

(No Model.)

2 Sheets—Sheet 1.

A. McDOUGALL.
APPARATUS FOR RAISING SAND.

No. 469,841.

Patented Mar. 1, 1892.

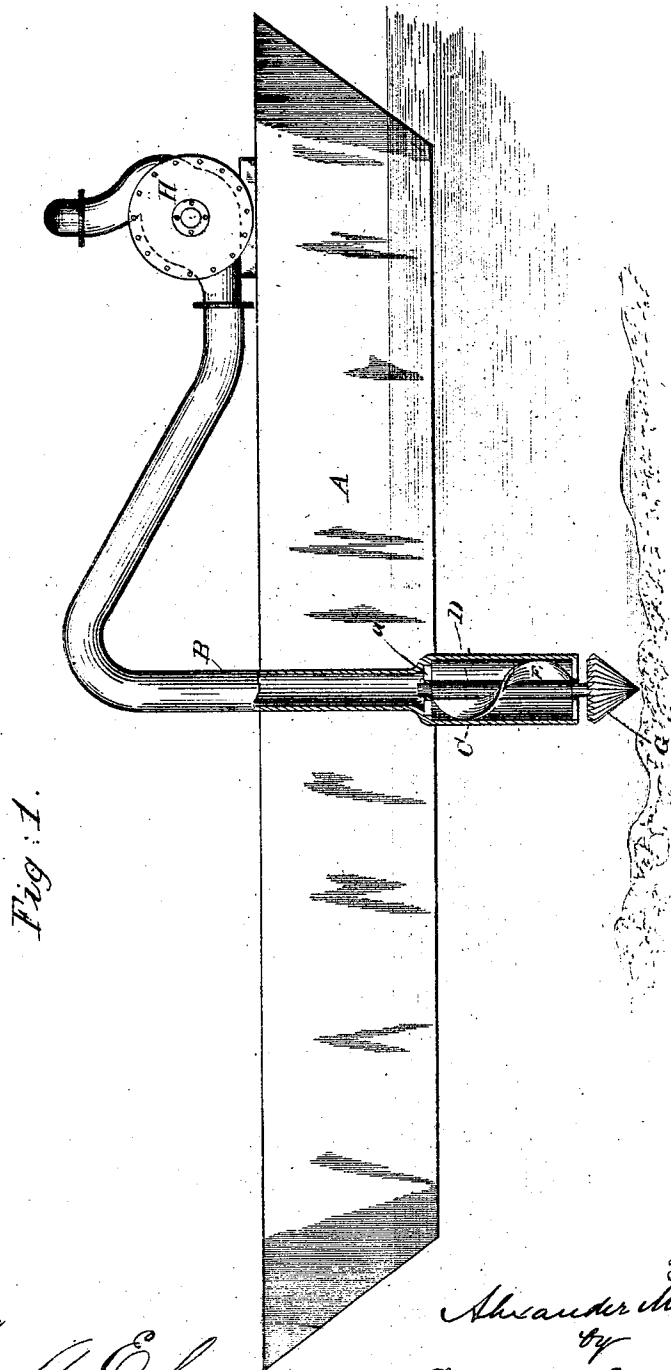


Fig. 1.

Witnesses
Arthur M. Erb.
B. S. Champion.

Inventor
Alexander M. Dougall.
by
Frank L. Iyer. Attorney

(No Model.)

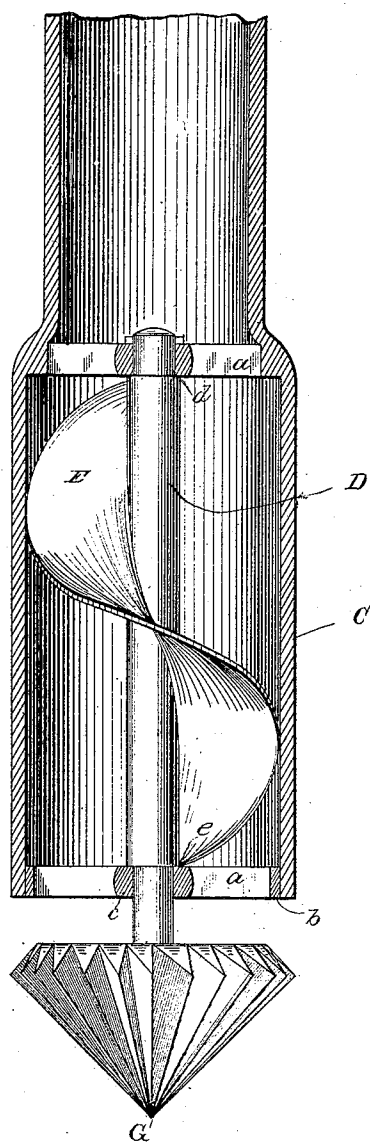
2 Sheets—Sheet 2.

A. McDOUGALL.
APPARATUS FOR RAISING SAND.

No. 469,841.

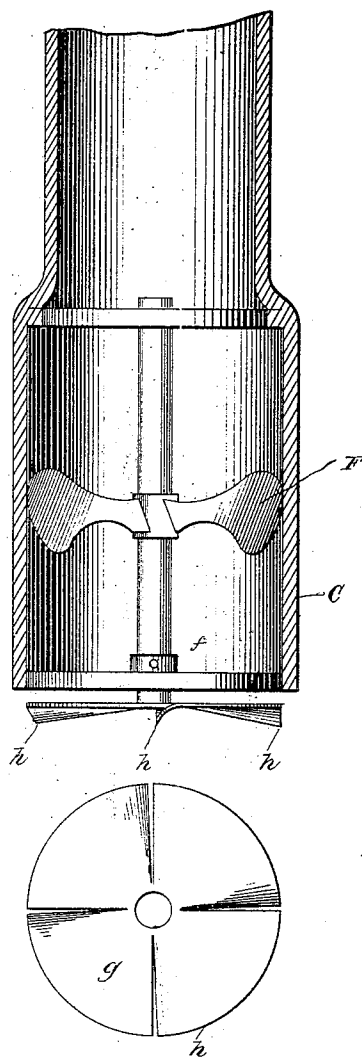
Patented Mar. 1, 1892.

Fig. 2.



Witnesses
Arthur A. Erb
William P. Crawley

Fig. 3.



Inventor
Alexander McDougall
By
Lawrence L. Iyer Attorney

UNITED STATES PATENT OFFICE.

ALEXANDER MCDOUGALL, OF DULUTH, MINNESOTA.

APPARATUS FOR RAISING SAND.

SPECIFICATION forming part of Letters Patent No. 469,841, dated March 1, 1892.

Application filed March 3, 1891. Serial No. 383,563. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER MCDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Apparatus for Raising Sand, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to an improved device for dredging the bottoms of rivers or harbors, or for removing sand, earth, &c., from positions under water, or for boring holes for piles and stakes under water.

The principal object of my present invention is to provide a device for the above purposes, which can be operated in any positions under water and may be readily changed from one position to another, since the boring or disintegrating tool is flexibly connected to the source of power.

Another object of my present invention is to provide a device for the purposes explained, wherein the use of shafting or other mechanical means connecting the source of power with the boring-tool is dispensed with.

A still further object of my invention is to provide a device for the purposes just set out, wherein the boring-tool is so connected with the source of power that if a rock or other obstruction is encountered the boring-tool will not be broken but will come to rest, although the engine or other source of power will continue to operate.

The principal novelties in my present invention consist of a flexible or other pipe adapted to be passed over the side of the dredging-vessel or to be lowered into position from a dock or other structure adjacent to the water; a metallic cylindrical casing at the lower end of said pipe; a worm or propeller or screw or analogous device within said cylindrical casing; a boring or disintegrating tool of any appropriate construction at the lower end of said casing and mechanically connected with said worm or cylinder device, and a pump or equivalent connected to the upper end of said pipe, all adapted to operate and coact together, as will be more fully described, and embodied in the claims.

For a better comprehension of my present invention attention is directed to the accom-

panying drawings, forming a part of this specification, and in which—

Figure 1 is a side view of my invention, partly in section, showing the same in use in connection with a boat; Fig. 2, an enlarged sectional view of one form of boring-tool, showing a worm for operating the same; and Fig. 3, an enlarged sectional view of another form of boring-tool, showing a propeller for operating the same.

In all of the above views corresponding parts are designated by identical letters of reference.

In Fig. 1 I have illustrated my improved device as being operated from a vessel A, which may be of any suitable construction or design; but it should be understood that the device may be operated just as conveniently from a dock or other structure adjacent to the water or from a point any distance inland. B is the pipe before referred to, which is passed over the side of the vessel A, as shown in Fig. 1, so that its lower end will be near the place to be operated on. The pipe B is preferably a flexible pipe, made either of some yielding material—such as rubber or water-proof fabric—or it may be a metal pipe having suitable joints therein, so as to be flexible. It should be understood, however, that the pipe B may be a rigid pipe. C is a cylindrical casing made, preferably, of metal and rigidly secured to the lower end of the pipe B by any suitable means. This casing C is made somewhat larger than the pipe B; but as a portion of its interior is occupied by the worm or equivalent and the shaft therefor the space within the casing C for the passage of the sand, earth, &c., is about the same as the pipe B. At the upper and lower portions of the casing are the spider-arms *a a*, which are secured in position in any appropriate way, or, instead, these spider-arms may be made integral with the casing.

In Fig. 2 the spider arm or arms at the lower portion of the casing are secured to a rim *b*, which is held in place by means of bolts or screws, so as to be removable. One or more spider-arms may be used at the upper and lower ends of the casing, or the equivalents thereof may be substituted. At the central part of the spider-arms *a a* is formed a bearing *c*, which may be of the same material as the spider-arms, or, instead, it may be of some anti-friction metal secured in place. D is a

shaft vertically mounted within the bearings *c*, so as to be easily rotatable. This shaft is provided near its upper end with a shoulder *d*, which abuts against the upper bearings, and at its other end with a shoulder *e*, which rests upon the lower bearings, so that the shaft will be securely held from moving laterally. This construction, which is illustrated in Fig. 2, is applicable only when the lower or upper spider-arms are removable, as will be understood. When the spider-arms are made integral with the casing *C*, a removable collar *f* may be used instead of the shoulder *e*, as shown in Fig. 3. Rigidly secured to the shaft *D* is a worm *E* of ordinary construction. When a slow motion of the boring-tool is desired, this worm is made with a very slight pitch, and vice versa. The worm *E* fits snugly within the casing *C*, so that when the water and sand or earth passes up through the same the worm will be revolved either rapidly or slowly, according to its pitch.

In Fig. 3 I have shown a propeller or screw wheel *F* secured to the shaft *D* instead of the worm *E*. The operation of this propeller *F* is the same as that of the worm; but it has the advantage of occupying less space than a worm, although the expense of a propeller or screw wheel would be greater than that of a worm. The pitch of the propeller or screw wheel may also be changed, so as to obtain different speed.

Instead of either a worm or a propeller or screw wheel, other mechanical constructions may be substituted; and I would have it understood that it is the intent of this specification to include as equivalents thereof all constructions of devices which will be operated by the passage of the water and sand through the casing.

At the lower end of the shaft *D* a boring-tool *G* is rigidly secured. The form of boring-tool shown in Fig. 2 is like a large-sized burr, the construction of which is well-known to mechanics, and hence this form need not be described here. The form of boring-tool shown in Fig. 3 is the form which I prefer to use on account of its cheapness and effectiveness in operation. It consists simply of a circular plate of metal *g*, as shown in the lower view of Fig. 3. Cut out from this metal plate are depending lips *h*, which are preferably cut at an angle, as shown, so as to form cutting-edges. It will be evident that by means of this form of boring-tool the sand, earth, &c., will be cut so as to pass directly into the mouth of the casing *C*, whereas in the construction of tool shown in Fig. 2 the material is thrown to one side and has to pass over the top of the burr into the mouth of the casing. The preferred form of boring-tool will feed itself into the substance to be cut, which will not be the case with the construction illustrated in Fig. 2. Although I intend to embody this preferred form of boring-tool in my claims, it must not be understood that I

restrict myself to this particular form, for any kind of boring-tool may be used in connection with the other elements of my improved device.

At or near the upper end of the pipe *B* is a pump *H*, or its equivalent, which is used for pumping the water and sand or earth up through the casing and pipe. The preferable form of pump for this purpose is a centrifugal pump; but I do not wish to be limited to such. The pump *H* is placed on the vessel *A* or the dock or other structure, or it may be placed any distance inland, and it is adapted to be operated by any suitable source of power.

The operation of my device, which will be readily understood, is as follows: The pipe *B* and casing *C* are lowered, so that the boring-tool will rest on the substance to be removed. The pump *H* is now started and water will first be drawn up through the casing *C* and pipe *B*. As this water passes through the casing *C*, it will cause the worm or propeller to revolve, as will be understood, and the boring-tool *G* will be rotated either fast or slow, according to the pitch of the worm or propeller. The boring-tool will cut into and loosen the substance, which will be drawn up through the casing and pipe by the suction, and the worm or propeller will therefore tend to work as long as there is material and water passing through the casing. After the water, with the sand or earth, leaves the pump *H* it may be disposed of in any ordinary way. In case the boring-tool strikes a rock or other obstruction its motion will be arrested without breaking the same, and the rotation of the worm or propeller will cease, although a pressure will be brought thereon which will tend to turn the boring-tool. This state of things will be observed at the pump by the presence of little or no sand or earth in the water, and the pipe *B* can then be raised and the boring-tool allowed to operate at some other point.

My improved device can be used in boring holes for piles, &c., under water by allowing the boring-tool to operate vertically downward at the particular place desired; but in the boring of holes I prefer to force water down through the pipe *B*, so as to reverse the actions I have just described, and this feature will be embodied in another application.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

In a device for the purposes mentioned, the combination of a pipe, a casing *C* at the lower end of the same and of larger diameter than the pipe, a worm or equivalent within said casing, a boring-tool connected with said worm or equivalent, and a pump or equivalent for creating a circulation of water within said pipe, substantially as set forth.

ALEXANDER MCDUGALL.

In presence of—

M. J. MULLIN,
CHAS. W. LELAND.