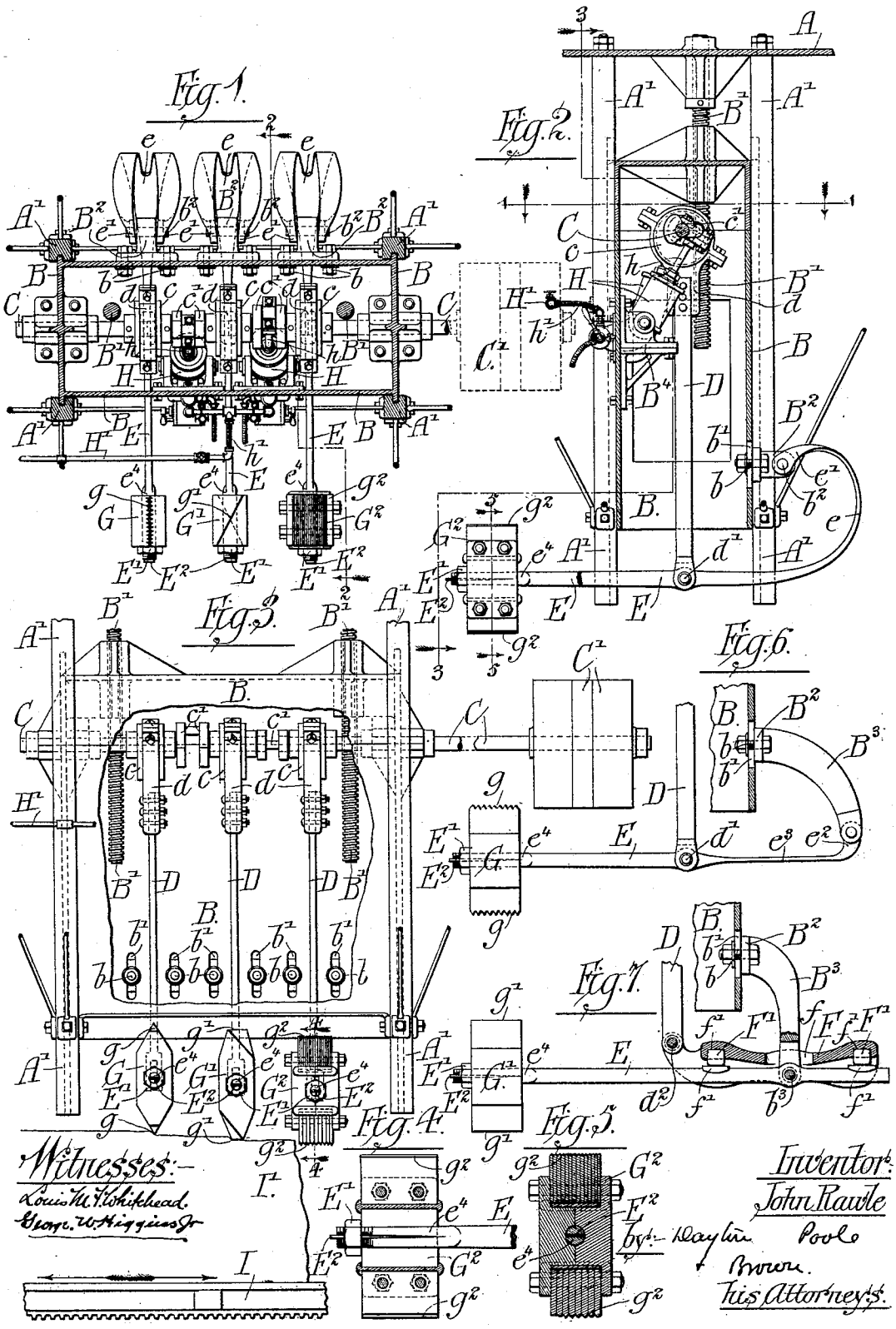
(No Model.)

J. RAWLE.

STONE CUTTING AND DRESSING MACHINE.

No. 482,099. Patented Sept. 6, 1892.



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UNITED STATES PATENT OFFICE.

JOHN RAWLE, OF CHICAGO, ILLINOIS.

STONE CUTTING AND DRESSING MACHINE.

SPECIFICATION forming part of Letters Patent No. 482,099, dated September 6, 1892.

Application filed July 21, 1891. Serial No. 400,238. (No model.)

To all whom it may concern:

Be it known that I, JOHN RAWLE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stone Cutting and Dressing Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to machines for cutting, dressing, and chiseling stone, and is in the general nature of an improvement upon the structure set forth in an application for Letters Patent of the United States filed by me April 7, 1891, Serial No. 387,968.

The object of my present invention is to devise a structure more particularly adapted for use in operating upon stone of extreme hardness, such as granite; and to this end my invention consists in certain novel features, which I will now proceed to describe, and will then particularly point out in the appended claims.

In the accompanying drawings, Figure 1 is a plan section, taken on the line 1 1 of Fig. 2 and looking in the direction of the arrows, of a machine embodying my invention, only so much thereof being shown as is necessary for a proper comprehension of the same. Fig. 2 is a vertical sectional view taken on the line 2 2 of Fig. 1 and looking in the direction of the arrows. Fig. 3 is a side elevation, partly in section, taken on the line 3 3 of Fig. 2 and looking in the direction of the arrows. Fig. 4 is an enlarged detail sectional view of one of the tools, taken on the line 4 4 of Fig. 3. Fig. 5 is an enlarged sectional view of the same tool, taken on the line 5 5 of Fig. 2. Fig. 6 is a detail sectional view similar to Fig. 2, illustrating a modification. Fig. 7 is a similar view illustrating another modification.

In the said drawings, A represents the base-plate, and A′ the guide-bars, of the guiding-frame, which carries the vertically-movable frame B, which latter is actuated by feed-screws B′ and mechanism for regulating the speed and direction of motion of said frame, all of these parts being constructed and arranged substantially as in my prior application hereinbefore referred to.

In the frame B there is mounted in suitable bearings a shaft C, arranged longitudinally of the said frame instead of transversely, as in my said prior application—that is to say, with its axis of rotation parallel with the line of movement of the stone-carrying carriage instead of at a right angle thereto. This shaft is provided with a plurality of eccentrics *c*, which are embraced by the corresponding straps *d* of a plurality of eccentric-rods D.

At the lower end of the frame B there is mounted a plurality of tool-carrying bars E, each of which is flexibly connected with the frame B and has pivoted to it the lower end of the corresponding eccentric-rod D. The arrangement which I prefer is that shown, in which the flexible connection between the frame B and the tool-carrying bars is located at one end of these latter, the tools being secured to their other end, while the eccentric-rods are pivoted to them about midway of their length by means of a pivot pin or bolt d'.

The flexible connection between the bars and frame may be effected in various ways. In the form shown in Figs. 1 and 2 the inner portion *e* of each bar is flattened and curved into the form of a C-spring, its end being pivoted to a support B^2, which is vertically adjustable on the frame B, being connected therewith by bolts *b*, which pass through vertical slots b' in the frame. It will be observed that the inner spring portions *e* of the bars E are bifurcated, as shown more particularly in Fig. 1, and the extreme ends of these portions are twisted or otherwise formed at a right angle to the remainder thereof, as shown at e', and are apertured to receive pivot-pins b^2 on the supports B^2. In the form of this connection shown in Fig. 6 the bar E is practically straight, its extreme inner end being bent vertically upward, as shown at e^2, and that portion of the bar intermediate between the said end e^2 and the pivoted connection d' of the eccentric-rod D is formed into a flat spring portion e^3.

The support B^2 is provided with an arm B^3, which extends downward to and is pivotally connected with the end e^2 of the bar E. It is obvious that in both of these structures the pivotal connection between the bar and frame may be dispensed with, the flexibility of the spring portion of the bar being relied upon

to form the flexible connection. I prefer, however, the connection shown, for the reason that it combines the free movement of the pivotal connection with the elasticity of the spring.

In Fig. 7 I have shown yet another form of flexible connection between the bars E and frame B, in which the bar is a straight bar pivoted in the bifurcated lower end of the arm B^3 of the support B^2 by means of a pivot-pin b^3. F represents an arm also pivoted on the pin b^3, centrally recessed at f to accommodate the end of the arm B^3, and having the eccentric-rod D pivotally connected with one of its ends at d^2. This arm F extends over the bar E in each direction from its pivot b^3, and at each end of said arm there is interposed between said arm and bar a spring or cushion F′, preferably of rubber, as shown, and retained in position by sockets f', formed for that purpose in the arm F and bar E.

The outer ends of the bars E receive and carry the tools, and are adapted to this end in the following manner: The outer end portion e^4 of each bar E is round or circular in cross-section, increasing in diameter inward, so as to form a tapering end. This end portion e^4 is threaded at its extremity to receive a nut E′ and is split axially to receive a wedge E^2. The tool is provided with an aperture to receive the end portion e^4 of the bar E, and, said tool being placed thereon, the nut E′ is screwed up to clamp the tool between said nut and the taper of the bar. The wedge E^2 is then driven in and will lock the parts firmly in place and prevent the nut from working loose. In case of looseness of the parts resulting from wear or an improper fit the tool may be driven onto the tapered end e^4 of the bar E until it properly engages the same, when the nut E′ will be screwed up tight to hold and clamp the tool in position and the wedge E^2 driven home to lock the parts.

The machine is designed for use in connection with any known form of tool for working stone, which is operated, usually, by hand, among which forms I may enumerate points, chisels, tooth-axes, plain or pening axes, "patent" axes, bush-hammers, &c. The tools which I prefer for general work, however, and with which the best general results are obtained are those shown, arranged in the following order: The first tool G is what is known as a "tooth-ax" having a transverse working edge g, provided with teeth or serrations, as indicated more particularly in Figs. 1, 3, and 6. The second tool G′ is a pening-ax, having a straight or serrated transverse working edge g'. Instead, however, of having this edge on a central transverse line parallel with the sides of the tool, as is usual, the form of ax which I have devised has this edge arranged diagonally, as shown in Figs. 1, 3, and 7, for the purposes hereinafter pointed out. The third tool G^2 is a patent ax, a well-known tool, the details of which form no part of my invention, but may be readily seen from Figs. 1 to 5 of the drawings.

The essential feature of this tool, so far as my present invention is concerned, is that it is provided with a plurality of parallel transverse working edges g^2, separated by intermediate depressions, which are at right angles to the depressions between the teeth g of the tooth-ax G. These tools are all double-edged and reversible, as is usual in tools of this class.

Power is supplied to the shaft C to rotate the same by means of a motor mounted on the frame B and moving therewith. Any suitable form of motor thus mounted may be employed for this purpose, that shown being a two-cylinder reversible steam-engine of a familiar type known as the "Kriebel" engine, and set forth in reissued Letters Patent No. 9,531, of August 24, 1880, to which reference is made for a detailed description thereof. The pistons h of the oscillating cylinders H are connected with cranks c' on the shaft C. The engine is supplied with steam by means of a supply-pipe H′, having a flexible section h' to accommodate it to the movement of the frame B. The rate and direction of motion of the shaft, and consequently of the tools, may be readily controlled through the medium of the engine. The form of this latter shown is small, compact, and light and is one which I deem well adapted for use in this connection; but I do not limit myself to this particular form of motor, as any other form adapted for use in connection with the mechanism set forth may be employed. In the construction shown the frame B is provided with a shelf or bracket B^4, on which the engine is mounted.

The machine thus organized operates in the following manner: The stone to be operated upon is mounted on a carriage such as is set forth in my prior application hereinbefore referred to or any other suitable form of carriage which is adapted for the purpose and is fed horizontally to and past the tools in the line of the shaft C and in such a direction that it will first encounter the tool G and subsequently the tools G′ and G^2 in the order named. The first tool—the tooth-ax—does the preliminary work, being followed by the second tool—the pening-ax—which, owing to the diagonal arrangement of its working edge, will break down and remove any transverse ridges which may be caused or left by the tooth-ax. The patent ax finishes the surface and completes the dressing of the stone. It will be noted that, as shown in Fig. 3 of the drawings, the parts are so arranged that each tool has its working edge or surface slightly below that of its predecessor, as is set forth in my prior application hereinbefore mentioned, so that the portion of the stone removed by each tool extends to a slightly-greater depth than that portion removed by the preceding tool or tools. This

arrangement of the tools may be accomplished in any suitable manner—as, for instance, in that shown, wherein the eccentric-rods are of successively-increasing length and the tool-carrying bars are normally arranged in successively-lower horizontal planes.

I have found that in a power-actuated machine of the type set forth in my prior application in case the connection between the tool and its supporting and operating mechanism is an inelastic or unyielding one, as is the case in the machine therein set forth, the said machine is not well adapted for use in operating upon hard stone—such as granite or the like—for the reason that the resistance of such stone to the blow of the tool causes a shock or jar, which tends to a rapid destruction of the machine and so great a wear of the tools as to render their use impracticable. These disadvantages are overcome by means of the construction hereinbefore described, and shown in the drawings, in which provision is made for an elastic or yielding connection between the tool and its supporting mechanism. In the form shown in Figs. 1 and 2 this elasticity is obtained by means of the spring portions *e* of the tool-carrying bars and in the form shown in Fig. 6 by the spring portions e^3 of said bars, while in the form shown in Fig. 7 it is obtained by means of the springs interposed between the tool-carrying bar and the arm which bears upon and imparts motion to the same. In each case the desired result will be obtained—*i. e.*, the blow delivered by the tool will be a yielding one, the elastic connection absorbing the shock and preventing injury to the stone, tool, or machine, and also preventing undue wear of the tool. The action of each tool and its carrying-bar is a close approximation of the yielding blow delivered by the ordinary hand ax or tool when used in the ordinary way by hand.

It will be observed that by adjusting the supports B^2 upon the frame B the normal horizontal position of the bars E may be varied, as is desired or necessary, for the purpose of so tilting the tool as to cause its working edge or face to come properly into contact with the surface of the stone operated upon. This adjustment or tilting takes place around the pivot *d'* as a center, and the adjustment of each tool and its carrying-bar is of course independent of that of the others.

It will be noted that the shaft C is provided with fast and loose pulleys C', by means of which it may be driven in the manner set forth in my prior application. It will also be noted that the carriage I, which carries the stone I' to be operated upon, moves in a line parallel with the shaft C, as indicated by the double arrow on said carriage.

It is obvious that when the machine is used to operate upon stone of sufficient softness to render it desirable a stationary scraping or planing tool may be employed to follow the tools already described and give the face of the stone a proper final dressing.

What I claim is—

1. In a stone cutting and dressing machine, the combination, with a supporting-frame and a revoluble shaft mounted therein and provided with an eccentric and eccentric-rod, of a tool-carrying bar provided with an elastic or spring portion pivotally connected with the supporting-frame, said bar having connected with it by a pivotal joint the end of the eccentric-rod, whereby the said bar is supported and its motions are controlled by said rod, substantially as described.

2. In a stone cutting and dressing machine, the combination, with a supporting-frame and a revoluble shaft mounted therein and provided with an eccentric and eccentric-rod, of a tool-carrying bar provided at one end with a tool intermediately pivoted to the eccentric-rod and connected at its other end with the frame, the connection at this latter point being an adjustable one to vary the tilt of the tool, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN RAWLE.

Witnesses:
IRVINE MILLER,
GEORGE W. HIGGINS, Jr.