March 14, 1950 F. R. HARRIS 2,500,354

APPARATUS FOR CONTROLLING SILT ACCUMULATION

Filed Feb. 24, 1945 3 Sheets-Sheet 1

Fig. 1.

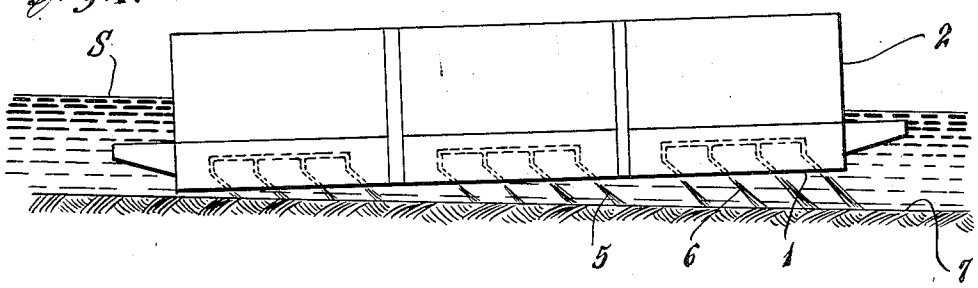


Fig. 2.

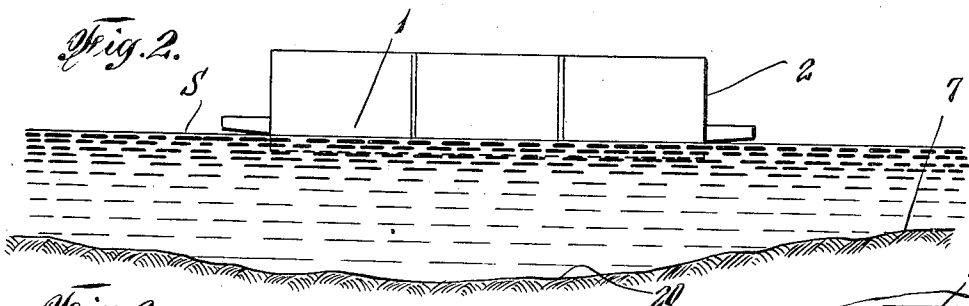
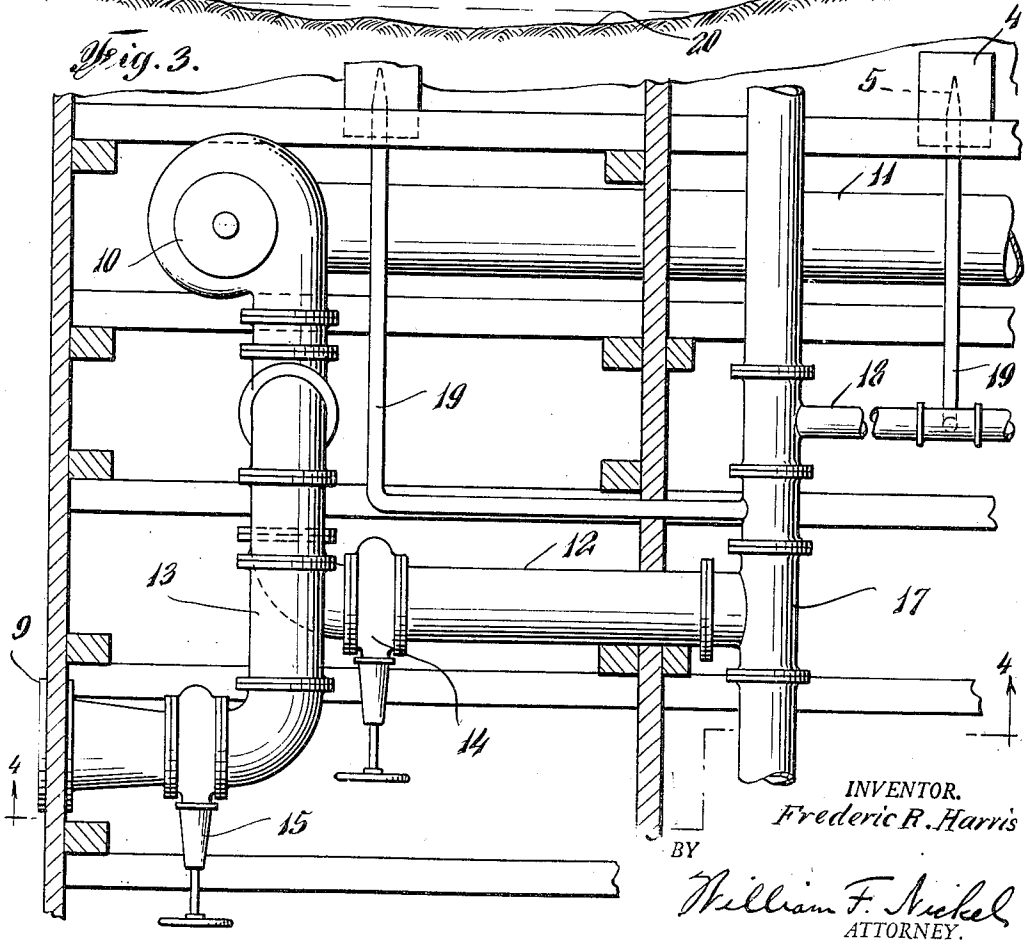


Fig. 3.



INVENTOR.
Frederic R. Harris

BY
William F. Nickel
ATTORNEY.

March 14, 1950 F. R. HARRIS 2,500,354

APPARATUS FOR CONTROLLING SILT ACCUMULATION

Filed Feb. 24, 1945 3 Sheets-Sheet 2

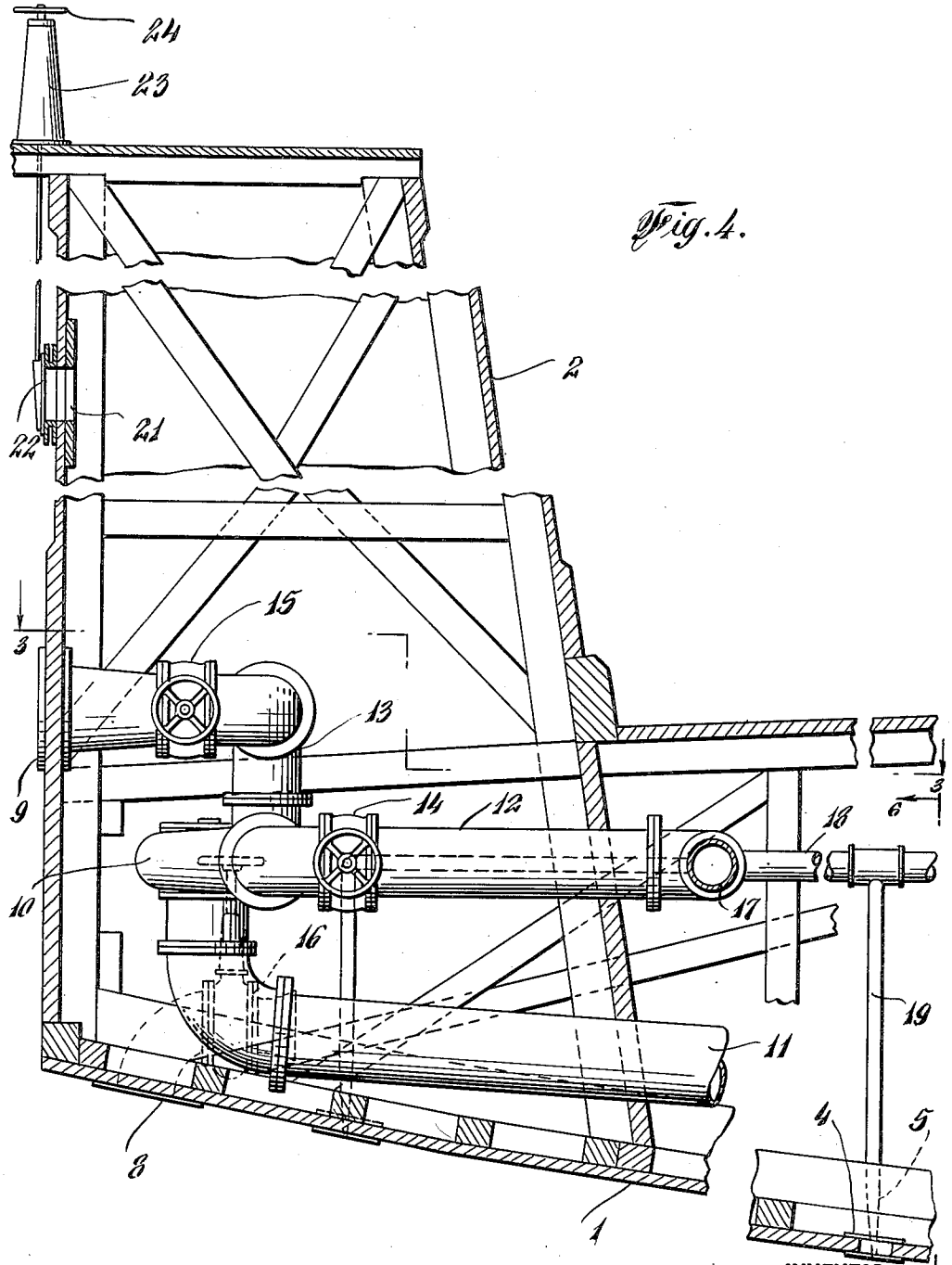


Fig. 4.

INVENTOR.
Frederic R. Harris

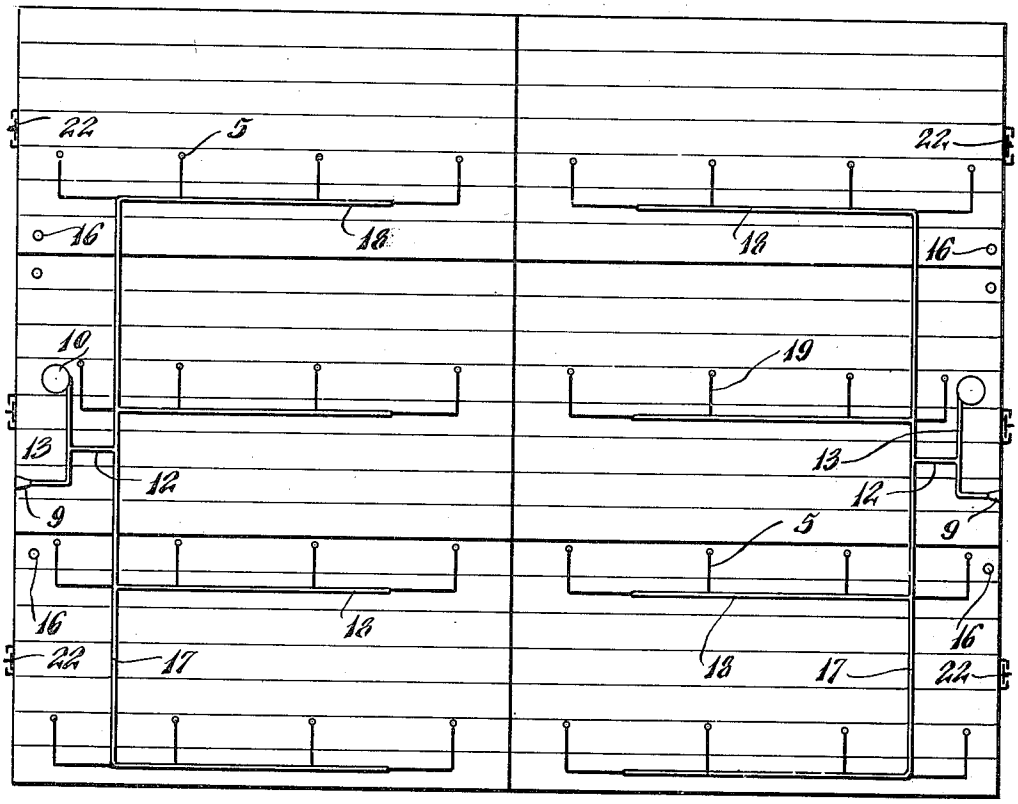
BY
William F. Nickel
ATTORNEY.

March 14, 1950 F. R. HARRIS 2,500,354

APPARATUS FOR CONTROLLING SILT ACCUMULATION

Filed Feb. 24, 1945 3 Sheets-Sheet 3

Fig. 5.



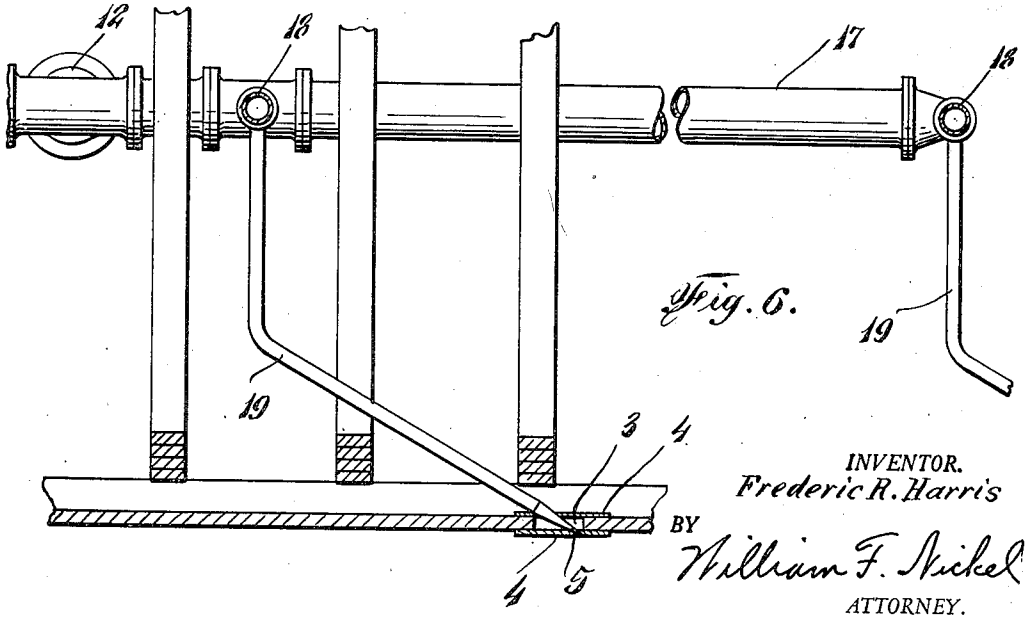


Fig. 6.

INVENTOR.
Frederic R. Harris
BY
William F. Nickel
ATTORNEY.

Patented Mar. 14, 1950

2,500,354

UNITED STATES PATENT OFFICE

2,500,354

APPARATUS FOR CONTROLLING SILT ACCUMULATION

Frederic R. Harris, New York, N. Y.

Application February 24, 1945, Serial No. 579,633

3 Claims. (Cl. 114—45)

1

This invention pertains to a method and apparatus for increasing the depth of a body of water otherwise and at lower cost than by ordinary dredging; and particularly the water at a site for a floating dry dock employed in the overhauling and repair of ships.

An important object of my invention is to control the accumulation of silt in slips and at other places selected for floating docks, so as to maintain a depth of water that it always sufficient for the work which the dock performs.

Many dry docks are located in rivers that flow through loamy and sandy areas, and then the water carries in suspension with it particles of sand and loam, termed river silt, which settles on the bottom when the current flow is slowed by an obstruction or a widening of the bed of the stream. This silt usually is in a state of fine subdivision; it is deposited extensively on the bottom, and the depth of the river soon becomes materially reduced.

A site for a floating dry dock often requires dredging so that the dock may be sunk deep enough to receive a vessel in the trough of the dock. A hole thus excavated at the bottom of the water naturally causes eddies and precipitation of silt in the depression will immediately set in; and deposit of silt at a rate of one foot per month under a floating dry dock is not uncommon.

Every foot of silt, of course, reduces the available draft of the dock over the keel blocks; and in a few months' time the accumulation will lessen the depth of the water by several feet. Hence, dredging must frequently be undertaken, or the dock cannot give the service for which it was designed. But dredging necessitates the temporary shifting of the dock from its berth, and substantial time is lost when the dock is not in use.

In the practice of my invention, however, I have discovered that dredging and its attendant drawbacks can be avoided, and that the quantity of water which is discharged by the pumps to sink and raise the dock is sufficient to cause a flow of water directly under it to flush away the silt and keep the bottom of the water free of interfering accumulations. Therefore, by periodically sinking the dock and preferably tilting the dock one or two feet along its length, and discharging the full pumping capacity of water for a few hours outward toward the center of the river, the required area of bottom under the dock will be effectively deepened and no dredging at all will be needed.

Further, though many rivers now can only be utilized for relatively small docks, my invention will enable floating dry docks to be located in relatively small rivers and serve larger ships than has heretofore been feasible.

2

These and other objects and advantages will appear in the following description, taken with the accompanying drawings, and the novel characteristics are defined in the appended claims. But this disclosure is explanatory only, and variations of structure and in the steps of proceeding may be adopted without departing from the principle of the invention or going beyond the scope and spirit thereof.

On the drawings:

Figure 1 shows how a dock is employed to sweep out silt from the bottom of a river directly beneath it.

Figure 2 shows in outline the bottom of a stream afterward.

Figure 3 illustrates in top plan the pump and pipe connections on the interior of a dock, as shown above the line 3—3 of Figure 4.

Figure 4 shows the same parts in side elevation.

Figure 5 shows in plan the supply pipes for the flushing system of the dock; and

Figure 6 presents in detail one of the flushing nozzles, viewed from the line 6—6 on Figure 4.

The same numerals identify the same parts throughout.

The dock has the conventional pontoon hull 1 and side walls 2. In the bottom of the hull are openings 3, over which are plates 4, which carry the discharge nozzles 5. The plates and nozzles of course close the holes or openings 3, to prevent leakage; and nozzles discharge jets of water 6 below the hull 1 towards the bottom of the stream 7 in a slanting direction. In action the dock is flooded so as to tilt up slightly at the end which is upstream, or if moored near the shore, the outshore end; and sunk deep enough for the nozzles to have the bottom 7 within effective range of their jets 6. Then enough silt can be washed away to excavate a depression of sufficient depth under the dock, as shown in Figure 2. The hull 1 has flooding inlets one of which appears at 8 on one side in Figure 4, for the admission of water to sink the dock; and a discharge port, shown at 9, for the discharge of water when the hull is pumped out for raising. The discharge opening is connected to a pump 10. The pump withdraws through a suction conduit 11 the water entering by way of the ports 8. The conduit 11 is joined to the inlet port of the casing of the pump, which is of the centrifugal type, and the outlet of the pump is coupled to a pipe 12 that supplies the nozzles 5. From the pipe 12 a branch pipe 13 leads to the discharge port 10. The pipes 12 and 13 are controlled by gate valves 14 and 15 respectively, and a gate valve 16 controls each inlet 8.

The conduit 12 leads to a header 17 having branch pipes 18. The header runs substantially parallel to the adjacent wall 2, and the lateral

branch pipes 18 therefrom towards the middle of the hull. Each pipe 18 has a number of smaller pipes 19 connected thereto; and the pipes 19 lead to the nozzles 5. The latter slope downward away from one end of the hull and towards the opposite end; that is, approximately parallel to side walls 2. The same arrangement is installed on the other side of the dock.

The dock is sunk as shown in Figure 1 by opening the ports 8, the discharge ports 8 being closed. With the dock in position the valves 15 and 16 are closed and the valves 14 are opened and the pumps started to draw the water in the hull through the pipe 11 and deliver it to the pipe 12. Water is therefore impelled through the pipe 12, header 16, pipes 17 and all the nozzles to wash away silt from the bottom 7 and deepen the water under the dock, as depicted in Figure 2. Though the water may be too shallow at the start, as indicated by the distance between the surface S and bottom, a depression 20 of sufficient depth is soon made.

Thus, dredging can be dispensed with altogether. The cost of the additional piping and nozzles is much lower than the regular expense which dredging entails.

When the dock is to be submerged it is on the surface, and water that enters the inlet ports 8 is taken from near the surface where it is comparatively free from mud and dirt. After sinking, when the openings 8 and 9 are closed, the nozzles often require more water than the dock contains; but now the inlets 8 cannot be reopened because the additional water would then be taken from near the bottom and the silt therein would foul the interior of the dock. To admit more water recourse is therefore had to gate openings 21 in the outer faces of the walls 2. These openings are controlled by sliding gates 22, having suitable connections 23 to hand wheels 24 at the tops of the walls 2. These inlet openings are high enough to take water from near the surface, where it is comparatively free from mud and silt, after the dock is submerged, and the fouling of the inside of the dock is thus prevented. A plentiful supply of virtually clean water is thus assured as long as the discharge from the jets 5 is continued.

The valves 14, 15 and 16 are actuated by connections not shown; and the pump can be driven from a suitable source of power that likewise need not be illustrated herein.

The dock is illustrated herein as having the usual trough shape, with pontoon hull and side walls, but it of course can be of any design, and built either in sections or as a single structural unit.

The interiors of the dock, of course, are divided into compartments and the dock can be sunk lower as indicated in Figure 1 by admitting enough water to the compartments at the end which is to be depressed.

My copending application No. 717,190, filed December 19, 1946, contains claims for the method disclosed herein; while the purpose of this application is to protect the construction of the dock.

Having described my invention, what I believe to be new is:

1. A floating dry dock having a hull and side walls and a port at each side of the dock adjacent the bottom to admit water to sink the dock, a discharge port at each side, a power pump at each side, piping connecting each power pump to one of the discharge ports, the hull having transverse rows of openings in its bottom, plates over said openings, tilted nozzles mounted in said plates to discharge water slantwise through the bottom of the dock throughout its length towards one end thereof, piping connecting said pumps to the nozzles, and valves to control said piping, said dock having an additional inlet in the upper part of a side wall to admit additional water to the dock after sinking, a valve to control said inlet and means extending to the top of said side wall to control said additional valve.

2. A floating dry dock having a hull and side walls and a port at each side of the dock adjacent the bottom to admit water to sink the dock, a discharge port at each side, a power pump at each side, piping connecting each power pump to one of the discharge ports, tilted nozzles mounted in said bottom to discharge water slantwise through the bottom of the dock throughout its length towards one end thereof, piping connecting said pumps to the nozzles, comprising longitudinal headers adjacent the sides of the dock leading from said pumps, lateral branches leading from said headers, each branch being connected to a group of nozzles in transverse alinement, and valves to control said piping, said dock having an additional inlet in the upper part of a side wall to admit additional water to the dock after sinking, a valve to control said inlet and means extending to the top of said side wall to control said additional valve.

3. A floating dry dock having a hull and side walls and a port at each side of the dock adjacent the bottom to admit water to sink the dock, a discharge port at each side, a power pump at each side, piping connecting each power pump to one of the discharge ports, the hull having transverse rows of openings in its bottom, plates over said openings, tilted nozzles mounted in said plates to discharge water slantwise through the bottom of the dock throughout its length towards one end thereof, piping connecting said pumps to the nozzles, comprising longitudinal headers adjacent the sides of the dock leading from said pumps, lateral branches leading from said headers, each branch being connected to a group of nozzles in transverse alinement, and valves to control said piping, said dock having an additional inlet in the upper part of a side wall to admit additional water to the dock after sinking, a valve to control said inlet and means extending to the top of said side wall to control said additional valve.

FREDERIC R. HARRIS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
184,998	Tassey	Dec. 5, 1876
727,059	Balch	May 5, 1903
749,171	Cunningham	Jan. 12, 1904
1,803,191	Jennings	Apr. 28, 1931

FOREIGN PATENTS

Number	Country	Date
17,855	Great Britain	Oct. 26, 1895