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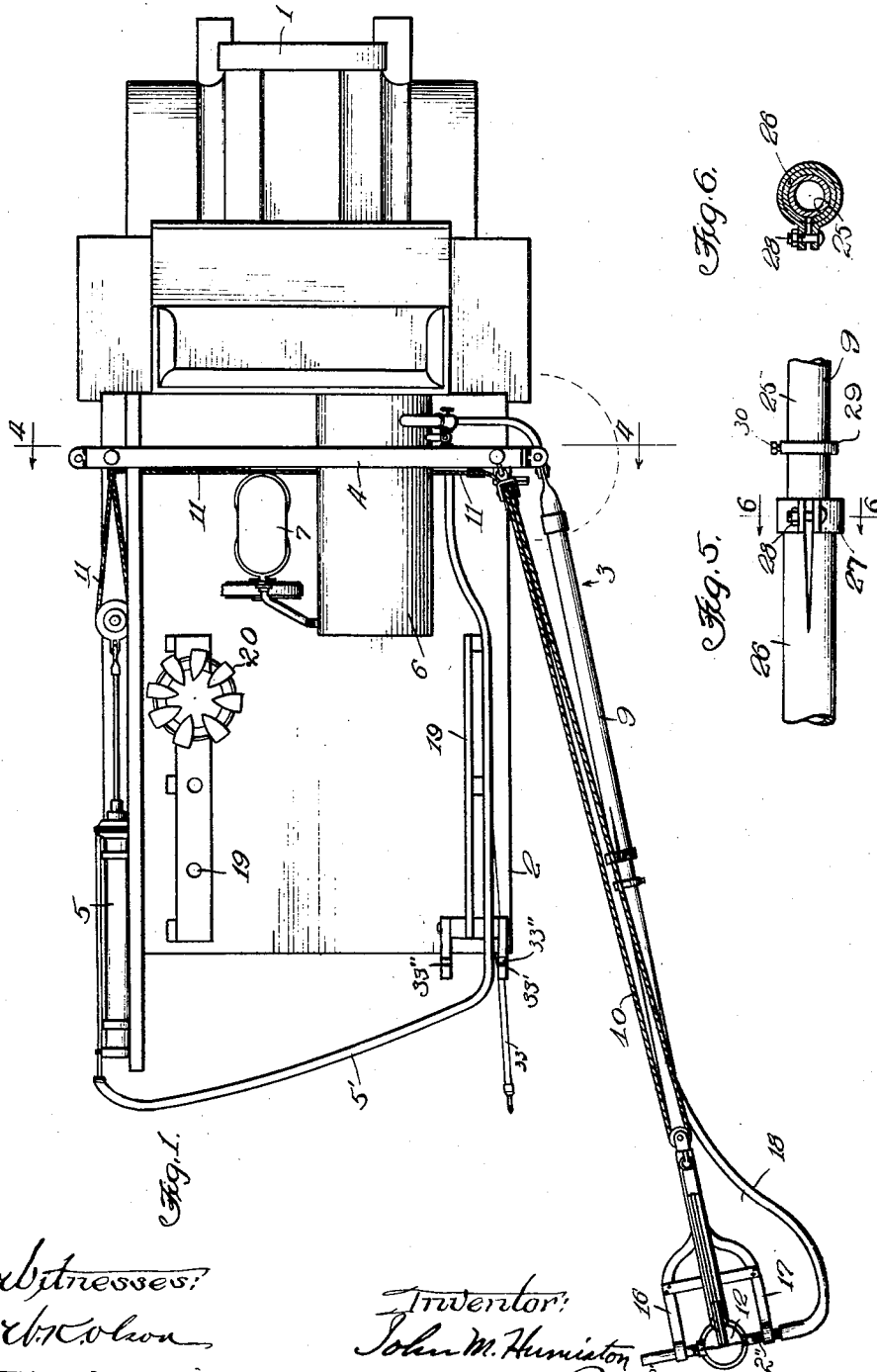
1,507,776

J. M. HUMISTON

EARTH BORING MACHINE

Filed May 13, 1921

4 Sheets-Sheet 1



Witnesses:
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F. M. Davis

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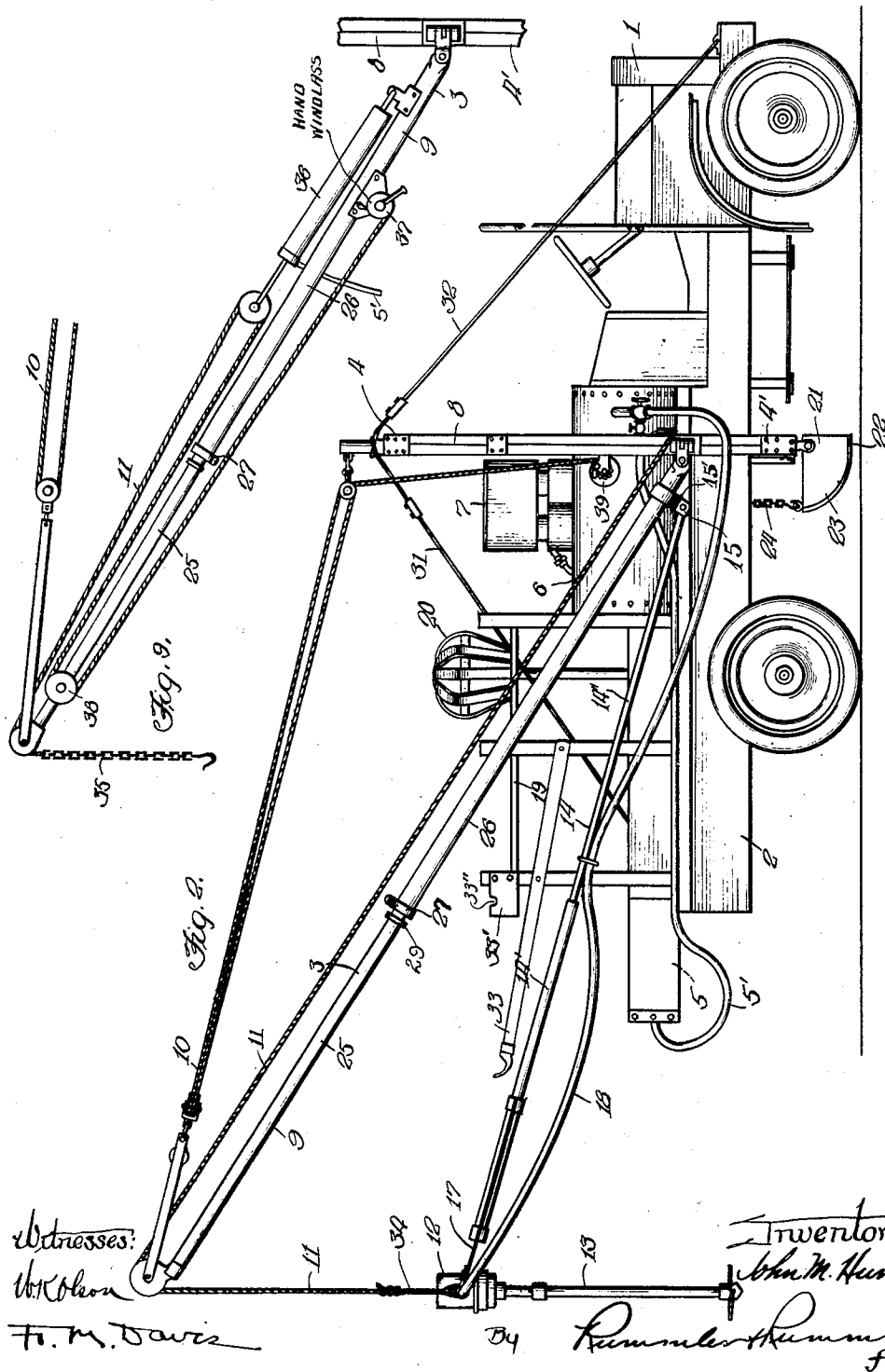
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EARTH BORING MACHINE

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4 Sheets-Sheet 2



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EARTH BORING MACHINE

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4 Sheets-Sheet 3

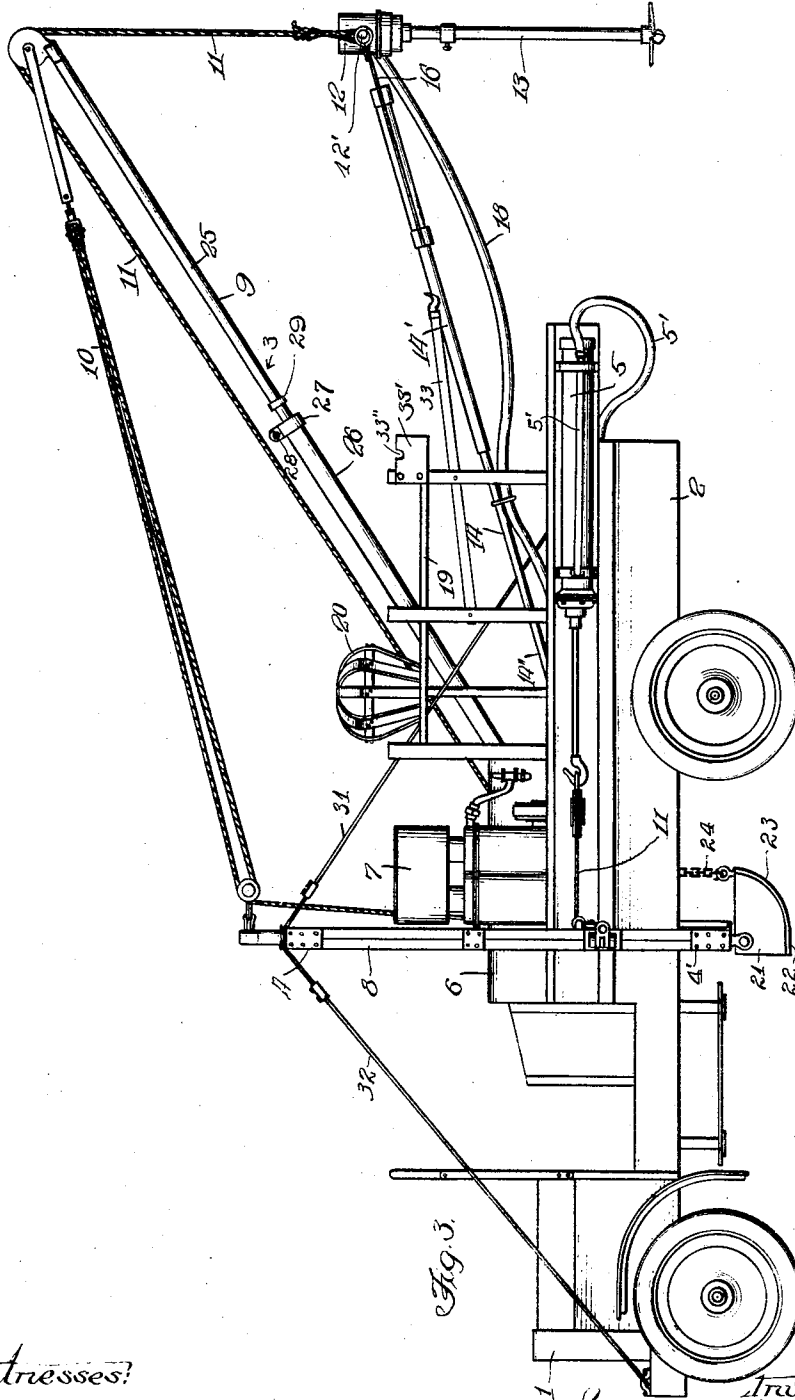


Fig. 3.

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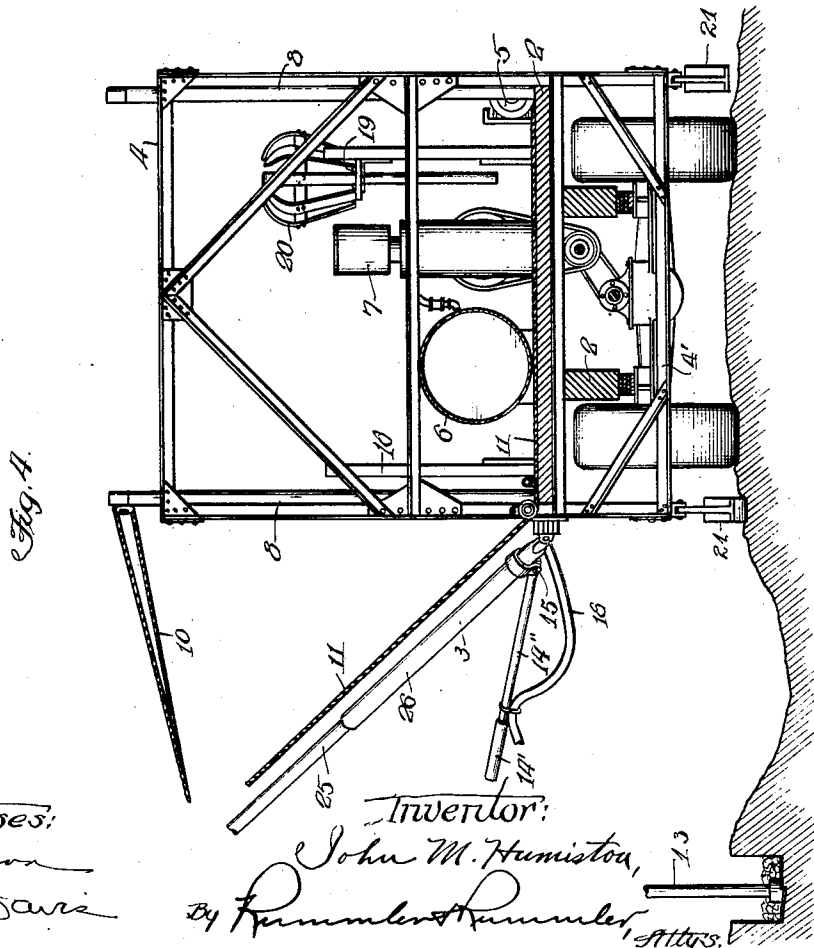
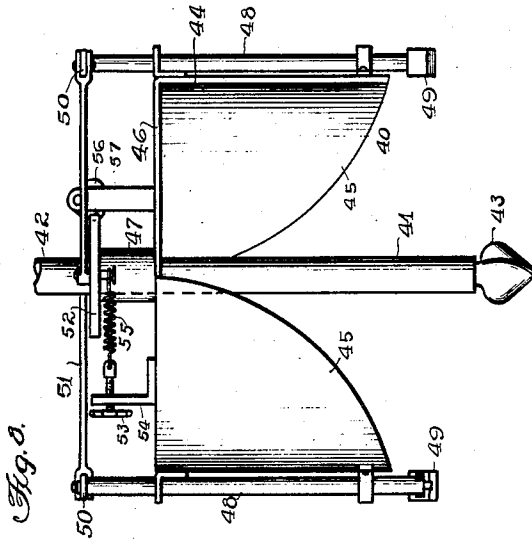
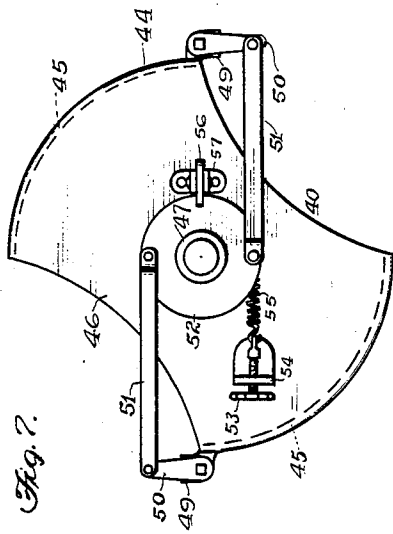
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J. M. HUMISTON
EARTH BORING MACHINE

Filed May 13, 1921

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

JOHN M. HUMISTON, OF BERWYN, ILLINOIS.

EARTH-BORING MACHINE.

Application filed May 13, 1921. Serial No. 469,126.

To all whom it may concern:

Be it known that I, JOHN M. HUMISTON, a citizen of the United States of America, and a resident of Berwyn, county of Cook, and State of Illinois, have invented a new and useful Improvement in Earth-Boring Machines, of which the following is a specification.

This invention relates to outside construction work, mainly earth boring, and particularly to autotrucks fitted with hole digging and pole erecting means.

My main objects are to improve upon the device of my earlier invention, covered by Letters Patent of the United States No. 1,114,477, of January 9, 1912; to provide improvements in the construction of various parts of the device; to provide means adapted for greatly extending the utility of the device, both as to variety of functions and efficiency in performance; to provide a more convenient and efficient arrangement of parts, with a view especially to boring holes and setting telephone poles beside a roadway with the truck in substantially its normal traveling position; to provide mechanical means of automatically adjustable character for holding the drill motor frame against rotating, so as to relieve the drill attendant from a very arduous task; and to provide an improved form of auger capable of cutting frost and frozen ground, or "frost" as it is often called.

In using the hole digger and pole erecting device of my said prior patent it was necessary to head the truck toward the work, owing to the position of the derrick on the front of the truck, and this usually necessitated working the truck around to a position crosswise of the road. This was often inconvenient, especially on narrow country roads bordered by deep ditches, and at best was wasteful of time and labor, as compared with my improved device herein described.

The device as a whole consists of an air compressor plant connected to the motive power source of a self-propelled vehicle, said plant having associated with it the following units:

(1) A rotary air drill motor to be used for turning an earth auger, operating a winch, operating a rotary cutter for cutting asphalt or concrete, or turning a concrete mixer;

(2) An air hoist to be used for raising or

lowering the earth auger, for raising poles, for raising or lowering supplies of any kind, which it is desired to handle in that way, for moving earth in back filling, for handling concrete either in mixing it or placing it;

(3) A pneumatic pump, to be used for pumping water out of manholes or out of ditches under construction;

(4) A pneumatic sprayer for spraying paint upon poles, buildings, vehicles, and bridges;

(5) A pneumatic sand blast for cleaning iron work, cleaning off old paint, scrubbing vehicles, et cetera; and,

(6) A derrick for the convenient handling and coordination of the other elements of this device.

For instance, in the operation of the earth auger, the rotary air drill attached to the auger is suspended from a rope passing over a sheave in the end of the derrick boom. The other end of the rope is attached to the piston of the air hoist. The operation of the earth auger consists in alternately applying the air pressure to the cylinders of the air drill and to the air hoist, the first effecting the rotation of the auger until it is full of earth and the second raising of the auger to a point where it may be emptied.

The motor-truck is arranged so that an apparatus commonly known among motor vehicle men as a "power take-off" may be connected to the transmission case in such fashion that at the will of the operator it can be kept running at all times whenever the motor or engine is running, whether the motor vehicle is traveling or not. This power take-off is connected to suitable transmission devices so that it can be geared by belting, chain and sprocket, or other means to an air compressor. The air compressor is furnished with a regulating device or so-called unloading device which operates to serve as a safety valve whenever the pressure in the tank reaches a certain selected maximum pressure. It is also furnished with the necessary means for cooling the cylinders, such as a radiator on a storage tank, and means for circulating water therefrom through and between cylinders.

The pressure discharge connection of the air compressor is connected through piping, with certain devices to secure some flexibility

when necessary, to a tank or air receiver. This tank is connected through piping with the regulating device on the compressor so that the tank pressure controls said regulating device. Connections from this tank also extend to a central point near the foot of the mast, where, as will be more fully explained, pipe connections are afforded for a hose extending and connected to a rotary air drill, a hose extending and connected to an air cylinder hoist, and a hose extending and connected to a reciprocating air drill, such as may be required for excavating rock.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Fig. 1 is a plan of an autotruck embodying the improvements of this invention, with the derrick swung outward somewhat for boring a hole beside a roadway.

Fig. 2 is a right side view of the device with the derrick boom swung to its normal position, parallel with the body of the truck.

Fig. 3 is a left side view of the device.

Fig. 4 is a section at 4—4 on Fig. 1.

Fig. 5 shows the boom joint.

Fig. 6 is a section at 6—6 on Fig. 5.

Fig. 7 is a top plan of the "frost" auger.

Fig. 8 is a side view of the "frost" auger.

Fig. 9 shows a modified derrick detail.

In the construction shown in the drawings, the autotruck 1 includes a body part of platform 2 on one side of which about midway of its length is mounted a derrick 3 secured to a rigidly mounted cross frame 4. Power means are provided for operating the derrick, including a pneumatic hoist cylinder 5 and an air supply tube 5' leading to the storage tank 6, which is supplied by an air pump 7 operated by the power source of the truck.

The derrick proper includes a mast member 8, which is substantially a part of frame 4 and a boom 9 swingingly mounted at its lower end at the base of member 8. Tackle and fall means 10 extend from the top of mast 8 to the extremity of boom 9 whereby the inclination of the latter may be adjusted from time to time as may be required.

A power cable 11 operated by the air cylinder 5 extends by the way of suitably arranged pulleys to the base of boom 9, thence to the outer end thereof, and downward to support the pneumatic motor 12 adapted for operating the twist drill or auger 13.

Laterally disposed means 14 are provided for securing the frame of motor 12 against the turning on its vertical axis which would otherwise result from the torque or mechanical reaction relative to drill 13. Said means 14 is in the form of a torque arm or yoke including an extensible bar or shank part secured at one end to the boom 9 adjacent to the mast, as by a combined swivel

and hinge joint 15, the opposite end being bifurcated and the arms 16 and 17 being secured to motor 12 by the arms 12' and 12'' on the opposite sides thereof. The yoke 14 is adapted for both telescopic and swivel action whereby its length is adjusted automatically according to the inclination of boom 9 relative to the perpendicularly supported device 12, and the auger may be swung sidewise. Hence the stiffer outer section 14' is free to turn axially on the smaller inner section 14'', so that the motor and drill or auger attached thereto may be tilted in any direction, as for drilling at an angle.

A pneumatic tube 18 extends from the tank 6 to the motor 12 for supplying the necessary power to operate the drill or auger 13. One or more racks 19 are provided on the platform 2 for supporting an assortment of drills, augers, and such other tools as may be required, as shown at 20.

In order to more rigidly support the derrick when in use, a pivotally mounted bearing 21 is provided directly under the mast member 8 at the lower edge of the downwardly extending vertical frame part 4'. Said member 21 is cam-shaped and comprises a relatively shallow part 22 and a deeper part 23 with a curved convex bearing surface extending from one edge to the other so that when the support 24 is released the cam may be adjusted to bear directly on the ground.

The boom 3 is of telescopic construction so as to be shortened, if desired, as when the truck is moved on the road. The smaller outer part 25 slides into the thicker inner part 26. The outer end of the part 26 is slotted longitudinally on one side and is provided with clamping means 27 secured by a bolt 28 for locking the outer section of the boom in place. Supplementing this bolt 28 is a clamp 29 secured to the outer part by a bolt 30. The mast 8 is secured in vertical position by stays or guy members 31 and 32.

Though the main use of the above-described derrick device is for boring holes, it is also used advantageously for handling materials, and particularly for raising telephone poles and the like in the process of setting same in the holes which have been drilled. In order that the derrick may be thus used for raising poles and the like, the drill motor 12 is swung to the rear of the truck where it is lowered into place for support on the bracket means 33, whereupon the tackle fall 11 is disconnected from the motor supporting loop 34 and a chain 35 or other suitable pole gripping means substituted therefor, as illustrated in Fig. 9.

In the modified arrangement of derrick parts shown in Fig. 9, the pneumatic lift cylinder 36 is secured at its lower end to the inner end of the boom 3, and the fixed end

of the cable 11 opposite from chain 35 is secured in the hand windlass 37, also secured to the boom adjacent to its inner end. Said windlass 37 serves to adjust the effective length of the cable 11, takes up the slack and may supplement the lift 36 where a long range pull is necessary. In this instance, the cable 11 runs over a pulley 38 mounted adjacent to the outer end of the boom 3.

The cable 10 for raising and lowering the boom has one end secured to the becket of the outermost pulley over which it travels, and the opposite end is arranged to be wound upon a hand windlass 39 for adjusting the inclination of the boom.

In order to facilitate boring holes in the earth when the ground is frozen, a special form of earth auger is used, as illustrated in Figs. 7 and 8. This "frost" auger comprises a central core shaft or bit member 41, the upper end of which serves as a shank 42 to be engaged by the drill chuck of motor 12, and the lower end is provided with a screw tip 43 for entering the ground. A casing member 44 is disposed symmetrically about said central member, which casing comprises a pair of segments 45 formed integrally with a horizontal top member 46. On the upper side of the top member is an upstanding collar 47 rigidly secured to the bit member 41. A pair of vertically disposed shafts 48 are rotatably mounted on opposite sides of the casing member, the lower ends of said shafts being provided with inclined interchangeable cutting blades 49 disposed to engage the earth in a downward direction as the auger rotates clockwise for boring. The upper end of each of said shafts is provided with a crank arm 50 for oscillating the shafts. Movement of said arms inwardly serves to throw the cutters at the lower end of the shaft inward, whereby upon attaining a sufficient depth the auger may be caused to undercut the lump of earth contained within the casing sufficiently to cause it to break away easily when the auger is raised. Said arms 50 are actuated by links 51 extending inwardly to a disk 52 pivoted horizontally on the bit shaft 41.

Actuating means for turning the control mechanism above described, is provided, comprising a hand wheel 53 having a screw shank set in an upright bracket 54 fixed on part 46 and operatively connected to said plate by a tension member 55 tangentially related to the disk and connected thereto, said tension member being in the form of a helical spring. A lock is provided to secure the disk in a fixed position, comprising a swingingly mounted latch 56 pivoted in an upright secured to a bracket 57 set on the horizontal part 46 of the casing. When the frost auger is to be used, the disk 52 is so positioned that the cutters are disposed in a normal operating position with their cut-

ting faces disposed tangentially of the casing wall. In this position the latch 56 engages a notch 57 in the edge of the disk. Tension is then applied to the spring by turning the hand-screw 53. Then after the auger has been rotated in its boring position sufficiently to have filled the casing chamber with earth, the latch is disengaged, whereupon the tension of the spring 55 rotates the disk and the links 51 pull the arms 50 inwardly thereby swinging the cutters centrally so that as the auger continues to rotate the block of earth will be undercut and released ready for removal by hoisting the auger.

In order to carry the motor 12 more securely when traveling along the road it may be supported on the bracket arms 33' with the arms 12' and 12'' resting in the sockets 33'', instead of hanging the motor on the pole and hook device 33 above mentioned. When the motor is hung by its loop 34 on the hook of bracket 33 the torque yoke 14 is retracted and swings below the motor. In order that said yoke 14 may swing horizontally relative to the boom 3 it is provided with a vertical joint 15' at its base. This permits the boom to swing freely for general work when the boring apparatus is hung on its bracket and the yoke 14 is stationary.

Although but one complete specific embodiment of this invention is herein shown and described, together with modifications of certain parts, it is to be understood that some of the details may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. In combination, a truck, a derrick mounted on one side thereof, tackle for said derrick, a motor suspended adjustably for raising and lowering by said tackle, torque resisting means laterally connecting said motor to said truck and a downwardly facing vertically axeled tool operatively connected to said motor for engaging the ground.

2. In combination, a truck, a laterally swinging derrick mounted on one side thereof, tackle for said derrick, an outwardly hung motor suspended adjustably on said derrick for raising and lowering by said tackle, an earth auger operatively connected to said motor, and inflexible telescopically jointed means extending from the derrick to the motor frame to hold the latter against turning.

3. In combination, a truck, a power auger, derrick and tackle means on said truck for suspending said power auger in its effective position, and steadying means of rigid character secured at one end adjacent to the foot of the derrick and at its other end to the frame of said power auger to prevent rotation of said frame.

4. In combination, a truck, a power motor

having an earth auger attached thereto, derrick and tackle means for adjustably supporting said motor and auger, and a forked yoke for steadying the frame of said motor
5 against turning, said frame having oppositely disposed horizontal handles to which the branches of said yoke are pivotally connected respectively, and the opposite end of the yoke being pivotally supported rela-
10 tive to the truck to permit the yoke to swing with the derrick.

5. In combination, a truck, a power motor having an earth auger attached thereto, derrick and tackle means for adjustably sup-
15 porting said motor and auger, and a forked yoke for steadying the frame of said motor against turning, said frame having oppositely disposed horizontal arms to which the branches of said yoke are pivoted respective-
20 ly, and the opposite end of the yoke being pivotally supported relative to the truck to permit the yoke to swing with the derrick, said yoke having a telescopic joint and being freely extensible.

6. A derrick truck having power operated
25 interchangeable derrick attachments, including earth boring augers, a pneumatic piston for operating the lift cable, and a hand windlass for adjusting the slack and for
30 supplementing the lift of the piston.

7. A device of the character described, including a truck having a frame provided with a laterally positioned derrick, and a supporting cam pivoted to said frame and
35 arranged to swing down to bear upon the ground for supporting said frame and derrick when the latter is in use.

8. In combination, a truck, a derrick there-
on, an earth auger suspended freely in a
40 pendulous manner on said derrick for swinging in any direction, a source of power on said truck, means to transmit driving power therefrom to said auger, and means on which
45 the torque effort may effectively react in driving the auger.

Signed at Chicago this 11th day of May
1921.

JOHN M. HUMISTON.