H. W. MUHLEISEN.

DRILLING APPARATUS.

APPLICATION FILED OCT. 4, 1909.

994,866.

Patented June 13, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

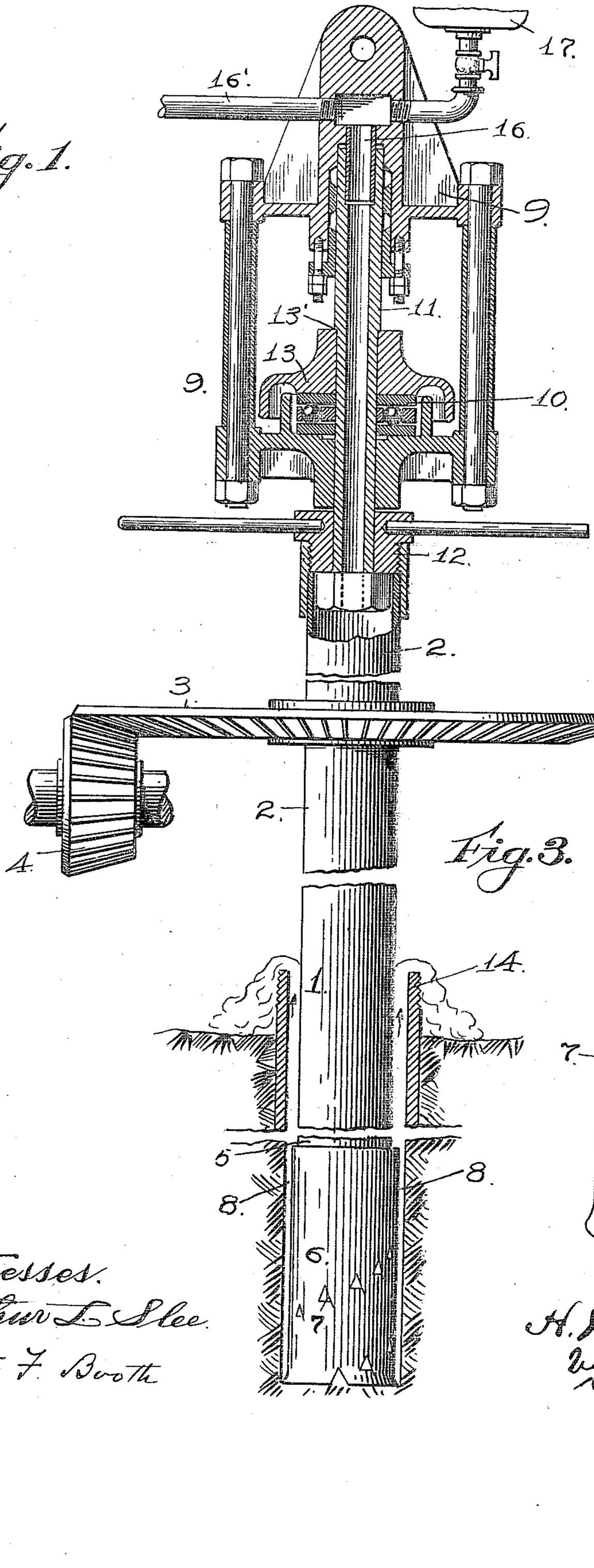
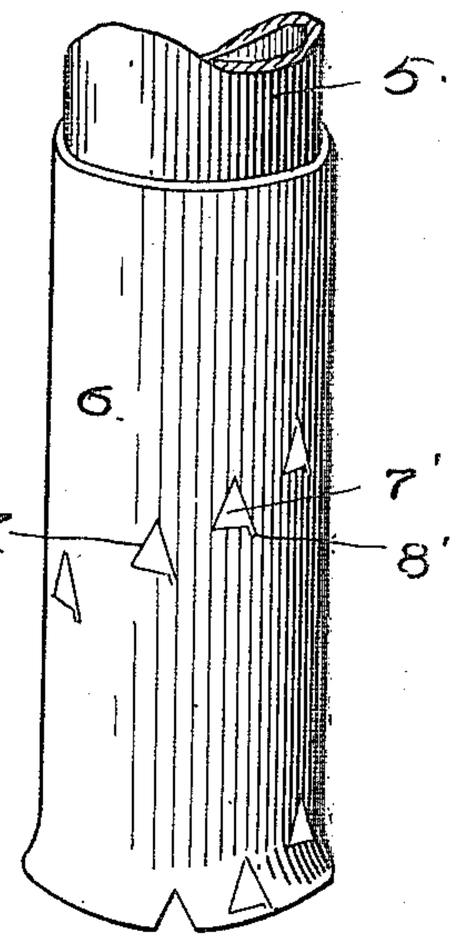


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

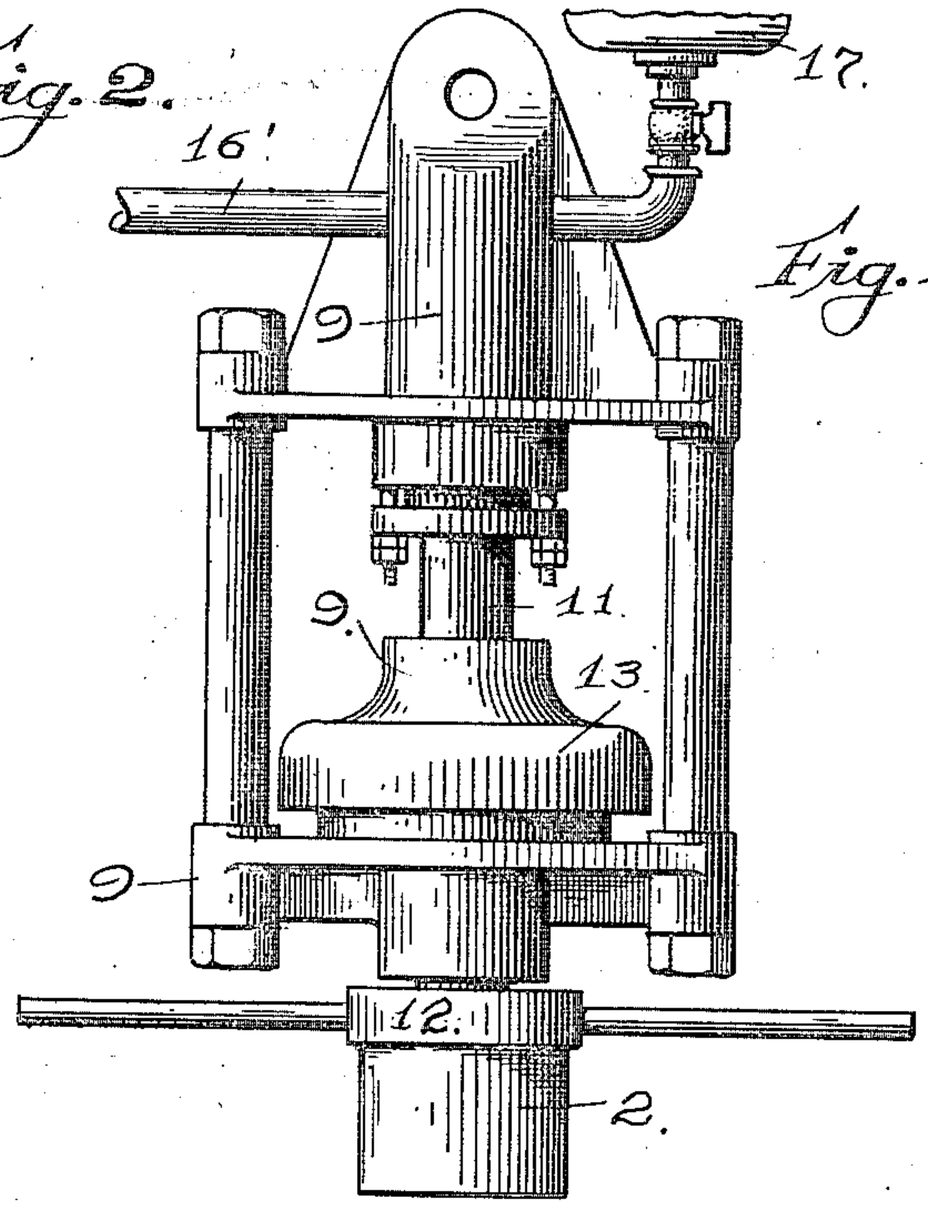


Fig. 4.

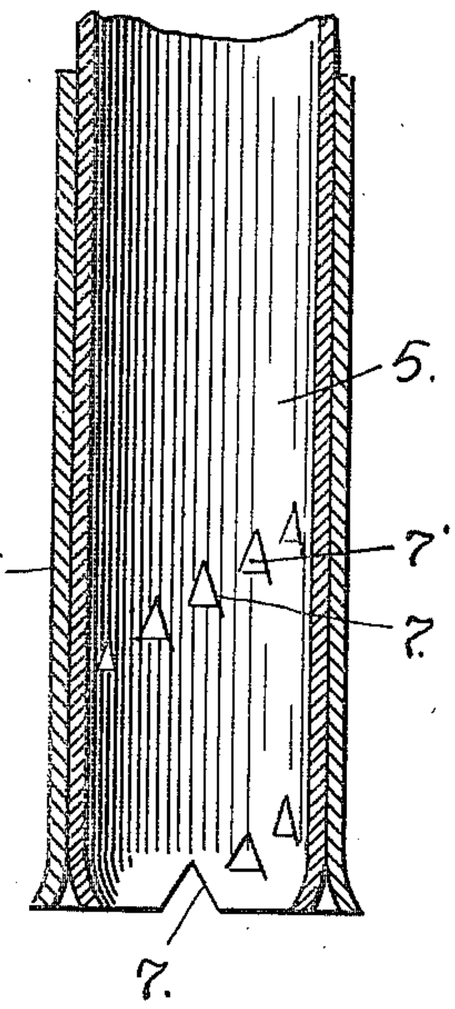
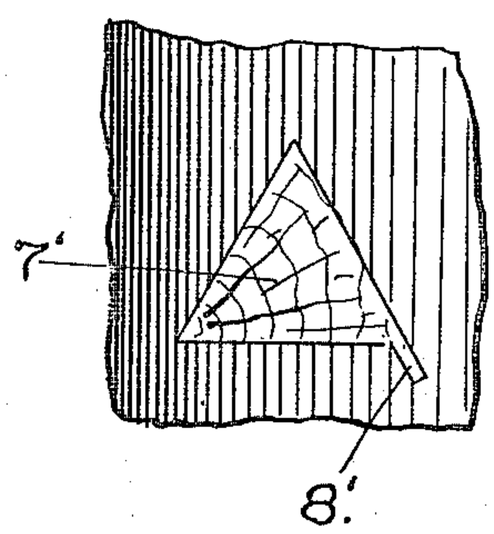


Fig. 5.



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UNITED STATES PATENT OFFICE.

HENRY W. MUHLEISEN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO EUGENE SCHMITZ, OF SAN FRANCISCO, CALIFORNIA.

DRILLING APPARATUS.

994,866. Specification of Letters Patent. Patented June 13, 1911.

Application filed October 4, 1909. Serial No. 520,930.

To all whom it may concern:

Be it known that I, HENRY W. MUHLEISEN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Drilling Apparatus, of which the following is a specification.

The hereinafter described invention relates to an improved apparatus for the sinking of a casing or shell any given or required distance below the surface of the ground for any desired purpose, as for instance, to determine the character of the soil, to ascertain as to the values contained therein in connection with the work of mine prospecting, or for the sinking of an oil well or wells generally, in fact the invention being designed for all uses to which ground boring machinery may be applied; the object of the invention being to expedite the work of sinking the drill, to simplify the construction of the working parts, to improve the construction and cutting action of the drill section of the casing or shell, and in providing means for forcing the drilled core under pressure from within the casing or shell being sunk within the ground.

To comprehend the invention reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a sectional elevation illustrating the sinking of a casing or shell, the same being broken, the pivotal point for the casing or shell and the swivel connected therewith being sectioned, the said view disclosing the muck being forced upwardly from within the bore during the drilling action. Fig. 2 is a similar view, illustrating the ejecting of the core from within the shell or casing, the swivel being disconnected from the drill casing for permitting a free discharge of the core piece. Fig. 3 is an enlarged perspective view of the drill section of the rotatable casing or shell. Fig. 4 is a vertical sectional view of the drill section of the rotatable casing or shell, illustrating the flaring of the grinding end thereof resulting from action of the same during the operation of boring. Fig. 5 is an enlarged detail disclosing one of the filled openings of the drill section.

In the drawings, the numeral 1 is used to indicate the rotatable casing or shell, which is composed of a series of connected or coupled sections. These sections are coupled or screwed together as the work of drilling progresses. The uppermost section is coupled to the drive section 2, which carries a gear 3 meshing with a driven pinion 4, actuated from any suitable source of power. The lowermost section of the casing or shell 1 constitutes the drill section of the rotatable casing or shell. This section differs from the remaining sections of the rotatable shell or casing, inasmuch as it comprises an inner tube 5, of a diameter equal to that of the rotatable shell or casing, which tube is enveloped by an outer tube 6, securely fitted thereover and united thereto in any suitable manner. Through the walls of this double tube drill section, a series of spirally disposed slots or openings 7 are formed, which slots are preferably triangular in shape and closed by a suitable filler 7′, preferably of wood. These slots are disposed throughout the length of the drill section, the lowermost one being at the exposed edge of the section and forms, so to say, a cutting tooth, which acts against the surface of the material being drilled. Owing to the outer tube 6 fitted over the tube 5, the drill section will cut a bore slightly larger in diameter than that of the casing 1, which acts as a stem of the drill section, and shall hereafter be referred to as a stem casing, so that an annular clearance space 8 will exist between the wall of the bore and the outer wall of the stem casing and by means of which the muck formed by the drilling operation will discharge.

The upper or drive section 2 is connected to the swivel head 9 by means of the ball joint 10, the connecting feed tube 11 screwing into the head 12 of the drive section, the said feed tube being held or supported by means of the cap 13, fitted thereon and which bears against the shouldered portion 13′ of the tube 11.

The drive section 2 extends through a cylindrical shell 14, which is fitted into an opening dug in the ground and surrounds the bore to be drilled. This cylindrical shell 14, is considerably larger in diameter than that of the drill section 1, and the same is closed by the cap 14′ screwed thereon to form a compressor chamber 15, the purpose of which will be hereinafter described. During the operation of drilling the cap 14′ is removed, so as to permit of a free overflow for the muck being forced upwardly under

pressure from the bottom of the bore through the annular passageway or clearance space 8.

Into the upper end of the feed tube 11 extends a guide 16, with which connects a water and air supply pipe 16′ and the reservoir 17 containing the abrasive material, the feed of which into the guide 16 may be controlled in any suitable manner. In the present case preference is given to adamantine as the abrasive material, which is conveyed by the water pressure admitted through the supply pipe 16′ through the feed tube and rotating casing or casing stem 1 to the bottom of the drill section. As the adamantine reaches the bottom of the drill section the same is received and carried around by the tooth in the lower end over the surface to be drilled and the desired cutting effect thus produced. The material or soil ground away or cut by the abrasive material combines with the water forced under pressure to the bottom of the rotating casing and a soft liquid muck is formed, which, by reason of the pressure thereon is forced upwardly through the annular clearance space 8 and discharged over the edge of the cylinder 14. As the abrasive material is carried around by the lower end of the drill section, the same packs between the tubes 5—6, forming said drill section, with the result that the pressure thus placed onto the walls of the drill section forces the same slightly apart, outwardly flaring the lower end of the tube 6 and inwardly flaring the lower end of the tube 5, Fig. 4 of the drawings. The result of this slight reverse flaring of the walls of the drill section is, the outward flare of the lower end of the tube 6 causes a bore to be made slightly larger in diameter than that portion of the drill section above the cutting edge, while the inward flare of the lower end of the tube 5 causes a core to be cut, when drilling through hard material, slightly less in diameter than the interior of said tube, which permits of the core moving freely upwardly within said drill section. As the drill section wears down beyond the lowermost of the series of spirally disposed openings 7, the second opening of said series is brought into action as a cutting tooth, the filling piece 7′ falling from within the same and being ground to a pulp passes off with the muck. By means of a small downward extension 8′ in each slot 7, into which a portion of the filling piece 7′ is fitted, the filling piece is held into its slot. The moment the wear of the drilling section passes beyond this slotted extension 8′, the filling piece is released.

When the drilling is through hard material where a core is formed and it becomes necessary to remove the same from within the drill section, the drive mechanism is stopped and the drive section 2 is disconnected from the swivel by unscrewing the cap 12. The cap 14′ is then screwed onto the embedded shell 14 and air under pressure from the pipe 15′, which leads from a suitable compressor, is admitted into the chamber 15, from whence it escapes through the clearance space 8 into the drill section beneath the core piece 10′ to be removed; the pressure of the air forcing the same upwardly through the casing stem for the drill section until carried beyond the open end thereof. Inasmuch as the core piece 10′ is drilled slightly less in diameter than the interior of the drill section and its casing stem, the same will move freely upward under the influence of the air pressure placed thereon.

Where the drill section is formed from a single tube provided with a projecting tooth, the wear thereon is at an outward inclination, hence the same cuts a core piece, when drilling through hard material, as for instance quartz, of a diameter slightly greater than the interior diameter of the body portion of the drill section, which results in the core piece clogging the same. By constructing the drill section as herein described, such clogging is successfully overcome and the difficulty above expressed disposed of. The spreading of the seam joint of the double tube drill section to reversely flare the cutting edges thereof, by the packing of the abrasive material therein, is a factor which will readily appeal to those requiring the use of the apparatus for deep boring.

The upward flow of the muck during the operation of drilling is indicated by arrows on Fig. 1 of the drawings, while the flow of the air under pressure for expelling the core piece from within the drill section and its stem casing, is indicated by arrows on Fig. 2 of the drawings.

An important feature of the invention resides in the provision of the filling members 7′, before described. These filling members when in place constitute in effect a continuation of the walls of the tubes or bit sections 5 and 6, whereby said walls are free from openings at these points, except such of those openings as are lowermost and which constitute the grinding edge of the drill. Such a construction has many advantages among which may be noted the fact that when the parts are coupled up as shown in Fig. 2 in connection with the air compressor, the discharge from the pipe 15′, will, instead of passing through the openings 7 and seeking an outlet at the top of the tubes, find its way to the lowermost edge of the drill and beneath the core piece 10′ to be removed. Again, the closing of the apertures which successively constitute the cutting teeth, prevents the choking the same, the filling pieces being automatically released when

the bit is worn down, and at the same time since the drilling bit is composed of two tubular sections, the same may be packed with abrasive material, if desired.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:—

1. A drill bit section comprising two concentric tubes having a plurality of apertures or perforations arranged substantially throughout the length thereof, and a filling piece temporarily held in each of the said apertures so that the apertures, as the filling pieces are released, form successive cutting teeth for the bit section.

2. In an apparatus for the described purpose, the combination with the rotatable stem casing, a tubular drill section connected to the lower end thereof and having a series of spirally disposed openings formed through the wall thereof, said openings acting successively as cutting teeth, means for supplying through the stem casing under pressure abrasive material, and means for temporarily filling said openings whereby the drill section is free from openings intermediate its ends and the abrasive material will be fed directly to the cutting edge of the drill section.

3. In combination with a rotatable stem casing, a drill section composed of two tubes connected to the lower end thereof and having a series of spirally disposed openings formed therein throughout the length thereof and acting successively as cutting teeth, and a removable filling piece temporarily held within each of the said spirally disposed openings of the drill section.

4. In an apparatus of the character described, the combination with a rotatable stem casing, a drive section secured to its upper end, and a double tube drill section connected to the lower end thereof, the drill section having a series of spirally disposed openings formed through the walls thereof for approximately the length thereof, feeding means for supplying abrasive material through the stem casing to the drill section, mechanism for supplying air under pressure around the drill section through the drilled bore to the interior of the drill section for forcing the core therefrom and from within the stem casing, and automatically releasable filling means one for each opening of the drill section whereby said section is free from openings intermediate its ends and said air and abrasive material will be fed to the lower edge of the drill section.

5. In an apparatus of the character described, the combination of a drill section comprising a tube, having a series of spirally disposed openings formed therethrough for acting successively as cutting teeth, and a filling piece for each opening adapted to be automatically released as the surrounding wall of the tube is worn.

6. In an apparatus of the character described, the combination of a drill section comprising a plurality of concentric tubes, having a series of spirally disposed openings formed therethrough for acting successively as cutting teeth, and a filling piece for each opening, said filling pieces being constructed of different material from the tube section.

7. In an apparatus of the character described, the combination of a drill section comprising a plurality of concentric tubes, having a series of spirally disposed openings formed therethrough for acting successively as cutting teeth, and a wooden filling piece for each opening adapted to be automatically released as the surrounding wall of the tube is worn.

8. In an apparatus of the character described, the combination of a drill section comprising a plurality of concentric tubes, having a series of spirally disposed openings formed therethrough for acting successively as cutting teeth, a filling piece for each opening having an offset extension filling in an extension of the opening substantially as and for the purpose described.

9. In an apparatus of the character described, the combination of a drilling section comprising a tube having a series of spirally disposed triangular openings formed therethrough for acting successively as cutting teeth, a wooden filling piece for each opening, and each of said filling pieces having a downwardly extending projection fitting in a similar recess in the wall of the tube, substantially as and for the purpose described.

10. In an apparatus of the character described, a drilling section comprising an inner tube, an outer tube snugly fitted to the lower end of the inner tube, each of said tubes having a series of registering spirally disposed openings, and an automatically releasable filling for each opening, the lower ends of the respective tubes being adapted to be oppositely flared, substantially as and for the purpose described.

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

HENRY W. MUHLEISEN.

Witnesses:
N. A. ACKER,
D. B. RICHARDS.