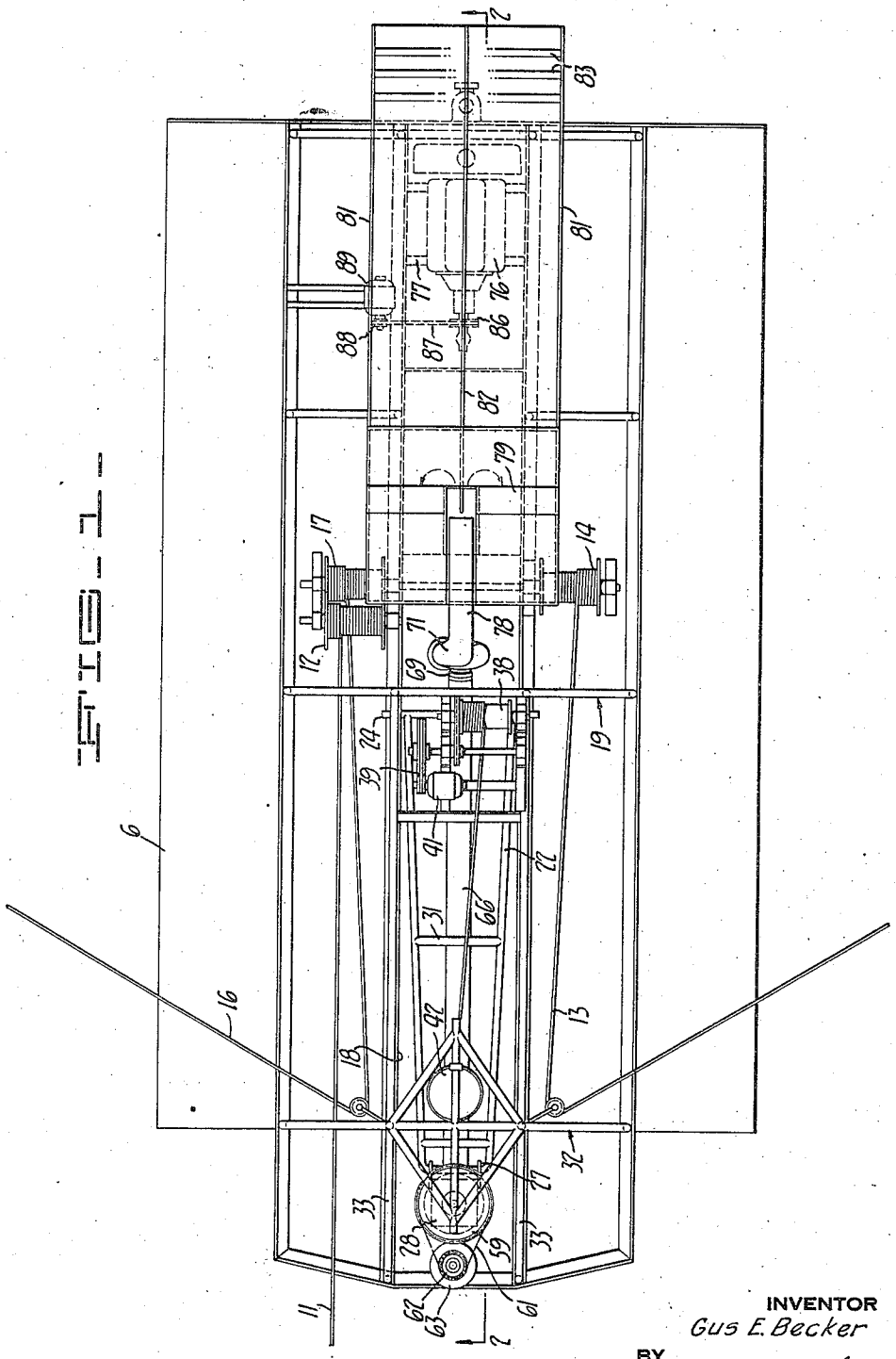
Jan. 12, 1943. G. E. BECKER 2,308,437

DREDGE

Filed Feb. 28, 1941 3 Sheets-Sheet 1



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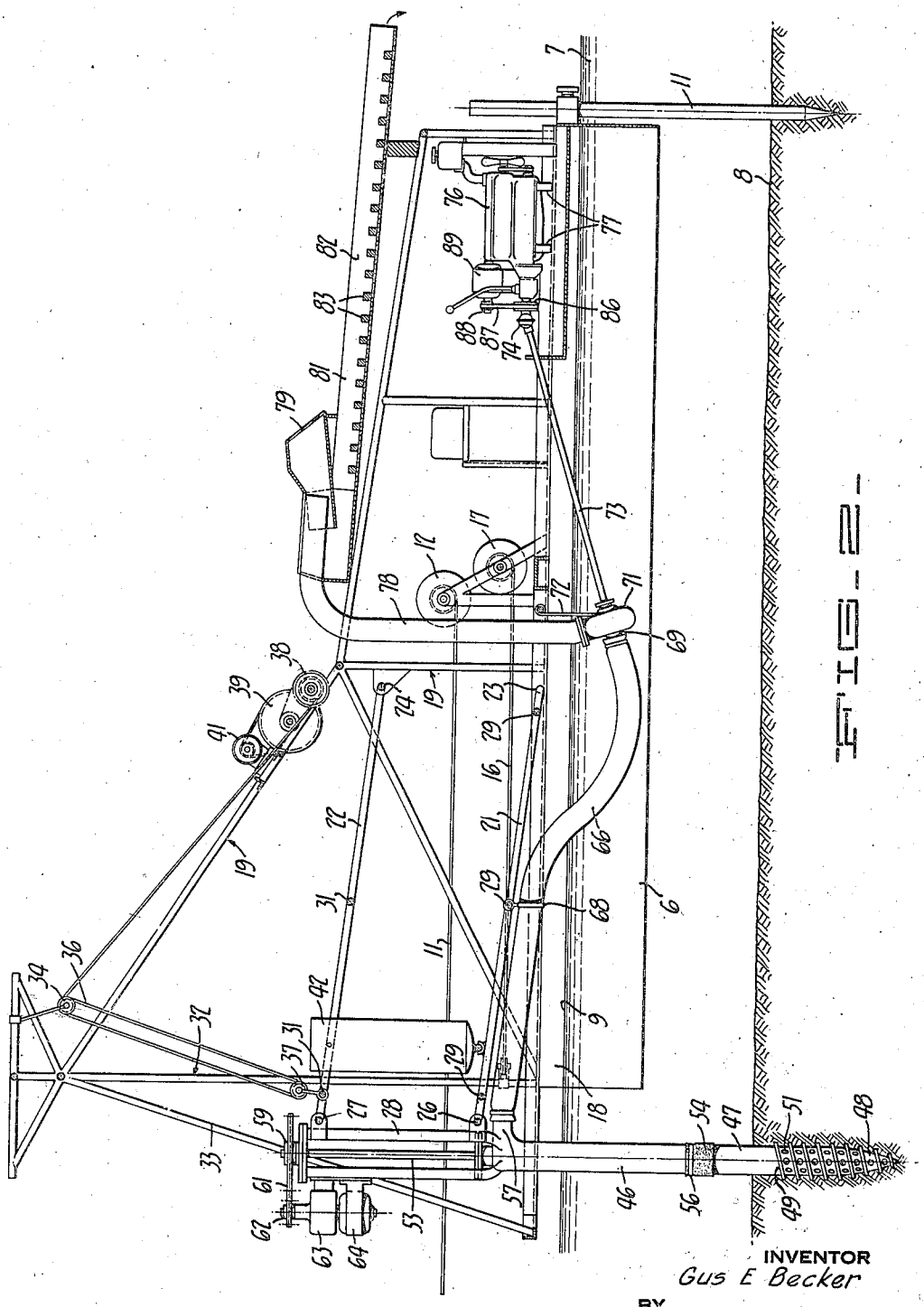


FIG. 2.

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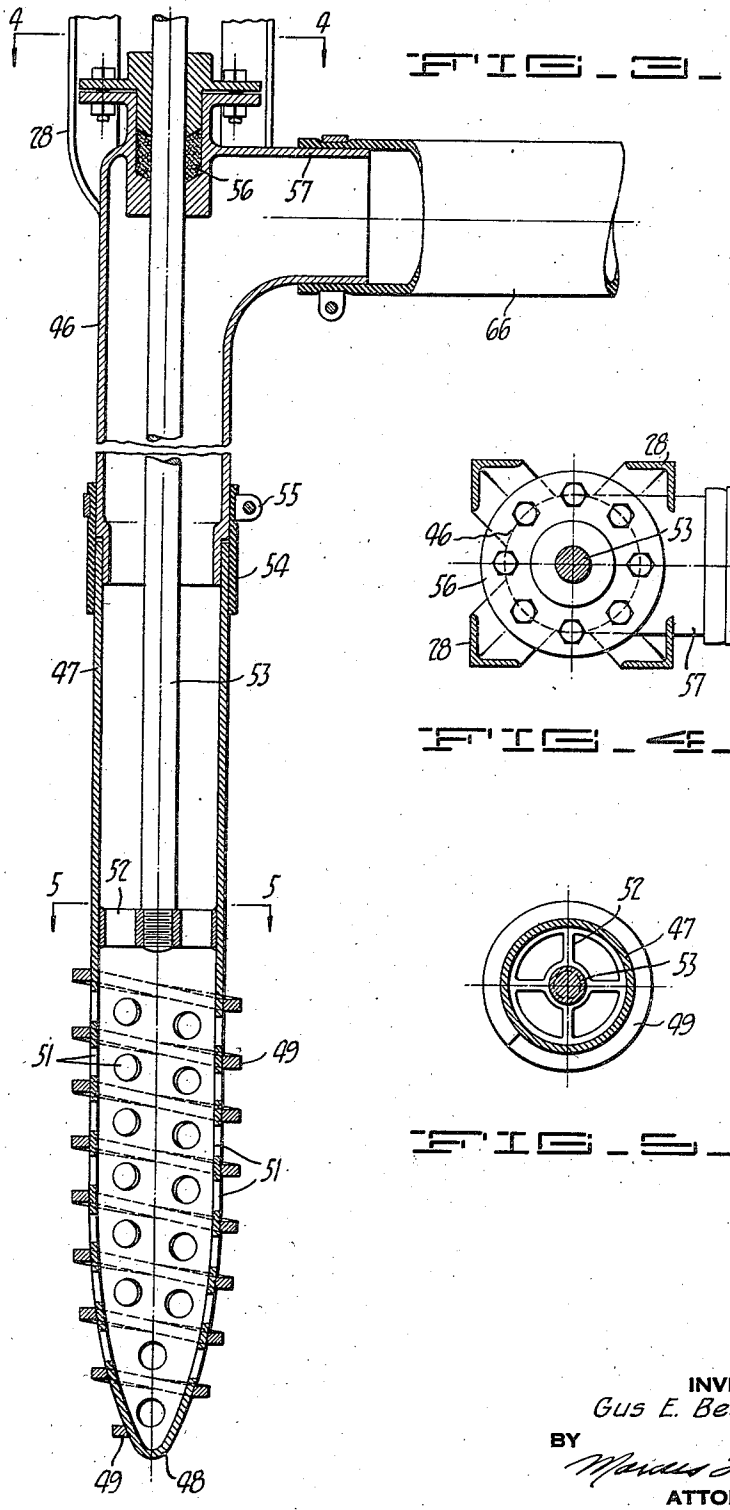


FIG. 3.

FIG. 4.

FIG. 5.

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Patented Jan. 12, 1943 2,308,437

UNITED STATES PATENT OFFICE

2,308,437

DREDGE

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Application February 28, 1941, Serial No. 381,110

3 Claims. (Cl. 37—65)

My invention relates to means for recovering values such as gold from the earth and is particularly concerned with a dredge adapted for recovering the values from gravel deposits such as exist in stream beds.

It is an object of my invention to provide a dredge which is very simple in construction and economical to operate to make feasible the working of deposits of relatively low grade.

Another object of my invention is to provide a dredge which requires very little superintendence and maintenance during its operation.

A further object of my invention is to provide a dredge which can be made relatively small and can therefore be accommodated to relatively small bodies of water.

A further object of my invention is to provide a dredge which is effective to remove the values from the surrounding material on the bed of a body of water such as a stream.

The foregoing and other objects are attained in the embodiment of the invention illustrated in the drawings, in which—

Fig. 1 is a plan of a dredge constructed in accordance with my invention.

Fig. 2 is a cross-section, the plane of which is indicated by the line 2—2 of Fig. 1.

Fig. 3 is a cross-section on a vertical axial plane through the suction nozzle and associated mechanism of my dredge.

Fig. 4 is a cross-section, the plane of which is indicated by the line 4—4 of Fig. 3.

Fig. 5 is a cross-section, the plane of which is indicated by the line 5—5 of Fig. 3.

In its preferred form the dredge of my invention comprises a hull having a reentrant portion within which on a frame is disposed a rotatably mounted and vaned perforated suction nozzle secured to a driving shaft driven from a motor located on the frame. A conduit extends from the suction nozzle and is joined by a flexible hose to a submerged suction pump. The frame is movably related to the hull for vertical motion, while the suction pump is driven by an engine disposed on the hull and effective to furnish all of the operating power and to cause the pump to discharge material sucked from beneath the hull into suitable recovery apparatus on the hull.

While the dredge of my invention is susceptible to practical embodiment in a number of variant forms so long as the salient characteristics are retained, it has successfully been constructed for use in recovering gold on relatively shallow streams as disclosed in the accompanying drawings. In this instance there is provided a dredge hull generally designated 6 which is adapted to float on a body of water 7 over the gravel bed 8 within which the values are found, the hull floating when loaded with a substantially fixed water line 9. The hull is preferably positioned in the customary fashion by a spud 11 engaging the material 8 and likewise held in place with respect to the stern of the hull 6. The dredge is manipulated by a head line 11 which extends to a winch drum 12 arranged on the hull for convenient manual operation. Also, there are provided a port side line 13 extending to a hand winch 14 mounted on the hull 6 and a starboard side line 16, which extends to a hand winch 17 located on the opposite side of the hull. By suitable manipulation of the head line, the side lines and the spud, the dredge is variously positioned over the bed 8.

The hull 6 is generally rectangular in plan, but the bow has a reentrant portion 18 in at least the forward parts thereof, or if desired, the hull can be constituted by a pair of pontoons as shown, the rearward portions of which, however, are bridged at various points. The desirable feature is to have a clear reentrant portion in the forepart of the hull. Rising from the hull there is a stationary framework generally designated 19 and which is conveniently fabricated of tubes welded together. Adjacent the hull center, the framework and the hull form supports for a lower pair of links 21 and an upper pair of links 22, which are mounted to pivot about axes 23 and 24 respectively. The outer ends of the links are connected by pivots 26 and 27 to a frame 28. The lower pair of links 21 are spanned by cross-tubes 29 at appropriate intervals while the upper pair of links 22 are spanned by brace tubes 31 at appropriate locations. This arrangement forms a parallel link motion for affording a substantially vertical movement of the frame 28 with respect to the barge or hull 6.

In order to raise and lower the frame 28, the hull 6 over the reentrant portion is bridged by a superstructure 32 connected with or forming part of the framework 19 and provided with appropriate braces 33. From the superstructure 32 is suspended a pulley 34 to which a cable 36 is dead ended. This cable extends around a pulley 37 secured to a brace 31 of the links 22 and then extends around the pulley 34 and to a winch 38 mounted on the framework 19. The winch is driven through a gear reduction 39 by an electric motor 41 or other suitable source of power. When the motor 41 is energized in forward or reverse direction the cable 36 is correspondingly

taken in or paid out so that the framework 28 is raised or is permitted to lower under its own weight. To augment the weight of the frame 28 and to increase the lowering force, we preferably mount a ballast tank 42 on the links 21 and 22 and fill the tank with an amount of water to give the appropriate weight to the structure. With the arrangement as so far described there is provided a well braced and easily maneuverable structure by means of which a frame 28 can readily be raised and lowered substantially vertically and adjacent the forward part of the bow of the barge or hull 6.

In accordance with my invention the frame 28 is secured to a suction conduit 46 (Fig. 3) preferably by welding the individual members of the frame 28 to the circular-cylindrical body portion of the conduit. Adjacent the lower end of the conduit 46 there is provided what in effect is a continuation thereof constituted by a circular-cylindrical, hollow nozzle 47, which for the most part is coaxial with the conduit 46 and adjacent its lower end gradually diminishes in diameter and converges substantially parabolically in cross-section to form a closed lower end 48. Around the exterior of the nozzle so formed, I provide a flange 49 which is preferably a flat strap of metal wrapped spirally around the surface of the nozzle and securely welded thereto. Extending spirally around the nozzle between successive flights of the flange 49 is a series of perforations 51 affording access to the interior of the hollow nozzle from the exterior thereof.

The nozzle 47 is intended to be rotated and for that reason on its interior is provided a spider 52 (Fig. 5) which is conveniently welded in place and is designed to receive a central, coaxial drive shaft 53 which extends upwardly through the conduit 46. The junction between the rotatable nozzle 47 and the conduit 46 is preferably bridged and sealed by a circumferential rubber collar 54 secured in place by a clamp 55 pinching around the conduit 46. Since the structure operates wet or under water for most of the time, the friction between the nozzle 47 and the sealing band 54 is very slight, yet due to the reduced pressure within the nozzle and within the conduit 46, the rubber band 54 provides a thoroughly satisfactory and long wearing seal.

The drive shaft 53 passes through a stuffing gland 56 at the upper elbowed end 57 of the conduit 46 and traverses the height of the frame 28. The upper end of the drive shaft emerges through a bearing in the top of the frame 28 and receives a driven sprocket 59 engaged by a chain 61 which is also trained around a sprocket 62. A gear reduction 63 and a motor 64, mounted on the frame 28, drive the sprocket 62 so that through the drive shaft 53 the suction nozzle 47 is appropriately rotated.

Material excavated by the nozzle and passing into the interior thereof and through the conduit 46 leaves the conduit through the discharge elbow 57 and passes into a flexible suction hose 66 clamped to the discharge elbow 57 and in part supported by a clip 68 on one of the cross-bars 29. The suction hose 66 is extended and clamped to the inlet 69 of a suction pump 71 supported by a bracket 72 from the hull 6, but disposed below the water line 9. Since the entire suction line can be immersed, difficulty with respect to air leaking into the line or with priming of the pump is obviated.

The pump 71 is operated by a drive shaft 73 which extends to a universal joint 74 located at one end of a source of power 76 such as a complete automotive engine power plant, mounted on bridges 77 spanning the stern of the hull 6.

Material discharged by the suction pump 71 flows through an upstanding discharge pipeline 78 to a distribution box 79 resting on the upper portion of the framework 19. Within the box 79 the force of the discharge is broken and the flow is diverted into the upstream ends of sluices 81 separated by a division plate 82. The sluices are arranged on the framework 19 and are provided with suitable recovery apparatus usually including riffles 83 so that the liquid and waste material is discharged over the stern of the hull, whereas the values are retained by the riffles.

In order to supply power to operate the motor 41 when desired and more especially to supply power for the motor 64 which usually operates continuously with the operation of the pump 71, the engine 76 is equipped with a pulley 86 driving a belt 87 entrained around a pulley 88 of an electric generator 89 suitably mounted on the hull 6 and connected by appropriate circuits (not shown) to the various electrical instrumentalities on the dredge.

In the operation of this structure the various winches are utilized to operate the head line and the side lines to position the drege in a selected location wherein the spud 11 is utilized as a fixed point. The engine 76 is started so that the pump 71 is put into operation to draw materials through the perforations 51, through the hollow nozzle 47, the conduit 46 and through the flexible suction hose 66 into the pump and thence outwardly through the discharge duct 78, the distribution box 79 and then over the riffles 83 in the sluices 82 finally to discharge over the stern. The generator 89 is also started at the same time and electricity is thereby supplied to the motor 64 so that the suction nozzle 47 is rotated by operation of the chain 61 and the drive shaft 53.

When the suction nozzle is in an appropriate location with respect to the gravel bed 8, the motor 41 is operated to pay out cable 36 from the winch 38, so that due to its own weight and action and due to the additional weight of the contents of the tank 42, the suction nozzle bores its way into the earth 8 beneath the water. The nozzle thereupon excavates a crater in the gravel, but the intermixed fine material, including the values, is sucked into and through the apertures 51 to be deposited eventually behind the riffles in the sluices. The suction nozzle 47 is from time to time raised and lowered and is moved forward and aft and from side to side by operation of the head and side lines of the dredge until finally all of the material 8 on the bed of the stream has been worked.

I claim:

1. A dredge comprising a hull having a forward reentrant portion, an upright frame disposed forward of said portion, a suction conduit on said frame, parallel links pivotally connected to said hull and to said frame, a suction nozzle rotatably mounted on said conduit, a suction pump on said hull, a flexible hose for connecting said conduit to said pump, and means on said hull for raising and lowering said frame.

2. A dredge comprising a hull having a forward reentrant portion, an upright frame disposed forward of said portion, parallel links pivotally connected to said hull and to said frame, a superstructure on said hull extending over said reentrant portion, means connected to said

superstructure for raising and lowering said frame, a suction nozzle on said frame, a suction pump on said hull, and a flexible hose connecting said suction pump and said nozzle.

3. A dredge comprising a hull having a forward reentrant portion, a superstructure on said hull and extending over said reentrant portion, an upright frame adapted to rise and fall with respect to said hull and forwardly of said reentrant portion, superposed parallel links pivoted at one end to said superstructure and at the other end to the upper and lower portions of said frame, means connected to said superstructure for raising and lowering said frame, a conduit fast on said frame, a rotatable shaft passing through said conduit, a suction nozzle communicating with said conduit and supported on said shaft, driving means for said shaft mounted on said frame, a suction pump on said hull, and a flexible hose connecting said conduit with said pump.

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