V. F. CASEY.

SUCTION DREDGE.

APPLICATION FILED JAN. 2, 1917.

1,238,260.

Patented Aug. 28, 1917.

2 SHEETS—SHEET 1.

Fig. 2

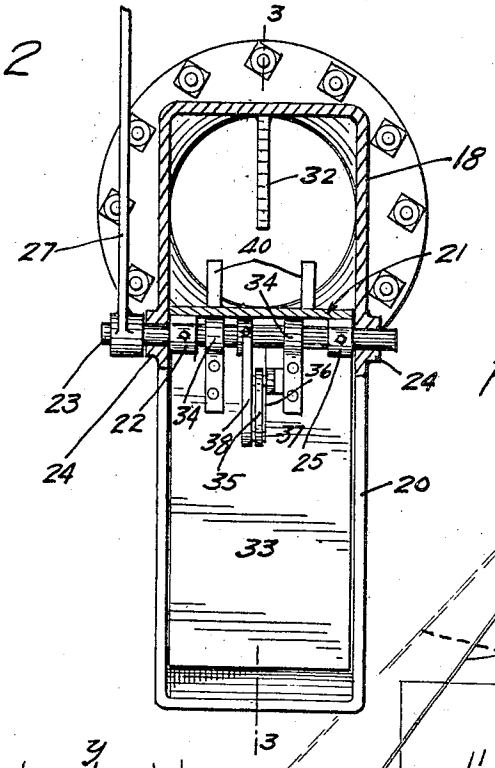


Fig. 1

WITNESSES

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Fig. 3

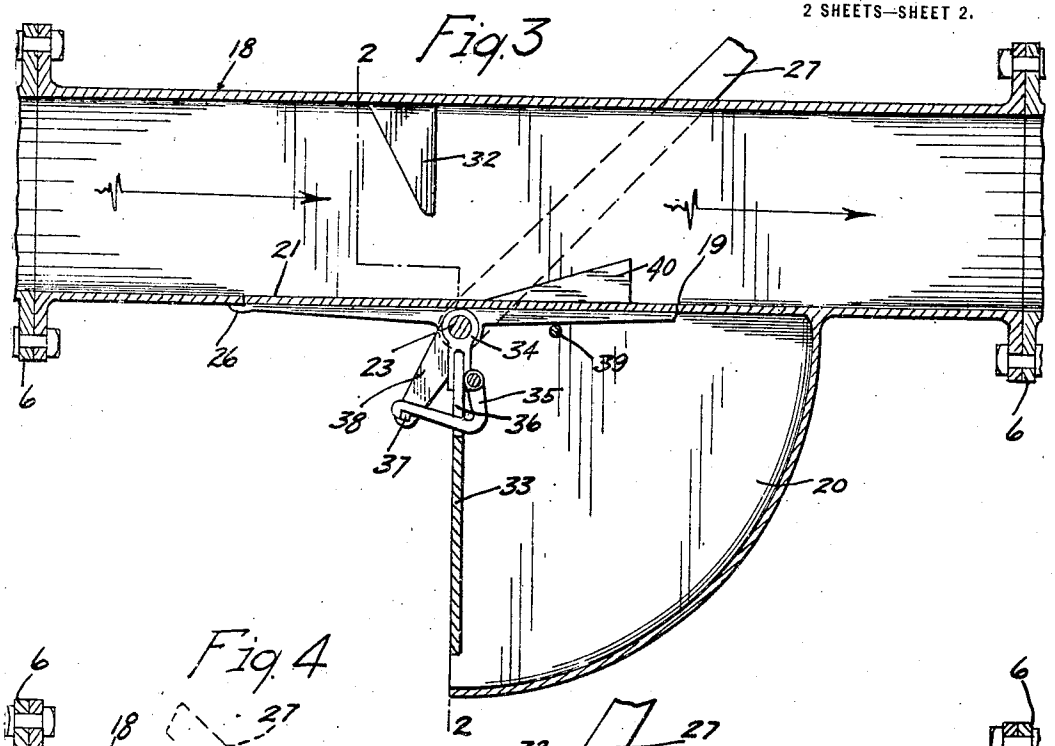
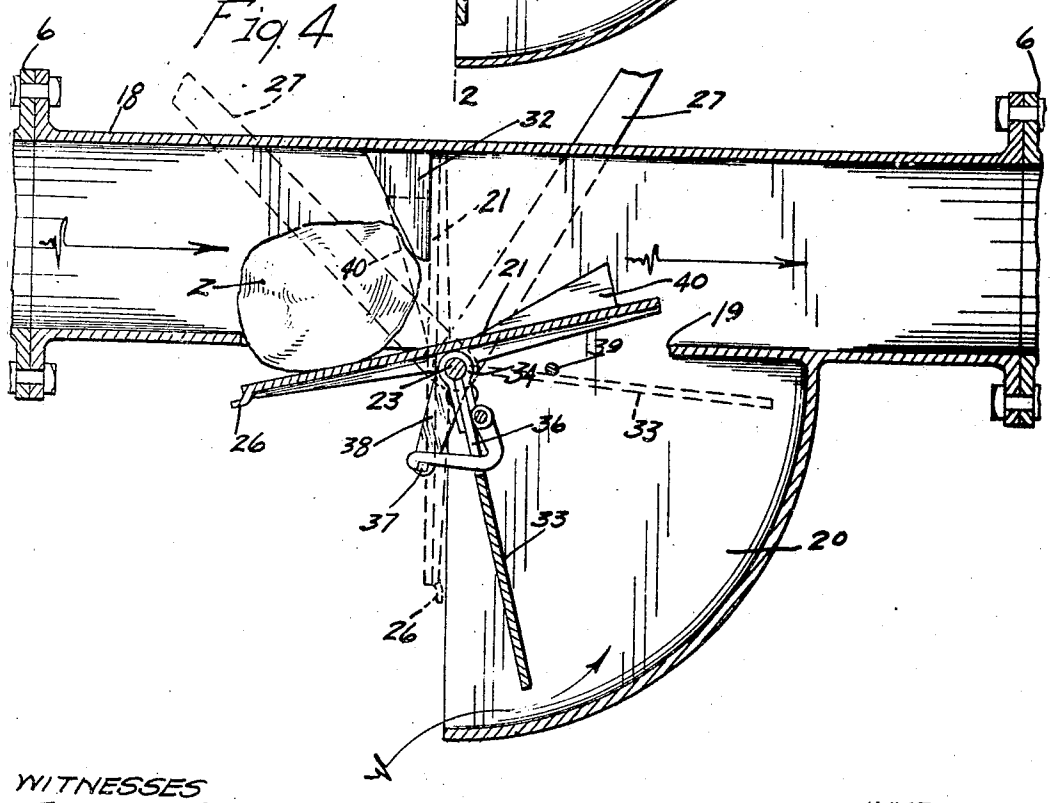


Fig. 4



WITNESSES

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UNITED STATES PATENT OFFICE.

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SUCTION-DREDGE.

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To all whom it may concern:

Be it known that I, VASCO F. CASEY, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Suction-Dredges; 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.

My invention relates to improvements in suction dredges and has for its object to provide means for arresting stones, above a predetermined size, when passing through the intake pipe of the dredge and automatically ejecting the same therefrom. As is well known, if such stones, owing to their size and weight, enter the intake pipe of dredges now in use, considerable time is lost in removing the same therefrom or from the pump and which often results in damage to said pump or other parts of the dredge.

To the above end, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings,

Figure 1 is a fragmentary view, principally in side elevation with some parts sectioned and other parts diagrammatically indicated, by means of broken lines, and illustrating a suction dredge having the invention incorporated therein;

Fig. 2 is a transverse section taken on the irregular line 2—2 of Fig. 3;

Fig. 3 is a longitudinal vertical section taken on the line 3—3 of Fig. 2; and

Fig. 4 is a view corresponding to Fig. 3, with the exception that the gate is opening to eject an arrested stone from the intake pipe.

The numeral 5 indicates a barge floating on a body of water Y and the numeral 6 indicates a sectional suction or intake pipe having its delivery end connected, by a ball and hinge joint 7, to the receiving end of a pipe 8 mounted on the barge 5 and leading to a pump, not shown. The intake pipe 6 is supported in the customary manner from a ladder 9 hinged at its inner end to the barge 5 for raising and lowering movements. By reference to Fig. 1, it will be noted that the internal diameter of the receiving end of the intake pipe 6 is slightly reduced by securing therein an annular band or ring 6^a. The purpose of this ring 6^a is to prevent stones, having substantially the same diameter as the internal diameter of the intake pipe 6, from entering the same and frictionally lodging therein. On the outer end of the ladder 9, is a cutter head 10 which works close to the receiving end of the intake pipe 6. This cutter head 10 is secured to the outer end of a shaft 11 journaled on said ladder and having at its inner end a gear 12, which meshes with a pinion 13 on a shaft 14 driven by any suitable means, not shown. The ladder 9, cutter head 10 and suction pipe 6 are simultaneously raised and lowered and supported at different elevations by suitable winding machinery, only the two cables 15 of which are shown. These cables 15 run over sheaves 16 connected by chains 17, the one to the cutter head 10 and the other to the intermediate portion of the ladder 9. The parts thus far described may be of the standard or any desired construction.

Referring now in detail to the invention, the numeral 18 indicates a pipe section interposed between certain of the sections of the intake pipe 6. The intermediate portion of this pipe section 18 is square in cross section (see Fig. 2) and has in its bottom an elongated opening 19. Integrally formed with the bottom of the pipe section 18, is a depending segmental housing 20, the sides of which form continuations of the sides of the pipe section 18. The mouth or intake of the housing 20 faces the receiving end of the intake pipe 6, extending at right angles to the bottom thereof and in line with the longitudinal center of the opening 19. It will thus be seen that the housing 20 only incloses the inner half of the opening 19.

The opening 19 is normally closed by a gate 21 intermediately hinged to the housing 20 for swinging movement in a vertical plane longitudinally of the intake pipe 6, and it is important to note that the two end portions of said gate have substantially the same area. The hinge connection for the gate 21 comprises depending lugs 22 on the bottom of said gate and through which is inserted a shaft 23 journaled in bossed openings 24 in the sides of said housing. Set screws 25 in the hinge lugs 22 rigidly but adjustably connect the gate 21 to the

shaft 23. On the outer end of the gate 21, is a stop lug or lip 26 which engages the under face of the bottom of the pipe section 18 to prevent the outer end portion of the gate 21 from swinging into said pipe section. A relatively long arm 27 is secured to one of the projecting ends of the shaft 23 and has secured to its free end, by a cable 28, a counterweight 29, which yieldingly holds the gate 21 closed. The intermediate portion of the cable 28 runs over a guide sheave 30 journaled on the upper end of a frame 31 on the barge 5.

Integrally formed with the top of the pipe section 18, is a stone arrester, in the form of a flat depending finger 32, located substantially over the shaft 23. This stone arrester 32 is to prevent stones, above a predetermined size, from passing through the intake pipe 6 and thereby damaging the pump or other parts of the dredge, owing to their size and weight. The outer longitudinal edge of the stone arrester 32 is beveled downwardly toward the shaft 23, so that a stone engaging the upper portion thereof will be forced downward and deposited on the outer end portion of the gate 21. During the opening and closing movements of the gate 21, the outer end portion thereof swings between the bottom of the pipe section 18 and the intake of the housing 20 and the inner end portion thereof swings within the pipe section 18. When the gate 21 is entirely open, its inner end portion extends transversely through the pipe section 18 and closes the same and, at the same time, engages the stone arrester 32 as a stop to limit the opening movement of the gate 21.

Mounted within the housing 20, is a flat propelling blade 33 having on its upper edge hinge lugs 34, through which the shaft 23 projects and connects said blade thereto for vertical swinging movement. Normally, the propelling blade 33 extends at right angles to the gate 21 and substantially closes the intake of the housing 20, with the exception of an opening between the lower end of said blade and the segmental portion of the housing 20. It is important to note that the propelling blade 33 has an area considerably greater than the area of one-half of the gate 21.

Normally and during the opening movement of the gate 21, the propelling blade 33 is locked thereto by a latch 35. This latch 35 is pivoted to the inner upper edge portion of the propelling blade 33 and works through a slot 36 formed therein, its free end having a hook arranged to interlock with a lock pin 37 on a depending arm 38 rigidly secured to the shaft 23, and hence, the gate 21. At the limit of the opening movement of the gate 21, the latch 35 is released from the lock pin 37 by engagement with a trip rod 39 which extends transversely through the housing 20 and is secured to the sides thereof. When the latch 35 is released from the lock pin 37, the gate 21 is returned to a closed position by the counterweight 29, suction and water, as will presently be described. After the gate 21 is closed, the propelling blade 33 returns to normal position under the action of gravity and, at the completion of said movement, the rounded free end of the latch 35 engages the lock pin 37 and is lifted thereby to permit the hook of said latch to automatically reëngage said lock pin.

Integrally formed with the top face of the gate 21, at the inner end portion thereof, is a pair of flanges 40, which pass, one on each side of the stone arrester 32, at the time the gate 21 is completing its opening movement to dislodge any stone or stones which may be held between said arrester and sides of the pipe section 18. It is, of course, understood that the stone arrester 32 may comprise one or more fingers, depending on the diameter of the intake pipe 6 and the minimum size of the stones to be ejected therefrom.

The operation of the above described invention may be briefly described as follows:—

During the normal operation of the suction dredge, the intermediately hinged gate 21, owing to the fact that the two end portions thereof have substantially the same area, is held closed in a balanced position between the external water pressure and the internal suction and water pressure within the intake pipe 6. The counterweight 29, will, of course, offset any ordinary disturbances which tend to open the gate 21.

When a stone enters the intake pipe 6 and is too large to pass the arrester 32, the same is held thereby, as indicated at Z in Fig. 4. Such a stone, of course, clogs the intake pipe 6 and greatly reduces the suction in the receiving end portion thereof, and hence, on the outer end portion of the gate 21. With the suction reduced in the receiving end portion of the intake pipe 6, an excess of suction is created on the inner end portion of the gate 21. This excess of suction overcomes the counterweight 29 and unbalances the gate 21, thereby causing the same to partly open, which breaks the vacuum in the intake pipe 6 and starts a flow of water under the propelling blade 33, through the housing 20 and into the intake pipe 6, between the stone Z and pump. This flow of water, together with suction, carries with it the propelling blade 33, which moves the gate 21 into an open position.

During the final opening movement of the gate 21, the water pressure on the inner end portion thereof, which tends to close the gate, is overcome by the action of the pro-

pelling blade 33 due to the increase of area thereof. In case an arrested stone rests on the outer end portion of the gate 21, the weight thereof will also assist in opening said gate. As the gate 21 is opened, the inner end portion thereof swings into the intake pipe 21 and gradually closes the same, thereby cutting off the flow of water around the arrested stone and relieving the suction thereon, so that the same is free to drop by gravity through the opening 19 and into the body of water Y. It is important to note that there is always a flow of water through the hood 20 and around the propelling blade 33 from the time the gate 21 starts to open, until the time that the same is closed, thus making it unnecessary to prime the pump, after the stone Z has been ejected therefrom. During the final opening movement of the gate 21, the latch 35 engages the trip 29 and is automatically released from the lock pin 37, thereby permitting the gate 21 and the propelling blade 33 to return to normal position, as previously described.

The opening and closing of the gate 21, of course, takes place very quickly and is hardly perceptible in the action of the dredge. The counterweight 29, in addition to closing the gate 21, also acts as an indicator so that an operator may know the position of the gate.

What I claim is:—

1. Mechanism for ejecting stones and the like from the intake conduit of a suction dredge, comprising a conduit section having an opening in the bottom thereof, a hinged gate closing said opening and forming part of the normal bottom of said conduit, an abutment in the conduit to arrest stones upon the gate, and means for automatically opening the gate when a stone is so arrested on the gate.

2. A suction dredge having in its intake conduit a stone arrester and an opening, and a balanced gate normally closing said opening, and means for opening the gate to eject an arrested stone from the intake conduit.

3. A suction dredge having in its intake conduit a stone arrester and an opening therebelow, an intermediately hinged gate normally closing said opening, the initial opening movement of said gate being imparted by the reduction of the suction through the receiving end portion of the intake conduit, caused by clogging due to an arrested stone and the resulting increase of suction on the inner end portion of the gate, and automatic means for completing the opening movement of the gate.

4. A suction dredge having in its intake conduit a stone arrester and an opening therebelow, an intermediately hinged gate normally closing said opening, the initial opening movement of said gate being imparted by the reduction of the suction through the receiving end portion of the intake conduit, caused by clogging due to an arrested stone and the resulting increase of suction on the inner end portion of the gate, a propelling blade for completing the opening movement of the gate, automatic means for rendering said blade inoperative at the completion of the opening movement of the gate, and yielding means for closing the gate.

5. A suction dredge having in its intake conduit a stone arrester and an opening therebelow, an intermediately hinged gate normally closing said opening, the initial opening movement of said gate being imparted by the reduction of the suction through the receiving end portion of the intake conduit, caused by clogging due to an arrested stone and the resulting increase of suction on the inner end portion of the gate, a propelling blade for completing the opening movement of the gate, automatic means for rendering said blade inoperative at the completion of the opening movement of the gate, and yielding means for closing the gate, said blade arranged to return to normal position under the action of gravity after the closing of the gate.

6. A suction dredge having in its intake conduit a stone arrester and an opening therebelow, an intermediately hinged gate normally closing said opening, a stop preventing the outer end portion of the gate from swinging into the intake conduit, the initial opening movement of said gate being imparted by the reduction of the suction through the receiving end portion of the intake conduit, caused by clogging due to an arrested stone and the resulting increase of suction on the inner end portion of the gate, automatic means for completing the opening movement of the gate, the inner end portion of the gate during its opening movement extending into the intake conduit and relieving the suction on the arrested stone to permit the same to drop by gravity from the intake conduit, and means for closing the gate.

7. A suction dredge having in its intake conduit a stone arrester and an opening therebelow, an intermediately hinged gate normally closing said opening, a stop preventing the outer end portion of the gate from swinging into the intake conduit, a depending housing for the inner end portion of said opening and having a water intake opening, a propelling blade mounted in said housing and arranged to be operated by suction and a flow of water through the housing after the initial opening movement of the gate to complete the opening movement thereof, a latch releasably connecting said blade to the gate, the initial opening movement of the gate being imparted by the re-

duction of the suction through the receiving end portion of the intake conduit, caused by clogging due to an arrested stone and the resulting increase of suction on the inner end portion of the gate, a trip for releasing said latch at the completion of the opening movement of the gate, and yielding means tending to close the gate.

8. A suction dredge having in its intake conduit a stone arrester and an opening therebelow, an intermediately hinged gate normally closing said opening, a stop preventing the outer end portion of the gate from swinging into the intake conduit, a depending housing for the inner end portion of said opening and having a water intake opening, a propelling blade mounted in said housing and arranged to be operated by suction and a flow of water through the housing after the initial opening movement of the gate to complete the opening movement thereof, a latch releasably connecting said blade to the gate, the initial opening movement of the gate being imparted by the reduction of the suction through the receiving end portion of the intake conduit, caused by clogging due to an arrested stone and the resulting increase of suction on the inner end portion of the gate, the inner end portion of the gate during its opening movement extending into the intake conduit and relieving the suction on the arrested stone to permit the same to drop by gravity from the intake conduit, a trip for releasing said latch at the completion of the opening movement of the gate, and yielding means tending to close the gate, said blade arranged to return to normal position under the action of gravity after the closing of the gate.

9. A suction dredge having in its intake conduit a stone arrester and an opening, a gate closing said opening and forming a part of the normal bottom wall of said conduit, and automatic means, which becomes operative at the time a stone is intercepted by said arrester for opening the gate to eject the arrested stone from the intake conduit.

10. Mechanism for ejecting stones and the like from the intake conduit of a suction dredge, comprising a conduit section having an opening in the bottom thereof, a hinged section of the normal conduit wall closing said opening, a stone arrester adjacent said hinged section, and automatic means operative when a stone is arrested upon said hinged section for swinging said section to uncover said opening and discharge the stone.

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

VASCO F. CASEY.

Witnesses:
CLARA DEMAREST,
HARRY D. KILGORE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."