This invention relates to a suction dredge and it is one object of the invention to provide a dredge so constructed that it is particularly adapted for use in mining operations wherein gold bearing gravel and sand is removed from the bed of a river and the gravel and sand returned to the river after removal of gold therefrom.

Another object of the invention is to provide a dredge having a penetrating tube so mounted that it can be disposed vertically through a well of a barge or other boat and lowered through the water so that its lower end will penetrate the bed of the stream and gold bearing sand and gravel enter the tube from which it will be withdrawn through a pipe line of a suction pump and delivered to a hopper from which it passes with the water to sluice boxes so that the gold will be held by riffles across the bottoms of the sluice boxes as the sand and gravel are carried through the same and returned to the river.

Another object of the invention is to so mount the penetrating tube that it may be disposed either in a vertical position perpendicular to the bed of the stream or at an incline, and thus permit the tube to be adjusted and operate upon a large area of the river bed.

Another object of the invention is to provide the penetrating tube with a head at its lower end which is so constructed that it serves as an auger for advancing the tube through the river bed and also as a strainer for admitting sand and gravel but excluding large stones and the like during dredging operations.

Another object of the invention is to so arrange the elements of the apparatus upon the barge that the load will be evenly distributed and the barge well balanced.

The invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view of the complete dredging apparatus shown partially in elevation and partially in section.

Fig. 2 is a top plan view of the dredging apparatus with parts shown in section along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view on an enlarged scale taken vertically through the penetrating tube and suction tube.

Fig. 4 is a transverse sectional view upon an enlarged scale taken along the line 4—4 of Fig. 1.

Fig. 5 is a side elevation on an enlarged scale of the lower portion of the penetrating tube and the auger carried thereby.

Fig. 6 is a view of the means for rotatably supporting the penetrating tube, the view being taken along the line 6—6 of Fig. 1.

This suction dredge is erected on a boat such as the flat bottomed barge 1 and in order to protect the apparatus from exposure to the weather there has been provided a housing 2 which may be formed of metal or any other desired material. A well 3 is provided at the center of the barge and upon referring to Fig. 1, it will be seen that this well extends vertically and tapers toward its upper end so that it gradually increases in dimensions toward its lower end, which lower end opens through the bottom of the boat. At one end of the boat or barge is mounted a hopper 4 from sides of which extend troughs 5 leading to the ends of sluice boxes 6 extending longitudinally of the barge at opposite sides thereof and sloping toward the other end of the barge so that gold bearing sand and gravel will be easily carried through the sluice boxes and the gold caught by the riffles 7 while the sand and gravel are returned to the river, lake, or other body of water upon which the barge floats.

A frame 8 having corner posts 9 and 10 is erected upon the barge with its upper portion projecting through the housing 2 and upper end portions of the corner posts carry tracks 11 along which travel the rollers 12 of the rails 13 upon which the carriage 14 is movably mounted. Since the carriage moves along the rails 13 in a direction at right angles to the direction in which the rails move along the tracks 11, the carriage may be shifted longitudinally or transversely of the barge and disposed at the center of the frame 8 or in any desired position within the boundaries of the frame. The carriage is provided at its center with a pulley 15 engaged by a strong rope 16 and this rope or cable is wound upon a drum 17 carried by one of the corner posts 10 at such a distance above the deck of the barge that a person may easily reach the handle 18 of the drum and turn the drum to wind the rope thereon or unwind the rope from the drum.

A motor 20, which is an internal combustion engine of conventional construction, is mounted on the deck of the barge between the frame and one end of the barge and rotary motion is transmitted from the motor to a shaft 21 by a belt 22 which is trained about pulley wheels 23 and 24 carried by the shaft 21 and the shaft of the motor. The shaft 21 is rotatably mounted in bearing brackets 25 carried by the corner posts 9 of the frame and this shaft carries a pulley 26 engaged by a belt 27 which is also trained about the pulley 26 carried by the shaft 21. The
shaft 29 is rotatably mounted in bearing brackets 30 carried by the corner posts 10 and, in addition to the pulley 28, also carries a pulley 32 mounted by a belt 33 which is trained about the pulley 32 of the suction pump 34 and operates the pump. It will thus be seen that the pump will be operated from the shaft 29 and water and gold bearing sand and gravel will be delivered through the discharge pipe 35 into the hopper 40 and eventual delivery into the sluice boxes 6.

In view of the fact that the motor is located adjacent one end of the barge and the pump and hopper are between the frame and the other end of the barge, the weight is evenly distributed and the barge will be well balanced.

A penetrating tube 36 extends vertically through the well 3 and passes through the center opening 31 of a plate or platform 33 secured in a horizontal position on the upper end of the well 3 by a suitable number of bolts 39. A collar 43 constituting a bearing race and carrying bearing balls 41, as shown in Fig. 3, fits loosely about the upper end of the tube 36 and is provided with upstanding ears 42 engaged by the lower ends of the arms 43 of a hanger 44. This hanger is formed of strong metal and its upper end is formed with an eye 45 through which passes a ring 46 and clamps between the knob of the rope or cable 16 is secured through this ring, the hanger and the penetrating tube will be suspended from the cable and the tube may be raised or lowered by manipulating the drum 17. A bearing ring 47, which is threaded on the upper end of the penetrating tube, fits within the collar or cup 48 and rests upon the bearing balls so that the tube will be permitted to turn freely in the collar.

A suction tube 48, through which sand, gravel and water are to be withdrawn from the penetrating tube, extends vertically in the penetrating tube axially thereof and the upper portion of this suction tube protrudes from the penetrating tube and, at its upper end, carries a header connection or elbow 49 to which a nipple 50 at the lower end of a flexible hose or pipe 51 is connected by a union 52. The hose leads to the suction pump and in order that priming may be carried out when starting the pump, there has been provided a priming cup 53 at the top of the elbow. A clamp 54 is secured about the upper end portion of the suction tube and has arms 55 terminating in sleeves 56 which engage about the arms 43 of the hanger 44 and rest upon collars 57 secured in set positions upon the arms of the hanger by the set screws 58. It will thus be seen that while the suction tube will be suspended in the penetrating tube and vertically adjusted therewith, the suction tube will be prevented from turning when the penetrating tube is turned. By adjusting the collars 56 upon the arms of the hanger the extent to which the suction tube projects upwardly from the penetrating tube may be controlled.

The penetrating tube and the suction tube are formed of a plurality of sections detachably connected with each other, as shown at 59 and 60, and it is to be understood that as many sections may be added as found necessary according to the depth of the water. The lower section 61 of the penetrating tube carries at its lower end a tapered head 62 constituting an auger and formed with outstanding ribs constituting threads for engaging in the bed of the river or lake and causing the penetrating tube to move downwardly through the same when the tube is rotated. Ports in the form of slots 64 extend circumferentially of the auger head 62 between the ribs 63 and it will be readily understood that as the head moves downwardly through the river bed, sand and gravel will be drawn inwardly into the penetrating tube by suction and discharged through the hose 51 to the suction pump 34 which ejects it through the pipe 35 into the hopper. Gold will be carried along with the sand and gravel and, as the sand and gravel are washed through the sluice boxes by the water and turned to the river, the gold will be caught by the riffles 7 and held in the sluice boxes. There also have been provided circumferentially extending slots 65 which are distributed about the lower section of the penetrating tube and permit mud, as well as gold bearing sand and gravel, to enter while excluding large stones.

In order to impart rotary motion to the penetrating tube, there has been provided a large gear plate 57 which is disposed about the penetrating tube over the platform 36 and rests upon rollers 58 mounted in brackets 59 carried by the platform. There have also been provided rollers 70 carried by brackets 71 and engaging a depending annular flange 72 formed about the center opening 73 of the gear plate and corresponding in diameter to the opening 77 so that to that end the tube is laterally shifted vertically and also tilted, as indicated by dotted lines in Fig. 1. Brackets 74 are pivoted to the gear plate by pins 75 which pass through bearings 76 and these brackets extend radially of the gear plate and are engaged by springs 77 so that rollers 78 at the inner ends of the brackets will bear against the penetrating tube. Ribs or lips 79, which extend longitudinally of the penetrating tube, engage the rollers 78, as shown in Fig. 4, and from an inspection of this figure it will be readily seen that when the gear plate is turned, rotary motion will be imparted to the penetrating tube. The lips not only serve to engage the rollers 78 but also constitute scrapers for enlarging the hole in the river bed and permitting the penetrating tube to easily move downwardly therein.

The bevelled teeth 80 about the periphery of the gear plate 57 mesh with a bevelled gear 81 carried by a shaft 82 rotatably mounted in a frame 83 and, at its other end, carrying a bevelled gear 84 which meshes with a larger bevelled gear 85 carried by a shaft 86. This shaft 85 is rotatably mounted in a frame 87 and carries a pulley 88 about which engages a belt 89 extending upwardly therefrom and engaged about a pulley 90 carried by the shaft 21. The shaft 21 thus constitutes a main drive shaft from which rotary motion is transmitted to the shaft 86 as well as to the shaft 28 and, when the motor is started to operate the suction pump, the gear plate 57 will also be turned and rotary motion imparted to the penetrating tube. The operation of the suction dredge will be clear from the foregoing and need not be again set forth.

Having thus described the invention, what is claimed is:

1. In a suction dredge, a body having a well, a penetrating tube extending vertically through said well, a suction tube extending vertically in said penetrating tube, a suction pump, a pipe connecting said suction tube with the inlet of said pump, a hanger for said tubes constituting means for rotatably mounting said penetrating tube and shifting the tubes vertically through said well, a drive gear about said penetrating tube rotatably supported about said well in concentric relation to the penetrating tube, longitudinally extending
ribs carried by said penetrating tube, means carried by said gear to bear against the penetrating tube and engage sides of the ribs for turning the penetrating tube with the gear while permitting vertical movement of the tube through the gear, and means for rotating said gear.

2. In a suction dredge, a body having a well, a penetrating tube extending vertically through said well, a suction tube extending vertically in said penetrating tube, a suction pump, a pipe connecting said suction pump with the inlet of said pump, a hanger for said tubes constituting means for rotatably mounting said penetrating tube and shifting the tubes vertically through said well, a drive gear about said penetrating tube rotatably supported about said well, brackets pivoted to said gear and extending radially thereof at an upward incline toward said penetrating tube and having tube engaging rollers at their free ends, ribs extending vertically along said penetrating tube and engaged at their sides by said rollers for causing turning of the penetrating tube with the gear while allowing vertical movement of the tube, and means for rotating said gear.

3. In a suction dredge, a body having a well, a penetrating tube extending vertically through said well, a suction tube extending vertically in said penetrating tube, a suction pump, a pipe connecting said suction tube with the inlet of said pump, a hanger for said tubes constituting means for rotatably mounting said penetrating tube and shifting the tubes vertically through said well, a supporting table about said well, a drive gear over said table having a depending flange about its inner periphery, supporting rollers for said gear carried by said table, other rollers carried by said table and engaging said flange to prevent lateral displacement of said gear, brackets pivoted to said gear and extending radially thereof toward said penetrating tube at an upward incline and having rollers at their free ends bearing against the penetrating tube, ribs extending longitudinally upon said penetrating tube and engaged at their sides by the rollers of said brackets, said ribs constituting means for causing turning of the penetrating tube with said gear and also constituting blades for enlarging an opening formed in a river bed by the penetrating tube, and means for rotating said gear.

4. In a suction dredge, a body, a penetrating tube extending vertically, a suction tube extending longitudinally in said penetrating tube, a frame, a drum, a cable wound upon said drum and trained about a guide carried by said frame, a hanger carried by said cable and having depending arms, a bearing race fitting about said penetrating tube and having upstanding ears engaged with the lower ends of the arms of said hanger, bearing balls in said race, a collar about said penetrating tube fitting within said race and resting on said bearing balls, a clamp secured about said suction tube, arms extending from said clamp and provided with sleeves engaged about the arms of said hanger and shiftable vertically along the same, supporting blocks adjustable longitudinally upon the arms of said hanger and engaging said sleeves to support the clamp and suction tube in a vertically adjusted position, and means for rotating said penetrating tube.

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