May 8, 1928. 1,668,671

R. R. DAILEY ET AL

HYDRAULIC DREDGE

Filed Sept. 11, 1926 3 Sheets-Sheet 1

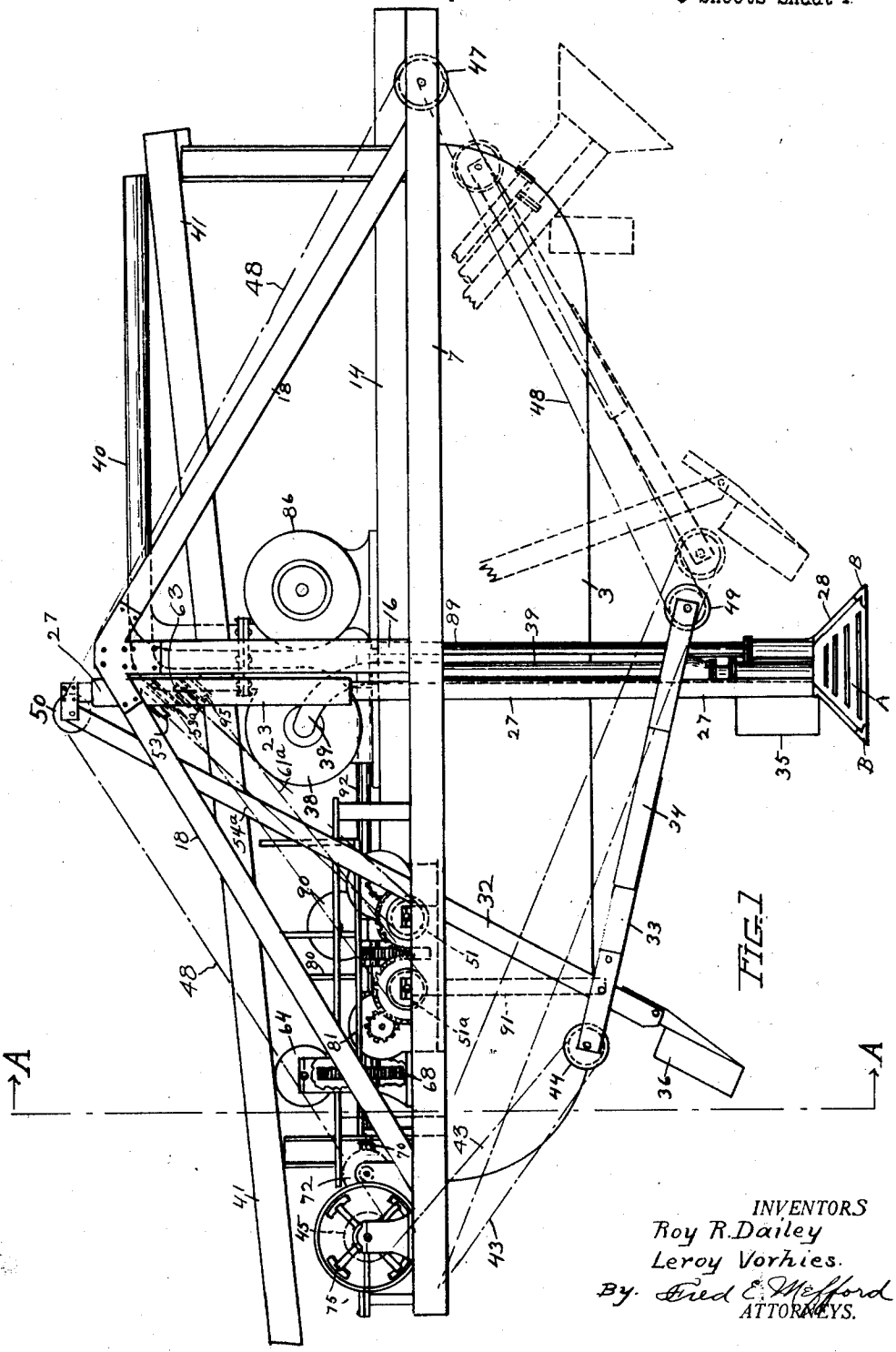


FIG. 1

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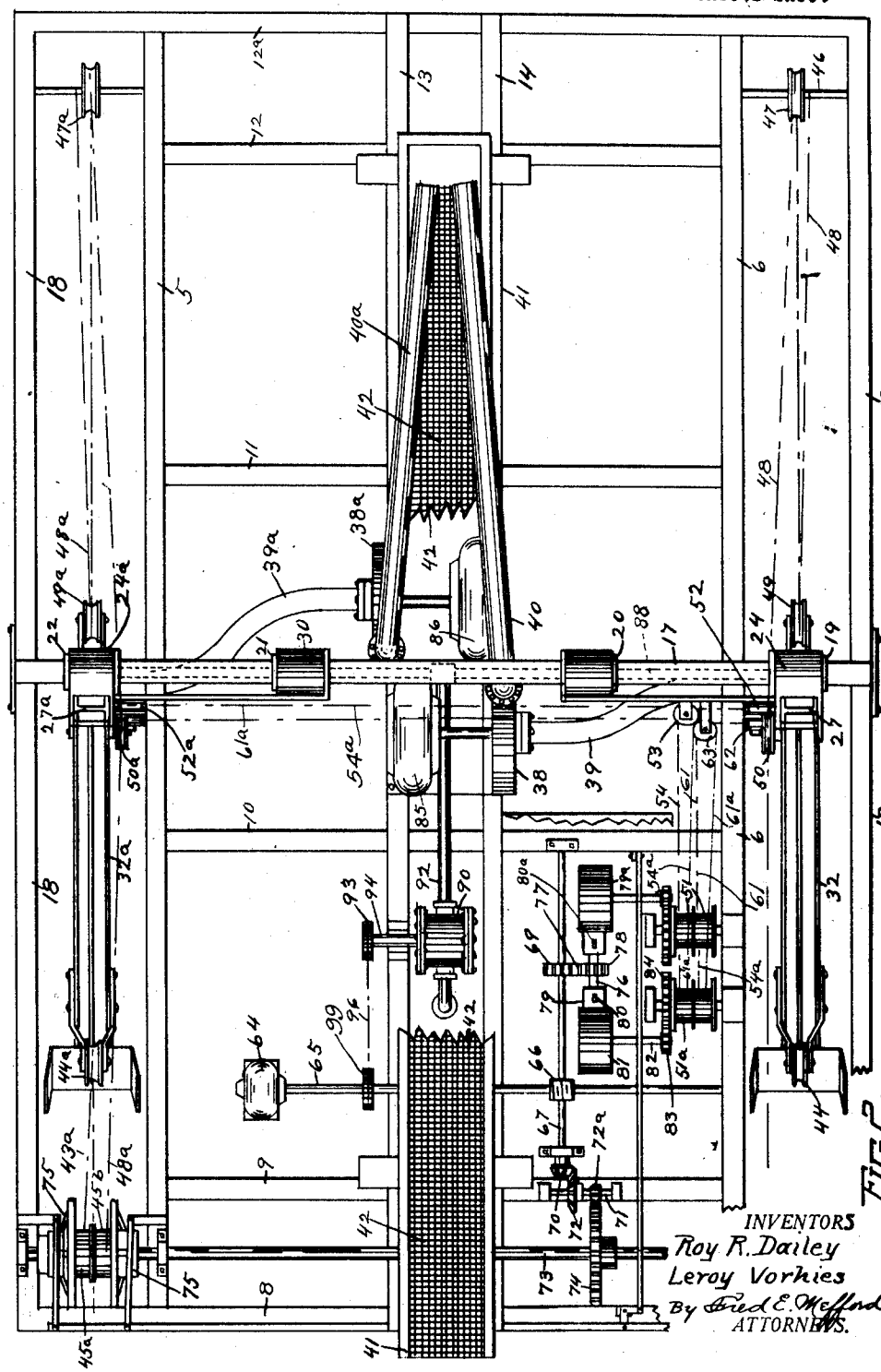


FIG. 2

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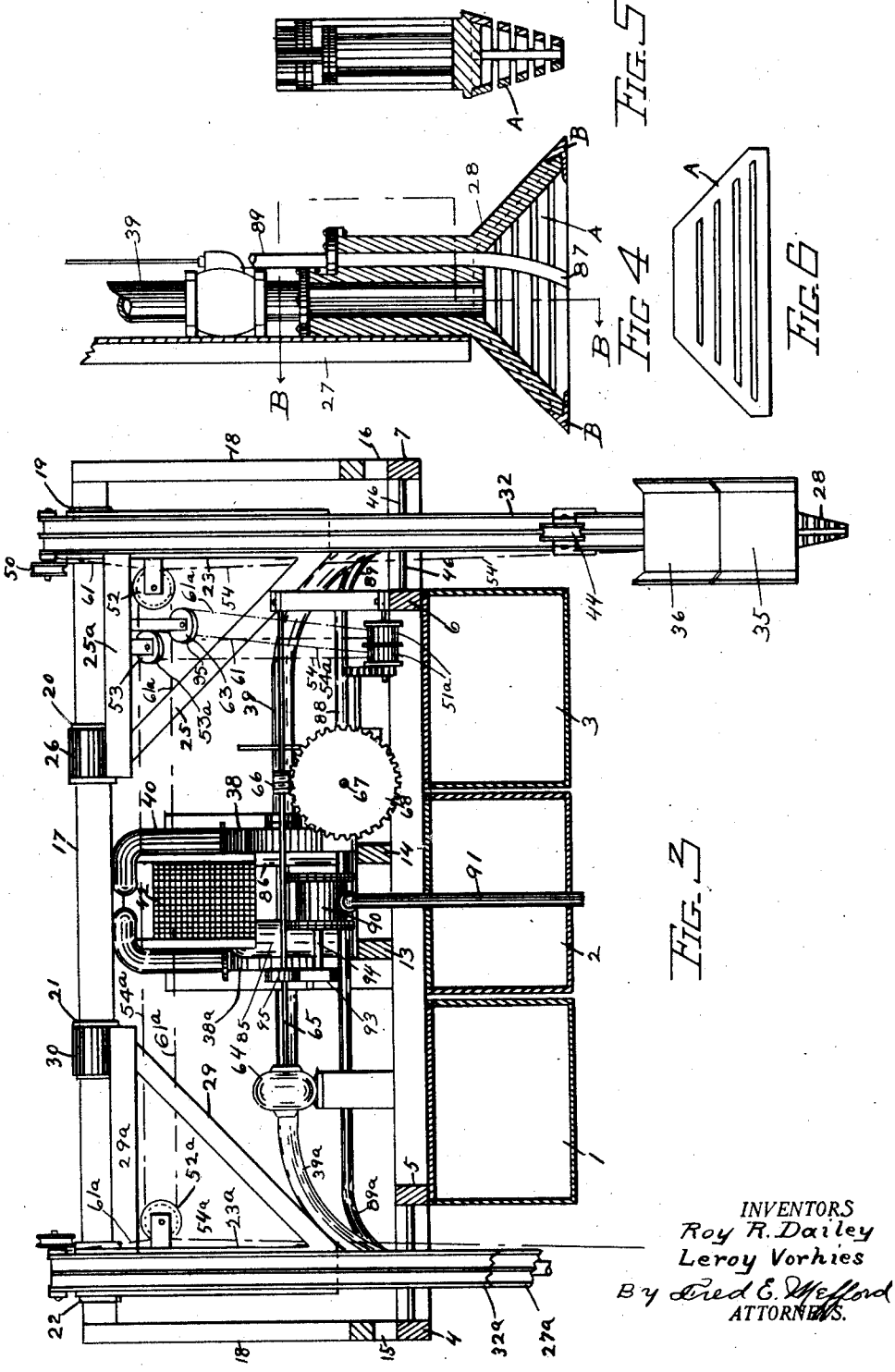


FIG. 3

FIG. 5

FIG. 4

FIG. 6

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UNITED STATES PATENT OFFICE.

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HYDRAULIC DREDGE.

Application filed September 11, 1926. Serial No. 134,869.

Our invention relates to suction dredges for the recovery of valuable metals from the beds of streams, and our object in general is to provide features in this class of dredges whereby the bed of a stream may be loosened so as to facilitate the pumping of the solid particles through conduits to the sluice box. More specific objects are to provide auxiliary agitating and loosening means to be used in connection with the agitating and screening device described in our Patent Number 1,597,580; to provide auxiliary means to remove coarse waste material to the rear after the finer portions containing the values have been removed through the screening devices; to provide lifting means for the agitating and screening devices and means to hold said devices in working engagement with the ground; and to provide actuating means for the swinging, lifting and the holding down of said agitating and screening devices. Other objects will appear as the description progresses.

Figure 1 represents a side elevation of a dredge containing our improvements; Fig. 2, a plan view of Fig. 1, partly broken away; Fig. 3, a sectional elevation, partly broken away, of Fig. 1 on the line A—A; Fig. 4, a fragmentary sectional elevation of the agitating and screening device with the discharge pipe of the auxiliary agitating device installed therein, drawn to an enlarged scale; Fig. 5, a sectional elevation of the agitating and screen device on the line B—B in Fig. 4; and Fig. 6, an elevation of a removable grid screen plate.

Although we show the preferred embodiment of our improvements we do not thereby limit ourselves to the precise forms shown, but wish it understood that various changes in the details of construction may be made within the scope of what hereinafter is claimed, without departing from the spirit of the invention.

Three boats 1, 2 and 3 are disposed side by side and support a frame work composed of longitudinal beams 4, 5, 6 and 7 connected by transverse beams 8, 9, 10, 11, 12 and 12ª. Two longitudinal beams 13 and 14 are disposed on the transverse beams and extend the full length of the frame. Two upright beams 15 and 16 are mounted on beams 4 and 7, respectively, and support a transverse beam 17 braced by oblique beams 18. Journals 19, 20, 21 and 22 are mounted on transverse beam 17. A sleeve 23 is provided with a bearing 24 pivotally mounted on journal 19. A bracing beam 25 is secured to sleeve 23 and carries a bearing 26 pivotally mounted on journal 20. A cross beam 25ª is secured to beam 25 and sleeve 23 to support sheaves which will hereinafter be described. A swinging beam 27 is slidably mounted in sleeve 23 and carries an agitating and screening device 28 provided with removable grid screening plates A and removable shoes B. A beam 32 is pivoted to beam 27 at the top and adjustably connected at the lower part by channels 33 and 34. Scoops 35 and 36 are pivoted to beams 27 and 32, respectively. A centrifugal dredge pump 38 is mounted on beams 13 and 14 and connected to an operating electric motor 85. A flexible intake conduit 39 communicates with the agitating and screening device 28 and an outlet conduit 40 leads to the sluice box 41. A riffle 42 is disposed in sluice box 41. A cable 43 is attached to transverse beam 8 and passes over sheave 44 to winding drum 45. A shaft 46, carrying a sheave 47, is mounted in beams 6 and 7. A cable 48 is secured to shaft 46 and passes over sheaves 49, 47 and 50 to a winding drum mounted on the same shaft as winding drum 45. The clockwise motion of winding drum 45 wind cable 43 thereon and swings beams 27 and 32 to the rear of the boats. The clockwise motion of the winding drum upon which cable 48 is wound, swings beams 27 and 32 to the front of the boats.

A sleeve 23ª is provided with a bearing 24ª pivotally mounted on journal 22. A bracing beam 29 is connected to sleeve 23ª and carries a bearing 30 pivotally mounted on journal 21. A swinging beam 27ª is slidably mounted in sleeve 23ª and carries an agitating and screening device like 28. A beam 32ª is pivoted to beam 27ª at the top and connected by channels. The clockwise motion of winding drum 45ª pulls cable 43ª over sheave 44ª and swings beams 27ª and 32ª to the rear of the boats. The clockwise motion of winding drum 45ᵇ pulls cable 48ª over sheaves 49ª, 47ª and 50ª and swings said beams to the front.

The radial lifting means for the swinging beams 27 and 32, comprise a winding drum 51, sheaves 52 and 53, and a cable 54 secured to beam 27 and wound upon drum 51. A cable 54ª is secured to beam 27ª and passes over sheaves 52ª and 53ª to winding drum

51ª. The anti-clockwise motion of winding drum 51 winds the cable 54 thereon and lifts beams 27 and 32, beam 27 sliding upward through sleeve 23. The anticlockwise motion of winding drum 51ª, winds cable 54ª thereon and lifts beams 27ª and 32ª radially.

In some cases the weight of the swinging beams is not sufficient to hold the agitating and screening device in engagement with the ground and we therefore provide auxiliary means to hold said devices in working engagement with the ground. These means comprise the winding drum 51, sheaves 62 and 63 and a cable 61. The cable 61 is attached to beam 27 at the top and passes under sheave 52 and over sheave 63 to the underside of winding drum 51. The clockwise motion of drum 51 winds cable 61 thereon and pulls beam 27 downward through sleeve 23. A similar cable 61ª is attached to beam 27ª and passes under sheave 52ª and over sheave 95 to the underside of winding drum 51ª. The clockwise motion of drum 51ª winds cable 61ª thereon and pulls beam 27ª downward through sleeve 23ª.

Pump 38 is operated by electric motor 85 and pump 38ª, by electric motor 86.

The actuating means for the main winding drums comprise a motor 64 provided with a drive shaft 65 upon which a worm 66 is mounted. A shaft 67 carries a worm gear 68, a spur gear 69 and a bevel gear 70. A shaft 71 carries a bevel gear 72 meshed with bevel gear 70, and a spur gear 72ª. A main drum shaft 73 is journalled on longitudinal beams 4, 5, 6 and 7 and carries winding drums 45, 45ª, 45ᵇ and a drum not shown. A spur gear 74 is mounted on shaft 73 and meshed with spur gear 72ª. Suitable clutches 75 are provided to engage the winding drums mounted on shaft 73.

A spur gear 69 is mounted on shaft 67 and a spur gear 78 is mounted on shaft 76. Gear 69 actuates gear 78 via gear 77. Shift gears are contained in housing 79 and are operated by lever 80. Similar shift gears are contained in housing 79ª and operated by lever 80ª. A worm and worm gear are mounted in housing 81 and actuate shaft 82 which carries spur gear 83. A gear 84 is mounted on the drum shaft of drum 51ª and meshed with gear 83. A similar set of gears actuates drum 51.

The swinging beams carrying the agitating and screening devices are swung forward and aft and at the same time the boats are moved slowly sidewise over new ground. This sidewise movement is accomplished by operating cables and winding drums not shown, the cables being anchored on land. The boats are moved up stream or allowed to move down stream, by suitable winding drums and cables not shown, the cables being anchored up and down stream.

The solid particles with the water are sucked through grid plates A into the right hand agitating and screening device 28 and travel through conduit 39, pump 38 and conduit 40 to sluice box 41 and over riffle 42 to the rear where it is returned to the stream, the values being left in the sluice box. The water and values entering the left hand agitating and screening device travels through conduit 39ª, pump 38ª and conduit 40ª to sluice box 41 and over riffle 42 to the rear.

The scoops 35 and 36 remove the coarse waste material to the rear of the boats after the agitating and screening devices have removed the finer portions containing the values.

To insure efficiency the ground must be thoroughly loosened so that the values can be conveyed to the sluice box. I therefore provide an auxiliary loosening means comprising a discharge pipe 87 mounted in the agitating and screening device 28; a transversely disposed conduit 88 communicating with discharge pipe 87 via a flexible conduit 89; a rotary pump 90 communicating with the stream via intake conduit 91 and with transverse conduit 88 via conduit 92.

A similar discharge pipe is mounted in the left hand agitating and screening device and communicates with transverse conduit 88 via flexible conduit 89ª. These discharge pipes may be made with a nozzle to insure greater force of discharge. The pump 90 draws the water through conduit 91 and forces it through conduits 92, 88 and 89 and discharges it with great force through pipe 87. This water striking the ground with great force, loosens up a great deal more ground than is loosened by the agitating and screening device alone, as the said device moves along in its swing.

The operating means for pump 90 comprise a pulley 93 mounted on shaft 94, a pulley 95 mounted on shaft 65 and a belt 96 mounted on said pulleys.

To increase the capacity, a plurality of boats may be aligned side by side and spaced from each other. A swinging beam carrying an agitating and screening device may be mounted as described and disposed between each pair of boats and operated in the same manner as hereinbefore described.

We claim:

1. The combination of a floating support; a transversely disposed beam and supporting standards therefore, mounted on said floating support; a plurality of sleeves pivotally mounted on said transverse beam; a beam slidably mounted in each sleeve and adapted to carry an agitating and screening device on the lower end; a beam pivoted to the top of each slidably mounted beam and adjustably connected thereto at the lower portions; a scoop pivotally mounted on the lower end of each pivotally mounted beam,

and means to lift said slidably mounted beams through said sleeves; for the purposes set forth.

2. The combination of a floating support; a transversely disposed beam and standards therefor, mounted on said floating support; a plurality of sleeves pivotally mounted on said transverse beam; a beam slidably mounted in each sleeve; a beam pivoted to the top of each slidably mounted beam and connected thereto at the lower portion by channels; a scoop mounted on said pivotally mounted beam; a sheave mounted on the lower portion of said slidably mounted beam; a sheave mounted on the lower portion of said pivotally mounted beam; cables for said sheaves and winding drums for said cables whereby said last named beams are swung fore and aft of said floating support; winding drums, cables and sheaves whereby said slidably mounted beams are slid through said sleeves, and means to actuate said winding drums.

3. The combination of a floating support; standards mounted on said support; a transversely disposed beam mounted on said standards; sleeves pivotally mounted on said transversely disposed beam, each sleeve carrying a beam slidably mounted therein; a ground engaging member mounted on the lower end of each slidably mounted beam; a cable attached to each slidably mounted beam, sheaves and a winding drum, whereby said slidably mounted beam is forced down to hold said ground engaging member in working position in the ground; a beam pivotally connected to the top of each slidably mounted beam and adjustably connected at the lower portion and carrying a scoop pivotally mounted thereon.

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