No. 850,113. PATENTED APR. 9, 1907.

A. F. JONES.

STONE CUTTING MACHINE.

APPLICATION FILED FEB. 8, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

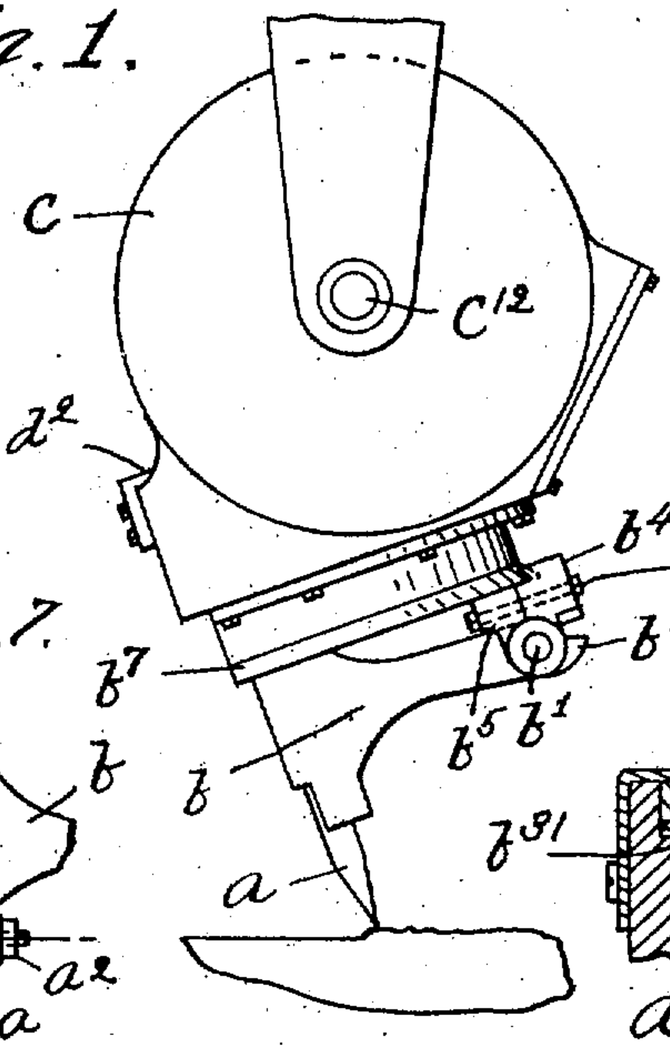

Fig. 2.

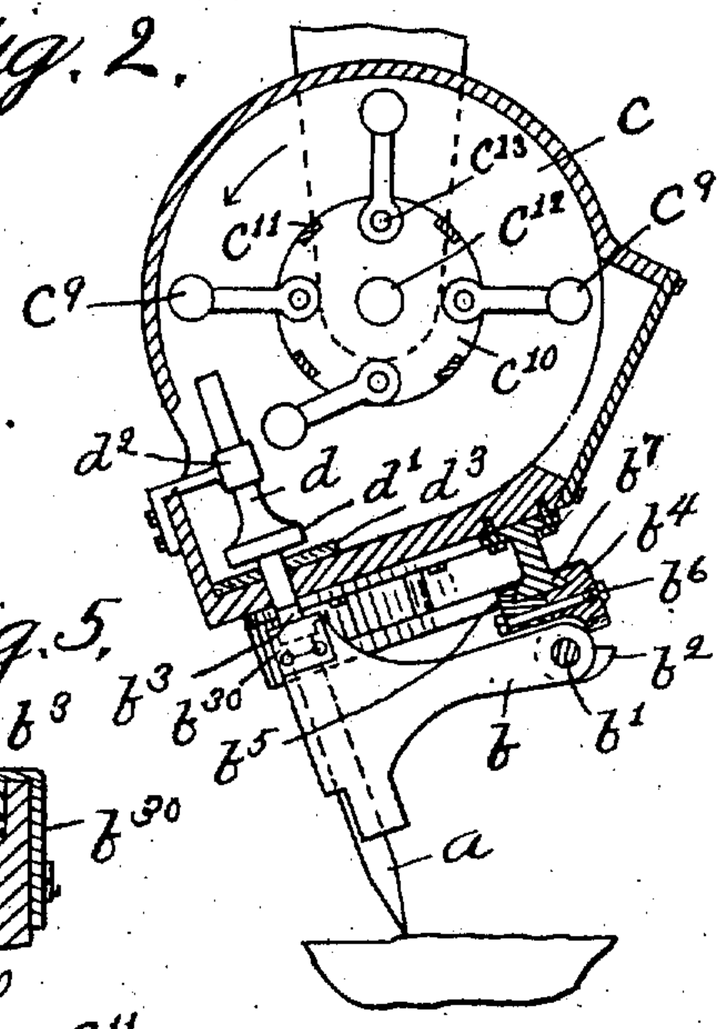

Fig. 7.

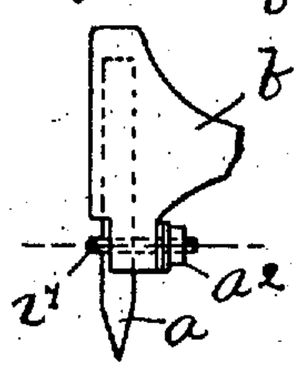

Fig. 5.

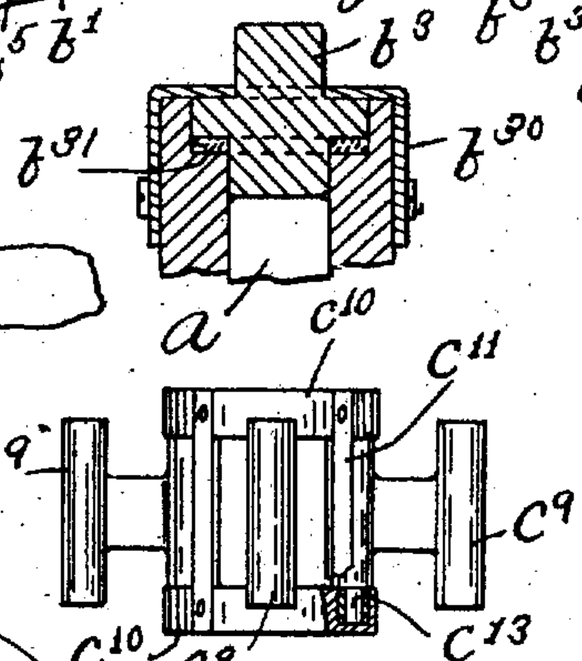

Fig. 3.

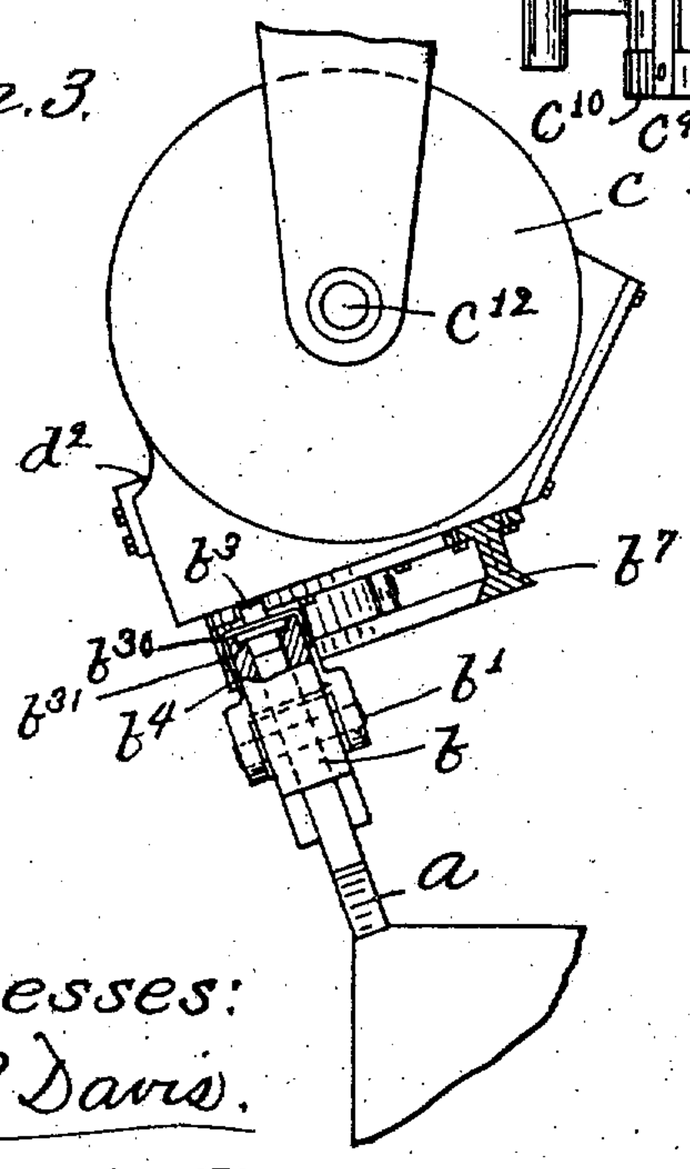

Fig. 6.

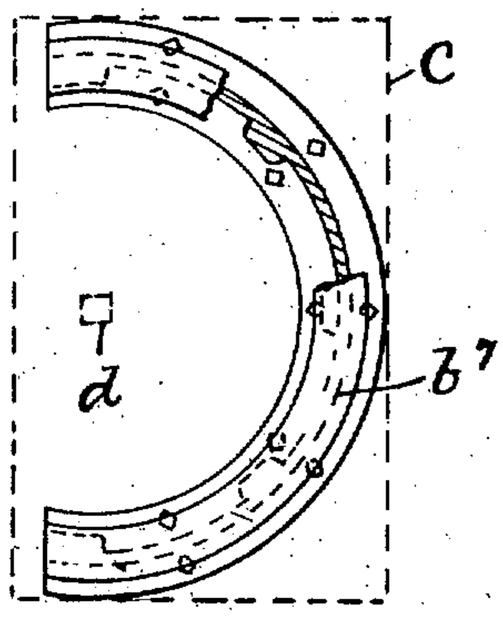

Fig. 4.

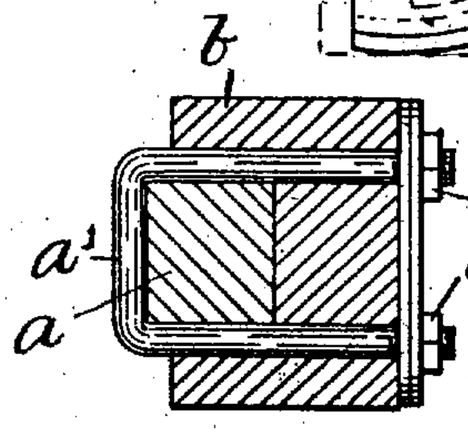

Fig. 8.

Witnesses:
H. B. Davis.
Wm. H. Piper

Inventor:
Albert F. Jones
by Stanley & Harriman
Atty.

No. 850,113. PATENTED APR. 9, 1907.

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STONE CUTTING MACHINE.

APPLICATION FILED FEB. 8, 1905.

2 SHEETS—SHEET 2.

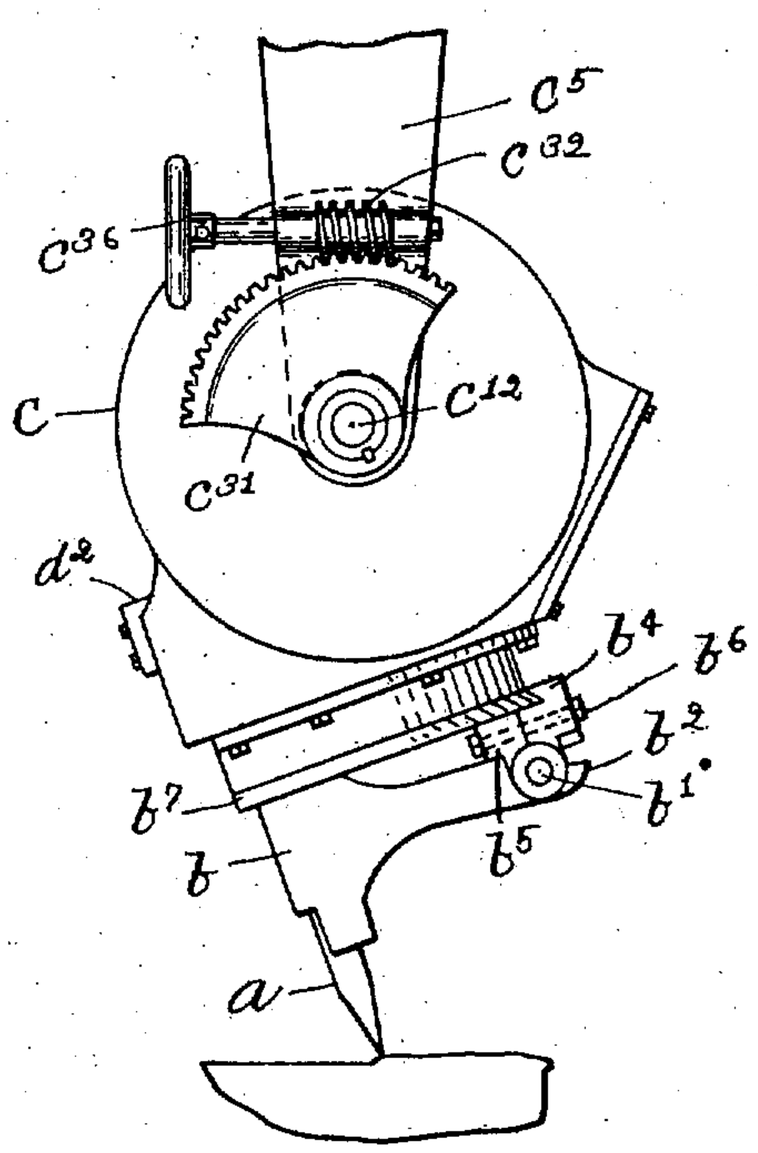

Fig. 9.

Witnesses:

H. B. Davis.

Cynthia Doyle.

Inventor:

Albert F. Jones.

by Hayes & Kerrinan.

attys.

UNITED STATES PATENT OFFICE.

ALBERT F. JONES, OF SALEM, MASSACHUSETTS, ASSIGNOR TO A. F. JONES COMPANY, OF SALEM, MASSACHUSETTS, A CORPORATION OF MAINE.

STONE-CUTTING MACHINE.

No. 850,113. Specification of Letters Patent. Patented April 9, 1907.

Application filed February 8, 1905. Serial No. 244,700.

To all whom it may concern:

Be it known that I, ALBERT F. JONES, of Salem, county of Essex, State of Massachusetts, have invented an Improvement in Stone-Cutting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to stone-cutting machines, and particularly to that type of stone-cutting machine employing a rebounding tool.

A rebounding tool possesses many advantages, as, for instance, many light blows may be imparted to it in a short period of time, and as a consequence the work will progress rapidly.

In my application for Letters Patent, Serial No. 208,999, filed May 21, 1904, a rebounding tool is shown which is movable longitudinally, and when such a tool is set at an acute angle to the surface of the stone being cut, as it will be when cutting the stone, and a protuberance of unusual height is encountered the tool will repeatedly engage said protuberance until it becomes wedged in a cavity formed therein by its repeated action and is either stuck fast or broken or the holder bearing the tool or some of the adjacent parts are broken; but by giving said tool a rebounding movement in the arc of a circle—as, for instance, by loosely pivoting the tool-holder on an axis substantially in parallelism with the surface of the stone being cut and locating said axis in advance of the tool—whenever the tool encounters a protuberance of unusual height it will gradually pass over the protuberance while repeatedly acting upon it, it being understood that the tool is moved along relative to the stone, or vice versa, while the blows are imparted to it.

In order that the tool when struck shall be free to rebound, I provide one or more rebounding hammers adapted to deliver blows in rapid succession, which are imparted to the tool, and as soon as a blow is delivered its force is spent and the tool is free to rebound.

The surface of a stone being cut is, of course, very irregular, having protuberances of varying heights and cavities of varying depths, and it is designed to cut down the protuberances to a plane with the bottoms of the deepest cavities to produce a flat surface. Therefore the tool must act only on the protuberances, remaining at rest while passing over the cavities. To accomplish this result, the position of the tool-holder relative to the tool-actuating means is so controlled that while passing over the protuberances blows will be imparted to the tool, and while passing over the cavities the tool will not be acted upon.

In accordance with my present invention the tool bears by gravity upon the stone and is held in operative position by a loosely pivoted or oscillating tool-holder, the axis on which the tool-holder moves being in parallelism with the surface of the stone and in advance of the tool. As the tool follows along the irregular surface of the stone, rising as it passes over the protuberances and falling as it passes over the cavities, the oscillating tool-holder will be moved on its axis so as to occupy different elevated positions. The actuating means employed for imparting blows to the tool is held at a predetermined elevation, and the freely-oscillating tool-holder is movable toward and from said actuating means as the tool passes over the irregular surface thereof. While the tool passes over the protuberances the tool-holder will rise high enough for its head to be acted upon by the actuating means, and when passing over the cavities it will fall far enough for its head to be removed from engagement with the actuating means. Thus the position of the tool and tool-holder relative to the actuating means is controlled by the surface of the stone being cut.

My present invention also includes as the actuating means for the tool one or more hammers and a driver, the driver being interposed between the hammer and the tool and adapted to be struck by the hammer to in turn impart the blow to the tool. The movement of the driver is limited by a suitable stop.

My invention also includes means for holding the tool at different inclinations to the perpendicular and also at different angles to the stone.

Figure 1 shows in side elevation a sufficient portion of the head of a stone-cutting machine to illustrate my invention. Fig. 2 is a vertical section of the same. Fig. 3 is a side

elevation of the head shown in Fig. 1, the tool and tool-holder being moved to a position at right angles to the position shown in Figs. 1 and 2. Fig. 4 is a detail showing an under side view of a semicircular frame bearing the support of the tool-holder. Fig. 5 is a sectional detail of the driver-engaging head on the tool-holder. Fig. 6 is a detail showing the actuator removed. Fig. 7 is a detail of a modified form of tool-holder to be described, and Fig. 8 is a sectional detail of a clamp for holding the tool. Fig. 9 is a side elevation of the head embodying my invention.

The tool *a*, which is herein shown as a pointing-tool, is loosely supported in operative position by a tool-holder *b*. The tool-holder *b* consists of an arm pivoted at one end, as at *b*, to a support and having at its opposite end a tool-engaging portion or socket adapted to receive the upper end portion of the tool *a*. The tool is held by the tool-holder at an acute angle to the surface of the stone. The point of the tool is directed toward a vertical plane passing through the axis on which the tool-holder oscillates. Hence the axis of the tool-holder is in advance of the tool. The tool bears by gravity upon the surface of the stone, and the tool-holder is free to oscillate on its pivot, rising and falling as the tool passes over the irregular surface thereof. The position of the tool and tool-holder is thus controlled by the stone over which it passes. To prevent the tool-holder dropping too great a distance—as, for instance, when the stone is removed—an ear b^2 is formed on the tool-holder adjacent its pivot which by striking against the support of the tool-holder limits its downward movement.

As the tool-holder is free to oscillate, it will instantly rebound when a blow is imparted to it by an actuator constructed and arranged to permit of a rebounding action, and when these blows occur in rapid succession the tool will progress rapidly along over the work. As the tool-holder is free to oscillate on an axis in parallelism with the surface of the stone and as such axis is located in advance of the tool, if the tool should meet a protuberance of unusual height it will pass over it while rapidly acting upon it, even though it should not cut it down to the desired level, it being understood that the tool is carried along by the head bearing it, as shown in my application referred to. As the oscillating tool-holder and tool pass over the surface of the stone, following all the irregularities therein, it is only desired to cut down the protuberances to a level with the bottom of the deepest cavities. Hence blows must not be imparted to the tool while resting in the cavities, but only while engaging the protuberances. Therefore when the tool-holder occupies certain elevations only must the blows be imparted to it. To accomplish these results, the actuating means is located at a predetermined elevation, and as the position of the tool-holder is controlled by the stone over which the tool passes it will be moved into and out of engagement with said actuating means. Thus when the tool passes over the protuberances the tool-holder will be held at a proper elevation to be engaged by the actuating means, and when the tool passes over the cavities the tool-holder will be held at an elevation, so as not to be engaged by the actuating means.

The actuating means herein shown comprises, essentially, one or more hammers and a driver, which is adapted to be engaged repeatedly by said hammers, and means are provided for limiting the downward movement of said driver, and the tool-holder is constructed and arranged to be engaged by said driver or not, according to its elevation.

As herein shown, the tool-holder *b* has a driver-engaging head b^3 attached to it in line with the tool, and said head has a projection on its under side which enters the upper end of the tool-receiving socket, and the tool abuts against the projection on the head. The head b^3 will be attached to the tool-holder by any suitable means—as, for instance, by a strap b^{30}. A piece of leather b^{31} or other cushion is placed beneath the head.

Referring to Fig. 7, the driver-engaging head is formed integral with the tool-holder, whereas in Fig. 2 it is represented as an independent piece. The form shown in Fig. 2 is preferable, as it may be made of hardened steel and, being removable, may be replaced by a new or repaired head whenever desired, and, furthermore, the blow is imparted more directly to the tool—that is to say, the driver-engaging head transmits the blow directly to the tool, and by reason of the cushion b^{31} said head has a movement independent of the tool-holder, and said tool, which is loosely supported by the tool-holder, will be moved longitudinally by the blow imparted to it a short distance independent of the tool-holder. The driver *d* is made as a bar, having at a point intermediate its length a circumferential flange *d'*, and the upper end portion of said bar is adapted to slide freely in a collar d^2, which is secured to a shell or case *c*, containing the actuator. The bar *d* is contained in said shell or case, and its lower end portion projects through a hole in the bottom wall thereof, so as to engage the driver-engaging head b^3 of the tool-holder. The bar *d* is disposed in alinement with the tool *a*, so as to impart the blow given to it in a direct line to the tool and thence to the stone. Upon the top of the bottom wall of the shell or case beneath the flange *d'* a suitable cushion d^3 is provided, against which said flange strikes when a blow is imparted to the driver. The cushion serves as a stop to limit the downward movement of the driver. The lower end portion of the bar *d*

normally projects through the bottom wall of the shell a short distance when the flange d' rests upon the stop d^3. As the tool passes over the irregular surface of the stone and encounters a protuberance of sufficient height to raise the driver-engaging head of the tool-holder against the driver and also to lift said driver a short distance above the stop, the driver when acted upon by the actuator to be described will be repeatedly thrust down against the stop d^3, and the blows will be imparted to the tool; but as soon as said tool enters a cavity of sufficient depth for the driver-engaging head of the tool-holder to drop out of engagement with the driver then the blows upon said driver will not be imparted to the tool. Thus the position of the tool and tool-holder is controlled by the irregular surface of the stone, and engagement with the driver is also controlled. The driver is free to move longitudinally or slide in its bearing and when struck a blow will immediately rebound so that the tool-holder will likewise rebound.

The tool-actuator herein shown is substantially the same as is shown in my aforesaid application and consists of a plurality of rebounding hammers c^9, loosely connected at equidistant points to a hammer-support fixed to a shaft c^{12}. The shaft c^{12} is horizontally disposed in the shell or case and is adapted to be rotated by means not herein shown, but which may be the same as shown in the aforesaid application. The hammer-support on the shaft c^{12} comprises two disks c^{10}, located a short distance apart, which are rigidly connected together by several cross-bars c^{11}, and the inner or adjacent faces of said disks c^{10} have trunnion-sockets which receive trunnions c^{13}, which project in opposite ways from the inner ends of the hammer-arms and which serve as pivots for the hammers. The heads of the hammers are elongated, as shown in Fig. 6. The several hammers c^9, four being herein shown, being thus loosely connected to the hammer-support at points remote from the axis of the shaft, will be caused to travel in a circular path as the shaft revolves, and as the shaft revolves rapidly said hammers will be extended outwardly or radially to the axis of the shaft by centrifugal action, so that the heads of the hammers will be brought into position to strike the blows. Whenever one of the hammers strikes the driver, said hammer will immediately rebound, and such rebounding stroke of the hammer will be checked by the cross-bar of the hammer-support, which is located back of the rebounding hammer. As the shaft c^{12} revolves the hammers c^9 repeatedly strike the driver d and thrust said driver downward until its flange d' strikes the cushion d^3, provided the driver occupies an elevated position, which it will do if lifted by the tool-holder; otherwise said driver will occupy its lowermost position, and as the hammers strike it no result will be produced.

As shown in Figs. 1 and 2, the cutting-tool is designed to cut the stone in a horizontal plane; but it is frequently desired to cut the stone at an angle to a horizontal plane—as, for instance, to cut a bevel along the edge of the stone—and to provide for thus cutting the stone at different angles, or, in fact, at any angle to a horizontal plane, the tool-holder is adjustably supported in the arc of a circle about the driver or other actuator as an axis. To provide such adjustment of the tool-holder, its pivot-support b' consists, essentially, of two clamping-blocks b^4 b^5, adapted to be rigidly secured together by a bolt b^6 or otherwise, and formed or provided with a dovetailed recess adapted to receive a dovetailed plate b^7, which is secured to the bottom wall of the shell or case, and the dovetailed plate b^7 is made semicircular, and the clamping-block b^4 b^5 is adjustable to any part of said plate, so that the tool may be adjusted to a position at right angles to the position shown in Fig. 2—as, for instance, as shown in Fig. 3—wherein it will be seen that the tool is disposed to cut the stone at an angle to a horizontal plane. Any other angle may be obtained by adjusting the tool-holder to different parts of the semicircular plate b^7. The semicircular plate b^7 conforms to the arc of a circle about the driver d or other actuator as an axis, so that in any position of adjustment the tool-holder will be supported with its driver-engaging head beneath the driver or other actuator.

It will be observed that herein, as in the application hereinbefore referred to, the shell or case c is adapted to be moved on its horizontal axis, so as to position the cutting-tool at the desired angle to the surface of the stone which is being cut, and whenever the cutting-tool is adjusted to cut at an angle to a horizontal plane the degree of such angle may be determined by oscillating the shell or case. Adjustment of the shell or case c on its axis may be accomplished by a sector c^{31}, secured to the shaft c^{12}, which is engaged by a worm c^{32}, adapted to be turned by a hand-wheel c^{36}.

In the modified form of tool-holder shown in Fig. 7 the tool may be clamped in position, as, for instance, by a loop a', the ends of which pass through holes in the tool-holder and project a short distance and are threaded to receive upon them nuts a^2.

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

1. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a pivoted tool-holder, freely movable in a direction toward and from the stone in a circular path, which loosely supports the tool, and means for imparting blows to the

tool, while said tool bears upon the stone, substantially as described.

2. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a pivoted tool-holder, freely movable in a direction toward and from the stone in a circular path, and means for imparting blows to the tool, while said tool bears upon the stone, substantially as described.

3. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder, free to oscillate on an axis substantially in parallelism with the surface of the stone being cut, and means for imparting blows to the tool, while said tool bears upon the stone, substantially as described.

4. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder free to oscillate on an axis substantially in parallelism with the surface of the stone being cut, which loosely supports the tool, and means for imparting blows to said tool, while said tool bears upon the stone, substantially as described.

5. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a pivoted tool-holder, freely movable in a direction toward and from the stone in a circular path, and a rebounding actuator for imparting blows to the tool, while said tool bears upon the stone, substantially as described.

6. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder free to oscillate on the axis substantially in parallelism with the surface of the stone being cut, and a rebounding actuator for imparting blows to the tool, while said tool bears upon the stone, substantially as described.

7. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a pivoted tool-holder, freely movable in a direction toward and from the stone in a circular path, which loosely supports the tool, and a rebounding actuator for imparting blows to the tool while said tool bears upon the stone, substantially as described.

8. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder, free to oscillate on an axis substantially in parallelism with the surface of the stone being cut, which loosely supports the tool, and a rebounding actuator for imparting blows to the tool while said tool bears upon the stone, substantially as described.

9. In a stone-cutting machine, the combination of a tool-holder freely movable in a direction toward and from the stone in a circular path, a tool adapted to bear upon the stone, which is loosely supported by said tool-holder but which controls the movements of said tool-holder and which is movable longitudinally independently of said tool-holder when a blow is imparted to it and means for imparting blows to the tool while the tool bears upon the stone, substantially as described.

10. In a stone-cutting machine, the combination of a tool-holder free to oscillate on an axis substantially in parallelism with the surface of the stone being cut, a tool adapted to bear upon the stone, which is loosely supported by said tool-holder and controls the movement thereof, but which is movable longitudinally independently of said tool-holder when a blow is imparted to it, and means for imparting blows to the tool, while the tool bears upon the stone, substantially as described.

11. In a stone-cutting machine, the combination of tool-actuating means, a tool-holder freely movable in a circular path in a direction toward and from the stone, a tool adapted to bear upon the stone which is loosely supported by the tool-holder but which lifts the tool-holder in a direction toward the tool-actuating means when passing over a protuberance and falls with the tool-holder when passing over a cavity, substantially as described.

12. In a stone-cutting machine, the combination of tool-actuating means, a tool-holder freely movable in a circular path in a direction toward and from the stone, a tool adapted to bear upon the stone, which is loosely supported by the tool-holder but which rises and lifts the tool-holder toward the tool-actuating means to a position for the blows to be imparted to the tool when passing over protuberances and which falls with the tool-holder to a position that the blows of said actuating means will not be imparted to the tool when passing over the cavities, substantially as described.

13. In a stone-cutting machine, the combination of a tool-holder freely movable in a direction toward and from the stone in a circular path, a tool adapted to bear upon the stone, which is loosely supported by said tool-holder but which controls the movements of said tool-holder, a driver-engaging head on said tool-holder against which the tool bears, said head and tool both being movable independently of the tool-holder when a blow is imparted to the driver-engaging head, and means for imparting blows to the driver-engaging head, substantially as described.

14. In a stone-cutting machine, a tool adapted to bear upon the stone, a pivoted tool-holder movable in a direction toward and from the stone, which is constructed and arranged to loosely support the tool, whereby said tool is movable independently thereof when a blow is imparted to it, said tool-holder moving with the tool as the latter rises and falls while passing over the irregu-

lar surface of the stone, and means for imparting blows to the tool while the tool bears upon the stone, substantially as described.

15. In a stone-cutting machine, a tool adapted to bear upon the stone, a pivoted tool-holder movable in a direction toward and from the stone, which is constructed and arranged to loosely support the tool, whereby said tool is movable independently thereof when a blow is imparted to it, said tool-holder moving with the tool as the latter rises and falls while passing over the irregular surface of the stone, and a rebounding actuator for imparting blows to the tool while the tool bears upon the stone, substantially as described.

16. In a stone-cutting machine, a tool adapted to bear upon the stone, a pivoted tool-holder movable in a direction toward and from the stone, said tool-holder moving with the tool as the latter rises and falls while passing over the irregular surface of the stone, and means for imparting blows to said tool, while said tool bears upon the stone, substantially as described.

17. In a stone-cutting machine, a tool adapted to bear upon the stone, a pivoted tool-holder movable in a direction toward and from the stone, said tool-holder moving with the tool as the latter rises and falls while passing over the irregular surface of the stone, and a rebounding actuator for imparting blows to said tool, while said tool bears upon the stone, substantially as described.

18. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a freely-movable tool-holder having a driver-engaging head, a driver into and out of engagement with which the head of said tool-holder is movable as the tool passes over the irregular surface of the stone, and means for imparting blows to said driver, substantially as described.

19. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, an oscillating tool-holder, freely movable on its axis as the tool passes over the irregular surface of the stone, having a driver-engaging head, a driver into and out of engagement with which the head of said tool-holder is movable, and means for imparting blows to said driver, substantially as described.

20. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a freely-movable tool-holder having a driver-engaging head, a driver into and out of engagement with which the head of said tool-holder is movable as the tool passes over the irregular surface of the stone, and a rebounding hammer for imparting blows to said driver, substantially as described.

21. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder having a driver-engaging head, a driver into and out of engagement with which the head of said tool-holder is movable as the tool passes over the irregular surface of the stone, a stop for limiting the descent of said driver, and means for imparting blows to said driver, substantially as described.

22. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder having a driver-engaging head, a longitudinally-movable driver into and out of engagement with which the head of said tool-holder is movable as the tool passes over the irregular surface of the stone, a flange on the driver, a stop against which said flange strikes, and means for imparting blows to said driver, substantially as described.

23. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, an oscillating tool-holder having a driver-engaging head, a longitudinally-movable driver into and out of engagement with which the head of said tool-holder is movable, as the tool passes over the irregular surface of the stone, and a rebounding hammer for imparting blows to said driver, substantially as described.

24. In a stone-cutting machine, the combination of a tool, a freely-movable tool-holder loosely supporting said tool, and having a driver-engaging head, a driver, into and out of engagement with which said head is movable, and means for imparting blows to said driver, substantially as described.

25. In a stone-cutting machine, the combination of a tool, a freely-movable tool-holder supporting said tool, a driver-engaging head removably mounted on said tool-holder, a driver, into and out of engagement with which said head is movable, and means for imparting blows to said driver, substantially as described.

26. In a stone-cutting machine, the combination of a tool-holder having a tool-receiving socket adapted to loosely receive a tool, a driver-engaging head on said tool-holder, located at the upper end of said socket, against which the tool abuts, both said driver-engaging head and tool being movable independently of the tool-holder, a driver for engaging said head, and means for imparting blows to said driver, substantially as described.

27. In a stone-cutting machine, the combination of a tool adapted to bear upon the stone, a tool-holder, free to oscillate on an axis substantially in parallelism with the surface of the stone and located in advance of the tool, a support for said tool-holder, and a shell or case bearing said support, which is movable on a horizontal axis, whereby the

angle of the tool relative to the surface of the stone being cut may be varied, substantially as described.

28. In a stone-cutting machine, the combination of a tool, an oscillating tool-holder, tool-actuating means, a support for said tool-holder, and means for adjusting said support in a circular path about the actuating means, substantially as described.

29. In a stone-cutting machine, the combination of a tool, an oscillating tool-holder, tool-actuating means, a support for said tool-holder, means for adjusting said support in a circular path about the actuating means, and a shell or case bearing the support for said tool-holder, which is movable on a horizontal axis, substantially as described.

30. In a stone-cutting machine, the combination of a tool, an oscillating tool-holder, having a driver-engaging head, a support for said tool-holder, a driver, into and out of engagement with which the head of the tool-holder is movable, means for imparting blows to said driver, and means for adjusting said tool-holder support in the arc of a circle about the driver as an axis, substantially as described.

31. In a stone-cutting machine, the combination of a shell or case, a hammer contained therein, movable in a circular path, a driver also contained therein, adapted to be struck by said hammer, the lower end of which projects through a hole in the bottom of the shell, an oscillating tool-holder having a driver-engaging head, which is movable into and out of engagement with the projecting end of said driver, and a tool held by the tool-holder, substantially as described.

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

ALBERT F. JONES.

Witnesses:
B. J. NOYES,
H. B. DAVIS.