

May 3, 1955

R. P. J. C. SCHAD ET AL
BORING-HEAD FOR HORIZONTAL DRILLS
IN WATER-COLLECTING DEVICES

2,707,616

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5 Sheets-Sheet 1

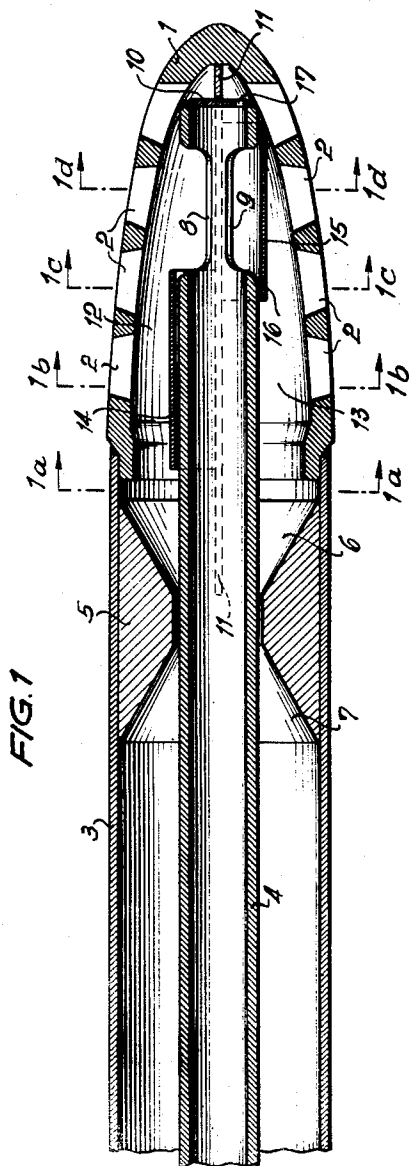


FIG. 1d

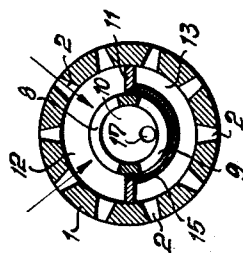


FIG. 1c

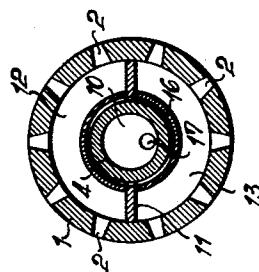


FIG. 1b

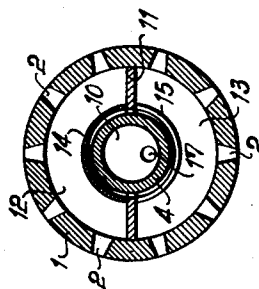
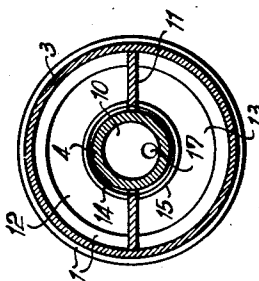


FIG. 1a



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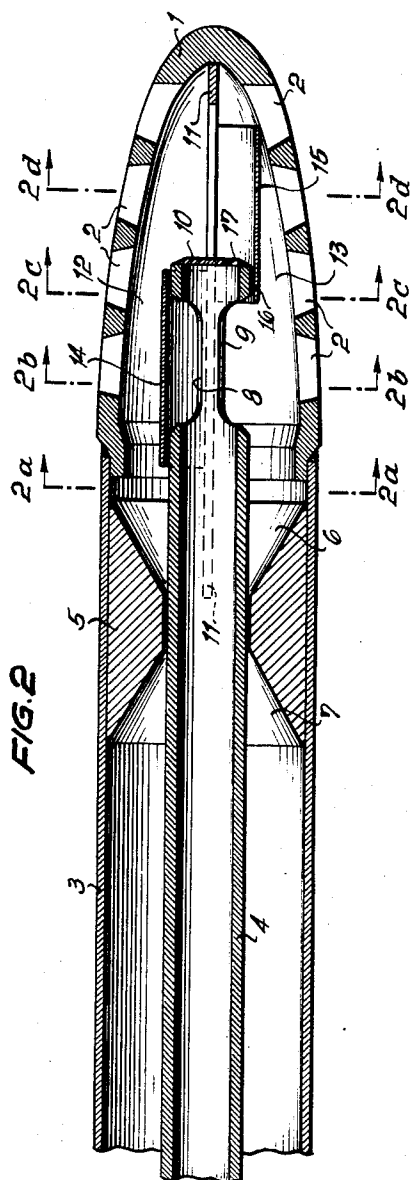


FIG. 2d

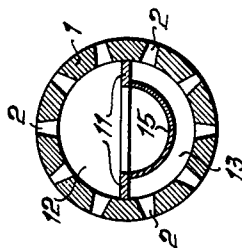


FIG. 2c

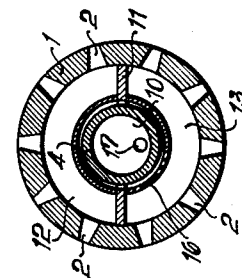


FIG. 2b

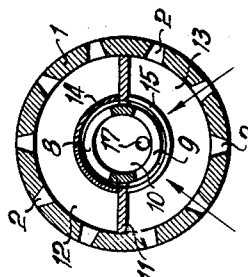
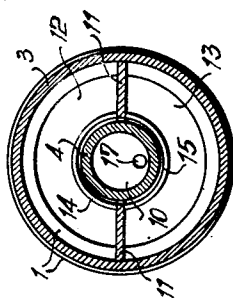


FIG. 2a



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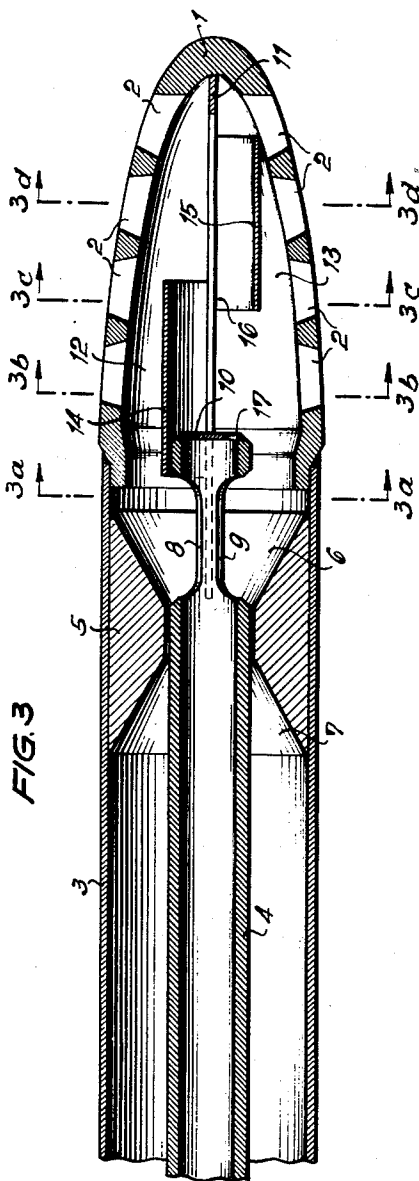


FIG. 3d

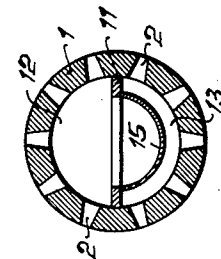


FIG. 3c

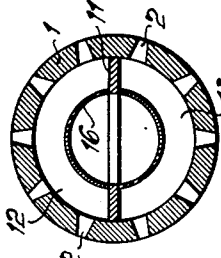


FIG. 3b

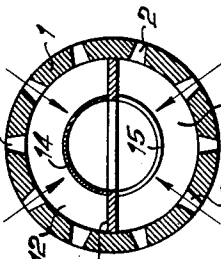
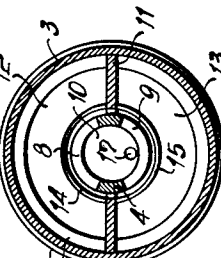


FIG. 3a



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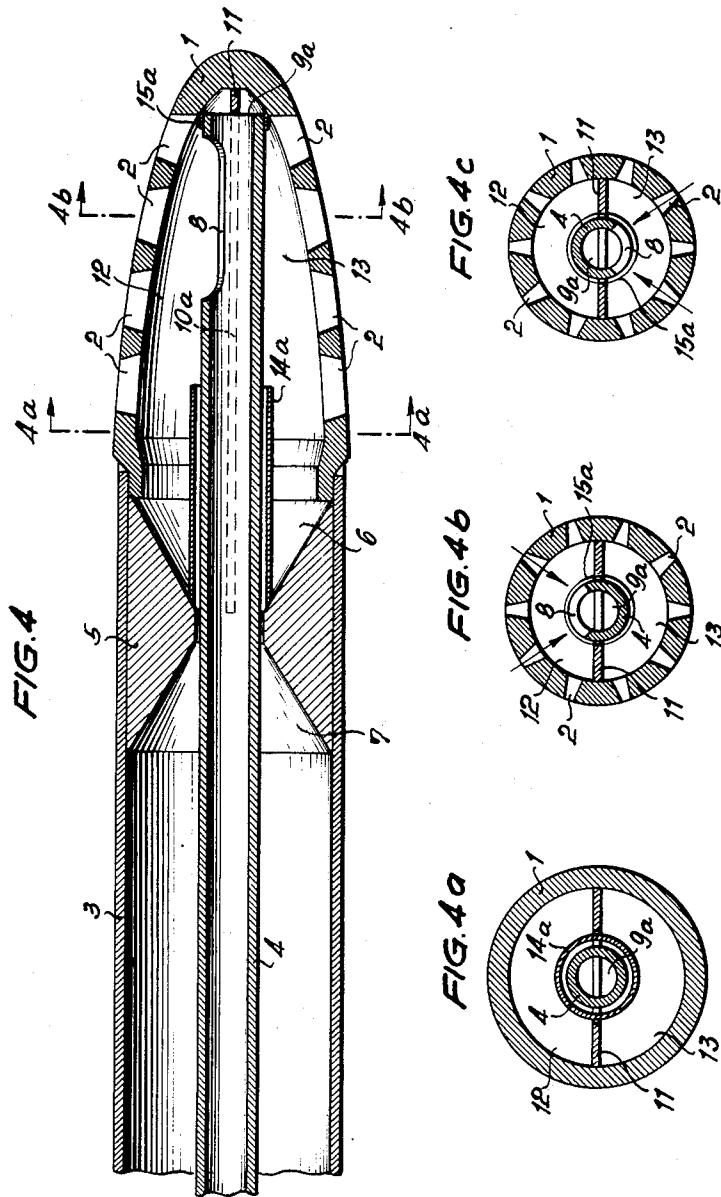
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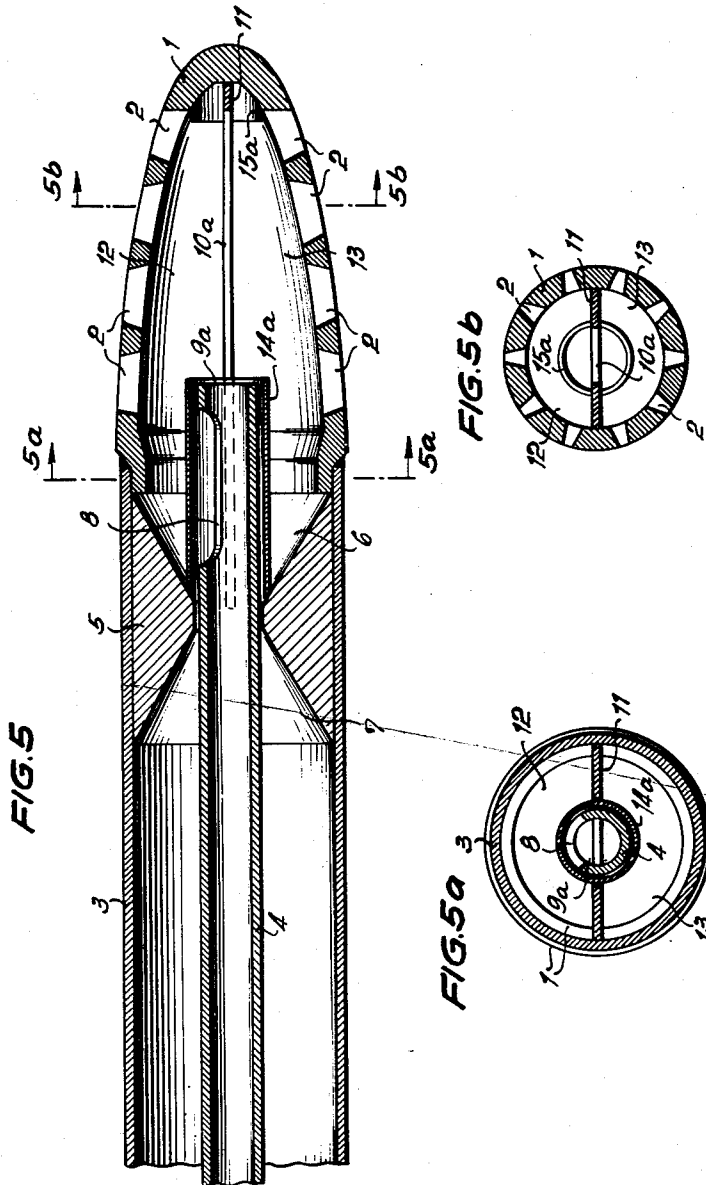
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5 Sheets-Sheet 5



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2,707,616

BORING-HEAD FOR HORIZONTAL DRILLS IN WATER-COLLECTING DEVICES

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Claims priority, application Germany August 28, 1953

9 Claims. (Cl. 255—1)

The present invention relates to water-collecting devices in which tubes are driven in star-like arrangement from a vertical shaft into water containing layers of earth, the tubes having either full or slotted walls.

It is the main object of the present invention to provide a boring-head for horizontal drills in water-collecting devices, which avoids any deviation from horizontal direction of the tubes extending from a vertical shaft and to arrange the said tubes in exact horizontal direction.

A plurality of means and devices have been proposed before for avoiding any deviation from the horizontal direction for the boring heads. Thus, it is known and conventional, for instance, to form the slots in the boring heads of different size from the top to the bottom, in order to achieve the horizontal arrangement in accommodation to the prevailing ground. Furthermore, attempts have been made, to bring about this result by continuous changes of the pressures exerted by the presses and simultaneous change of the intensity of the washing out. These known means are not completely satisfactory because the ground through which the pipes pass is not homogeneous and therefore causes the pipes to rise or fall at different rates. It is also possible that this result is also effected by the amount of water present.

It is, therefore, another object of the present invention to provide a slender boring-head which is equipped with slots along its entire periphery and of parabolic shape, the boring-head being divided into two chambers by means of a horizontally disposed metal wall extending through the median axis of the boring head which metal wall is equipped with a guiding tube, in which a soil removing tube is slidably mounted, which soil removing tube has recesses, the soil removing tube being slidable in such manner that the upper and lower chamber of the boring head may communicate either separately or jointly with the boring-head.

The mentioned design of the boring-head has the advantage, that it is now possible by change of the watering process to bring about immediately a correction of the advancing tube arrangement, in such manner that the watering tube and the soil removing tube are moved in the boring-head, upon observing a deviation of the tube arrangement from the horizontal direction during its advancement.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

Figure 1 is an axial section of a boring-head in connection with a boring tube and a soil removing tube slidably disposed in the boring tube, the soil removing tube being shown in its extreme right position;

Fig. 2 is an axial section of the boring-head shown in Fig. 1, however, the soil removing tube being in slightly advanced position;

Fig. 3 is an axial section of the boring head shown in

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Fig. 1, however, the soil removing tube being in its most advanced left position;

Fig. 1a is a section along the lines 1a—1a of Fig. 1;

Fig. 1b is a section along the lines 1b—1b of Fig. 1;

Fig. 1c is a section along the lines 1c—1c of Fig. 1;

Fig. 1d is a section along the lines 1d—1d of Fig. 1;

Fig. 2a is a section along the lines 2a—2a of Fig. 2;

Fig. 2b is a section along the lines 2b—2b of Fig. 2;

Fig. 2c is a section along the lines 2c—2c of Fig. 2;

Fig. 2d is a section along the lines 2d—2d of Fig. 2;

Fig. 3a is a section along the lines 3a—3a of Fig. 3;

Fig. 3b is a section along the lines 3b—3b of Fig. 3;

Fig. 3c is a section along the lines 3c—3c of Fig. 3;

Fig. 3d is a section along the lines 3d—3d of Fig. 3;

Fig. 4 is an axial section of a boring-head, constituting a second embodiment of the present invention, in which the soil removing tube has at one end a one-sided recess only;

Fig. 4a is a section along the lines 4a—4a of Fig. 4;

Fig. 4b is a section along the lines 4b—4b of Fig. 4;

Fig. 4c is a section similar to that shown in Fig. 4b, however, the soil removing tube being in a 180° reversed position;

Fig. 5 is an axial section of the boring-head, however, the soil removing tube being in a completely withdrawn position;

Fig. 5a is a section along the lines 5a—5a of Fig. 5; and

Fig. 5b is a section along the lines 5b—5b of Fig. 5.

Referring now to the drawings, and particularly to Figs. 1 and 1a to 1d, the present device comprises a boring-head 1, also called a "water-head," of conventional shape, which is equipped with a plurality of slots 2 equally distributed over its wall, and which extends with its rear end into the boring-tube 3 to which it is secured. The boring-tube 3 may have a full wall or a filter wall having slots, depending upon the process used for the advance of the tube arrangement into the water-containing ground.

The so-called soil removing tube 4 is slidably mounted in the boring-tube 3 and is guided in a bearing-ring 5 disposed at the end of the boring-tube 3, the bearing-ring 5 being equipped with two conical openings 6 and 7 which widen in axial direction.

The soil removing tube 4, which is also called "water-tube," has at its rear end two diametrically oppositely disposed recesses 8 and 9 as well as an end wall 10, so that the water of the ground may enter the soil removing tube 4 only from the top and the bottom through the slots 2 provided in the boring-head 1.

The boring-head 1 itself is divided into an upper chamber 12 and a lower chamber 13 by means of a horizontal wall 11 extending through the longitudinal axis of the boring-head 1. This dividing wall 11 extends from the front point of the boring-head 1 to the conical opening 6 of the bearing-ring 5 and is accommodated to the opening 6. The dividing wall 11 carries also a guiding tube 16 which has two recesses 14 and 15 set off relative to each other, which may be selectively brought to positions to coincide with the recesses 8 and 9 of the soil-removing tube 4 by relative axial movement.

The operation of the above described is as follows:

In the position of the soil removing tube 4, as shown in Fig. 1, which is the position to its extreme right, the water enters through the upper slots 2 into the upper chamber 12 of the boring-head 1 and flows through the soil-removing tube 4 towards the shaft (not shown). No water can enter the soil-removing tube 4 from the lower chamber 13 of the boring-head, since the upper opening 8 only of the soil-removing tube 4, being in communication with the corresponding recess 14 of the guiding tube 16, provides a connection with the upper chamber 12. The fact, that water and, thereby, also other material, as

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sand and grit may enter the soil removing tube 4 through the upper chamber 12 from the upper half only of the boring-head 1, since material is taken from the upper portion, brings about a rising of the boring-head 1 and, thereby, of the entire horizontal tube arrangement.

If the soil-removing tube 4 is withdrawn into the position shown in Fig. 2, the lower recess 9 of the soil-removing tube 4 is in communication with the lower chamber 13 of the boring-head 1, so that only the water mixed with sand etc. entering the lower chamber 13 of the boring-head 1 is fed to the soil-removing tube 4. In this manner a lowering of the boring-head 1 is achieved.

If now the soil-removing tube 4 is further withdrawn, into the position shown in Fig. 3, so that the upper recess 8 and the lower recess 9 of the soil-removing tube 4, which is supported by the bearing-ring 5, extend into the conical front opening 6, water enters the upper and lower parts 12, 13 of the boring-head 1, is fed to the soil-removing tube 1, and through the latter to the shaft (not shown).

The end wall 10 of the soil-removing tube 4 may be equipped with one or more openings 17, in order to ease the sliding of the tube 4 into its extreme right position and to avoid sand formations in the point of the boring-head 1.

In the embodiment shown in Figs. 4 and 5, the axially movable soil-removing tube 4 is open at its free end 9a and equipped only with an axially disposed recess 8 and also turnable upon its longitudinal axis in a tube 14a.

The boring-head 1 is again divided into two chambers 12 and 13 by means of a dividing wall 11 which has a center slot 10a, the edges of the center slot 10a engaging tightly the outer wall of the soil-removing tube 4 during axial movement of the soil-removing tube 4 into its right end position (Fig. 4) or into its left end position (Fig. 5).

The soil-removing tube 4 is shown in its extreme right end position in Fig. 4 and projects with its free end into a muff 15a, the recess 8 of the soil-removing tube 4 being directed upwardly, in other words faces the upper chamber 12 of the boring-head 1. In this position the water enters through the upper slots 2 of the boring-head 1 into the upper chamber 12 of the boring-head 1, to be fed to the shaft (not shown) through the soil-removing tube 4. No water can enter, however, the soil-removing tube 4 from the lower chamber 13 of the boring-head 1, since the recess 8 of the soil-removing tube 4 communicates only with the upper chamber 12. The fact, that water and, thereby also other material, as sand and grit may enter the soil-removing tube 4 through the upper chamber 12, since material is taken from the upper portion only, brings about a rising of the boring-head 1 and, thereby of the entire horizontal tube arrangement.

If the soil-removing tube 4 is turned for 180° from the position shown in Fig. 4b into the position shown in Fig. 4c, the recess 8 of the soil-removing tube 4 communicates with the lower chamber 13 of the boring-head 1, so that only water mixed with sand etc. entering the lower chamber 13 is fed through the soil-removing tube 4. In this manner, a lowering of the boring-head 1 is achieved.

If the soil-removing tube 4 is withdrawn into the position shown in Fig. 5, so that the recess 8 of soil-removing tube 4 is in the tube 14a, water entering the upper and lower chambers 12 and 13 of the boring head 1 is fed through the opening 9a to the soil-removing tube 4 and therethrough to the shaft (not shown). This arrangement brings about the effect that the tube tends during its advancing movement to remain in horizontal position i. e. in its normal position.

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While we have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

We claim:

1. A boring-head for horizontal borings in water collecting devices which include a vertical shaft and a plurality of tubes to be driven from the said shaft into the said water-containing ground layers, comprising a hollow tubular member of substantially parabolic shape having a plurality of slots along its entire wall, the said tubular member being equipped with a horizontally disposed wall extending through the longitudinal axis of the said member and dividing the said boring head into an upper chamber and a lower chamber, a guide tube carried by the said horizontally disposed wall, and a soil removing tube slidably mounted in the said guide tube, the said soil removing tube being in communication with the said upper or said lower or both said chambers depending upon the position of the said soil-removing tube in the said guide tube.

2. The boring-head, as set forth in claim 1, in which the said guide tube comprises two half tubes set off toward each other and disposed at the opposite sides of the said horizontally disposed wall.

3. The boring-head, as set forth in claim 1, in which the said soil-removing tube has a closing wall at its free end.

4. The boring-head, as set forth in claim 3, in which the said closing wall has a plurality of slots.

5. The boring-head, as set forth in claim 1, which includes a boring-tube engaging the rear end of the said tubular member, and a bearing ring having a conically shaped opening in both axial directions disposed in the said boring-tube, and the said soil-removing tube being axially slidable in the bearing-ring.

6. The boring-head, as set forth in claim 1, in which the said soil-removing tube has two oppositely disposed recesses close to its front end.

7. The boring-head, as set forth in claim 1, in which the said soil-removing tube is open at its front end and has an axially extending recess at one side thereof and the said soil-removing tube is mounted for axial movement, as well as rotary movement for 180° upon its longitudinal axis.

8. The boring-head, as set forth in claim 7, in which the said tubular member has at its front point an inner muff receiving the open end of the said soil-removing tube in the most forward position of the latter and, thereby, closing the front end of the said soil-removing tube.

9. The boring-head, as set forth in claim 7, which includes a boring-tube engaging the rear end of the said tubular member, and a bearing ring having a conically shaped opening in both axial directions disposed in the said boring-tube, and the said soil-removing tube being axially slidable in the bearing-ring and which includes further an additional tube extending from one of the said conical openings in forward direction, which tube is adapted to cover the said axially extending recess of the said soil-removing tube, when the latter is in its rearmost position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,126,576	Ranney	Aug. 9, 1938
2,670,180	Ranney	Feb. 23, 1954