C. CANTILLI.

BORING APPARATUS.

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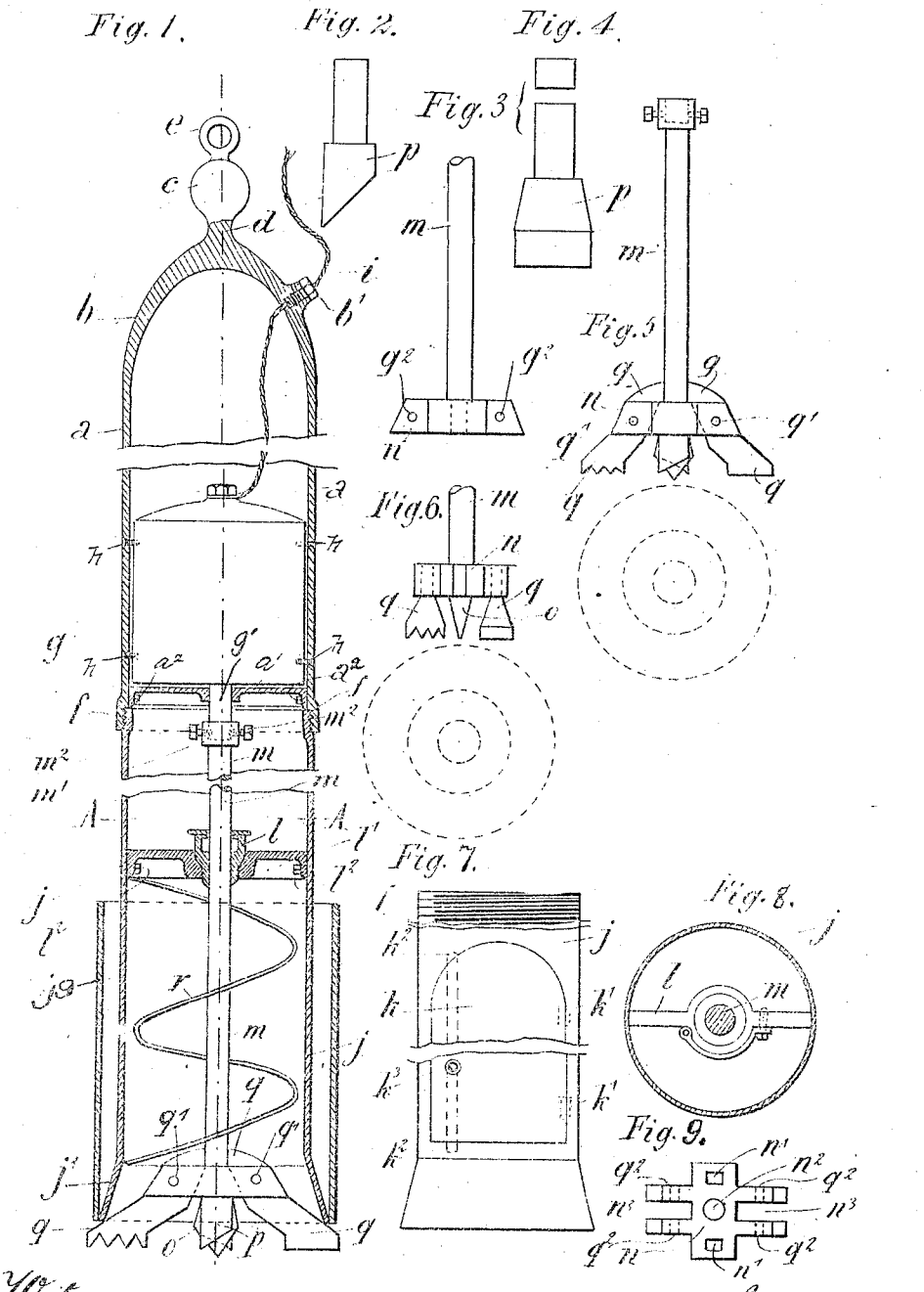


Witnesses
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# UNITED STATES PATENT OFFICE.

CONSTANTIN CANTILLI, OF BUCHAREST, ROUMANIA.

## BORING APPARATUS.

1,003,334. Specification of Letters Patent. **Patented Sept. 12, 1911.**

Application filed November 19, 1909. Serial No. 528,922.

*To all whom it may concern:*

Be it known that I, CONSTANTIN CANTILLI, a citizen of the Kingdom of Roumania, residing at Bucharest, Roumania, have invented certain new and useful Improvements in Boring Apparatus, of which the following is a full, clear, and exact description.

My invention refers to an apparatus for effecting borings of any dimensions and at any depth, whatever may be the nature of the ground. One of the principal features of the invention consists in the arrangement of the motor driving the tools as well as in the arrangement of the apparatus itself so that it accompanies the tool or tools in their ascending or descending movements as the work progresses. Advantage has also been taken of centrifugal force for increasing the area worked on or rendering it larger than the boring tube itself, while at the same time permitting the said tools to pass through the latter.

I shall now describe my invention with reference to the accompanying drawing showing one form of construction of the present apparatus, in which:—

Figure 1 is a vertical section along the axis of the apparatus. Fig. 2 is a detail of one of the tools. Fig. 3 is an elevation of the tool shaft and a disk carried thereby. Fig. 4 is a view of the tool shown in Fig. 2 looking at right angles thereto. Fig. 5 is a view of the parts shown in Fig. 3 with the cutters mounted in the disk. Fig. 6 is an elevation of the shaft and a disk or plate with a plurality of different forms of tools. Fig. 7 is an elevation with a portion broken away showing the tubular casing. Fig. 8 is a horizontal section on the line A—A of Fig. 1. Fig. 9 is a plan of one of the tool carriers.

The apparatus consists of a metal tube $a$ the upper part of which terminates in an arch connected by a neck $d$ with a ball $c$ provided with a ring $e$. The lower part of the tube $a$ is threaded at $f$. An electric motor $g$ is situated at the interior of the tube $a$ and is held in position by screws $h$; the current is supplied to the motor through a wire $i$ passing through a screw plug $b^1$ in the arch $b$. A plate $a^1$ closes the tube at its lower portion just above the screw thread $f$ and is held in position by screws $a^2$. An opening formed in the center of the plate $a^1$ permits the passage of the shaft $g^1$ of the motor, which latter is completely inclosed in the tube $a$ and thus well protected against the penetration of foreign bodies which might eventually interfere with its working. The tubular part $j$ is screwed to the tube $a$ at $f$ and is of cylindrical shape throughout almost the whole of its length but is slightly enlarged bell-shape at its lower end $j^1$. A door $k$ is formed in the walls of the tube $j$ and turns on two or more hinges $k^1$. The door is held closed at $k^2$ $k^2$, by means of a lock $k^3$. A bearing $l$ is arranged in a support $l^1$ situated within the tube $j$. The support $l^1$ is held in position by screws or rivets $l^2$.

The tool carrier or borer properly speaking is shown separately in Figs. 3, 5, 6 and 9 and consists of a shaft $m$ provided with a coupling sleeve $m^1$ by means of which it can be fixed to the shaft $g^1$ of the motor by tightening up screws $m^2$ $m^2$. A plate or disk $n$ shown in plan view in Fig. 9 is provided with holes $n^1$, $n^2$ and slots $n^3$ for fitting the actual borer and four cutters. The central opening $n^2$ is for borers, openings $n^1$ are for the cutters $p$ (Figs. 2 and 4) and the slots $n^3$ for the cutters $q$ $q$ shown in Fig. 6. $j^3$ is a short section of the well casing surrounding the tubular part $j$, see Fig. 1. The tools $o$ and $p$ are rigidly fitted to the plate $n$ whereas the two cutters $q$ $q$ are mounted so as to pivot on the pins $q^1$ which pass through the holes $q^3$ in the cutters $q$ $q$ and also through the openings $q^2$ of the plate $n$. This method of mounting the cutter $q$ $q$ is for the purpose of enabling the latter to work on a larger surface than that of the apparatus and the boring tube, so as to allow the latter to permit the tools to be easily introduced into the boring tube. Figs. 5 and 6 give the projection of the surfaces acted on by the tools. A spirally arranged member such as a wire or rod $r$ is arranged around the shaft $m$ and serves as guide when mounting or unmounting the same and also serves to assure the raising up of the materials removed by the tools.

The apparatus works in the following manner: The apparatus is suspended, by a cable preferably a metallic cable, by its ring $e$. The cable passes over the pulley arranged at the top of the boring tower, scaffolding or the like and preferably driven by means of some suitable motor force. Near at hand is arranged the arrival of the current, the switch board and other apparatus necessary for the use of electric cur-

rent which is fed to the apparatus by means of a cable *i* which is wound up in the same degree as that supporting the apparatus in order that they may remain of equal length. Without in any way affecting the principle of the present invention if desired a motor other than an electric motor, may be employed according to the nature of the strata. Before commencing to bore, a hole of the size of the borer and about one meter deep is dug. The apparatus is then placed in this hole and by reason of its weight forces its cutters and borers into the ground, retaining its vertical position. Then the current driving the motor is switched on thus causing the borer to rotate. The earth or materials broken up by the borer and cutters are raised by means of the spiral arranged around the shaft of the borer. When the apparatus has descended a certain distance the borer will be filled with earth, the current is then switched off and the apparatus withdrawn; then by means of the door *k* the earth or other material contained in the apparatus is removed. If the borer and the motor are hot, another apparatus will be placed in the boring hole, and two apparatus will thus be used alternately. When boring in a layer of very hard stone the cutters are removed and only the plate is used which is fitted to the shaft instead of the borer and is provided with diamonds; after having worked for example for a depth of about 20 centimeters the inner cutters are added to the apparatus and again a depth of about 20 centimeters cut through, then the two other pivoting cutters are fitted to the apparatus and again 20 centimeters cut through, all these cutters being provided with diamonds. Inasmuch as it is not possible to bore into stone for any length of time without stopping and as furthermore the layer removed by the diamonds is not thick enough to reach to the spirally arranged vertically disposed wire or the like, the borer with the cutters is removed and the apparatus provided with an ordinary tubular borer such as is used when boring by hand to remove the mud; but it should be of the same diameter as the bore, because care will always be taken to have a certain amount of water in the boring hole so as to prevent the too rapid heating of the borer as well as the explosions that might result owing to the presence of gas; so that the apparatus will withdraw the broken residues of stone together with the water. When a new column of tubes are introduced into the boring hole for well known reasons when boring and the diameter of the boring hole is reduced another apparatus of the required dimensions will be employed.

Having thus described my invention, what I claim is:

In an apparatus for the purpose described, a tubular part having bell-shaped lower end, a tube screwed into the upper end of the same and having a closed upper end with suspending means, a motor within said tube, a plate separating the tube and tubular part, a motor shaft extended through said plate, a support within the tubular part having a bearing for said motor shaft, a tool holder carried by said shaft and a spirally arranged vertically disposed member within said tubular part above its bell-shaped end and secured to said support within the tubular part, said spirally arranged member serving as a guide in assembling the parts and as a means for raising the material removed by the tools.

In testimony whereof I affix my signature in presence of two witnesses.

CONSTANTIN CANTILLI.

Witnesses:
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