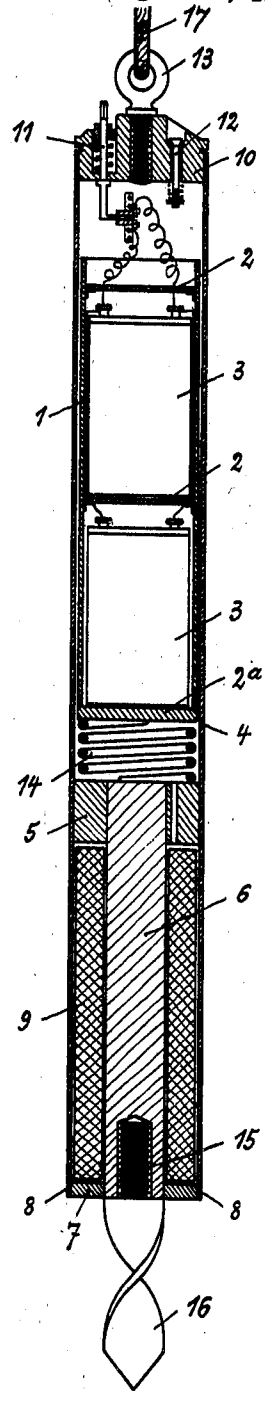
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1,589,678

T. BORNEMANN

REMOVING BROKEN TOOLS FROM BORE HOLES

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Inventor:
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by
Attorney.

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UNITED STATES PATENT OFFICE.

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REMOVING BROKEN TOOLS FROM BORE HOLES.

Application filed August 24, 1921, Serial No. 494,980, and in Germany February 7, 1917.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

My invention relates to the art of mining, and more especially to a device for cleaning bore holes. In drilling bore holes, it frequently happens that, notwithstanding due precaution, steel or iron parts such as tools, chisels, parts of drills and the like get into the hole and must be removed. It even occurs, that the crowns of drills are completely broken off, so that the operation is disturbed or even obstructed.

It has been attempted to extract such iron or steel bodies by means of an electromagnet. The supply of current to the electromagnet was effected by cables, which involves the drawback, that the cable was frequently damaged on account of the very high velocity at which the electromagnet is lowered into the hole and in consequence of the frictional resistance to which the cable is subjected in the tube. Damages to the insulation were particularly frequent. Besides, very complicated winches were required, because the cable must have the same tension as the suspension rope. A further serious difficulty was the water tight introduction of the cables to the electromagnet from the outside, there prevailing as is well known, a very high pressure at the bottom of a bore hole which causes moisture to enter the electromagnet. Finally, the means for producing current of the required intensity were not always at hand, so that often a considerable loss of time was caused by these devices having to be procured.

According to my invention, now, these drawbacks are obviated by combining the source of electric energy with the electromagnet, storage batteries being used to this end. In consequence thereof the supply cables may be dispensed with altogether and the lifting rope may carry both the magnet and the battery. In a modification of my invention a spring is inserted between the electromagnet and the battery, so as to protect the battery against the shocks exerted when striking the body of the bore hole.

My improved device is always ready for use, it being only necessary to connect the leads between the coil of the electromagnet and the accumulators, which is effected by means of suitable switches when the device is being lowered into the bore hole. Both parts of the device can be arranged in a common casing or combined to form a rigid body which is gas tight, so that moisture cannot enter.

In the drawings affixed to this specification and forming part thereof, a device embodying my invention is illustrated diagrammatically in longitudinal section by way of example.

Referring to the drawings, in a casing 1 are arranged on transverse partitions 2 storage batteries 3. The casing 1 is disposed in a tube 4 in which is secured an iron ring 5, carrying the iron core 6 of the electromagnet, which is provided at its lower end with a ring 7 of insulating material, fixed in at the end of tube 4. In the space between the core 6 and the tube 4 is arranged the coil 9 of the electromagnet. In this manner, the core 6, the ring 5 and the lower end of tube 4 form a bell shaped magnet, the north pole of which is disposed at the lower end of core 6 and the south poles of which are on the outside of the tube at 8.

The top of the tube is closed by a plug, on which is arranged the switch 11, the discharge valve 12 and the ring 13, to which the rope 17 is attached. A strong helical spring 14 is inserted between the bottom 2^a of casing 1 and ring 5.

The lower end of core 6 may be provided with a threaded boring 15 into which may be inserted tools such as a drill 16, so as to facilitate the detaching of iron parts jammed in the bore hole when lowering the device.

The spring 14, which serves to deaden the shocks, acting on the batteries can as well be replaced by other shock absorbing devices.

The tube 4 arranged in the manner described forms the outer poles of and at the same time a protecting casing for the electromagnet and its coil. Instead of designing the electromagnet as a bell shaped magnet, it may have any other form.

The switch 11 is operated when the device is lowered into the bore hole so as to break connection betwen the storage battery 3 and the coil 9.

Instead of storage batteries, galvanic batteries may be used.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for ob-

vious modifications will occur to a person skilled in the art.

I claim:—

1. In an electromagnetic lifting device for use in bore-holes in combination, an electromagnet, means for lowering said electromagnet into a bore-hole and a source of electric energy combined with said electromagnet to form a self-contained unit suspended from said lowering means.

2. In an electromagnetic lifting device for use in bore-holes in combination, an electromagnet, an electric battery, a casing surrounding said magnet and said battery and means attached to said casing for lowering same into a bore-hole.

3. In an electromagnetic lifting device for use in bore-holes in combination, an electromagnet, an electric battery, a casing surrounding said magnet and said battery and forming an electrically active part of said magnet, and means attached to said casing for lowering same into a bore-hole.

4. In an electromagnetic lifting device for use in bore-holes in combination, a tubular casing, an iron core fixed in said casing, a coil intermediate said core and said casing and surrounding said core, an electric battery in another part of said casing, and means for lowering said casing into a bore-hole.

5. In an electromagnetic lifting device for use in bore-holes in combination, an electromagnet, an electric battery, shock absorbing means associated with said battery, a casing surrounding said magnet and said battery and means attached to said casing for lowering same into a bore-hole.

6. In an electromagnetic lifting device for use in bore-holes in combination, an electromagnet, an electric battery, a casing surrounding said magnet and said battery a plug in the upper end of said casing and a switch, a valve and means for lowering said casing into a bore-hole attached to said plug.

In testimony whereof I affix my signature.

THEODOR BORNEMANN.