

No. 881,838.

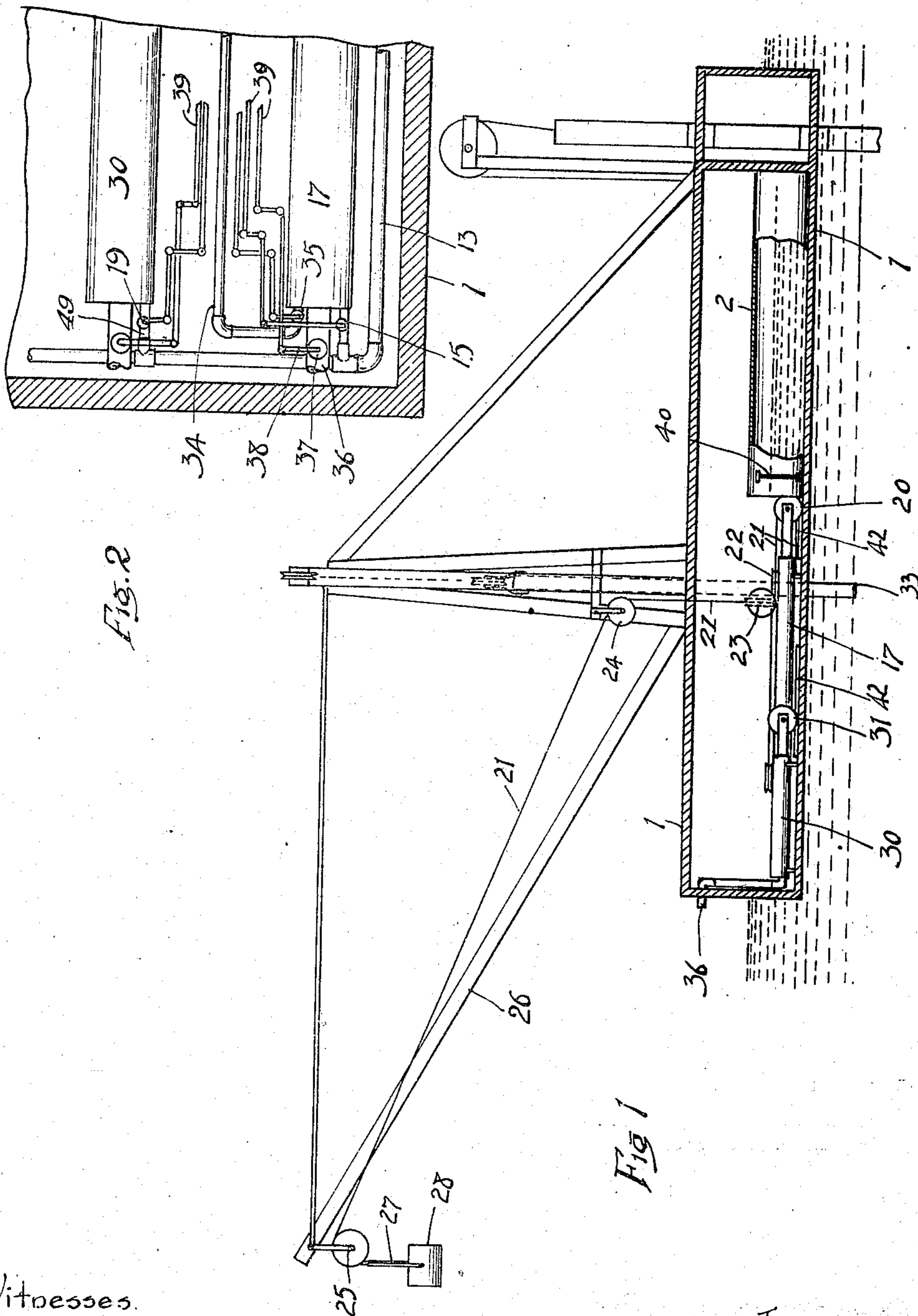
R. M. WILSON.

PATENTED MAR. 10, 1908.

HOISTING APPARATUS FOR DREDGERS AND THE LIKE.

APPLICATION FILED MAY 21, 1907.

3 SHEETS—SHEET



Witnesses.

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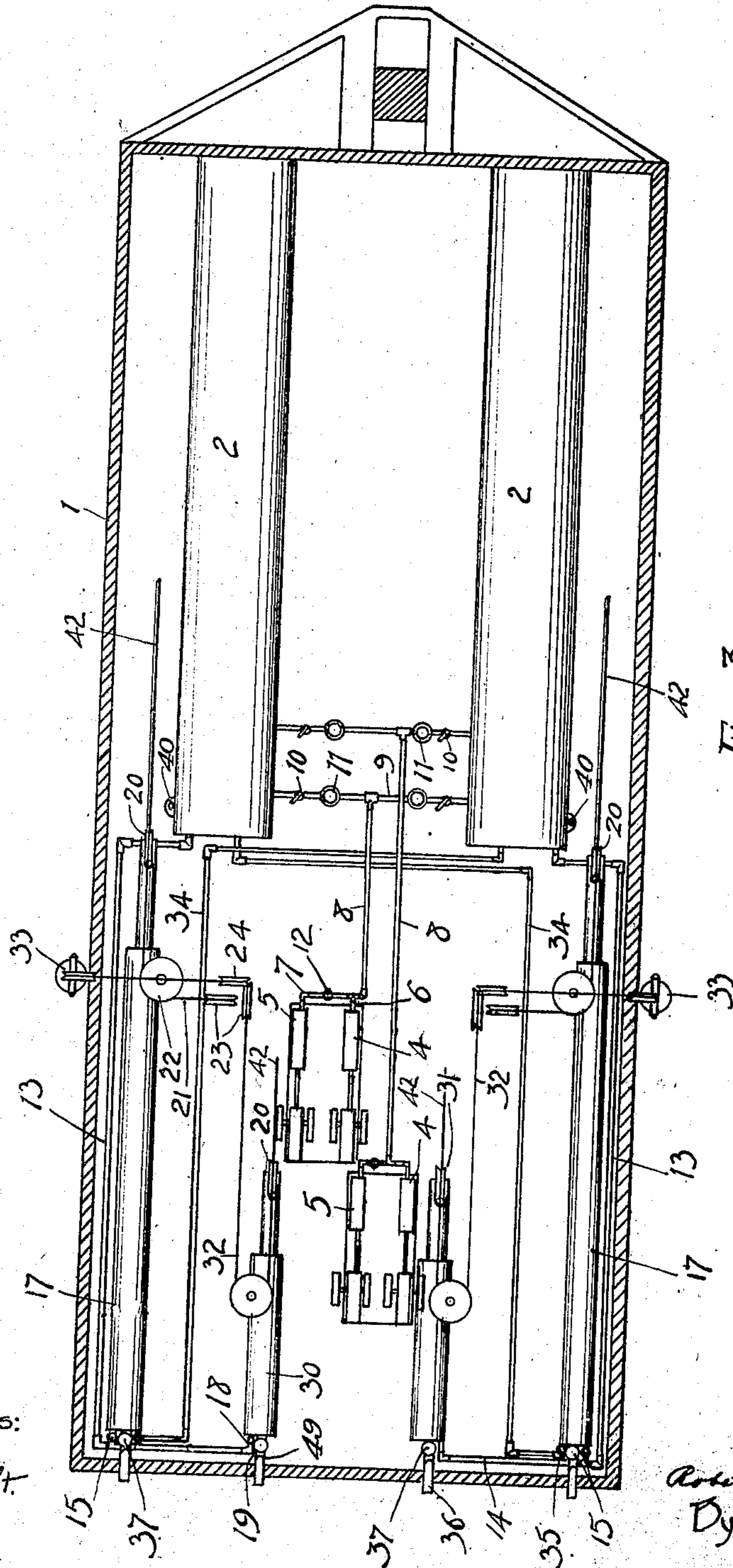


Fig. 3.

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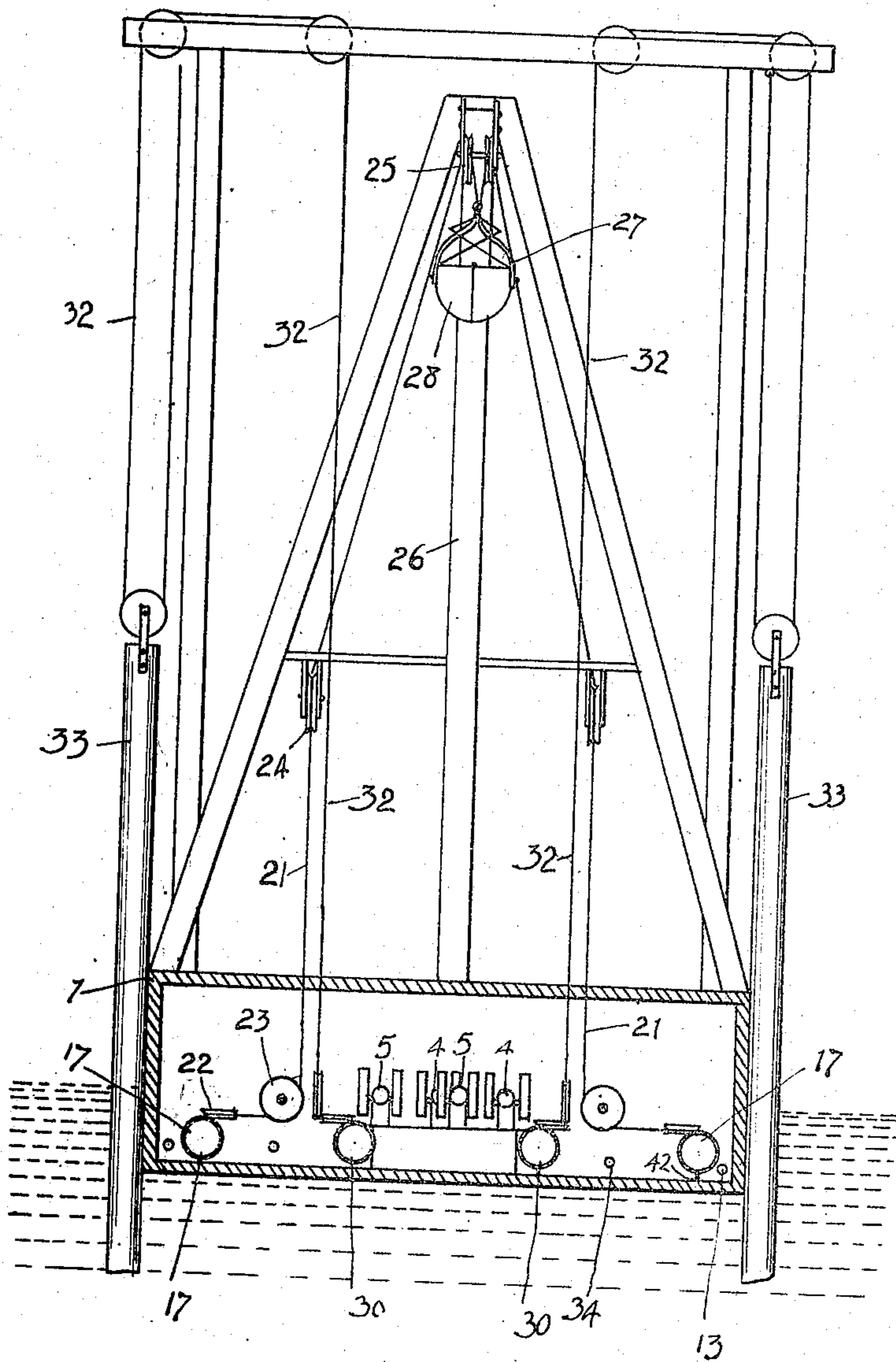


Fig. 4

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UNITED STATES PATENT OFFICE.

ROBERT M. WILSON, OF SAN FRANCISCO, CALIFORNIA.

HOISTING APPARATUS FOR DREDGERS AND THE LIKE.

No. 881,838.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed May 21, 1907. Serial No. 374,956.

To all whom it may concern:

Be it known that I, ROBERT M. WILSON, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Hoisting Apparatus for Dredgers and the Like, of which the following is a specification.

The object of the present invention is to provide an improved form of apparatus for operating such machines as bucket dredgers, hoists, or the like, by which the force may be applied more effectively, more certainly, and with greater ease, than with those at present in use.

For sake of illustration I herein show the apparatus as applied to a bucket dredger, but it is to be understood that it may be applied equally well with various other forms of apparatus, suitable changes being made in the arrangement of the mechanism.

In the accompanying drawing, Figure 1 is a broken longitudinal vertical section of the apparatus; Fig. 2 is an enlarged detail view of the valve connections at the ends of the cylinders on one side of the hull; Fig. 3 is a horizontal section of the apparatus; Fig. 4 is a transverse vertical section.

Referring to the drawing, 1 indicates a hull, upon which are a pair of receivers 2 for containing pressure fluid, which receivers are made uniform in size and strength, although in use, one of them is used as a high pressure receiver, and the other as a low pressure receiver, they being in this respect interchangeable, the pressure under which each receiver is used depending upon the side at which certain operations take place, as will hereinafter appear.

To supply high and low pressure fluids to the respective receivers there are provided two pairs of force pumps, each pair comprises a liquid pump 4 and an air pump 5, from which pumps lead respectively pipes 6, 7, connecting with a pipe 8, having branches 9 leading to the receivers 2 and controlled by stop cocks 10, and also having therein check valves 11. In the air pipes 7, are located valves 12 for controlling the amount of air passed through said pipes.

It will be seen that, with the above arrangement, by suitably opening and closing the valves leading from the pumps to the respective receivers, either receiver may be connected with either pair of pumps and may thus be used either as a high pressure

receiver or as a low pressure receiver. From said receivers 2, pipes 13 lead to the front end of the hull, and from them lead branches 14 controlled by valves 15, and connected with the inlet ends of hydraulic cylinders 17. The plunger of each cylinder 17 carries a sheave 20, around which passes a cable 21, its end being attached to a fixed point on the end of the cylinder. This rope, may, however, be attached directly to the end of the plunger, or, instead of a single sheave, a plurality of sheaves may be carried, when it is desired to multiply the speed. Said cable passes around sheaves 22, 23, then up over a gin sheave 24 and thence over a gin sheave 25 on the end of the boom 26. The outer end of one of these cables 21 is attached to the arms of the bucket 28, and the outer end of the other is attached to the sides of the bucket, these attachments being reversed when changing the side at which the load is discharged. Also leading from said pipes 13 are branch pipes 49, controlled by valves 19, which pipes connect with two shorter cylinders 30, the plungers of which carry sheaves 31 around which pass ropes or cables 32 for raising or lowering the side spuds 33.

Each plunger head is provided with a suitable guide 42 to keep it in line as it is projected from the cylinder. Each receiver is also connected by means of a pipe 34 controlled by a valve 35, with the cylinder 17 on the opposite side of the hull, the object of this arrangement being to permit the low pressure receiver to be partly charged by means of the exhaust from the high pressure cylinder, which, it will have been understood, is on the opposite side of the hull.

The outlet pipes 36, for the cylinders 17 and 30, discharge over the end of the hull. The outlet valves 37 and the inlet valves 15, 19, for all of said cylinders, also the valve 35 are controlled from a distance by means of levers 38, and wires or rods 39.

In operating the apparatus, the pressure receivers are only partly filled with liquid, and contain a considerable quantity of compressed air, which is pumped into the receiver, and it is for this purpose that two pumps are provided, one for pumping water, and one for pumping air, the amount of air necessary to be supplied being ascertained by the level of the liquid in the receiver, as shown by the water gage 40. The use of compressed air in the receiver constitutes an

important feature of this invention; for thereby there is obtained a pressure for the hydraulic cylinders which is substantially constant, not being materially affected by the withdrawal of a charge of liquid from the receiver. To illustrate, supposing the receiver 2 has a capacity of twenty times that of the cylinder 17, then, if filled one-third with liquid; and two-thirds with compressed air; this would give an amount of liquid about six times the charge of the cylinder. Upon drawing a charge of liquid from the receiver to operate the cylinder, the expansion of the air in the receiver would be only about one-fourteenth of its former volume, so that, even if the pump 4 were not running, the fall in pressure would be inconsiderable. But the pump is being constantly operated, and hence the pressure is even more uniform than that stated. If, however, the receiver were completely filled with water under pressure, the pressure available for the cylinder would be much more variable.

In the operation of the apparatus as applied to a dredger, the high pressure cylinder is used for loading, lifting, and swinging out the bucket, while the low pressure cylinder is used for unloading, bringing back, and dropping the empty bucket. Thus, if the high pressure cylinder is on the right side of the hull in the direction in which it is advancing, then the apparatus is arranged for swinging out and unloading on the right side. Should it be desired to unload on the left side, the cables connected with the bucket are arranged so that the cable on the left is now connected with the forks and that on the right with the sides of the bucket, and the stop cock 10 in the branch pipe 9 leading to the right is closed and that in the pipe 9 leading to the left is opened, so that the receiver on the left becomes the high pressure receiver, and that on the right the low pressure.

It is to be understood that in applying the power to the dredger bucket the general method at present in use is adopted whereby the tightening of the cable on the right hand side swings the boom to the right, and the tightening of the cable on the left swings the boom back again. Thus after supplying the high pressure fluid to the high pressure cylinder for the purpose of raising the loaded bucket and thereby also swinging the boom to one side, the low pressure cylinder being at this time used merely to maintain the cable leading therefrom taut as it is paid out on account of the boom swinging away from that side, when the end of the boom has reached its destination, the high pressure fluid is shut off and the pipe 34 leading from the high pressure cylinder to the low pressure receiver is opened, permitting the liquid from the high pressure cylinder to

escape into the low pressure receiver, the plunger in the high pressure cylinder moving inward a short distance. Then the valve 35 controlling said pipe 34 connecting the high pressure cylinder with the low pressure receiver is closed, and the exhaust outlet 36 from the high pressure cylinder is opened, permitting the rest of the pressure water to discharge from said cylinder, and allowing the bucket to open and discharge its contents, the opening of the bucket being effected by the pull upon the cable attached to the sides of the bucket being greater than that on the cable attached to the forks. The plunger in the low pressure cylinder now holds the bucket up until the boom swings back to the position where the bucket descends to take up a fresh load, which it does on the low pressure exhaust valve also being opened.

This apparatus is greatly superior to hoisting apparatus at present in use, for various reasons. It avoids the noise of cog gears and of the exhaust from the steam engine, and other noises and enables the operator to do his work in perfect quiet so that orders can be readily heard, and with the ease of having only water valves to handle. It dispenses with the cumbersome friction drums with their uncertainty of action and dangerous brakes. It also enables a single engine placed at any convenient location, out of the way of the moving parts, to operate all of the hoists required on any dredger or vessel. It also insures that the action of the device will not stop, even though the engine should stop, for there is sufficient power stored in the receiver to take a number of loads. It also provides an elastic pressure to operate the cylinders.

I claim:--

1. In an apparatus of the character described, the combination with mechanism for applying power, of a cylinder, a plunger therein, an operative connection therefrom to said mechanism, a receiver for pressure fluid, a connection therefrom to said cylinder, and means for forcing compressed air and a liquid into said receiver, substantially as described.

2. In an apparatus of the character described, the combination, with mechanism for applying power of a cylinder, a plunger therein, an operative connection therefrom to said mechanism, a receiver for pressure fluid, a connection therefrom to said cylinder, and means for forcing compressed air and a liquid into said receiver, said means comprising a liquid pump and an air pump, means for operating said pumps in unison, and a connection from said pumps to said receiver, substantially as described.

3. In an apparatus of the character described, the combination with the hull of a dredger, of a boom swinging on said hull,

cylinders carried by said hull, plungers in said cylinders, cables operatively connected with said plungers and leading to the boom on opposite sides thereof, high and low pressure receivers connected with the respective cylinders, and means for supplying high and low pressure fluids to the respective receivers, substantially as described.

4. In an apparatus of the character described, the combination with the hull of a dredger, of a boom swinging on said hull, cylinders carried by said hull, plungers in said cylinders, cables operatively connected with said plungers and leading to the boom on opposite sides thereof, high and low pressure receivers connected with the respective cylinders, and means for interchangeably supplying high and low pressure fluids to the receivers, substantially as described.

5. In an apparatus of the character described, the combination with the hull of the dredger, and a swinging boom, of a cylinder carried by said hull, a plunger in said cylinder, a cable operatively connected with said plunger and with the boom, a receiver for pressure fluid, means for forcing air and a liquid under pressure to said receiver, and a conduit from said receiver to said cylinder, substantially as described.

6. In an apparatus of the character described the combination with the hull of the dredger, of a boom swinging thereon, a pair of cylinders, plungers therein operatively connected with said boom, a pair of receivers, connections from the receivers to the respective cylinders, an air pump and a liquid pump, and means for operating said pumps, conduits leading from said pumps to the respective receivers, and means for selectively controlling said conduits, substantially as described.

7. In an apparatus of the character described the combination with the hull of the dredger, of a boom swinging thereon, a pair of cylinders, plungers therein operatively connected with said boom, a pair of receivers, connections from the receivers to the respective cylinders, an air pump and a liquid pump, and means for operating said pumps in unison, conduits leading from said pumps to the respective receivers, means for selectively controlling said conduits, means for supplying low pressure fluid and means for selectively conducting the low pressure to one of said receivers while conducting the high pressure fluid to the other receiver, substantially as described.

8. In an apparatus of the character described, the combination, with the hull of the dredger, of a boom swinging thereon, sheaves carried by the outer end of said boom, cables passing over said sheaves, a

dredger bucket having forks to which one of said cables is connected, the other cable being connected to the sides of the bucket, cylinders, plungers therein, operatively connected with the respective cables, high and low pressure receivers connected with the respective cylinders, means for supplying high and low pressure fluids to the receivers, the cables leading to the forks of the bucket being operatively connected with the cylinder connected with the high pressure receiver, and the other cable being so connected with the other cylinder, substantially as described.

9. In an apparatus of the character described, the combination, with the hull of the dredger, of a boom swinging thereon, sheaves carried by the outer end of said boom, cables passing over said sheaves, a dredger bucket having forks to which one of said cables is connected, the other cable being connected to the sides of the bucket, cylinders, plungers therein, operatively connected with the respective cables, high and low pressure receivers connected with the respective cylinders, means for supplying high and low pressure fluids to the receivers, the cables leading to the forks of the bucket being operatively connected with the cylinder connected with the high pressure receiver, and the other cable being connected with the other cylinder, and means for interchanging the connections to said receivers for the high and low pressure fluids, substantially as described.

10. In an apparatus of the character described, the combination, with the hull of the dredger, of a boom swinging thereon, sheaves carried by the outer end of said boom, cables passing over said sheaves, a dredger bucket having forks to which one of said cables is connected, the other cable being connected to the sides of the bucket, cylinders, plungers therein, operatively connected with the respective cables, high and low pressure receivers connected with the respective cylinders, means for supplying air and a liquid under high pressure to one of said receivers and under low to the other of the receivers, the cables leading to the forks of the bucket being operatively connected with the cylinder connected with the high pressure receiver, and the other cable being so connected with the other cylinder and means for interchanging the connections to said receivers for the high and low pressure fluids, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ROBERT M. WILSON.

Witnesses:

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D. B. RICHARDS.