

L. MAISH.
REMOVING ARTICLES FROM WELLS, &c.

No. 517,806.

Patented Apr. 3, 1894.

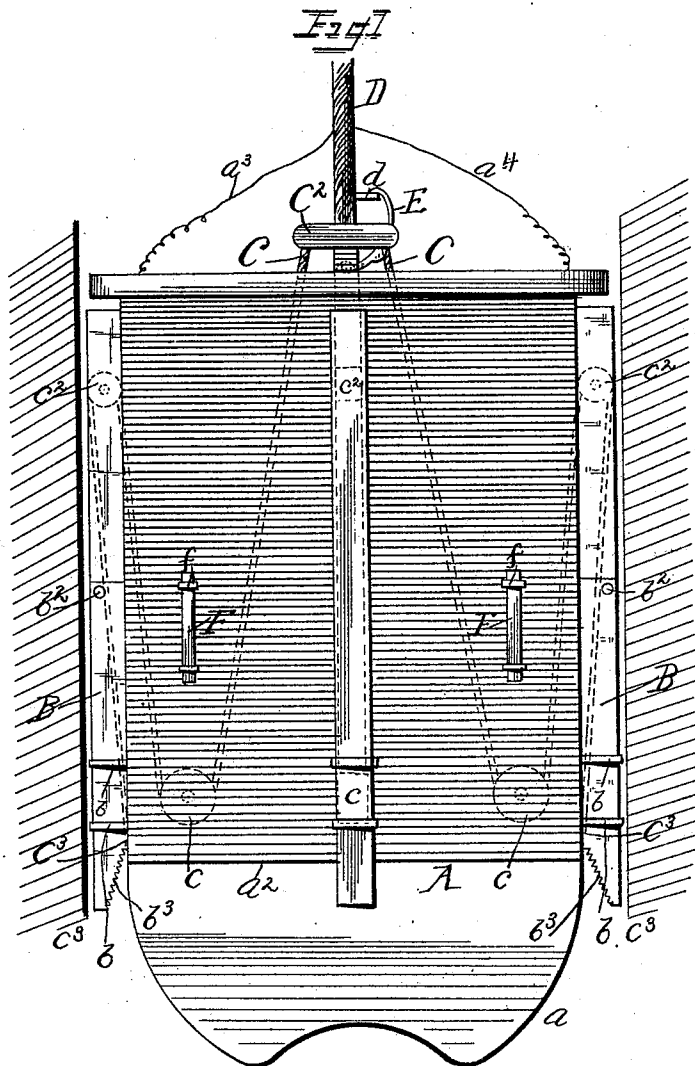


Fig. 2.

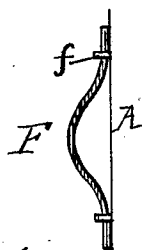
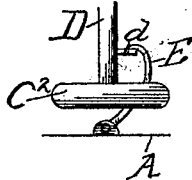


Fig. 3.



Witnesses

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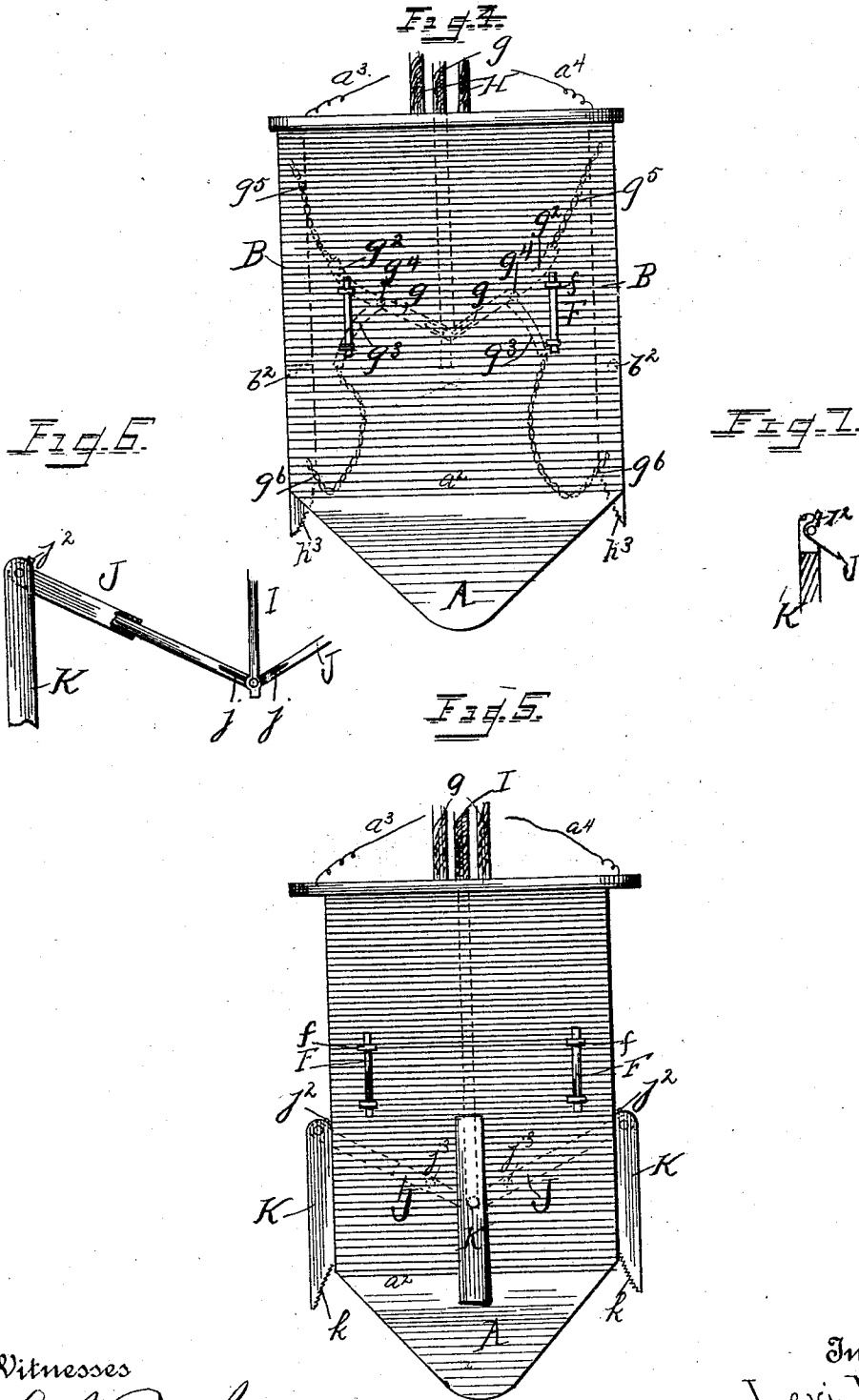
(No Model.)

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UNITED STATES PATENT OFFICE.

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REMOVING ARTICLES FROM WELLS, &c.

SPECIFICATION forming part of Letters Patent No. 517,806, dated April 3, 1894.

Application filed October 27, 1893. Serial No. 489,303. (No model.)

To all whom it may concern:

Be it known that I, LEVI MAISH, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Removing Articles from Wells, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to removing metallic articles from wells or other places inaccessible by hand.

In bored and drilled wells, for example, it frequently occurs that the boring tool, or the rod by which the tool is supported, breaks or separates, and difficulty is then experienced in removing the part broken off or separated. Various devices for removing broken or disjointed tools or rods have been devised; but, from their construction, they are defective, in that, instead of aiding in the removal of the broken or separated part, a firmer wedging of the same in the well often takes place. The device most generally employed for removing tools, &c., from wells of the kind, consists of various forms of grapples, tongs, or grippers. These, however, are, in most cases, not effective, for the reason that a broken tool or rod will ordinarily lean against the side of the well, and an implement passed down to it will not take hold of it but will rather jam it or wedge it fast.

The object of my invention is to place a tool, a piece of tool, a rod, or other article or matter of appropriate metal, which is in a well or other situation practically inaccessible by hand, in position to be removed, as by grasping, inclosing, or otherwise taking it.

With this object in view, the invention consists in removing a tool, a piece of tool, or other article or articles of appropriate metal from a deep place, by first drawing the same to a proper position by magnetic attraction, and then lifting by any suitable means; furthermore, in a device or contrivance by which a tool, a piece of tool, or other appropriate metallic matter in a well or other situation practically inaccessible by hand, will first be caused by magnetic attraction to assume a position free to be seized, and then be en-

gaged or inclosed by tongs, a grapple, a scoop, or other means.

The invention is illustrated in the accompanying drawings, in which—

Figure 1— is a side elevation of one embodiment of my invention. Fig. 2— is a detail view of the spring-guides whereby the device is directed in its movement up and down in the well. Fig. 3— is a detail view, showing a portion of the connection between the raising and lowering cables and the device. Fig. 4— is a side elevation of a modified form of apparatus. Fig. 5— is a side elevation of another modified form of apparatus. Fig. 6— is a detail view of the operating-device shown in Fig. 5. Fig. 7— is a detail view of a portion of the operating mechanism of the form of device shown in Fig. 5. Fig. 8— is another modified form of device. Fig. 9— is a plan view of the device shown in Fig. 8; and Figs. 10 and 11, are detail views of the operating mechanism shown in Fig. 8; and Fig. 12— is a modified form of grasping finger and lever for operating the same.

In Fig. 1 of the drawings, A represents an electro-magnet which may either be a permanent magnet or an electro-magnet, according to the requirements. In the embodiment of the device shown in Fig. 1, the form of the core *a* is that of a truncated cone, the sides, however, being curved and the apex being depressed, forming an indentation. The advantage of this form is, that when the device is put in a well in which there is a piece of tool or other metal which is desired to be removed, the same will be attracted and brought into contact with the core of the magnet. The attraction being greatest at the center, will result in bringing the tool or other article to be removed into the indentation in the core, and thereby possibility of wedging the same against the side of the well will be prevented.

In Fig. 1, windings, *a*², are shown. These are, of course, employed only when the magnet is an electro-magnet, and when an electro-magnet is employed, the wires *a*³, *a*⁴, extend from the magnet to the surface of the earth and serve to conduct currents of electricity into the primary and secondary coils of the magnet.

B represents fingers which are mounted at

the side of the magnet and are retained in suitable position in relation thereto by guides b , by which longitudinal movement of the fingers is permitted, and, at the same time, the fingers retained in proper position relative to the magnet. The movement of the fingers is downward when the article to be removed is engaged and then inward to come into contact with and retain the same. Any suitable means for imparting this movement to the fingers may be employed. The embodiment shown in Fig. 1 consists of chains or ropes C , which are arranged inside the core a , and pass over idle-wheels or pulleys c , mounted in the core. After passing over these idle-wheels or pulleys c , the ropes or chains pass up over pulleys c^2 mounted on the fingers, and thence down to the lower ends of the fingers where they are fixed at points c^3 , so that, inward movement of the lower portions of the arms is permitted. The chains or ropes C are each connected with a ring C^2 , and each in turn is connected with a rope or cable D by which the entire weight of the device is sustained.

In order to utilize one rope or cable D both for raising and lowering the device and for operating the engaging or grasping fingers B , I connect with the electro-magnet A a weighted-hook E , designed to engage a staple d on the rope or cable D . A limited movement of the rope or cable D up and down in the ring C^2 is permitted.

When the device is to be lowered into the well for operation, the hook E is placed in engagement with the staple d , thus bringing the entire weight of the device on the staple. As the device becomes seated in the well, as, for instance, by resting on the tool or the like, to be raised, the cable moves downward through the ring C^2 , thus releasing the hook e from the staple d , when the hook, being weighted, will fall, severing connection directly between the cable D and the electro-magnet. Now, when the cable is raised, it moves up a short distance in the ring C^2 , and then, being attached firmly to the same, continued raising on the cable will result in pulling on the chains C and of forcing down the fingers B . There is a downward vertical movement of the entire length of each finger, and then when the point b^2 , at which the fingers are pivoted, reaches the surface, continues raising on the chain C^2 , and results in turning inward the ends of the fingers, bringing them into contact with the tool or the like which has previously been attracted by the magnet. The lower inner faces of each finger are provided with roughened surfaces or teeth b^3 , which serve to insure close contact with the tool or the like.

In the embodiment of the invention shown in Fig. 1, I preferably employ four grasping or engaging fingers, though, of course, any desired number may be used.

Situated at suitable points between the fingers B , are spring-projections F arranged in

suitable guides f attached to the outside of the magnet. These spring-guides are designed to bear against the face of the well in which the device is to be lowered, and to guide the device up and down in its movement, and prevent sagging or wedging.

In the device shown in Fig. 4 of the drawings, a modified form of operating-means is shown. In this form, the fingers B are given motion through a rope or chain G connected with suitable levers g , pivoted in the electro-magnet, and hoisting ropes H are used for raising and lowering the entire device.

In the form of operating mechanism, shown in Fig. 4, the levers g which are employed, are provided with arms g^2 , g^3 , the arms being pivoted at points g^4 . Each arm g^2 is connected by a chain g^5 with the top of the finger B , and each arm g^3 is connected by a chain g^6 to the bottom of the finger. Thus, it will be seen, that, by pulling up on the connection G , the outer ends of the levers will be drawn down, and this will result, first, in pulling down on the tops of the fingers B causing them to descend vertically, and then when they have been pushed a sufficient distance, the chains g^6 will become taut, resulting in the drawing inward of the inner ends of the fingers, causing them to turn on their joints b^2 , and to bring their lower serrated or toothed ends b^3 into contact with the article to be removed.

It will be observed that, in the form of apparatus shown in Fig. 4, the magnet is shown in the form of a cone with a rounded apex, this form being desirable in removing fragments of a kind having projecting pieces, where it is desirable to move the entire fragment as nearly as possible to exactly the center of the well, in order that, when it is being removed, it will not come in contact with the sides of the well and thereby retard its upward movement.

In the form shown in Fig. 5, a direct connection I with the surface of the earth is provided, by which the fingers to grasp the articles to be removed from the well are operated. In this form of device, levers, J , are connected at a central point with a connection I and these levers are arranged in the magnet. Each lever J is composed of two telescoping pieces, and they are connected at the center to a suitable rod or plate provided with a pin which moves in slots j in the inner ends of the levers. The outer ends of the levers are connected with fingers K , provided at their lower inner ends with teeth or serrations k . Each lever is provided, in its outer end with a lug or projection j^2 , which moves in the slot in the upper end of the finger K . The length of the slot is such that, when, by pulling up on the inner ends of the levers J and causing them to turn on their pivots j^3 , and the fingers K are brought down to bring their inner ends below the lower end of the magnet, the projections will come in contact

with the end of the slot and thereby turn the fingers inward to engage the article to be removed.

In the form of device shown in Fig. 8 of the drawings, the magnet A and the arms B are arranged inside a shell or casing L, the arrangement being such that the magnet may be moved freely up and down inside the shell. In the form shown in Fig. 8, the construction of the arms B and the means of operating them, is entirely different from the other forms illustrated. The arms are provided with slots b^4 , in which are designed to move pins a^4 , which are attached to projections a^5 connected to the magnet A. The arms B may be of any desired number, and arranged in a circular series around the inner face of the shell L. The entire device is raised and lowered by a suitable hoisting-rope D and the magnet is raised in the shell L by means of ropes or chains M, which are connected, at one end, to the shell, and pass over suitable pulleys m on the magnet, and thence to a suitable windlass or the like. When the magnet A is drawn upward in the shell L, the pins a^4 are moved up in the slots b^4 in the arms B, and, when the pins arrive at a point b^5 , in the slot, the arms are moved inward on the pins as pivots. Any suitable means may be employed for imparting this inward-movement to the arms. In the present embodiment of the invention, I have shown coil-springs N. These springs are connected at one end to the shell L, and, at the other end, to the upper portion of the arms B. In order to set the arms ready for operation, the lower ends of the arms are pulled outward to bear against the inner face of the shell L. This movement makes a tension on the springs, and the springs are held extended by means of pins O attached to the sides of the shell, and designed to rest in the notch in the upper end of the arms B. A cross-piece or pin o , rests against the outer face of the arm and prevents outward movement of the upper ends of the arms while the pins are in engagement with the arms. In order that the arms may be released from the pins O and the spring allowed to act at the proper time, stops n are provided on the ropes M. The stops are so arranged that, when the magnet is drawn up, it brings any body attached to it up within the shell. The stops strike all the pins O of the arms and release the springs, allowing the arms to turn on the pin a^4 , moving their inner serrated or toothed ends b^3 inward to engage the body which may be attached to the magnet.

In Fig. 12, a modified form of grasping fingers and lever for operating the same are shown. In this form, the grasping fingers

are provided on their inner faces with teeth P, which are designed to be engaged by the teeth of a segmental rack, Q formed with or attached to the end of a lever Q^2 . The lower end of the arm is pivoted to the upper end at a point b^2 , and to the lower end is connected one end of a chain q^2 , the other end of which is connected to the lower end of the segmental rack Q. A rope or chain q by which the levers are operated, is connected to their inner ends. By drawing up on this rope or chain, the rack is caused to move downward, and its teeth, being in engagement with the teeth on the arm B, the arm will be moved downward. As the arm reaches a point near the limit of its downward movement, the chain q^2 becomes taut and the lower portion of the arm is drawn inward, bringing its roughened end b^3 into contact with the object to be grasped.

While I have particularly described certain specific details of construction of devices, it will, of course, be understood that I do not wish to limit myself in this respect, as obviously, the mechanism employed, may be modified greatly without departing from the spirit of my invention; and it will also be obvious that my invention may find application in placing articles of appropriate metal in proper position to be removed from situations other than wells, for example, in proper position in crevices or holes of caverns or quarries, in deep water away from under rocks, and generally, in situations not practically accessible by hand.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of removing a tool, a piece of tool, or other matter of appropriate metal, from a well or other situation practically inaccessible by hand, which consists in drawing the object or objects to be removed to a position to be seized or held, by subjecting the same to the influence of magnetic attraction, and then causing the object or objects to be lifted, substantially as described.

2. The method of removing a tool, a piece of tool, or other appropriate metallic article, from a well or other situation, by first drawing it away from the walls by magnetic attraction, so that its upper part will be free, and, then, engaging it with tongs, a grapple, a scoop, or the like, and lifting it out, substantially as set forth.

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

LEVI MAISH.

Witnesses:

R. G. DYRENFORTH,
DAVID H. MEAD.