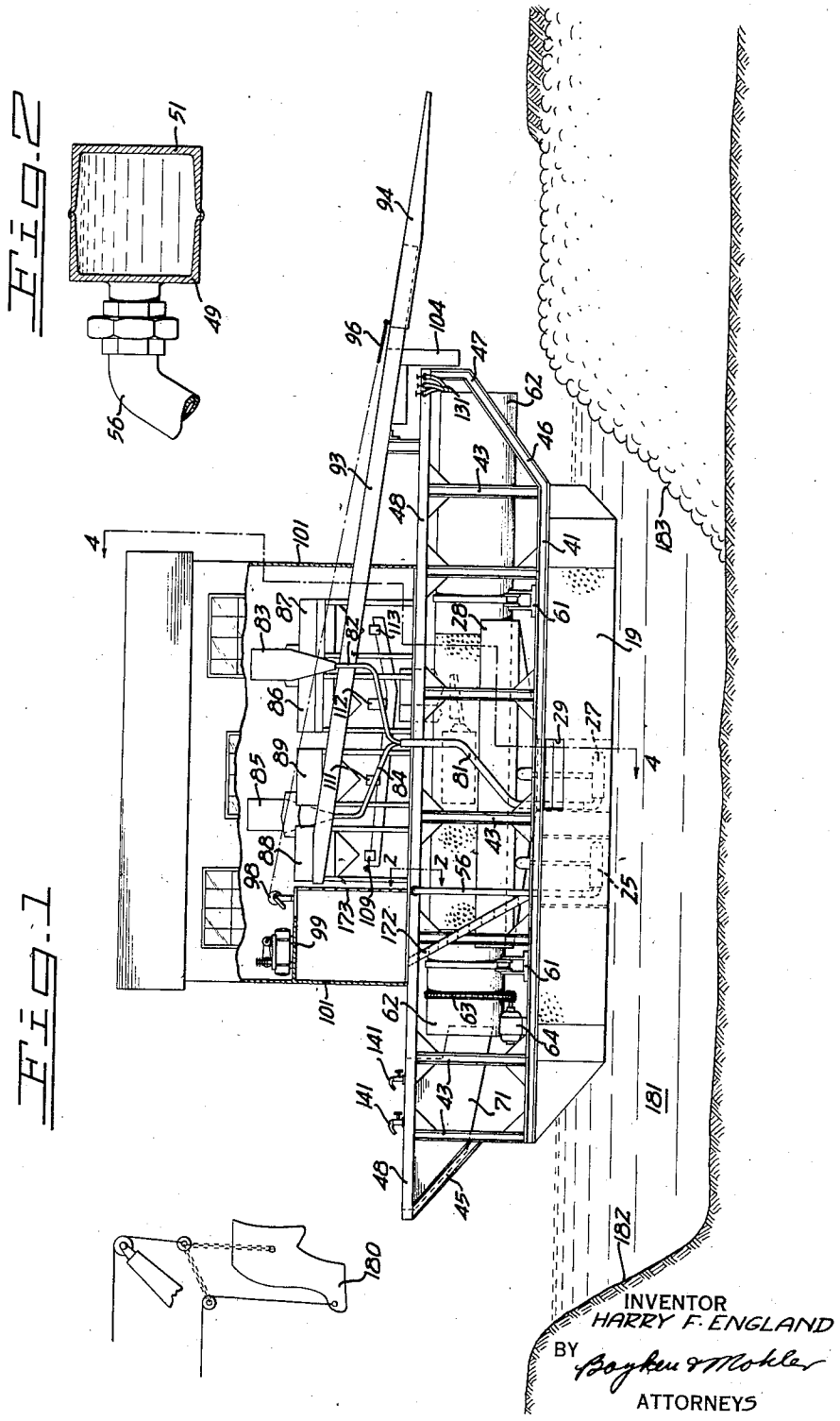
April 20, 1943. H. F. ENGLAND 2,316,943

PLACER DREDGE

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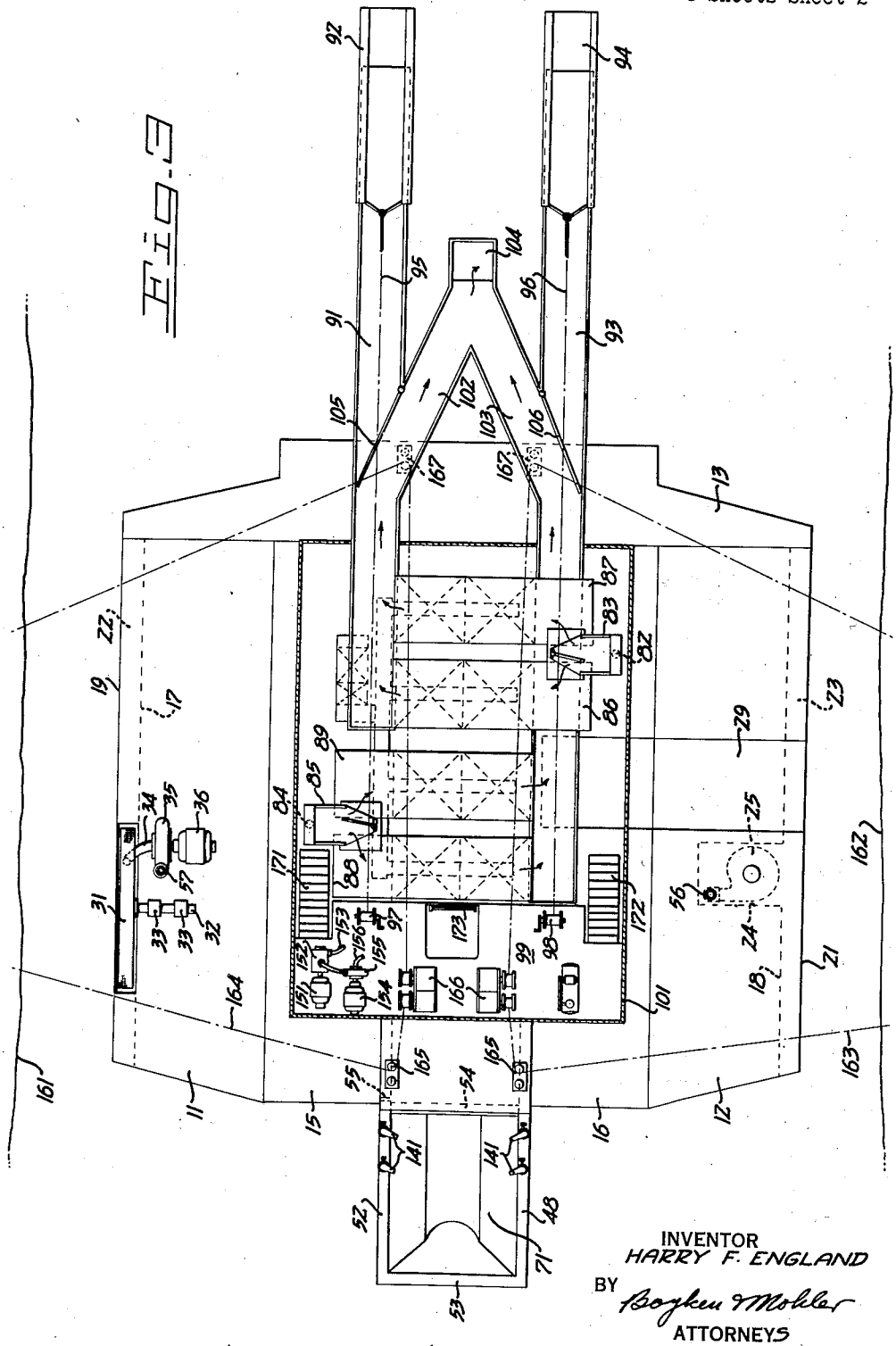
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PLACER DREDGE

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FIG. 3



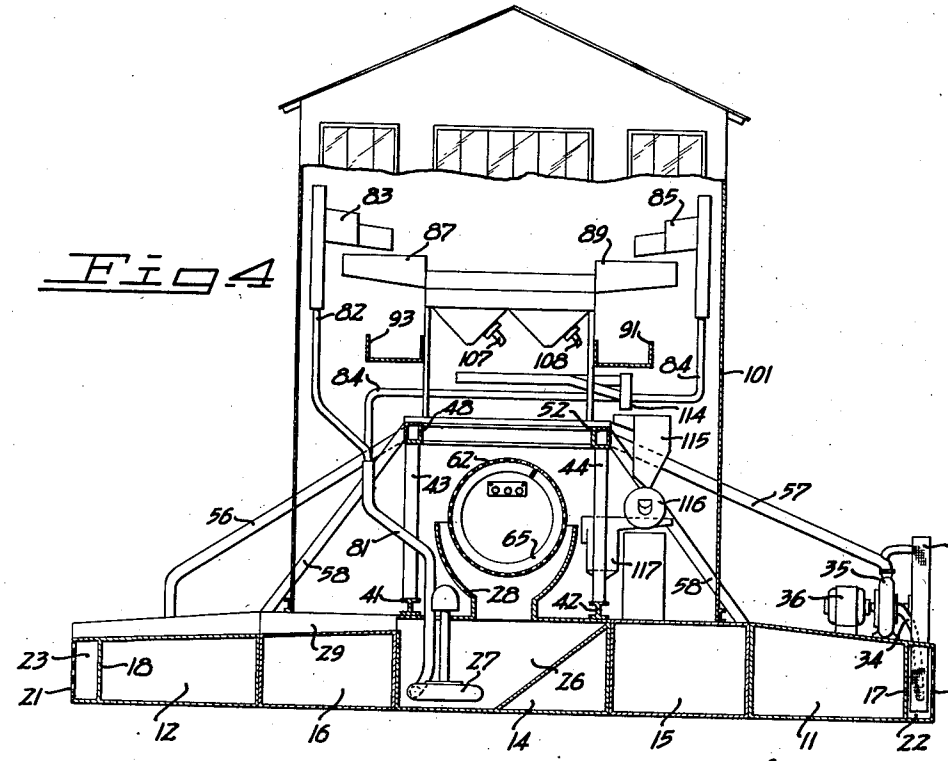
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PLACER DREDGE

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Fig. 4



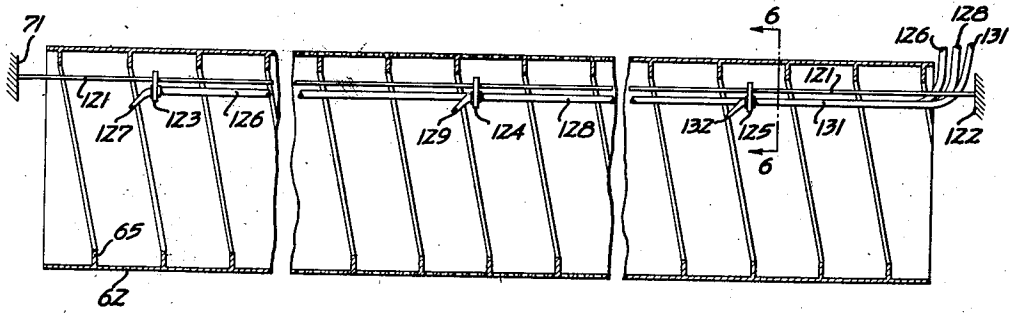


Fig. 5

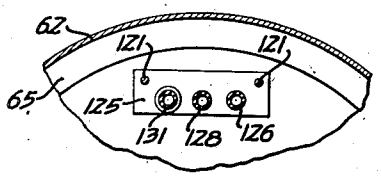


Fig. 6

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2,316,943

PLACER DREDGE

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Application February 10, 1940, Serial No. 318,335

15 Claims. (Cl. 209—44)

This invention relates in general to dredges and dredging operations and particularly to a dredge which can be effectively used for progressively reclaiming dredged land as one step of the dredging operation and readily knocked down for transportation purposes.

Dredging operations as now carried out leave the dredged land in the form of mounds of rock and gravel devoid of any topsoil. Not only is the dredged land unsightly, but it is entirely unsuitable for agricultural purposes and for these reasons many sections of the country have passed laws either prohibiting dredging operations or requiring that after dredging, the land must be reclaimed and made just as suitable for agricultural purposes as it was prior to the dredging operation.

One of the objects of this invention is the provision of a dredge and method of dredging wherein the tailings or rock and gravel passing through the dredge are deposited in a level sublayer adjacent the stern of the dredge and wherein this sublayer is subsequently covered with a uniform layer of topsoil removed from the next succeeding cut.

Another object of this invention is the provision of a method of dredging wherein the stern of the dredge is made to oscillate between the two banks of the pond so that the tailings are deposited in a substantially level condition.

A further object of the invention is the provision of a dredge having a trommel rotating about a substantially horizontal axis and mounted on the lower deck of the dredge so that the feed to the trommel will not have to be elevated to any great extent.

Still another object of the invention is the provision in a dredge of pontoons having their entire longitudinal outer sides perforated for the purpose of screening the water used for washing the material delivered to the feed hopper and passing through the trommel.

A further object of the invention is the provision of a dredge formed with a frame above its lower or main deck which serves as a conduit for the water used in washing the material passing over the feed hopper and through the trommel and for operating the jigs associated with the dredge.

Another object of the invention is the provision in combination with a dredge of a rotary screen for screening the water used in the jigs associated with the dredge.

Another object of the invention is the provision in combination with a dredge of means for applying a wash water within the trommel associated with the dredge.

The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawings accompanying and forming a part of the present specification is outlined in full. In said drawings, one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims may be embodied in a plurality of forms.

Referring to the drawings:

Figure 1 is a side elevation of a dredge embodying the mechanical features of my invention and by means of which the process of my invention may be carried out.

Figure 2 is an enlarged partial detail taken on the line 2—2 of Figure 1 and illustrating the wash water conduit formed by a portion of the dredge frame.

Figure 3 is a top plan view of the dredge shown in Figure 1 with the upper portion of the dredge cabin broken away.

Figure 4 is a vertical section taken on the broken line 4—4 of Figure 1.

Figure 5 is an enlarged longitudinal midsection of the trommel associated with the dredge.

Figure 6 is an enlarged partial detail taken on the line 6—6 of Figure 5.

As shown in these figures, the objects of my invention are embodied in a dredge comprising a boat, the hull of which consists of longitudinally extending lateral sections 11 and 12, a transverse stern section 13, a longitudinally extending central section 14, and longitudinally extending intermediate sections 15 and 16. Each of these six sections is complete in itself and arranged to be bolted to adjacent sections to form the hull in its entirety. This construction is resorted to for ease of transportation when it is desired to move the dredge from one location to another by means of a truck and in order to comply with highway regulations. The lateral sections 11 and 12 are formed with longitudinally extending vertical partitions 17 and 18 spaced from the vertical sides 19 and 21 of these sections and forming compartments 22 and 23. The entire surfaces of the sides 19 and 21 are perforated as shown in Figure 1 so as to form a screen for screening the water to be used in washing the material passing through a trommel and trommel feed hopper to be subsequently described. Extending inwardly from the partition 18 is a pump compartment 24

for housing a main wash water pump 25. Formed intermediate the ends of the central longitudinally extending section 14 of the hull is a sump 26 for receiving the value-bearing fines passing through the trommel and for the accommodation of a sump pump 27. Communicating with this sump is a pan 28 surrounding the trommel and serving to guide the slimes from the trommel into the sump. Extending between the left hand side of the sump 26 and the left hand side of the hull as best shown in Figures 3 and 4 is an overflow channel 29 by means of which the clear liquor contained in the sump may be returned to the pond. The deck of the longitudinally extending hull section 11 is cut out for the accommodation within the compartment 22 of a rotary screen 31 (Figure 3). The water passing into the interior of this screen is first subjected to a primary screening action through the perforated side 19. This water is therefore subjected to a double screening action so as to be suitable for use in the jigs associated with the dredge. The rotary screen is carried by a shaft 32 journaled in bearings 33 carried by the hull section 11 and is provided on its interior with radially extending partitions forming internal compartments or buckets. Extending into the lower part of the rotary screen is an intake 34 of a pump 35 mounted on the hull section 11 and adapted to be driven by an electric motor 36. Rotation and cleaning of the bucket is effected by delivering a stream of water to these buckets on the descending side of the screen. The water used for this purpose may be screened water obtained from the delivery end of the pump 35.

Supported on the deck of the central longitudinally extending hull section 14 is a generally rectangular structural steel frame comprising a pair of spaced longitudinally extending I-beams 41 and 42, a plurality of longitudinally spaced vertical I-beams 43 and 44, and diagonally disposed I-beams 45 and 46. The upper ends of the I-beams 46 are welded to I-beam sections 47. Welded to the upper ends of the I-beams 43 in vertical alignment with the I-beams 41 is a rectangular conduit 48 which, as best shown in Figure 2, is made of a pair of abutting channels 49 and 51 welded together. Similarly a conduit 52 is carried by and welded to the vertically extending I-beams 44 in alignment with the longitudinally extending I-beam 42. Communicating between the extreme left hand ends of the conduits 48 and 52 as viewed in Figures 1 and 3 is a conduit 53 constructed in the same manner as shown in Figure 2. Extending across and welded to the conduits 52 and 48 is a conduit 54 which communicates with the conduit 52 and through the conduit 52 with the conduits 53 and 48. Blanking off the conduit 52 immediately to the right of the conduit 54 is a partition 55. Screened wash water is delivered from the pump 25 to the conduit 48 by a conduit 56 which also serves to brace the hull section 12 against the generally rectangular frame formed above the central longitudinally extending hull section 14. It will therefore be seen that screened wash water from the pump 25 may be obtained from any point on the conduits 48, 53, the left hand section of the conduit 52 as viewed in Figure 3, and the conduit 54. The delivery end of the pump 35 communicates through a conduit 57 with that portion of the conduit 52 to the right of the partition 55 as viewed in Figure 3 and therefore water subjected to the double screening action above described can be obtained from any point on the conduit 52 to the right of the partition 55. The conduit 57 also serves the purpose of bracing the hull section 11 against the generally rectangular frame disposed above the central hull section 14. In addition to the pipes 56 and 57, the hull is braced by struts 58 (Figure 4).

Secured to the deck of the central hull section 14 are two pairs of trunnions 61 and mounted for rotation on these trunnions about a horizontal axis is a trommel 62. Rotary motion is imparted to the trommel 62 through a chain 63 driven by a motor 64. Formed on the inner surface of the trommel 62 is a screw 65 for advancing the material therethrough. The trommel is perforated only above that portion lying within the confines of the pan 28.

Supported by and depending from the conduits 48 and 52 over the bow of the boat is a hopper 71 formed with its inner end extending into the trommel 62, as shown in Figure 1. The base of the hopper is semi-circular in form, its upper walls converging into this base. There is, however, no longitudinal convergence of the walls of the hopper and therefore any boulders or rocks which are too large to pass through the hopper into the trommel will become lodged in the left hand end of the hopper as shown in Figure 1 and can be readily removed at this point. Extending upwardly from the sump pump 27 is a conduit 81 formed with a branch 82 for delivering the slimes into a distributor 83 formed on the left side of the dredge as viewed in Figure 4 and with a branch 84 extending across the frame of the dredge for delivering material to a distributor 85 on the right side of the dredge. The distributor 83 delivers slimes to a pair of transversely extending longitudinally spaced jigs 86 and 87, while the distributor 85 delivers material to a pair of similar jigs 88 and 89. The details of construction of the jigs 86, 87, 88 and 89 are fully disclosed in application Serial No. 214,676 filed June 20, 1938 by Harry C. Heath and entitled "Ore Separator and Method," and since these details of construction per se form no part of the present invention, it is deemed unnecessary to describe them here. The tailings passing over the jigs 86 and 87 drop into a rearwardly inclined tail sluice 91 formed at its outer end with a telescoping sluice extension 92. Similarly, the tailings from the jigs 88 and 89 drop into a rearwardly inclined tail sluice 93 provided at its outer end with a telescoping sluice extension 94. The sluice extensions 92 and 94 may be moved relative to the tail sluices 91 and 93 by cables 95 and 96 operated respectively by hand hoists 97 and 98. These hoists are mounted on a deck 99 formed as part of a generally rectangular pilot house 101 supported by and extending upward from the main deck of the boat. Communicating with the tail sluices 91 and 93 at a point immediately above the stern of the boat are a pair of sluices 102 and 103 converging on the vertical chute 104. Formed between the sluices 91 and 102 is a distributor gate 105 by which the tailings dropping into the sluice 91 may be diverted to the sluice 102. Similarly, the sluice 93 is formed with a distributor gate 106 by which the tailings dropping into the sluice 93 may be diverted into the sluice 103.

Water for operating the jigs 86, 87, 88 and 89 is introduced to the sides of the jigs through conduits 107 and 108 communicating with that portion of the conduit 52 to the right of the partition 55. As previously described, the con-

duit 52 communicates with the pump 35 through the conduit 57. The value-bearing minerals passing through the jigs 86, 87, 88 and 89 drop into receivers 109, 111, 112 and 113, all of which communicate with a common launder 114. From the launder 114 the material passes through a cleaner jig 115 and then through a rotary amalgamator 116 where the values are recovered. To insure that no values are lost, the amalgamator may be supplemented by a scavenger jig 117, all in a manner well known to the industry.

Secured to the rear end of the hopper 71 or to any other fixed portion of the frame in alignment with the interior of the trommel 62 are the forward ends of a pair of parallel cables 121 which pass through the upper part of the trommel clear of the screw 65. The rear ends of these cables are secured to any fixed portion 122 of the rear end of the frame carried on the boat in alignment with the interior of the trommel. Suspended in spaced relation from the cables 121 are a number of plates 123, 124 and 125. Extending through and supported by the plates 123, 124 and 125 is a hose 126 terminating at its forward end in a spray nozzle 127. In like manner, a second hose 128 is supported by the plates 124 and 125 and terminates in a spray nozzle 129. A third hose 131 extends through the trommel to the plate 125 and terminates in a spray nozzle 132 (Figures 5 and 6). Each of the hose 126, 128 and 131 communicates at its rear end through a suitable valve with the conduit 48 formed, as shown in Figure 2 by the welded channels 49 and 51. By means of the nozzles 127, 129 and 132, the material passing through the trommel may be washed to any desired extent.

Communicating with the conduits 48 and 52 are a plurality of valved spray nozzles 141 by means of which the material fed to the hopper 71 may be washed. Mounted on the main deck of the boat within the pilot house 101 is a motor 151 for driving a rotary distributing valve 152 communicating through a conduit 153 with the jigs 86, 87, 88 and 89. Adjacent the motor 151 is a motor 154 for driving a pump 155 communicating through a conduit 156 with the jigs, for the purpose of driving the jigs, all as set forth in the Heath application above referred to.

For the purpose of causing the stern of the boat to oscillate between the two banks 161 and 162 of the pond, shore lines 163 and 164 are made to pass over idlers 165, air hoists 166, and idlers 167, the free ends of the shore lines being anchored at spaced points along the banks of the pond. From this construction it will be seen that by pulling in on one of the shore lines and paying out on the other, the stern of the dredge may be made to oscillate as desired between the two banks of the pond.

Access to the various operating mechanisms carried by the boat may be had by means of ladders 171, 172, and 173.

The operation of the dredge as above described in reclaiming the dredged property is as follows:

A pond 181 is first formed, having the banks 161 and 162 above referred to, and the dredge is floated in the pond so formed with the shore lines 163 and 164 anchored to the shore. Material is then taken from the forward end 182 of the pond by a bucket 180 or other suitable device, and delivered through the hopper 71 into the trommel. The coarse material passes through the trommel and drops from the rear end of the trommel to the rear bank 183 of the pond. The fines pass through the perforations of the trommel into the pan 28 and from the pan 28 into the sump 26. In passing through the hopper 71 and the trommel 62, the material is washed by water which has been previously screened by passing through the perforations in the sides 21 of the hull section 12. From the sump 26 the slimes are delivered through the pump 27 and the conduits 81, 82, and 84 to the distributors 83 and 85 and from there to the jigs 86, 87, 88 and 89. The coarse material passing over the jigs is delivered to the sluices 91 and 93 and since at this stage of the operation the gates 105 and 106 are in the position shown in Figure 3, this coarse material passes into the sluices 102 and 103 and is delivered through the vertical chute 104 to the rear bank of the pond. During this stage of the operation the stern of the boat is made to oscillate between the two banks of the pond and consequently the coarse material delivered to the pond by the rear end of the trommel and by the chute 104 is deposited uniformly in the pond rather than in mounds, as would otherwise be the case. When it is desired to take another cut from the leading bank 182 of the pond, the boat is advanced and again anchored in place by the shore lines. The top soil covering the forward bank of the pond is then removed by the shovel or bucket and passes through the dredge in the manner previously described with the exception that during this operation the sluice extensions 92 and 94 are extended rearwardly so as to cover the rock and gravel previously deposited on the pond and the gates 105 and 106 are swung inwardly so that all of the tailings from the jigs will pass downwardly through the sluices 91 and 93 and the sluice extensions 92 and 94. Any coarse material which may be contained in the top soil passes through the trommel 62 and is delivered at its rear end to the rear edge of the pond. By gradually moving the sluice extensions 92 and 94 forward by means of the cables 95 and 96, the entire area of rock and gravel deposited by the previous dredging operation may be covered with a layer of top soil, thereby placing the dredged property in a condition at least as good as prevailed prior to the dredging operation. When the top soil has been removed from the forward bank of the shore, the gates 105 and 106 are returned to the position shown in Figure 3, whereupon the coarse material passing through the jigs is again delivered to a point immediately in advance of the rear bank of the pond.

The success of this method of dredging insofar as the reclamation of the dredged property is concerned, depends upon first depositing a sublayer of rock and gravel at the stern of the boat while moving the stern from bank to bank so as to form a substantially level deposit, and then advancing the boat, passing topsoil through the dredge, and depositing this topsoil over the sublayer by oscillating the stern of the boat from bank to bank and by moving the sluice extensions 92 and 94 longitudinally over the sublayer.

By constructing the hull of the boat in sections, the dredge is made sufficiently portable so as to comply with highway regulations. By forming the conduits 48, 52, and 53 as an integral part of the frame, the use of additional piping is made unnecessary. By perforating the sides 19 and 21 of the boat over their entire surface, an adequate supply of screened water for washing purposes may be maintained. This is a decided advantage over previous constructions wherein a relatively small screen is re-

sorted to. By the use of the rotary screen 31 operating on the water already subjected to a preliminary screening action by the perforated sides 19 and 21, an adequate supply of sufficiently clear water for operating the jigs can be readily maintained.

Having described my invention, I claim:

1. A dredge comprising: a trommel; means for advancing material through said trommel; a cable passing through the trommel and secured under tension to fixed portions of the dredge; and a plurality of wash water conduits supported by said cable, each provided with a spray nozzle located within said trommel.

2. A dredge comprising: a trommel; means for advancing material through said trommel; a cable passing through the trommel with its ends secured to fixed portions of the dredge so as to hold the cable under tension; a plurality of wash water conduits supported by said cable having their ends terminating at spaced points within the trommel; and a spray nozzle secured to each end of each conduit.

3. A dredge of the character described comprising: a hull formed on one side with a wash water compartment extending substantially the full length thereof, the outer common side of said hull and compartment being perforated over substantially its entire length to form a wash water screen; a trommel carried by said hull; nozzles located within said trommel; and a pump having its intake in communication with said wash water compartment and its delivery end in communication with said nozzles.

4. A dredge comprising: a hull provided with sides perforated over substantially their entire length; a trommel and jig associated with said hull; nozzles associated with the interior of said trommel; a wash water compartment formed in said hull and defined in part by one of the perforated sides thereof; a jig water compartment formed in said hull and defined in part by the other of its perforated sides; a wash water pump having its intake communicating with said wash water compartment and its delivery end with said nozzles; and a jig water pump having its intake communicating with said jig water compartment and its delivery end with said jig.

5. A dredge comprising: a boat having one of its sides perforated over substantially its entire length; a compartment formed within said boat adjacent said perforated side for the reception of screened wash water; a trommel carried by said boat and designed to rotate about a substantially horizontal axis; a substantially rectangular frame disposed over said trommel, a portion of said frame forming a wash water conduit; means for conveying wash water from said compartment to said conduit; and means for conveying wash water from said conduit to the interior of said trommel.

6. A dredge comprising: a hull formed with an internal wash water compartment defined in part by one side of the hull and having communication with the exterior of the hull below the water line through perforations formed in said side; a trommel supported by said hull; a structural steel frame formed about said trommel; a wash water conduit formed as an integral part of said structural steel frame; means for establishing communication between said wash water compartment and wash water conduit; and means for establishing communication between said wash water conduit and the interior of the trommel.

7. A dredge comprising: a hull having both of its sides perforated over substantially their entire length; a wash water compartment associated with each side of said hull; and a rotary screen arranged to rotate within one of said compartments; a trommel; and means for delivering water from said water compartment and rotary screen to said trommel.

8. A dredge comprising: a hull having both of its sides perforated over substantially their entire length; a wash water compartment associated with each side of said hull; a rotary screen arranged to rotate within one of said compartments and to subject the water contained therein to a screening action; a structural steel frame supported by said hull, portions of said frame being made out of channel iron welded together to form non-communicating water conduits; means for delivering to one of said conduits water passing through said rotary screen; means for delivering to another of said conduits water from the wash water compartment opposite the compartment with which the rotary screen is associated; a trommel; and means for delivering water from said conduits into said trommel.

9. A floating dredge of the character described including a hull supporting washing, screening and gold saving equipment thereon; said hull having an outer wall formed with uniform perforations of a size admitting free passage therethrough of water in which the hull is adapted to be floated and being sufficiently small to exclude passage of debris and foreign material of sizes objectionably large to satisfactory operation of such washing and gold saving equipment; a wash water compartment in said hull one wall of which comprises said perforated outer wall; a drum type screen in said compartment and extending into the water adapted to enter said compartment through said perforations when said hull is floated; the mesh openings in said screen being smaller in size than that of the perforations in said wall; and a conduit extending into the area enclosed by said screen for conducting water from within said screen to said washing and gold saving equipment for conducting water from within said screen to said equipment.

10. In a construction as defined in claim 9, means supporting said drum-type screen for rotation about a horizontal axis coincident with the central axis of said screen, and said screen being disposed with its central axis horizontal.

11. A floating dredge of the character described including a hull and a frame thereon with gold saving equipment supported on said frame; said frame including elongated hollow frame members forming water conduits for conducting water to separate points for use; a compartment in said hull one wall of which is exposed to water in which said hull is adapted to be floated and which wall is perforated for admission of such water into said compartment; and means for conducting water in said compartment to within said hollow frame members for carrying by said frame members to said points.

12. In a construction as defined in claim 11, a horizontally extending trommel on said hull; said frame being generally rectangular and horizontal, and said trommel being disposed within the vertically projected confines of said frame.

13. In a construction as defined in claim 11, said gold saving equipment comprising a plurality of jigs, a second compartment in said hull for collecting fines and water; means for conducting such water and fines from said compartment to said jigs; a gravel washer over said second compartment having a conduit connecting with one of said hollow members for supplying water to said washer; said gravel washer being in communication with said latter compartment for passage by gravity of such water and the fines washed from gravel in said washer from said washer to said second compartment whereby water from said hollow frame members will be conducted to said jigs; and a third compartment in said hull having a perforated wall exposed to water in which said hull is floated for passage of water through the perforations in said latter wall to within said third compartment; means for conducting water from said third compartment to another of said hollow frame members for supplying water from said third compartment to said latter frame member.

14. A dredge of the character described comprising: a hull; a structural steel frame supported on said hull; gold saving equipment supported on said frame; said structural sttel frame being hollow to thereby form a conduit for water; and means for conducting water from a body thereof in which said hull is adapted to be floated to within said conduit formed by said frame; a washer on said hull; and means for conducting water from said frame to said washer for washing material to be supplied to said gold saving equipment.

15. In a construction as defined in claim 14, said structural steel frame being formed of channel iron strips having their open sides in opposed relation and secured together along the adjacent free edges of the sides of said strips.

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