

(No Model.)

C. B. EMERSON.

SUBMARINE PLOW AND RIVER MINING MACHINE.

No. 590,392.

Patented Sept. 21, 1897.

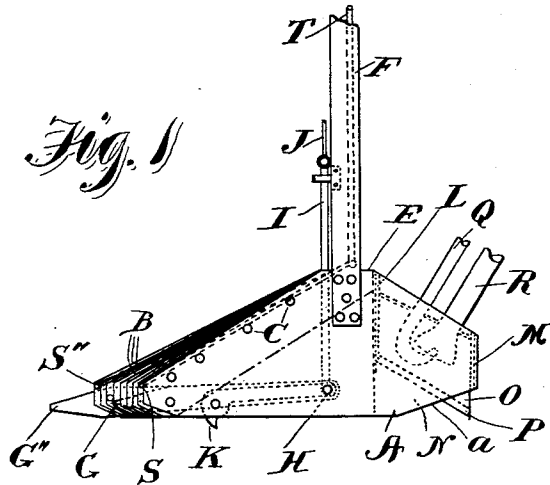
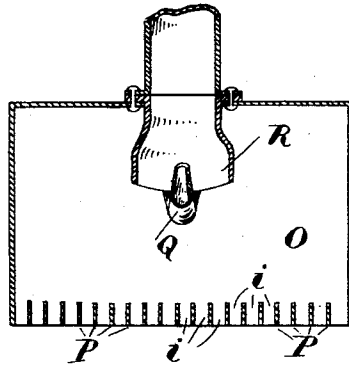


Fig. 3

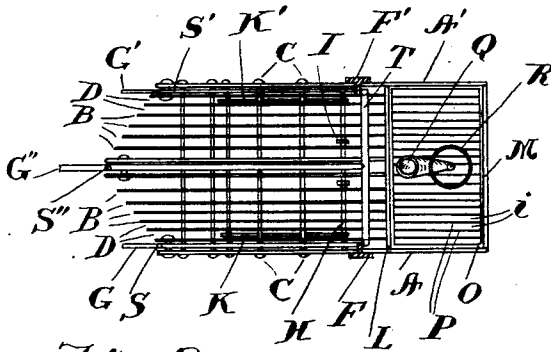


Fig. 2

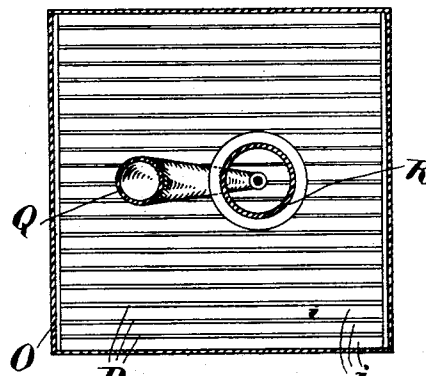
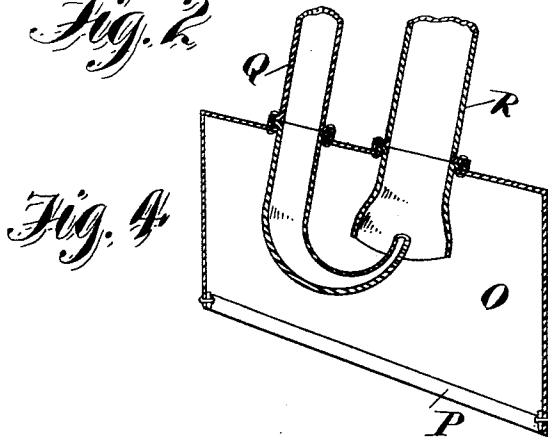


Fig. 5



WITNESSES:

John M. Adams

Ed. Adams

INVENTOR
Chas. B. Emerson
BY
Wm. H. Roca
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES B. EMERSON, OF SAN FRANCISCO, CALIFORNIA.

SUBMARINE PLOW AND RIVER-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 590,392, dated September 21, 1897.

Application filed July 11, 1895. Serial No. 555,654. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. EMERSON, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Submarine Plows and River-Mining Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates in general to hydraulic dredging-machines, and more particularly to that class wherein a jet of water at high pressure is directed to accomplish the elevation of the material as distinguished from that class known in the art as "suction-dredgers," wherein the material is drawn, not forced, through suitable delivery-conduits.

The prime objects of my invention are, first, to provide a simple but efficient and durable excavator or plow that will successfully cope with excessive irregularities of the bed operated upon and segregate the desired material; second, to guard against any loss of valuable disintegrated material resulting from the velocity of the stream by providing a reception-chamber situated to the rear of the cutting or feeding extremity of the excavator and capable of an independent vertical motion; third, to provide a series of forwardly-projecting beaks having a continuous motion tending to elevate or cast aside obstructions of considerable magnitude, such as boulders or the like, and thereby gain a clear and uninterrupted path for excavation; fourth, to so direct a series of hydraulic jets that their efficiency is brought to a maximum, and, fifth, to accomplish the elevation and distribution of the disintegrated spoil by an ejector-pipe secured to and moving with the reception-chamber, and also provide means for the constant forward pressure of the plow.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically pointed out in the appended claims.

The drawings hereto annexed and constituting a part of this specification clearly illus-

trate the operation and advantages of the invention, and the similar letters of reference marked thereon designate corresponding parts throughout the several views.

Figure 1 is a side elevation of the plow or excavator, the principal interior features being shown in dotted lines, while the upper portion leading to the floating barges and operating machinery is broken away. Fig. 2 is a plan view of the plow. Fig. 3 is a transverse section of the reception-chamber. Fig. 4 is a section taken at right angles to Fig. 3, and Fig. 5 is a top view of the chamber with the upper plate or cap removed.

I will now explain in detail the construction and operation of my invention, reference being had to the above figures.

The main body of the plow or excavator is formed; essentially, of the extreme or side plates A A' and the intermediate plates B, which are bolted together by means of the bolts C in such a manner by washers or other means as to form a grating with alternate open spaces D. The side plates A A' incline downward from a frustumed vertex E toward the forward and rear extremity of the plow, while the intermediate plates B are comparatively narrow, as shown in dotted lines in Fig. 1, and extend from the vertex E to the forward extremity and increase in width and length as they approach the center of the plow, where they project beyond and above the side plates A A'. The forward lower edge of each plate A and A' is slightly chamfered off, while the lower rear edge *a* inclines upward and backward from a point immediately below the vertex E.

Securely bolted to and extending perpendicularly upward from each of the plates A and A' are the T-shaped beams F F', which connect the plow to the upper floating barges or vessels, where the pumping, concentrating, elevating, and other necessary mechanism is situated.

Between each outer plate A and A' and the adjacent plate B, and also between the two central plates B, are respectively pivoted the beaks G G' G'', whose forward extremities project beyond the plow proper, and whose rear

extremities are connected to the transverse bar H, which in turn is connected by means of the guided connecting-rods I to the pistons J of a double-acting hydraulic cylinder supported between the beams F F', and which causes the beaks to assume an oscillating motion.

Beneath the two outer beaks G G' and pivoted to the plates A A' are the pronged creepers K K', which assume a motion similar to that of the beaks by their connection with the transverse rod H.

Immediately behind the rear extremities of the plates B and extending downward to within a short distance of the bottom edge of the plates A A' is the partition L, which in conjunction with the rear plate M forms a compartment N, the object of which I will now explain.

Adapted to slide vertically in the compartment N is a supplemental or reception chamber O, the sides, ends, and upper surfaces of which are closed, while the bottom is covered with a grating formed of a series of parallel bars P, having alternate open spaces *i*. Entering the chamber O through the upper surface thereof is an ejector-pipe Q, which is contracted in diameter and curved to direct a stream of water to the bell-shaped mouth of a delivery-pipe or conduit R, the latter being connected to the floating barges by suitable flexible connections. The lower surface of the chamber O is inclined in a direction opposite to the edge *a* of the plates A A'. Directly above and directed to the projecting extremities of the beaks G G' G'' are the hydraulic nozzles S S' S'', which are supplied through the pipes T, leading to the pumping mechanism above.

From the above description it is manifest that as the pistons J are caused to reciprocate the beaks G G' G'' and creepers K K' are oscillated and the plow caused to advance in the direction of the arrow in Fig. 1. The action of the beaks G G' G'' and jets from the nozzles S S' S'' and the cutting edges of the plates B disintegrates the material, which by the action of the current of the stream carries the material of the desired fineness between the plates B to the chamber O, where it is ejected by a stream of water at high pressure through the pipe R to the barges or other receptacles above.

It is further manifest that the elevating power at the extremities of the fulcrumed beaks G G' G'' is sufficient to cope with and cast aside over the inclined surface of the plow obstructions of great magnitude and weight, while the weight of the reception-chamber causes it to automatically assume a position on the bed of the stream regardless of irregularities thereon.

The rigidity of the structure and the great leverage afforded by the T-shaped beams F F'

as the barges are forced backward and forward is sufficient to rock the plow and thereby disintegrate material of the most dense and compact nature.

In cases where it is desired to advance the plow more rapidly it is my intention to attach tow-lines to its forward extremity; but this and other changes, such as variations in the form, number, and proportion of parts of the devices herein shown and described, I am aware can be made without departing from the spirit of my invention or sacrificing any of its advantages, and I therefore reserve the right to make such changes and alterations as fairly fall within the scope of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a submarine plow and excavator, the combination of a plow composed of a series of relatively rigid parallel plates, with a supplemental chamber carried by said plow and capable of vertical adjustment independent thereof, and a device for removing the spoil, as set forth.

2. In combination, an excavator constructed of a series of relatively rigid parallel plates forming excavating edges, with a plurality of bars or beaks fulcrumed longitudinally with said plates and projecting beyond the excavating edges thereof, said beaks being provided for oscillating movement independent of said parallel plates, and a device for removing the disintegrated spoil, as set forth.

3. In combination, an excavator composed of a series of relatively rigid plates assembled to work with a front feed, a rear supplemental and vertically-adjustable chamber adapted to receive the disintegrated spoil, and an ejector-pipe opening into said chamber, as set forth.

4. In combination, an excavator constructed and arranged to work with a front feed and rear delivery and a plurality of projecting oscillating beaks in conjunction with a series of hydraulic nozzles directed toward the projecting extremities of said beaks, and a device for removing the spoil as set forth.

5. In combination, an excavator constructed and arranged to work with a front feed, a vertically-adjustable chamber adapted to receive the disintegrated spoil, the bottom of said chamber being formed essentially of a series of parallel plates, and an ejector-pipe opening into said chamber as set forth.

6. In combination, an excavator composed of a series of relatively rigid parallel plates forming excavating edges, and an independent vertically-adjustable chamber carried by the excavator for the reception of spoil passed between said parallel plates, a plurality of longitudinally-oscillating bars or beaks fulcrumed to said plates, and a series of hydraulic nozzles directed toward the forward

extremities of said beaks, and a device for removing the spoil, as set forth.

7. In a submarine plow and excavator, the combination of a plow composed of a series
5 of relatively rigid parallel plates, with a supplemental chamber carried by said plow and capable of vertical adjustment independent thereof, one or more creepers pivoted to said plow and capable of independent oscillation,

and a device for removing the spoil, as set forth.

In witness whereof I hereunto set my hand in presence of two witnesses.

CHAS. B. EMERSON.

Witnesses:

C. W. AYERS,
P. C. KRETZ.