

(No Model.)

4 Sheets—Sheet 1.

C. G. COLLINS.
DREDGING APPARATUS.

No. 496,343.

Patented Apr. 25, 1893.

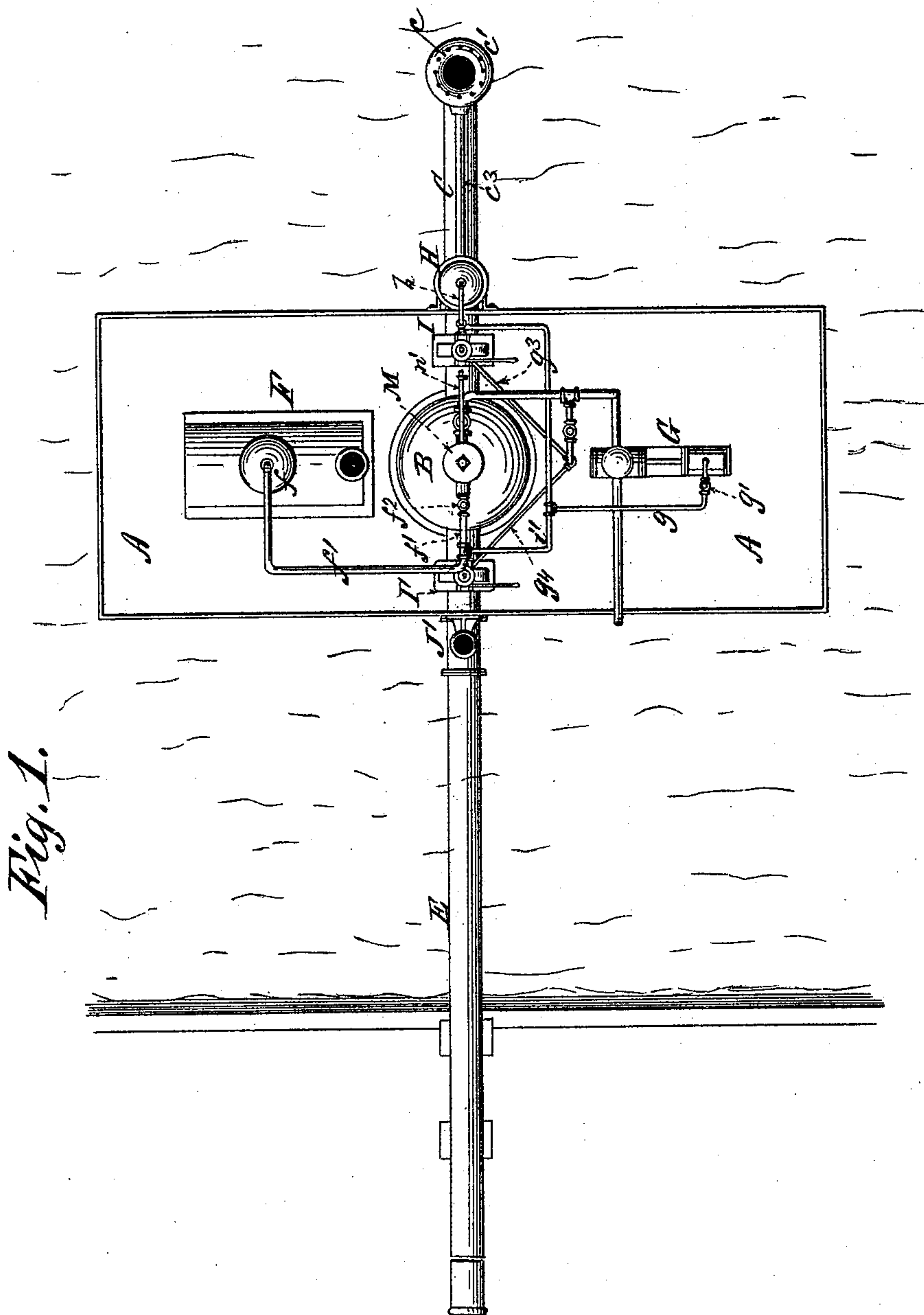


Fig. 1.

Witnesses:

D. W. G. and D. W. G.

[Signature]

Inventor:

Caleb G. Collins

By his Attorney

George William Smith

(No Model.)

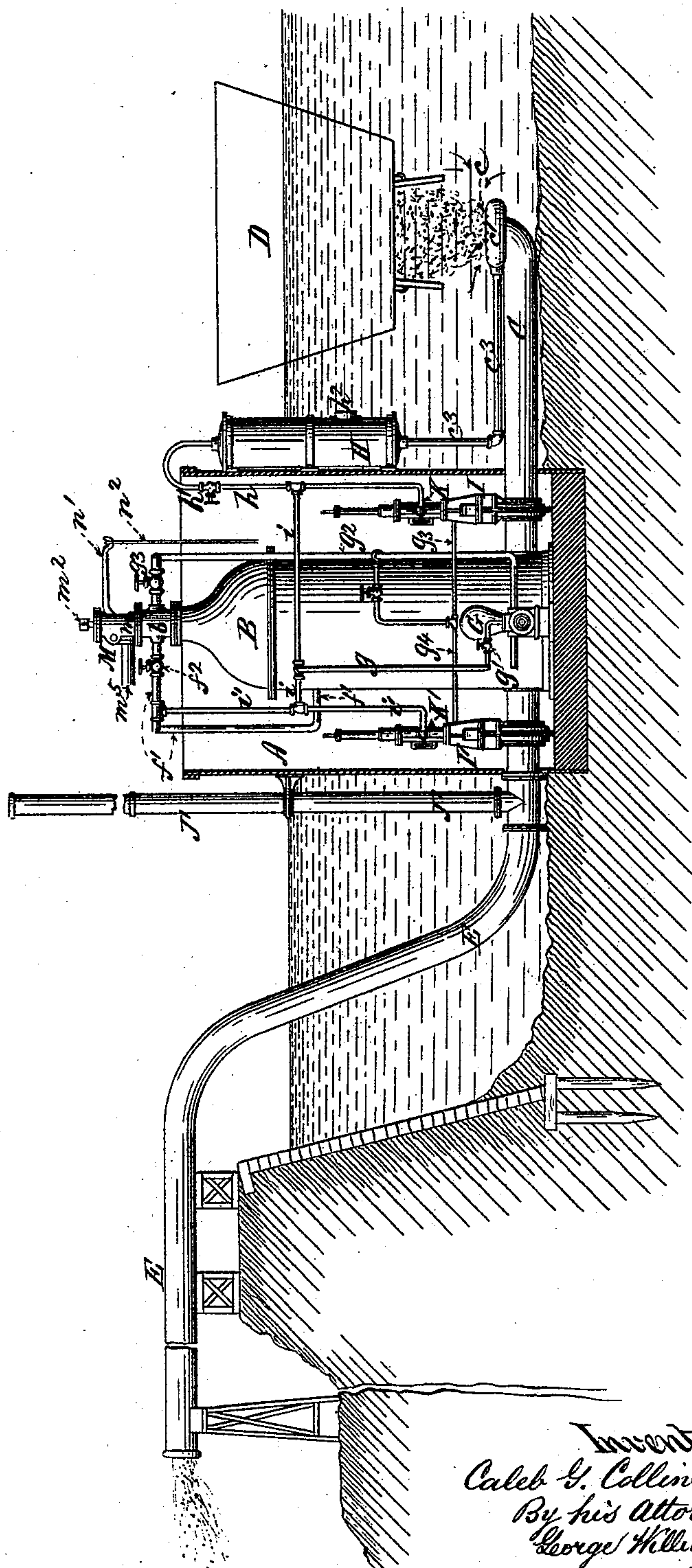
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Fig. 2.



Witnesses:
A. W. Gardner.
[Signature]

Inventor:
Caleb G. Collins,
By his Attorney
George William Mith

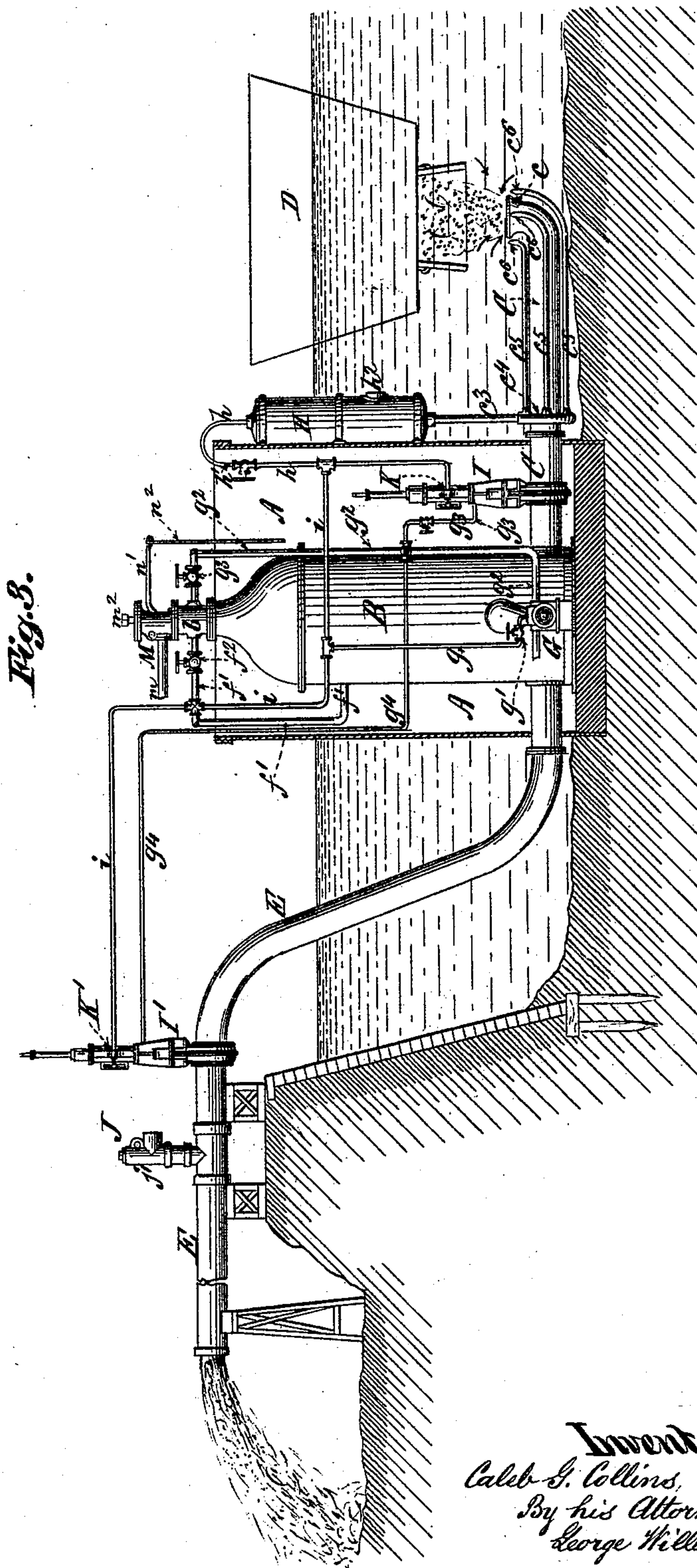
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G. H. Smith

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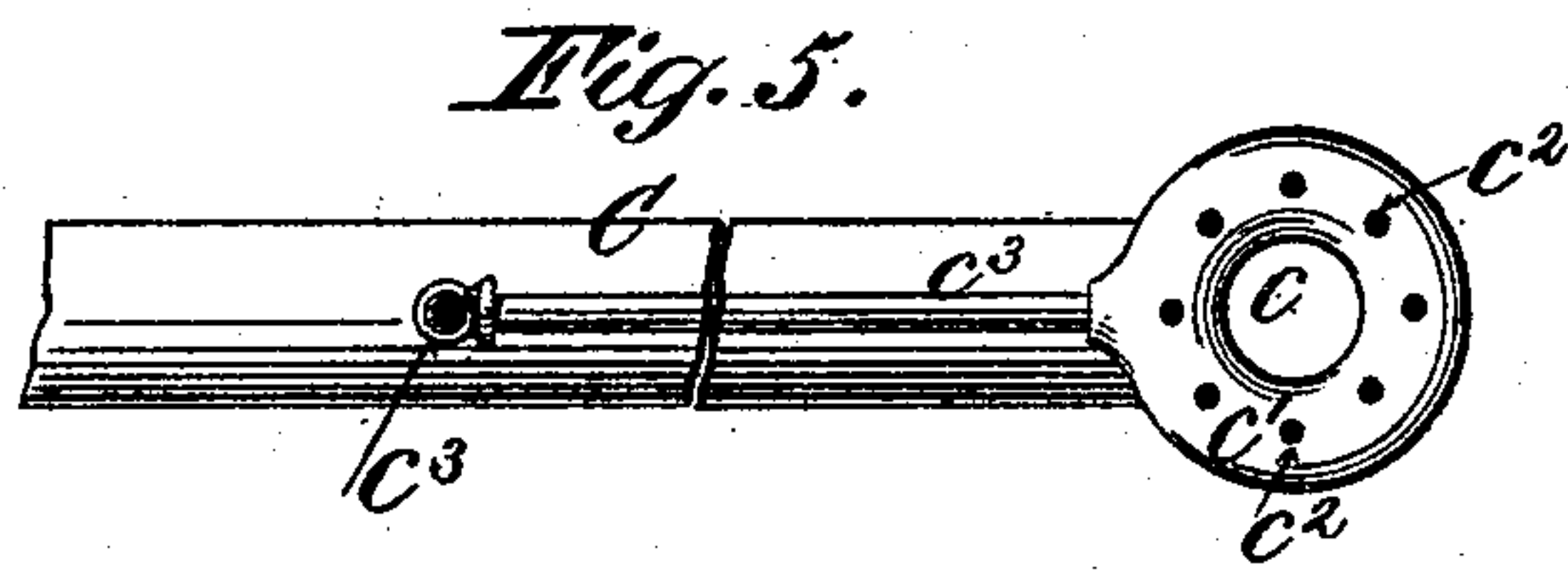
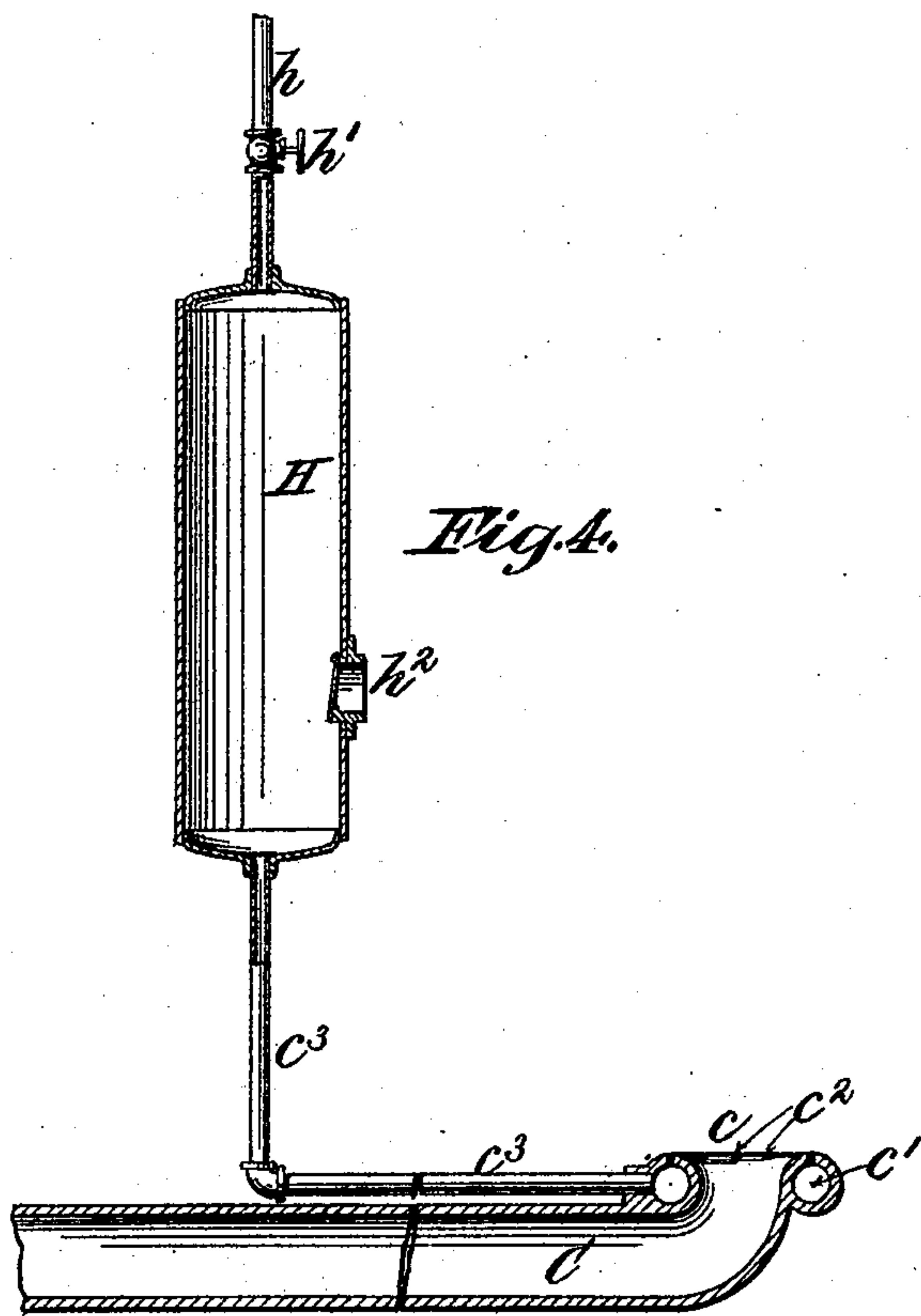
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Patented Apr. 25, 1893.



Witnesses:
A. W. Gardner.
G. J. Math

Inventor:
Caleb G. Collins
By his Attorney
George William Math

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 Woodsb-
burg, in the county of Queens and State of
5 New York, have invented certain new and use-
ful 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
10 same.

My improvements relate to the class of ap-
paratus 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
15 which vacuum chambers are employed in ex-
cavating and transferring the spoil in con-
nection with water acting as a vehicle.

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

The features of my invention to which I
25 limit myself herein relate to the means em-
ployed 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.

30 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
35 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
40 such proportion as to render the water avail-
able as a vehicle and lubricant in the passage
of the mass through the vacuum apparatus.
Certain kinds of spoil however, as that con-
taining a large percentage of clay, are apt to
45 pack and clog around and above the mouth
of the suction pipe, and a feature of my in-
vention consists in providing the suction pipe
with means for loosening up and disintegrat-
ing such masses of accumulated material when
50 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 be-
low the water line into a chamber from which 55
it is expelled through the ejection pipes by
live steam, although a pump of ordinary con-
struction may be substituted if preferred.
The advantages of my special arrangement are
that it is simple, inexpensive and automatic 60
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 65
and water, the charges being afterward ele-
vated and ejected by the direct pressure of
steam. The operation is thus rendered more
economical and effective.

In the accompanying drawings I illustrate 70
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 75
of the invention, however, and I do not con-
fine myself strictly to the identical form and
arrangement of parts shown.

In the accompanying drawings, Figure 1, is
a plan illustrating diagrammatically the ar- 80
rangement of apparatus suitable for carrying
out my improvements. Fig. 2, is a vertical
section of a caisson and surroundings show-
ing the apparatus in elevation. Fig. 3, is a
view similar to Fig. 2, showing a modification 85
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. 90

The caisson A, is of any ordinary or suit-
able 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 95
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 100

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.

20 *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.

25 The main steam supply pipe *f'*, extends from the steam dome *f*, of the steam boiler *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 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 *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 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'*.

30 The apparatus is operated in the main substantially as set forth in my prior applications 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 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 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*, 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 spoil to rush into and through the conduit *C*, under atmospheric pressure. The vacuum chamber *B*, is emptied of the charge thus ob-

70 tained by closing the inlet steam gate valve *I*, opening the discharge gate valve *I'*, and ejecting the material through the discharge 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.

75 In operating upon certain classes of spoil 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 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 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 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.

80 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 *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 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 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.

85 In lieu of the simple form of forcing chamber *H*, shown in the drawings any form of 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 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 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 if preferred with like result.

90 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.

Witnesses:

EDWARD FELL LUKENS,
S. H. HICKS.