St. J. RAVENEL.

Excavating and Dredging Machine.

No. 210,359. Patented Nov. 26, 1878.

Fig. 1.

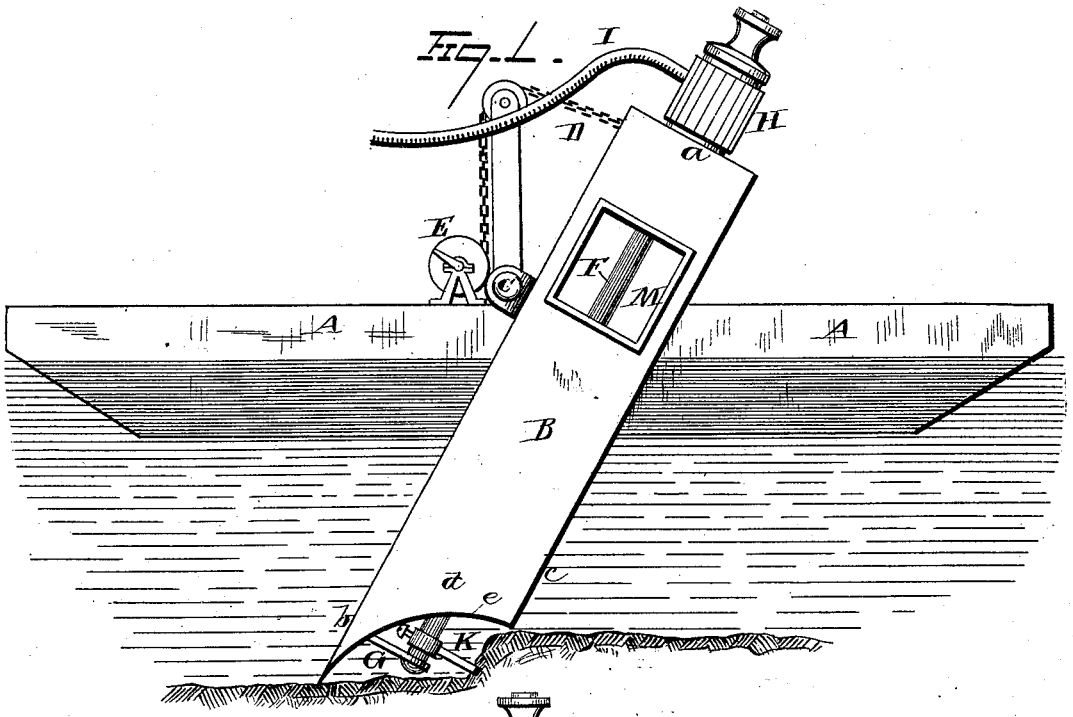
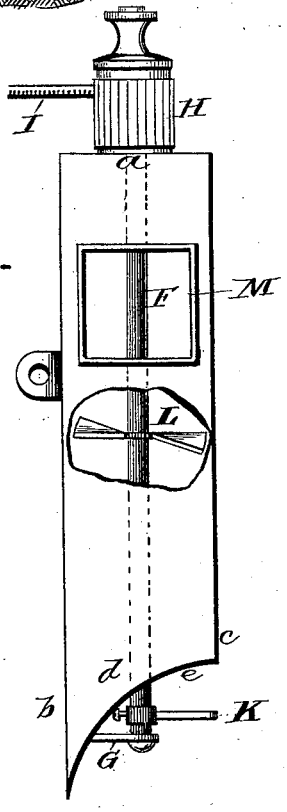


Fig. 2.



WITNESSES

E. F. Nottingham

Geo. T. Seymour

INVENTOR

St. Julien Ravenel

By H. A. Seymour

ATTORNEY

UNITED STATES PATENT OFFICE.

ST. JULIEN RAVENEL, OF CHARLESTON, SOUTH CAROLINA, ASSIGNOR TO PAUL S. FELDER, OF SAME PLACE.

IMPROVEMENT IN EXCAVATING AND DREDGING MACHINES.

Specification forming part of Letters Patent No. **210,359**, dated November 26, 1878; application filed October 22, 1878.

To all whom it may concern:

Be it known that I, ST. J. RAVENEL, of Charleston, in the county of Charleston and State of South Carolina, have invented certain new and useful Improvements in Excavating and Dredging 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in excavating and dredging machines, the object being to provide a machine or apparatus more especially adapted for breaking up phosphate-rock, which exists in strata on the beds of certain rivers and bays, and excavating such pieces of broken rock, and depositing the same on lighters or flats, whereby the phosphate-rock may be transported to suitable points to be converted into fertilizers or for other purposes.

My invention consists in the combination, with an adjustable casing or chute, of a revolving shaft, extending lengthwise through the casing or chute, and having suitable hooks or cutting implements secured to its lower end, one or more propeller-blades attached to the revolving shaft within the casing, and a rotary engine connected with the upper end of the shaft, whereby the revolution of the shaft serves to operate the hooks or cutters and break up the phosphate-rock, while the propeller-blades create an upward suction and raise the pieces of broken rock within the casing to the discharge-opening, from which the rock is discharged upon a perforated elevator, and raised and deposited upon a flat-boat or lighter.

My invention further consists in certain details in construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my invention. Fig. 2 is a side elevation of the casing, with a portion of the latter cut away to show the construction and arrangement of the operating mechanism within the same.

A represents any suitable boat, either flat-boat or lighter. B is the casing or chute of the dredger and excavator, and is supported by a shaft, C, journaled in suitable frame-work on the boat; or the casing may be suspended by chains, if desired, the object being to so connect the casing with the boat that it may be adjusted for varying depths of water. If the casing is attached to a supporting rock-shaft, as represented in the drawings, a chain, D, may be secured to its upper end, and the other end of the chain be attached to a windlass, E.

This arrangement will enable the casing to be adjusted at any desired angle, so that its lower end, E, may rest on the bed-rock of the river or bay.

F is a shaft, the lower end of which is supported in a journal-bracket, G, secured to the lower end of the casing or chute, while the opposite end of the shaft is supported in the upper end, *a*, of the casing, and projects through the same.

H is a rotary engine of any approved form of construction, and is connected with the upper end of the shaft F. Steam is supplied to engine H by a flexible pipe, I, leading thereto from a steam-boiler on the boat, the flexible pipe allowing of the variable adjustment of the casing without interfering with the continuous operation of the engine.

K represents a hook or cutter secured to the lower end of shaft F.

Any desired construction and number of cutters K may be employed, which are removably secured to the shaft, in order that they may be disconnected therefrom when it is desired to sharpen the cutters.

L is a propeller-blade, secured to the shaft F within the casing between the cutter or cutters K and discharge-opening M. Any desired number of propeller-blades may be attached to the shaft.

The lower end of the chute or casing is constructed with its upper side, *b*, extending beyond the lower side, *c*, and the sides *d* curved, as at *e*, in order that the casing may be seated fairly on the bottom, and a strong current of water created through the openings formed by the curved sides *e*, to draw the broken pieces of rock up into the casing.

The operation of the machine is as follows: The casing is adjusted in such position that the lower end thereof will rest on the rock-bed, and steam is then admitted to the rotary engine through the flexible pipe. As the engine revolves the shaft F attached thereto, the hooks or cutters are rapidly revolved with sufficient force to tear up and disintegrate the strata of phosphate-rock. At the same time the propeller blade or blades attached to the shaft within the casing create by their rapid revolution a strong upward current, which operates to raise the pieces of severed rock together with the sand and mud, and deposit and eject the mass from the discharge-opening in the side of the casing upon a perforated elevator, which latter allows the sand and mud to escape while the pieces of rock are deposited on the deck of the flat or lighter.

While my improved machine is especially adapted for excavating phosphate-rock, I do not limit myself to such exclusive use, but contemplate employing the same for other like purpose.

It is evident that many slight changes may be made in the construction and arrangement of the several parts of the apparatus, and hence I do not restrict myself to the exact construction shown and described; but,

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

1. The combination, with an adjustable elevator-chute provided with a discharge-opening intermediate with respect to its opposite ends, of revolving cutters located at the lower end of the chute or casing, and one or more propeller-blades located within the casing between its lower end and discharge-opening, substantially as set forth.

2. The combination, with an adjustable excavator chute or casing, of a revolving shaft, provided on opposite ends with a rotary engine and cutters or hooks, and having one or more propeller-blades secured to the shaft within the casing, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 3d day of October, 1878.

ST. JULIEN RAVENEL.

Witnesses:
GEO. F. CRANLEY,
T. R. WEBB.