(No Model.) 2 Sheets—Sheet 1.

C. N. MORRIS.

MACHINE FOR SURFACING LITHOGRAPHIC STONES.

No. 336,582. Patented Feb. 23, 1886.

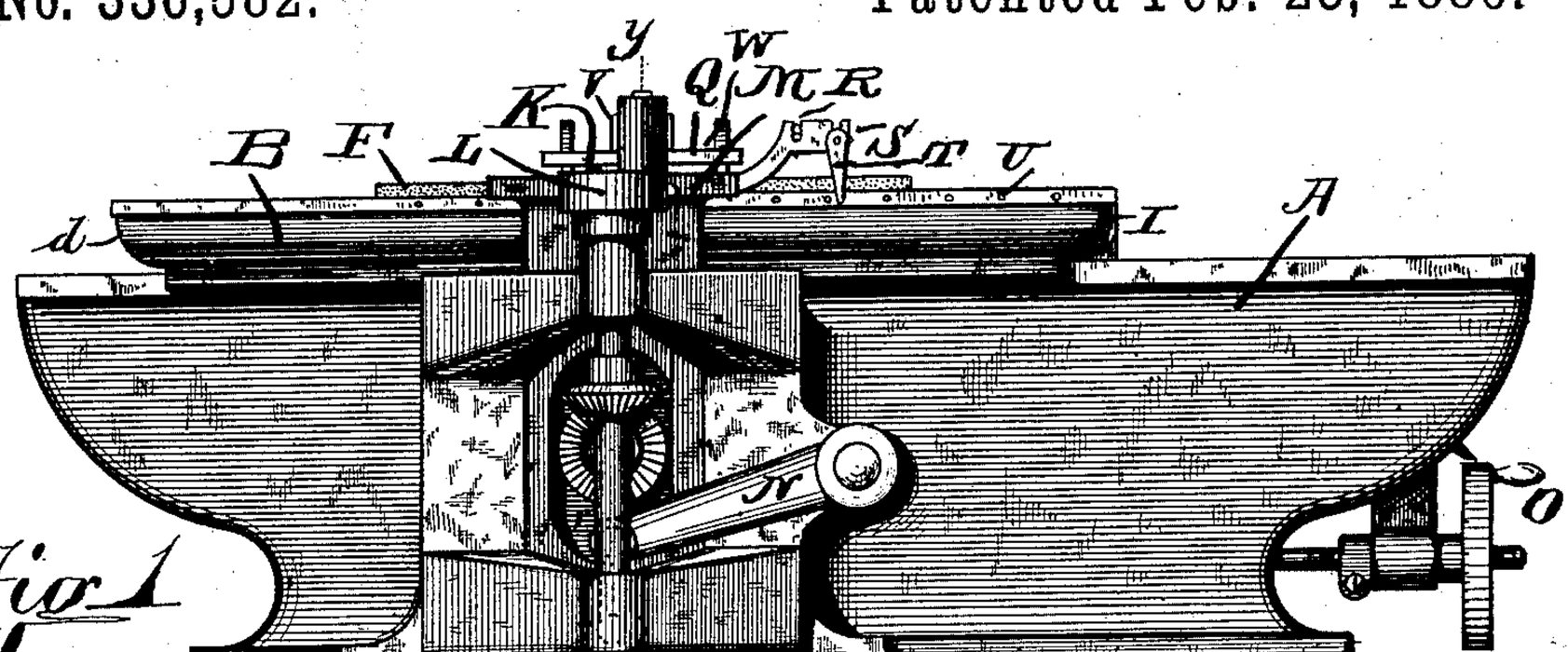

Fig 1

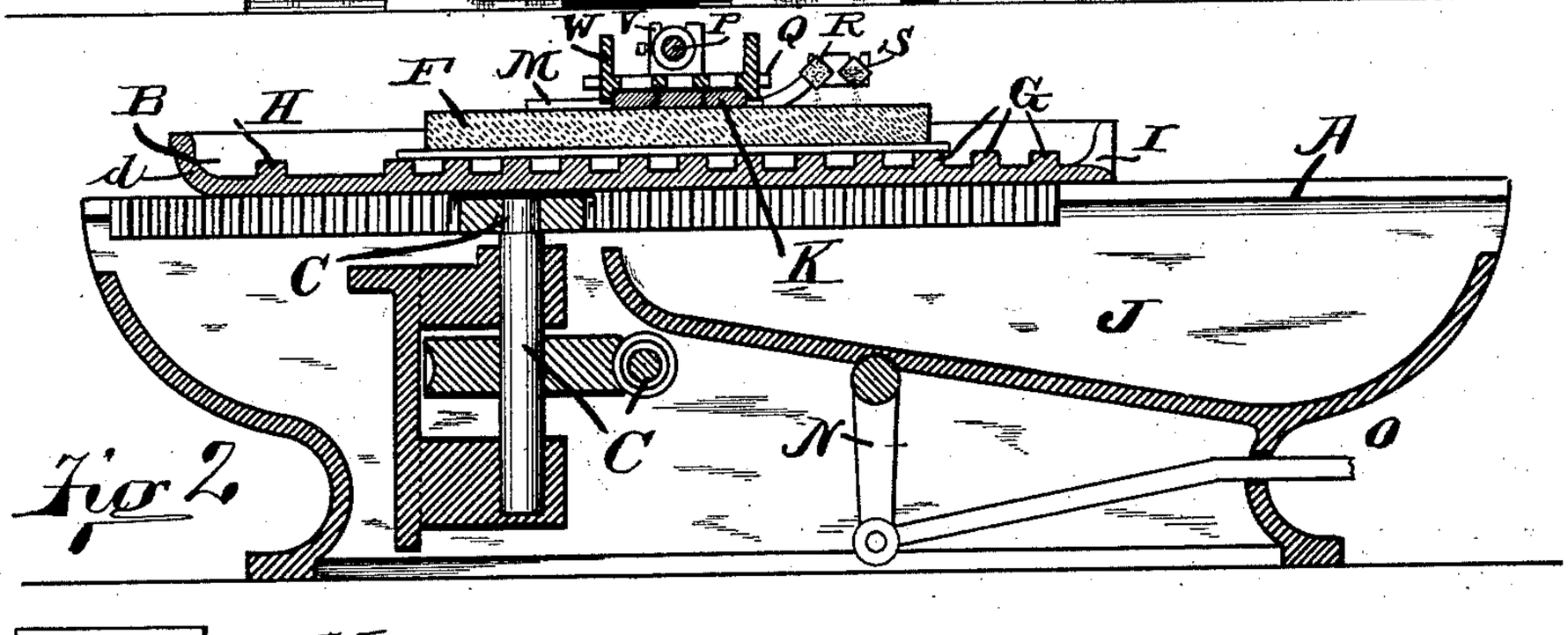

Fig 2.

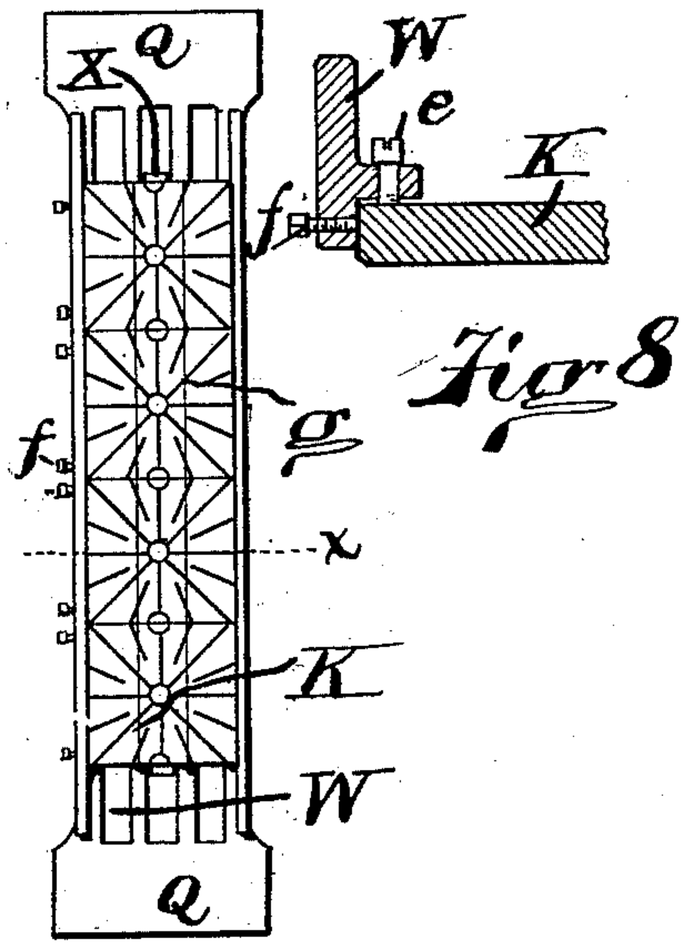

Fig 8

Fig 7

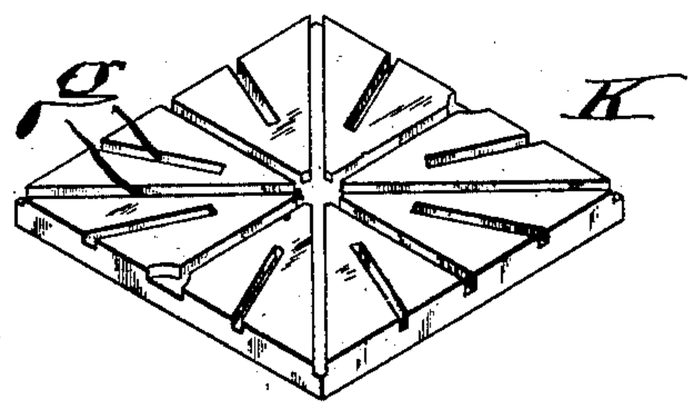

Fig 9

Witnesses:
W. A. Seward
C. D. Mathes.

Charles N. Morris Inventor

by James N. See
Attorney

(No Model.) 2 Sheets—Sheet 2.

C. N. MORRIS.

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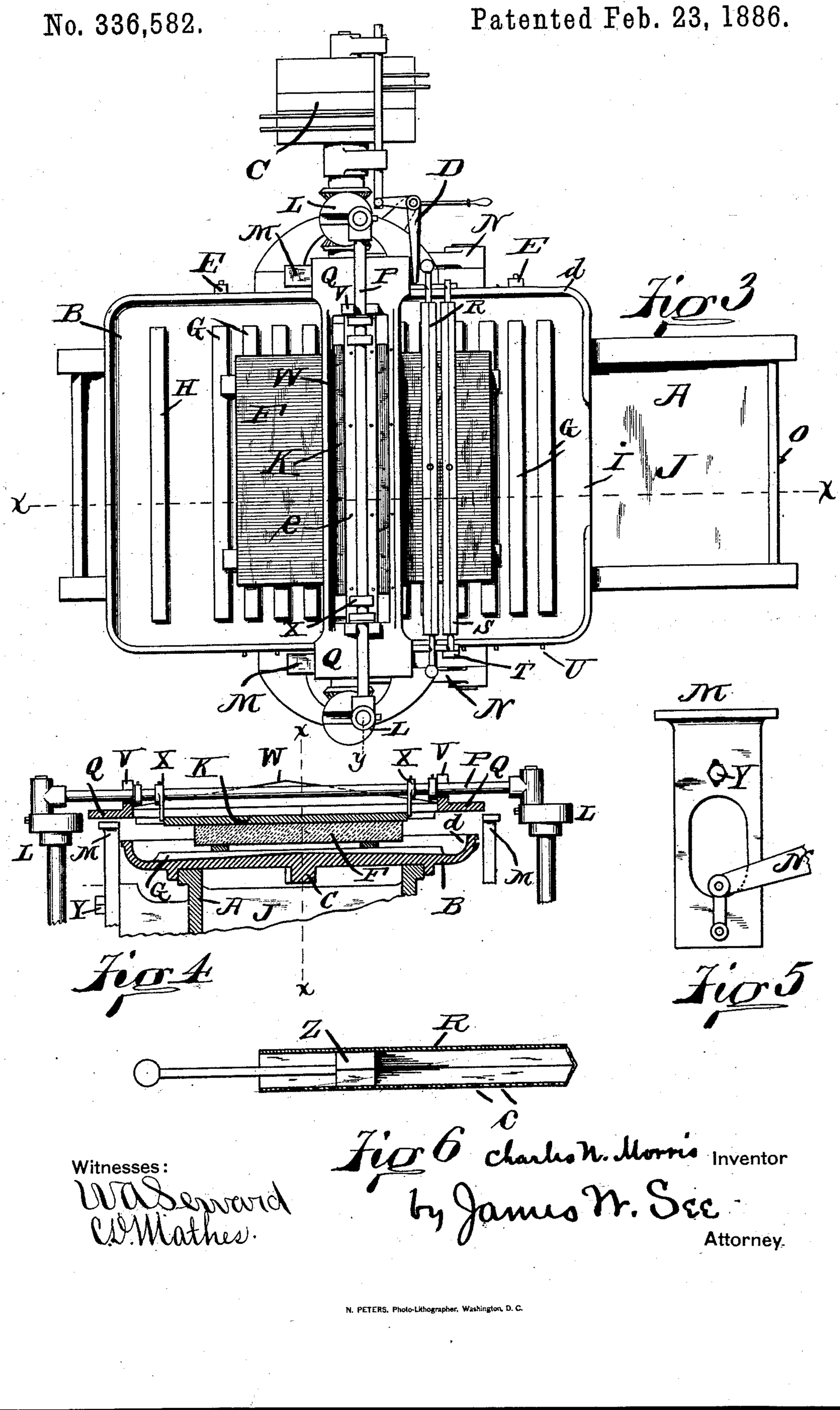

Fig 3

Fig 4

Fig 5

Fig 6

Witnesses:
W. A. Seward
C. D. Mathes.

Charles N. Morris Inventor
by James N. Sec
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES N. MORRIS, OF CINCINNATI, OHIO.

MACHINE FOR SURFACING LITHOGRAPHIC STONES.

SPECIFICATION forming part of Letters Patent No. 336,582, dated February 23, 1886.

Application filed June 20, 1884. Serial No. 135,469. (No model.)

To all whom it may concern:

Be it known that I, CHARLES N. MORRIS, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Machines for Surfacing Lithographic Stones, &c., of which the following is a specification.

This invention pertains to machinery for surfacing lithographic stones, printing-plates, and the like.

My invention will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figures 1, 2, and 3 are respectively a side elevation, vertical longitudinal section, and plan of a machine embodying my improvements; Fig. 4, a vertical transverse section of a portion of the machine; Fig. 5, a side elevation of one of the bearers with its lifting-lever; Fig. 6, a vertical longitudinal section of a portion of the sand-sprinkler; Fig. 7, a face view of the lower surface of the grinder; Fig. 8, a vertical transverse section of a portion of the grinder; and Fig. 9 a perspective view of a section of the grinder, exhibiting its lower face. The sections Figs. 2 and 8 are taken at the line *x* and the section Fig. 4 is taken at the line *y*.

In the drawings, A, B, C, D, and E represent, respectively, a bed, table, driving mechanism, belt-shifting tumbler, and tumbler-operating dogs, all constructed and arranged to operate in the same manner as is common in metal-planing machines.

F represents a lithographic stone laid upon the table of the machine; G, a series of truly-faced parallel ribs formed upon the upper surface of the table and forming a channeled face to the table; H, a similar rib near one end of the table, separated somewhat from the ribs G, and not intended to be covered by the stone being operated upon; I, a draining-opening at one end of the table, serving to carry away the sand and water which run over the stone being operated upon; J, a tank within the bed of the machine, arranged to catch the drain from the table; K, the grinder, hereinafter more fully described, which operates directly upon the upper surface of the stone; L, a pair of vertical cranks housed at the sides of the machine and driven by the general driving mechanism previously referred to; M, a pair of vertical adjustable bearers having their upper ends faced to true planes, and arranged, one at each side of the machine, in position to support the grinder, as hereinafter more fully set forth; N, a bell-crank lever journaled in the bed of the machine, and connected with the bearers M, as shown, in such manner that the oscillation of the bell-crank serves to raise and lower simultaneously the two bearers; O, a graduated hand-wheel, index, and screw, for adjusting the vertical height of the bearers through the medium of the bell-crank referred to; P, a double-ended pitman or connecting-rod engaging the two cranks L, and intended to be reciprocated by the cranks; Q, wings at each end of the carrier of the grinder, having their under surface dressed to true planes, and adapted, if unprevented, to rest upon the two bearers while in motion; R, a tube disposed across the machine above the stone, and adapted to contain water or other liquid to aid in the abrading operation; S, a similar tube similarly located, and intended to contain sand or other abrading material, the tube being supported by bearings at its ends; T, a tappet-arm fixed to one end of the sand-tube; U, a series of pins projecting from the edge of the table and adapted to engage successively the end of the tappet-arm; V, slotted lugs projecting upwardly from the face of the carrier of the grinder, and engaging the connecting-rod P; W, the carrier of the grinder; X, a pair of fingers secured adjustably to the connecting-rod and adapted to engage against the end of the grinding-plate held in the carrier W; Y, bolts by which the bearers M may be rigidly secured after adjustment; Z, adjustable stoppers or pistons fitted to slide in the ends of the tubes R and S; *c*, perforations in the bottom of the tubes for the discharge of liquids and abrading material; *d*, a ledge at the margin of the table, serving to confine the sloppy matter; *e*, screws by which the grinder K, made in the form of plates, is supported beneath the carrier; *f*, set-screws by which the grinder K may, if desired, be rigidly secured in the carrier, the screws *e* being intended simply to support the grinder, and *g* grooves in the face of the grinder, arranged as groups of divergent radii.

In the operation of this machine the stone to be surfaced is laid upon the table, parallel strips of wood being interposed between the table and stone to prevent the marring of the latter. The stone is then moved under the carrier, the machine not being in motion, and the carrier allowed to rest with the face of the grinder against the upper surface of the stone. By means of the adjusting devices O the bearers are now so adjusted vertically as to leave the space between their upper face and the wings of the carrier equal to the depth of the material which it is desired shall be removed from the face of the stone. The machine is now set in motion, and the stone reciprocates slowly back and forth under the grinding-plates, the grinder being rapidly reciprocated in a direction transverse to the path of the stone, the reciprocation being produced by the cranks L, which obviously give to the grinder a circular as well as a reciprocating motion. While the stone is thus being acted upon by the grinder water flows from the water-tube and sand or emery, or other abrading material, flows from the sand-tube, the tappet-arm T, being knocked by the pins U, serving to shake the sand from the perforations in the tube. The grinding, carried on with pressure due to the weight of the carrier, proceeds until the carrier descends far enough to rest upon the bearers, after which the operation continues, the carrier then being guided in a true plane by the bearers, and the latter stages of the operation being carried on without any pressure due to the weight of the carrier. The stone is then reversed and its other side treated in a similar manner. The stone is thus finished with two truly-planed surfaces, perfectly parallel with each other, and with a peculiar finish due to the final surfacing under a moving grinder operating upon it without pressure. The table of the machine slopes from the center to the sides, as shown in Fig. 4, thus causing the slop to drain between the ribs G and flow forward past the ends of the ribs to the outlet-opening I and thence to the tank J, the table having a slight longitudinal slope toward the opening, the slopes mentioned having reference to that portion of the table-surface lying below the level of the ribs G.

When I use the word "grinding" I refer to the general operation of surfacing, which includes the preliminary operation of grinding the stone down to a true plane and the final operation of graining it or polishing it, as may be desired. The grinder may be formed integrally with the carrier W, and for treating some kinds of stone it may be of cast-iron; but I prefer to insert a grinder separably in the carrier, whereby I am enabled to readily alter the character of the grinder, and also to provide for renewals. The grinder may be in the form of a long plate rigidly secured to the carrier by means of screws, bolts, or otherwise; but I prefer to make up the grinder in separable sections, secured together in the carrier, and I further prefer to so attach the grinding-plates to the carrier that the grinding-plates may rise and fall slightly, independent of the carrier and independent of each other. By so doing I am enabled to perform the initial grinding away of the stone under the full pressure due to the weight of the carrier and grinder, and as the operation proceeds and the carrier becomes supported by the bearers the grinding will proceed under the pressure due to the weight of the grinder only, and at a still later stage of the operation, when the grinder can descend no farther, the finishing touch is given without any pressure. The carrier, it will be observed, is in the form of a plate, shown as slotted longitudinally for the sake of lightness. The grinder K is hung to the carrier by means of the screws *e*, which do not draw the grinding-plates tightly to the carrier, but permit a certain degree of vertical motion. If the grinding-surface is made up of separate sections, each section is thus at liberty, within certain limits, to adjust itself vertically, independent of its fellows, as well as independent of the carrier.

In Fig. 7 it will be seen that the grinding-surface is made up of four short grinding-plates arranged contiguously, and in some cases I further subdivide these plates by longitudinal divisions, as indicated by the two longitudinal lines seen in Fig. 7, dividing the plates transversely into three sections, as may be more readily understood from an inspection of Fig. 2. In practice I sometimes interpose strips of rubber or other elastic material between the contiguous edges of the plates.

By forming the grinder of separate short plates I am enabled to adapt the length of the grinding-surface to the width of the stone being surfaced, it being desirable, though not essential, that during the reciprocation of the grinder the ends of the grinder shall move inward past the edge of the stone, whereby there is less likelihood of shoulders being formed near the ends of the grinder.

In order to effect the more even distribution of the abrading material I groove the grinder in a radial manner, as shown, whereby the abrading material finds grooves of detention and distribution at all times at right angles to the path of motion.

The grinders may be formed of cast-iron, or of steel, or of lead, or of stone, depending much on the character of the stone being surfaced; but I have discovered, after much experimenting, that, for ordinary lithographers' stones, phosphor-bronze possesses peculiar capacities for maintaining its truth of surface, for resisting wear, for resisting the embedment of abrading material, and for resisting corrosion. The cranks L have their crank-pins adjustable, so that the stroke of the grinder may be altered at pleasure. The bearers are lifted simultaneously by means of the lever system, and, being once truly adjusted to the parallelism with plane of the table, are not liable to lose their accuracy; but at the same time it is

desirable to provide means for testing their accuracy of position, even when the stone is upon the machine. I therefore provide a special rib, H, which may be brought under the grinder, so as to enable an accurate test to be made. This rib is not liable to be marred by any ordinary work of the machine, and it does not become covered by the stone. The shaft P transmits its reciprocating motion to the carrier by means of collars engaging against the face of the lugs V, rubber washers being interposed to prevent shock in case of some slight lost motion. The water-tube R is to be provided with an inlet-opening, through which it may be filled when required, though it is preferable to connect the tube by hose or piping with a continuous supply of water. The discharge of water may be suited to the width of the stone being operated upon by adjusting the pistons Z, which serve to practically shorten the tube or to limit its operations to a certain number of perforations. The fingers X serve to transmit the reciprocating motion to the grinder independent of the reciprocating motion of the carrier, whereby the supporting-screws *e* are relieved from any friction due to a driving duty. The direction of rotation of the cranks, and consequently the direction of the circular rubbing action on the stone, reverses with the reversing of the table motion. This peculiarity of the rubbing motion aids in prevention of furrowing and improves the distribution of the abrading material.

I claim as my invention—

1. In a machine of the character specified, the combination of a grinder arranged to operate under the pressure due to its weight, and a pair of bearers provided with bearing-surfaces in the form of true planes, and arranged to intercept the descent of the grinder and relieve the surfacing operation of the pressure due to the weight of the grinder.

2. In a machine of the character specified, the combination of a carrier for a grinder or grinders, a pair of bearers arranged to be engaged by said carrier, and a grinder or grinders secured to said carrier, but capable of a limited upward motion with reference thereto.

3. In a machine of the character specified, the combination, with a pair of bearers having truly plane bearing-surfaces, of a grinder provided with a grinding-face and with independent truly plane surfaces fitted to engage said bearers.

4. In a machine of the character specified, the combination of cranks L, carrier W, having lugs V, and rod P, having collars engaging said lugs.

5. In a machine of the character specified, the combination of cranks L, carrier W, lugs V, plate or plates K, rod P, having collars engaging said lugs, and fingers X, engaging said plate.

6. In a machine of the character specified, the table B, having a stone-supporting surface, and provided with the testing-rib H to the rear of said surface.

7. In a machine of the character specified, the table B, having a marginal ledge and a sloping upper surface, and provided with a series of stone-supporting ribs projecting from said sloping surface.

8. In a machine of the character specified, the combination of table B, having ledge *d* and opening I, and bed A, having tank J.

9. In a machine of the character specified, the combination of bed A, table B, carrier W, bearers M, levers N, and adjusting-screw O.

10. In a machine of the character specified, the combination of table B, water-tube R, and tube S, for abrading material, said tubes being disposed across the table and supported in bearings.

11. In a machine of the character specified, the combination of a tube for liquid or abrading material, having a row of perforations in the bottom thereof, with adjustable pistons Z, fitting within the tube.

CHAS. N. MORRIS.

Witnesses:
J. W. SEE,
W. A. SEWARD.