Nov. 8, 1938. A. DUKELOW 2,135,970

POST HOLE FORMING MACHINE

Filed Aug. 24, 1937 5 Sheets-Sheet 1

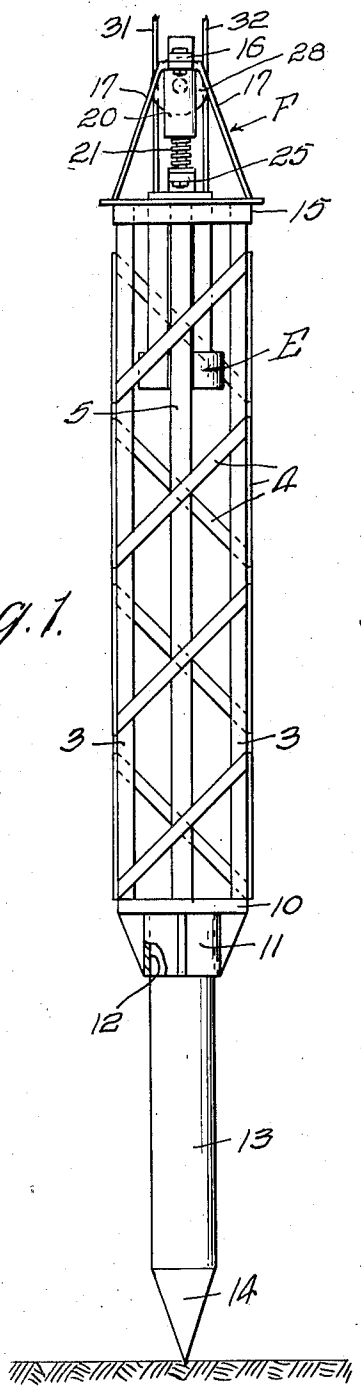


Fig. 1.

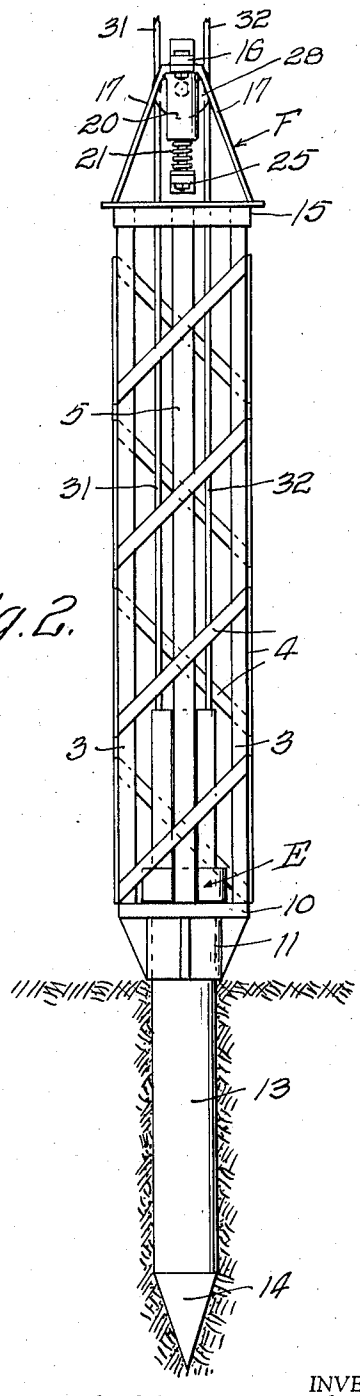


Fig. 2.

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POST HOLE FORMING MACHINE

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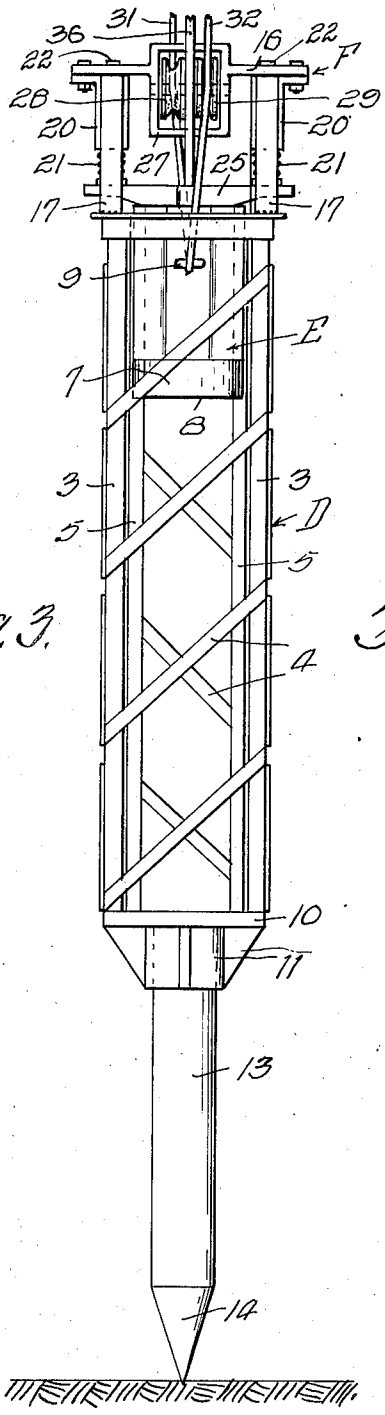


Fig. 3.

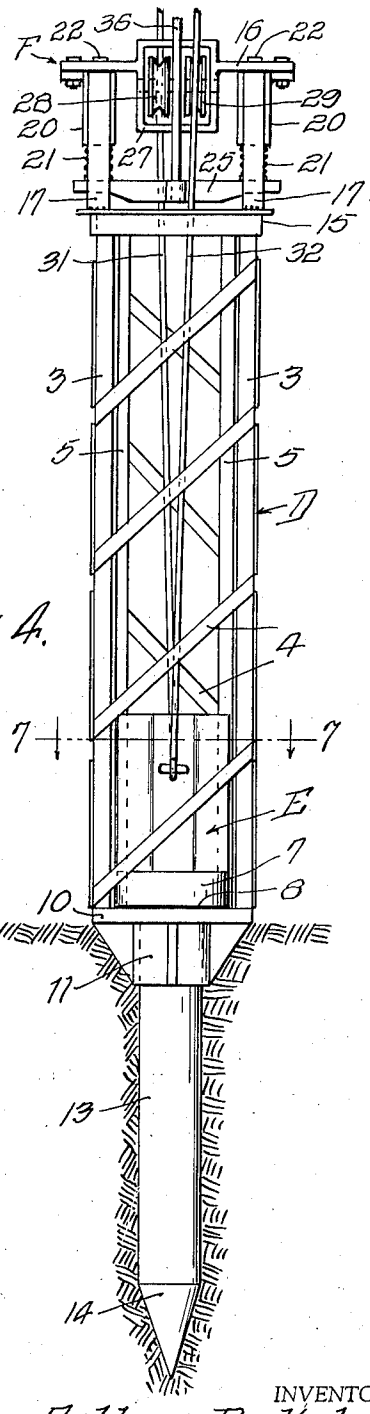


Fig. 4.

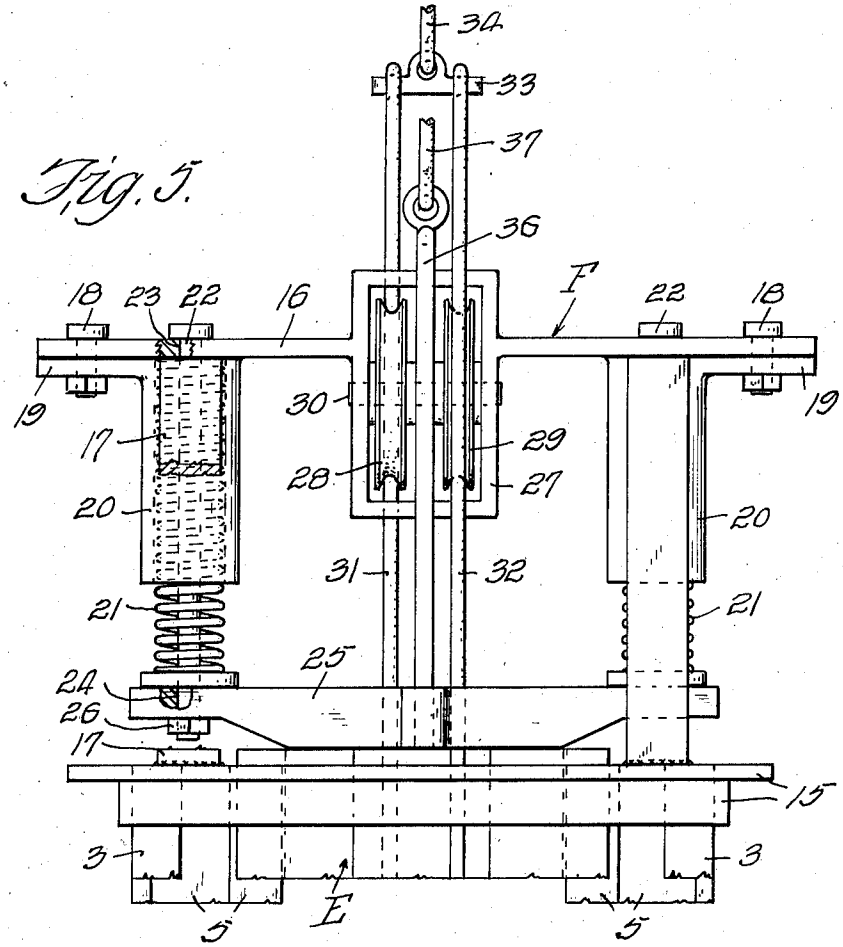
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POST HOLE FORMING MACHINE

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Fig. 5.



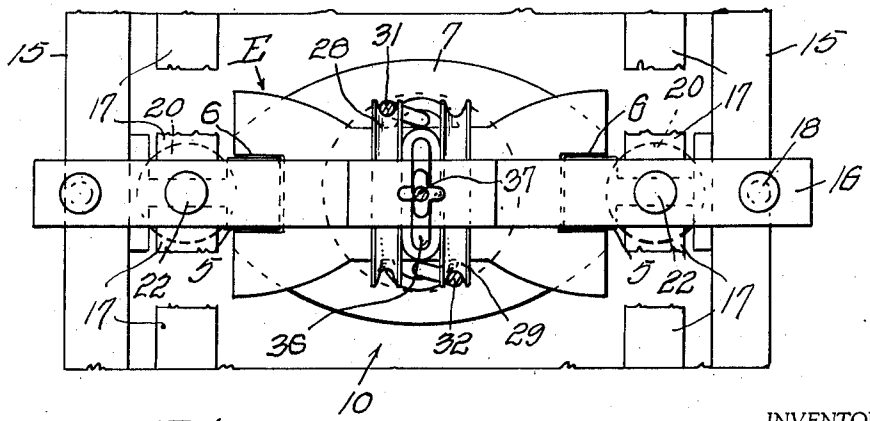


Fig. 6.

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POST HOLE FORMING MACHINE

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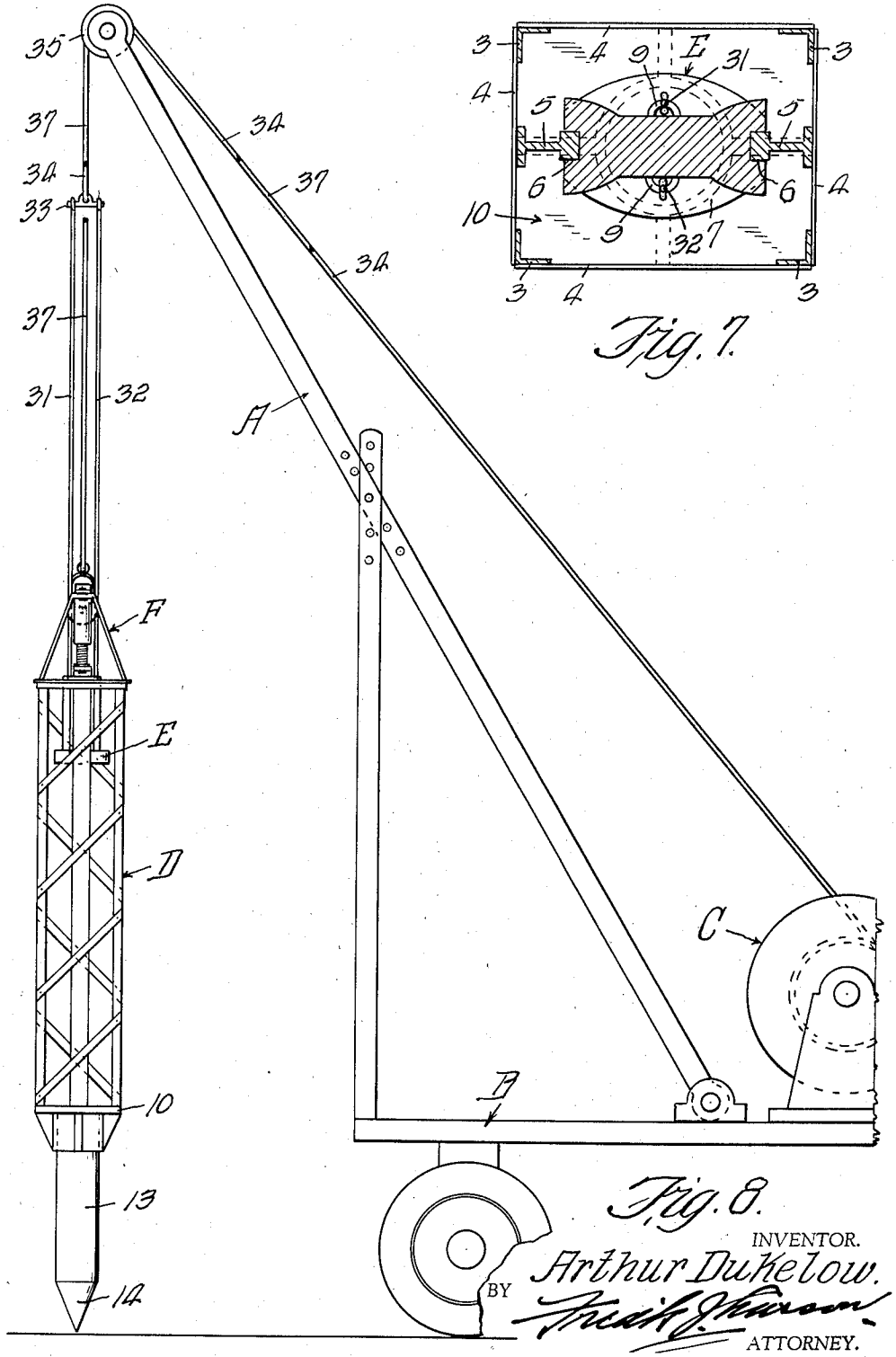


Fig. 7.

Fig. 8.

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POST HOLE FORMING MACHINE

Filed Aug. 24, 1937 5 Sheets-Sheet 5

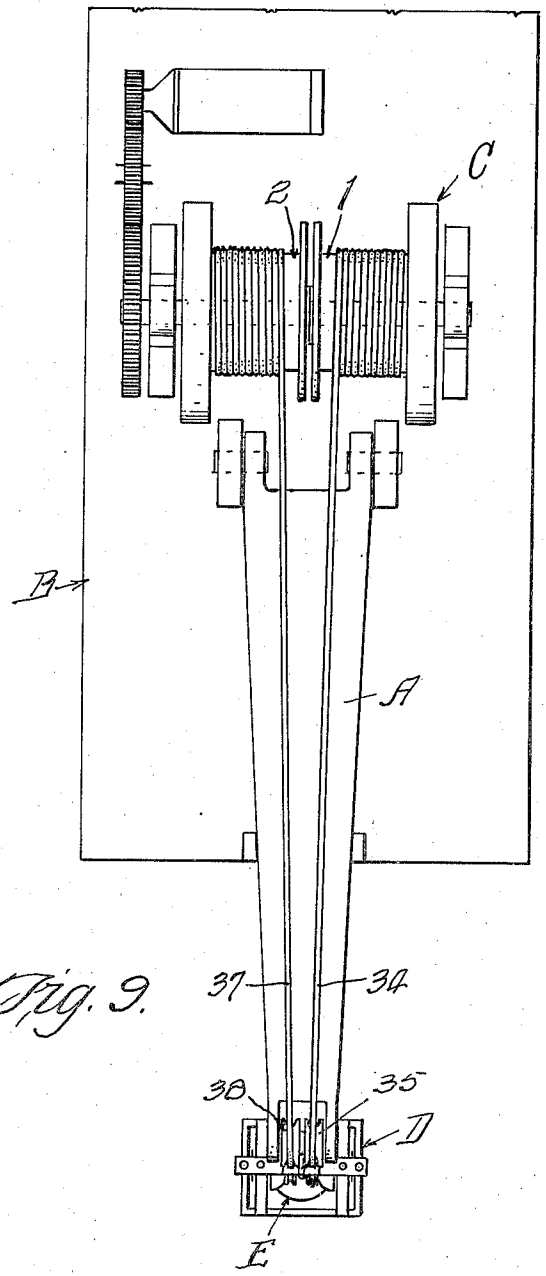


Fig. 9.

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Patented Nov. 8, 1938 2,135,970

UNITED STATES PATENT OFFICE

2,135,970

POST HOLE FORMING MACHINE

Arthur Dukelow, Denver, Colo.

Application August 24, 1937, Serial No. 160,653

15 Claims. (Cl. 255—1)

This invention relates to an apparatus, or machine for mechanically forming holes in earth.

The invention has for its primary object to provide, in a manner as hereinafter set forth, an apparatus comprising a simple, compact, durable and novel construction, combination and arrangement of parts, which can be operated with facility, and through the medium of which holes in earth, for various purposes, but more particularly post holes, can be expeditiously and uniformly formed by persons having no skill in such art, and without the removal, or handling of earth during the hole forming operation.

Another and important object of the invention is to provide an apparatus of the aforementioned character in which the holes, formed thereby, have substantially hard packed walls and are of uniform diameter throughout their depth.

Another and important object of the invention is to provide an apparatus which shall embody a pointed pile projecting downwardly from a concussion plate or pile head, which is carried by a frame lead structure including a drop hammer, and which lead structure and hammer are suspended from independent cables associated with a boom and usual hoisting mechanism mounted on a truck.

An additional object of the invention, broadly speaking, is to provide an apparatus with means for preparing post holes, such for instance, as guide post holes along the curves in highways, by successive concussions to the head of a pile associated with a suspended lead structure and a suspended hammer vertically slidable in the lead structure.

A further object of the invention is the provision of means at the upper end of the lead structure to cushion the hammer shocks at the end of the upward travel of the hammer.

An object of the present invention is to overcome the digging of post holes by hand, as by shovels, which is slow and tedious, especially where the earth is graded earth such, as in highway construction, and, where dirt, sand, gravel and rock are present, which requires a hole to be dug in which a man can stand, due to cave-ins and the like, where otherwise the hole would be of smaller diameter.

All of the foregoing and still further objects of the invention will readily become apparent from a study of the following specification, when read in connection with the accompanying drawings, wherein like characters of reference denote similar parts throughout the several views, and in which drawings one preferred form of the construction of the invention is illustrated.

Referring to the drawings:

Fig. 1 is a side elevation of a post hole forming device embodying the features of my invention and showing the hammer in its uppermost position, and the pile in position to start a post hole.

Fig. 2 is a view similar to Fig. 1 showing the pile as fully in the ground which will leave a finished post hole when elevated from the ground.

Fig. 3 is a view of the device taken at a right angle to Fig. 1.

Fig. 4 is a view of the device taken at a right angle to Fig. 2.

Fig. 5 is a fragmentary view of the upper end of the device, showing parts thereof broken away and in cross-section.

Fig. 6 is a top plan view of the device with portions of the lead structure broken away.

Fig. 7 is an enlarged horizontal sectional view taken on line 7—7 of Fig. 4.

Fig. 8 is a diagrammatic view of the hole in side elevation of the post hole machine as a whole.

Fig. 9 is a top plan view of the machine.

As regards its general features and excepting as to features pointed out, a truck and hoisting mechanism associated with my invention may be of any desired or approved construction, as a considerable number of different makes of hoisting mechanisms of the general, or usual types are for sale commercially, and in common use for other purposes than that which I herein propose, and, it is therefore not believed necessary to show and describe such hoisting mechanism in detail, as all necessary details, both regards structure and operation, can be readily supplied by engineers and mechanics skilled in the art, and, in the drawings, I have shown and described only a boom mounted on a truck and the hoist drums and which exemplify any usual boom on a truck and hoisting mechanism which may be employed with my hole forming device.

Describing my invention with particular reference to the drawings. The reference character A designates a suitable boom, suitably mounted on a truck designated B, and, the reference character C designates, generally a suitable hoisting mechanism, suitably apertured, and shown as including two suitable or usual hoist drums, designated 1 and 2.

Associated with, and arranged and used in combination with aforementioned mechanisms A, B and C, is a suitable frame structure, hereinafter known as a lead structure, and designated, generally as D.

The lead structure shown in one preferred embodiment thereof, includes four suitable corner posts or members 3 of angular or other formation, which are suitably spaced apart and suitably braced by members 4 to form an elonged skeleton shaped rectangular frame or lead structure. A pair of suitable guide members 5, known as slides, or tracks, are suitably secured to the frame structure described and they are preferably arranged midway the corner posts 3 on opposite sides of the frame. A suitable weight, or hammer designated, generally as E, is slidably mounted between the two slide or track members 5. The weight E is vertically recessed, as at 6, on opposite sides thereof to receive the slide or track members 5 so as to prevent lateral displacement of the weight, or hammer in its vertical sliding movements. The weight, or hammer E is also provided with a suitable base portion 7 having a plane lower face 8 and its side walls at right angles to the recesses 6 are provided with suitable eyelets 9.

The lower end of the elongated frame structure E is provided with a suitable concussion plate 10. The plate 10 is suitably secured to the lower ends of the corner posts 3. The concussion plate 10 is preferably provided with a suitable underside reinforcement structure 11 providing a socket 12 to suitably receive the upper end of a suitable pile member, or hole forming tool 13, which is suitably secured against displacement. The pile tool may be solid or tubular and it is provided, or formed at its lower end with a suitable pilot or point 14. The pilot point may be integral with the pile member, or hole forming tool 13, or it may be detachably secured thereto, as is manifest. It may be here mentioned, that the concussion plate 10 serves as a head for the pile member 13, as clearly shown in the drawings.

A suitable horizontally disposed frame structure 15 is secured to the upper ends of the corner posts 3 and forms a part of the lead frame structure D.

A super-structure designated, generally as F, is carried by and above the upper frame 15 of the lead structure D due to the springs resiliently yielding against such shocks.

The super-structure F comprises a pair of suitable cross-head members 16 supported in position a suitable distance above the upper end of the lead frame structure by means of suitable legs 17, which are suitably secured at their lower ends to the frame member 15 at the upper end of the lead frame structure. The cross-head 16 is secured by suitable fastening devices 18 at its ends to ears 19 projecting laterally from the upper ends of tubular members 20, which tubular members 20 depend from and are disposed between the upper ends of each pair of legs 17, as clearly shown in Figs. 1, 2 and 5 of the drawings.

Suitable compression springs 21 are carried in the tubular members 20 with the upper ends thereof contracting the under face of the cross-head 16 and with their lower ends projecting a suitable distance below the lower edges of the tubular members 20. A suitable bolt 22 passes downwardly through openings 23 in the cross-head 16 through the springs 21 guided by the tubular members 20 and through openings 24 in the ends of a suitable buffer yoke member 25 upon the ends of which the springs 21 are seated. The lower ends of the bolts 22 are provided with suitable nuts 26 for slidably connecting the yoke member 25 with the bolts 22, so that the yoke member will serve as a buffer to cushion the shock of the hammer E at the end of its upper stroke or movement.

The cross-head, or bar 16 is provided midway its ends with a vertically disposed frame structure 27, open on opposite sides, and within the frame structure 27, there is rotatably mounted a pair of sheaves designated 28 and 29 on a suitable shaft 30 journaled in the frame structure 27. A pair of suitable cables designated 31 and 32 ride over the sheaves 28 and 29 and they are connected at their lower ends to the eyelets 9 secured to opposed sides of hammer E. The upper ends of the cables 31 and 32 are suitably tied together or secured to a suitable connection 33 and from this connection or the tied ends of the cables a suitable single cable 34 leads to and over a sheave 35 on the point of the boom A and then to a suitable hoist drum, shown for the purpose of illustration only as drum 1, which when driven under power in one direction raises the weight or hammer E to the end of its upstroke after which the drum is released and the weight or hammer E falls within the lead structure and strikes the pile head plate 10 with such force as to drive the pointed pile into the ground a short distance, and by successive falls of the hammer, driving the pile member 13 into the ground by successive concussions until the hole has been formed.

A suitable bail-like member 36 is suitably connected at its lower ends to the buffer yoke 25. The bail 36 projects upwardly from yoke 25, straddles the frame structure 27 of the cross-head or bar 16 and is connected a suitable distance above the frame structure 27 of the bar 16 with a single hoist cable 37 which leads to and over a sheave 38 on the point of the boom A and then leads to a suitable hoist drum shown for the purpose of illustration only as 2.

In operation, the hoist cable 37 is employed for hoisting the lead frame, as the lead frame is suspended therefrom, as is clearly apparent from the drawings and the foregoing description. Thus, it will be apparent that the lead frame can be positioned directly over any piece of ground in which a hole is to be formed, and the pile point directed to the very center of the hole to be formed. After the lead frame has been properly positioned and the pile point jabbed into the ground by the mere weight of the apparatus due to gradual release of cable 34, the lead frame may be guided manually until the pile or hole forming tool 13 has entered the earth a sufficient distance as to balance and support the lead frame structure without manual assistance. After the pointed pile or hole forming member 13 has been started into the ground, the weight or hammer is operated and by succession blows against the concussion plate 10, the pointed pile member 13 is gradually driven into the ground or earth by successive concussion, as is manifest.

When the hole has been formed, the lead structure is raised by the cable 37.

A hole formed in the manner illustrated and described, will have a substantially packed or hard wall, even when the ground in which the hole is being formed is soft or loose, or cluttered with pieces of rock or other materials, as the force of the pointed pile member 13 in being driven into the earth forces the ground laterally packing the same, thus giving the wall of the hole a smooth and substantially hard surface not likely to give away until a post is inserted into the hole. Further, a hole, so formed, need not be substantially larger in diameter than the post to be placed therein, whereas holes dug by spades, as is the

usual and present manner of making them, particularly in graded material along highway constructions where post hole diggers of usual construction are not practical due to hard and foreign materials in the ground, must of necessity be of such diameter as to permit a man to stand in the hole to dig the same as they are an average of five feet or the like in depth. With my present apparatus, holes of such depth are quickly formed and the diameter for such holes in highway work is substantially one foot. While I have referred to dimensions herein, it is only for the purpose of illustration and clarity, as it is manifest that the depth and diameter of the holes are gauged solely by the length and diameter of the pointed pile or hole forming tool 13.

It is nothing unusual for a man to dig but a few holes in a day with a spade in certain formations of graded highway material, whereas in the same ground a very large number of holes can be formed with my present apparatus in the course of a day.

It is, of course apparent that the length of the lead structure can be of any desired height, the pile member of hole forming tool can be of any length and diameter, and that the hammer may be of any desired weight, as well as the hoisting mechanism being of the usual or any desired construction.

The many advantages of the herein described invention, it is believed, will be readily apparent to those skilled in the art to which the invention relates.

From the foregoing description, it is evident that a simple device for this purpose has been disclosed, but it is to be understood that I do not desire to restrict, or limit myself to the very details of the construction shown and described, which is merely illustrative, it being obvious that changes, not involving the exercise of invention, may be made without conflicting or departing from the spirit of the invention within the scope of the appended claims.

What I claim is:

1. In combination with a boom and hoisting mechanism, of a lead structure, a pile projecting downwardly from and carried by the lead structure, and means for driving the pile into earthen material by successive concussions for forming a hole therein.

2. In combination, a truck, hoisting mechanism on the truck, a boom on the truck, cables leading from the hoisting mechanism to and over sheave on the point of the boom, a lead structure suspended from one of the cables, a hammer suspended from the other cable and mounted for vertical sliding movement in the lead structure, a pile carried by and projecting downwardly from the lead structure adapted to be driven into earth formation by successive concussions delivered by the hammer.

3. In an apparatus of the class described, a lead structure, means from which said structure is suspended, a weight slidably mounted for vertical movement in said lead structure, and a pointed pile carried by the lower end of the lead structure for forming holes in earthen material by successive concussions delivered by said weight in falling movements thereof.

4. In a post hole forming machine, the combination of a boom, of hoisting mechanism including a pair of cables, means suspended from said cables for forming holes in earthen material by successive concussions, said means including a lead structure, a weight slidably mounted in the lead structure, and a pointed pile carried by and projecting downwardly from the lead structure.

5. A machine as defined in claim 4, including a structure carried by the upper end of the lead structure for absorbing shock delivered to the lead structure at the end of the upward sliding movement of the weight.

6. An apparatus of the class described comprising a lead structure, a pointed pile projecting from the lower end of said structure, means for raising and lowering the lead structure in a vertical suspended position, and vertically slidable means mounted in the lead structure to deliver concussions to the pile at the end of downward movements thereof to drive the pile into and from a hole in earthen material.

7. In combination with a lead structure, a cable from which the lead structure is suspended, a weight slidably mounted in the lead structure, a cable from which the weight is suspended, and a pointed pile secured to and projecting from the lower end of the lead structure.

8. In combination with a lead structure, a weight slidably mounted in the lead structure, a concussion plate at the lower end of the lead structure against which the weight strikes, and a hole forming tool in the form of a pile secured to and depending from the concussion plate.

9. In combination with a lead structure, a weight slidably mounted in the lead structure, a concussion plate at the lower end of the lead structure against which the weight strikes, a hole forming tool in the form of a pile secured to and depending from the concussion plate, and means carried by the upper end of the lead structure to cushion shocks delivered to the lead structure during upward movements of the weight.

10. A power post hole machine having, in combination, a boom, a pair of hoist cables riding over sheaves on the point of the boom, a skeleton lead structure suspended from one of the hoist cables, a concussion plate on the lower end of said structure, a heavy member slidably mounted for vertical movements in said lead structure and suspended from the other cable, and a pointed pile projecting downwardly in axial alignment with the lead structure and adapted to be driven into earth formation by concussions delivered to the concussion plate by said heavy slidable member to form a hole having substantially packed walls after the pile has been elevated therefrom.

11. A post hole device comprising a skeleton frame structure, opposed tracks within the frame structure, a heavy concussion plate on the bottom end of said frame structure, a socket formed in the lower side of said concussion plate, a pointed pile carried by the socket and projecting downwardly therefrom, a hammer slidably mounted in the frame structure adapted to ride on the tracks, a leg supported cross-bar disposed above the upper end of the frame structure, spring sockets supported by said legs, compression springs in said sockets, a shock-bar supported by rods depending from the cross-bar and passing through said springs, a bail for the shock-bar, a hoist cable connected to said bail for raising and lowering the skeleton frame, a pair of sheaves mounted on said cross-bar, hoisting cables connected with the hammer and riding said sheaves and said cables being connected to a single hoist cable for raising the hammer.

12. A device of the class described having, in combination, a lead structure, a drop hammer vertically slidable within said structure, and a pile

secured to and projecting downwardly from the lower end of said lead structure.

13. A device of the class described having, in combination, a lead structure, a drop hammer vertically slidable within said structure, a pile secured to and projecting downwardly from the lower end of said lead structure, and a hammer shock cushioning mechanism connected with the upper end of said lead structure.

14. A device of the class described having, in combination, a lead structure, a drop hammer vertically slidable within said structure, a pile secured to and projecting downwardly from the lower end of said lead structure, a hammer shock cushioning mechanism connected with the upper end of said lead structure, and means associated with said mechanism for raising and lowering the lead structure.

15. In a post hole machine, an elongated skeleton box like structure, opposed leads within the structure, a weight mounted for sliding movements on said leads, a concussion plate on the lower end of said structure, and a pointed pile secured to and projecting from said concussion plate.

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