

(No Model.)

2 Sheets—Sheet 1.

H. S. WOOD & R. A. PERRY.
DREDGING APPARATUS.

No. 557,178.

Patented Mar. 31, 1896.

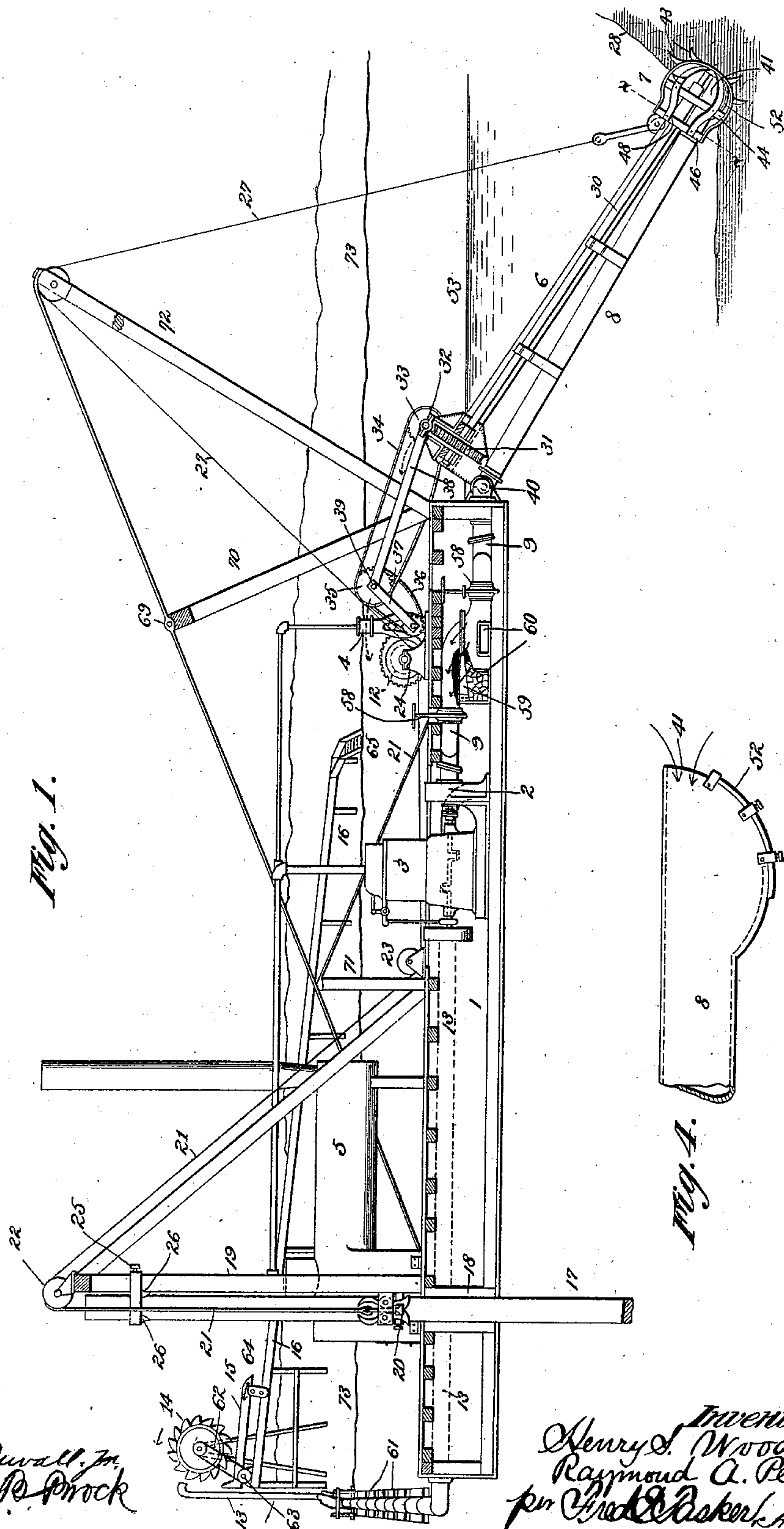


Fig. 1.

Fig. 4.

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Inventors:
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Fig. 2.

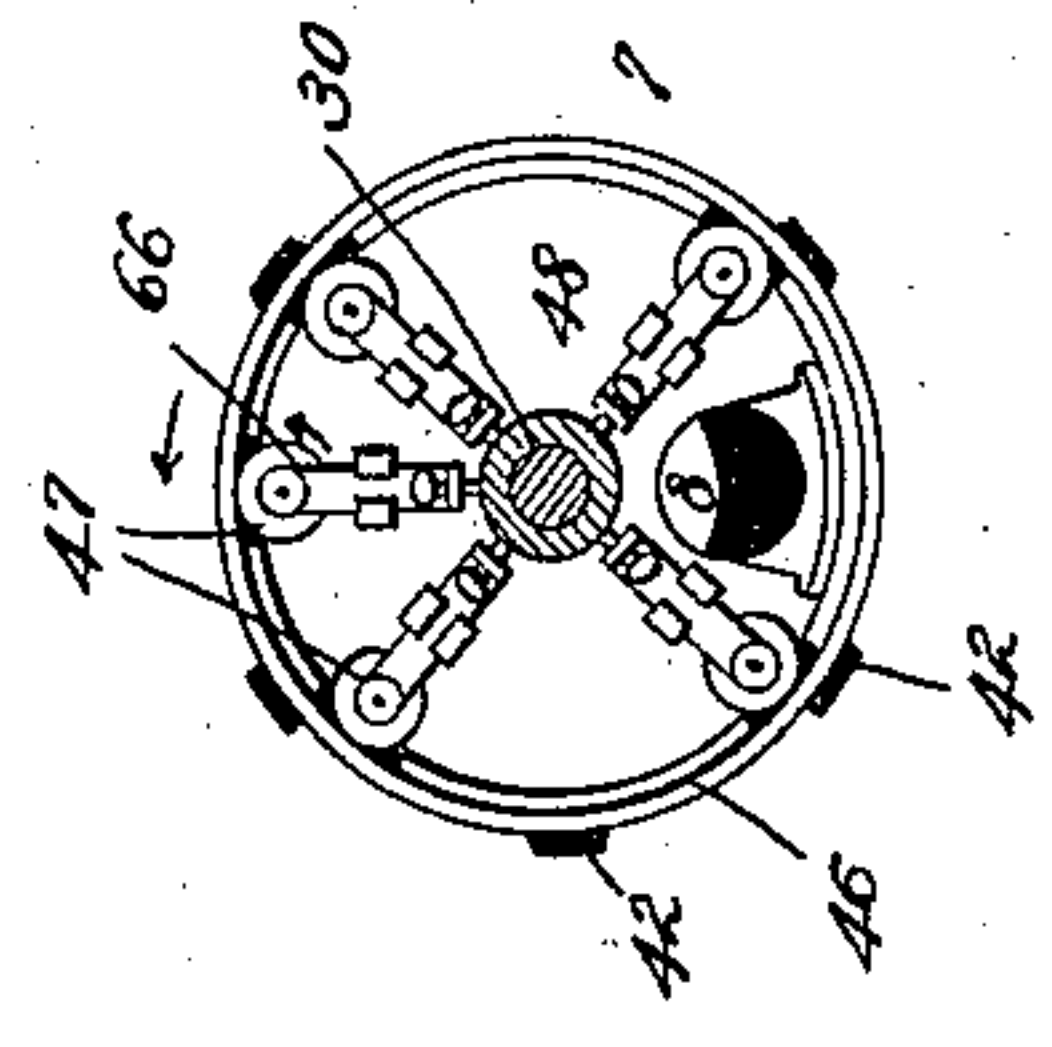
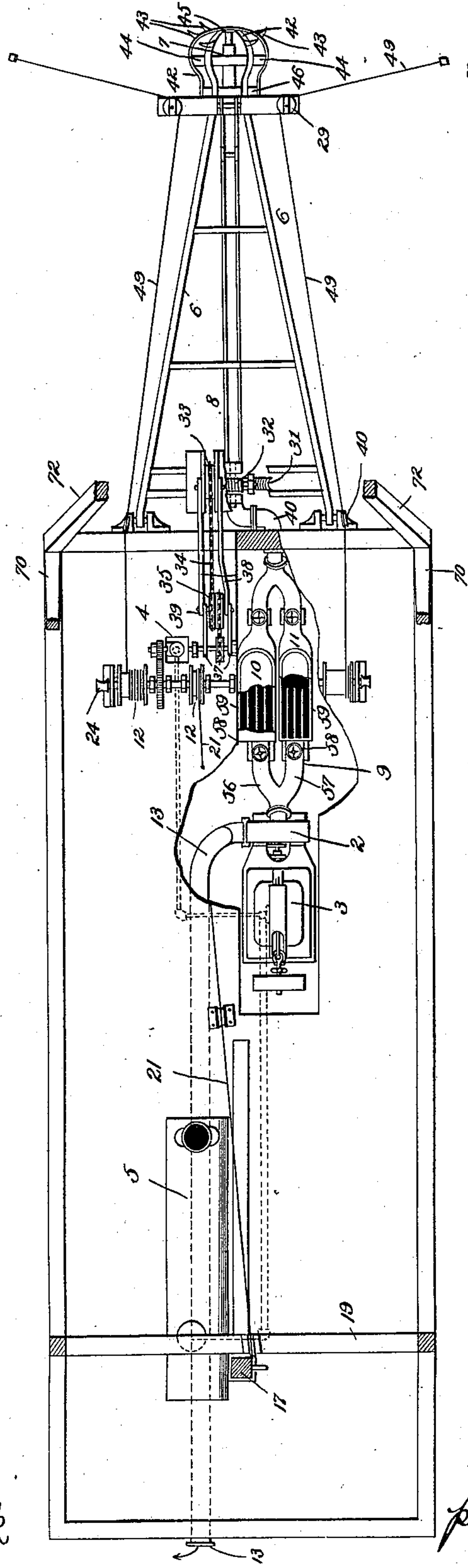


Fig. 3.

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UNITED STATES PATENT OFFICE.

HENRY S. WOOD AND RAYMOND A. PERRY, OF SAN FRANCISCO, CALIFORNIA.

DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 557,178, dated March 31, 1896.

Application filed March 8, 1894. Serial No. 502,884. (No model.)

To all whom it may concern:

Be it known that we, HENRY S. WOOD and RAYMOND A. PERRY, citizens of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Dredging Apparatus; and we hereby declare the following specification and the drawings therewith to be a full, clear, and exact description of our invention, with methods of constructing and applying the same.

Our invention relates to dredging fluvial or alluvial deposits, including auriferous gravel and sand, by means of pumps, also to the extraction of gold or other minerals therefrom by processes and apparatus as hereinafter described.

Our improvements consist in forming the pump suction-pipes with relay-chambers, through which the suction-current flows, for catching by precipitation and for removal of stones or other solid obstructive matter that might interfere with or injure the pump, or in the case of treating auriferous material be an impediment to extraction processes after the spoil has passed through the pump; also consists in gratings or screens to remove or retain mechanically such obstructions so placed as to not impede or contract the area or capacity of the suction-ducts.

Our invention also consists in an improved form and manner of constructing the spoil-loosening mechanism at the intake end of suction-pipe, in the method of driving or transmitting power to such mechanism, and to the manner of supporting the same, also in means to control the inlet to the suction-pipe.

Our invention further includes means of conveying the spoil from the pump, and when auriferous its treatment by extracting processes; also various other constructive and operative details, including the movement and handling of the machinery and the vessel on which it is mounted, as will be more fully pointed out in connection with the drawings.

The object of our invention is to remove alluvial or other subaqueous deposits and, when required, to extract therefrom free minerals, especially gold, as they exist in the

beds or estuaries of auriferous streams by a continuous and connected process of dredging, disintegration and washing the material, as herein explained, and shown in the drawings, in which—

Figure 1 is a longitudinal elevation, partially in section, showing a dredging apparatus constructed according to our invention. Fig. 2 is a partial plan view of the same. Fig. 3 is a section on the line *x y* of Fig. 1, showing the inner end and manner of supporting the rotary harrow mechanism for loosening the material when it is drawn into the suction-pipe. Fig. 4 is a side view of the outer or intake end of the suction-pipe, showing the adjustable cover thereon to regulate area of the inlet.

Similar numerals of reference indicate corresponding parts in the different figures of the drawings.

The principal parts are designated by the following references:

1, a vessel or barge on which the machinery is mounted; 2, a centrifugal pump for raising and propelling the material; 3, a steam-engine connected with and driving the pump; 4, a steam-engine driving the rotary cutter and for winding; 5, a steam-boiler supplying both these engines; 6, a hinged ladder-frame supporting the disintegrating implement and suction-pipe; 7, the rotary harrow for loosening the material; 8, the outer suction-pipe with adjustable orifice; 9, the inner suction-pipe with catch-chambers; 10 11, catch-boxes to arrest the passage of stones or other obstructions; 12, windlasses for swinging the barge and machinery and for winding; 13, the discharge-pipe from the pump; 14, a water-wheel to operate a grizzly or screen; 15, a grizzly or screen to remove stones or other solids; 16, a sluiceway with riffles to catch minerals; 17, a pile or spud to anchor the barge.

In suction dredging-machines the main operations are loosening the material, the avoidance of obstructive matter, the adjustment or feed of the spoil-loosening mechanism and suction-pipe, the conveyance of the spoil by means of jointed pipes to and from the pump and to the shore or place of deposit, also the

adjustment and movement of the barge or supporting-vessel progressively forward as the deposit in front is removed.

We are aware that these operations have been carried on by apparatus analogous in nature, but in a less complete manner than is attained by our invention.

Referring now to the drawings and the various parts represented therein, the barge 1 is anchored by the pile or spud 17. This latter is preferably a heavy piece of timber shod with iron, passing through a wellway 18 from the deck to the bottom of the barge 1, also supported above by a gallows-frame 19, as shown in Figs. 1 and 2. This pile or spud 17 is raised by the automatic grab-hooks 20 and a chain or rope 21 passing over pulleys 22 23 and to a clutch-drum on the windlass-shaft 24. When this pile 17 is raised by the hooks 20 engaging the stud 68, extensions 67 come in contact with the releasing-stop 26 at the top of the stroke, and the pile 17 being thus freed falls with full force, sinking in the bottom, forming a firm pivotal point on which the barge 1 may swing.

The ladder-frame 6, with the rotary harrow 7 and suction-pipe 8, is then lowered by means of the chain or rope 27, operated by a clutch-drum on the winding-shaft 24, until the rotary harrow 7 comes in contact with the deposit 28 and is set in revolution by means of the shaft 30, tangent wheel 31, worm-wheel 32, and the wheel 33, the latter driven preferably by a pitch-chain 34 from the wheel 35, and this again by a pitch-chain 36 extending from a wheel on the shaft of the engine 4.

The wheel 35 is supported on a short shaft having its bearings in or upon the links or struts 37 38, jointed at 39, permitting a movement of the wheel 33 about the axis 40 as the ladder-frame 6 and the rotary harrow 7 are raised or lowered, thus preserving a uniform length and tension of the chains 34 36, or to accommodate shafts, wheels, or any kind of gearing employed to transmit power from the engine 4 to the harrow-shaft 30.

Referring next to the rotary harrow 7, this is made with its external contour of a pear shape to fit around the inlet end of the suction-pipe (shown in Fig. 4) and also secure the principal disintegrating action and inlet-area or some of the spaces between the radial bars or spokes 42 at the most effective point at or beyond the intake-orifice 41. This rotary harrow 7 is composed of a series of steel bars 42, provided with plows or teeth 43, that displace stones and disintegrate the material in advance of the bars 42, after which the force of suction draws the material into the pipe 41. This pear shape of the harrow reduces its diameter at the point of its support, gaining thereby structural advantages and permitting its inoperative or neutral part to pass over obstructions in the path of the lateral movement, and, as already stated, concentrates its action at or in advance of

the suction-inlet of the pipe 8. These bars 42 are attached to a strong flange 45 on the end of the shaft 30. The inner ends are supported by a ring 46, to which all the bars 42 are attached. This ring 46 has an internal bearing upon a series of rollers 47 adjustably supported on the diaphragm or disk 48, to which the ladder-frame 6 and the suction-pipe 8 are permanently attached. These rollers are held in movable brackets 66, set out by screws, as shown in Fig. 3. To compensate for wear, remove the weight of the harrow from the main-shaft bearing and maintain concentricity of the harrow-shaft and bearing. The braces 42 at the forward or ploughing ends are curved inward to form spokes and thus support the structure at this end without internal brace-rings or other obstruction to the inflow at the point of principal action. In this manner it will be seen that spokes and internal brace-rings or other obstructions are avoided and better action attained.

The barge 1 being anchored by the pile 17 and the rotary harrow 7 lowered and set in motion, a lateral or swinging movement from side to side is performed by means of guy-ropes 49, one of which is completely shown in Fig. 2. These ropes 49 are attached to anchors or stakes 50, and being wound and unwound on the clutch-drums 12 swing the rotary harrow 7 with the barge 1 from port to starboard and the reverse as the drums 12 are engaged and disengaged, the rotary harrow 7 being lowered, as required and as the material 28 is removed. When a section has been removed to the intended depth 51, the pile 17 is hauled up and the barge 1 advanced for another cut or section.

The spoil, after being loosened by the rotary harrow 7, is drawn by suction into the pipe 8 at the inlet 41. This inlet is made variable in area by means of an adjustable plate 52 held by screws, as shown in Fig. 4, so the inlet-area can be regulated to suit the kind of material being dredged and other circumstances of operating, such as the admission of a proper amount of water to maintain a fluid state of the spoil and permit its free passage through the pipes, also to intensify the intake-current in dredging hard material, or to suck up particles from the bed-rock exterior to the harrow.

The outboard-section of the suction-pipe 8 is provided with a hinged joint at 40 concentric with the pivotal axis of the supporting ladder-frame 6, so as to permit free movement in a vertical plane, this joint 40 being preferably below the surface of the water 53, so that no air will enter.

The spoil being drawn in through the hinged joint 40 enters the inboard-section of the suction-pipe 9, which is divided into two branches 54 55 leading to the catch-boxes 10 and 11, from which two other branches, 56 57, lead to the pump 2.

The flow to and from the catch-boxes 10 11 is intercepted by valves 58, so the current can be changed through one or the other and thus permit the precipitation and removal of stones or obstructions from either alternately without stopping the pumping or other processes for that purpose. These catch boxes or chambers 10 11 are of elongated form, as shown in the side view, Fig. 1, having an enlarged section, so as to diminish the flow at this point, and are provided with fixed grated screens 59 fastened to and projecting from the rear wall of the chambers, but terminating at the front, so as to leave a free anterior passage for the water and spoil if the chamber below becomes filled with stones or the spaces between the bars become clogged. In this manner it will be seen that stones or other obstructions will sink by reason of the retarded current in these boxes or chambers 10 and 11, and will by precipitation be thrown beneath the screens 59 and be prevented from rising until the space is filled. Then, if not removed, the flow will go on, as indicated by the arrows in Fig. 1, and no interruption or impediment will occur; but the stones or other solids will pass into the pump 2 until the catch-chamber is cleared. This is done by means of the removable plates 60, two or more of which are provided at each catch-box.

The spoil, after passing the pump 2, is forced through the discharge-pipe 13 to the rear end of the barge 1, and thence to a separate barge or tender provided with washing-slucies or on pontoons 61 to the shore 73.

If not containing gold, the spoil is led or flows to where it is to be finally deposited; but if it contains gold in such quantity as to warrant extraction the pipe 13 is elevated so as to discharge into a screen or grizzly 15, which, if required, can be given a shaking motion by means of a water-wheel 14, a chain 62, or other suitable gearing to impart motion to a rocking shaft 63. This grizzly 15 catches and separately disposes of small stones or other solids that may have passed the catch-boxes 10 and 11, the liquid or lighter spoil flowing over the end at 64 into a sluiceway 16, which is made of the required length and provided with riffles in the usual manner, the spoil being finally discharged at 65, and led to a place of final deposit.

Having thus explained the nature and objects of our invention, with the method of constructing and applying the same, what we claim as new, and desire to secure by Letters Patent, is—

1. In suction dredging apparatus, a revoluble skeleton rotary harrow, as herein described, having its outer end supported on the end of a driving-shaft, and its inner end by means of rollers bearing on the interior of an end-supporting ring, the rollers adjustable outward from the center so as to compensate for wear, in the manner and for the purposes substantially as described.

2. In a suction dredging apparatus as herein described, a revoluble harrow or disintegrating implement mounted on a radial swing-frame pivoted on the barge or vessel, a tangent wheel on the harrow-shaft operated by a pinion, pitch-chains, a movable intermediate chain-wheel so arranged as to transmit power to the revoluble harrow from a fixed engine or other source and permit a free movement of the pear-shaped harrow and its supporting-frame in a vertical plane, in combination with a suction-pipe whose intake end extends to a point of the harrow's largest diameter and principal action.

3. In suction dredging apparatus, a supporting barge or vessel, a pump and impelling-engine thereon; a movable outboard suction-pipe, hinged and operating in the manner shown; an inboard suction-pipe provided with relay catch-chambers through which the current passes and is there retarded to permit precipitation, intercepting-valves in each branch of the suction-pipe so the current can be sent through either catch-box or both, as may be desired, in the manner substantially as described.

4. In suction dredging apparatus, a barge or vessel with a pumping apparatus thereon; a movable outboard suction-pipe and a double inboard suction-pipe; two catch-box chambers separately connected with the suction-pipe, and valves to direct the flow through either catch-box or both, the latter provided with screens to retain stones or other obstructions, and detachable manholes through which such obstructing material can be removed, in the manner substantially as shown.

5. In suction dredging apparatus, a movable barge or vessel provided with a pump and suction-pipes, as herein described; the inboard suction-pipe provided with dual catch-boxes or stone traps independently connected with the suction-pipe, and having intercepting screens projecting forward opposite to the flow, and leaving a full-way passage around the anterior end of the screens, so the flow cannot be shut off by the accumulation of debris, in the manner substantially as herein described.

6. In suction dredging apparatus, as herein described, a barge or supporting-vessel with pumping and impelling machinery thereon; a forked suction-pipe provided with catch-chambers or stone traps in the manner described, these chambers having catch gratings or screens; retaining-chambers beneath and full-way passage around the anterior of the gratings or screens, in the manner substantially as and for the purposes described.

7. In a suction dredging apparatus, the combination of a movable supporting-barge and pumping-engine thereon to raise and impel the dredged material, a revoluble pear-shaped harrow or suction-pipe and divided or alternate catch-boxes as herein described, flexible discharge-pipes to conduct the spoil from the

barge to the shore or place of deposit, and
grizzlys, screens or other separating ma-
chinery for extracting gold from the spoil,
the same being protected from stones or ob-
5 structive materials or stoppage by the alter-
nate catch-boxes before named, substantially
as described.

In testimony whereof we have hereunto af-

fixed our signatures in the presence of two
witnesses.

HENRY S. WOOD.
RAYMOND A. PERRY.

Witnesses:

ALFRED A. ENQUIST,
WILSON D. BENT, Jr.