T. D. MOWLDS.

STONE CHANNELING TOOL.

APPLICATION FILED MAY 13, 1913.

1,174,433. Patented Mar. 7, 1916.

FIG. 1.

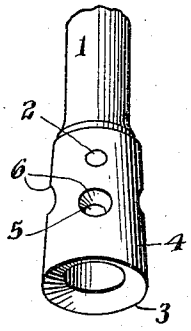


FIG. 2.

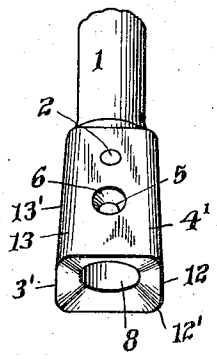


FIG. 3.

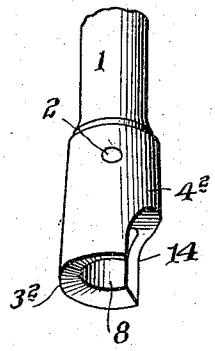


FIG. 4.

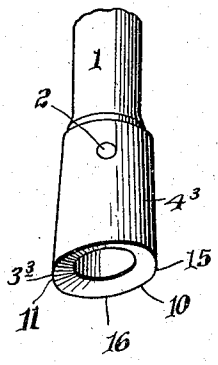


FIG. 5.

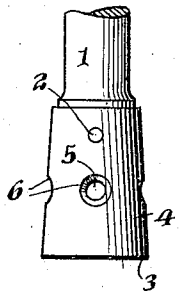


FIG. 6.

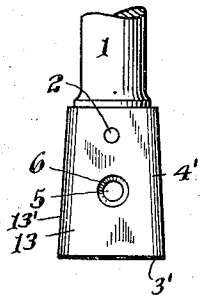


FIG. 7.

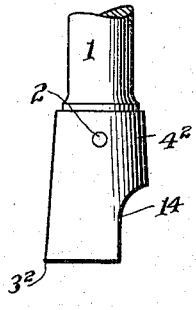


FIG. 8.

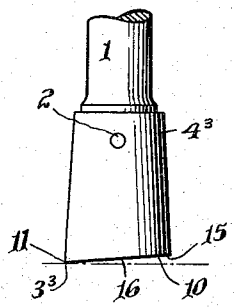


FIG. 9.

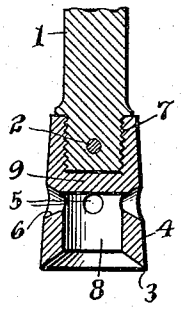


FIG. 10.

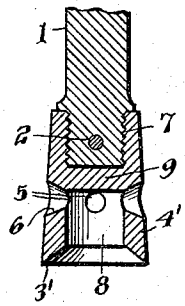


FIG. 11.

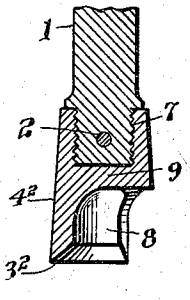


FIG. 12.

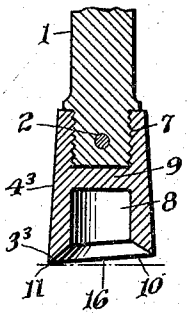


FIG. 13.

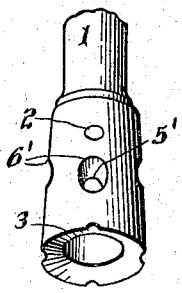
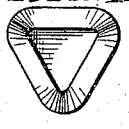


FIG. 14.



WITNESSES

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STONE-CHANNELING TOOL.

1,174,433. Specification of Letters Patent. Patented Mar. 7, 1916.

Application filed May 13, 1913. Serial No. 767,257.

To all whom it may concern:

Be it known that I, THOMAS D. MOWLDS, a citizen of the United States, residing at Bala, Montgomery county, State of Pennsylvania, have invented a certain new and useful Stone-Channeling Tool, of which the following is a specification.

My invention relates to channeling tools having a cutting edge upon the extreme outer part of the cutting face of the tool.

The purpose of my invention is to secure substantial continuity of cut from side to side of a channel at each stroke of the tool with a change in the direction of the cutting edge, from transverse at the middle to parallel with the sides at the sides.

A further purpose of my invention is to permit the tool to be turned to bring a different cutting edge into play without change in the character of cut made by it.

A further purpose of my invention is to permit the free exit of the chips and refuse cut during the progress of a cutting tool along the channel in connection with a tool cutting from side to side at each cut and substantially parallel with the sides of the channel at its side cutting edges.

A further purpose of my invention is to avoid the use of angles or corners for cutting duty.

A further purpose of my invention is to present a transverse cutting edge at the center of the cut where the greatest bite is being taken and to reduce the angle across the cut as the side edge of the cut is approached, bringing the cutting edge into substantial parallelism with the side channel wall at each side of the cut, preferably making the change from one direction of cutting edge to the other gradually and along curved lines.

A further purpose of my invention is to connect front and side cutting edges by a substantially continuous preferably curved edge cutting in the same plane with them.

A further purpose of my invention is to provide a cutting tool having a substantially continuous curved cutting edge on the extreme outer edge of the tool and with clearance from said edge upwardly and toward the axis on the outside and upwardly and toward the axis on the inside, the latter providing internal wedging of the tool against the stone cut substantially in the plane of the tool face and perpendicularly to the curve throughout.

A further purpose of my invention is to provide for clearance in a continuous cutting edge turning from transversism to parallelism to the side of the channel by a curve and having clearance toward the center of the tool or the rear end of the channel as preferred, according as the plane of the cutting edge is maintained substantially horizontal or at an angle.

I have preferred to illustrate my invention by several forms thereof which are practical, efficient and relatively inexpensive and which at the same time well illustrate the principles of my invention, without purporting to show all of the variations by which, with my disclosure, those familiar with the art will see that my invention could be carried out.

Figures 1, 2, 3 and 4 are perspective views of four different forms of my invention, which I will refer to, hereafter, as my first, second, third and fourth forms, respectively. Figs. 5, 6, 7 and 8 are side elevations respectively of the forms shown in Figs. 1, 2, 3 and 4. Figs. 9, 10, 11 and 12 are central longitudinal sections respectively of the forms shown in Figs. 1, 2, 3 and 4. Fig. 13 is a perspective view showing modifications of Fig. 1. Fig. 14 is a bottom plan view of a modification of Fig. 2.

Some of the subject matter of this application is a continuation for certain purposes of the subject matter contained in my co-pending application, Serial No. 554,687 filed April 11th, 1910, issued as Patent No. 1,062,790, granted May 27th, 1913.

In all of the forms I show a tool carrying rod 1 capable of being operated vertically by mechanism of the character shown in my Patent No. 1,012,569 of December 19, 1911, and corresponding either to the tool rod of said patent or to the tool rod 9 of my said copending application at the will of the user. Obviously, the tool rod can be operated by other mechanisms and maintain other relations to the operating mechanism,

providing it be reciprocated vertically and moved horizontally along the path of the channel. I contemplate also, with some forms of my invention, turning this tool rod and the tool carried thereby, intending to turn the tools of my third and fourth forms through a half rotation each and my second form by quarter rotations when turned at all and turning the tool of my first form any desired amount, since the purpose of rotation in this latter case is merely to change the cutting edge operating on any part of the channel being cut and anything differing from a complete rotation would serve this purpose. One way in which this rotation can be provided is shown in my Letters Patent No. 1,012,569 and another method of this rotation applicable to my first form is shown in my Patent No. 1,062,790.

In each of the forms of my invention I connect the tool with the tool rod 1 by a conventional fastening shown, locked by pin 2, so that they shall reciprocate and rotate.

In my first form I provide a cutting edge 3 upon what is intended to be the extreme outside edge of the tool, *i. e.* that portion of the tool lying farthest from the axis of the spindle, and give outside clearance from this cutting edge to form the truncated cone shown at 4 in Fig. 1, or the portions thereof shown at 4′, 4^2 and 4^3 in Figs. 2, 3 and 4, the cone or portion thereof preferably tapering uniformly from the edge 3 upwardly and inwardly toward the axis of the tool rod to provide support for the cutting edges, 3, 3′, 3^2 and 3^3 respectively, without interfering with these cutting edges cutting clear up to the extreme end wall of the channel where this is desired. In my first form the edge 3 lies in a plane transverse to the axis of the tool rod and is preferably unbroken in continuity, though I recognize that very slight serration thereof, such as is shown in exaggerated form in Fig. 13 and in my Patent No. 1,062,790 would not detract appreciably from the value of the tool and for some purposes might be advantageous, so long as a substantially continuous cutting edge is maintained.

Since my first form has a continuous cutting edge in the cutting plane, I provide exit for chips and refuse through openings 5, countersunk on the outside, as at 6, whose character and position will depend upon the size of the tool, the distance from the cutting edge to which it is desired to harden the tool, the kind of stone in which it is intended to cut, rate of feed, etc. I prefer to make these openings round, because of the convenience of drilling round holes as compared with oval holes, for example, having their greatest length along the elements of the cone, though recognizing that the latter form would have greater strength for the amount of opening provided. The oval or elliptical form is shown in Fig. 13 at 5′, countersunk at 6′, and applicant appreciates that other sections of opening might be used to advantage.

Where the duty to which the tool is to be put is heavy, I prefer that the opening 7 for the tool rod shall not be continuous with the opening 8 which I find useful for the passage of material from the cutting edge and have therefore so shown the tool as solid at 9 between these two axial openings at 7 and 8.

In order to provide bottom rake or clearance for the cutting edge, I slope the under side of the cutting face away from the cutting edge along straight or curved lines extending upwardly and toward the tool axis from the cutting edge, *i. e.*, the direction of the slope being toward the axis at all points, though the canted plane of the cutting edge in my fourth form at 10 provides a rake for the intended center of the cutting part at 11 and adjoining parts toward the right in Fig. 12, which will be toward the rear in the preferred line of travel of this tool. The rake by reason of this canting of the lower plane of the tool is not toward the axis, except just at the center of the channel width, but is along parallel lines. For some kinds of duty this rake due to the canting of the face may be sufficient and the under-cutting shown may not be required. Both rakes are shown in Fig. 12, that due to the canting and that due to the recessing. Obviously, the exact character of the clearance which is most desirable will vary with different duties to which the tool is intended to be put, depending upon the thinness or sharpness of the edge which should be used against the stone. The extent of slope or recessing will also obviously depend upon similar conditions. I show that which has produced the best results in use in my machine.

The opening 8 is not essential to the cutting theory of my tools but is intended to be used as a sort of temporary receiver for chips to prevent an accumulation of them under the tool from blocking action of the tool and also as an outlet through holes 5 for such chips as are forced up into it. Where these functions are not required the opening 8 may be reduced or omitted.

My second form is quite similar to my first form, but the part of the cutting edge 12 which lies squarely across the channel is not upon a curve, but forms part of a straight line extending some distance on each side of the center and is connected by curved lines 12′, with similar edges 12 substantially parallel to the side of the channel. This forms a tool of generally square section having sides 13 connected by curved joining parts

13′. It is capable of being turned by quarter turns only and then requires removal from the channel at the end of the cut where the channel is open or at the top, before turning. It may have the recess 8 and openings 5.

In Fig. 14 I have illustrated a form of flat-sided curved-edged tool similar in action to that of Fig. 2, regarded by me as a modification thereof and intended to be fed along the channel with one of its sides 17, preferably the forward side, directly across the channel. The sides 17 are united by curved portions 17′. This tool possesses the advantage that it can be turned in the channel preferably by thirds.

I have preferred to show the continuous cutting edge about the tool in three shapes only, the round, the nearly square and the nearly triangular. Other forms which are suggested by these examples will readily occur to those skilled in the art.

In my third form I have cut away a portion of the tool at 14, preferably less in extent than half of the circumference, in order to give additional exit for chips, keeping sufficient of the tool edge to provide a continuous curved cutting edge from side to side of the channel, avoiding any exposed corner and extending the cutting edge at the side somewhat for the advantage of reinforcement and to insure the protection of the edge even if the tool be slightly turned. With this tool, except where the channel is open at one end, it will be desirable to turn the tool before reversing the cut, preferably allowing the tool to dwell slightly to attain the desired depth before reversing. The reversal represents but a short time compared with the time of reciprocation in order that the forward surface of the cutting edge may not be exposed excessively. It will be entirely possible, of course, to turn the tool the approximate half circle required between reciprocations and the desirability of this may be measured by the user against the slight opportunity for injury of the forward surface during this turning. The cutting away of what I prefer to use as the rear of the tool in the direction of feed along the channel, illustrated in this third form of my invention may, of course, be applied to the other tools of whatever shape, as, for example, to Figs. 2, 4 and 14.

In my fourth form, the slope away from the cutting edge due to cant of the face may begin at any point and may extend, as shown, across the entire width of the tool. It is less undesirable than might at first be supposed, because it is in the correct theoretic direction at the point (the center) where most of the cutting is being done and departs from this correct direction most markedly as points on the crescent-shaped cut are reached, at which but little cutting is to be done. The general wedge-shape of this tool toward the rear due to this construction (for the moment not considering the recessing of the face upwardly from the canted plane shown) and the lifting of the rear portion 15 above the front portion 16 permits chips and refuse to pass out from under the tool.

In the fourth form of my invention, the width of the tool at the middle, *i. e.* that part coming in contact with the side walls of the channel is very slightly less than the width represented by the diameter at the front portion 16. The taper of the tool is, however, so slight that this difference is negligible and is fully taken care of by the well known characteristic of tools cutting in other material as well as in stone, that they cut holes larger than themselves, by reason of which the tool can be turned freely in the passage cut by these slightly reduced side portions. The extent of size reduction at the middle will depend, of course, upon the extent of bottom rake given the tool, and the outside clearance or slope of the tool, both of which factors will vary somewhat according to the character of stone being cut and the extent to which the tool is being crowded.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a stone channeling tool, a tapered body having a curved cutting edge on the lower outer edge of the body and having the extremities of the curved cutting edge separated to permit egress of refuse.

2. A stone channeling tool having a tapered outer surface and a curved cutting edge upon the lower extreme outer edge of the tool, the cutting edge extending throughout somewhat more than half of the perimeter of the outer surface at the bottom and open at the rear of the cut for exit of chips.

3. A stone channeling tool having a tapered outer surface and a curved cutting edge upon the lower extreme outer edge of the surface lying in a plane at an angle to the axis of the tool, extending throughout somewhat more than half of the perimeter of the outer surface at the bottom and open at the rear of the cut for exit of chips.

4. A stone channeling tool having a tapered outer surface terminating in a cutting edge adapted to extend directly across the channel at the middle of the cut and substantially parallel to the sides of the channel wall at the side of the cut, including therebetween a curved wall, all of said cutting edge being located on the extreme outer edge of the tool and adapted to wedge the stone cut interiorly toward the axis of the tool and having the center of the tool hollowed.

5. In a stone channeling tool, a cutting tool having a tapered exterior surface extending at the cutting edge throughout the width of the cut and turning therein from a position at the center transverse to the channel length to a position at the sides substantially parallel therewith and open at the back of the cutting edge to permit egress of chips therefrom, the tool tapering from the said cutting edge inwardly and upwardly.

THOMAS D. MOWLDS.

Witnesses:
HELEN I. KAUFFMAN,
GERTRUDE BADER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."