No. 619,675. Patented Feb. 14, 1899.

A. W. CRAM.

DREDGER AND ELEVATOR.

(Application filed Feb. 4, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

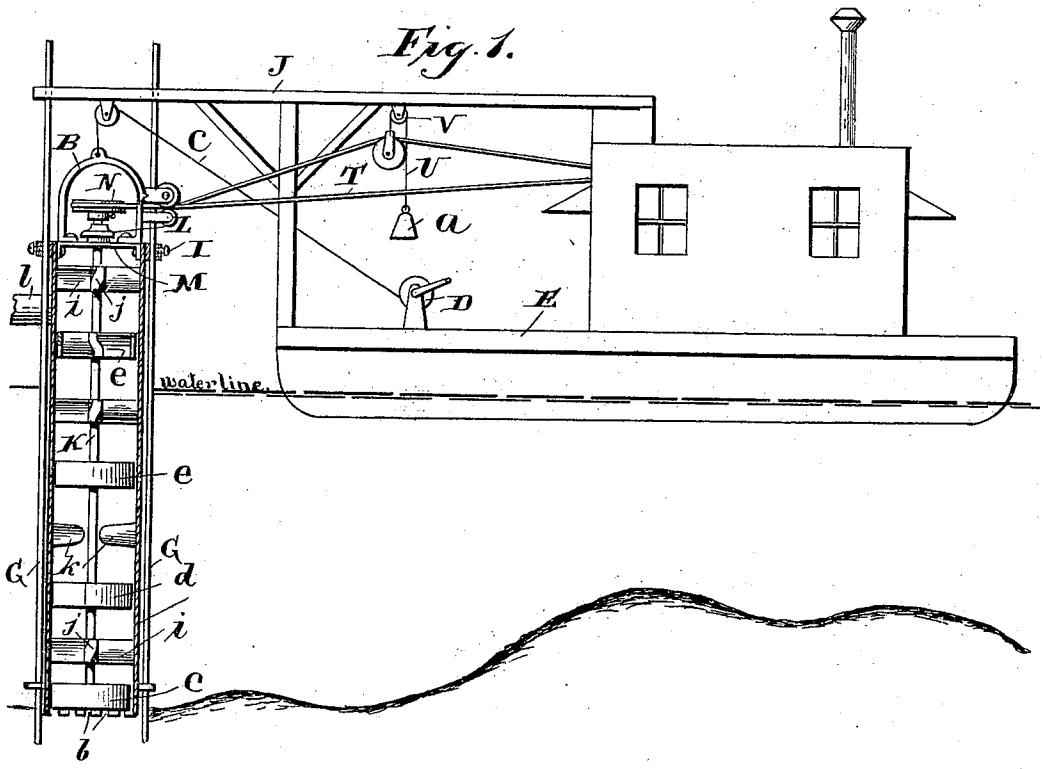


Fig. 3.

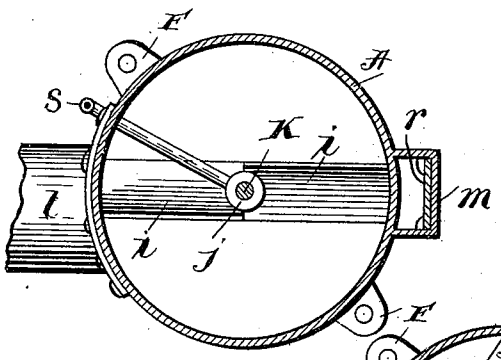


Fig. 4.

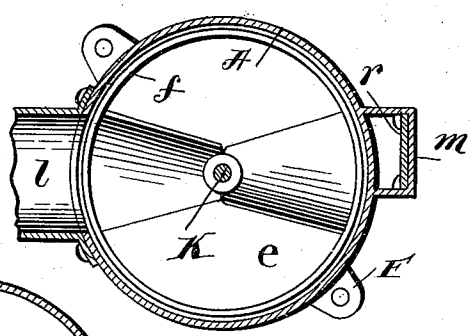
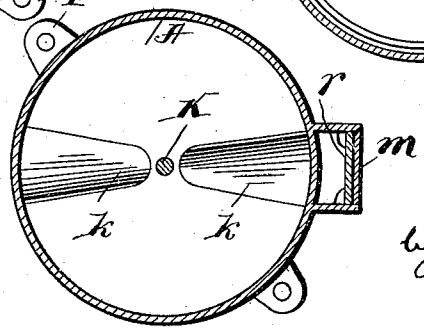


Fig. 5



Witnesses
Geo. E. Frech.
B. E. Seitz

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 619,675. Patented Feb. 14, 1899.

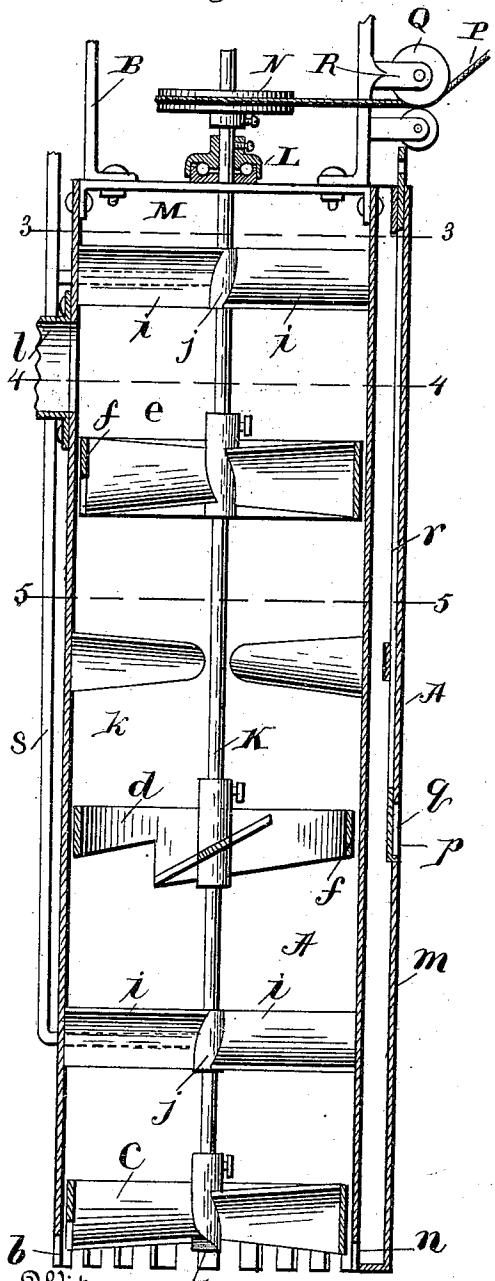
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(No Model.) 2 Sheets—Sheet 2.

Fig. 2.



Witnesses
Geo. E. Frech.
B. E. Seitz

Fig. 6.

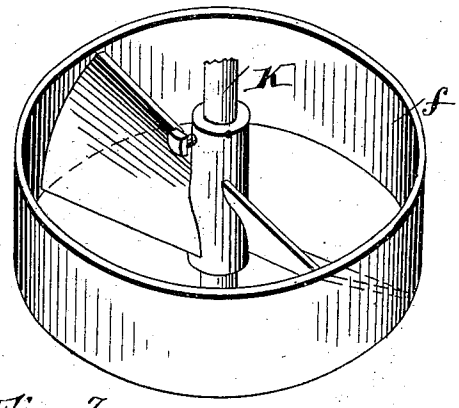
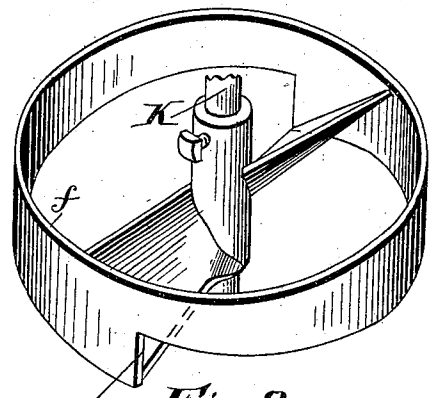
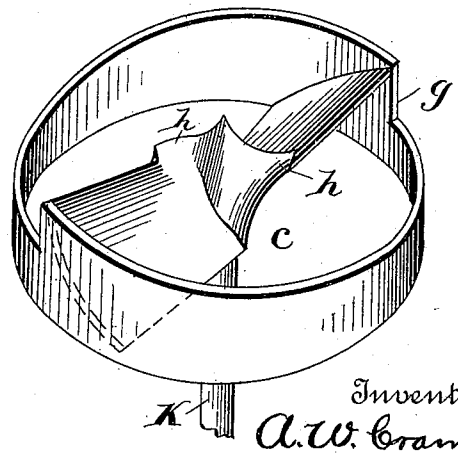


Fig. 7.



g Fig. 8.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALONZO W. CRAM, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR TO THE CENTRIFUGAL PUMP AND MINING COMPANY, OF SAME PLACE.

DREDGER AND ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 619,675, dated February 14, 1899.

Application filed February 4, 1898. Serial No. 669,099. (No model.)

To all whom it may concern:

Be it known that I, ALONZO W. CRAM, of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Dredgers and Elevators; 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 the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in combined dredgers and elevators, and pertains to a machine in which a tube is used containing rotating cutters and blades for propellers, all of which will be fully described hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a boat with my invention applied thereto, the elevator-tube being shown in section. Fig. 2 is an enlarged vertical sectional view of the elevator-tube. Fig. 3 is a horizontal sectional view taken on line 3 3 of Fig. 2. Fig. 4 is a similar view on line 4 4 of Fig. 2. Fig. 5 is a similar view on line 5 5 of Fig. 2. Fig. 6 is a detached perspective view of the preferred form of elevator blade or propeller. Fig. 7 is a similar view showing a modification. Fig. 8 is an inverted view of the blade at the lower end of the tube.

Referring now to the drawings, A indicates the elevator-tube, which is provided at its upper end with a yoke B, to which an elevator-rope C is attached at one end, the other end of the rope being attached to a hoisting device D upon the boat E. The tube A is provided with laterally-projecting perforated ears F, through which the supporting and driving rods G pass. The upper perforated ears F are preferably provided with clamping-screws I, by means of which the tube is clamped to the rods G. These rods G pass upward through a beam J, projecting out from the boat E and through the medium of which the elevator-tube A can be raised or lowered, as will be readily understood.

A shaft K passes longitudinally within the tube A and is provided at its upper end, preferably, with a ball-bearing L, supported upon a transverse bar M, spanning the upper end of the tube A. A driving pulley or wheel N is affixed to the upper projecting end of the shaft K, and around which a driving-belt P, preferably of the rope form, passes. Guiding-sheaves Q are supported upon brackets R, projecting from the yoke B, and this driving belt or rope P then passes around the driving machinery within the boat E, not here shown, but which may be of any desired form. For the purpose of keeping the driving-rope taut as the elevator-tube is raised or lowered a pulley T is supported to be movable transverse the belt. The construction here shown for this consists in having the pulley attached to a cord or rope U, passing over a sheave or guide V, supported by the beam J, and to which a weight *a* is attached. This weight will be of a heft sufficient to keep the belt tight for running the driving-shaft K.

The lower end of the elevator-tube A is provided with projections *b*, forming openings for the purpose of keeping out large stones, &c., that could not be elevated by the elevator propellers or blades.

The lower elevator-blade *c* is of the propeller form, as is also the other blades *d* and *e*. The particular novel feature in respect to these propeller blades or wheels is the providing of a flange *f*, surrounding and connected with the blade, the object of which is to prevent the material and water from being forced outward against the side of the tube, thus causing it to pass upward from the blades without any lateral force against the side of the tube. As shown in Fig. 6, I prefer to have the bands of a uniform width surrounding the propeller-blades, but this may be varied without departing from the spirit of my invention. The band may be cut upward, as shown at *g* in Fig. 7, which will to a considerable degree accomplish the same purpose.

The lower propeller *c* is provided with a novel form of cutter at its center. This cutter consists of a blade *h*, projecting from the lower edge of one blade of the propeller and extending to a point about at the axis of the

shaft of the propeller and then extending across to the lower edge of the opposite blade. This construction provides a cutter that is rapid in its action and at the same time provides a cutter that tends to throw outward any stones or other hard material as the propeller revolves.

Another feature of my invention consists in providing specially-constructed brackets or supports within the tube A for the shaft K. These brackets or supports consist of oppositely-inclined blades *i* and the inclination of which is opposite to the inclination of the blades of the propellers. The function and object of this construction are that as the material is forced upward these blades *i*, which contain the bearings *j* of said shaft, cause a continued rotating movement of the upwardly-moving material, which facilitates its upward movements, and the blades instead of being an impediment, as flat brackets or rods would be, are more or less of an assistance. These blades or brackets or pins are blade-shaped, and instead of impeding or obstructing the whirling motion of the upgoing water and material they receive and correspond with the upward whirl on the same principle as do the blades of the propeller. In this way they are not an obstruction in the same sense that a rod or flat bracket would be. For the same purpose blades *k* project from opposite sides of the tube A between the propellers *d* and *e* and perform the same function as the brackets or supports I'. The object is to keep the material in a continual whirl from one end of the tube to the other, and by keeping up this whirl it is more easily elevated, for less resistance is offered to the upper blade or propeller *e*.

Situated at any point or points throughout the length of the tube A are outlets *l*, which may be in the form of a tube or spout for running the material into a boat or off to a distant point.

Extending along parallel with and outside of the tube A is a passage-way *m*, having at its lower end an inwardly-opening passage *n* for the purpose of feeding water to the lower end of the tube A to be mixed with the mud when it is found necessary to thin it for facilitating its being forced upward within the tube A. This passage-way *m* is in the form of a tube and is provided with one or more inlet-openings *p* for admitting water thereto at a point above the cutter or lower end of the elevator-tube. This inlet-opening *p* is provided with a valve or door *q*, having an actuating-rod *r* extending upward to the upper end of the tube and by means of which the valve or door may be opened more or less for the admission of water within the passage-way *m* and to the lower end of the elevator-tube A. By this means any desired quantity of water may be admitted to the lower end of the tube for thinning the material cut by the lower propeller-blade to assist the action of the apparatus.

If desired, an oil-feeding tube *s* may be provided for feeding oil to the journals of the shaft K, and thus keeping them oiled.

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

1. A dredger and elevator comprising an elevator-tube, a combined cutter and propeller at the lower end thereof, an external passage-way having an outlet-opening at its lower end at a point below the said propeller and communicating with the elevator-tube, and an external inlet-opening at a point thereabove, substantially as described.

2. A dredger and elevator comprising an elevator-tube, a combined cutter and propeller at the lower end thereof, an external passage-way extending from the lower end thereof to a point above the water-line and having an open upper end, the lower end of the passage-way having an opening at its lower end communicating with the elevator-tube at a point below the propeller, an inlet-opening at a point above the propeller and below the water-line, and a valve for said opening, substantially as described.

3. A dredger and elevator comprising an elevator-tube, a cutting-propeller at its lower end, an external passage-way having an opening at its lower end communicating with the elevator-tube at the propeller, and extending above the water-line and provided with an inlet-opening at a point above the propeller and below the water-line, a valve for the said inlet-opening, and an operating member for the valve extending up through the passage-way to the top of the tube, substantially as described.

4. A combined dredger and elevator comprising a propeller-tube, a centrally and longitudinally arranged shaft within the said tube, a combined cutter and propeller secured to the lower end of the shaft within and at the lower end of the tube, a plurality of propellers attached to the shaft and concentrically arranged within the tube one above the other, and a plurality of oppositely inwardly extending blades attached to the said tube and arranged between the propellers, and an operating mechanism, substantially as described.

5. In a dredger the combination of an elevator-tube having an open lower end, a propeller-blade rotatable within and at the lower end of the tube, the propeller-blade having at the center of its lower side cutting-blades *h*, substantially as and for the purpose described.

6. A dredger and elevator comprising an elevator-tube, a rotating shaft within the tube, propellers attached to the shaft, and inwardly and oppositely extending blades attached to the elevator-tube at a point between the propeller, said blades having an opposite inclination, whereby they serve to cause the upflow-

ing water to continue its twirling movement between the elevator-blades and from one to the other, substantially as described.

7. A propeller-blade for a dredger elevator-tube, comprising propeller-blades, and an annular ring connected to the outer edges of the blade, the said ring being cut upward or narrowed at a point in front of the cutting edge of the blade substantially as shown at *g*, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALONZO W. CRAM.

Witnesses:
WM. D. CRAM,
EMMA MENTER.