adapted to be swung, through the reciprocation of the shifter, on their pivotal connections 26 backwardly and forwardly in a direction longitudinally of the tool. At their outer ends the levers 28 respectively carry carbon or other contacts 30 and 31 which are adapted, by the reverse movements of said levers, to engage an intermediate stationary carbon or other contact 32 connected with one of the lead wires 33 of an electric circuit supplied with current from any suitable source, the other wire 34 of which circuit is connected by a conductor 35 with both solenoids to operate as a common return or ground connection for each, as will be readily understood. The

front contact 30 is connected with the solenoid 8 by a conductor 36, while the rear contact 31 is connected with the solenoid 7 by a conductor 37. The shifter 20 is of less length than the distance between the beveled ends of the switch levers 27—28, so that it has an intermediate inoperative position to cut-off connection between both solenoids and the source of electric supply to stop the operation of the tool, and it is adapted, at the respective limits of its forward and rearward movements, to engage the levers 27 and 28 and alternately throw the contacts 30 and 31 into engagement with the contact 32, whereby the solenoids will be alternately energized and deënergized to project and retract the plunger core.

In the use of the tool it will be understood that the cutting bit is applied to the forward end of the shank or stem 14, the tool adjusted to bring the bit into cutting position, and said tool then set into operation by throwing in a cut out switch, not shown, in the line, which will energize whichever solenoid the contact 32 is in connection with and set the tool into action, the operation thence being automatic. Assuming that the contact 32 is in engagement with contact 31 when the line switch is thrown, it will be apparent that the solenoid 7 will be energized to propel the plunger on its forward or cutting stroke. When the plunger nears the limit of its forward movement, its tappet or projection 25 engages the tappet 22 of the shifter 20 and moves said shifter forward so that it will strike the lever 27 and thus swing the switch levers to throw the contact 31 out of and the contact 30 into engagement with the contact 32, thus cutting the solenoid 7 out of circuit and throwing the solenoid 8 into circuit for energization to retract the plunger. Near the limit of its return stroke the tappet 25 of the plunger engages the tappet 23 of the switch shifter and moves the shifter backward so that it will strike the lever 28 and shift both switch levers to throw the contact 30 out of and the contact 31 into engagement with the contact 32, thus again energizing the solenoid 7, and this automatic shifting of the switch back and forth to alternately energize the solenoids for the automatic action of the plunger will continue during the normal operation of the tool. The operator may, of course, stop the operation of the tool at any time by simply throwing out the cut out switch in the line, but the tool may be started by adjusting the shifter 20 by means of its handle 24 in case the switch contacts should from any cause be stopped in a neutral position. If on the cutting motion of the plunger the bit should strike a particularly hard object which it can not penetrate, thus arresting the plunger and stopping the switch contacts in a neutral position, the operator may manually shift said switch to effect the retraction of the tool and its subsequent propulsion on its working stroke, and this action may be continued to govern the operation of the tool until the hard material is cut through, when the automatic action may be resumed. Provision is thus made for the thorough and effective control of the tool in operation under any and all conditions of service. The cut out switch will be placed at a convenient place so as to be easily reached and manipulated by the operator.

It will be seen from the foregoing description that a simple, efficient and reliable type of electro-mechanically-operated tool is provided which may be rapidly operated and driven by a current from a storage battery or other suitable source of supply through the use of flexible conductors, which will permit the tool to be easily adjusted and transported from place to place.

Having thus fully described the invention, what is claimed as new, is:—

A tool of the character described comprising a casing having a central opening at one side thereof, solenoids arranged within the opposite ends of the said casing, cores operating therein and connected to form a plunger, the solenoids being spaced to form a central chamber in the casing opposite said opening, a guide bracket arranged within the chamber, a shifter bar mounted to reciprocate upon the bracket and having spaced laterally extending tappets and a handle, the latter projecting outwardly through said opening in the side of the casing, a tappet upon the central portion of the plunger for coaction with the tappets on the shifter to alternately move the shifter in opposite directions, horizontal switch levers eccentrically pivoted on the bracket and having their short arms provided with reversely beveled end portions adapted to be alternately engaged by the ends of the shifter, a link means connecting the long arms of the levers for movement in unison, contacts carried by the long arms of the levers and electrically connected with the respective solenoids, and a main circuit contact arranged between and adapted to be engaged by the aforesaid contacts, said levers, link and contacts being inclosed with the shifter within the central chamber.

In testimony whereof I affix my signature in presence of two witnesses.

LE ROY T. BONSALL.

Witnesses:
C. C. HINES,
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