

N. H. SMITH,
 MECHANISM FOR OPERATING EARTH BORING TOOLS.
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1,299,803.

Patented Apr. 8, 1919.

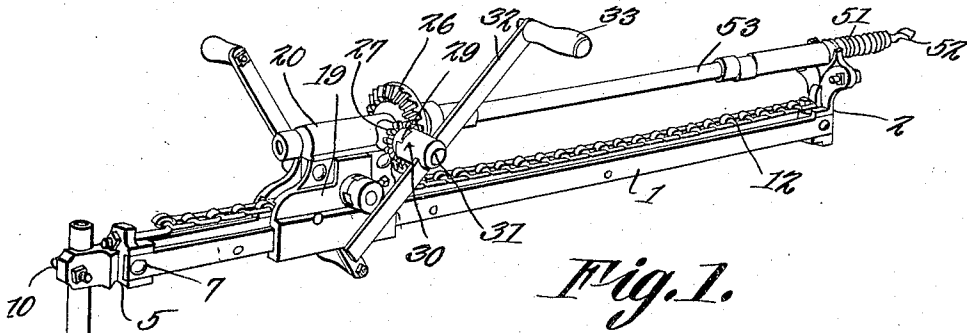


Fig. 1.

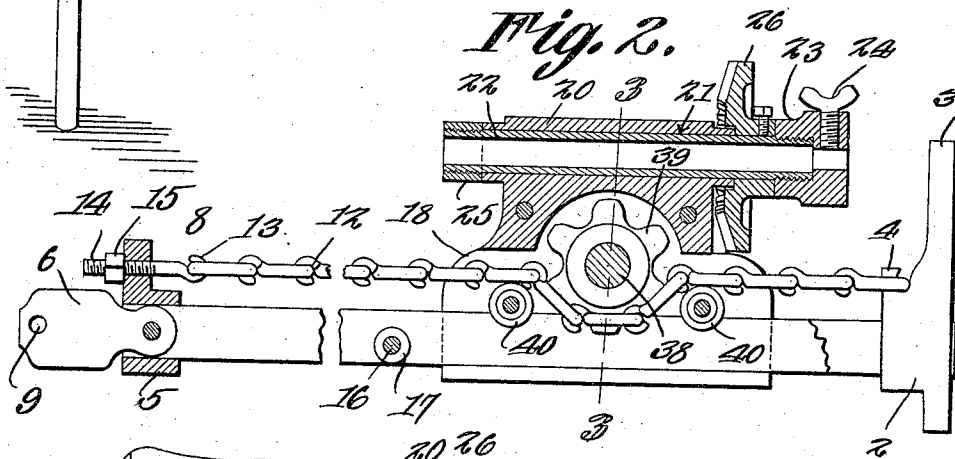


Fig. 2.

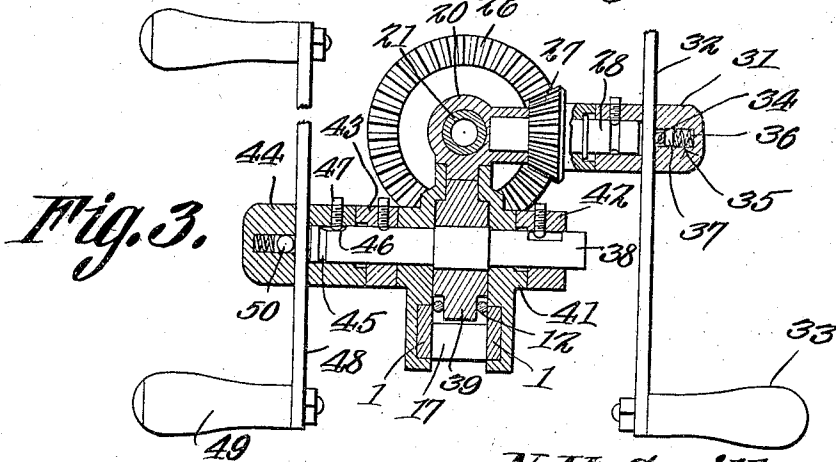


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR OPERATING EARTH-BORING TOOLS.

1,299,803.

Specification of Letters Patent.

Patented Apr. 8, 1919.

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To all whom it may concern:

Be it known that I, NEWTON H. SMITH, a citizen of the United States, residing at Hamilton, in the county of Hancock and State of Illinois, have invented a new and useful Mechanism for Operating Earth-Boring Tools, of which the following is a specification.

This invention relates to mechanism for operating earth boring tools such as shown, for example, in an application filed by me on May 20, 1916, Serial No. 98,832.

As is well known, it is the practice in some localities to drill or bore holes horizontally in the ground for the reception of small gas or water pipes which can thus be laid without the necessity of digging trenches or ditches. The augers employed for this purpose have generally been pushed and turned by gripping the end of the stem or shaft carrying the auger or the end of an iron rod or link. After the auger has been forced into the ground a short distance it is pulled out so as to remove the loosened soil and is then reinserted. This operation is exceedingly laborious and slow.

One of the objects of the present invention is to provide a simple and efficient mechanism which can be lowered in a pit at the point where the boring is to be started and which constitutes means for rotating the boring tool and also for feeding it at a desired speed into the soil, said mechanism being so constructed as to multiply the power exerted in the boring operation and the feeding means being adapted, when reversed, to quickly withdraw the auger from the soil in which it is embedded.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—

Figure 1 is a perspective view of the mechanism constituting the present invention.

Fig. 2 is a central vertical longitudinal

section through the mechanism, parts being broken away.

Fig. 3 is a section on line 3—3 Fig. 2.

Referring to the figures by characters of reference 1 designates parallel side members connected at one end by a block 2 which is provided with an upstanding guide 3 in the form of a yoke and also with an upstanding stud 4 constituting an attaching means, this stud being arranged over the space between the side members. The side members are spaced apart at their upper ends by blocks 5 and 6 arranged side by side, all of these parts being held together by a transverse bolt 7. The block 5 has an upstanding ear 8, while the block 6 extends longitudinally beyond the side members and is provided with a transverse aperture 9. This aperture is adapted to receive the threaded end of a hooked bolt 10 which is designed to straddle a detachable and adjustable leg 11 which can be made of gas pipe or any other like structure. Engaging the hook or stud 4 is the end link of a chain 12, the other end link of this chain engaging a hook 13 provided at one end of a bolt 14. Said bolt engages the upstanding lug 8 on the block 5 and is held therein adjustably by a nut 15 or in any other manner desired. At intermediate points the side members 1 are connected by bolts or rivets 16 on which are arranged spacing sleeves 17.

Mounted to travel on the side members 1 are the sides 18 of a carriage 19, said carriage being offset so as to fit snugly about the side members. The upstanding sides are connected by a head 20 in which is formed a longitudinal bore 21. Journaled in this bore is a tubular spindle 22 to one end of which is secured a chuck 23 which in the form shown, has a set screw 24. The other end of the spindle is engaged by a nut 25. A bevel gear 26 is secured to the spindle between the chuck 23 and the head 20 and this gear is constantly in mesh with a smaller drive gear 27 mounted for rotation on a laterally extending stud 28 carried by the head 20. The gear 27 has an integral clutch member 29 adapted to be engaged by a clutch member 30 at one end of a sleeve 31 which is mounted on the stud 28. A lever 32 extends diametrically through the sleeve 31 and has a grip 33 at one end. Said lever is held against longitudinal movement by a roller 34 seated in a recess in the end por-

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tion of the sleeve 31, said recess being indicated at 35 in Fig. 3. A spring 36 is seated in the recess and bears against a block 37 which frictionally engages the roller 34.

5 Thus while the lever 32 is held against longitudinal movement under ordinary conditions, it can be easily pulled longitudinally when it is desired to increase or reduce the leverage.

10 Journalled within the carriage close to but above the side members 1 is a transverse shaft 38 to which is secured a sprocket 39 arranged below the head 20 and projecting slightly between the side members 1. Anti-friction rollers 40 are supported in the carriage adjacent opposed portions of the sprocket and the chain 12 extends over these anti-friction rollers and under the sprocket so as to be crimped where engaged by the sprocket and as shown in Fig. 2.

20 Extending laterally from one side of the carriage and surrounding the shaft 38 is a clutch member 41 and feathered on the adjacent end of the shaft 38 is another clutch member 42. This clutch member 42 can be shifted into engagement with the clutch member 41 to hold the shaft 38 against rotation or it can be shifted out of engagement therewith to allow the shaft 38 to rotate.

30 Secured to and revoluble with the other end portion of the shaft 38 is a clutch member 43 and mounted on the extremity of shaft 38 is a sleeve 44. The shaft has an annular groove 45 and a longitudinal groove 46 and a holding screw 47 projects into the groove 46 to hold the sleeve 44 against rotation while the clutch member 43 is engaged by the inner end of sleeve 44. By pulling the sleeve 44 outwardly, the inner end of the screw 47 can be brought into the groove 45 and the clutch member 43 can be released from the sleeve so that the sleeve 44 is thus free to rotate on the shaft 38.

45 Extending diametrically through the sleeve 44 is a lever 48 having a grip 49 at each end and engaging the lever at an intermediate point is a spring pressed roller 50 similar to the roller 34 and which serves to hold the lever against accidental longitudinal movement.

50 In using the apparatus herein described a ditch is dug at the point from which the pipes are to be laid and the structure is set up in the ditch so as to support a boring tool at the desired distance below the surface of the ground. As before stated, different forms of boring tools can be used and in the structure shown an auger 51 is provided back of a bit 52 and a stem 53 extends from the auger and is secured within the chuck 23. The tool is adapted to rest in the yoke 3 and after being fastened in the chuck the point of the tool is placed against the wall of the ditch and the lever 32 is actuated to rotate sleeve 31 and the parts controlled thereby. Thus the gear 26 will be revolved and a corresponding movement imparted to the boring tool. During this revolution of the tool, the lever 48 can be actuated to rotate shaft 38 and cause the sprocket 39 to travel along chain 12. This operation can continue until the entire tool is embedded in the ground whereupon a rod of any suitable form may be coupled to the stem and attached to the chuck, this rod being passed through the tubular spindle 22. In certain kinds of earth the tool once well embedded, will travel forward under the action of the auger without having a pushing force applied. Under these circumstances the clutch elements 43 and 44 may be disengaged so as to allow the handle 48 to remain stationary. After the tool has been driven the desired distance into the ground, it can be pulled back a few inches in order to completely break up that portion of the soil engaged by the auger, this pulling being effected by reversing the movement of the sprocket 39. The apparatus can then be detached from the tool and said tool readily withdrawn by hand from the opening. By providing a chain connection for the sprocket 39, said chain being mounted on the supporting rollers 40 and extending downwardly under the sprocket, a positive gripping of the parts is assured and, should the chain break or become unduly worn, a new one can be readily substituted therefor at slight cost. Likewise if the sprocket becomes worn a new one can be substituted. Such a structure is advantageous as compared with one in which a rack might be used. An apparatus of this character is continually being used in damp, moist soil which would soon become packed between the teeth of a rack or its pinion and seriously interfere with their operation. This is entirely avoided by a chain and sprocket in which no pockets are formed to catch earth.

110 Importance is attached to the fact that the means employed for moving the carriage forwardly or backwardly operates independently of the mechanism used for driving the boring tool. Thus the operator can put any desired pressure behind the boring tool in order to properly advance it in different kinds of earth encountered. For instance, in a clay soil, more pressure of the left hand lever will be required in order to advance the boring tool while said tool is being turned by the right hand lever, than would be necessary in sandy or loose soil. Should the boring tool encounter shale, still more pressure would be required. With this machine an auger will bore through a brick wall, but, obviously, much greater pressure would be required with the left hand lever than while boring through softer substances. The independent operation of

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feeding the carriage forward and turning the auger enables the operator to maintain the proper relation between these two movements in whatever kind of soil or other material the auger may be working. Likewise, this independent operation enables more rapid boring to be effected in loose soil than can be accomplished where the advancing of the carriage and the turning of the auger are produced by the operation of one lever.

What is claimed is:—

A mechanism for operating earth boring tools, including a support, a carriage on the support, a spindle rotatable in the carriage, a gear wheel rigid on the spindle, a stud ex-

tending laterally of the carriage, a driving gear rotatable on the stud and meshing with the gear wheel, there being a clutch member integral with the driving gear, a sleeve rotatable on the stud and having a clutch member engageable with the clutch member of the driving gear, and a crank extending from the sleeve for operating the same.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

NEWTON H. SMITH.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."