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P. MARCEROU
 TOOL FOR DRILLING ROCKS AND THE LIKE AND
 DRILLING DEVICE COMPRISING SUCH TOOLS
 Filed May 12, 1948

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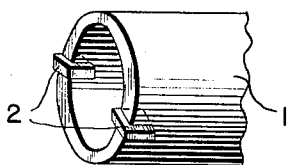


FIG. 1.

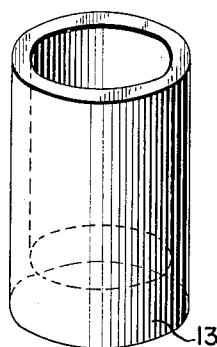


FIG. 3.

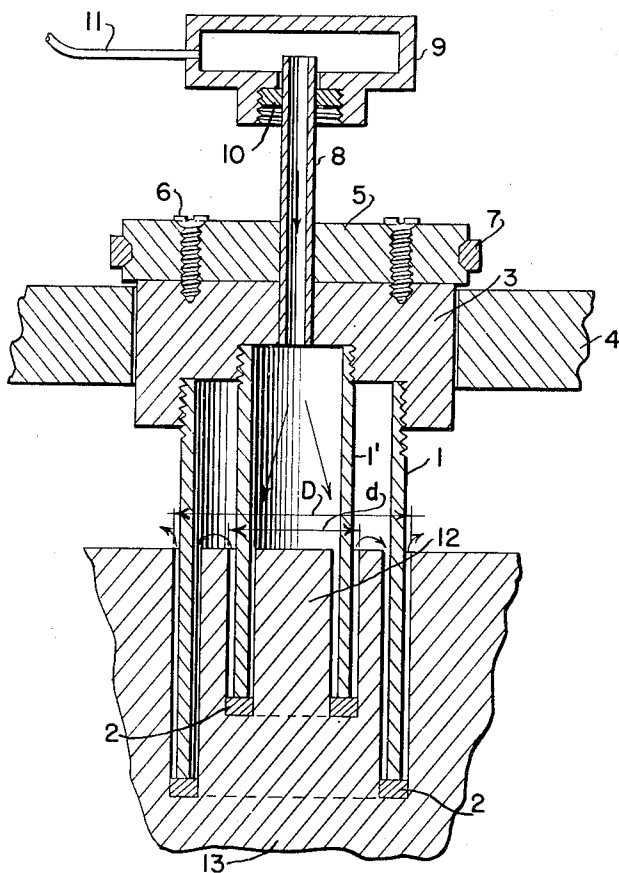


FIG. 2.

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TOOL FOR DRILLING ROCKS AND THE LIKE
AND DRILLING DEVICE COMPRISING
SUCH TOOLS

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7 Claims. (Cl. 255-72)

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The invention has for its object a tool for drilling rocks and stones and the like and a drilling device comprising a number of such tools purported to drill several concentric holes at a time so as to manufacture through the drilling operation proper a hollow article, for instance a vase.

The tool consists of a metal pipe the free end of which carries at least one small local mass of an abrasive material, for instance, tungsten carbide, vanadium or the like steel, and the said mass or masses are so disposed as to project inside, outside and before the free end of the pipe. In this way, the annular hole is drilled into the stone with a thickness larger than that of the pipe walls, which improves the withdrawal of stone chips and dust resulting from the drilling operation and allows for continuous drilling.

The drilling device of the invention is characterized in that it comprises a number of such tools, usually two of them, concentrically placed into each other and driven simultaneously so as to drill two concentric annular holes by every drilling operation. This practice makes it possible to manufacture a hollow article while drilling the required hole, said hollow article being for instance a vase drilled from the mass of stone or rock, which is a new characteristic feature. With this object in view, the device comprises usually two such concentrically rotating tools of the type stated above, means for rotating said tools around their common longitudinal axis, means for moving said pipes axially, and finally, means for feeding a compressed fluid for improving the withdrawal of chips and dust resulting from the drilling operation.

In a preferred embodiment of this device with concentric tubular tools, the inner pipe may have its free or cutting end in a plane behind that of the corresponding end of the outer pipe, relatively to the rock to be drilled, and this difference of levels will correspond usually to the bottom thickness of the hollow article to be manufactured.

As a mere example, without in any way to restrict the scope of the invention, one embodiment of the invention is roughly schematized in the appended drawings in which:

Figure 1 is a perspective view of the cutting end of a tubular drilling tool according to the invention.

Figure 2 is a longitudinal schematic section of a device using two concentric tools similar to that shown in Figure 1.

Figure 3 is a perspective view of a hollow article made while performing a drilling operation according to the invention.

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In the drawings, the characteristic tool of the invention is made from a pipe 1 acting as a supporting member for the tool proper which comprises at least one small local mass 2—in the present case, two such masses—of an abrasive material suitably fastened to the pipe, for instance by soldering, in such conditions that said mass projects inside, outside and before the free end of the pipe 1. The size, nature and number of such abrasive local masses or bits depend mainly on the kind of drilling operations proposed, and especially on the hardness of the rock, stone or like material and on the desired speed of drilling.

The new characteristic device equipped with such tubular concentric tools is roughly shown in Figure 2. It consists of at least two concentrically disposed pipes 1—1' extending from a common rotary supporting member 3 guided in a bearing plate 4; the member 3 carries a pulley 5 attached to it by means of screws 6 for instance and driven from convenient power means by a belt 7. The local abrasive masses 2 are located as stated above and the inner pipe 1' has its free end in a plane at a distance behind that of the corresponding end of the outer pipe 1, this distance being designated by *h*. The rotary common supporting member 3 and the pulley 5 carry a centrally transverse pipe 8 extending from a water chamber 9 sealed by a stuffing box 10, the other end of the pipe 8 opening into the top end of the inner tubular tool 1'. The water chamber is fed through a flexible hose 11.

Such a device operates very simply; indeed, it is used in just the same way as an ordinary tubular tool, for which purpose it is driven into rotation around its longitudinal axis while moved axially forward. This causes both pipes 1—1' simultaneously to drill into the stone along concentric annular cutting areas. Assuming now that a hole of predetermined diameter *D* is to be drilled, another hole of diameter *d* is drilled at the same time, and when the central core 12 is removed, a hollow article 13 easy to separate from the stone mass is obtained at the same time as the hole of the desired diameter *D* is drilled. In this way, the invention does not only procure a device allowing for easy manufacturing of hollow articles from stones, rocks and the like but also constitutes an important advantage in the practice of drilling blind holes of any kind, due to the facts that the core separated from the stone block is recuperated and that said recuperated core may find immediate use on the market. If the stone formation be made of the desired height prior to the drilling operation forming the vase, no problem arises

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for breaking the vase out of the formation without danger to the walls.

The supporting and driving members for the concentric tubular tools may of course be formed in any other suitable manner than in the embodiment of Figure 2. The water supply and the withdrawal of water containing rock dust and chips may be assured in various other ways than that stated above, as desired.

Water may of course be replaced by other convenient fluids such as air, especially when the stone drilled should be kept dry or when working on soft stones. Finally, the invention also scopes the hollow articles manufactured by means of the new tool and device of the invention, the characteristic feature of said articles being their annular drilling in the stone mass as stated above.

What I claim is:

1. A tool for drilling stone and the like, the tool comprising two concentrically placed pipes, to the free end of which is fastened at least one small mass of an abrasive material so formed as to project inside, outside and before the free end of the two pipes and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as to leave an annular uncut portion of stone between the pipes, means for rotating said pipes around their longitudinal axis, means moving said pipes axially, and means circulating a fluid through said device for cooling tools and withdrawing stone chips and dust.

2. A tool for drilling stone and the like, the tool, comprising two concentrically placed pipes, to the free end of which is fastened at least one small mass of metallic abrasive material so formed as to project inside, outside and before the free end of the two pipes and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as to leave an annular uncut portion of stone between the pipes, means rotating said pipes around their longitudinal axis, means moving said pipes axially, and means circulating a fluid through said device for cooling tools and withdrawing stone chips and dust.

3. A tool for drilling stone and the like, the tool, comprising two concentrically placed pipes, to the free end of which is fastened a number of circumferentially spaced small abrasive masses so formed as to project inside, outside and before the free end of the two pipes and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as to leave an annular uncut portion of stone between the pipes, means rotating said pipes around their longitudinal axis, means moving said pipes axially, and means circulating a fluid through said device for cooling tools and withdrawing stone chips and dust.

4. A tool for drilling stone and the like, the tool, comprising two concentrically placed pipes, to the free end of which are soldered a number of circumferentially spaced small masses of a metallic abrasive material so formed as to project inside, outside and before the free end of the two pipes and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as

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to leave an annular uncut portion of stone between the pipes, means rotating said pipes around their longitudinal axis, means moving said pipes axially, and means circulating a fluid through said device for cooling tools and withdrawing stone chips and dust.

5. A tool for drilling stone and the like, the tool, comprising two concentrically placed pipes, to the free end of which is fastened at least one small mass of an abrasive material so formed as to project inside, outside and before the free end of the two pipes; the two pipes being located within each other and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as to leave an annular uncut portion of stone between the pipes, a common rotary supporting member to which said pipes are fastened, means driving said member around the longitudinal axis of the pipes, means moving said pipes axially and means circulating a fluid through said device for cooling tools and withdrawing stone chips and dust.

6. A tool for drilling stone and the like, the tool, comprising two concentrically placed pipes, to the free end of which is fastened at least one small mass of an abrasive material so formed as to project inside, outside and before the free end of the two pipes and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as to leave an annular uncut portion of stone between the pipes, a rotary supporting member common to both pipes, a driving pulley fastened to said member, means driving said pulley, means moving the pipes axially, and means circulating a fluid through the pipes.

7. A tool for drilling stone and the like, the tool, comprising two concentrically placed pipes, to the free end of which is fastened at least one small mass of an abrasive material so formed as to project inside, outside and before the free end of the two pipes and forming inner and outer annular cutters, the pipes and the abrasive material being spaced and the inner annular cutter located in a plane above that of the outer cutter so as to leave an annular uncut portion of stone between the pipes, a rotary supporting member common to both pipes and a driving pulley fastened to said member, said pulley and said member carrying at least one pipe extending through them, a water chamber connected with the last-mentioned pipe and opening into the inner pipe, whereby the pipes may be rotated and moved forward simultaneously while water is kept circulating through the pipes.

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