

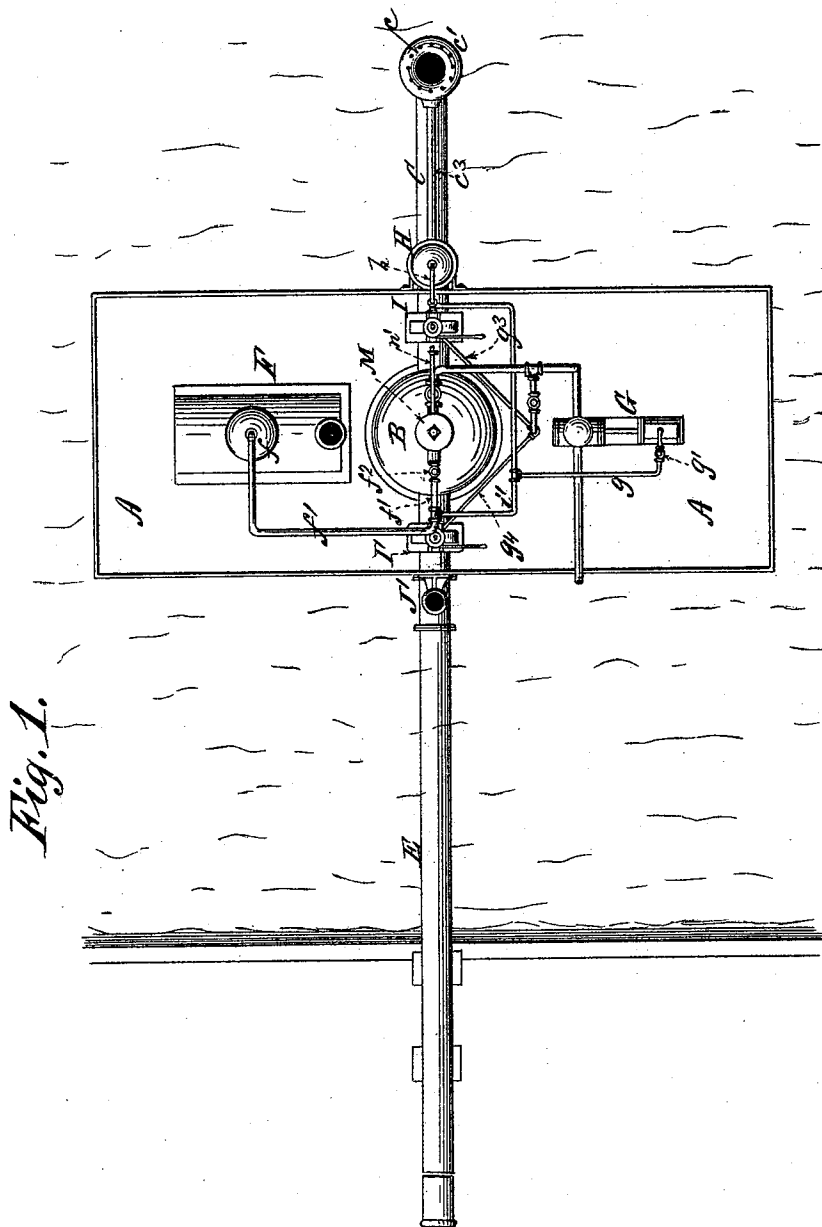
(No Model.)

4 Sheets—Sheet 1.

C. G. COLLINS.
DREDGING APPARATUS.

No. 496,343.

Patented Apr. 25, 1893.



Witnesses:

D. W. G. and Son.

J. Turner

Inventory:

Caleb G. Collins

By his Attorney

George William Matthews

(No Model.)

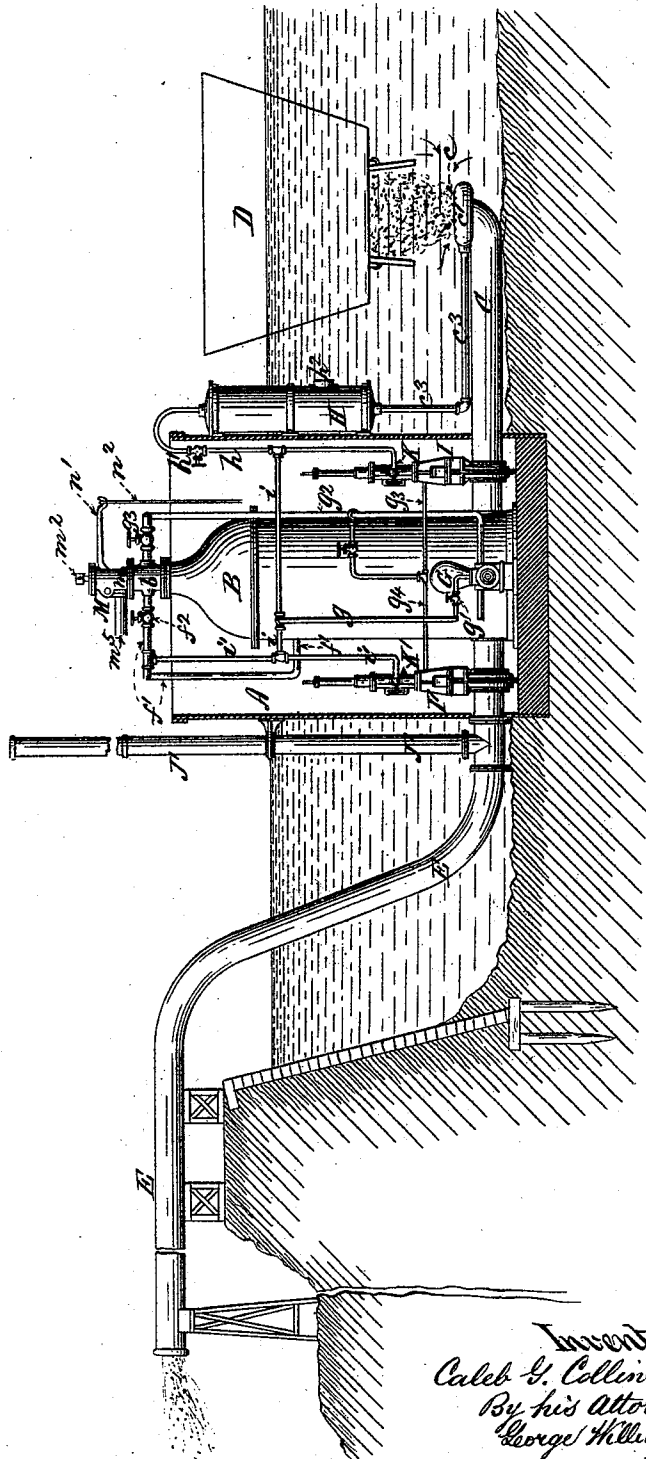
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Fig. 2.



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George William Math

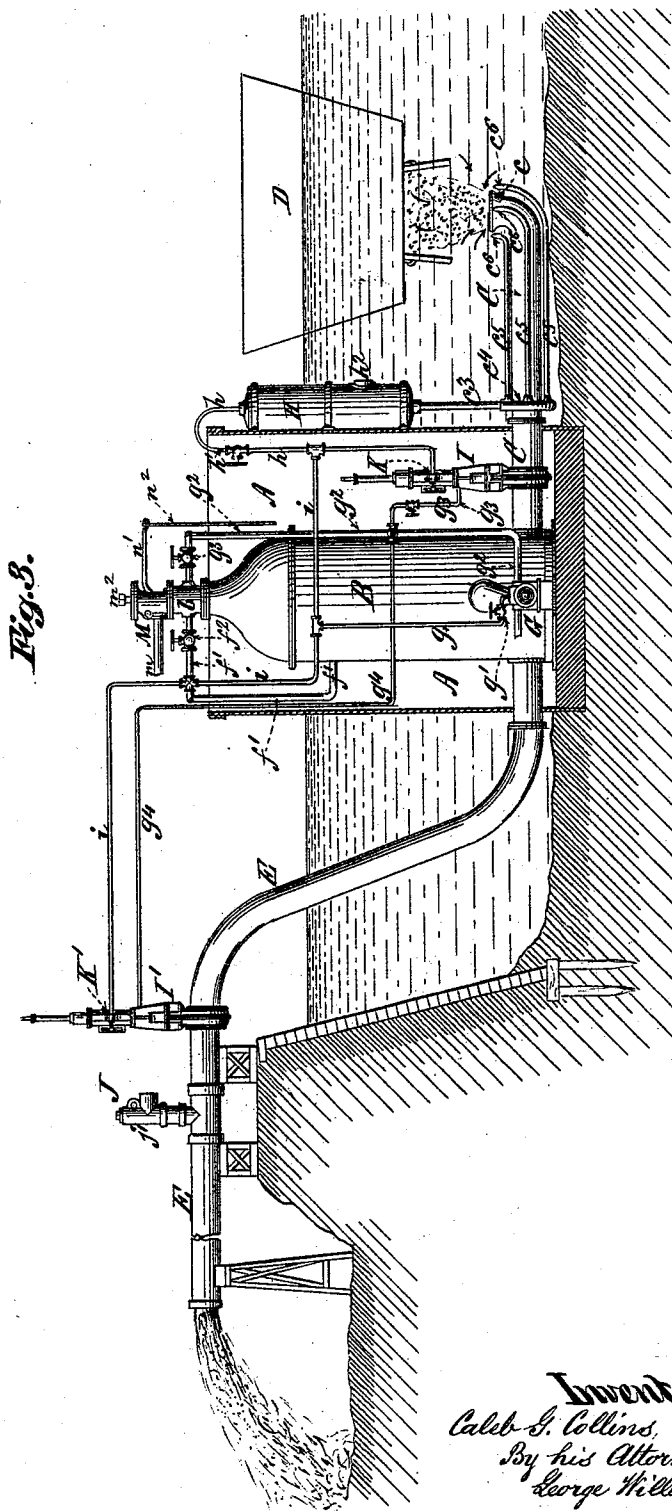
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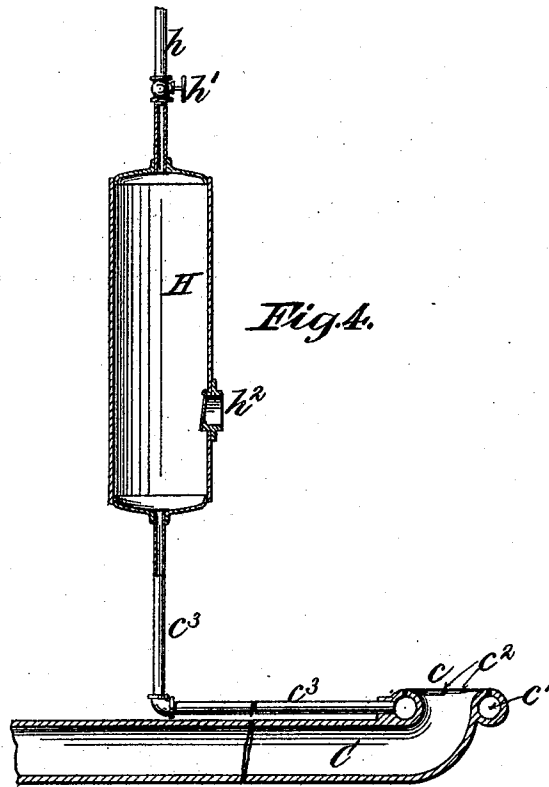


Fig. 4.



Fig. 5.

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UNITED STATES PATENT OFFICE,

CALEB G. COLLINS, OF WOODSBURG, ASSIGNOR TO CALVIN AMORY STEVENS,
OF NEW YORK, N. Y.

DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 496,343, dated April 25, 1893.

Application filed September 5, 1892. Serial No. 445,070. (No model.)

To all whom it may concern:

Be it known that I, CALEB G. COLLINS, a citizen of the United States, residing at Woodsbury, in the county of Queens and State of New York, have invented certain new and useful Improvements in Dredging Apparatus, of which the following is a specification sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

My improvements relate to the class of apparatus set forth in my prior applications for patent, Serial No. 434,534, filed May 27, 1892, and Serial No. 436,998, filed June 16, 1892, in which vacuum chambers are employed in excavating and transferring the spoil in connection with water acting as a vehicle.

The present application shows and describes an arrangement and construction of parts substantially the same as shown and described in my concurrent application, Serial No. 454,357, filed December 7, 1892, which latter is a sub-division of this case.

The features of my invention to which I limit myself herein relate to the means employed for receiving the spoil under water, for preventing the clogging of the suction pipe, and for elevating and discharging the spoil above the water line.

In carrying out my invention practically I employ a submerged suction pipe the mouth of which projects upward to receive the spoil which is dumped into the water over it. Where the spoil is transported in dumping scows to a place for delivery or distribution this is a convenient and economical method of transferring it, since the act of dumping it into the water over the mouth of the suction pipe favors its admixture with the water in such proportion as to render the water available as a vehicle and lubricant in the passage of the mass through the vacuum apparatus. Certain kinds of spoil however, as that containing a large percentage of clay, are apt to pack and clog around and above the mouth of the suction pipe, and a feature of my invention consists in providing the suction pipe with means for loosening up and disintegrating such masses of accumulated material when necessary by jets of water under pressure dis-

charged at the mouth of the suction pipe. An incidental feature of the invention in this connection consists in effecting this operation by means of water admitted automatically below the water line into a chamber from which it is expelled through the ejection pipes by live steam, although a pump of ordinary construction may be substituted if preferred. The advantages of my special arrangement are that it is simple, inexpensive and automatic in action.

A distinguishing feature of my invention consists in locating the vacuum chamber, &c., in a submerged caisson, so that the vacuum is only used to draw in the commingled spoil and water, the charges being afterward elevated and ejected by the direct pressure of steam. The operation is thus rendered more economical and effective.

In the accompanying drawings I illustrate diagrammatically and in detail the essential features of my improvements.

The apparatus may be modified more or less in construction and arrangement of parts without deviating from the spirit and intent of the invention, however, and I do not confine myself strictly to the identical form and arrangement of parts shown.

In the accompanying drawings, Figure 1, is a plan illustrating diagrammatically the arrangement of apparatus suitable for carrying out my improvements. Fig. 2, is a vertical section of a caisson and surroundings showing the apparatus in elevation. Fig. 3, is a view similar to Fig. 2, showing a modification in the arrangement of the parts. Fig. 4, is a sectional elevation of the suction pipe and means for clearing the mouth thereof when obstructed. Fig. 5, is a plan of the outer end of the suction pipe.

The caisson A, is of any ordinary or suitable construction, and is sunk and maintained in position in the usual way.

B, is the vacuum cylinder situated in and resting upon the bottom of the caisson, so that its receiving or suction pipe C, extending out horizontally from the bottom of the cylinder and from the side of the caisson is submerged sufficiently below the water line to permit dumping scows D, to pass over and above its

mouth *c*. The discharge pipe *E*, extends upward from the opposite side of the cylinder and of the caisson to the point at which it is desired to discharge or distribute the spoil.

5 In the drawings the source of steam supply is represented symbolically as derived from a steam boiler *F*, situated within the caisson, although any other source of steam supply may be employed, as may be found most expedient in practice.

10 *G*, is a symbolical representation of a steam pump employed to afford the requisite supply and pressure of water to certain parts of the apparatus as hereinafter set forth.

15 *H*, is the device for ejecting water around the mouth *c*, of the suction pipe *C*, for the purpose of loosening up the spoil at that point when necessary.

I and *I'*, are respectively the inlet and outlet steam gate valves.

J and *J'*, are alternative forms of a relief device for the discharge conduit.

The main steam supply pipe *f'*, extends from the steam dome *f*, of the steam boiler 25 *F*, to the cylindrical chamber *b*, upon the top of the vacuum chamber, a suitable valve *f*², being interposed in its length. A branch pipe *i'*, extends from the main steam pipe *f'*, to the throttle valve *K'*, of the vacuum cylinder 30 steam gate valve *I'*. Another branch pipe *i*, conveys steam from the main pipe *f'*, to the steam pipe *g*, which supplies steam through the valve *g'*, to the pump *G*; also to the pipe *h*, which supplies steam through the valve 35 *h'*, to the ejector *H*; and finally to the throttle valve *K*, of the vacuum cylinder inlet steam gate valve *I*. The steam pump *G*, supplies water under pressure through the pipe *g*², and valve *g*³, to the compartment *b*, upon 40 the top of the vacuum chamber *B*, and through branches *g*³, *g*⁴, to certain packing boxes on the vacuum chamber steam inlet and outlet valves *I*, *I'*.

The apparatus is operated in the main substantially as set forth in my prior applications 45 hereinbefore referred to,—that is to say the vacuum chamber steam gate valves *I*, *I'*, being both closed, a suitable quantity of steam is admitted through the pipe *f'*, and valve *f*², to the upper part of the vacuum chamber *B*, the valve *f*², is closed, and the valve *g*³, in 50 the pipe *g*², is opened admitting sufficient water to spray and condense the steam. The valve *g*³, having been closed as soon as a desired degree of vacuum is attained within 55 the cylinder the apparatus is now ready for the reception of the charge of spoil to be transferred. This is effected by dumping from the scow *D*, moored over the mouth *c*, 60 of the suction pipe *C*, more or less of the comparatively compact material transported therein. The inlet gate valve *I*, being now opened the partial vacuum within the vacuum chamber *B*, causes the commingled water and 65 spoil to rush into and through the conduit *C*, under atmospheric pressure. The vacuum chamber *B*, is emptied of the charge thus ob-

tained by closing the inlet steam gate valve *I*, opening the discharge gate valve *I'*, and ejecting the material through the discharge 70 conduit *E*, by means of the direct pressure of steam admitted to the top of the vacuum chamber by means of the steam valve *f*².

In operating upon certain classes of spoil 75 of a compact, tenacious nature, as clays, &c., difficulty is experienced in keeping the mouth *c*, of the suction conduit free and clear. The solid matter under the action of the suction caused by the vacuum collects around and above the mouth *c*, in the shape of an inverted 80 cone, finally clogging the passage and necessitating the suspension of operations until the obstruction can be removed. I obviate this difficulty by arranging for a series of hydraulic jets around the mouth *c*, of the suction 85 pipe *C*, by which means the clogged material may be quickly and effectually broken up and separated whenever necessary without retarding the working of the apparatus; or if preferred and rendered advisable by the 90 nature of the spoil under treatment the jets of water may be utilized continuously, or nearly so, for aiding in the disintegration and dilution of the material as dumped from the scows. 95

Various mechanical contrivances may be resorted to in effecting this clearance of the mouth of the suction pipe, alternating devices being shown in the drawings. In Figs. 1, 2, 4 and 5, the mouth *c*, of the suction pipe 100 *C*, is formed with an annular chamber *c'*, having openings *c*², adapted to direct jets of water upward around the mouth *c*,—the water being supplied under pressure to the annular chamber *c'*, by a single pipe *c*³, proceeding 105 from the forcing chamber *H*. In Fig. 3, the pipe *c*³, from the forcing chamber *H*, enters an annular head *c*⁴, from which projects the pipes *c*⁵, running parallel with the suction pipe *C*, and having their outer ends bent up 110 into nozzles *c*⁶, surrounding the mouth *c*, of the conduit *C*. In either case the operation and results are substantially the same, in so far as the treatment of the spoil is concerned.

In lieu of the simple form of forcing chamber *H*, shown in the drawings any form of 115 pump or equivalent device may be used for supplying the water under pressure to the mouth *c*, of the suction pipe *C*. The chamber *H*, is simply a cylinder into which water is 120 admitted automatically through the inwardly opening valve *h*², to be expelled from the chamber through the pipe *c*³, by the direct pressure of steam admitted through the pipe *h*, and valve *h'*, the inlet valve *h*², closing automatically and being held closed by the internal pressure while the chamber is being 125 discharged of its contents. In lieu of ejecting the water thus around the mouth of the suction pipe, the steam itself may be so ejected 130 if preferred with like result.

Having thus described my invention I wish to state that I am aware that vacuum chambers, submerged suction pipes, &c., have been

used in conjunction with portable excavating apparatus, with which however my improvements have nothing to do.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In apparatus for transferring spoil &c., the combination with a portable dumping scow or vessel in which the spoil is transported, of a submerged caisson, a vacuum cylinder situated in said submerged caisson, a discharge valve, a discharge conduit extending above the water line, an inlet valve, and a submerged suction pipe formed with a mouth or receiver opening upward into which the spoil may be dumped from the transporting vessel, substantially in the manner and for the purpose set forth.

2. In apparatus for transferring spoil &c. the combination with a portable dumping scow or vessel in which the spoil is transported, of a submerged caisson, a vacuum chamber situated in said submerged caisson, a discharge valve, a discharge conduit extending above the water line, an inlet valve, a submerged suction pipe formed with a mouth or receiver opening upward into which the spoil may be dumped from the transporting vessel, and mechanism for ejecting jets of water or steam upward around the mouth of the said suction pipe substantially in the manner and for the purpose described.

3. In apparatus for transferring spoil &c., the combination with a portable dumping scow or vessel in which the spoil is transported, of a submerged caisson, a vacuum chamber situated in said submerged caisson, a discharge valve, a discharge conduit extending above the water line, an inlet valve, a submerged suction pipe formed with a mouth or receiver opening upward into which the spoil may be dumped from the transporting vessel, a submerged compartment formed with a water inlet valve below the water line, a pipe or pipes for conducting water or steam from the said submerged compartment and ejecting the same upward around the mouth of the submerged suction pipe, and pipes and connections for supplying said submerged compartment with steam under pressure, for the purpose and substantially in the manner described.

4. In apparatus for transferring spoil &c., the combination with a portable dumping scow or vessel in which the spoil is transported, of a submerged caisson, a vacuum

chamber situated in said submerged caisson, a discharge valve, a discharge conduit extending above the water line, an inlet valve, a submerged suction pipe formed with a mouth or receiver opening upward into which the spoil may be dumped from the transporting vessel, a submerged water compartment formed with an inlet valve below the water line which opens automatically to admit water to the compartment and closes automatically under internal pressure, a pipe or pipes for conducting water or steam from said submerged compartment and ejecting it upward around the mouth of the submerged suction pipe, and pipes and connections for supplying said submerged compartment with steam under pressure for the purpose and substantially in the manner described.

5. In apparatus for transferring spoil &c., the combination and arrangement substantially as herein set forth, of the submerged caisson A, vacuum chamber B, discharge valve I', discharge conduit E, extending above the water line, the inlet valve I, and the submerged suction pipe C, formed with the mouth c, opening upward for the purpose described.

6. In apparatus for transferring spoil &c., the combination and arrangement substantially as herein set forth, of the submerged caisson A, vacuum chamber B, discharge valve I', discharge conduit E, extending above the water line, the inlet valve I, submerged suction pipe C, with receiver c, opening upward, and the water compartment H, provided with pipe or pipes leading to the receiver, and with steam pipe h, connecting it with a source of steam supply for the purpose and substantially in the manner described.

7. In apparatus for transferring spoil &c., the combination and arrangement substantially as herein set forth, of the submerged caisson A, vacuum chamber B, discharge valve I', discharge conduit E, extending above the water line, the inlet valve I, submerged suction pipe C, with receiver c, opening upward, the water compartment H, steam connection h, automatic valve h², and discharge pipe or pipes for conducting the contents of the compartment H, to, and ejecting the same upward, around, the receiver c, substantially in the manner and for the purpose described.

CALEB G. COLLINS.

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