W. A. McCAULEY.

DREDGE NOZZLE.

APPLICATION FILED JAN. 16, 1909.

952,928. Patented Mar. 22, 1910.

Fig. 1

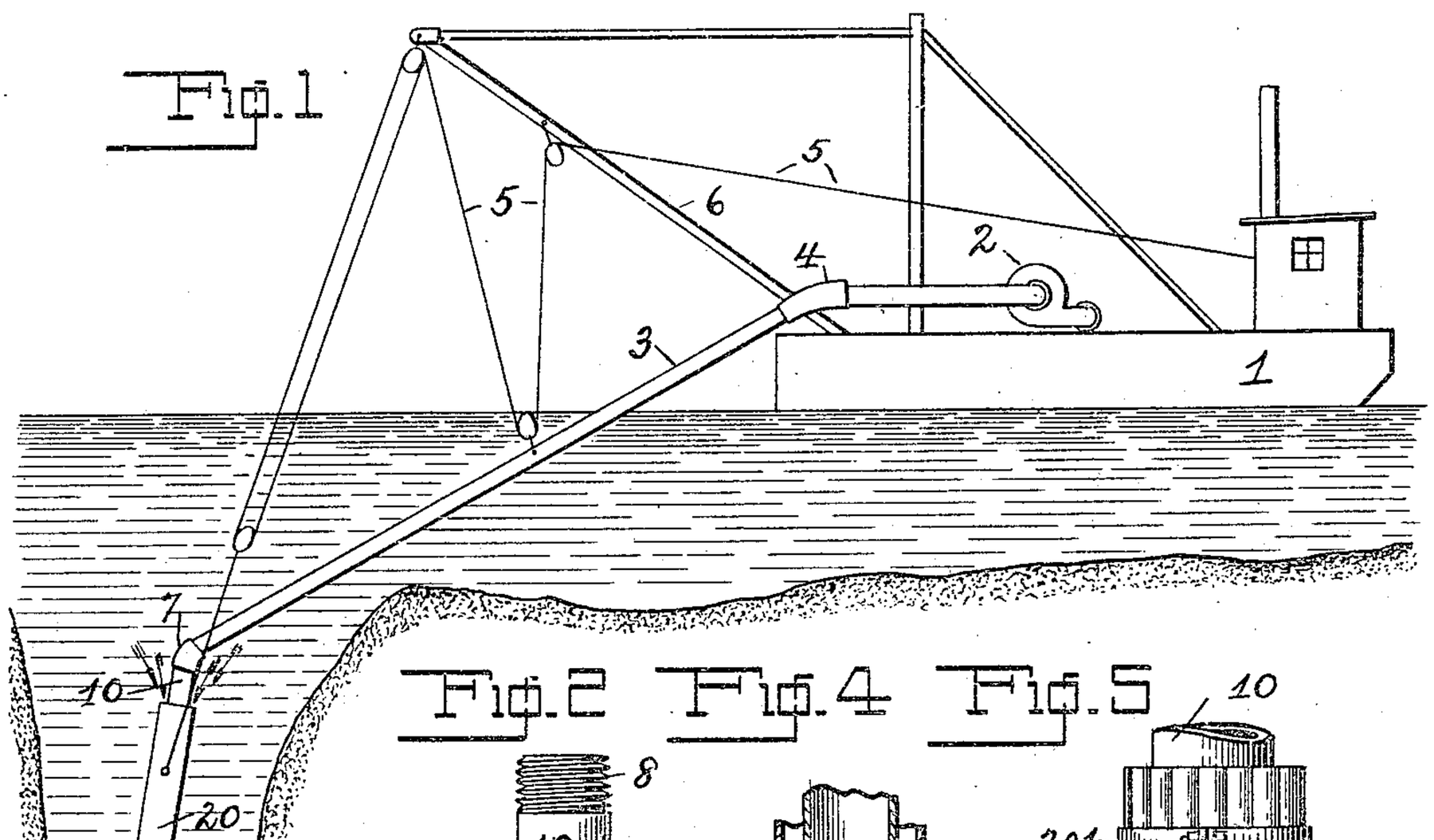


Fig. 2

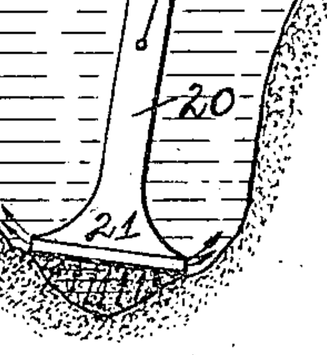


Fig. 4

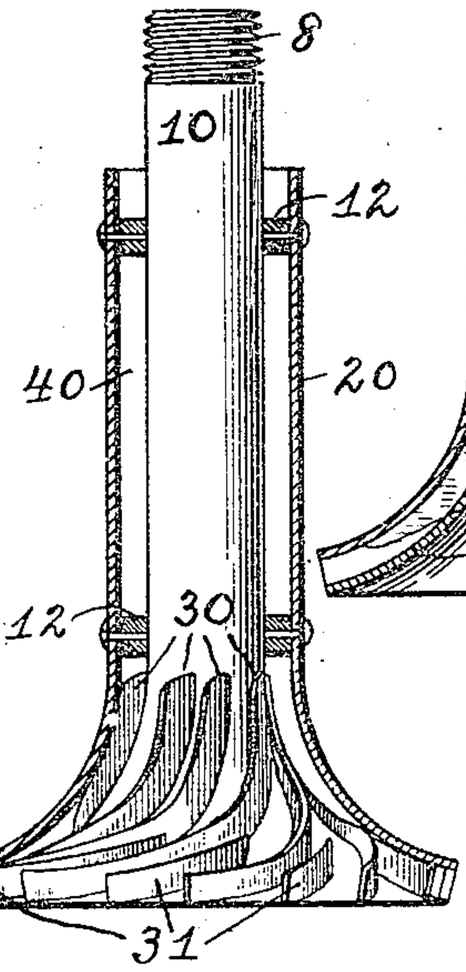


Fig. 5

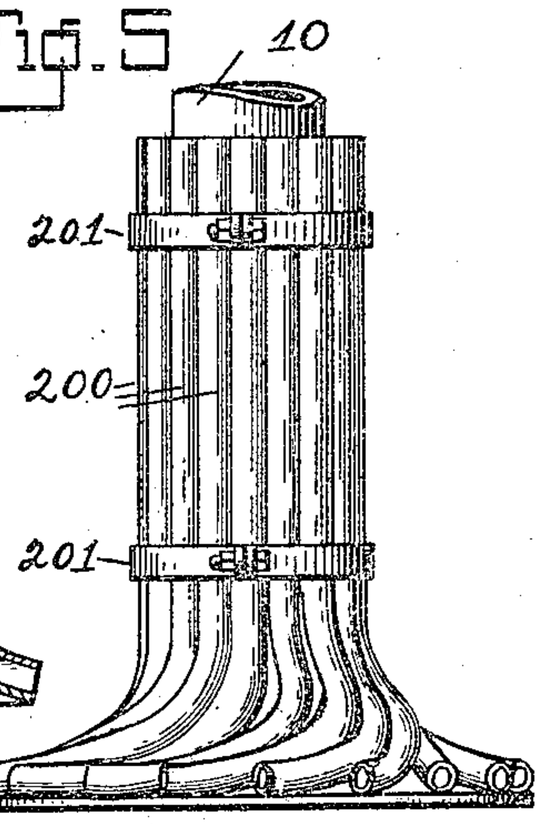


Fig. 6

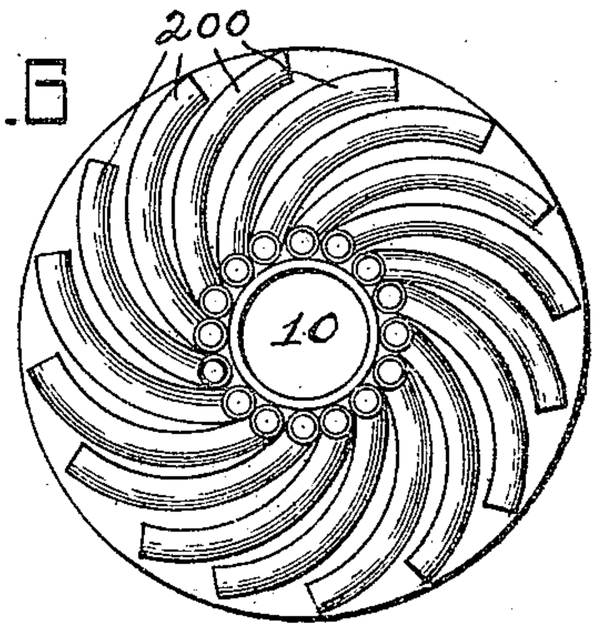
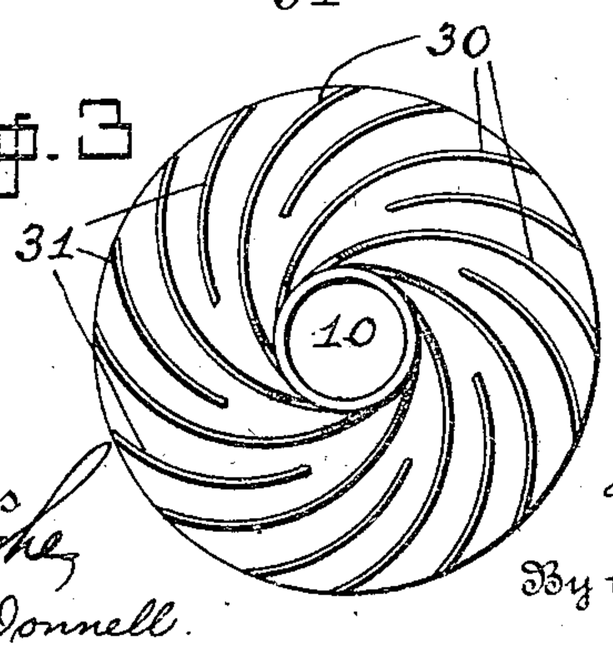


Fig. 7

Fig. 3



Witnesses
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UNITED STATES PATENT OFFICE.

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DREDGE-NOZZLE.

952,928. Specification of Letters Patent. **Patented Mar. 22, 1910.**

Application filed January 16, 1909. Serial No. 472,714.

To all whom it may concern:

Be it known that I, WILLIAM A. McCAULEY, a citizen of the United States, and resident of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Dredge-Nozzles, of which the following is a specification.

My invention relates to nozzles adapted to be used in connection with suction dredging apparatus and its novelty consists in the fact that a whirling motion is imparted to the inrushing water at the mouth of the nozzle whereby a scouring effect upon the surrounding material is produced and it is the more rapidly loosened and removed.

In the drawing, Figure 1 represents a dredging apparatus showing the manner of locating the nozzle; Fig. 2 is a vertical central section through the outer nozzle tube and a side elevation of the inner nozzle tube; Fig. 3 is a top plan view of the parts shown in Fig. 2; Fig. 4 is a central section through the lower part of both nozzles; Fig. 5 is a side elevation and Fig. 6 is a top plan view of a modified form of the device and Fig. 7 is a central section of a modified form of the outer nozzle tube.

In the drawings, 1 indicates a dredging scow or platform which is provided with an engine, boilers, shelter cabin and other usual appurtenances. A centrifugal pump, or other suction device, is indicated at 2 and to this leads the discharge conduit 3 which is provided with an elbow 4 and is held up by rigging 5 from a suitably supported boom 6.

At the lower end of the discharge conduit 3, it is connected to an elbow, or nipple, 7 to which, in turn, is connected an inner nozzle tube 10. This connection may be by means of threads, indicated at 8 in Fig. 2, or in any other suitable manner.

The inner nozzle tube 10 has a flaring mouth 11, the internal surface of which is preferably smooth. Secured to the inner nozzle tube 10 by brackets, indicated at 12, or in any other suitable manner, is an outer nozzle tube 20 having an open flaring mouth 21 and open at the top. Between these tubes 10 and 20, there are arranged suitable guide plates indicated at 30, preferably secured to the outer surface of the inner tube 10 and arranged obliquely to such surface and to the inner surface of the outer tube and preferably made of spiral form. Near the lower end of the annular space 40 between the tubes 10 and 20 there are arranged supplemental guide plates 31 located between the guide plates 30.

The general mode of operation of the described device is as follows: The dredge scow is first brought to position above the place to be excavated. The nozzle is then dropped to the bottom with its flaring mouth downward and the suction pump is started. A vacuum is thus created within the discharge conduit 3 and the inner nozzle tube 10. This forces the water up through the inner nozzle tube and discharge conduit 3, carrying with it the mud, silt, or other material of which the bottom is composed; provided, of course, it is loose enough to be so transported. The partial vacuum thus created causes an inrush of the water into the annular space 40 between the inner and outer nozzle tubes and this column of water serves further to disintegrate and loosen the material adjacent to the mouth of the nozzle and thus to facilitate its removal.

The purpose of my invention is to increase and make more efficient the disintegrating and eroding action of this downrushing column of water, and this I do by providing means whereby a whirling motion is communicated to it as it moves between the inner and outer nozzle tubes and it is discharged in the form of spirally moving jets. The preferred means are to be found in the guide plates 30. As stated, these are arranged obliquely to the surfaces between which they are secured and preferably in spiral form. As the tubes 10 and 20 both flare at the bottom, the column of water would have a tendency to spread between the primary guides 30 and thus lose its momentum. Therefore, the supplementary guides 31 are provided so that the cross sectional area of the jets delivered are each substantially equal to such area at the upper part of the guides.

By making the walls of the two nozzles approach each other, as seen in Fig. 7, the down rushing column of water is restricted and somewhat the same effect is produced.

In Figs. 5 and 6, there is illustrated a modified form of the device in which the outer nozzle tube 20 is replaced by a plurality of pipes 200 which are secured in place by straps or bands 201 and which pipes together take the place of the annular space

40 in the construction previously described. The pipes are twisted so as to secure the delivery of the water in the form of whirling or spiral jets as before.

What I claim as new is:—

1. A dredge nozzle comprising an inner suction tube, an outer tube separated therefrom to leave a space between them, and means whereby the water delivered at the bottom of said space is given a whirling motion.

2. A dredge nozzle comprising an inner suction tube, an outer tube separated therefrom to leave a space between them, and means whereby the water delivered at the bottom of said space is given a whirling motion, consisting of guiding surfaces intermediate the tubes.

3. A dredge nozzle comprising an inner suction tube, an outer tube separated therefrom to leave a space between them, and means whereby the water delivered at the bottom of said space is given a whirling motion, consisting of curved guiding surfaces intermediate the tubes.

4. A dredge nozzle comprising an inner suction tube, an outer tube separated therefrom to leave a space between them, and means whereby the water delivered at the bottom of said space is given a whirling motion, consisting of spiral surfaces between the tubes.

5. A dredge nozzle comprising an inner suction tube having an inlet mouth, and means mounted on the tube for giving the material adjacent the mouth a whirling motion.

6. A dredge nozzle comprising an inner suction tube having a flaring inlet mouth, and means mounted on the exterior of the tube and having spiral open ended channels for giving a whirling motion to the material at said mouth.

7. A dredge nozzle comprising an inner suction tube, an outer tube separated therefrom to leave a space between them, and means whereby the water delivered at the bottom of said space is given a whirling motion, consisting of guiding surfaces between the tubes and short supplementary guiding surfaces between the primary guiding surfaces near the mouths of the tubes.

8. A dredge nozzle comprising an inner suction tube, an outer tube separated therefrom to leave a space between them, and means whereby the water delivered at the bottom of said space is given a whirling motion, consisting of spiral surfaces between the tubes and smaller supplementary spiral surfaces near the mouths of the tubes.

9. A dredge nozzle comprising an inner suction tube with a flaring mouth, an outer tube inclosing the same leaving a space between them and open at the top and curved guides between the tubes near the bottom of said space.

10. A dredge nozzle comprising an inner suction tube with a flaring mouth, an outer tube inclosing the same having a space between them and open at the top and curved guides between the tubes near the bottom of said space arranged obliquely to both surfaces.

11. A dredge nozzle comprising an inner suction tube with a flaring mouth, an outer tube inclosing the same leaving a space between them and open at the top and curved guides between the tubes near the bottom of said space arranged obliquely to both surfaces and flaring outwardly with smaller intermediate guides between them.

Witness my hand this 13th day of January 1909, at New York, N. Y.

WILLIAM A. McCAULEY.

Witnesses:
WILLIAM R. BAIRD,
HERMAN MEYER.