

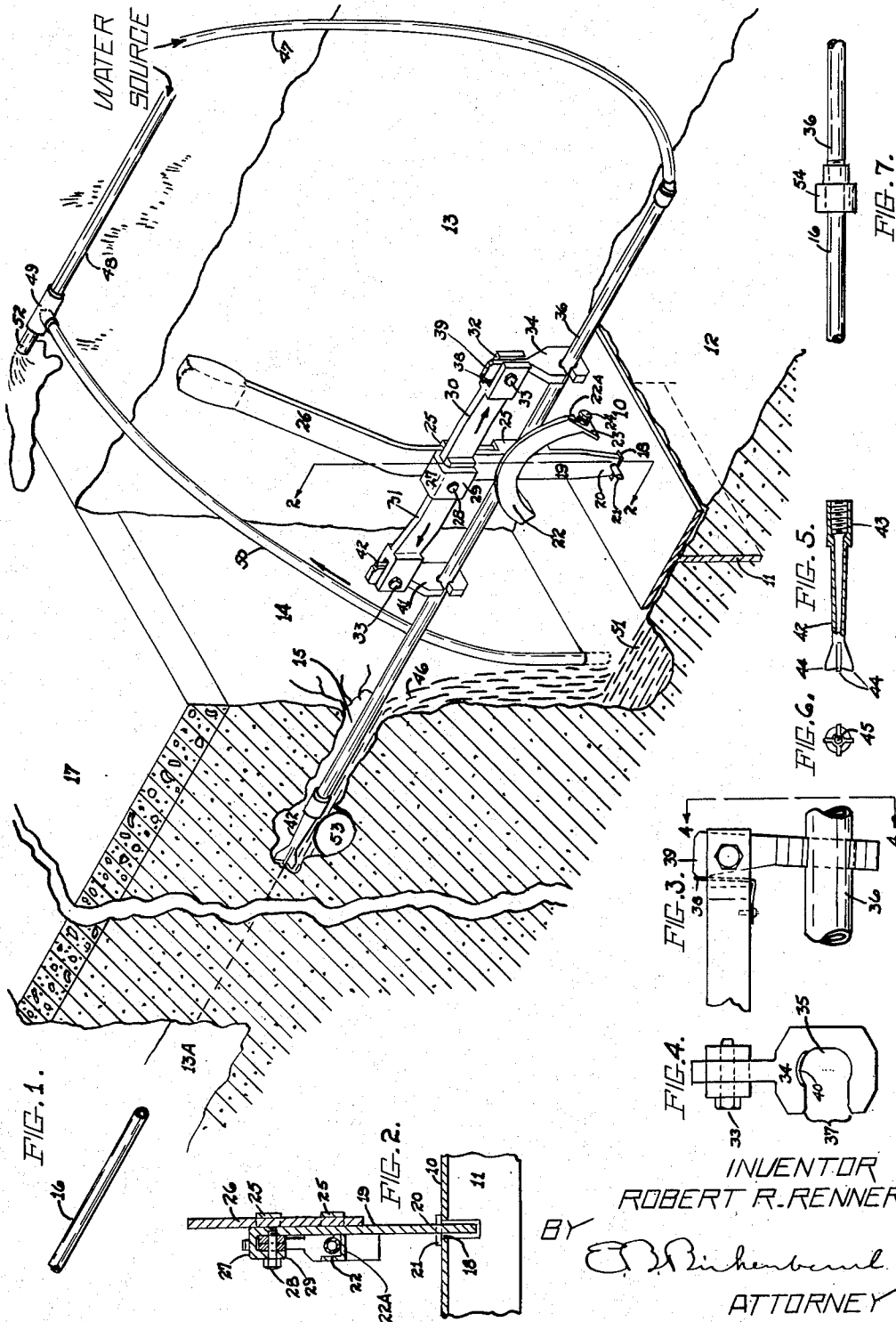
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HYDRAULIC DRILL

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HYDRAULIC DRILL

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3 Claims. (Cl. 255—1)

This invention relates generally to drills, and particularly to a hydraulic drill.

The main object of this invention is to construct a drill especially adapted for laying water pipes under pavements, walks or buildings without trenching or tunnelling in a fraction of the time ordinarily required for such purpose and with the least expenditure of effort.

The second object is to construct a drill of the class described especially adapted for use in connection with the laying of copper piping which on account of its flexibility must be drawn through an opening.

The third object is to construct a device of the class described which will adapt itself readily to the drilling of various sizes of holes and by means of which the drill point can be accurately aimed and guided toward its destination.

The fourth object is to construct an improved form of hydraulic drilling bit by means of which a small jet of water is directed along the bit axis where the force of the water is expended in drilling while the slower moving water acts as a conveyor to carry the debris out of the hole being formed.

The fifth object is to construct a device of the class described whereby the feeding action can be accurately controlled and whereby the drill carrying pipe is accurately supported at a fixed height thereby insuring accurate control of the drilling bit.

These and other objects are accomplished in the manner set forth in the following specification as illustrated in the accompanying drawing, in which:

Fig. 1 is a perspective sectional view through a trench showing the device in use.

Fig. 2 is a vertical section taken along the line 2—2 in Fig. 1.

Fig. 3 is a fragmentary side elevation of one of the pipe gripping jaws.

Fig. 4 is an end elevation of the gripping jaw taken along the line 4—4 in Fig. 3.

Fig. 5 is a side elevation of a representative form of drill bit partly broken away in section.

Fig. 6 is an end elevation of the bit shown in Fig. 5.

Fig. 7 is a fragmentary view showing the manner of attaching a copper pipe to the drilling pipe after the drilling bit has been removed.

Similar numerals refer to similar parts throughout the several views.

Referring in detail to the drawing, there is shown a base 10 which in this instance is a section of T-bar whose leg 11 is forced into the

earth 12 in the bottom of the trench 13 in whose end wall 14 a hole 15 is to be formed in order that the copper pipe 16 may be laid therethrough without disturbing the paving 17.

In the base 10 is formed an opening 18 into which is inserted the upright lever 19 in whose lower end 20 is inserted a pivot pin 21 which rests upon the top side of the base 10 and permits the lever 19 to rock within the opening 18. Secured against the side of the lever 19 is an arcuate quadrant 22, the top side 22—A of which is an arc struck from the axis of the pin 21. On one end of the quadrant 22 is disposed a downturned lug 23 in which is mounted an adjusting screw 24, the purpose of which will be explained later.

On the back of the lever 19 are formed the sockets 25 into which may be inserted the hand lever 26 which is preferably bent away from the end wall 14.

The upper end 27 of the lever 19 is bent laterally and then downwardly and a bolt 28 is passed through the downturned portion 29 into the upright portion of the lever 19. On the bolt 28 are hinged the pulling arm 30 and the pushing arm 31. On the forked end 32 of the pulling arm 30 is mounted a pin 33 on which is hinged the pipe pulling jaw 34 having an opening 35 large enough to receive the largest pipe 36 which will be used with the equipment. The quadrant 22 is of a size sufficiently large to receive the pipe 36 freely upon the surface 22—A thereof. The opening 35 has a side outlet 37 large enough to admit the pipe 36.

The forked end 32 is provided with a spring 38 adapted to engage the upper end 39 of the jaw 34 and urge its lower end toward the stop screw 24.

The edge 40 of the opening 35 is preferably serrated and hardened to enable the jaw 34 to engage the pipe 36 in a pulling direction.

The pushing jaw 41 is constructed exactly like the jaw 34 except that its spring 42 urges it in the opposite direction to the one in which the jaw 34 is urged in order that the jaw 41 may exert a pushing movement on the pipe 36 when the lever 26 is rocked toward the trench end 14.

On the pipe 36 is mounted a drill bit 42 whose coupling 43 is threaded onto the pipe 36. Cutting lips 44 radiate from the end of the bit 42 and a hole 45 extends axially through the bit 42 throughout the length thereof so that water 46 from the pipe 36 may be projected from the hole 45 against the end of the hole 15 being formed.

Water is supplied to the pipe 36 from a con-

venient source of supply through a hose 47. From the same source of supply water is delivered through a hose 48 to an injector 49 whose suction line 50 extends into the sump 51 from whence it escapes through the discharge pipe 52 into any convenient run off.

The operation of the device is as follows:

If it is desired to run a line of copper pipe 16 underneath a pavement 17 without forming a trench through the pavement or tunnelling thereunder, the trench 13 is first formed as near to the pavement as desired and the base 10 is placed in position as shown in Fig. 1. The lever 19 is then inserted into the base 10 and the pipe 36 is placed in position on the quadrant 22 and extending through the two jaws 34 and 41.

The pipe 36 is then aimed in a desired direction and guided until the hole 15 is fairly well started or thereafter if desired. Water is then admitted from the hose 47 to the pipe 36 and a rocking motion imparted to the hand lever 26. It is apparent that any movement of the lever 26 toward the trench end 14 will move the drill bit 42 into the hole 15 and any backward movement of the lever 26 will withdraw the pipe 36. However, in order to provide a feed for the drill, the withdrawal must be less than the advance and for this purpose I have provided the screw 24 which engages the jaw 34 in the extreme of the feeding stroke and holds the jaw 34 out of a pipe engaging position. That is to say, the feed is determined by the setting of the screw 24.

If, for example, a ten inch stroke is used on the pipe 36, then the pushing jaw 41 would move the pipe 36 forward ten inches, and if a one inch feed was to be used, then the screw 24 would be set to engage the jaw 34 when the lever 26 has been moved nine inches so that on the return stroke the jaw 34 does not become effective or engage the pipe 36 until the first one inch of return had passed, that is, the jaw 34 would actually engage the pipe 36 only during nine inches of return travel, the result being one inch of actual feed.

Obviously, this could be any amount desired depending upon the nature of the ground, size of the hole 15 being formed, the water supply and other factors.

If, for example, a rock 53 is encountered, the operator merely suspends operation long enough to have the water wash the dirt from around the rock and form an enlarged pocket into which the rock can fall, after which the drill proceeds on its way in a straight line direction.

When the drill bit 42 reaches the farther trench 13—A, the bit 42 is removed and the copper pipe 16 is joined to the pipe 36 by means of a suitable coupling 54 and the copper pipe 16 may be drawn through the hole 15 by hauling on the pipe 36 in any convenient manner. This is normally accomplished by withdrawing the pin 33 from the jaw 41 and then removing the

jaw 41 and operating the handle 26 which will cause the jaw 34 to withdraw the pipe 36. In some instances it will be convenient to attach a truck to the pipe 36 or in some cases it will be actually withdrawn by hand.

From the foregoing it can be seen that with the removal of a very small amount of earth, a water pipe can be laid underneath any surface without disturbing the top wall or pavement in any way and in a fraction of the time ordinarily required for such purposes.

The form of coupling shown in Fig. 7 is merely illustrative, it being desirable to streamline the coupling as much as possible to prevent it catching on rocks projecting into the hole 15.

While I have thus described my invention, it must be understood that the details thereof may be varied considerably without departing from the spirit of this invention. It is therefore not my intention to limit myself to the precise form shown herein, but I intend to cover all such forms and modifications thereof as fall fairly within the appended claims:

I claim:

1. A drill of the class described consisting of a base adapted to be mounted in a trench, a lever pivotally mounted on said base, a pipe support attached to said lever the pipe supporting surface thereof being curved on an arc struck from the pivot center of the lever, a pair of pipe moving jaws attached to said lever, one of said jaws being adapted to move a pipe resting on said support in a feeding direction and the other jaw being adapted to move said pipe in a withdrawing direction and means for varying the relative effective movements of said jaws.

2. A hydraulic drill of the class described consisting of a base adapted to be mounted in the bottom of a trench, a rock lever pivotally mounted in said base, a flanged pipe supporting element attached to said lever having its uppermost side curved on a radius struck from the pivot center of the lever, pipe engaging jaws extending forwardly and rearwardly from said lever and hinged thereto, the foremost jaw being adapted to grasp said pipe in a driving direction and release said pipe in an opposite direction while the rearmost jaw is adapted to grasp said pipe in a withdrawing direction and release said pipe in a feeding direction and means for varying the relative lengths of the driving and withdrawing actions of the jaws, together with a water supply pipe actuated by said jaws and supported on said curved element and having a water discharging drill bit mounted on the work engaging end thereof.

3. A hydraulic drill consisting of a pair of pipe holding clamps in combination with means for reciprocating said clamps horizontally and means for varying the duration of the clamping actions during alternate reciprocations.

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