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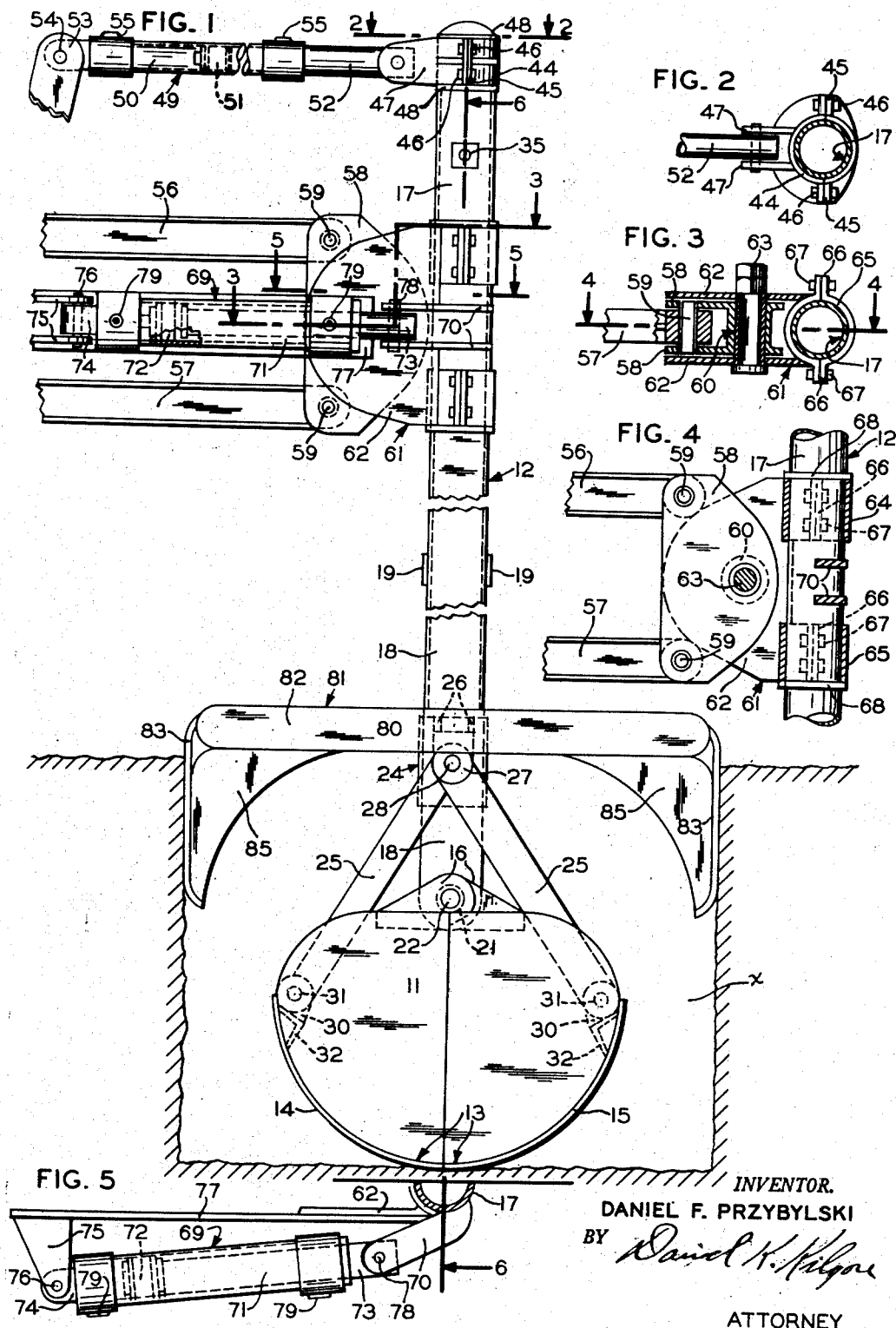
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DIPPER STICK AND DIPPER OPERATING MEANS

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2 Sheets-Sheet 1



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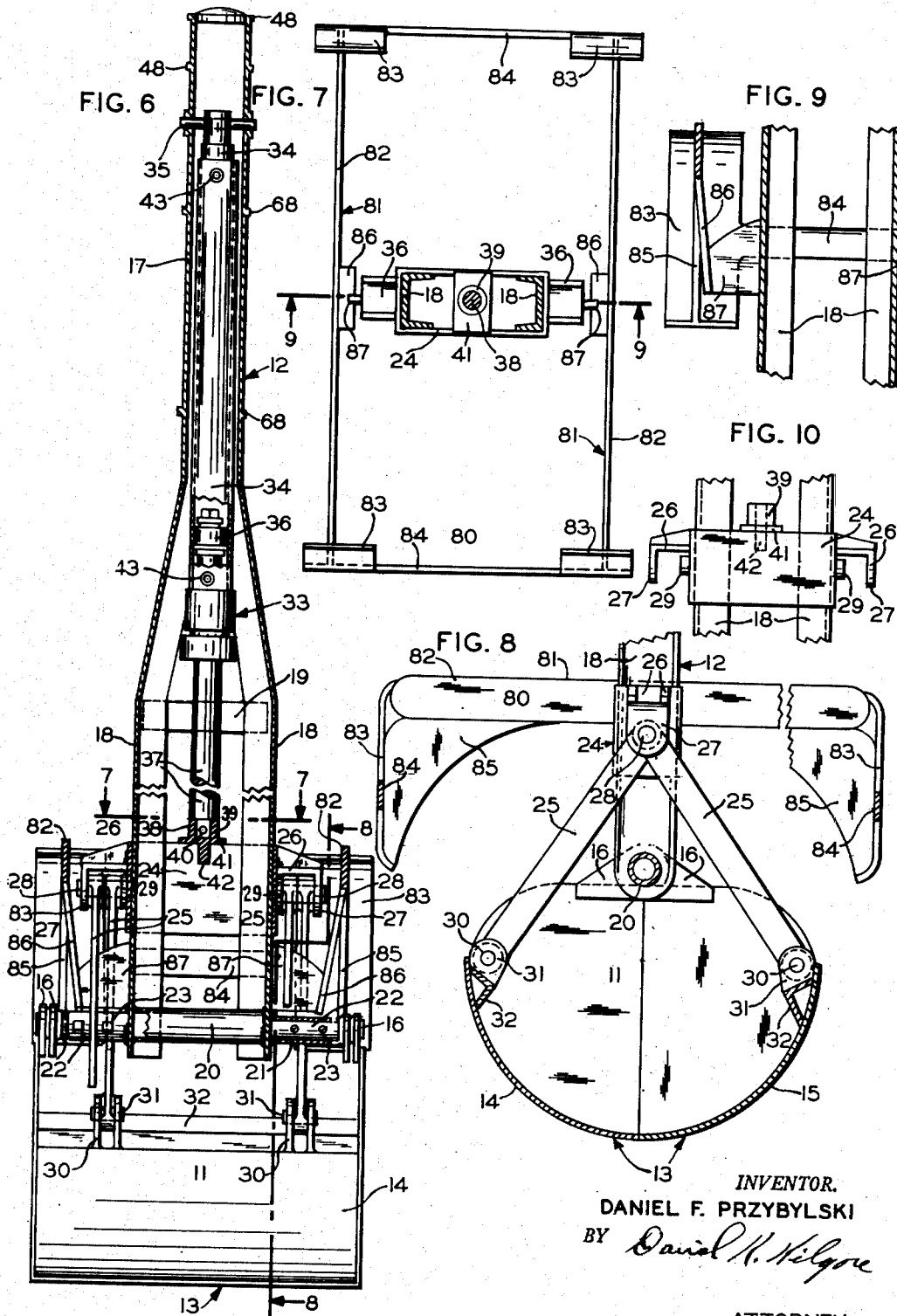
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2 Sheets-Sheet 2



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DIPPER STICK AND DIPPER OPERATING MEANS

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5 Claims. (Cl. 214-147)

1

My present invention relates to a novel grave digger and has for its object to provide a novel dipper stick and dipper-operating means.

To the above end, generally stated, the invention consists of the novel devices and combination of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a fragmentary view of the invention in side elevation;

Figs. 2 and 3 are fragmentary detail views partly in plan and partly in section taken on the line 2-2 and the irregular line 3-3 of Fig. 1, respectively;

Fig. 4 is a fragmentary detail view partly in side elevation and partly in section taken on the irregular line 4-4 of Fig. 3;

Fig. 5 is a fragmentary detail view principally in plan with the dipper stick sectioned on the line 5-5 of Fig. 1;

Fig. 6 is a view principally in central vertical section taken on the line 6-6 of Fig. 1;

Fig. 7 is a view partly in plan and partly in section taken on the line 7-7 of Fig. 6;

Fig. 8 is a fragmentary view partly in side elevation and partly in section taken on the irregular line 8-8 of Fig. 6;

Fig. 9 is a fragmentary sectional view taken on the line 9-9 of Fig. 7; and

Fig. 10 is a front elevational view of the elevator and a section of the dipper stick on which it is mounted.

The numeral 11 indicates a dipper of the clam-shell type attached to the lower end portion of an upstanding dipper stick 12. The two jaws 13 of the dipper 11 comprise front and rear members 14 and two side members 15. The front and rear jaw members 14, when closed, are substantially semi-circular in cross-section and the side members 15 are parallel and extend materially above said front and rear jaw members 14. A pair of overlapping hinge lugs 16 connect the two sections of each side member 15 and have aligned transverse holes. These hinge lugs 16 are fixed to the upper portions of the sections of the side members 15 on the inside thereof and project thereabove.

The dipper stick 12 comprises a cylindrical upper section 17 and a lower section formed of two channel bars 18 integral with said upper section. The channel bars 18, from the cylindrical section, first extend in downwardly diverg-

2

ing relation, and then they extend parallel for the major portion of their length, with their flanges in opposing relation. The channel bars 18, at the upper end portions of their parallel sections, are rigidly connected by a pair of cross-tie bars 19 secured to the outer sides thereof. The channel bars 18 are further rigidly connected, at their lower end portions, by a large tubular member 20, the ends of which abut the webs of said channel bars 18 at their transverse centers and are rigidly secured thereto.

A pair of tubular members 21, axially aligned with the tubular member 20, is rigidly secured, at their inner ends, to the webs of the channel bars 18. Two trunnions 22 extend, one into each of the tubular members 20, and are secured thereto by bolts 23. The trunnions 22 extend through the aligned holes in the pairs of hinge lugs 16 and pivotally support the same and the dipper 11.

An elevator 24, in the form of a rectangular sleeve, extend around the two channel bars 18 with a free sliding fit thereon. The elevator 24, at each end, is connected by a pair of links 25 to the dipper jaws 13. A ribbed bracket 26, integral with each end of the elevator 24, extends outwardly therefrom and has on its outer end a depending ear 27. Each pair of links 25 is pivotally attached to the elevator 24 by a pin 28 mounted in the ear 27 of said bracket and a boss 29 on said elevator. The links 25 of each pair are in downwardly diverging relation from their pivot pin 28. The links 25 of each pair are at their lower end attached by pivot pins 30 to 35 and between pairs of laterally spaced ears 31 integral with the upper flanges of a pair of angle bars 32. These angle bars 32 extend, one in each of the jaws 13 from one end to the other thereof along the upper longitudinal edge portions of the front and rear members 14. The flanges of the angle bars 32, at their longitudinal edges, rest on the dipper jaw members 14 and are fixed thereto.

The elevator 24 is raised and lowered to open 45 and close the dipper jaws 13 through the links 25, by a hydraulic ram 33 that extends centrally in the cylindrical section 17 of the dipper stick 12 and between the channel bars 18. This ram 33 includes a cylinder 34 pivoted at its upper end 50 on a pin 35 that extends transversely through a pair of aligned holes in the cylindrical section 17 and secured to said section. Cooperating with the cylinder 34 is a piston 36 having a depending piston rod 37. This piston rod 37 has a short reduced lower end portion 38 that extends into

an upstanding tubular boss 39 and secured thereto by a pin 40. The tubular boss 39 is an integral part of a plate 41 that extends transversely between the channel bars 18, rests at its end portions on the upper edges of side members of the elevator 24 and secured thereto. The plate 41 has on its under side a central longitudinal reinforcing rib 42, the ends of which abut the sides of the elevator 24 and are secured thereto. On each end portion of the cylinder 34 is a fitting 43 through which fluid under pressure is introduced into said cylinder for operating the piston 36.

The cylindrical section 17 of the dipper stick 12 is turnably mounted in a two-part ribbed sleeve bearing 44 having outturned ears 45 connected by nut-equipped bolts 46. One part of the bearing 44 has a pair of integral outstanding laterally spaced ears 47. The cylindrical section 17 of the dipper stick 12 is held against axial movement in the bearing 44 by and between a pair of annular ribs 48 integral with said section 17. The dipper stick 12 is raised and lowered in part by a hydraulic ram 49 comprising a cylinder 50 and a cooperating piston 51 having a piston rod 52. The cylinder 50, at its outer end, is pivoted to and between a pair of upstanding links 53 fragmentarily shown. The piston rod 52, at its outer end, extends between the ears 47 and is attached thereto by a pivot pin 54. On each end portion of the cylinder 50 is a fitting 55 through which fluid under pressure is introduced in the cylinder 50 for operating the piston 51.

The dipper stick 12 is operated to position the dipper 11 by a boom 56 and swung laterally by a boom 57, both being fragmentarily shown. The ram 49, links 53 and booms 56 and 57, in conjunction with the present invention, form a part of a grave digger. The elements 49, 53, 56 and 57 are fully shown, described and broadly claimed in an application for patent executed of even date herewith. The two booms 56 and 57 are spaced parallel, the former above the latter, in the same plane. These booms 56 and 57, at their outer end portions, extend between a pair of laterally spaced bearing plates 58 and are connected thereto, each by a pivot pin 59. The bearing plates 58 are integral with a hub 60 positioned midway between the pivot pins 59 and inwardly thereof. A mount 61, for the bearing plates 58, includes a pair of side plates 62 connected by a nut-equipped pivot bolt 63 on which the hub 60 is turnably mounted. The side plates 62 are integral with two two-part sleeve bearings 64 and 65 spaced, the former above the latter, and in which bearings the cylindrical section 17 of the dipper stick 12 is turnably mounted. These bearings 64-65 have outturned ears 66 connected by nut-equipped bolts 67. The bearings 64-65 are held against axial movement on the cylindrical section 17 of the dipper stick 12 by and between a pair of annular ribs 68 integral with said section 17.

The dipper stick 12 may be turned ninety degrees (90°) in the bearings 44, 64 and 65 by a hydraulic ram 69 and a pair of laterally spaced crank-acting arms 70, integral with the cylindrical section 17 of the dipper stick 12, midway between the bearings 64 and 65. This turning of the dipper stick 12 positions the dipper 11 to form a square while digging. The ram 69 includes a cylinder 71 and a cooperating piston 72 having a piston rod 73. The cylinder 71 has on its outer end a lug 74 that extends between a pair of laterally spaced ears 75 and is connected there-

to by a pivot pin 76. Said ears 75 are fixed to the outer end portion of a horizontal bar 77 rigidly secured, at its inner end portion, to one of the side plates 62, see Figs. 1 and 5. The piston rod 73, at its outer end portion, extends between the crank arms 70 and is connected thereto by a pivot pin 78. Fluid under pressure is introduced into each end portion of the cylinder 71 through a fitting 79 for operating the piston 72. The ram 69, for turning the dipper stick 12, also forms a part of the dipper stick-operating means heretofore referred to.

Associated with the dipper 11, for guiding the same, when digging a grave or other excavation, is an outrigger 80. This outrigger 80 has a rectangular frame 81 including a pair of flat side bars 82 positioned edgewise in vertical planes. A shoe 83, in the form of an upright plate, flat in cross-section, is fixed at its upper end near its transverse center to each end of each side bar 82 and depends therefrom. The end portions of the shoes 83 are curved inwardly. The outrigger frame 81 further includes end bars 84, positioned edgewise in the planes of the shoes 83 and integral with the inner edges of said shoes slightly below their vertical centers. Reinforcing gussets 85, in the planes of the side bars 82, rigidly connect the shoes 83 to said side bars.

The channel bars 18 of the dipper stick 12 extend through the outrigger frame 81-84 at its longitudinal and transverse centers and is rigidly secured thereto by a pair of depending flat plates 86 and a pair of gussets 87. The plates 86, at their upper ends, are integral with the side bars 82, at their lower edges and longitudinal centers. These plates 86 are in downwardly converging relation and are rigidly secured to the channel bars 18, by the gussets 87. Said gussets 87 are formed of flat plates and disposed in vertical planes. The gussets 87 are rigidly secured at their upright edges to the inner faces of the plates 86 and the outer faces of the channel bars 18 at their transverse centers.

Obviously, the shoes 83 engage opposite sides of a grave *x*, as shown in Fig. 1, and thus guide the dipper 11.

From what has been said, it will be understood that the invention described is capable of modifications as to details of construction and arrangement within the scope of the invention herein disclosed and claimed.

Copending with this application are two applications identified as follows:

Grave Digger, filed October 25, 1951, under Serial No. 253,181, with claims to a bed, a frame tiltable on the bed, a turntable fixed to the frame, rams for tilting the frame and the turntable, a second frame turnable on the turntable and rams for turning the second frame; and

Boom and Boom-Operating Means for Dipper Stick, filed October 25, 1951, under Serial No. 253,183, with claims to a frame, a travelling dolly on the frame, a boom pivoted to the dolly, means for raising and lowering the boom, and means for endwise reciprocating the boom during the raising and lowering of the same.

What I claim is:

1. An upstanding dipper stick having a cylindrical upper section and a lower section formed of two channel bars in rectangular arrangement and with their flanges in opposing relation, bearings in which the cylindrical section of the dipper stick is turnably mounted, means on said dipper stick for holding the same from axial movement in the bearings, crossmembers connecting the

5

channel bars, a dipper including a pair of jaws hinged to the lower end portions of the channel bars, an elevator in the form of a rectangular member slidable on the channel bars and held from relative turning, means connecting the elevator to the jaws for opening and closing the same, and a hydraulic ram for operating the elevator, said ram comprising a cylinder and a co-operating piston having a piston rod, said cylinder extending axially in the cylindrical section and attached thereto at its outer end, said piston rod extending between the channel bars and attached to the elevator, said cylinder having at each end portion a fitting through which fluid is introduced into the cylinder for operating the piston.

2. The structure defined in claim 1 in which the piston rod has a reduced outer end portion, said structure further includes a plate extending transversely between the channel bars and rigidly secured at its ends to the side members of the elevator, said plate having at its center a tubular boss into which the reduced end portion of the piston rod extends and is attached thereto.

3. An upstanding dipper stick, a dipper including a pair of jaws hinged to the lower end portion of the dipper stick, an elevator slidable on the dipper stick above the dipper, connections from the elevator to the jaws for opening and closing the same, means for raising and lowering the elevator relative to the dipper stick, and an outrigger including a frame secured to the elevator above the dipper and having wall-engaging shoes for guiding the dipper, each shoe being a vertically elongated rectangular plate, the lower end portion of which is inwardly curved.

4. An upstanding dipper stick, a dipper including a pair of jaws hinged to the lower end portion of the dipper stick, an elevator slidable on the dipper stick above the dipper, connections from

6

the elevator to the jaws for opening and closing the same, means for raising and lowering the elevator relative to the dipper stick, and an outrigger including a rectangular frame secured at its center to the elevator above the dipper and having at each corner an independent wall-engaging shoe for guiding the dipper.

5. An upstanding dipper stick, a dipper including a pair of jaws hinged to the lower end portion of the dipper stick, an elevator slidable on the dipper stick above the dipper, connections from the elevator to the jaws for opening and closing the same, means for raising and lowering the elevator relative to the dipper stick, and an outrigger including a frame comprising side and end members secured to the elevator above the dipper and having wall-engaging shoes for guiding the dipper, said shoes being vertically elongated rectangular plates integral with the end members, depending therefrom and their lower end portions being inwardly curved, and in which the side members rigidly connect the shoes at their intermediate portions.

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