(No Model.) 3 Sheets—Sheet 1.

W. DAVIDSON & J. WALKER.

STONE CUTTING AND DRESSING MACHINE.

No. 559,515. Patented May 5, 1896.

Fig. 2.

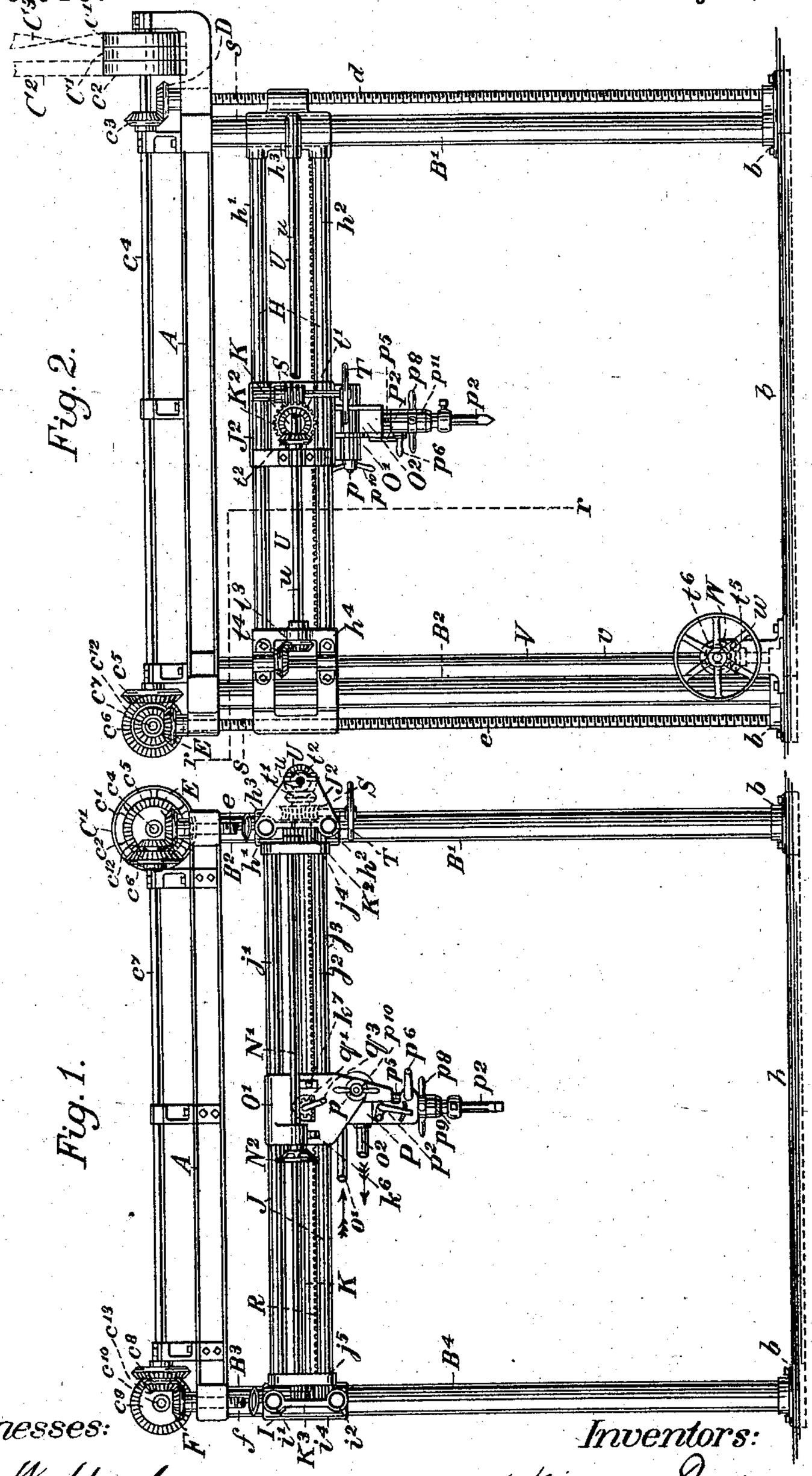

Fig. 1.

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Fig. 4.

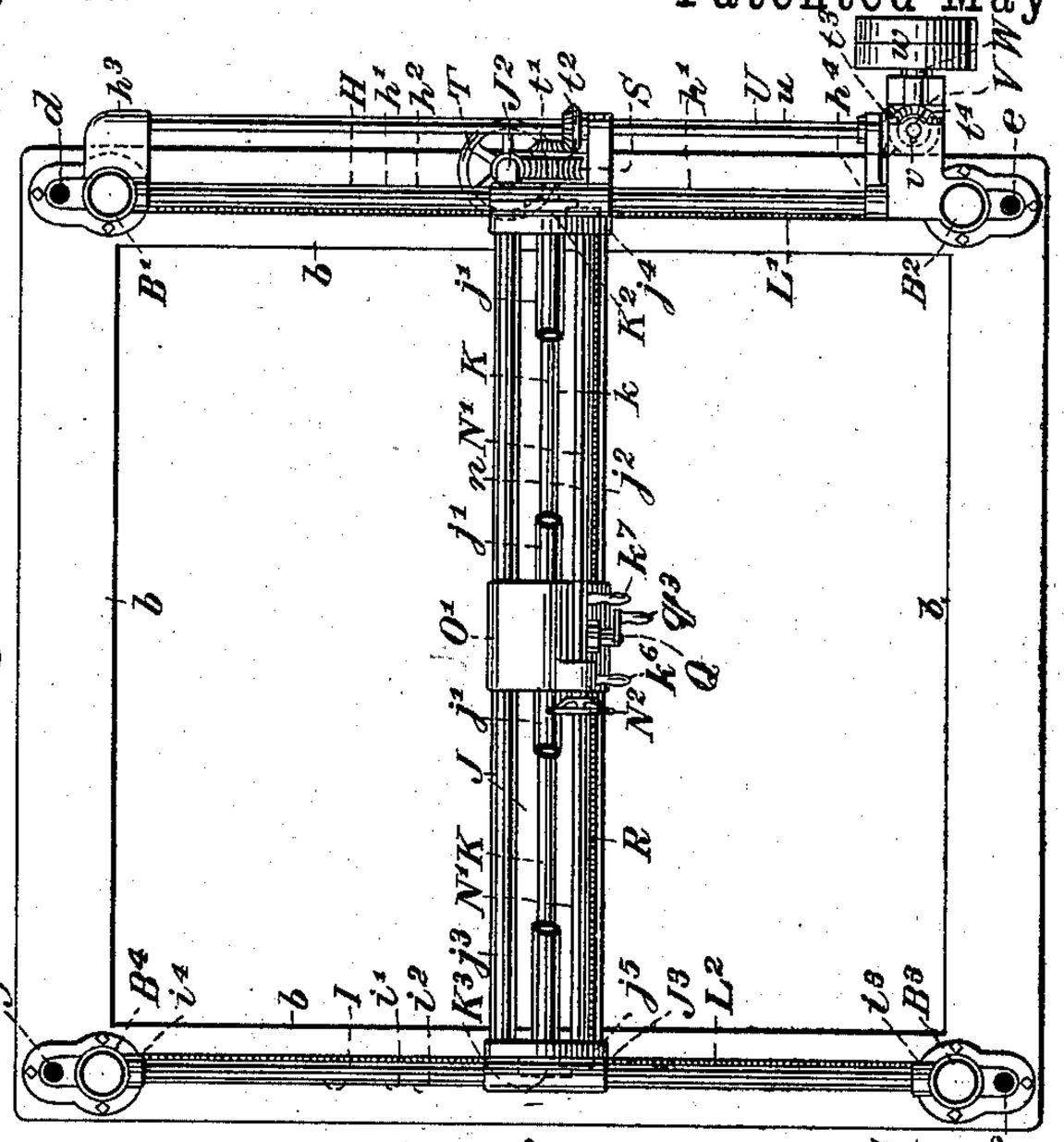
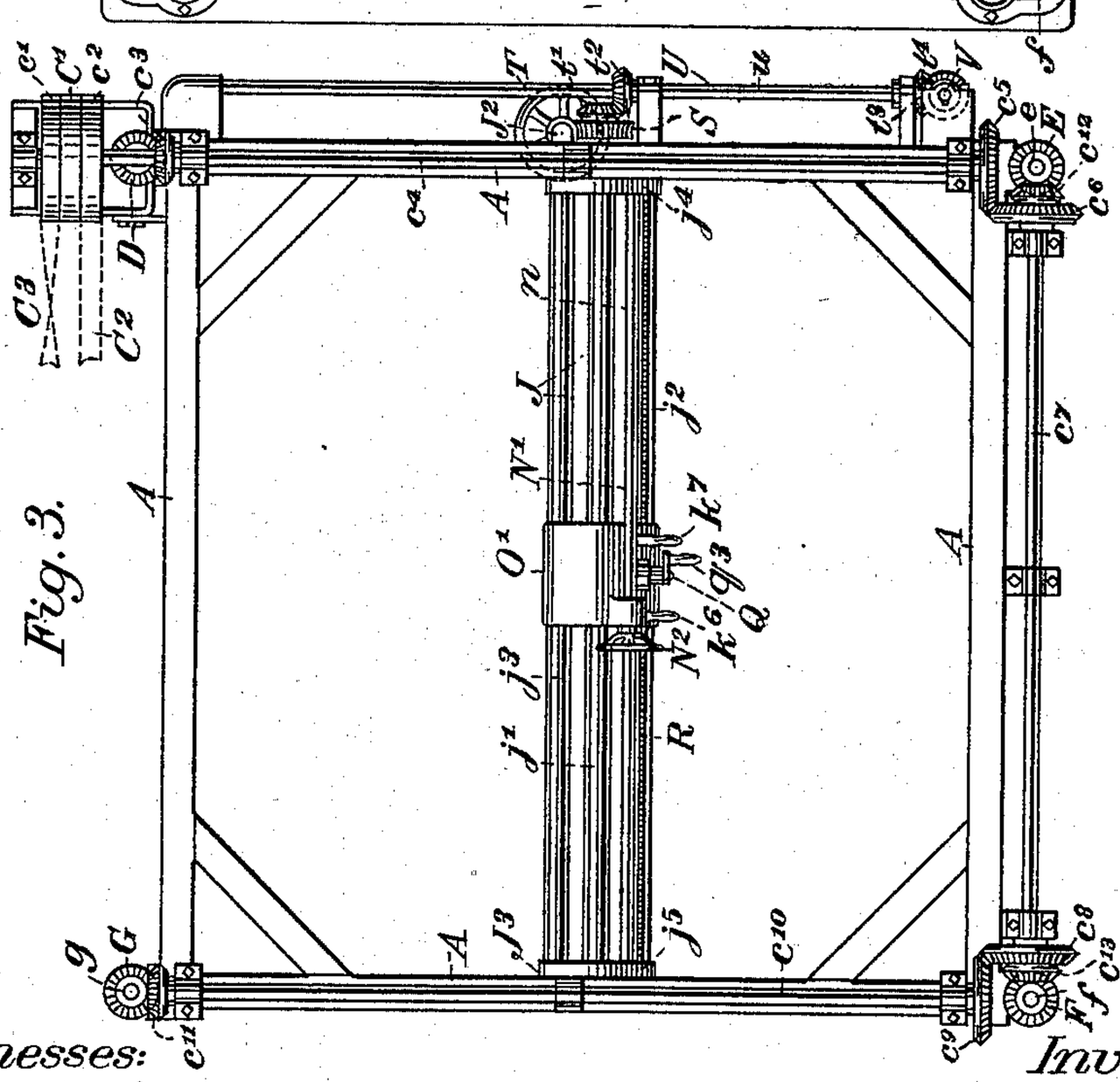


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

W. DAVIDSON & J. WALKER.

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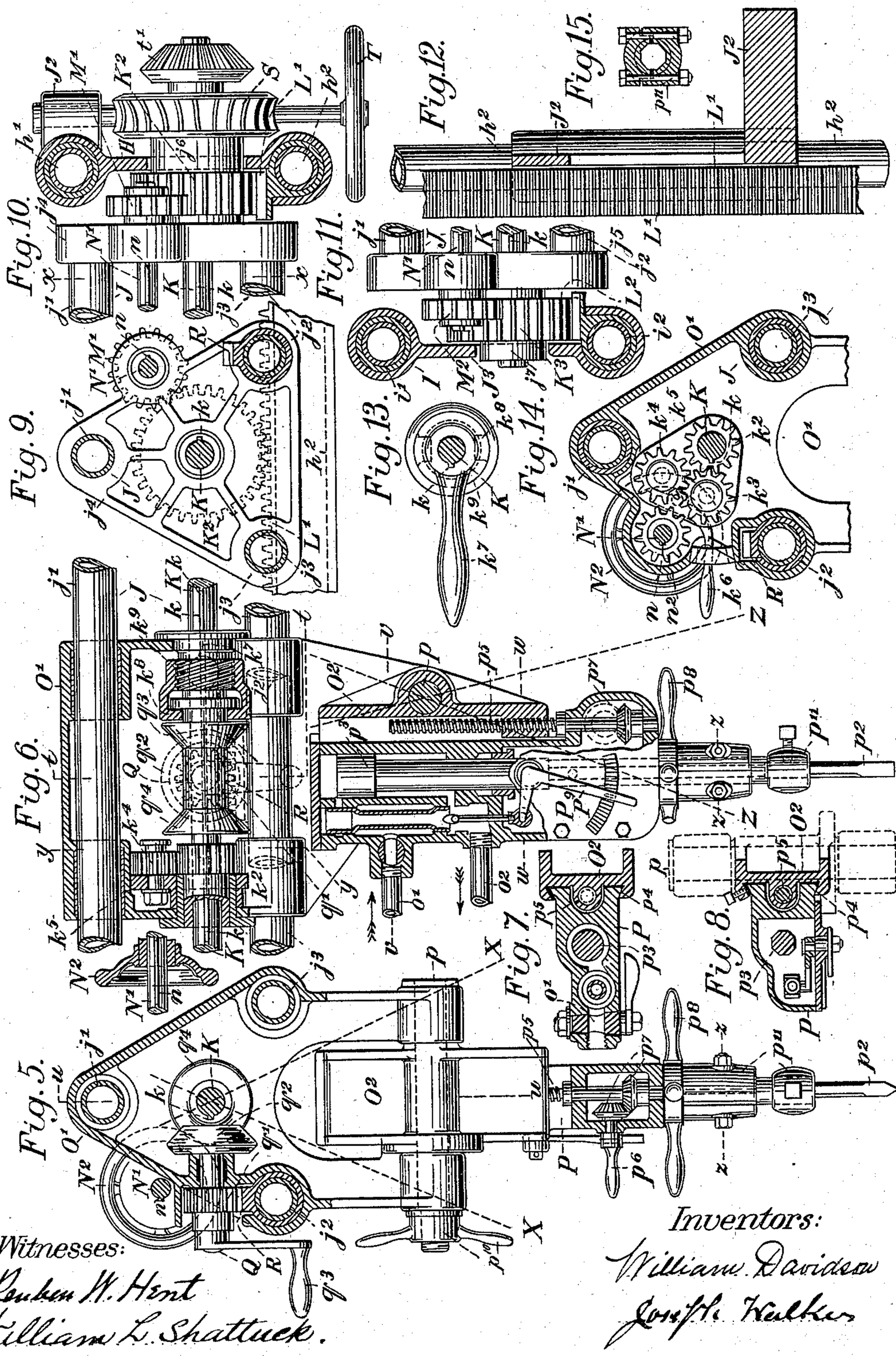

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UNITED STATES PATENT OFFICE.

WILLIAM DAVIDSON AND JOSEPH WALKER, OF SAN FRANCISCO, CALIFORNIA.

STONE CUTTING AND DRESSING MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,515, dated May 5, 1896.

Application filed April 29, 1895. Serial No. 547,508. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM DAVIDSON and JOSEPH WALKER, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Stone Cutting and Dressing Machines, of which the following is a specification.

Our invention relates to improvements in that class of stone cutting and dressing machines in which the impelling power is applied directly to the operating-tool.

The objects of our invention are to utilize the direct application of the impelling power to the tool and, by the substitution of machinery holding and guiding the tool, to prevent its recoil in the hand, thus fitting our machine for doing heavy as well as light work, while avoiding all pressure liable to bruise the stone and economizing power. In such machinery and the novel constructions, arrangements, and combinations of elements hereinafter described, and specifically pointed out in the claims, consists, essentially, our invention.

In our machine the tool or a series of tools driven directly by any power—such as steam, compressed air, or electricity—can, while rigidly held by the machine, travel in any direction whatever and strike the stone at any angle and with any degree of force desirable.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation and part section looking on the line *r r*, Fig. 2. Fig. 2 is an end elevation. Fig. 3 is a plan. Fig. 4 is a plan looking on the line *s s*, Fig. 2. Fig. 5 is a transverse section on the line *t t*, Fig. 6, of the main feature O′ of the machine. Fig. 6 is a longitudinal section on the line *u u*, Fig. 5. Fig. 7 is a sectional view on the line *v v*, Fig. 6. Fig. 8 is a sectional view on the line *w w*, Fig. 6. Fig. 9 is a part section and elevation on the line *x x*, Fig. 10. Fig. 10 is a part elevation and section of the operating end of the transverse moving part J. Fig. 11 is a part elevation and section of the opposite end of Fig. 10. Fig. 12 is a plan of the rack-bar in Fig. 10. Fig. 13 is a view of the lever for shifting friction-roller in Fig. 6. Fig. 14 is a transverse section on the line *y y*, Fig. 6, showing reversing-gear. Fig. 15 is a plan on the line *z z*, Figs. 5 and 6.

A horizontal rectangular frame A, preferably formed of I-beams, is secured at the corners to vertical supports B′, B^2, B^3, and B^4, preferably formed of pipe, secured to a bed-plate *b* flush with the floor.

A driving-pulley C′ is mounted on a driving-shaft c^4, provided near one end with miter-gear c^3, meshing with miter-gear D, mounted on vertical screw-shaft *d*, and at the other end with miter-gear c^5, meshing with miter-gear c^6, mounted on shaft c^7, provided with miter-gear c^{12}, meshing with miter-gear E, mounted on vertical screw-shaft *e*, thus rotating shaft c^7, provided with miter-gears c^8 and c^{13}, the miter-gear c^8 meshing with the miter-gear c^9, mounted on shaft c^{10}, and the miter-gear c^{13} meshing with miter-gear F, mounted on vertical screw-shaft *f*, thus rotating shaft c^{10}, provided with miter-gear c^{11}, meshing with miter-gear G, mounted on vertical screw-shaft *g*, thus rotating the vertical screw-shafts *d*, *e*, *f*, and *g* synchronously and thereby vertically raising or lowering two parallel horizontal frames H and I, supporting a transverse horizontal frame J, carrying a bracket O′, to which is attached the mechanism holding the operating-tool p^2 for cutting or dressing the stone lying on the bed-plate *b*. By means of straight belt C^2, cross-belt C^3, and loose pulleys *c′* and c^2 the direction of rotation of the screw-shafts can readily be reversed or their rotation stopped.

The frame H, composed of bars *h′* and h^2, fitted into sockets h^3 and h^4, adapted to slide vertically along the supports B′ and B^2 and to be raised or lowered by the screw-shafts *d* and *e*, supports the end bearing J^2 of the frame J, and the frame I, composed of bars *i′* and i^2, fitted into sockets i^3 and i^4, adapted to slide vertically along the bars B^3 and B^4 and to be raised or lowered by the screw-shafts *f* and *g*, supports the other end bearing J^3 of the frame J. The bar h^2 has integrally formed with it a rack-bar L′ and the bar i^2 an integrally-formed rack-bar L^2. The frame J, composed of bars *j′*, j^2, and j^3, preferably formed of pipe, secured at their ends

to end plates j^4 and j^5, is adapted, by means of its end bearings J^2 and J^3, to slide horizontally along the parallel frames H and I and supports the tool-carrying bracket O′, adapted to slide on the bars j', j^2, and j^3 also horizontally, but in a line at right angles to the line of travel of the frame J. The bar j^2 has integrally formed with it a rack-bar R. The end plate j^4 is integral with a hub j^6, extending through the center of a gear K^2 and forming its journal, and the end plate j^5 is integral with a hub j^7, extending through the center of a gear K^3 and forming its journal, the gears K^2 and K^3 at the outer faces of the plates j^4 and j^5, respectively, being revoluble on the hubs j^6 and j^7, respectively, which themselves are revoluble on a central shaft K, extending through the center of the frame J, including the bracket O′, also revoluble on the shaft K, provided with a miter-gear t' and a key k, extending the whole length of the shaft to rotate a pinion k^2 and a friction-roller q^4 while sliding along the shaft as the bracket O′ travels along the frame J.

The gears K^2 and K^3 run on the rack-bars L′ and L^2, respectively, and mesh with pinions M′ and M^2, respectively, mounted on a shaft N′.

The gear t' meshes with miter-gear t^2, mounted on shaft U, having a key u and miter-gear t^3, meshing with miter-gear t^4, mounted on vertical shaft V, provided with a key v, and with miter-gear t^5, meshing with miter-gear t^6, mounted on shaft W of the pulley w, connected by a belt to the driving power.

The bracket O′ carries a pneumatic or steam cylinder P, with a piston p^3 for operating the tool p^2, O^2 being a plate pivoted at p to change the angle of the cylinder P, as shown by the dotted lines z z, Fig. 6; o', the induction and o^2 the exhaust port; p^4, Fig. 7, groove for cylinder to slide in; p^5, vertical screw for raising or lowering the cylinder; p^6, a crank for operating the miter-gears p^7 for turning the screw p^5; p^8, handle for changing angle of cylinder, as shown by the dotted lines X X, Fig. 5; and p^{10} a tightening-nut to hold the cylinder at the desired angle. By means of a valve-lever with sword attachment, in contact with a pin on the piston-rod and having its fulcrum in an eccentric (not shown in the drawings) operated by a lever p^9, the position of the fulcrum may be changed and thereby the cut-off shortened or lengthened. To prevent the tool from rotating axially, the lower part of the cylinder and of the piston-rod is of octagonal shape, as shown in Fig. 15.

Extending transversely through one side of the bracket O′ is a shaft Q, provided with a pinion q', running on the rack-bar R, and with a friction-wheel q^2, adapted to be brought into contact with either of the conical ends of the friction-roller q^4, mounted and sliding longitudinally along the shaft K by means of a lever k^7, Fig. 13, operating a clutch k^8, turning on a thread k^9 for shifting the friction-roller q^4, which continuously rotating with the shaft K rotates the friction-wheel q^2, and therefore the pinion q' in either direction, according to which of said conical ends is in contact with the friction-wheel q^2, thus permitting the movement of the bracket O′ to be at any moment reversed or stopped by means of the lever k^7.

As will be seen from Fig. 5, the shaft Q, and thereby the shafts K and N′, may also be rotated by hand by means of the crank q^3. Within the bracket O′ is the pinion k^2, mounted on the central shaft K, meshing with a pinion k^3, meshing with a pinion k^4, both pinions k^3 and k^4 being mounted on an end plate k^5, pivoted to the shaft K, and either pinion being adapted to engage with a pinion n^2, mounted on the shaft N′, which is secured to the end plates j^4 and j^5 and is provided with a key n, extending the whole length of the shaft N′, the pinion k^3 or k^2 being engaged with the pinion n^2, as circumstances require, by means of the handle k^6 for changing the direction of rotation of the shaft N′, and thereby the direction in which the gears K^2 and K^3 run on the rack-bars L′ and L^2.

By a worm-gear S, operated by a hand-wheel T and engaging the hub j^6, the end plates j^4 and j^5 may be turned on the shaft K, and thereby the tool p^2, to any desired angle in a plane at right angles to the axis of the shaft K, as shown by the dotted lines X X in Fig. 5, and held at such angle, and by the handle p^8, after loosening the tightening-nut p^{10}, the cylinder P, and thereby the tool p^2, may be turned on the pivot p to any desired angle in a plane through said axis, as shown by the dotted lines z z in Fig. 6, and by tightening the nut be held at such angle.

We claim as our invention—

1. In a stone cutting and dressing machine, the combination with screw-shafts, d, e, f, and g, of a frame, H, composed of bars, h', and, h^2, fitted into sockets, h^3, and, h^4, adapted to slide vertically along supports, B′, and, B^2, a frame, I, composed of bars, i', and, i^2, fitted into sockets, i^3, and, i^4, adapted to slide vertically along supports, B^3, and, B^4, and a frame, J, composed of bars, j', j^2, and, j^3, secured to plates, j^4, and, j^5, and having end bearings adapted to slide horizontally along the frames, H, and, I, substantially as shown and described and for the purposes set forth.

2. In a stone cutting and dressing machine, the combination with screw-shafts, d, e, f, and, g, of frame, H, composed of bars, h', and, h^2; sockets, h^3, and, h^4, frame, I, composed of bars, i', and i^2; sockets, i^3, and, i^4, frame, J, composed of bars, j', j^2, and, j^3; plates, j^4, and, j^5, and bracket, O′, carrying cylinder, P, with piston, p^3, for operating the tool, p^2, substantially as shown and described and for the purposes set forth.

3. In a stone cutting and dressing machine, the combination with the frame, J, and the bracket, O′, of the shaft, K, with key, k, pinions, k^2, k^3, k^4, and, n^2, shaft, N′, with key, n,

gears, M′, and, M², hubs, j^6, and, j^7, gears, K², and, K³, and racks, L′, and, L², substantially as shown and described and for the purposes set forth.

4. In a stone cutting and dressing machine, the combination with a shaft, K, of hubs, j^6, and, j^7, revoluble thereon, and respectively, in the end bearings, J², and, J³, gears, K², and, K³, revoluble on the hubs, j^6, and, j^7, respectively, and the gears, M′, and, M², meshing with the gears, K², and, K³, respectively, substantially as shown and described, and for the purposes set forth.

5. In a stone cutting and dressing machine, the combination of the frame, A, pulley, C′, shafts, c^4, c^7, and, c^{10}, screw-shafts, d, e, f, and, g, frames, H, and, I, rack-bars, L′, and, L², sockets, h^3, h^4, i^3, i^4, frame, J, end bearings, J², and, J³, gears, k^2, M′, K³, M², shaft, K, with key, k, pinions, k^2, k^3, k^4, plate, k^5, pinion, n^2, shaft, N′, with key, n, handle, k^6, friction-roller, q^4, shaft, Q, pinion, q', rack-bar, R, friction-wheel, q^2, lever, k^7, clutch, k^8, thread, k^9, shaft, U, with key, u, shaft, V, with key, v, and pulley, W, substantially as shown and described and for the purposes set forth.

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