Feb. 5, 1929. 1,701,430

M. R. THURSTON

CUTTING AND MEASURING DEVICE FOR SUCTION DREDGES

Filed May 11, 1925

Fig. 1.

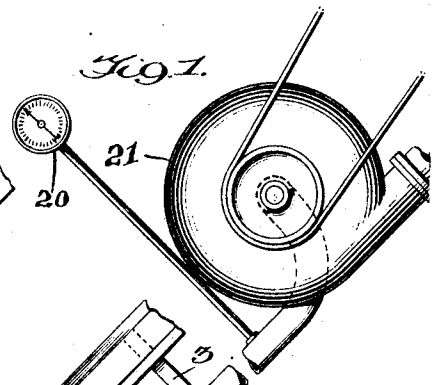
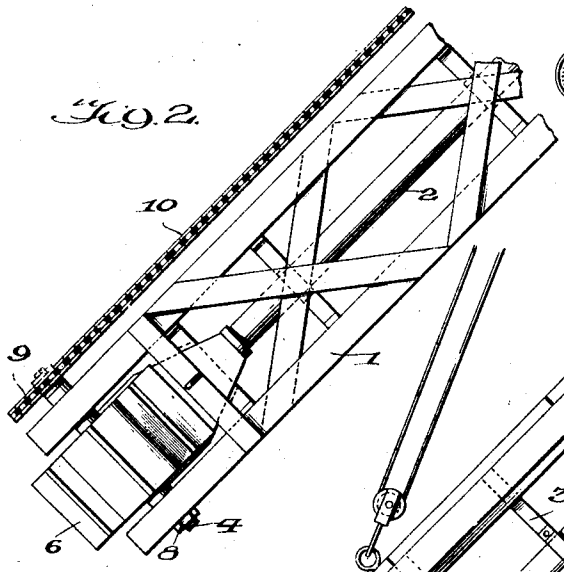


Fig. 2.



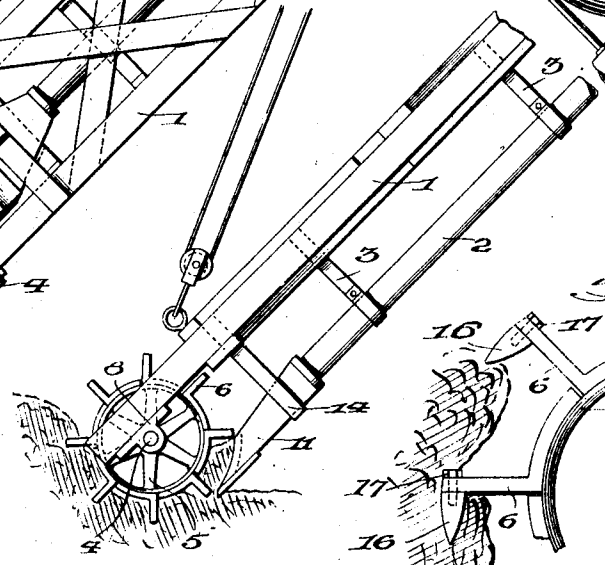


Fig. 5.

Fig. 3.

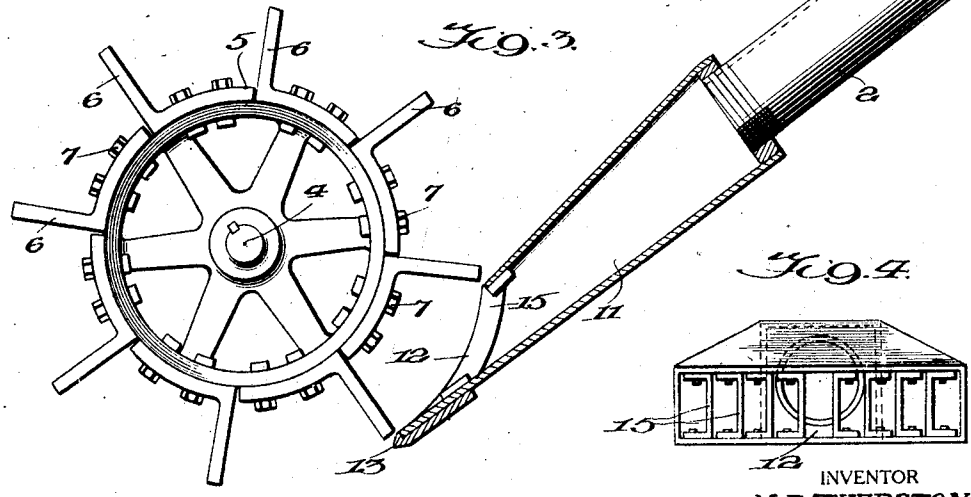


Fig. 4.

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UNITED STATES PATENT OFFICE.

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CUTTING AND MEASURING DEVICE FOR SUCTION DREDGES.

Application filed May 11, 1925. Serial No. 29,511.

My invention consists in new and useful improvments in cutting and measuring devices for suction dredges, and has for its object to increase the efficiency of suction dredges over those heretofore known.

Another object of my invention is to make it possible at all times to maintain the discharge of excavated material at any desired consistency.

A still further object is to provide an apparatus of the class described which will cut and deliver a given amount of material directly into the intake of the dredge pump, the amount of material being proportionate to the size of the cutting wheel and the speed at which it is revolved.

With the above and other objects in view, which will appear as the description proceeds, my invention consists in the novel features herein set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

Referring to the drawings, in which numerals of like character designate similar parts throughout the several views,

Fig. 1 is a side elevation of my improved device.

Fig. 2 is a plan view of the same.

Fig. 3 is a sectional view in detail of the cutter and hopper.

Fig. 4 is an end view of the hopper, showing the means for excluding objects which might be too large to pass through the pump, and

Fig. 5 is a modification showing supplemental cutting teeth which may be applied to the wheel.

In the drawings, 1 designates a ladder or frame work of wood or metal, pivotally mounted on the hull of a dredge (not shown) to which is secured a suction pipe 2, by means of straps 3. 4 represents a shaft upon which is keyed or otherwise mounted a cutter wheel or drum 5, having a series of blades 6 laterally secured to the periphery thereof. These blades are substantially L-shaped in cross section, as shown in Fig. 3, the base of each being curved to conform to the periphery of the wheel and being drilled to receive bolts 7.

The shaft 4 with the wheel thereon, is rotatably mounted in water and grit proof journals 8 on the outboard end of the ladder or frame work 1, and is actuated by any suitable means, this particular embodiment of the invention employing a sprocket wheel 9, mounted on one end of the shaft 4 rotated by a chain 10 from a source of power on the dredge (not shown).

At the lower end of the suction pipe 2, I secure a metal hopper 11, the mouth 12 of which is curved in cross section to a slightly greater radius than the arc described by the edges of the blades 6 on the wheel 5. In front elevation, this hopper is substantially rectangular in shape, the length of the mouth 12 being approximately the same as the cutting width of the blades 6 on the wheel and the height of said mouth being approximately the same as the depth of said blades.

In case curved cutting blades are used on the wheel 5, this mouth in the hopper will vary in shape according to the curve of the blades.

The bottom or cutting side of the hopper 11, which is shod with a renewable cutting edge 13, is rigidly mounted in the plane of the axis of the wheel 5, by means of a band or strap 14, and is parallel to the supporting ladder 1, with the bottom side tangential to the lowest point of the arc described by the edges of the cutting blades in revolving, and just sufficiently removed from the same to afford clearance to the blades in passing.

The mouth 12 of the hopper is provided with a plurality of vertical bars 15, extending across the same, secured in any suitable manner, and spaced part to exclude any solid object which might be too large to pass through the pump, such objects being carried up and away by the upward sweep of the cutting blades. In Fig. 4, these guards are shown as angle bars which provide for the spacing of the same, being secured to the hopper by bolts or screws passing through the L's.

In Fig. 5 I have shown teeth 16 secured to the blades 6 by means of cap screws 17, at approximately right angles to the said blades and pointing in the direction of rotation for excavating harder or more compact materials.

The operation of my device is as follows;

The ladder 1 with the cutting wheel 5 and hopper 11 thereon is submerged to the bottom of the river or stream to be dredged and the suction pump 21 and cutter wheel 5 set in motion.

The wheel 5 in revolving fills the spaces between the blades 6, virtually a series of three sided boxes, with the material to be

excavated, and in passing before the mouth 12 of the hopper, delivers it directly into the hopper where it is carried away by the action of the dredge pump.

As the wheel compartments when operating, are at all times full of the material to be excavated, practically no free water is admitted at the top and bottom sides of the hopper; the necessary water to move the excavated material being drawn in through the open spaces at the ends of the blades on the cutting wheel. Thus it will be readily seen that as the pump will only handle a certain quantity in a given unit of time, the consistency of the discharge i. e., the proportion of water to solids, can be exactly governed either by variation in the speed of the cutting wheel, thereby delivering to the hopper a greater or lesser amount of solids in proportion to the amount of water possible to enter through the open spaces at the ends of the cutting blades, as, in case of the material falling or sliding to the cutting wheel, or by the rate of progress at which the cutting wheel is forced into the material to be excavated, the economic point being that it will deliver to the pump the thickest mixture possible to handle through the pump and piping. It is, therefore, seen that the apparatus described is designed to furnish at least two positive and convenient methods of accomplishing this result.

The consistency of the discharged material will be constantly indicated by a vacuum gage as shown at 20 in Fig. 1, connected into the suction pipe of the dredge pump 21. Consequently, by maintaining the proper degree of pressure between the cutting wheel and the material to be excavated, or by maintaining the proper speed of the cutting wheel as under the condition indicated above, any vacuum can be had which will produce the desired pulp consistency from the pump discharge.

From the foregoing it is believed that my invention may be clearly understood without further description, it being borne in mind that numerous changes may be made in the details of construction without departing from the spirit of the invention as set forth in the appended claims.

What I claim and desire to secure by Letters Patent is:—

1. The combination with a suction dredge having a submergible ladder, of a shaft rotatably mounted on the outboard end of said ladder, a wheel secured to said shaft, blades securely attached to the periphery of said wheel and extending in a plane approximately radial to the axis thereof forming trough shaped compartments, a suction pipe leading from a pump on the dredge secured to said ladder and having a hopper at its lower end, the mouth of said hopper being curved in side elevation to a slightly greater radius than the arc described by the edges of the blades on the wheel and just sufficiently removed therefrom to allow clearance as the wheel rotates, the blades on said wheel projecting below the lower extremity of said hopper when in operating position, whereby the material to be excavated is cut, measured and delivered directly into said hopper.

2. The combination with a suction dredge, of a rotatably mounted, power actuated cutting wheel, having a plurality of laterally extending, radially disposed projections forming a series of compartments thereon, a hopper connected to a suction pipe on said dredge, having its mouth so arranged that said compartments open successively thereinto, said mouth being commensurate with the mouths of the respective compartments, and just sufficiently removed therefrom to allow for clearance as the wheel rotates, whereby the material being cut is delivered directly into the mouth of said hopper in measured quantities.

In testimony whereof I affix my signature.

MARCUS R. THURSTON.