T. F. SEITZ.

BORING MACHINE.

APPLICATION FILED MAR. 25, 1914.

1,147,898.

Patented July 27, 1915.

Fig. 1

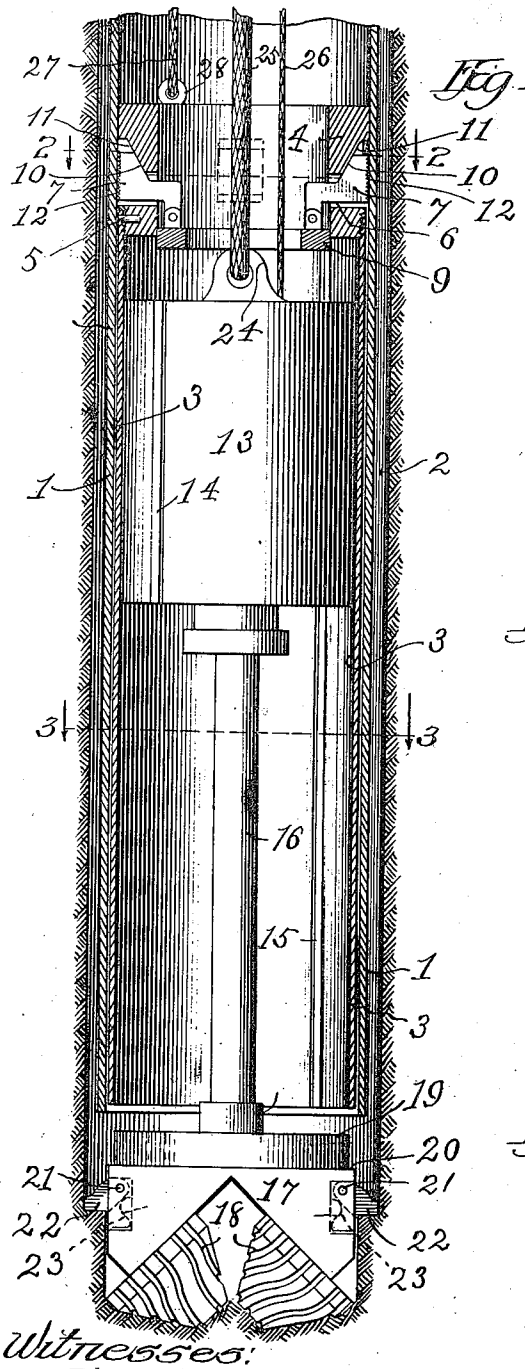


Fig. 3.

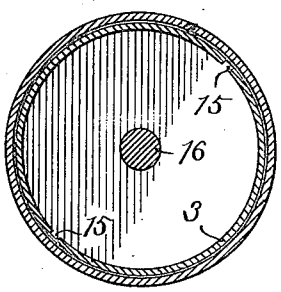


Fig. 2

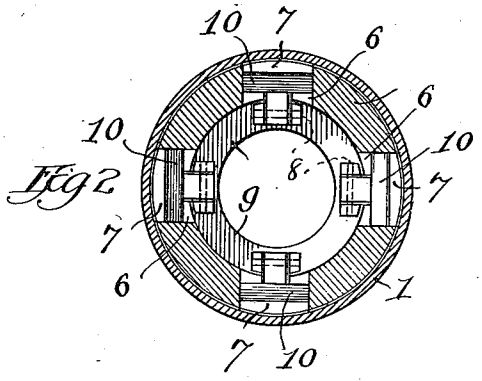
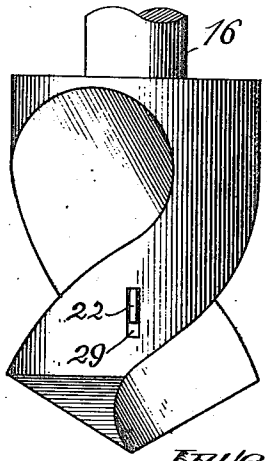


Fig. 4



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BORING-MACHINE.

1,147,898. Specification of Letters Patent. Patented July 27, 1915.

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To all whom it may concern:

Be it known that I, THEODORE F. SEITZ, a citizen of the United States, residing at Sullivan, in the county of Sullivan and State of Indiana, have invented certain new and useful Improvements in Boring-Machines, of which the following is a description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding numerals of reference in the different figures indicate like parts.

My invention relates to boring machines for use in boring wells in earth or rock, and particularly to that class of work in which deep boring is required in conjunction with the use of tubular casing, and my object, primarily, is to dispense with the use of tools which require the power to be applied thereto directly at the ground surface regardless of the depth of the bore and to apply said power within said bore substantially at the point where the work is to be done.

A further object is to utilize said device in conjunction with a hollow cylinder adapted to be raised and lowered within a casing, said cylinder being arranged to contain a motor in operative connection with a boring tool, the whole being so arranged that the latter or a portion thereof, may be operated to close the bottom of the movable cylinder, thereby transforming the same into a bailing bucket for removing the borings from time to time as required during the progress of the work.

To these, and other subsidiary ends, my invention consists in the combination of elements hereinafter more particularly described and definitely pointed out in the claims.

In the drawings—Figure 1 is a vertical sectional view of a portion of a well and well casing, showing a combined bucket and cage gripping mechanism, motor and boring device as they would appear when in use in the bottom of a well. Fig. 2 is a sectional view in plan, taken upon the line 2—2, Fig. 1, Fig. 3 is a like sectional view taken upon the line 3—3, and Fig. 4 is an elevation of a modified form of drill.

Referring to the drawings, 1, indicates a tubular metallic casing such as is usually employed in a well known way in connection with bored wells, said casing being shown within a bore 2. The casing may be assumed to be lowered step by step at intervals as heretofore commonly practised or continuously. Loosely fitted within the casing so as to telescope therewith, is a cylindrical or tubular member 3, preferably formed from steel tubing, which is open at the bottom. Inasmuch as an important function of the member 3 is to serve as a bucket in conjunction with other uses, I shall hereafter refer to the same as a bucket or bucket member. Tapped into the upper end of said bucket is a relatively thick elongated annular member 4, Figs. 1 and 2, which is secured against rotary displacement by means of a pin 5. The outer diameter of the upper portion of the part 4, conforms substantially to that of the bucket, and the main purpose of making the walls thicker is to add weight to the bucket to act in conjunction with suitable clamping devices, in clamping the bucket to the casing.

Cut through the walls of the member 4, are openings 6, preferably four, adapted for the reception of clamping dogs, generally designated by 7, which pass loosely through said openings and are jointedly connected by means of pins 8 to lugs upon a ring 9, placed loosely within the part 4, and so arranged that its lower face will lie in a plane somewhat beneath the level of the lower end of said part 4. Said dogs are elbow-shaped as shown and are provided with upwardly and outwardly inclined faces 10, adapted to be engaged by counterpart inwardly and downwardly inclined faces or cams 11, formed in the recesses or openings 6. The outer or engaging faces of the clamping dogs 7, are serrated as shown at 12, to enable them to firmly grip the casing 1, when pressed against it as hereinafter described. The purpose of the ring 9, is to release said dogs by the action of gravity when not so pressed and when support is withdrawn from beneath the ring.

An electric motor 13, of any approved type, is provided with a cylindrical casing which is loosely fitted within the bucket 3. Splines 14, one of which is shown in Fig. 1, are formed upon the motor casing and arranged to fit in grooves 15, Figs. 1 and 3, in the bucket. Connected with the armature of the motor is a shaft 16, to the lower end of which is detachably secured in a well known way, a boring tool generally desig-

nated by 17, having rotary cutters 18. Formed upon the top of the tool is a short cylindrical portion 19, corresponding substantially to the inner diameter of the bucket, so that when the motor and shaft are lifted as hereinafter described, the part 19, will enter the lower end of the bucket, while the shoulder 20 upon the main body will abut against the lower end of said bucket, thereby making a complete closure, so that the boring tool will in effect form the bottom of the bucket.

Inasmuch as the tool is intended to be raised and lowered through the casing 1, it follows that its diameter must be somewhat less than the interior diameter of the latter, and hence means should be provided for enlarging the bore to a size sufficient to receive said casing. This may be accomplished as follows: Formed in the periphery of the drill 17, are a plurality of recesses into each of which is pivoted, as shown at 21, a cutter 22, which is yieldingly held in an operative or extended position by means of a spring 23. Said cutters are of a length to enable them to extend laterally beneath the casing, thereby forming a bore of sufficiently large diameter to receive said casing. The upper portions of the cutters are rounded as shown, so that when the tool is drawn upwardly within the casing, the cutters will be engaged by said casing and forced into their respective recesses against the action of the springs 23.

Formed upon the top of the motor casing 13, is a loop or eye 24, which serves as a means for suspending said casing from a cable 25, extending downwardly from a windlass, not shown, at the top of the bore. An electrical cable 26, likewise wound upon a windlass, is connected in a well known way with the motor coils.

A cable 27, Fig. 1, is attached to an eye 28, upon the upper end of the annular part 4, which cable, like the others is attached to a suitable windlass, not shown, at the top of the well and so arranged as to be operated independently of the other cables.

The device is intended to be operated as follows: A section of the casing is supported in a well known manner upon the surface of the ground with the bucket 3 therein; said bucket in turn, having the motor and drill operatively connected therewith in the manner described. The motor is held suspended in the upper part of the bucket, and when the bucket is lowered so that its lower end will be at or near the lower end of the casing, the cable 25 may be slightly wound up so that the top of the motor casing may engage with and lift the ring 9. This action serves to support the inner ends of the dogs against downward movement while the serrated faces thereof are in contact with the inner surface of the casing in position to be clamped against it as a result of the contact with the inclined faces of said dogs of the cam or the inclined face of the gravity clamping ring 4, when the latter is allowed to rest thereon. Upon slackening the tension of the cable 27, the cam surfaces 11, will act upon the inclined faces 10 of the dogs and cause the serrated faces to grip the inner surface of the casing 1, thereby clamping the bucket against vertical or rotary movement; it being understood that the weight of bucket and part 4, acting through said cams and dogs serves to insure and maintain said clamping action. The casing 1 may be held rigidly in place and locked against rotary movement in any well known way. When the parts are thus secured the electric circuit is closed between the motor and a generator, thus actuating the boring tool, the motor and tool being lowered by means of the cable 25, as the work progresses.

When the drill descends to a depth corresponding substantially to the length of the shaft 16, the electric current is turned off and the cable 27, is wound up until the clamping dogs 7, are released. Thereupon, the bucket is lowered until its lower end incloses the part 19 and abuts against the part 20. It will thus be seen that the part 19, serves to close the lower end of the bucket and to form a bottom therefor. Upon winding up the cables 25 and 27, the bucket 3, which, presumably, is filled with cuttings, and for the time being becomes a bailing-bucket, may be withdrawn from the casing and the borings therein discharged. The casing 1, may then be lowered to the bottom of the bore and held against rotary movement, when the bucket may again be inserted, clamped therein, and the operation repeated.

It is understood that water may be supplied to the bore in any well known way to aid the process and for this purpose an opening or passage may be made through or around the motor casing.

It is obvious that the drill or auger may be varied according to the requirements of the work; but inasmuch as it is necessary to lower the casing as the boring tool is advanced, it is essential that undercutting means, such, for example, as the cutters 22, should be employed to make the bore of a sufficient diameter to receive the casing.

In Fig. 4, I have shown a modified form of boring tool 28, having the cutters 22 secured in recesses 29, therein in the same manner as is shown in Fig. 1.

I do not wish to be limited to the exact construction shown, inasmuch as it may be varied in form and character without departing from the spirit of the invention. For example, it is apparent that the motor may be placed above the bucket and allowed

but a slight vertical movement, in which case by lowering the bucket itself as the work progresses the same result may be accomplished.

Having thus described my invention, I claim:

1. A device of the class described, comprising a tubular member open at the bottom to be operated within a casing, means for raising and lowering said member within a casing, means for temporarily locking the same against movement therein, a motor supported by said tubular member, a boring tool arranged to be driven by said motor, means for imparting a vertical movement to said tool independent of said tubular member and means supported by said tool for closing the bottom of said tubular member when the tool is raised to substantially its maximum height with respect thereto.

2. In a well boring machine, the combination with a tubular member adapted to have telescopic movement within a casing, said member being normally open at the bottom, of a motor in operative connection with said tubular member, a drill to be driven thereby, means controlled by the movement of said drill for closing the bottom of said member at a predetermined time, means actuated by the gravity of said member for clamping the same within a casing, and means for imparting a vertical movement to said tool and tubular member independently of each other.

3. A well boring machine comprising a hollow cylindrical member adapted to form a support for a motor and boring tool, a motor and boring tool, the latter having a vertical movement to enable it to close the lower end of said member, means for raising and lowering said member and means for independently raising and lowering said tool, whereby said cylindrical member may form a bailing bucket for removing the borings made by the tool.

4. A well boring machine comprising a hollow cylindrical member adapted to form a support for a motor and boring tool, a motor and boring tool, the latter having a vertical movement to enable it to close the lower end of said member, means for independently raising and lowering said tool, clamping dogs in operative connection with said member for engaging an outer casing, means controlled by the gravity of said member for holding said dogs in clamping relation and means for arbitrarily holding said dogs in a predetermined relation to said member to initiate the engagement thereof.

5. A boring machine comprising, in combination, a hollow cylindrical member adapted to telescope within a permanent casing, means for adjustably clamping said member within said casing at a predetermined height, a motor located within said cylindrical member, means for preventing rotation of the motor casing within said cylindrical member while leaving it free to be moved vertically, a boring tool in operative connection with said motor, means held by said tool for closing the lower end of said cylindrical member when the motor is lifted to its maximum height therein, and means for simultaneously raising and lowering said motor, boring-tool and cylindrical member.

6. A boring machine, comprising in combination, a hollow cylindrical member adapted to telescope within a permanent casing, means for adjustably clamping said member within said casing at a predetermined height, a motor located within said cylindrical member, the length of which is materially less than that of said member, means for preventing the rotation of the motor casing within said member while leaving it free to be raised and lowered therein, a boring tool having a shaft extending downwardly from said motor, means supported by said shaft for closing the lower end of said cylindrical member when the motor is lifted to its maximum height therein, means for raising and lowering said cylindrical member, and separate means for raising and lowering said motor within said cylindrical member when the latter is at rest.

7. A boring machine, comprising in combination, a hollow cylindrical member adapted to telescope within a permanent casing, means for adjustably clamping said member within said casing at a predetermined height, a motor located within said cylindrical member, the length of which is materially less than that of said member, means for preventing the rotation of the motor casing within said member while leaving it free to be raised and lowered therein, means for raising and lowering it therein while the latter is at rest, a boring tool having a shaft, the upper end of which is connected with said motor, means, controlled by said shaft for closing the lower end of said cylindrical member, and means for simultaneously lifting said cylindrical member and motor out of the permanent casing.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

THEODORE F. SEITZ.

Witnesses:
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