T. NOBLE.

WELL BORER.

APPLICATION FILED JAN. 30, 1907.

1,002,743.

Patented Sept. 5, 1911.

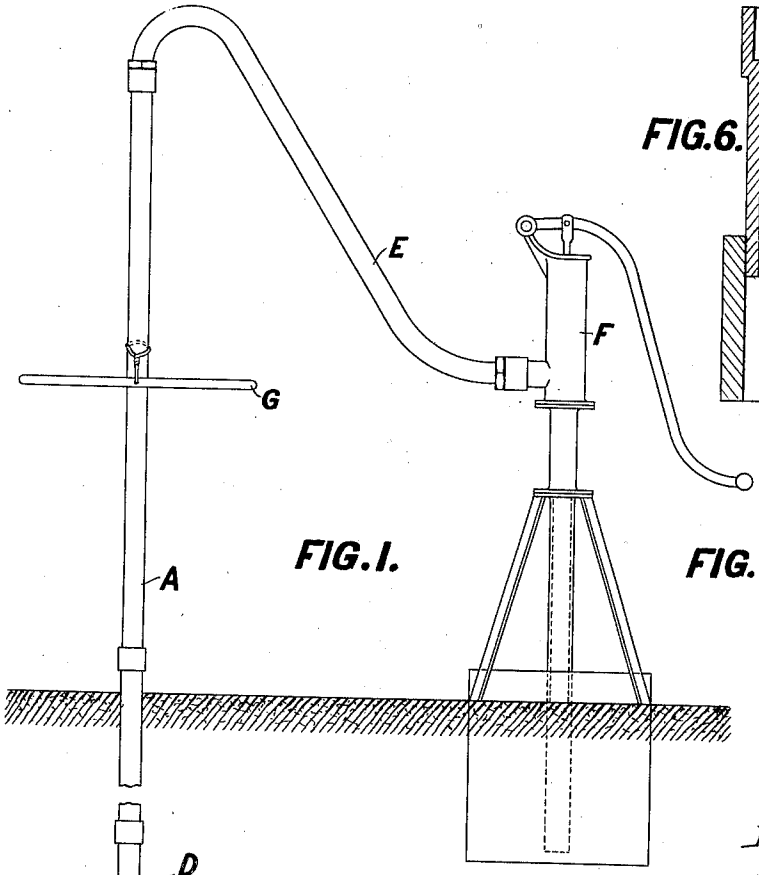

FIG. 1.

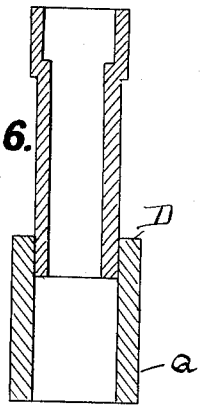

FIG. 6.

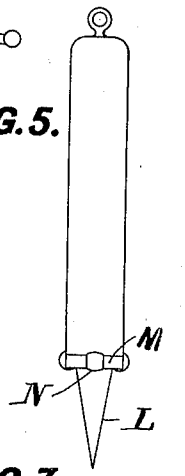

FIG. 5.

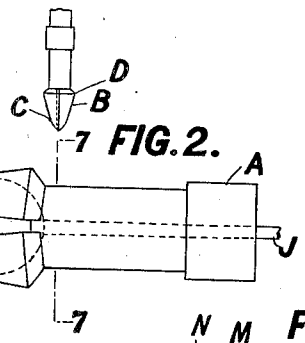

FIG. 2.

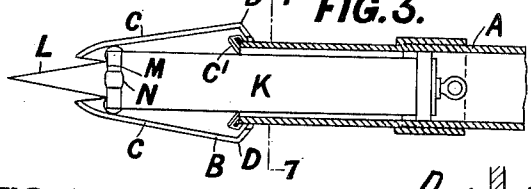

FIG. 3.

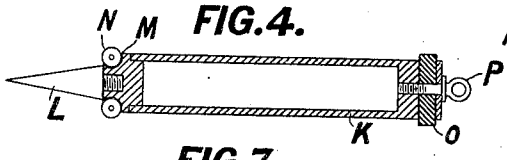

FIG. 4.

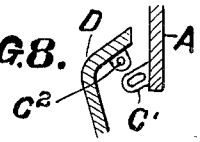

FIG. 8.

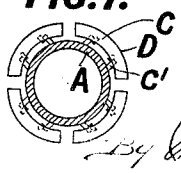

FIG. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS NOBLE, OF ST. ANNES-ON-THE-SEA, ENGLAND.

WELL-BORER.

1,002,743. Specification of Letters Patent. Patented Sept. 5, 1911.

Application filed January 30, 1907. Serial No. 354,928.

To all whom it may concern:

Be it known that I, THOMAS NOBLE, subject of the King of Great Britain, residing at St. Annes-on-the-Sea, in the county of Lancaster, in the Kingdom of England, well-borer, have invented certain new and useful Improvements in Well-Borers, patented in Great Britain, No. 4,302, dated February 21, 1906.

This invention has for its object improvements in apparatus for boring wells, making drains, testing ground, driving piles, and the like.

The invention lies in the arrangement whereby the apparatus presses the ground laterally and so makes a bore hole or the like, through which the bore tube can be gradually lowered.

In order that the invention may be fully understood, reference will now be had to the accompanying drawings, in which,

Figure 1 shows the apparatus as worked by hydraulic means; Fig. 2, a detail view of the point or end to the boring tube as worked by an expanding cushion; Fig. 3. the point of the boring tube as arranged when driven by a plunger or piston; Figs. 4 and 5, the different forms of the plunger or piston used in connection with the device shown in Fig. 3; and Fig. 6, a modification of the point or end; Fig. 7, a sectional view on the line 7—7, Figs. 2 or 3. Fig. 8 is a detail view showing the connection between the bore tube and the fingers carried thereby.

The apparatus as shown in Fig. 1 consists for the main part of a bore tube A carrying a point or end indicated as a whole by B, and preferably formed of several hinged or otherwise movable pieces or fingers C. These fingers C are provided with shoulders D, and so formed that when they are close together they form a conical point having an annular enlargement formed of the shoulders D. The fingers C may be secured to the tube either by simply being hinged thereto in any ordinary manner or by being slotted thereto, that is to say being so mounted by means of slots C^1 and pins C^2 as shown in Fig. 8, as to be capable of movement radially relative to the axis of the tube, the object being to first force the shoulders D out from the bore hole so as to press the earth away and grip the sides, and then force the points of the different fingers apart, as shown in dotted lines in Fig. 8, and so force the earth at the bottom of the bore hole to the side, and permit the bore tube to penetrate farther into the bore hole, and permit the function to be repeated.

In Fig. 1 the bore tube A is connected by a pipe E with a suitable source of liquid supply such as a force pump F. Suitable means G are provided to enable the bore tube to be raised and allowed to fall down again of its own weight. In the case shown in Fig. 1 the water is forced down the bore tube so as to first force the shoulders D of the fingers forming the point C outward, so as to grip the sides of the bore hole. The water then forces the parts forming the point apart, the tendency of the water to lift the tube being counteracted by the shoulders of the fingers gripping the sides. The water further forces the earth to the side and away from the tube, the pressure is taken off and the tube allowed to fall, and in so doing the point will close up again, and the same operation can again be repeated.

Instead of having water to actually issue from the point of the bore tube, the device indicated in Fig. 2 can be used in which an expansible cushion or ball H is mounted inside the point and connected by means of a suitable pipe J to any suitable source of fluid pressure. By applying and releasing the fluid pressure on the ball or cushion H it will be obvious that the shoulders D of the point will be expanded and contracted and the points of the fingers also moved inward and outward, with a result that the earth will be pressed to the side of the bore tube; on pressure being released the cushion will contract so that the bore tube can be raised, when the points of the fingers will come together after which the bore tube is allowed to fall, which will cause the point to penetrate under the earth, after which the separate points will be forced apart again, and the earth will be pressed to the side.

Instead of working the points by means of a cushion exactly as shown, they could be worked by means of a piston or plunger, such as shown in Fig. 4, comprising a cylindrical part K, a pointed part L, and a shoulder M carrying rollers N, a leather washer or collar O being arranged on the top together with a handle or means P for securing a rope or chain to it. In this case when a hydraulic pressure is applied the piston will be forced down the tube, the

rollers N will come into contact with the inner surfaces of the fingers C and force the shoulders out radially, as the piston continues its travel the point L will penetrate between the points of the fingers and spread them apart farther moving the earth to the side, the point of the piston itself penetrating into the ground. On the piston being raised, the bore tube will of itself sink down with the points of the fingers entering the hole in the ground made by the point L, when the operation can be repeated.

As shown in connection with Fig. 5, it is not essential that this device be operated by hydraulic means, as the piston could be raised and lowered mechanically, and will perform exactly the same function.

Fig. 6 shows the simplest embodiment of the invention, the bore tube is simply provided with an enlarged cylindrical portion Q the end of which to a certain extent prevents fluid rising up past the outside of the tube and causes it to exert its full pressure on the earth and press it away from the mouth of the tube, the shoulder D serving for the purpose of preventing the bore tube being raised by the water.

I claim:—

1. In a well borer, a bore tube, pivotal fingers on the end of said bore tube, said fingers forming a tapering point, and means for forcing said fingers apart.

2. In a well borer, a bore tube, a point for said bore tube, said point consisting of fingers hinged to the bore tube, means for forcing the fingers forming the said point apart, and means whereby the bore tube may be raised.

3. In a well borer, a bore tube, a plurality of fingers hinged on said bore tube and capable of radial movement relative to said bore tube, shoulders near the top of said fingers, points at the bottom of said fingers, and means for forcing the said fingers outward relative to the bore tube.

4. In a well borer, a bore tube, a plurality of hinged fingers at the bottom of said bore tube having shoulders toward the top, and so arranged that when brought together the fingers form a point for the bore tube, means for forcing first the shoulders and then the points of the said fingers outward radially relative to the bore tube.

5. In a well borer, a bore tube, an expanding point on said bore tube, a device adapted to move axially in said bore tube for expanding the point, an annular shoulder on said device, a plurality of rollers on said shoulder, and a tapering point on said device below said shoulder, substantially as described.

6. In a well borer, a bore tube, an expanding point on said bore tube, said expanding point comprising a plurality of pivoted fingers provided with shoulders, a hydraulically actuated device capable of axial movement in said bore tube, means on said device whereby the shoulders on said fingers are forced outward before the points of the same.

7. In a well borer, a bore tube, a plurality of fingers having radial movement relative to and mounted on the end of said bore tube, said fingers being provided with shoulders near their point of attachment to the bore tube and points at their outer ends, means for forcing the shoulders and then the points of said fingers outward.

In witness whereof, I have hereunto signed my name this 14th day of January, 1907, in the presence of two subscribing witnesses.

THOMAS NOBLE.

Witnesses:
HUBERT PUMPHREY,
JOHN MCLACHLAN.