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D. SHORTSLEEVE.

MACHINE FOR ORNAMENTING STONE.

No. 260,424. Patented July 4, 1882.

Fig 1.

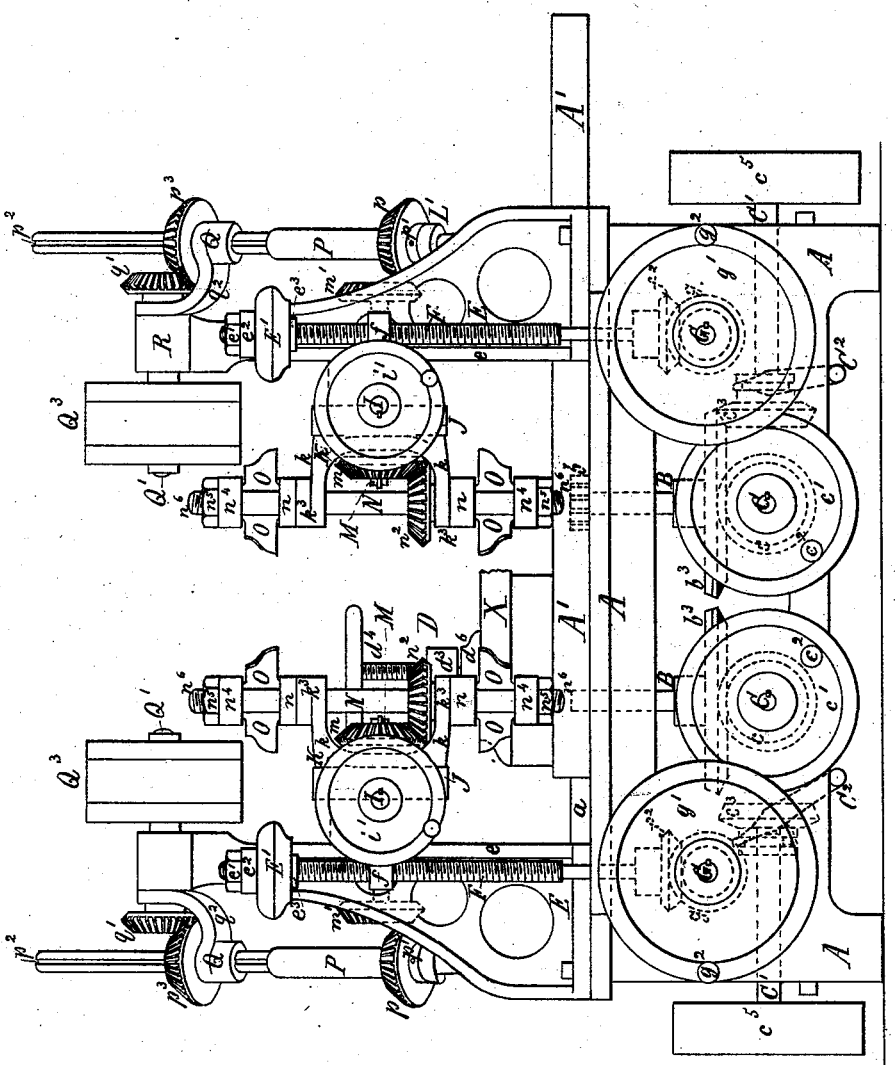

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Fig 10

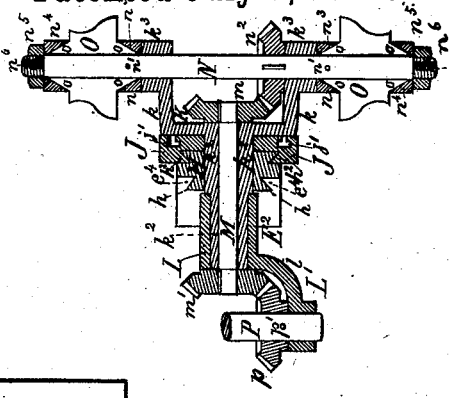
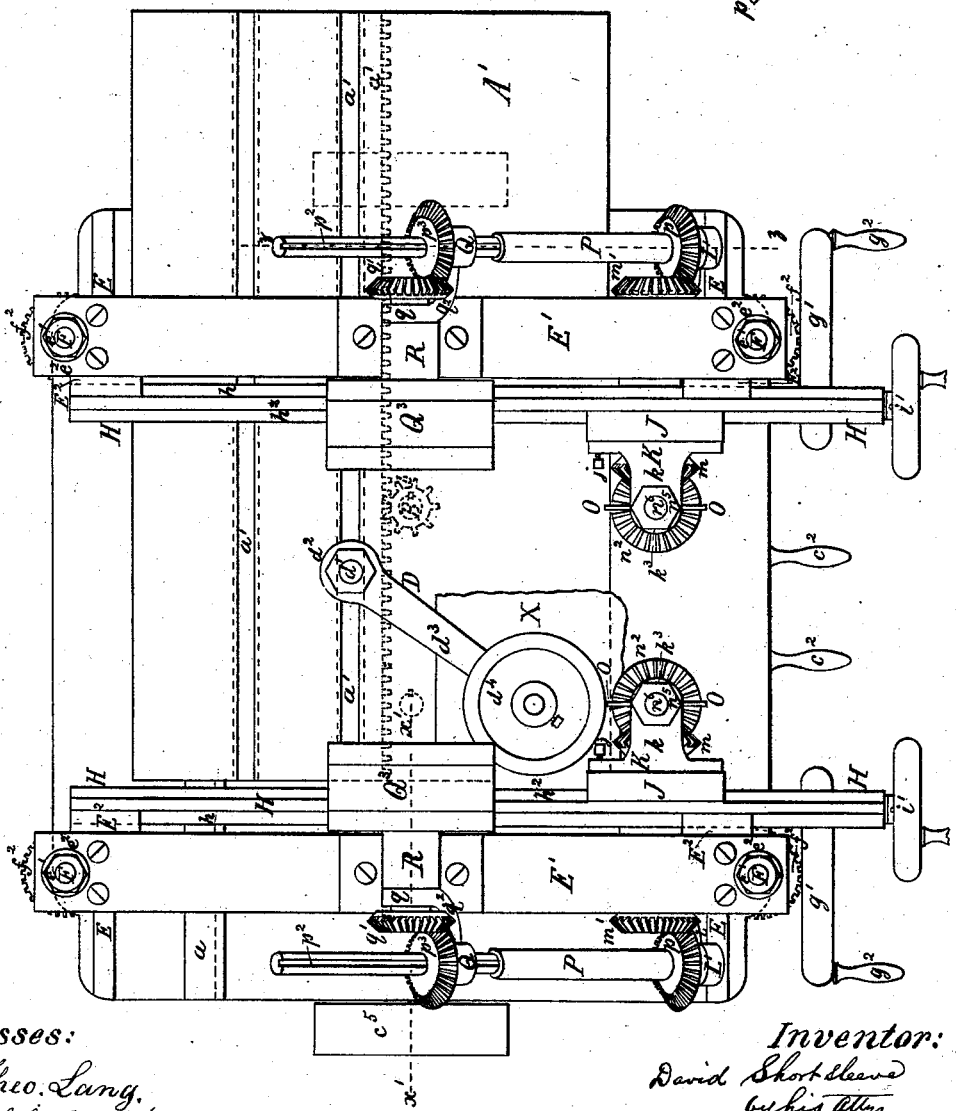


Fig 2



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D. SHORTSLEEVE.

MACHINE FOR ORNAMENTING STONE.

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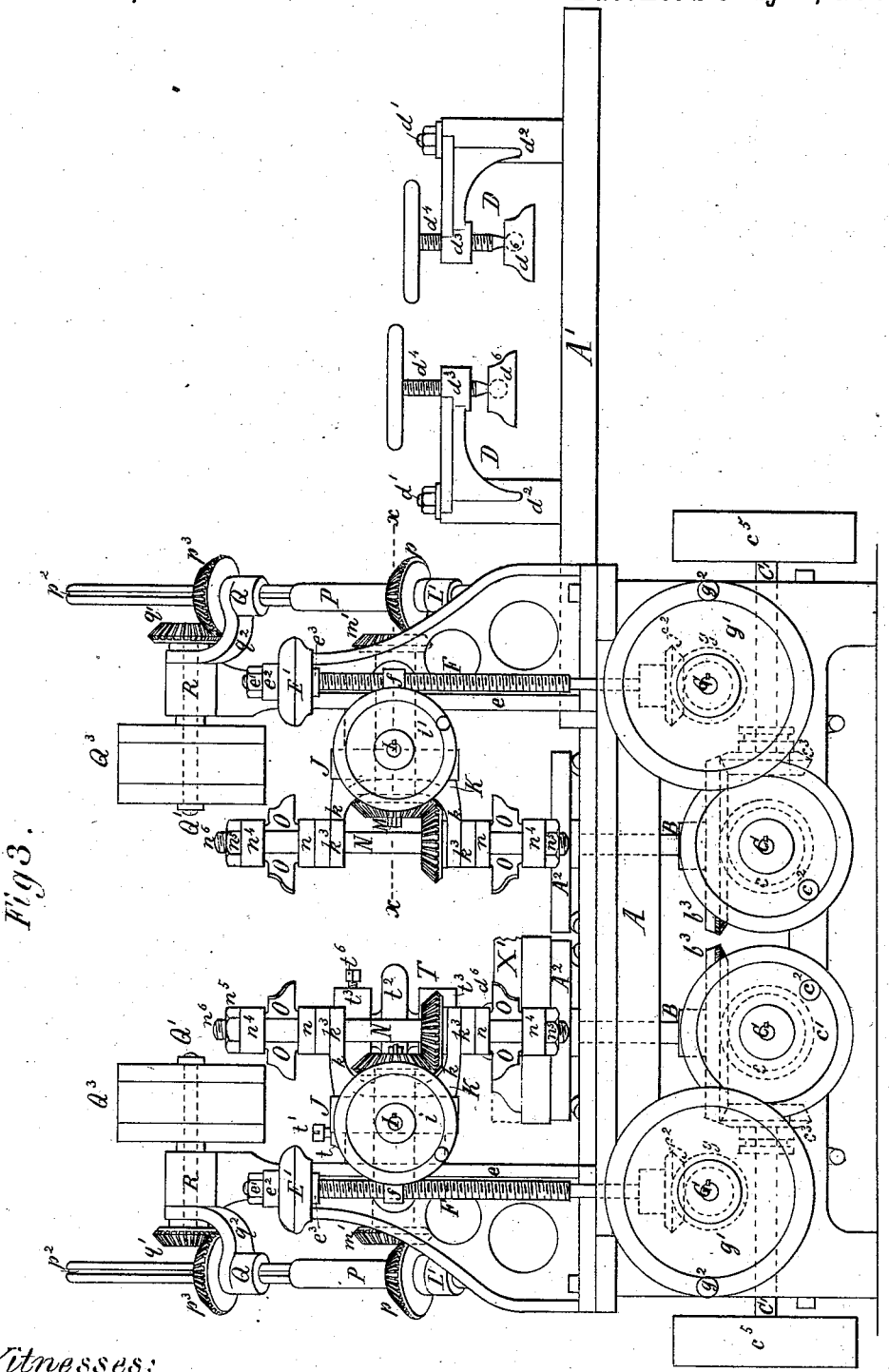

Fig 3.

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D. SHORTSLEEVE.

MACHINE FOR ORNAMENTING STONE.

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Fig 4.

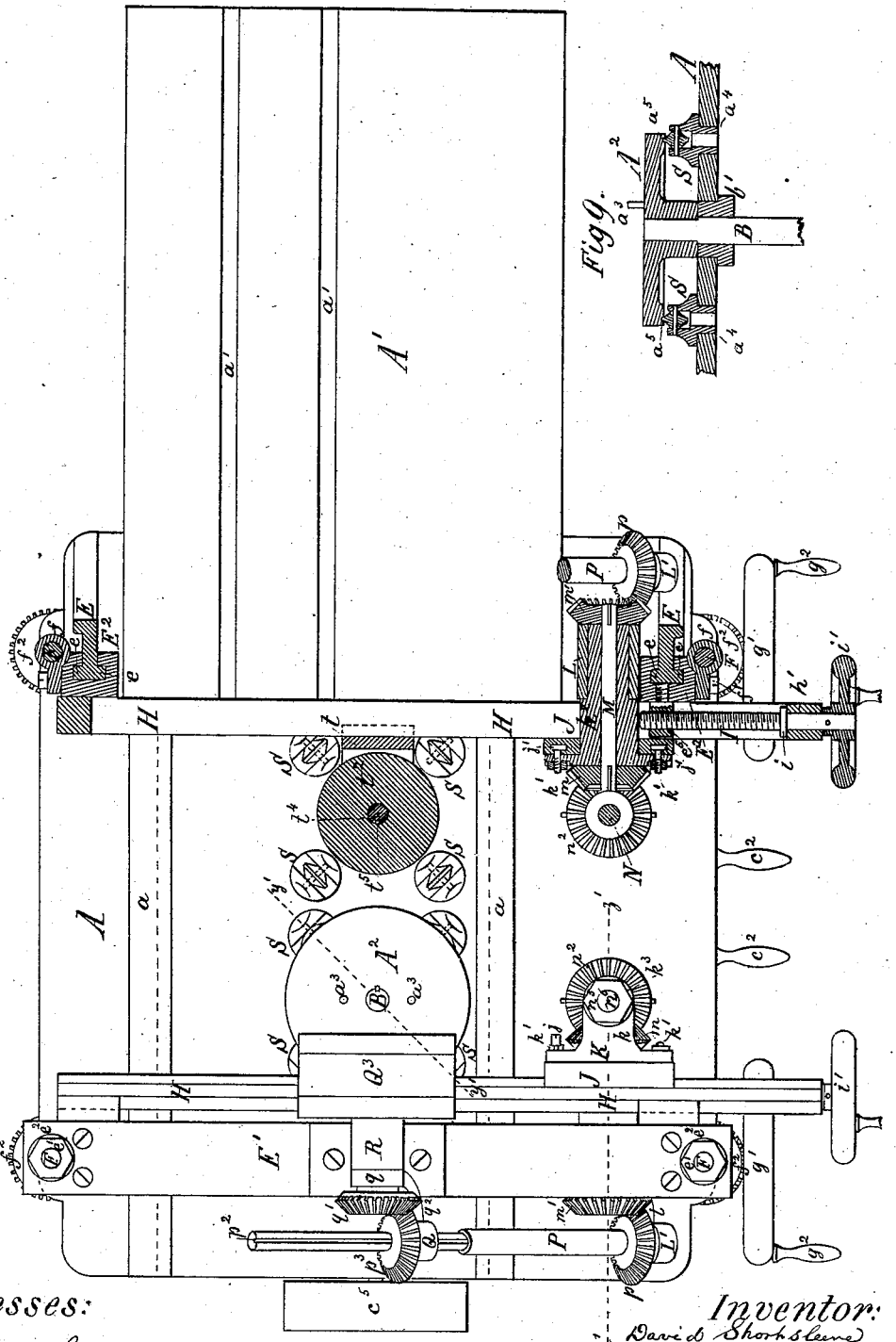

Fig 9.

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D. SHORTSLEEVE.

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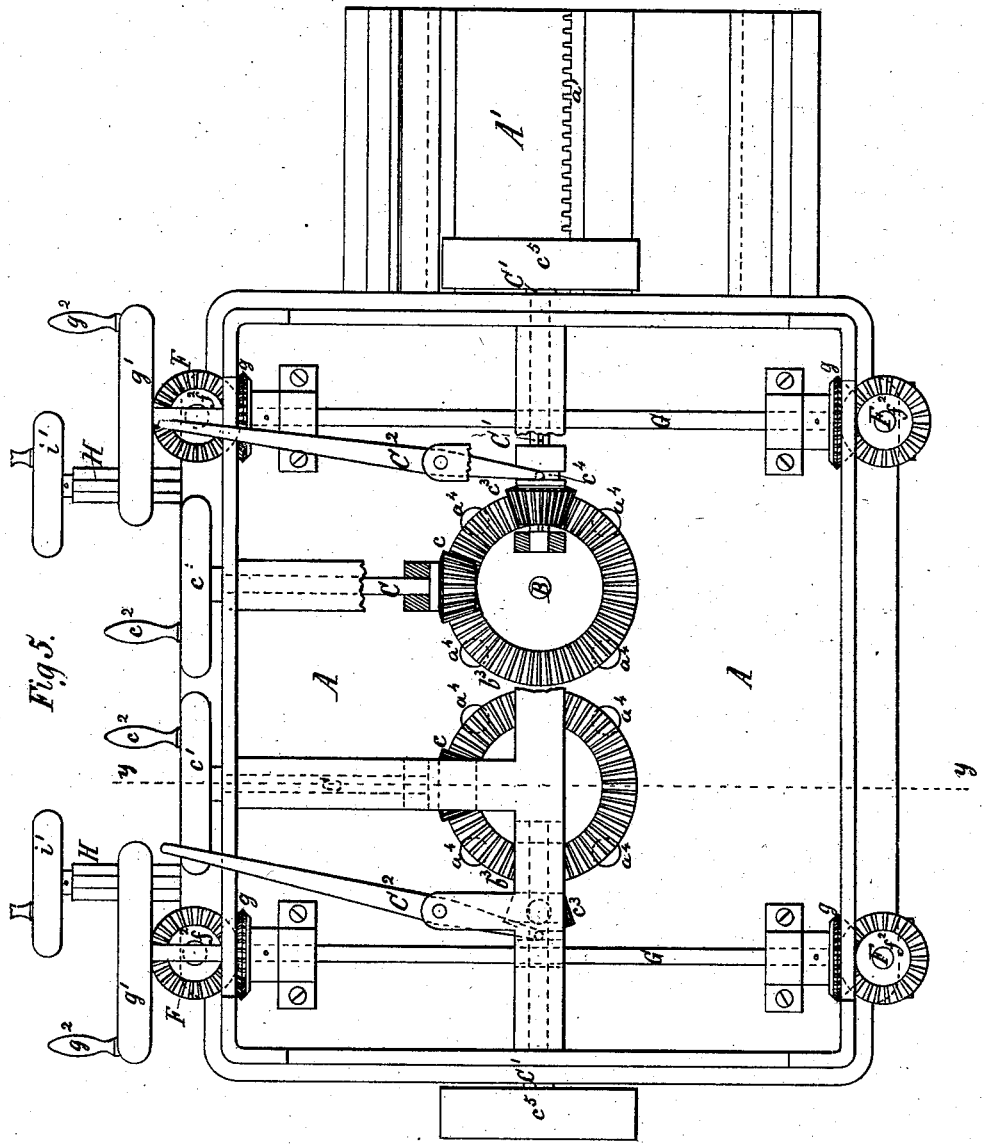

Fig 5.

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MACHINE FOR ORNAMENTING STONE.

No. 260,424. Patented July 4, 1882.

Fig 7.

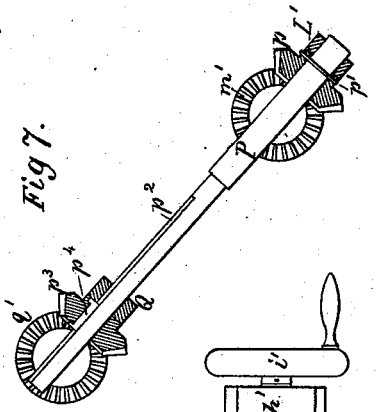


Fig 8.

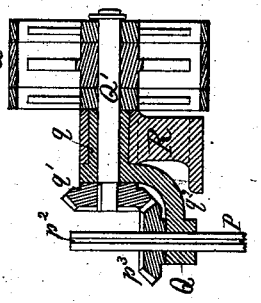
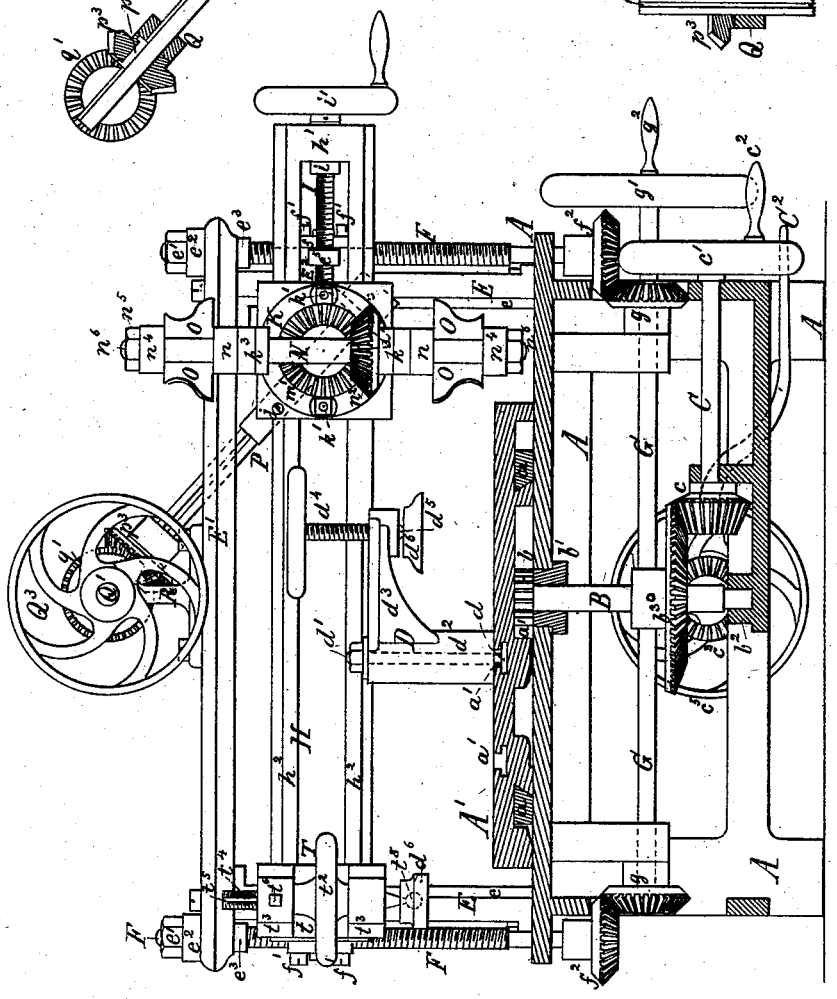


Fig 6.



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UNITED STATES PATENT OFFICE.

DAVID SHORTSLEEVE, OF RUTLAND, VERMONT, ASSIGNOR OF ONE-HALF TO SIDNEY W. ROWELL, OF SAME PLACE.

MACHINE FOR ORNAMENTING STONE.

SPECIFICATION forming part of Letters Patent No. 260,424, dated July 4, 1882.

Application filed February 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, DAVID SHORTSLEEVE, a citizen of the United States, residing at Rutland, in the county of Rutland and State of Vermont, have invented a new and useful Machine for Ornamenting Stone, of which the following is a specification.

My invention relates to a machine for shaping and finishing marble, slate, or other stone-like substances with either straight or serpentine outlines or surfaces; also for mortising, drilling, and countersinking such stone; also for ornamenting and finishing round, oval, or other irregular-curved shapes in stone. The machine may be made single or double, the one represented and described herein being double—that is, having shaping-cutters and operating and clamping mechanisms on either side of the center of the frame. The machine, when used for other than round, oval, or like irregular-curved ornamentations and finishing, employs a reciprocating stone-supporting bed; and when used for round, oval, or other like irregular-curved work employs a revolving stone-supporting bed.

In the accompanying drawings, Figure 1 is a front elevation of a stone shaping or molding and finishing machine made double, as above mentioned, and illustrating the manner of employing the reciprocating table of the machine for supporting the stone, in connection with clamps, mechanism for operating the revolving cutter-bars and cutters and reciprocating the stone-supporting table. Fig. 2 is a plan view of the same. Fig. 3 is a front elevation of the same machine, illustrating the manner of employing a rotary stone-supporting table. Fig. 4 is a plan view of the machine shown in Fig. 3, without the clamps seen in the preceding figure, and showing the cutter-operating mechanism in horizontal section in the line $x\ x$ of Fig. 3. Fig. 5 is a bottom view of the machine, portions being broken away to expose the mechanism. Fig. 6 is a vertical cross-section of the machine in the line $y\ y$ of Fig. 5. Fig. 7 is a central section of the connection between the driving-pulley and the revolving cutter-bar in the line $z\ z$ of Fig. 2. Fig. 8 is a vertical central section of the said driving-pulley in the line $x'\ x'$ of Fig. 2. Fig. 9 is a vertical central section of one of the revolving tables in the line $y'\ y'$ of Fig. 4. Fig. 10 is a vertical section of one of the cutter-bars and part of its operating mechanism in the line $z'\ z'$ of Fig. 4. In this view I have represented a novel mode of fastening the cutters O to the cutter-bar N; but this mode of fastening the cutters will form the subject-matter of another application for a patent, and is not claimed specifically under this patent.

Similar letters refer to similar parts throughout the several views.

In the drawings, A represents a suitable platform or frame, provided at its top surface with longitudinal dovetail-shaped guides a, to which a reciprocating table, A′, is fitted. This table A′ is provided with a longitudinal rack, a', into which a pinion, b, upon a vertical shaft, B, gears, and thereby gives motion to the same.

The shaft B, which is hung between suitable bearings, $b'\ b^2$, on the frame A, is provided with a bevel-wheel, b^3, into which a bevel-wheel, c, upon a shaft, C, gears, and thus gives motion to the wheels b and b^3.

The shaft C is suitably hung in the frame A, and it extends beyond the front of the frame A, where it is provided with a hand-wheel, c', having a handle, c^2, for the convenience of the operator. The wheel b^3 may also be connected with another bevel-wheel, c^3, secured to a shaft, C′, standing at an angle to the shaft C, and being suitably hung in the frame A. The wheel c^3 fits loosely around the shaft C′, and by means of an ordinary tongue and groove fit is adapted to slide longitudinally upon the shaft C′ and partake of its rotary motion.

The hub of the wheel c^3 is provided with an annular groove, c^4, into which the prongs of a forked lever, C^2, fit, and whereby the wheel c^3 may be moved into gear with the wheel b^3 or out of gear therewith. The shaft C′ extends beyond the side of the frame, and is provided with a pulley, c^5, which receives motion through an ordinary belt from a line or counter shaft. By moving the wheel c^3 into gear with the wheel b^3, the table A′ is moved by the power of the line or other shafting of the shop. By moving the wheel c^3 out of gear with the wheel b^3, the table A′ can be moved by hand by means of the handle c^2 of the wheel c'.

The table A′ is provided with suitable T-

grooves, a', into which the head d of a bolt, d', is fitted, by which bolt a clamp, D, may be secured to the table. This clamp consists of a vertical body, d^2, through which the bolt d' passes, and a horizontal arm, d^3, which extends over the stone to be clamped down upon the table.

The end of the arm d^3 is provided with a clamp-screw, d^4, and the foot d^5 of this clamp-screw, which is spherical, has a clamp-washer, d^6, loosely attached to it, so that it may easily level or adapt itself to horizontal or inclined positions of the stone to be clamped.

At both sides of the table A′ the frame A is provided with two upright guides, E, united at top by a horizontal bar, E′. The guides E have T-ribs e, upon which slides E^2 are fitted and are lowered and raised by means of screws F and nuts f. The nuts f are fastened by means of screws f' to the slides E^2, and the screws F are hung between the projecting ends of the bar E′ and the frame A, and their upper ends are secured to the bar E′, by means of nuts e' and washers e^2 above the bar, and by collars e^3 below the same.

The lower ends of the screws F are provided with bevel-wheels f^2, into which gear bevel-wheels g of horizontal shafts G. The shaft G is suitably hung in the frame A and extending beyond the front of the same is provided with a hand-wheel, g' g^2. The screws F having one a right-hand and the other a left-hand thread, both of the same pitch, the turning of the hand-wheel g' will cause the two slides E^2 to move up or down simultaneously and with the same speed.

The slides E^2 are provided with horizontal dovetail guides e^4, between which a hollow cross-head, H, is held by means of horizontal dovetail ribs h, formed on the same, and thus the cross-head, besides partaking of the vertical motion of the slides E^2, may also be horizontally moved in said slides. This horizontal movement is effected by means of a screw, I, which passes through a nut, e^5, upon the slide E^2 and has its front end embedded in the end portion, h', of the cross-head, to which it is longitudinally secured by means of a collar, i, at the inside, and a hand-wheel, i', at the outside, of the same.

The cross-head H (see Figs. 4 and 10) is provided with dovetail ribs h^2, to which a face-plate, J, is fitted, and to which ribs the said face plate may be fastened in any place along their length by means of set-screws j bearing against the cross-head. Upon the face-plate J a center plate, K, with two arms, k, is secured by means of bolts k', whose heads are inserted in annular grooves j' in the face-plate J, and by this construction angular adjustments of the plate K upon the face-plate J are secured. The center plate, K, is also provided with a central sleeve, k^2, passing through the face-plate J, and having fitted to its end a loose collar, L, with which a bearing, L′, is connected at a right angle by means of a curved arm, l. Through the center of the plate K and the sleeve k^2 a shaft, M, passes, having a bevel-gear wheel, m, fastened to one of its ends, and a bevel-gear wheel, m', to its other end, and by these wheels the collar L is kept upon the sleeve k^2, and the shaft is also prevented from longitudinal movement. The arms k of the center plate, K, are provided with bearings k^3, through which a shaft, N, is passed. This shaft N is provided with two collars, n, fastened by means of pins n' to the shaft, one of said collars being immediately above and the other below the bearings k^3.

Between the bearings k^3 a bevel-wheel, n^2, is fastened to the shaft N, so that it also gears into the bevel-wheel m of the shaft M. The collars n have inner conical surfaces, n^3, into which the triangular shanks o of flat cutters O are fitted. These cutters O have similar shanks o at both ends, and collars n^4 similar to those, n, are loosely fitted upon the shaft N, and firmly clamped upon the cutters O by means of nuts n^5 on the threaded ends n^6 of the shaft N.

The inner conical surfaces, n^3, of the collars n and n^4 may be grooved for the purpose of embedding a portion of the shanks o of the cutters into said collars, and thus holding the cutters very firmly, and making them capable of resisting the greatest strains of the machine without being displaced. The bevel-wheel m' gears into another bevel-wheel, p, fastened by means of a pin, p', to a shaft, P. This shaft P passes through the bearing L′, and through a similar upper bearing, Q, which latter is, by means of a sleeve, q, and arm q^2, secured to a standard, R, upon the bar E′.

The upper part of the shaft P is provided with a longitudinal groove, p^2, and a loosely-fitting bevel-gear, p^3, which is caused to revolve with the shaft P by means of a straight key, p^4, fastened in the bore of the wheel and fitting the groove p^2. The wheel p^3 rests upon the bearing Q, and thus maintains its normal position. Into the bevel-wheel p^3 another bevel-wheel, q', on a horizontal shaft, Q′, gears. The shaft Q′ revolves in the sleeve q, and is provided with suitable pulleys, Q^3, which in practice are driven by means of a belt from the line-shafting of the shop. By this means the connection between the pulley-shaft Q′ and the cutter-shaft N is maintained, while the cutter-shaft may be moved horizontally or vertically, or have its inclination changed to any suitable angle. In the drawings two similar cutter-bars and their operating mechanisms are shown, one only of which is described, while both are lettered similarly. This is done with a view of illustrating the general arrangement of the same upon a frame, A, common to both, without intending to confine my invention to any given number of such cutter-bars and mechanisms, as one, two, three, or more cutter-bars with their operating mechanisms may be employed on one machine. When a revolving motion of the stone is preferred to the

reciprocating motion imparted by the table A′, a round table, A^2, (see Figs. 3 and 4,) is secured upon the shaft B, after the table A′ has been moved out of the way, as indicated in said figures, and the pinion *b* has been removed from its shaft to give place for the table A^2.

In order to prevent the stone from slipping upon the table A^2, dowel-pins a^3 are provided on its top surface, and in order to support the table near its circumference, removable caster-rollers S are inserted into socket-holes a^4 in the frame A, so as to bear against the lower surface of the table A^2, by running in an annular groove, a^5, of the same, as seen in Fig. 9.

In order to hold the stone upon the table A^2, a clamp, T, is provided. This clamp comprises a dovetail slide, *t*, fitted upon the dovetail ribs h^2 of the cross-head H, to which ribs it may be fastened at any desired point by means of a set-screw, *t′*. To this slide a threaded hand-wheel nut, t^2, is secured between two arms, t^3, thereof, and a screw, t^4, passes loosely through said arms and screws into an inner thread of the hand-wheel t^2.

In the screw t^4 a longitudinal groove, t^5, is formed, and a steady-pin, t^6, of one of the arms t^3, entering groove t^5, prevents the screw from turning. On the lower spherical end, t^8, of the screw t^4, a self-leveling foot-washer, d^6, is loosely fitted and bears upon the revolving stone X′.

The construction and arrangement of the clamp T is such that it can be adjusted over the shaft B, so that the screw t^4 may stand in line with said shaft B, and thus the washer d^6, after being screwed down upon the stone X′ by means of the hand-wheel nut t^2, will revolve concentrically with stone X′ and shaft B, while the screw remains stationary. One revolving table may be provided for each cutter-bar.

In Figs. 1 and 2, a stone-slab, X, is shown clamped flat to the table A′, and the cutter-bar N vertical thereto. This is not however always done, as for certain kinds of shaping or molding it may be necessary to operate the cutter-bar at an inclination, or even in a horizontal position, in which latter case the stone slabs may be fastened in a more or less upright position, and thus two such slabs may be operated upon at the same time. In the said Figs. 1 and 2, and in Fig. 5, the wheel c^3 is shown in gear with the wheel b^3, which indicates that the reciprocating table A′ is operated by the power of the line-shafting.

The cutters O or finishing-tools may be so adjusted that both can be used when the table is moving forward or backward; or they may be adjusted right and left handed, so as to be used when the table is being moved in the appropriate direction. The cutter-bar, as well as the table, is therefore adapted to forward and backward movements by means of ordinary counter-shafting (connected with the pulleys c^5 and Q^3) driven from the line-shafts by straight and crossed belts.

I do not limit myself to any number of cutters O between the collars *n* n^4, as one, two, three, or more cutters will be used according to the quality of stone being cut and work being done. The shape of the cutting-edges of the cutters O will vary in accordance with the design of work to be done upon the stone, and cutter-bars might be provided with suitable appliances for holding a drill, chisel, or suitable tool, and the same operated so as to cut holes or mortises or countersinks in the stone.

Operation: When a stone slab is to be provided with straight molding it is by means of one or more clamps, D, fastened upon the reciprocating table A′, so that the edge to be finished overhangs the edge of the table. The cutter-bar N is provided with the requisite cutters, and, by means of the hand-wheel *g′* and the therewith-connected mechanism, is moved at a proper elevation with respect to the stone slab. This done, the cutter-bar is moved toward the stone slab by means of the hand-wheel *i′* and its mechanism; and, finally, the pulley Q is started by means of the ordinary belt-shipping lever attached to the driving-pulley on the counter-shaft. By means of the hand-wheel *c′* the table A′ and the stone slab X are moved toward the revolving cutters O. This movement is continued until the operator finds that he can safely apply the running power of the shop to the feed-motion of the stone slab, when he, by means of the lever C^2 and bevel-wheel, c^3, connects the operating mechanism of the table A′ with the pulley c^5. This pulley c^5 is now set in motion in the ordinary way, and the stone slab is finished entirely by machinery. When the molding of the stone slab is to be serpentine, instead of straight, a templet of wood having the desired outlines may be used, and upon it the stone slab is placed. While the cutters O shape the stone slab, the lower collar n^4 is, by means of the hand-wheel *i′*, caused to bear against the serpentine outline of the templet, and the molding of the stone slab will present the desired outline. When circular or more or less circular molding is required the table A′ is moved back sufficiently to allow a round table, A^2, to be secured to the shaft B, from which the pinion *b* has been previously removed. No templet will be necessary for a truly circular slab; but for elliptic or serpentine molding or edging a templet may be used in the same manner as when used with the reciprocating table. With the use of the round revolving table the clamp T is employed for fastening the stone. This clamp is moved from its extreme (idle) position, shown in Fig. 6, toward the position shown in Fig. 4, or directly above the shaft B, so that the screw t^4 stands exactly in line with it. When the stone revolves the washer d^6 revolves with it, but the screw t^4 remains stationary.

The most simple construction of my stone-shaping machine is that in which one cutter-bar and one reciprocating and one revolving

table are used. I have, however, illustrated the practicability of employing two cutter-bars, two revolving tables, and one reciprocating table in the same machine; but while one reciprocating table of appropriate length may suffice for all cases, the number of revolving tables and cutter-bars may be varied according to the requirements of the shop.

What I claim as my invention, and desire to secure by Letter Patents, is—

1. In a machine for executing ornamental work in stone, the combination of the feed mechanism for operating the table which supports the stone, clamp for holding the stone, the revolving adjustable cutter-bar, provided with shaping-cutters, the mechanism for adjusting the cutter-bar with its cutters in vertical, horizontal, and inclined positions with respect to the stone-supporting table, and the mechanism for operating the cutter-bar and cutters while the bar is standing in either of said positions, substantially as and for the purpose described.

2. In a machine for executing ornamental work in stone, the combination of a movable table which supports the stone, clamp for holding the stone, a revolving adjustable cutter-bar, N, provided with cutters, and the fixed pulley-standard R, shaft Q′ for pulley Q^3, gear-wheels m' and p, sliding shaft P, swinging bearings L′ Q, gears p^3 and q', slide E^2, sliding plate J, shaft M, and gear-wheels m and n^2, substantially as and for the purpose described.

3. The combination, with the revolving cutter-bar N, having stone-shaping cutters, and with the shaft B, which sets the stone-supporting table in motion, of the power-shaft C′, gears b^3 c^3, and clutch device C^2, and the hand-shaft C, provided with the gear c, and hand-wheel c' c^2, whereby the stone may be fed either by power or hand, substantially as and for the purpose described.

4. The combination, with the stone-supporting table, of a clamp, a vertically adjustable slide, a longitudinally adjustable center plate, and the vertically revolving cutter-bar having cutters set transversely to it, and applied upon a turning plate which is adjustable concentrically with the shaft carrying the wheel which revolves the bar and cutters, substantially as and for the purpose described.

5. The combination of a stone-supporting table provided with suitable clamps, a revolving cutter-bar, N, provided with cutters at both its ends, and hung in bearings of an adjustable center plate, K, shaft M, and bevel-wheels n^2 m, substantially as and for the purpose described.

6. In a stone-ornamenting machine, the combination of the hand-screws F and L, the guide H, the slide E^2, sliding support J, revolving cutter-bar and cutters, a stone-supporting table, mechanism for adjusting the cutter-bar and cutters, mechanism for operating said cutter-bar and cutters from a fixed pulley, mechanism for operating the stone-supporting table, and adjustable clamps having self-leveling washers, substantially as and for the purpose described.

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