No. 685,028. Patented Oct. 22, 1901.

C. H. BROWN.

APPARATUS FOR SUBMARINE OPERATIONS.

(Application filed Dec. 3, 1900.)

(No Model.)

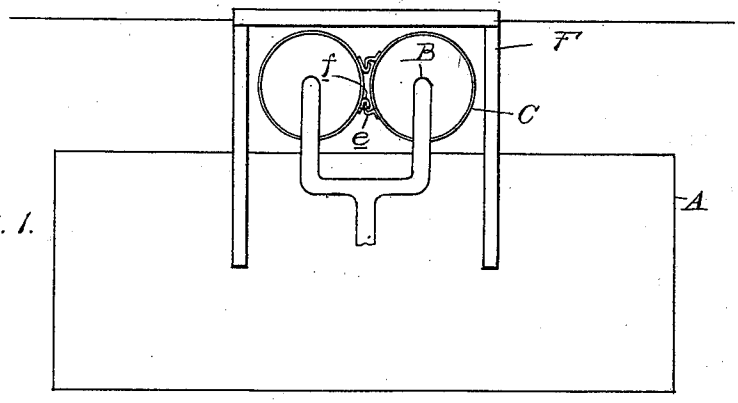


Fig. 1.

Fig. 2.

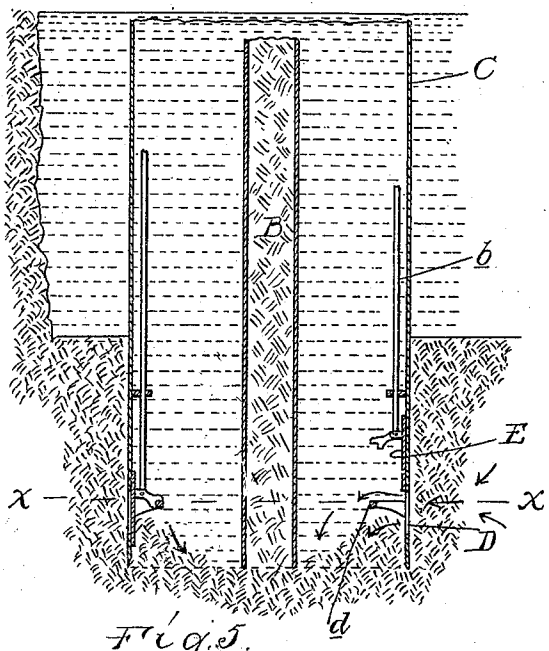


Fig. 5.

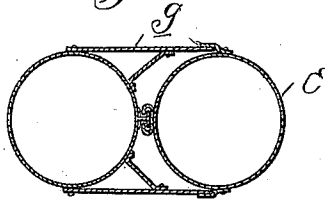


Fig. 3.

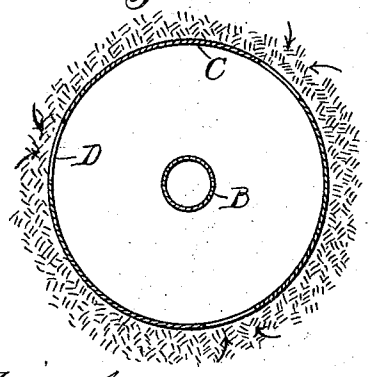
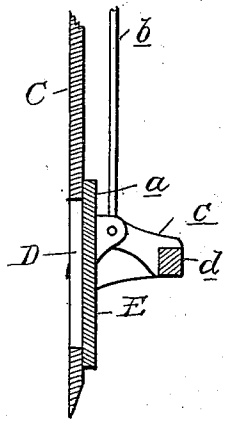


Fig. 4.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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APPARATUS FOR SUBMARINE OPERATIONS.

SPECIFICATION forming part of Letters Patent No. 685,028, dated October 22, 1901.

Application filed December 3, 1900. Serial No. 38,493. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. BROWN, a citizen of the United States, residing at Port Huron, in the county of St. Clair and State of Michigan, have invented certain new and useful Improvements in Apparatus for Submarine Operations, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to apparatus for submarine operations; and it is the special object of the invention to obtain a device adapted for excavating in river and lake bottoms.

The apparatus is more particularly designed for use in mining operations—*i. e.*, where gold or other valuable substances are mixed with the mud or sand of the bottom; but it is also capable of use for excavating only or for the removal of cargoes from sunken vessels.

The invention consists in the peculiar construction, arrangement, and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is a diagram plan view of the apparatus. Fig. 2 is a vertical central section through the lower portion of the caisson and suction-pipe. Fig. 3 is a section on line *x x*, Fig. 2; and Fig. 4 is a detail view of a closure for a lateral opening in the caisson. Fig. 5 shows a modification of the caisson.

The device comprises a scow or float A, on which the hoisting apparatus, pump, &c., (not shown,) may be carried and from which the excavating apparatus may be lowered. This excavating apparatus comprises a suction-pipe B, adapted to be lowered to extend to the sand or mud composing the river or lake bottom and to elevate the same to the scow.

Heretofore it has been common to use suction-pipes for the purpose of excavating or for removing cargoes, such as slack coal, &c., from sunken vessels. In the use of such apparatus it has been found that the suction-pipe tends to work downward in the material without excavating to any considerable extent laterally excepting as its position is changed. The result is that after a certain depth is reached the surrounding material is liable to cave in, and thereby choke the water-inlet, so as to prevent further operation of the suction until the pipe is again raised. It is one of the objects of my invention to avoid this difficulty, and to this end I provide, in addition to the suction-pipe, a surrounding casing or caisson C, which is adapted to be lowered therewith into the material to be excavated. This caisson forms a lateral support for the sand or other material, preventing the caving in thereof, and at the same time the material contained within the area of the caisson is detached and loosened sufficiently, so that it is readily drawn into the suction-pipe and removed. Thus the excavation may be continued to any depth desired without danger of choking.

It frequently happens in mining operations that the stratum containing the valuable mineral is some distance beneath the surface of the river or lake bottom. In order to excavate in the said stratum without the necessity of removing the material above, the caisson C is provided with one or more apertures in its walls near the lower end thereof, preferably a series of apertures extending around on all sides. These apertures D are preferably normally closed by the valves or closures E, which latter may be of any suitable construction, but, as shown in Fig. 4 of the drawings, comprises the cover *a*, the operating-stem *b*, and the toggle-lever *c*, adapted to engage with the frame *d* and force the cover laterally to its seat. Any other form of closure may, however, be used in place of the one described. In operation when the caisson has been lowered to the required depth the closures E are removed, permitting the material to be forced laterally into the caisson through the openings D. In order to cause the material thus to feed in, the water is pumped from out the caisson to allow the hydrostatic pressure on the river or lake bottom to act upon the material and if necessary the workman may descend and assist in excavating through the openings D. If desired, water-jets or other apparatus may be used for loosening up the stratum, so that it may be drawn in through the openings D.

It is often the case that the bank of the river or lake descends perpendicularly to a considerable depth and that material rich in

minerals is deposited in pockets in said bank. In order that the excavation may be carried on in this material, the scow or float A is preferably provided with an outrigger or frame F, from which the caissons may be lowered close to the bank. This would not be possible if the caissons were lowered from the well arranged centrally within the scow.

Where the excavation is carried on along the bank of a river, it may be desirable to arrange a number of caissons side by side, in which work may be carried on simultaneously. It is also desirable to brace said caissons against the action of the current, and to accomplish this they are preferably provided with a locking engagement on their adjacent walls. As shown in Fig. 1, this is accomplished by providing one caisson with the grooved vertical flanges *e*, with which the flanges *f* on the adjacent caisson are adapted to slidingly engage. This construction permits of lowering either of the caissons independently of the other and at the same time always bracing one caisson by the other.

While I have described the apparatus as used for mining operations, it is obvious that it may be used for simple excavating or removal of cargoes from sunken vessels.

In Fig. 5 a modified construction is shown, in which two cylindrical caissons are coupled together and also provided with shields for deflecting the current. These shields *g* are in the form of plates attached to one caisson and slidingly engaging with grooved flanges on the other caisson, so as to bridge the groove or space between the two. Thus the current deflected by the forward caisson will be prevented from turning in and striking the rear caisson, as would be the case if the plates *g* were omitted.

What I claim as my invention is—

1. In a device for submarine operations, the combination with a suction-pipe, of a caisson surrounding the same adapted to be lowered therewith, said caisson having a lateral opening near its lower end for the purpose described.

2. In a device for submarine operations, the combination with a suction-pipe, of a caisson surrounding the same adapted to be lowered therewith, said caisson having a lateral opening near the lower end thereof and a removable closure for said opening.

3. In a device for submarine operations, the combination with a suction-pipe, of a caisson surrounding the same and adapted to be lowered therewith, said caisson being provided with a series of apertures near and extending around the lower end thereof, a removable closure for said apertures, for the purpose described.

4. In a device for submarine operations, the combination with a float, of an outrigger-frame secured thereto, a caisson adapted to be lowered from said outrigger-frame in close proximity to the bank, said caisson comprising two adjacent sections having a sliding engagement with each other, for the purpose described.

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

CHARLES H. BROWN.

Witnesses:
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H. C. SMITH.