May 24, 1927. 1,629,581

A. W. MACHLET

TOOL FOR DRILLING CONCRETE, ETC

Filed Oct. 27, 1923

Fig. 1.

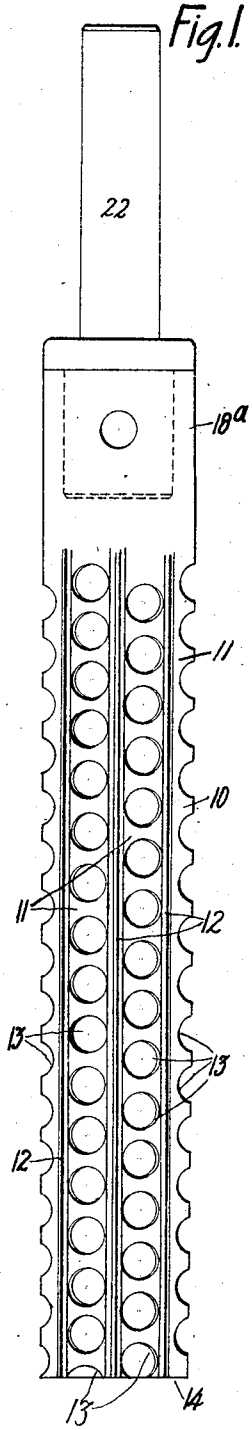


Fig. 2.

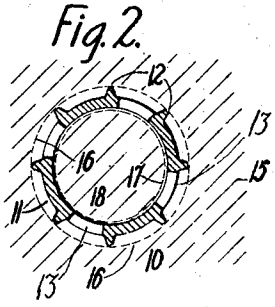


Fig. 3.

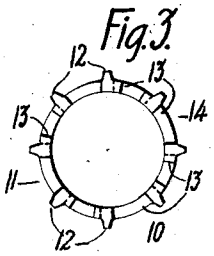


Fig. 4.

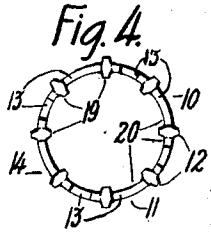


Fig. 5.

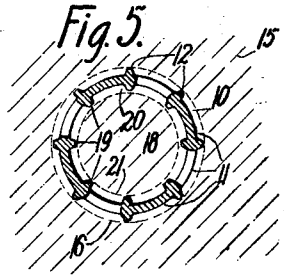


Fig. 6.

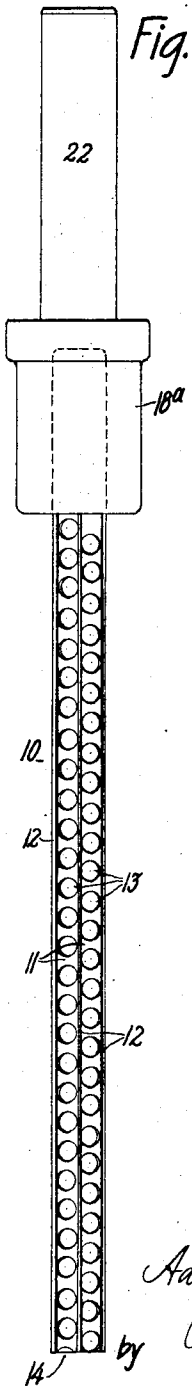


Fig. 9.

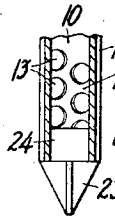


Fig. 7.

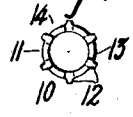


Fig. 8.

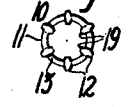
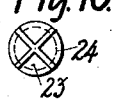


Fig. 10.



Inventor:
Adolph W. Machlet
by B. B. Stickney
Attorney

Patented May 24, 1927. 1,629,581

UNITED STATES PATENT OFFICE.

ADOLPH W. MACHLET, OF ELIZABETH, NEW JERSEY.

TOOL FOR DRILLING CONCRETE, ETC.

Application filed October 27, 1923. Serial No. 671,086.

This invention relates largely to bits or tools for drilling holes in cement, concrete, brick, etc., to serve as sockets in which to fasten expansion bolts, used for a variety of anchorage and other purposes, as for example in installing hangers, shelves and sinks, and in fastening machinery to the floor.

In drilling such holes, it is the custom to use a chisel like tool or bit which is cross-pointed or cross-shaped in transverse section at the nib, and it has to be turned during the operation of hammering or pounding it into the cement or other material to grind up the material and make a round hole. All of the material that comes from the hole is first pounded or ground into powder by such a tool, entailing much labor and loss of time and consumption of power. The usual drills tend to make irregularly shaped holes, and in operating them care and skill must be exercised, as otherwise the drill will lock itself against turning, and is apt to produce an irregularly shaped hole instead of a round one.

The tools are expensive to make in comparison to the small amount of service which they can render. They rapidly wear away, necessitating frequent resharpening, and soon have to be discarded. Moreover, the corners of the cross-shaped tool wear away in a short time, thus changing the diameter of the hole, so that the holes successively produced by the same tool are less and less in diameter; and it becomes necessary, therefore, for a workman to provide himself with many duplicate tools in order to preserve as nearly as possible uniformity of diameter of holes.

The holes produced by common methods are not uniformly circular, but are usually of irregular contour. The interior of the hole is apt to be irregular also, even where the top of the hole may look round and satisfactory. The result is that the expansion bolt when placed in the hole has a poor hold and is not adequately supported throughout the length of the hole, because of its irregular and hollowed-out interior. This is a source of annoyance and weakness and is otherwise objectionable.

Moreover, it is found difficult to make a hole that shall be within the required limits as to diameter. The expansion bolt itself is capable of only slight expansion, and when placed in the hole it is sometimes found that the bolt will not expand enough to become anchored, on account of the oversize of the hole. A closely fitting hole is demanded. If the diameter of the hole is beyond the range of expansion of the bolt, the taper therein will pull through.

The closer the hole is to the expansion bolt the better. The diameter of the bolt must match the diameter of the hole. There must be uniform diameter of the hole and uniform fit throughout its depth. Expansion bolts have a limited range of expansion, of from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch, and owing to this small range it results that if the hole in the concrete is rough, the bolt cannot be satisfactorily tightened and anchored in the hole.

To overcome the difficulties and meet the requirements, the present invention is in the nature of a hollow cylindrical bit or tool having a self-renewing wearing edge or nib and embodying a provision for securing clearance and assuring accurate and true form of the hole in the cement or the like for its entire depth.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 shows an elevation of one form of drill of the class specified.

Figure 2 is a cross-section.

Figure 3 is an end view of the same showing the nib or cutting edge in its original condition.

Figure 4 is similar to Figure 3, but shows a drill having internal teeth or ribs, as well as the external teeth or ribs seen at Figure 3.

Figure 5 is a view similar to Figure 2, but showing also the internal teeth or ribs of Figure 4.

Figure 6 is a view similar to Figure 1, but shows a smaller tool having fewer sides and ribs.

Figure 7 is an end view of the tool seen at Figure 6.

Figure 8 is similar to Figure 7, but shows also the internal teeth or ribs.

Figures 9 and 10 show a point secured to the drill for starting the hole in the work; the same being shown in sectional and end views.

The improved hollow tool 10 is cylindrical and is longitudinally fluted at 11 all around the tool, and the longitudinal ridges 12 which are formed by the fluting have the appearance of projecting teeth or spurs, when the tool is viewed in cross-section,

Figure 2. The fluted portions of the cylinder are formed with longitudinal rows of perforations 13, which are illustrated as circular, although not limited to circular form. With the end or nib 14 of the tool placed against the cement or other work 15, the tool is hammered or worked as a drill, and the edge of the cylinder, forming the nib 14, serves to grind away or break up the cement or other material, and to produce an annular cut 16, 17 in said material, the cut proceeding to the desired depth, and being cylindrical throughout its depth, since the tool is of uniform diameter from end to end; and a solid or uncut core 18 is left in the hole, which core is broken off and removed, either at the completion of the drilling or from time to time during its progress. The tool makes a fine, true hole. Instead of pounding or grinding up all of the material to be removed from the hole, this tool only grinds up the annular space 16, 17, in which the tool works, leaving the core which can be removed in solid condition.

The perforations in the flutings 11 have the effect of producing gaps 13 in the self-renewing nib or working end or edge of the hollow tool, Figure 3. These perforations are staggered, Figures 1 and 6, so that, as the tool wears away, the constantly changing working-edge or nib 14 remains substantially uniform in area and efficiency, requiring substantially uniform handling or pounding, and proceeds at substantially uniform speed through the work. During the hammering operation, the drill, in certain classes of work, may be rotated slightly, so as to make a complete annular channel 16, 17 in the work.

The radiating or projecting teeth 12 seen on the end of the tool are efficient in securing clearance for the tool in the work, so that there is no liability of the tool becoming frozen or caught in the work, but it is always free therein. The ribs 12 may be even relatively closer than illustrated, so that the tool may be hammered into the work without rotating the tool at all, the projecting teeth being close enough together to effect the necessary breaking up of the work-material. In any case the need for rotating the tool may be slight, and will be partly dependent upon the extent of separation of the teeth or ribs 12 from one another; whereas in using the cross-shaped bit above mentioned, the same must be rotated to a great extent, in attempting to approximate a cylindrical form of hole in the work. Moreover, these projecting teeth or ridges 12 between the flutes have the effect of insuring accuracy of contour of the final hole 16 throughout its depth, so that a firm anchorage is afforded for the expansion bolt.

The provision of the teeth 12 secures the further advantage that the hole 16 can be made of precisely the required diameter within very close limits, so that holes may be readily and practically produced for expansion bolts of a given diameter without incurring liability of their being unable to expand sufficiently to become anchored in the holes. The tool, inasmuch as it has the same diameter throughout, will make holes of uniform size as long as it lasts, that is, until the fluted perforated portion of the tool is all worn off to the hilt or tool-shank 18^a. The ribs or teeth 12 remain efficient throughout the life of the tool.

By the use of this tool there is kept substantially the same extent of nib contact always from the start to the finish of the work, so that the same efficiency is preserved, and the character of the work done is the same throughout the depth of the hole, thus securing accuracy in diameter and shape of the hole throughout.

The even surface in the hole that is produced by the improved tool, is better adapted to the expansion bolt, as more surface contact is afforded between the bolt and the hole, and the bolt is tighter and firmer. Moreover, the cement or other material stands up under the strain under which it is put by the expansion bolt, because the strain is spread over a greater area, instead of being confined to a few high points in an irregular hole, which might spread and cause the material to crack.

This tool is always sharp as well as always self-clearing, because there is always substantially the same amount of metal to sustain the blow. It does not necessarily have keen working edges or nibs, but there is always substantially the same amount of working face at the nib. Certain former drills became more blunt as they were operated, and therefore more surface was exposed to the blow, and hence less impression was made upon the work. But this improved tool can be worked until it is worn off to the hilt, and it is always substantially the same.

The size of successive holes made in the cement or brick work, or the like, is exactly the same until the drill is worn out. Each hole is true and of exactly the right diameter.

The tool may be made of considerable length, so as to have a long life, and secure a relatively low cost. Some material is much harder, and a harder blow has to be used on the tool, rendering it necessary to have more strength in the tool and requiring more surface on the working end or nib of the tool than is illustrated.

Where a deep hole is made with a core or plug 18 in it, it is desired to clear the hole or to shake out the plug. The tool is not desired to pack in the hole, nor is it desirable for the core to pack in the tool.

The hollow tool may have a set of teeth 12 only on its exterior, for certain classes of work, and may have similar teeth or ribs 19 only on the interior, Figures 4 and 5, for certain other classes of work. For still other kinds of work, it may have both exterior and interior flutes 11, 20 and teeth 12, 19, as at Figures 4 and 5. The annular channel 16, 21, at Figure 5, is thus made a little wider than at Figure 2.

The inside teeth 19 may serve to clear the hole in certain classes of work, so that packing does not take place. Where inside teeth are provided, the work core or plug is reduced a little in diameter, and the operation is highly successful (whether outside teeth 12 are also used or not), and the clearing is more satisfactory, the dust is not apt to cause the plug to stick in the tool, and the tool is more likely to fit the work core loosely, and the latter is more readily shaken out, than where the inside teeth are omitted. The inside teeth 19 do not need to be deep, but just enough to make a clearance inside of the bore of the tool.

It will be seen that the expansion-bolt-socket forming drill terminates in a series of chisel-edges impinging upon the work, each chisel-edge, as at Figure 5 preferably comprising two ribs 12, 19, and the intervening segmental wall-portion of the tool, said wall-portion being defined by the fluting 11. The work-engaging portion of the tool consists of chisel-edges which are formed or defined by the perforations, the perforations extending in rows longitudinally of the tool, the rows being preferably straight, and the perforations having an echelon arrangement. By reason of this arrangement, the chisel-edges are divided into two sets, each set comprising rows of chisel-edges extending longitudinally of the tool, the rows of chisel-edges in one set alternating with the rows of chisel-edges in the other set. Upon the wearing away of the four chisel-edges in either set, they are succeeded by the next four fresh chisel-edges in the other set.

At Figures 9 and 10 there is shown a point 23, which may be fitted in the end of the drill to start the hole in the work. The point may be cross-shaped when viewed endwise, as shown, and the attachment may comprise this cross-shaped head and a shank 24 for insertion into the end of the tool, which it fits tightly. After the hole is started by means of the pointed head, the latter may be removed from the tool, and the hole then drilled in the manner hereinbefore explained.

The holes 13 in the tool 10 are preferably cylindrical and therefore easy to make. In making these holes, the machine drill can go clear through the tool from one side to the other, thus making the two holes in the opposite sides of the tool 10 at one operation, with a symmetrical result. There is preferably an even number of similar flutes 11 for this reason, and the expense is thereby reduced. The inside flutings 20 (where employed) coincide radially with the outside flutings 11, so that the same holes 13 occur between both the interior ribs 19 and the exterior ribs 12.

The tool may be made of gas-piping or other tubing of either hard or soft steel, according to the nature of the work to be performed; and if made of soft steel it may be case-hardened, thus adding to the efficiency of the tool, such increased efficiency enduring until the entire tool is worn out. The tool may be formed with a head 22 and may be used with pneumatic drills, or otherwise.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others, and the use is not limited to cement or concrete, but holes may also be drilled in bricks, earthy or refractory materials, stone, rock-drilling, coal-drilling, slate-work, oil and other well-drilling, and all work where drills are used, including drills which only revolve as well as those that pound.

While the drawings show drills having six and eight sides or flutes, it will be understood that the invention is not limited to this number of sides. It is not in some cases desirable to have the perforations 13 spaced widely apart circumferentially of the drill, because it is not well to have too much edge or nib striking the work. In larger drills there may be more flutes or sides for certain kinds of work.

Having thus described my invention, I claim:

1. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib thin enough to produce a cut in the material when the tool is hammered and provided with straight longitudinal ribs at intervals around its periphery, the tool having rows of chisel-forming perforations between the ribs, the perforations having an echelon arrangement around the tool.

2. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib thin enough to produce a cut in the material when the tool is hammered and provided with straight longitudinal ribs at intervals around its interior periphery, the tool having rows of chisel-forming perforations between the ribs, the perforations in each row having an echelon arrangement relatively to those in the adjoining rows.

3. A drill of the class described, in the

form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib thin enough to produce a cut in the material when the tool is hammered and provided with straight longitudinal ribs at intervals around its periphery, the tool having rows of chisel-forming perforations in echeon between the ribs, said ribs being both exterior and interior, and the flutes between the interior ribs coinciding substantially with those between the exterior ribs.

4. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib and provided with longitudinal ribs at intervals around its periphery, the tool having rows of perforations between the ribs, said ribs being both exterior and interior, and the flutes between the interior ribs coinciding substantially with those between the exterior ribs, said perforations being cylindrical, and the flutes being evenly spaced and of an even number, the perforations in each flute being opposite the perforations in another flute.

5. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib impinging directly upon the work to produce a cut therein when the tool is hammered and provided with longitudinal ribs at intervals around its periphery, the tool having rows of chisel-forming perforations in echelon arrangement between the ribs, dividing said tool into longitudinal rows of chisel-points in echelon arrangement and forming sets which come alternately into use by reason of the wearing away of the tool.

6. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib impinging directly upon the work to produce a cut therein when the tool is hammered and provided with longitudinal ribs at intervals around its periphery, the tool having rows of chisel-forming perforations in echelon arrangement between the ribs, dividing said tool into longitudinal rows of chisel-edges in echelon arrangement and forming sets which come alternately into use by reason of the wearing away of the tool, said tool being case-hardened.

7. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib and provided with longitudinal ribs at intervals around its periphery, the tool having rows of perforations between the ribs, said tool having a head secured thereto for hammering.

8. A drill of the class described, in the form of a hollow tool of the same diameter throughout and having a self-renewing wearing edge or nib thin enough to produce a cut in the material when the tool is hammered and provided with longitudinal surface ribs for securing clearance, said ribs being straight for the length of the tool, rows of chisel-forming perforations between the ribs, dividing the tool into chisel-edges impinging directly upon the work, said perforations having an echelon arrangement.

9. A drill in the form of a hollow tool and having a self-renewing wearing edge or nib and provided with longitudinal surface ribs, and a pointed head inserted upon the end of said tool for starting a hole in the work; said head being removable.

10. A drill in the form of a hollow tool and having a self-renewing wearing edge or nib and provided with longitudinal surface ribs, and a pointed head inserted upon the end of said tool for starting a hole in the work; said pointed head being cross-shaped, as set forth, and having a shank portion for insertion into the end of the tool.

11. An expansion-bolt-socket forming drill in a form of a hollow tool of the same diameter throughout its length and terminating in a series of chisel edges impinging upon the work to produce a cut therein when the tool is hammered, said chisel edges separated by chisel-forming perforated portions of said tool, the material of the tool between the perforations constituting the chisel edges and being brought successively into use by the wearing away of the tool, said perforations having an echelon arrangement, and dividing the tool into a succession of annular series of alternating chisel edges and spaces, the chisel edges being formed in columns upon said tool, and chisel edges in one set of columns coming into use as those of alternating columns are worn away.

12. An expansion-bolt-socket forming drill in a form of a hollow tool of the same diameter throughout its length and terminating in a series of chisel edges impinging upon the work to produce a cut therein when the tool is hammered, said chisel edges separated by chisel-forming perforated portions of said tool, the material of the tool between the perforations constituting the chisel edges and being brought successively into use by the wearing away of the tool, said perforations having an echelon arrangement, and dividing the tool into a succession of annular series of alternating chisel edges and spaces the chisel edges being formed in columns upon said tool, and chisel edges in one set of columns coming into use as those of alternating columns are worn away, said tool formed with ribs extending longitudinally thereof and forming portions of the chisel edges and securing clearance.

13. An expansion-bolt-socket forming drill

in a form of a hollow tool of the same diameter throughout its length and terminating in a series of chisel edges impinging upon the work to produce a cut therein when the tool is hammered, said chisel edges separated by chisel-forming perforated portions of said tool, the material of the tool between the perforations constituting the chisel edges and being brought successively into use by the wearing away of the tool, said perforations having an echelon arrangement, and dividing the tool into a succession of annular series of alternating chisel edges and spaces, the chisel edges being formed in columns upon said tool, and chisel edges in one set of columns coming into use as those of alternating columns are worn away, said tool formed with ribs extending longitudinally thereof and forming portions of the chisel edges and securing clearance, said ribs extending parallel with the axis of the tool, and said perforations disposed in rows between the ribs.

ADOLPH W. MACHLET.