Sept. 5, 1950 G. V. FARNHAM ET AL 2,521,508

GOLD DREDGER

Filed May 26, 1947 2 Sheets-Sheet 1

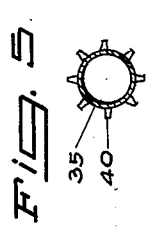


Fig. 5.

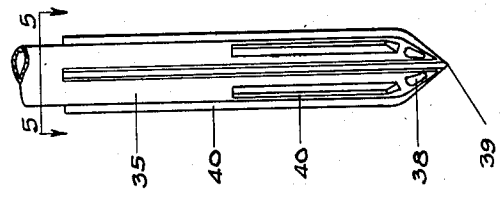


Fig. 4.

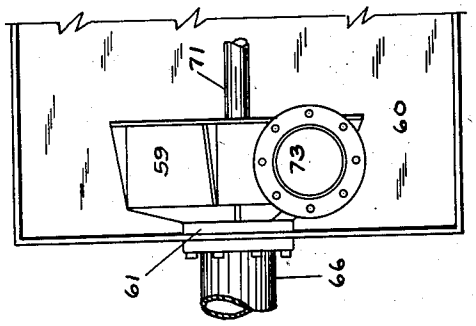


Fig. 3.

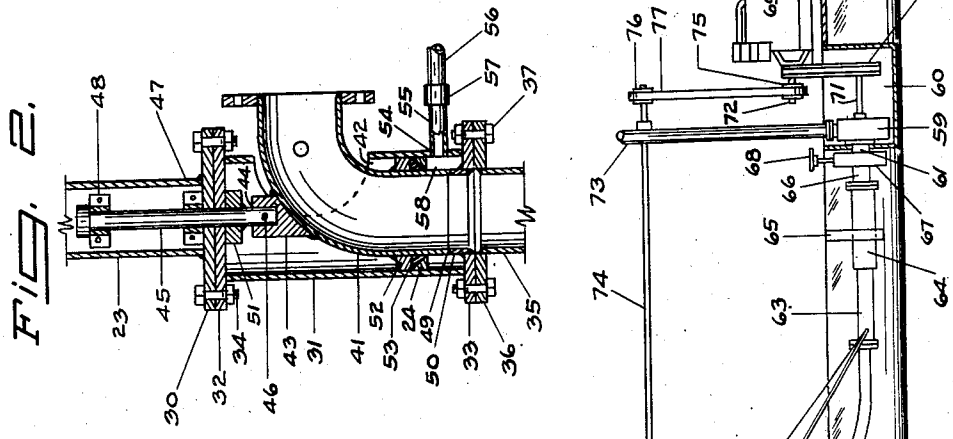


Fig. 2.

Fig. 1.

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Sept. 5, 1950 G. V. FARNHAM ET AL 2,521,508

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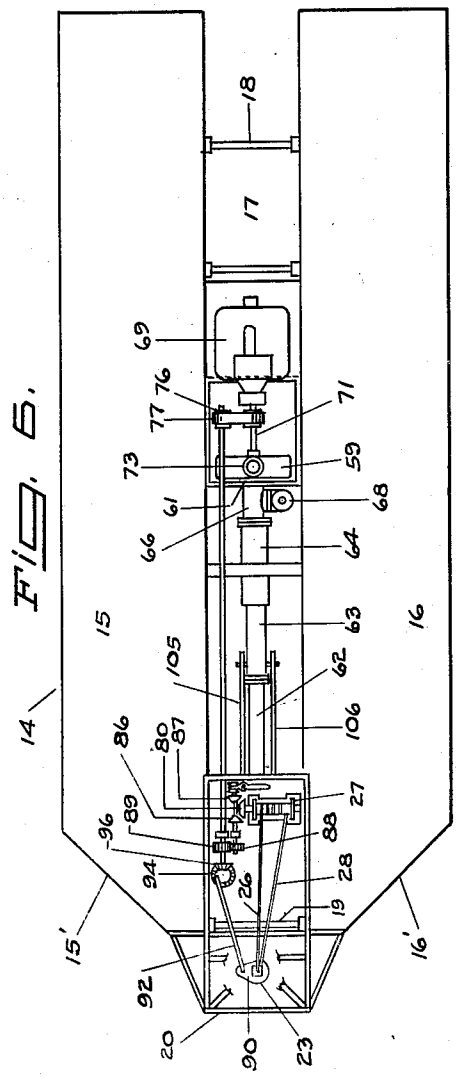


Fig. 6.

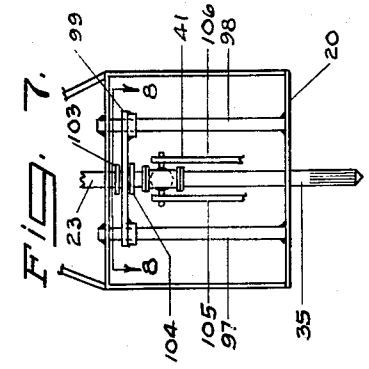


Fig. 7.

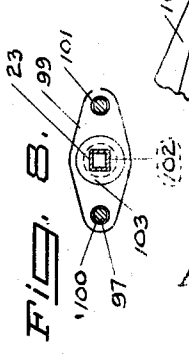


Fig. 8.

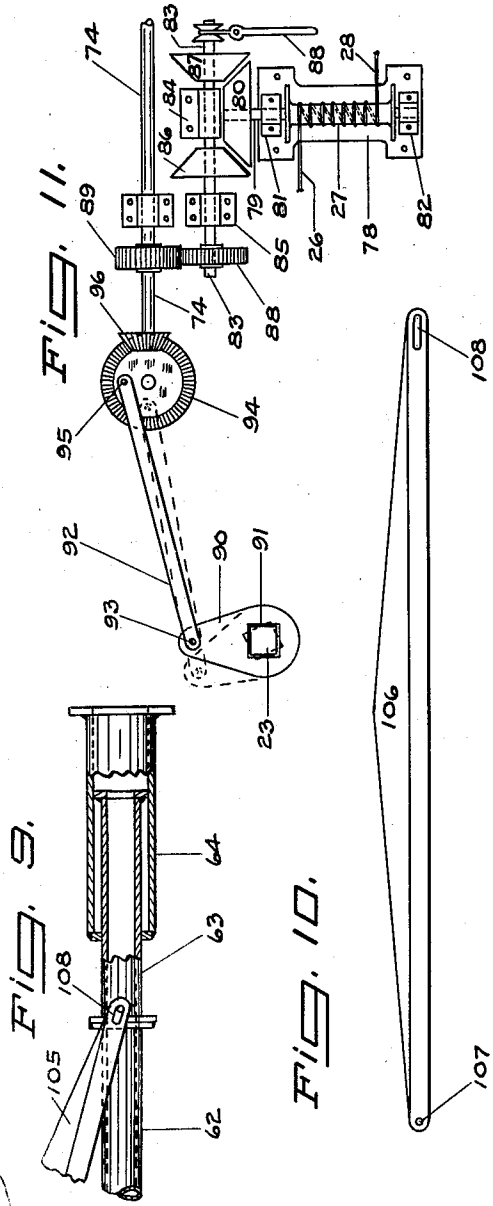


Fig. 11.

Fig. 9.

Fig. 10.

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GOLD DREDGER

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2 Claims. (Cl. 37—58)

1

This invention relates to an improved gold dredger of the suction type, employed for recovering gold, platinum and other precious metals deposited in gravel and sand underneath water. The usual type of such dredger includes a hollow drill or pointed digger and a pump having its suction connected to the said hollow drill by a suitable hose whereby the mixture of water, earth and metals are pumped out of the hollow digger and deposited on a device capable of separating the metals from the mixture. The hollow drill extends from and is rigidly fixed to an elongated rectangular vertical bar, known in the trade as the Kelly bar, which bar is oscillated during its vertical movement. It is necessary for the pipes and suction hose, connected to the said pump and drill, to longitudinally move on a horizontal plane during the vertical movement of the drill, and as the said drill oscillates during the vertical movement thereof a tremendous strain is produced on the suction hose, causing wear and breakdowns and requiring constant attention and is very inefficient.

One of the objects of the present invention is to embody an improved swivel type elbow in the mechanism connecting the Kelly bar and hollow drill to the suction hose, whereby the said Kelly bar and drill are free to oscillate without disturbing the hose.

Another object of the present invention is to provide an improved means for sealing the joint of the swivel elbow, which means includes the forming of a sealed box-like structure around the joint and supplying fresh water under pressure into the said box structure, thus providing a tight joint without the possibility of air leaks and thereby maintaining a perfect vacuum in the suction line, enabling the pump to lift the gold and other heavy minerals from the water and gravel in which the dredge is operating.

A further object of the present invention is to form the said suction line of a flexible hose and plurality of pipes telescopically positioned one in the other and to connect the said telescopically positioned pipes to the said swivel elbow by a pair of pivotally operative arms, whereby the telescope pipes are moved in and out when the Kelly bar is raised and lowered, thus removing all strain from the flexible hose which would be caused to continually bend and also holding the elbow in a manner enabling the same to be removable in a vertical line only, thereby keeping the hose, elbow outlet and telescopically positioned pipes in alignment at all times.

A still further object of the present invention

2

is to mount the suction pump in a suitable tank, which tank itself functions as a pontoon, adding additional buoyancy to the dredge as a whole, permitting the pump to rest below the water level, whereby the suction efficiency is increased and the pump is kept continuously primed whether idle or running and also enabling the pump to always be accessible for oiling or greasing and making other minor repairs that become necessary. This construction also enables the pump to set horizontal with the dredge, affording a vertical discharge of materials, thereby reducing the resistance on the intake and discharge to the minimum.

A still further object of the present invention is to operate the Kelly bar and drill through the medium of a winch having a cable wound thereon in opposite directions and to control the revolvable movement of the winch by a manually operative revers able friction drive clutch, which friction drive functions as a safety device for enabling the clutch to slip in the event the drill strikes a hard bed of rock, thus preventing any damage from being done to the drill or to any part of the operating mechanism.

A still further object of the present invention is to provide a gold dredger of the character described that is durable, simple in construction, economical to manufacture, positive in operation and highly efficient and serviceable in use.

In the accompanying drawings forming a part of the specification, wherein for the purpose of illustration like numerals designate like parts throughout the same,

Fig. 1 is a central vertical longitudinal view of the device shown partly in section and partly in elevation.

Fig. 2 is an enlarged central vertical sectional view illustrating the swivel elbow and the construction provided for securing the said elbow to the Kelly bar and to the hollow drill,

Fig. 3 is an enlarged plan view of the suction pump and a fragmentary plan of the tank into which the pump is mounted,

Fig. 4 is an enlarged vertical elevational fragmentary view of the lower portion of the hollow drill employed in the invention,

Fig. 5 is a horizontal cross sectional view of the hollow drill, taken on line 5—5 of Fig. 4, looking in direction of the arrows.

Fig. 6 is a top plan view of the dredger, particularly illustrating the arrangement of the mechanism thereon,

Fig. 7 is a front elevational view illustrating a means for guiding the Kelly bar and drill,

Fig. 8 is a horizontal sectional view taken on line 8—8 of Fig. 7, looking in direction of the arrows,

Fig. 9 is an enlarged view of the telescopically positioned pipes, shown partly in elevation and partly in section, and also shows a portion of the flexible hose and the lower portion of the arm connecting the telescoped pipe to the swivel elbow,

Fig. 10 is an enlarged side elevational view of one of a pair of arms provided for connecting the telescope to the elbow associated with the hollow drill, and

Fig. 11 is an enlarged top plan view of the winch, friction drive, and the mechanism oscillating the Kelly bar.

Referring in detail to the drawings and the numerals thereof, the number 14 designates, as a whole, a floating base constructed of a plurality of pontoons 15 and 16, spaced apart as at 17 and rigidly secured one to the other by suitable ties 18 and 19 and a rugged steel gantry frame 20 as shown to advantage in Figs. 1 and 6. The front side portions of the pontoons are formed angular as at 15' and 16' for enabling the dredger to operate close to the banks of streams and the like. The pontoons are specially designed to ride a fast water stream without the hazard of the water coming in over the deck of the dredger, and are tapered and beveled, the taper being designed to split the stream and the bevel for a safety feature. The pontoons are also beveled in the rear to produce the proper stream action so as not to interfere with the tailing disposal problem. A suitable pulley 21 is secured to the top portion of the gantry frame and likewise a second pulley 22 is positioned at the lower portion thereof. An elongated rectangular bar 23, commonly called the Kelly bar, and preferably constructed of a pair of elongated angles welded one to the other, is suspended from one end portion of a suitable cable termed the hoist line 26. The said cable is wound around a conventional winch 27 and the other end portion 28 termed to crowd line extends underneath the lower pulley 22 and the outer end of the said crowd line is fixed to the upper extremity of the Kelly bar as at 29.

The lower end portion of the Kelly bar 23 is flanged as at 30 for accommodating an intermediate sleeve 31, which sleeve is flanged as at 32 and 33, the said sleeve being secured to the Kelly bar by the bolts and nuts 34, shown to advantage in Fig. 2. A hollow drill or digger 35 provided with a flange 36 is secured to the said sleeve flange 33 by the bolts and nuts 37, whereby the said drill 35 is secured to the Kelly bar. The drill is formed with a plurality of openings 38, which openings are located in proximity to the point 39 thereof, whereby the gravel and precious metals are sucked into the drill during the operation of the same. A plurality of spaced elongated ribs 4 are provided around the outer surface of the hollow drill 35 as shown to advantage in Figs. 4 and 5, to facilitate the flow of water in sufficient volume to the said openings 38 where the suction is being created. Thus the water needed to create the flow necessary to suck the gravel and gold and other valuable minerals that are on the bed of the stream is acquired.

An especially constructed swivel elbow 41 is mounted in the intermediate sleeve 31, the wall of the sleeve being recessed as at 42 for permitting the elbow to oscillate at least ninety degrees. A vertically extending lug 43, recessed as at 44

is welded to the upper curved portion of the said swivel elbow and a shaft 45 is pinned into the said lug, as at 46 and vertically extends through the flanges 32 and 30 and into the Kelly bar 23 wherein it is revolvably supported in suitable bearings 47 and 48, which bearings are secured to the Kelly bar as disclosed to advantage in Fig. 2. The lower extremity of the said elbow 41 rests on the end of an upwardly extending pipe 49 as at 50, which pipe is welded to the flange 33. It will be obvious that a joint is thus formed upon which the elbow 41 rests, whereby the Kelly bar 23, intermediate sleeve 31 and hollow drill 35 are free to oscillate independent from the said elbow. A collar 51 is secured on the vertical shaft 45 and positioned against the bottom face of the flange 32 for receiving any upward thrusts applied against the elbow. A collar 52 is welded to the elbow and rests against a rubber or other suitable washer 53, which washer is supported on an internally beveled bushing, which bushing is welded to the sleeve 41. The wall of the said sleeve 41 is apertured as at 54 for accommodating a fresh water inlet pipe 55, which pipe is welded to the said sleeve. The numeral 56 designates a high pressure water line connected to the inlet pipe 55 by a conventional pipe connection 57, whereby fresh water under pressure can be supplied into the chamber 58 surrounding the joint 50, whereby the said joint is positively sealed.

A suitable pump 59 is provided for sucking the gravel, gold and other valuable minerals from the hollow drill 35. The said pump is mounted in a pit or suitable tank 60, which tank is rigidly secured to the pontoons 15 and 16, the suction inlet 61 of the pump extending through the wall of the tank as shown to advantage in Fig. 1. The line connecting the suction to the swivel elbow 41 comprises a flexible hose 62, connected to a pipe 63, which pipe is telescopically positioned in a second pipe 64 that is held in position by the support 65. A third pipe 66 is secured to the said second pipe 64 and also to the pump inlet 61. The said pipe 66 has an outwardly extending pump priming inlet 67 having a conventional valve 68 for controlling the same independent of the suction line. The said swivel elbow, flexible hose, and pipes are all provided suitable flanges and bolted together in a conventional manner. The numeral 69 designates a suitable motor of any type for operating the pump and is connected thereto by a suitable belt or chain 70. The numerals 71 and 72 designate the pump shaft and motor shaft respectively, suitable pulleys or gears being provided for accommodating the said belt or chain employed for operatively connecting the said shafts. The numeral 73 designates the discharge pipe leading from the pump for conveying the water gravel and metals to the recovery plant not shown, which plant can be of any conventional type.

The means provided for operatively connecting the motor 69 to the winch 27, whereby the Kelly bar is raised and lowered, consists of an elongated shaft 74 positioned above the motor drive shaft 72 and in parallelism therewith, the said shafts 72 and 74 being connected one to the other through the medium of a pair of pulleys 75 and 76, respectively, and a belt band 77 as shown to advantage in Fig. 1. The said shaft 74 can be revolvably supported in any suitable manner and extends to and past the winch 27 as illustrated to advantage in Figs. 6 and 11. The

said winch is mounted on a fixed base 78 and is equipped with a shaft 79, which shaft carries a cone shaped friction member 80 and is revolvably supported on the said base by suitable bearings 81 and 82. A second shaft 83 revolvably and slidably supported in bearings 84 and 85 is positioned crosswise to the said winch shaft 79 and in parallelism with the elongated shaft 74 and is provided with a pair of oppositely opposed cone shaped friction drive members 86 and 87, which cone shaped friction drive members 86 and 87 are positioned to straddle the cone shaped member 80 and in proximity thereto. A gear wheel 88 is fixed on the outer end portion of the shaft 83, and likewise, a similar gear 89, preferably of wider dimension, is fixed on the elongated shaft 74, the said gears being adapted to engage, one with the other. The said shaft 74 is equipped with a conventional lever shifting mechanism 88 whereby either of cone shaped drive members 86 or 87 can be engaged with the cone shaped member 80 fixed on the outer end portion of the winch shaft 79.

From the foregoing description taken in conjunction with the accompanying drawings it will be obvious that the winch 27 can be revolved in a direction to pull the crowd line 28 and thereby force the Kelly bar 23 downwardly and push the digger point 39 into the gravel, utilizing the weight of the dredger to do so. It will also be obvious that the revolving of the winch can be reversed, whereby the hoist line 26 will lift the said Kelly bar back to its normal position where the digger point is lifted above the surface of the water or bottom of the dredger as illustrated in Fig. 1. The said reversible friction drive acts as a safety device and will slip before any damage can be done to the mechanism of the dredger in the event the digger point strikes a hard bed of rock which cannot be penetrated.

It is important to oscillate the Kelly bar 23 and the drill 35 during the drilling and digging operation of the drill. To accomplish the oscillating movement a suitable plate 90 having a rectangular opening 91, adapted to fit the Kelly bar is mounted thereon and an end portion of the said plate is pivotally secured to a lever 92 as at 93, shown to advantage in Fig. 11. The opposite end portion of the lever 92 is eccentrically pivoted to a bevel gear 94 as at 95, which bevel gear is revolved by a suitable bevel pinion 96 that is fixed to the outer extremity of the shaft 74, whereby the Kelly bar is oscillated during the vertical movement of the same. The said plate 90 and bevel gear 94 can be properly supported on the gantry frame in any suitable manner.

The means provided for vertically guiding the said Kelly bar 23 is disclosed in Fig. 7 and comprises a pair of vertical guide posts 97 and 98 and a horizontally positioned guide plate 99. The said posts are fixed to the lower portion of the gantry frame 20 and the guide plate is apertured as at 100 and 101 for receiving the guide posts. The said guide plate is further apertured as at 102 for receiving the Kelly bar 23 and enabling the same to freely oscillate therein. The said Kelly bar is equipped with an upper flange 103 and a lower flange 104, which upper and lower flanges are respectively positioned above and below the guide plate 99, whereby the said plate vertically moves with the Kelly bar and is slidably supported on the fixed posts 97 and 98.

It will be particularly noted that the Kelly bar is raised, lowered and oscillated simultaneously with the sucking of the water and gravel through the hollow drill 35 and inlet line composed of the flexible hose 62 and the telescopically positioned pipes 63 and 64. It will also be noted that as the Kelly bar is forced downwardly and upwardly, the said inlet line must move inwardly and outwardly due to the continuous change being made in the distance between the hollow drill 35 and 59, caused by the vertical movement of the drill. A pair of radius arms 105 and 106 are thus provided and the upper outer ends thereof are pivoted to the swivel elbow 41 and the lower inner ends connected to the telescope pipes 63 as disclosed to advantage in Figs. 1, 6, 7 and 9, whereby all strains caused from the movement imparted to the telescope pipe 63 and the flexible hose 62 is carried on the said arms. The said arms are apertured at the outer ends thereof, as at 107 and slotted on the opposite end as at 108, shown to advantage in Fig. 10, to allow for freedom of movement.

It is to be understood that the form of our invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the shape, size, material and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the sub-joined claims.

Having thus described our invention, we claim:

1. A dredger of the character described comprising a floating base structure, a pump capable of drawing water and solid substances and discharging the same, a hollow drill, means for reciprocating the drill to force the same into and out of the earth, an inlet opening in the lower portion of the hollow drill adapted to admit water and solid substances therein, an outlet in the hollow drill positioned above the said inlet, an elbow positioned over said outlet and secured to said hollow drill, an inlet line leading from said elbow to the pump, said line including a flexible hose, extending downwardly from said elbow, means securing one end of said hose to the said elbow, a pipe connected to the opposite end of the hose, a second pipe of larger diameter than the first pipe, the second pipe leading to the pump, the first pipe being telescopically positioned in the second pipe, and an arm, the upper end portion of which is connected to the said elbow and the lower end portion connected to the telescoped pipe, whereby excessive strains on the flexible tubing caused by reciprocating the drill and telescoped pipe are eliminated.

2. A dredger of the character described comprising a floating base structure, a pump capable of drawing water and solid substances and discharging the same, a vertical bar slidably supported on the structure, a vertical sleeve secured to the lower extremity of the bar, an opening in the wall of the said sleeve, an elbow, one portion of the elbow extending in said sleeve and another portion horizontally extending through said opening, means for suspending the elbow from the vertical bar, means for revolubly supporting the elbow, a hollow drill fixed to the bottom of the said sleeve, a plurality of inlet openings in the lower portion of the hollow drill capable of admitting water and solid substances therein, means for reciprocating the said vertical bar, sleeve and drill, means for oscillating the same, an inlet line leading from said elbow to the pump, said line including a flexible hose, means securing one end of said hose to the elbow, a pipe connected to the opposite end of the hose, a second pipe of larger diameter than the

first pipe, the second pipe leading to the pump, the first pipe being telescopically positioned in the second pipe, a pair of arms positioned astraddle the telescoped pipe and elbow and extending upwardly from the pipe to the elbow, means pivotally connecting the upper end portions of the arms to the elbow and means connecting the lower end portions of the pipe to the telescoped pipe.

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