(No Model.)

H. C. SEARS.

Steam Vacuum Dredger.

No. 230,072. Patented July 13, 1880.

Fig. 1.

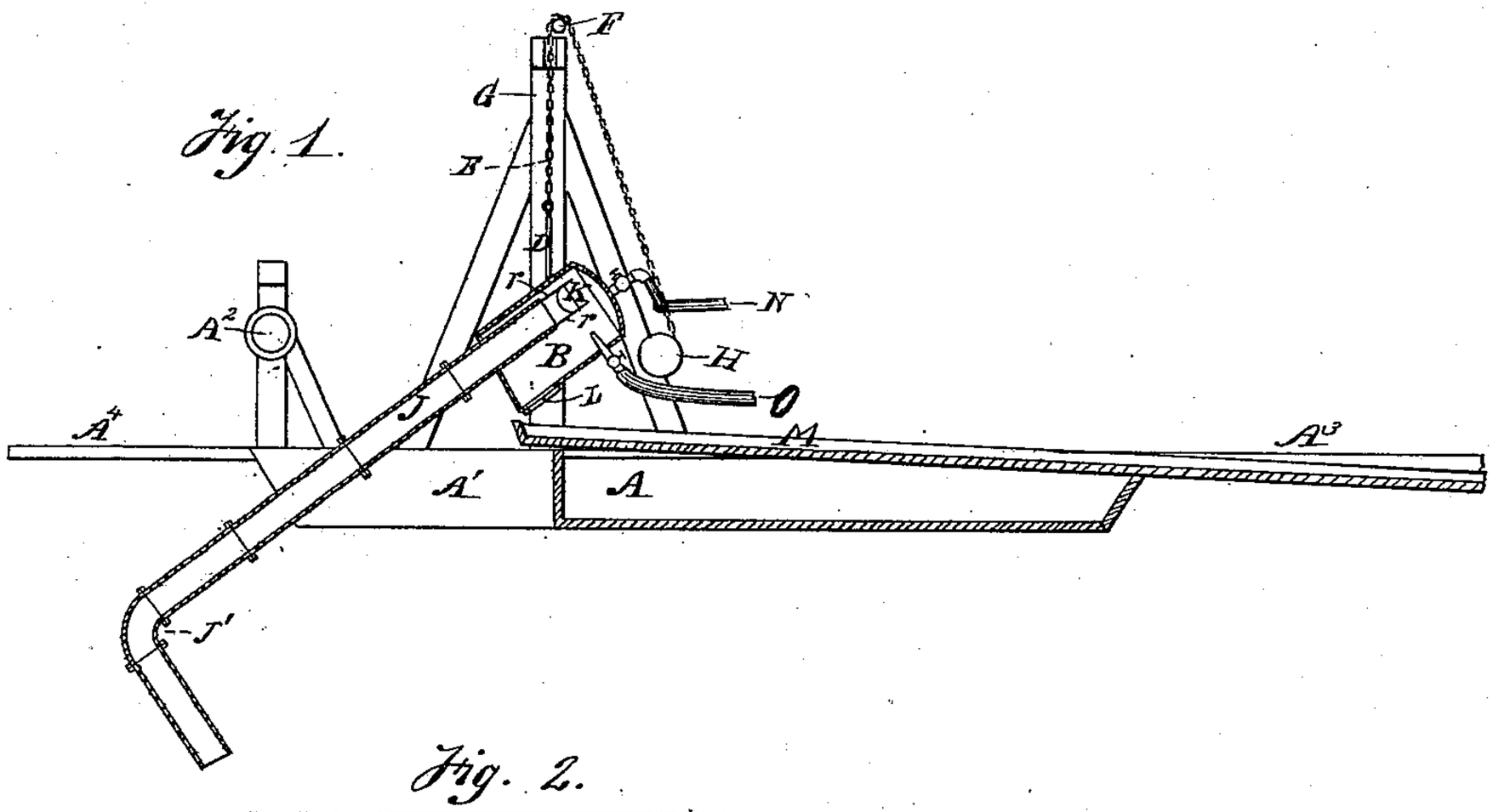


Fig. 2.

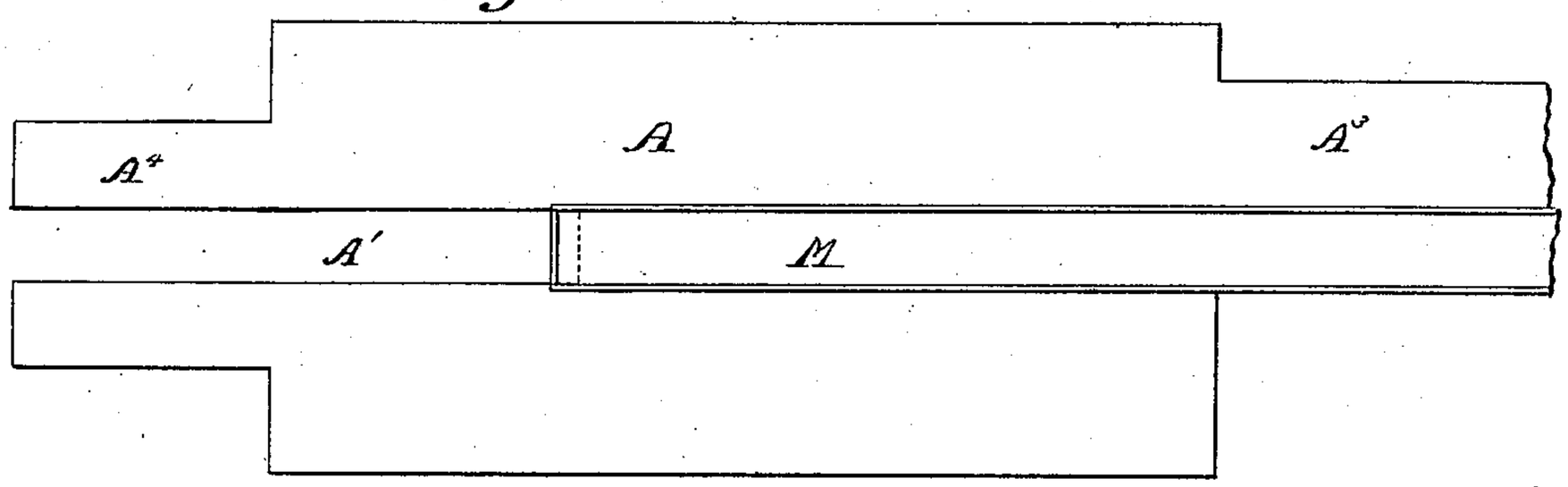


Fig. 3.

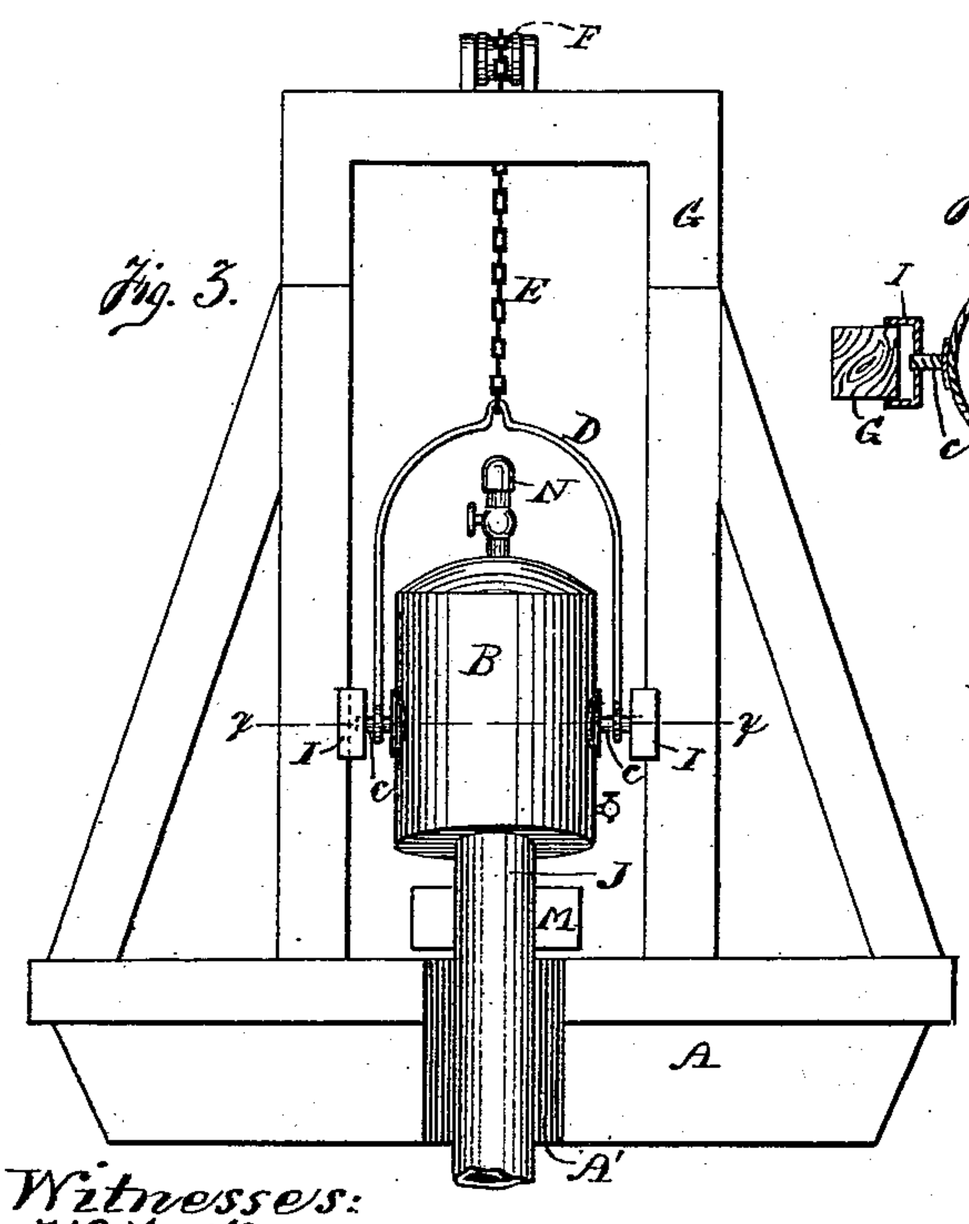


Fig. 5.

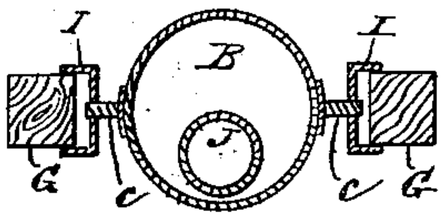
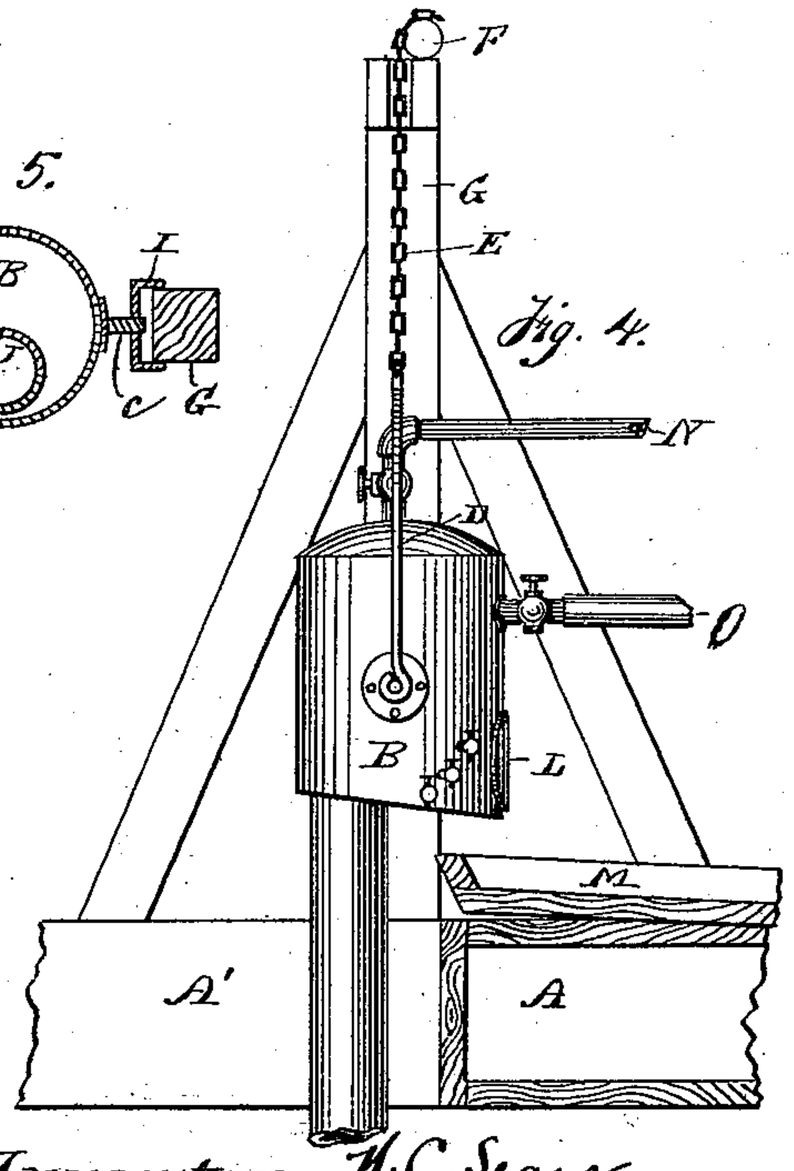


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY C. SEARS, OF BOSTON, MASSACHUSETTS.

STEAM VACUUM DREDGER.

SPECIFICATION forming part of Letters Patent No. 230,072, dated July 13, 1880.

Application filed March 25, 1880. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SEARS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Steam Vacuum Pumping Apparatus, of which the following is a specification.

This invention relates to apparatus for raising water and solid matter from submerged surfaces by the use of the Savary process—*i. e.*, charging a vacuum-chamber with steam, and then condensing the steam to form a vacuum, which induces a flow of water and other matter from the submerged surface into the vacuum-chamber through a valved induction-pipe projecting at its upper end into the chamber and extending down to the submerged surface.

My invention has for its chief object to provide the induction-pipe with an upwardly-opening valve arranged to be washed by a jet of water from the pipe employed to introduce water into the chamber to condense the steam, and be deprived thereby of the mud, gravel, and dirt that are liable to adhere to it, so that it may fit snugly on the end of the induction-pipe, the object of said valve being to prevent the escape of the matter contained in the induction-pipe when the chamber is opened to discharge its contents.

The invention also has for its object to provide certain other improvements relating to the vacuum-chamber and its induction-pipe, and to a scow or vessel supporting the same.

The invention consists, first, in such a relative arrrangement of the valve of the induction-pipe and the pipe through which water is introduced into the chamber to condense the steam that the water from the latter pipe shall wash the under surface of the valve and enable the valve to fit snugly on its seat, which is the end of the induction-pipe.

The invention consists, secondly, in pivoting the chamber to a scow or vessel so that the induction-pipe may stand at various angles.

The invention consists, thirdly, in certain improvements in the construction of the scow or vessel, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal section of an apparatus embodying my invention. Fig. 2 represents a plan view of the scow without the other parts. Fig. 3 represents an end view of the apparatus, showing the chamber in a vertical position. Fig. 4 represents a side elevation of the chamber and a section of a portion of the scow. Fig. 5 represents a section in line *x x*, Fig. 3.

The same letters of reference indicate the same parts in all the figures.

In the drawings, A represents a scow or vessel of any suitable construction. B represents the vacuum-chamber, which consists, preferably, of a cylinder of plate-iron strongly made, and is provided with lateral trunnions C C, which are journaled in suitable supports, so as to enable the chamber to swing and assume any desired inclination. In the present instance the supports of the trunnions are eyes formed on the end of a metallic bail, D, which is supported by a chain, E, passing over a pulley, F, on a vertical frame, G, and secured to a drum or windlass, H. These elements enable the vacuum-chamber to be raised and lowered, the trunnions being held and guided by flanged plates I I, having apertures to receive the trunnions, and adapted to slide on the uprights of the frame G. If desired, however, the supports for the trunnions may be rigid instead of movable; but I prefer to make them movable to accommodate the apparatus to varying depths of water.

J represents the induction-pipe, which consists of any desired number of lengths or sections of tubing having end flanges. The upper end of the pipe enters the bottom of the chamber and projects into the latter half-way, or more, to the top, and is provided with an upwardly-opening valve, K, at its upper end, said valve being preferably hemispherical, and adapted to slide between guide-rods *r*, attached to the end of the pipe. The lower end of the pipe J rests on the bottom or submerged surface, and may be inclined, as shown in Fig. 1, or vertical, as shown in Fig. 4. When the tube is inclined the pivoted vacuum-chamber enables it to rise and fall at its lower end and thus conform to inequalities of the bottom on which it rests. When the tube is vertical the same result may be produced by raising and lowering the vacuum-chamber. The scow or

vessel has a longitudinal opening or well, A′, to permit the tube J to swing from an inclined to a vertical position.

A² represents a hoisting apparatus at the end of the scow to raise the tube to a horizontal position.

L represents a valve or door at the lower end of the vacuum-chamber, which is adapted to be shut air-tight while the vacuum-chamber is being filled, and is opened to discharge the solid and liquid contents of the receiver into a sluice, M, or other receptacle. Steam is admitted into the condenser through a pipe, N, communicating with a suitable boiler or generator. (Not shown.)

O represents a pipe to admit water into the vacuum-chamber from a force-pump. (Not shown.) This pipe is arranged to direct the water upon the under side of the valve K of the pipe J when said valve is open, as shown in Fig. 1, so that the valve is cleaned from mud and dirt, and enabled to fit tightly on the end of the pipe J when it closes.

The described apparatus is intended mainly for raising deposits containing gold from the beds of rivers; and to separate the gold from the other matters the sluice M is provided, extending at a gentle incline from the point where the contents of the vacuum-chamber are discharged. In order to obtain a sluice of sufficient length, I extend M beyond the end of the scow, and provide the latter with a narrow extension, A³, to enable a person to walk out to the outer end of the sluice. By this construction I avoid the necessity of making the body of the scow long enough to contain the entire sluice, thus saving in expense and weight. The opposite end of the scow is also provided with an extension, A⁴, to enable a person to add or remove a section from the pipe J. When the pipe J is inclined I provide it with a curve, J′, to make its lower end so nearly vertical that the pipe will not take up so much water as it would if its lower end were considerably inclined, particularly on a hard bottom.

The operation of the apparatus is as follows: A vacuum having been formed in the chamber B by the successive introduction of steam and water through the pipes N and O, the chamber is filled with solid and liquid matter through the pipe J, the valve K rising to admit the passage of such matter, and being liable to be coated with mud or gravel passing through the pipe. When the chamber is filled with liquid and solid matter the valve or door L is opened, and the contents of the chamber are discharged into the sluice S, and at the same time a stream of water is admitted through the pipe O upon the valve to remove the mud or gravel that may adhere to it, so that it can fit closely upon the end of the pipe when it closes and prevent the contents of the pipe from sinking to the level of the water that supports the scow. This part of my invention—viz., the relative arrangement of the valve K and pipe O—I consider of much importance, as it insures the proper fitting of the valve, and thus facilitates the operation of the apparatus.

I am aware that an induction-pipe has been pivoted to a fixed vacuum-chamber on a scow provided with a longitudinal wellway through which the pipe passes. Such an apparatus necessitates careful packing around the hollow trunnions or joints connecting the pipe to the chamber, and the joints are liable to leak and interfere with the operation of the vacuum-chamber. By pivoting the chamber and attaching the induction-pipe rigidly to it I obviate the last-named objection and simplify the construction. I am also aware that a scow with an inclined sluice to receive the discharges from the chamber is not new, the sluice extending only to the end of the scow. Therefore I do not claim these features by themselves. By making the pipe J in sections I am enabled to readily shorten or lengthen it.

I claim—

1. In a steam vacuum pumping apparatus, the combination of a vacuum-chamber, a valved induction-pipe terminating within the upper portion of the chamber, and a pipe or condensing-nozzle adapted to direct a stream of water upon the valve of the induction-pipe when said valve is opened, as and for the purpose specified.

2. In a steam vacuum pumping apparatus, the combination of a scow or vessel having a longitudinal well or opening, a vacuum-chamber pivoted to supports on the scow, and a valved induction-pipe entering said chamber and rigidly attached thereto, so that both will be inclined together, as set forth.

3. The combination of the scow or vessel having a vertical frame, G, the vacuum-chamber having an induction-pipe, J, and trunnions C C, eyes or supports for said trunnions suspended from said frame and guided thereby, and means for raising and lowering the eyes or supports, as set forth.

4. The scow or vessel having the inclined sluice extended beyond its end and the track leading out from the body of the scow to the end of the sluice.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 23d day of March, A. D. 1880.

HENRY C. SEARS.

Witnesses:
C. F. BROWN,
H. G. WADLIN.