Jan. 5, 1954 F. BRINK ET AL 2,665,116

POSTHOLE BORING MACHINE

Filed Feb. 27, 1951

6 Sheets-Sheet 1

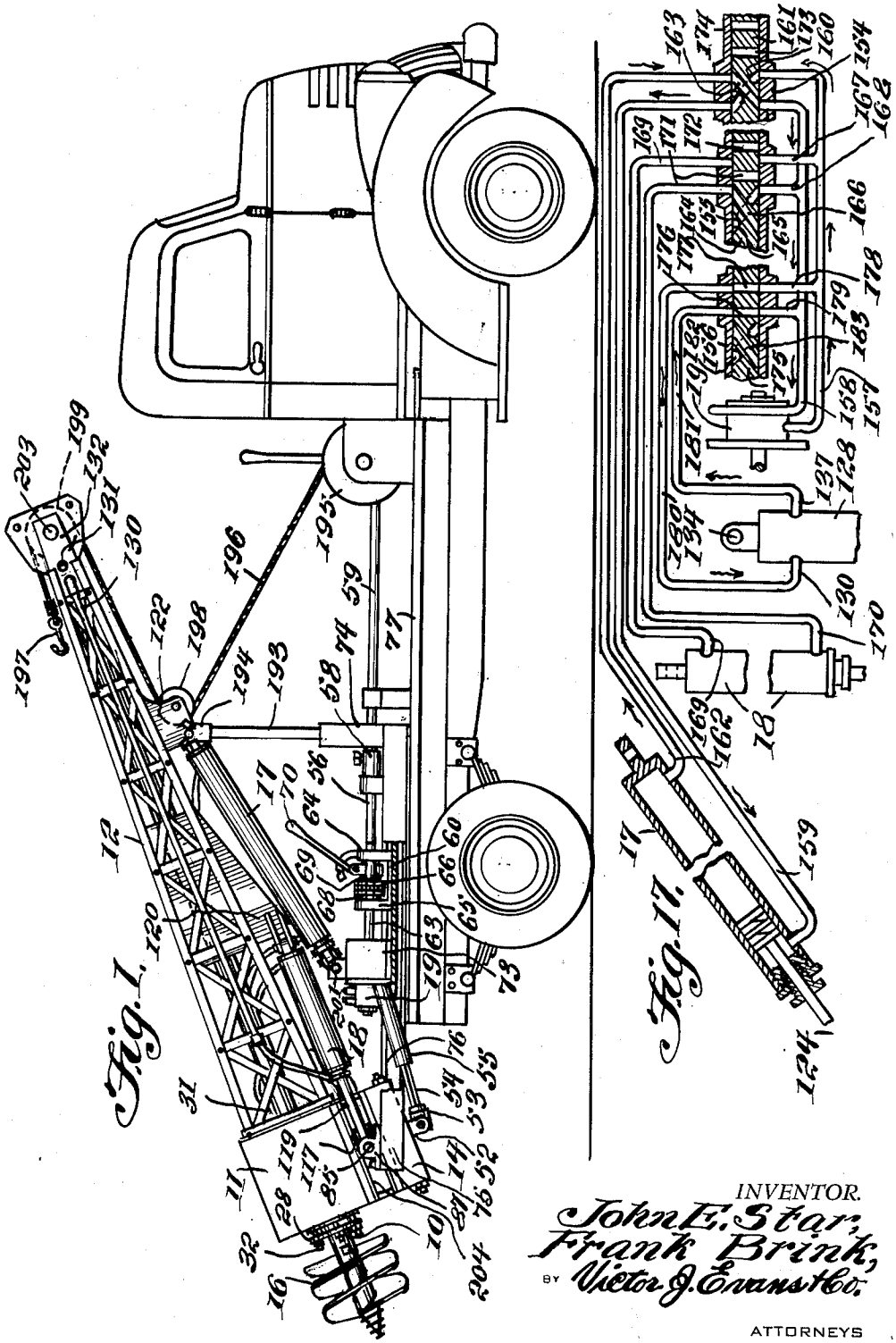


Fig. 1.

Fig. 1A.

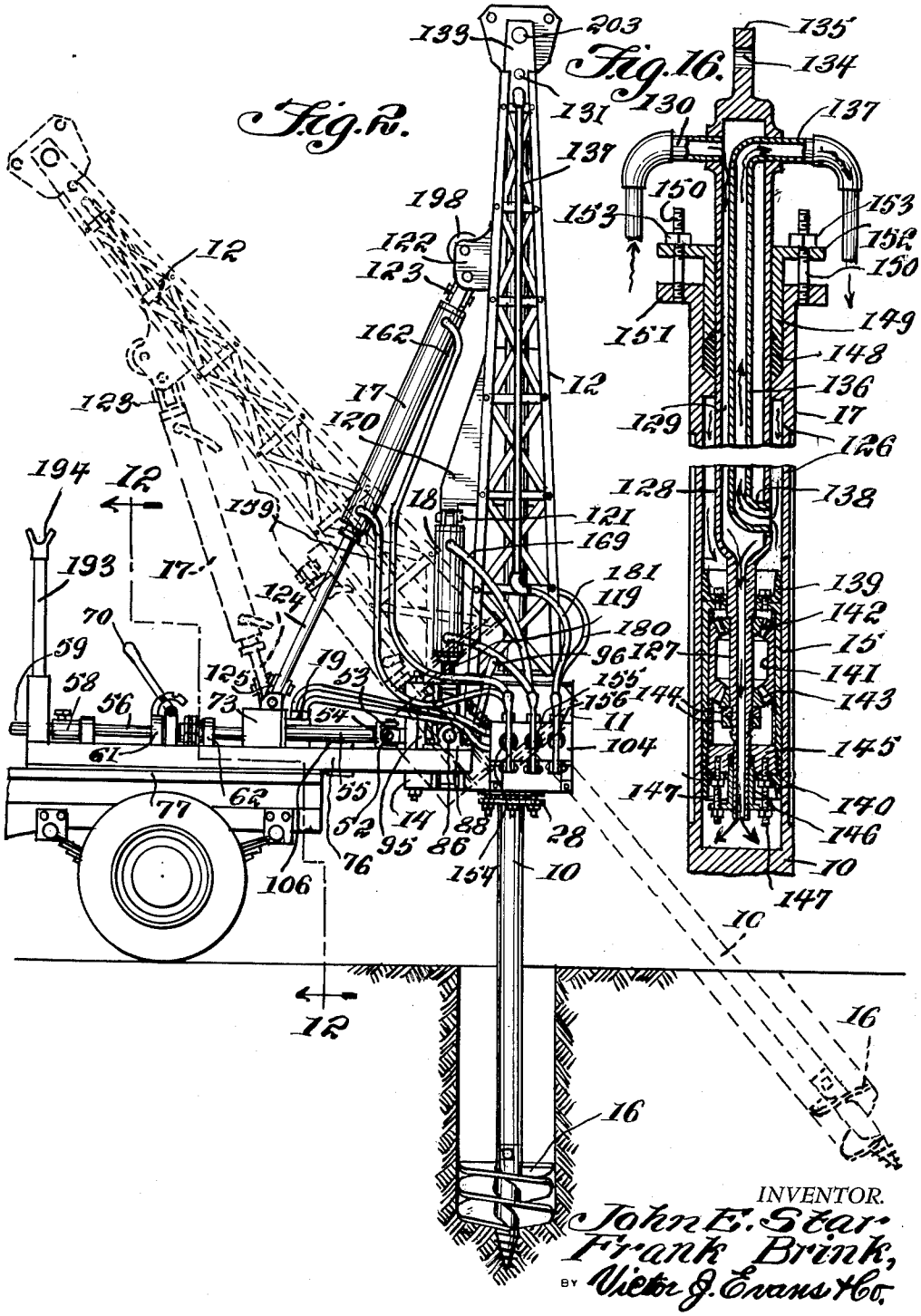
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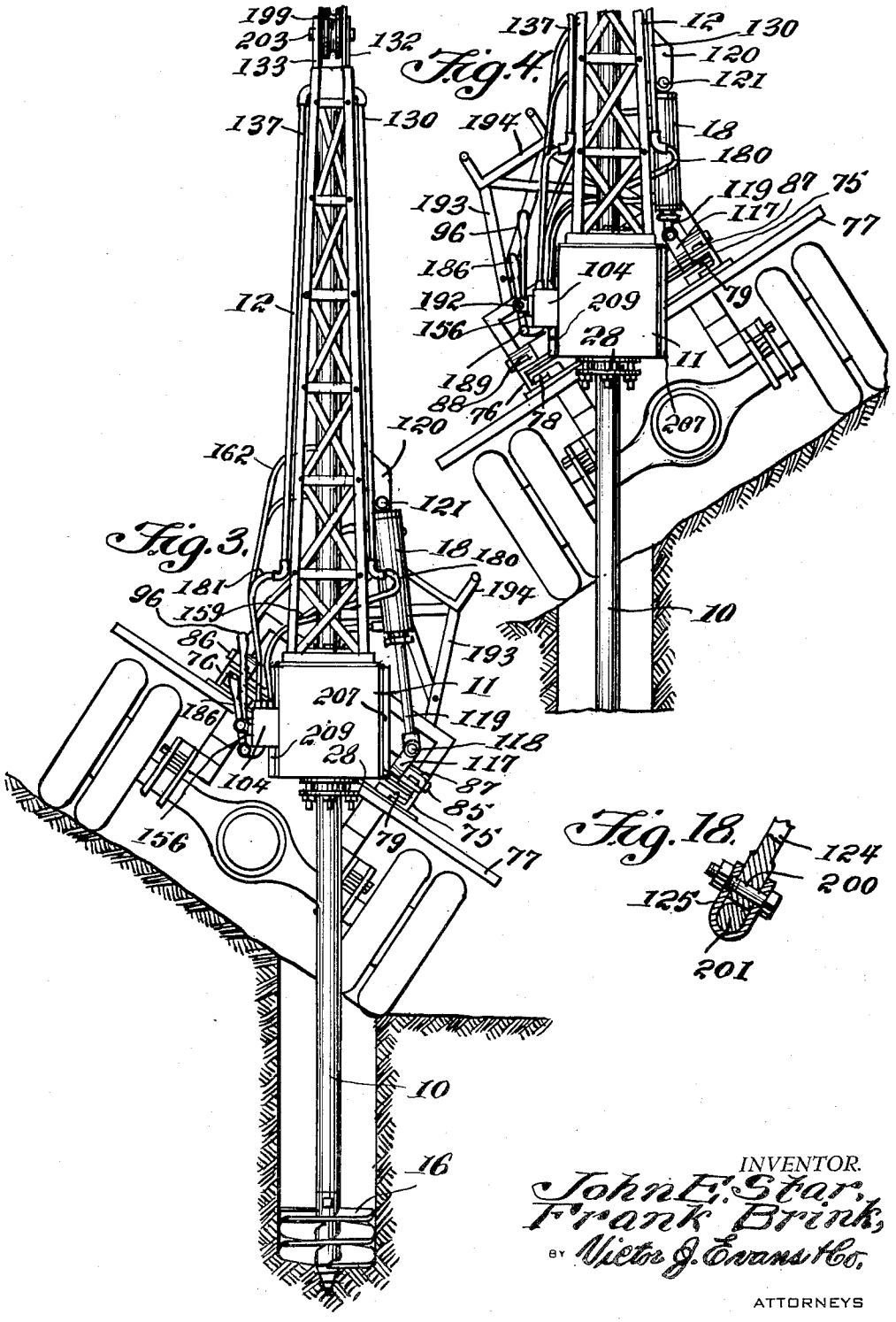
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POSTHOLE BORING MACHINE

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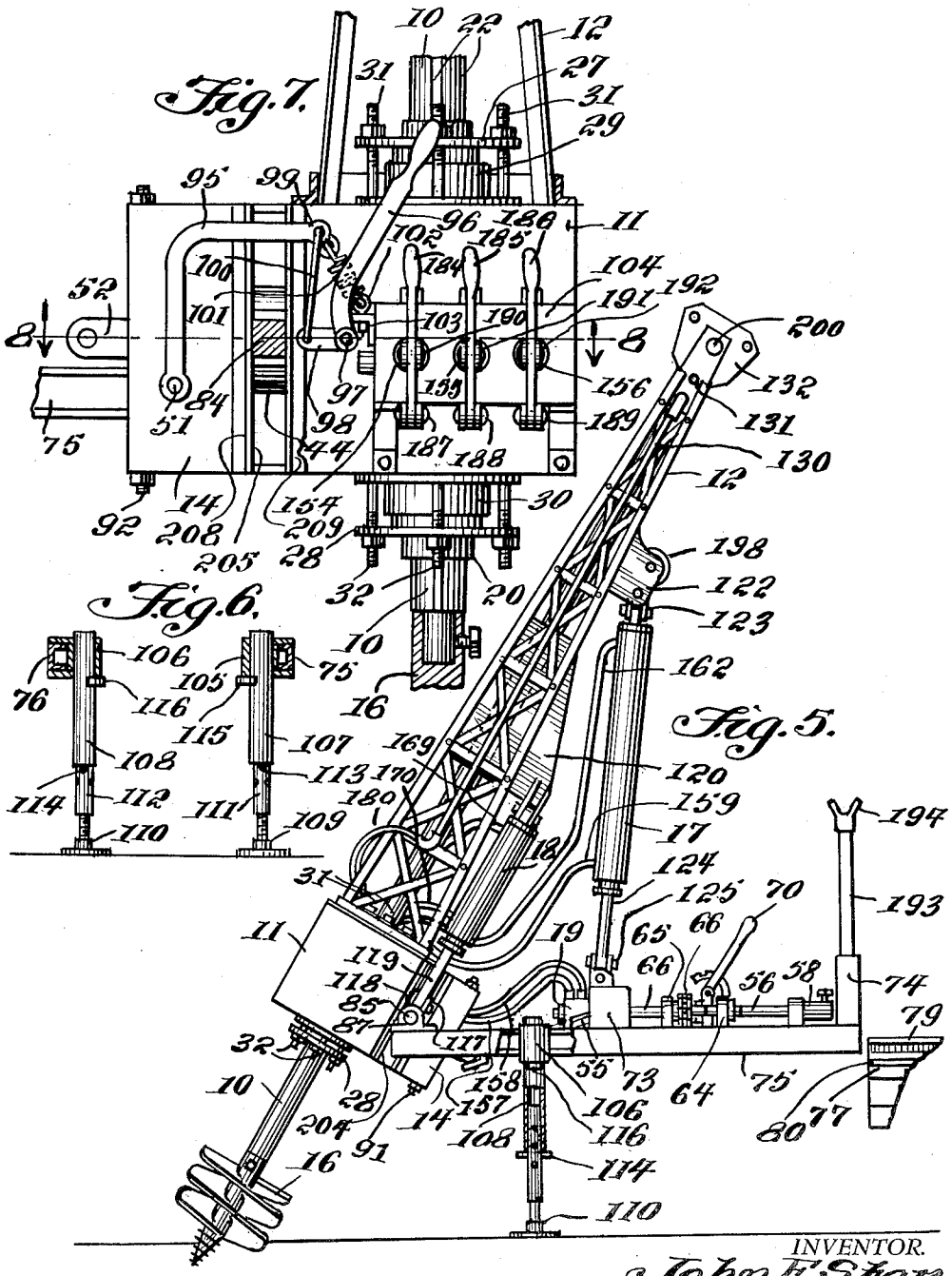


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POSTHOLE BORING MACHINE

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POSTHOLE BORING MACHINE

Filed Feb. 27, 1951 6 Sheets-Sheet 5

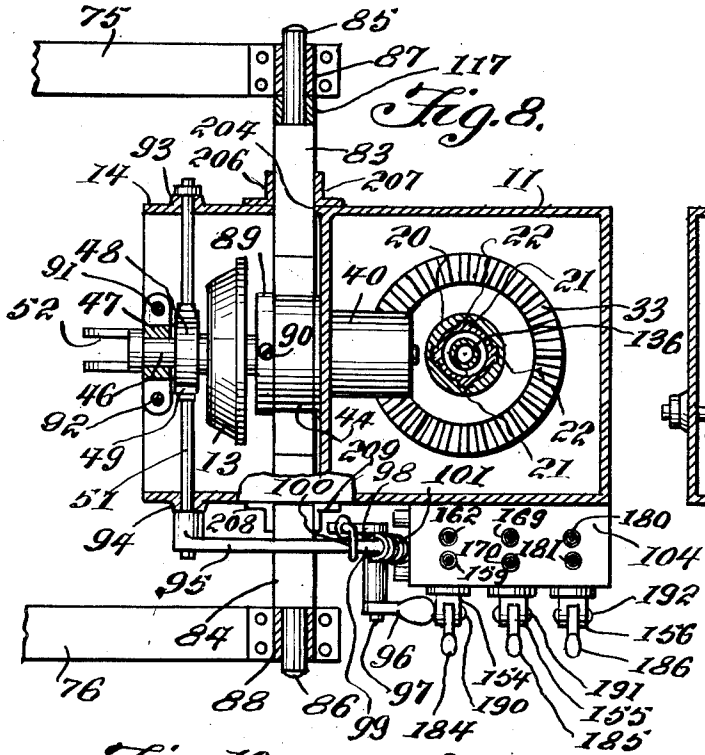


Fig. 8.

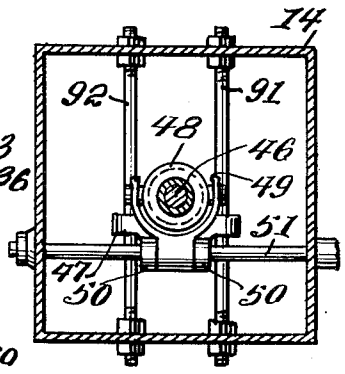


Fig. 11.

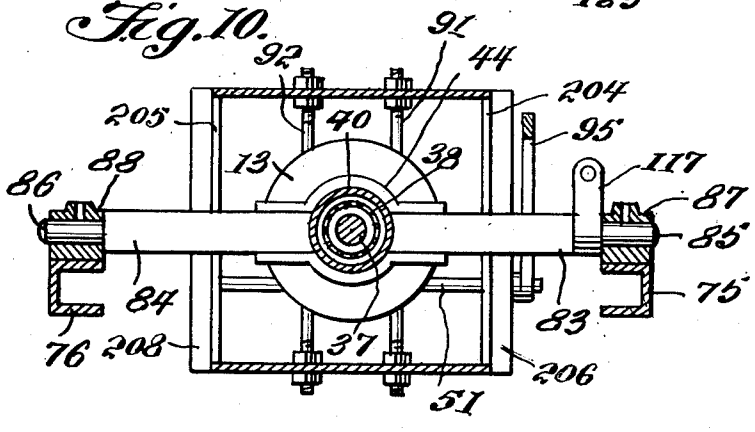


Fig. 10.

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POSTHOLE BORING MACHINE

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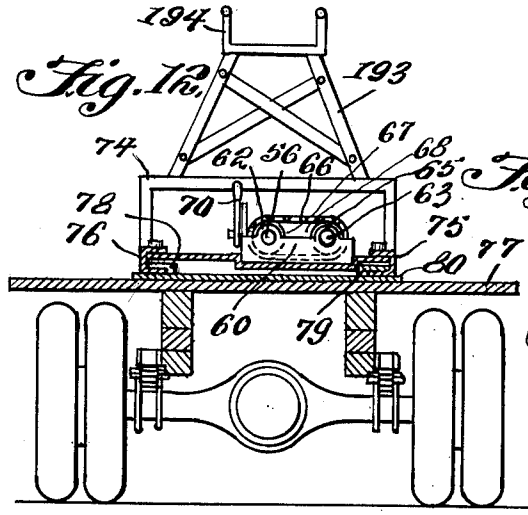


Fig. 12.

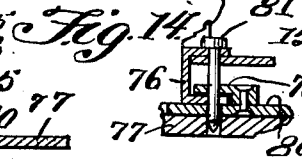


Fig. 14.

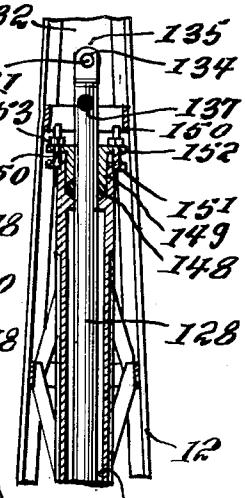


Fig. 15.

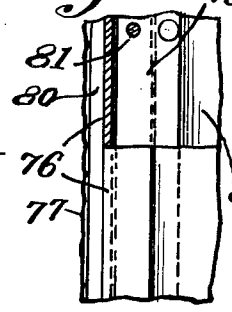


Fig. 13.

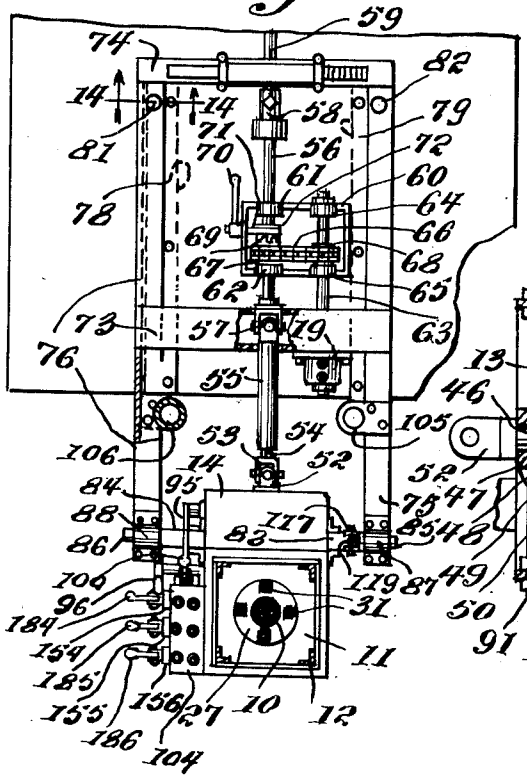
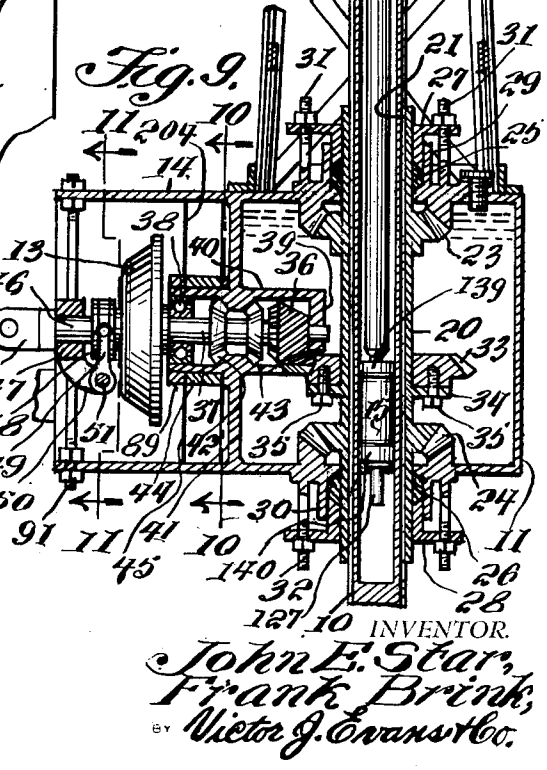


Fig. 9.



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POSTHOLE BORING MACHINE

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Application February 27, 1951, Serial No. 212,976

2 Claims. (Cl. 255—19)

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This invention relates to earth boring tools of the type used on truck platforms for boring holes for telephone poles, posts, and the like, and in particular a machine having a base with a derrick-like superstructure designed to be mounted on the platform of a truck or the like with a boring shaft journaled in the derrick frame and having an auger on the lower end, and the invention also includes means for adjusting the auger carrying shaft to a vertical position or to different positions in a plane extended longitudinally through the truck body and also to different positions in a plane extended transversely of the truck body.

The purpose of this invention is to provide a post hole auger wherein the auger and the shaft on which the auger is carried may readily be adjusted to different positions in relation to a truck or other carrying vehicle whereby the axis of the auger and shaft is vertical even though the vehicle may be positioned on the side of a hill extended upwardly from the side of a roadway, or on a grade or slope of substantially any angle.

Various types of earth boring machines have been provided for boring holes at different angles and whereas the axis of the boring shaft of conventional machines of this type is adjustable in a plane extended longitudinally through a carrying vehicle it is difficult to adjust the axis to a vertical position when it is desired to bore a hole on the side of a hill or embankment extended upwardly from a roadway. With this thought in mind this invention contemplates a universal mounting of a post hole boring tool whereby the axis of the boring tool shaft may be adjusted to a vertical position regardless of the position of the truck body on which the device is mounted.

The object of this invention is, therefore, to provide means for constructing an earth boring tool mounting whereby the axis of the motor shaft is adjustable both longitudinally and transversely.

Another object of the invention is to provide an adjustable mounting for earth boring tools that may readily be mounted on a platform of a truck with the drive shaft thereof connected to the power take off of the truck.

Another object of the invention is to provide a post hole boring tool that may readily be mounted upon a truck platform in which the tool may readily be adjusted to a position with the auger suspended above the ground for transportation.

Another object of the invention is to provide a post hole boring tool in which the boring tool shaft is journaled in an upwardly extended derrick frame and wherein the device may also be used for withdrawing telephone poles, posts and the like from holes.

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A further object of the invention is to provide an improved post hole boring machine which is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a derrick superstructure mounted on a gear housing with a boring tool shaft journaled in the superstructure and extended through the gear housing and with the superstructure and housing carried by a base mounted on the platform of a truck body with means for actuating the auger and also means for adjusting the position of the auger carrying shaft longitudinally and transversely of the truck body.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings wherein:

Figure 1 is a side elevational view illustrating the improved post hole boring tool mounted on a truck with the structure in an inclined position on the truck in which position the tool may readily be conveyed from one position to another.

Figure 2 is a similar view showing the rear portion of the truck with the tool shown in a vertical position in full lines and in an inclined position in dotted lines and also showing an auger of a smaller size on the shaft of the tool in the dotted line position.

Figure 3 is a rear elevational view showing the truck on an incline with the boring tool vertically positioned.

Figure 4 is a similar view showing the tool in a vertical position with the truck on an oppositely sloping incline.

Figure 5 is a side elevational view also similar to that shown in Figure 1 showing the tool adjusted to a different angle and illustrated with the truck platform removed.

Figure 6 is a detail showing a transverse section through the mounting element shown in Figure 5 illustrating supporting jacks attached to side bars of the base.

Figure 7 is a side elevational view, on an enlarged scale illustrating the gear housing with the hydraulic control valves mounted on the side thereof and with the superstructure, truck body and boring tool shaft broken away.

Figure 8 is a sectional plan taken on line 8—8 of Figure 7 showing the interior of the gear housing.

Figure 9 is a vertical longitudinal section through the gear housing showing the auger shaft in a vertical position.

Figure 10 is a cross section through the clutch housing taken on line 10—10 of Figure 9.

Figure 11 is also a cross section through the clutch housing taken on line 11—11 of Figure 9.

Figure 12 is a cross section taken on line 12—12 of Figure 2 showing the base mounted on the platform of the truck body.

Figure 13 is a sectional plan showing the mounting base with the base positioned on the platform of the truck body.

Figure 14 is a detail illustrating an attachment of one of the side rails of the base to the truck body being taken on line 14—14 of Figure 13.

Figure 15 is a sectional plan illustrating the attachment shown in Figure 14.

Figure 16 is a vertical section through the upper part of the auger carrying shaft illustrating the piston and cylinders therein whereby pressure is applied to the upper end of the auger shaft.

Figure 17 is a diagrammatic view illustrating a hydraulic valve for controlling the adjusting cylinders and also the auger carrying shaft cylinder.

Figure 18 is a detail illustrating a swivel connection used between the ends of the cylinders and superstructure in which the auger carrying shaft is mounted.

Referring now to the drawings wherein like reference characters denote corresponding parts the post hole boring tool or digger of this invention includes a tubular drill bit carrying rod 10, a drill rod housing 11 in which the rod is journaled and through which the rod extends, a superstructure 12 mounted on the housing 11 and providing supporting means for the upper end of the drill rod, a clutch 13 in a clutch housing 14 that is mounted on the housing 11, a piston 15 positioned in the drill rod and through which fluid under pressure is forced to feed a drill bit 16 on the drill rod 10 downwardly, a hydraulic cylinder 17 for tilting the drill rod in a longitudinal plane, a hydraulic cylinder 18 for tilting the drill rod in a transversely disposed plane, and a pump 19 by which fluid under pressure is supplied to the drill rod and cylinders through suitable valves.

The drill rod 10 is slidably mounted in the housing 11 through an elongated bearing sleeve 20 that is provided with elongated grooves 21 into which splines 22 on the surface of the drill rod extend, as shown in Figure 8 and the opposite ends of the sleeve are journaled in roller thrust bearings 23 and 24, as shown in Figure 9. The ends of the sleeve 20 extend through packing glands 25 and 26 formed by flanged bushings 27 and 28, respectively which extend into hubs 29 and 30 on the upper and lower panels of the housing 11, and which are held by bolts 31 and 32, respectively.

The sleeve 20 is provided with a bevel gear 33 that is secured to a flange 34 thereon by bolts 35 and the gear 33 meshes with a beveled pinion 36 on a stub shaft 37 that extends from the clutch 13.

The stub shaft 37 is journaled in bearings 38 and 39 in a cylinder 40 of an inner wall 41 of the housing 11 and the shaft is also provided with roller thrust bearings 42 and 43.

The end of the cylinder 40 that extends into the clutch housing 14 is journaled in a bearing 44 which is supported from the outer wall of the housing by arms 45.

A driving shaft 46 extends from the opposite end of the clutch and this shaft is journaled in a bearing 47. The clutch collar 48 is slidably mounted on the shaft 46 and the collar is actuated by a yoke 49 that is pivotally mounted on an arm 50 extended from the bearing 47 by a pin 51.

The outer end of the shaft 46 is provided with a section 52 of a universal joint, a complementary section 53 of which is carried by the end 54 of a telescoping shaft 55. The shaft 55 is connected to a driving shaft 56 through another universal joint 57 and the shaft 56 is connected to a coupling 58 through a power and take off shaft 59 of a truck upon which the well boring tool is mounted.

The shaft 56 extends through a frame 60 in which the shaft is journaled in bearings 61 and 62 and the frame is also provided with a countershaft 63 that is journaled in bearings 64 and 65 and the countershaft is driven from the shaft 56 by a chain 66 which is trained over sprockets 67 and 68. The sprocket 67 is provided with a jaw clutch 69 and the jaw clutch is actuated by a shift lever 70 through a yoke 71 and clutch collar 72. The countershaft 63 extends through a beam 73 on which the pump 19 is mounted and the shaft extends through pumps providing means for operating the same.

The beam 73, and also a beam 74 provide mounting means for the shaft 56 and frame 60 and these beams are carried by parallel rails 75 and 76, which are channel-shaped in cross section and which are mounted on a platform 77 of a truck body by tongues 78 and 79 that extend upwardly from a base plate 80. These parts are secured to the platform 77 by bolts 81 and 82, as illustrated in Figure 14.

The bearing 44 in which the end of the cylinder 40 of the gear housing 11 that extends into the clutch housing 14 is journaled, as shown in Figure 9, is supported by transversely disposed arms 83 and 84, the outer ends of which are provided with trunnions 85 and 86 and the trunnions are journaled in bearings 87 and 88, respectively on extended ends of the side rails 75 and 76 of the supporting frame that is bolted to the platform 77.

The bearing 44 is secured on the end of the cylinder 40 by a collar 89 that is secured in position by a set screw 90 and the bearing 47 is supported in the housing by vertically disposed rods 91 and 92.

The clutch yoke actuating shaft 51 of the collar 48 of the clutch 13 is journaled in the housing 14 in bearings 93 and 94 and an arm 95 on the outer end of the shaft is actuated by a hand lever 96 which is pivotally mounted on a pin 97 and which is provided with an arm 98 that is connected to the end 99 of the lever 95 by a link 100. A spring 101 is connected, at one end to the end 99 of the lever 95 and, at the opposite end to an eye 102 on a clip 103 of the valve housing 104 on the side of the gear housing 11.

The side rails 75 and 76 of the mounting frame are provided with cylindrical sockets 105 and 106 that are positioned to receive the upper ends of tubular telescoping members 107 and 108 of jacks 109 and 110, as illustrated in Figure 6. The jacks are provided with intermediate sleeves 111 and 112 in which pins 113 and 114, respectively, are inserted. The members 107 and 108 are provided with stops 115 and 116 respectively upon which the sockets 105 and 106 rest to provide means for supporting a mounting frame independent of the truck body with the parts in the position illustrated in Figure 5 wherein the drill bit coacts with the jacks to provide three points of support.

The trunion arm 83 is provided with a bearing 117 which, with a bearing section 118 provides a swivel joint for a piston rod 119 extended from the hydraulic cylinder 18, the upper end of which is attached to a mounting bracket 120 on the side of the superstructure 12 whereby the superstructure and drill rod are tilted in a transversely disposed plane, as illustrated in Figures 3 and 4 upon expansion and contraction of the cylinder 18. The upper end of the cylinder 18 is connected to the bracket 120 with a swivel connection 121.

The upper end of the hydraulic cylinder 17 is also connected to the superstructure 12 through a bracket 122 with the upper end of the cylinder connected to the bracket by a universal joint 123 and with the lower end of a piston rod 124, extended from the lower end of the cylinder, connected to the cross beam 73 of the mounting frame by a universal joint 125.

The piston 15 in the elongated cylinder 126 of the drill rod 10 is journaled on a tubular stem 127 on the lower end of a cylinder 128. The cylinder 128 is provided with an internal passage 129 that is supplied with fluid under pressure through a connection 130 and the fluid supply to the chamber 129 passes downwardly through the stem 127 and into the lower end of the cylinder 126 thereby forcing the drill rod 10 downwardly. The piston 15 is in a fixed position longitudinally and the stem 127 and cylinder 128 are held by a bolt 131 which extends through the upper parts 132 and 133 of the superstructure 12 and through an opening 134 in a tongue 135 on the upper end of the cylinder 128.

The cylinder 128 is also provided with an inner tubular member 136 that is provided with a fluid supply connection 137 at the upper end and also with an outlet connection 138 at the lower end, the said outlet connection extends through the wall of the cylinder 128 whereby fluid is supplied to the cylinder 126 on the opposite side of the piston 15.

The piston 15 is provided with cup-shaped friction washers 139 and 140 and the piston is mounted on a sleeve 141 that is journaled on the stem through roller thrust bearings 142 and 143. The position of the piston on the stem is controlled by lock nuts 144 that are threaded on the stem which extends downwardly through the piston head 145 and also through a packing gland 146 which is held in the lower end of the piston by bolts 147. The washer 139 is mounted by bolts on the upper end of the piston 15, which is mounted on the stem 127.

The upper end of the drill rod is provided with a packing gland 148 that is formed with a sleeve 149 which extends into the upper end of the gland and which is secured in position by bolts 150 that are carried in flanges 151 that extend through flanges 152. The bolts are provided with nuts 153 by which the sleeve of the packing gland may be adjusted.

Fluid under pressure is supplied to the hydraulic cylinders 17 and 18 and also to the drill rod 10 by a pump 19 with the fluid controlled by the valves 154, 155 and 156 in the valve housing 194, the valves being shown in detail in Figure 17 wherein the pump is provided with a discharge pipe 157 and a suction pipe 158.

With the parts as illustrated in Figure 17 the pump discharge is connected to the lower end of the cylinder 17 by a pipe 159 which is connected to the pipe 157 through a cross connection 160 in the core 161 of the valve 154 and the suction of

the pump is connected by a pipe 162 to the upper end of the cylinder 17 with the pipe 162 connected to the pipe 158 by a cross connection 163 in the core of the valve.

In this position the discharge of the pump, is closed off to the cylinder 18, the valve core 164 of the valve 155 being in the neutral position whereby the cross connections 165 and 166 do not register with the pipe 167 and the pipe 157 or with a pipe 168 from the pipe 158. The valve 155 is provided with a discharge connection 169 that extends to the upper end of the cylinder 18 and also a connection 170 that extends to the opposite end of the cylinder 18. By use of the cross connections 165 and 166 of the valve core 164, or the passages 171 and 172 of the valve fluid under pressure may be applied to either end of the cylinder 18 and the return connections may also be connected to either end.

The core 161 of the valve 154 is also provided with straight connections 173 and 174, similar to the connections 171 and 172 whereby fluid may be applied to and returned from the opposite ends of the cylinder 17.

The valve 156 controls the flow of fluid to the drill rod 10 and with the parts as illustrated in Figure 17 the core 175 of the valve 156 is positioned with the straight openings 176 and 177 aligned with discharge and suction connections 178 and 179 and with connections 180 and 181, respectively connected to the connections 136 and 137 of the cylinder 128 of the drill rod 10. The core 175 of the valve 156 is also provided with cross connections 182 and 183 by means of which fluid supply and return to the cylinder of the drill rod may be reversed.

The valves 154, 155 and 156 are controlled by hand levers 184, 185 and 186 which are pivotally mounted in the valve housing by pins 187, 188 and 189 and similarly connected to the valve core by pins 190, 191 and 192, respectively.

By this means the position of the drill rod and superstructure are positively controlled by the hydraulic cylinders and the cylinders are controlled by the hand levers so that the drill rod and supporting structure may be positioned so that the drill rod is vertical regardless of the position of the body of a truck upon which the device is mounted and the device may be used for vertically disposed post holes, particularly as shown in full lines in Figure 2, or holes for anchors, which are preferably positioned at an angle of 45 degrees. It will also be understood that the parts are adjustable to bore holes at suitable angles in a longitudinal plane and also in a transverse plane so that a post hole or hole for an anchor may be bored in the side of a bank at an angle of 45 degrees or at any suitable angle.

Superstructure and drill rods may also be adjusted to a position, such as illustrated in Figure 1, with the superstructure supported on a post 193 on the forward end of the mounting frame and having a fork 194 on the upper end that is positioned to receive the superstructure.

It will also be understood that the device may be provided with means for withdrawing posts from holes and for this purpose a winch 195 is mounted on the platform of the truck and a cable 196, having a hook 197 on the outer end, extends around a pulley 198 which is journaled in the bracket 122 and also over a pulley 199 that is journaled on a pin 203 between the parts 132 and 133 in the upper end of the superstructure.

It will be understood that the swivel connec-

tions particularly between the ends of the hydraulic cylinders and piston rods thereof may be formed in any suitable manner. A typical universal or swivel connection is illustrated in Figure 18 wherein the lower end of the piston rod 124 is connected to the joint 125 by a bolt 200 and the member 125 is pivotally mounted on a bolt 201 which extends to the lower or base section of the joint.

With the shaft 59 connected to the power take off of a truck, tractor, or the like the drill rod is rotated through the mounting or bearing sleeve 20 with the gears 33 and 36 and through the clutch 13. As the drill rod is rotated the valve 156 is actuated so that fluid under pressure passes downwardly through the chamber 129 of the cylinder 128 and is discharged through the lower end of the stem 127. With the piston 15 fixed longitudinally by the stem 127 and cylinder 128 the pressure in the cylinder 126 forces the drill rod 10 downwardly as it is rotated. With the drill rod passing downwardly fluid in the upper part of the cylinder 126 above the piston 15 passes through the tube 136 and back to the pump or source of fluid supply.

By actuating the valve 154 the cylinder 17 may be expanded or contracted to adjust the position of the drill rod and superstructure whereby the rod may be moved from the position shown in full lines in Figure 2, to the position shown in dotted lines, or to the position illustrated in Figure 1 where the drill bit is suspended above the ground for transportation.

By the same means the valve 155 may be actuated to expand or contract the hydraulic cylinder 18 and by this means the drill rod and superstructure may be rotated in a plane positioned transversely of the truck body so that the angle of an opening formed by the drill bit may conform to the slope of the ground and the hole may extend at any suitable angle in relation to the ground.

It will be noted that as the position of the drill rod is adjusted in a transverse plane in relation to the body of the truck the arms 83 and 84 travel in slots 204 and 205 in the sides of the section 14 of the housing and these arms are slidably mounted between angles 206 and 207 on one side and 208 and 209 on the other.

It will also be noted in Figures 12 and 13 that the boring structure is slidably mounted by the beams 73 and 74 which are mounted on the rails 75 and 76 and the rails are slidably mounted on the tongues 78 and 79 whereby the device may readily be removed from the truck body.

It will be understood that modifications may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A post hole boring tool comprising a mounting frame, a drill rod housing, provided with front, rear and side walls and having vertically disposed slots in the side walls thereof, a support bearing mounted in the housing and having arms extending outwardly of the housing through the slots in the side walls of the housing, means journalling the outer ends of the arms on said mounting frame, said arms pivotally supporting the drill rod housing on the frame to swivel in a transversely disposed plane in relation to the mounting frame by means of the support mounted within the housing, a clutch, mounted in said drill rod housing, an upwardly extended superstructure mounted on the upper side of said drill rod housing, a drill rod having a longitudinally disposed cylinder therein extended through the said drill rod housing and superstructure and having a drill bit on the lower end, power driving means mounted on the said mounting frame and connected through universal joints to the said drill rod housing, means in the said drill rod housing for rotating the drill rod, a piston positioned in the cylinder of the drill rod and having a piston rod the outer end of which is anchored in the upper end of the superstructure, a hydraulic cylinder mounted through universal joints on the mounting frame and superstructure, respectively, and positioned to rotate the said drill rod and superstructure in a plane extended longitudinally through the said mounting frame, a hydraulic cylinder also mounted through universal joints on the superstructure, and positioned to rotate the said superstructure and drill rod in a plane transversely positioned in relation to the said mounting frame, and means applying fluid under pressure to the said hydraulic cylinders and also to the cylinder of the drill rod.

2. A post hole boring tool as in claim 1 wherein a pump is mounted on the said mounting frame, a valve housing having valves therein, and suitable connections from the pump to the valve housing and from the valve housing to the hydraulic cylinders for adjusting the position of the drill rod and superstructure and also to the cylinder in the said drill rod for actuating the said drill rod.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,238,388	Burnton	Aug. 28, 1917
1,548,559	Simpson	Aug. 4, 1925
1,921,812	Erdahl	Aug. 8, 1933
2,410,959	Brown	Nov. 12, 1946
2,415,572	Jaques	Feb. 11, 1947
2,418,601	Richards	Apr. 8, 1947
2,421,970	Smith	June 10, 1947
2,480,537	Arps et al.	Aug. 30, 1949
2,587,893	Pridy et al.	Mar. 4, 1952