(No Model.) 2 Sheets—Sheet 1.

P. C. MÖLLER.

MACHINE FOR GRINDING LITHOGRAPHIC STONES.

No. 268,119. Patented Nov. 28, 1882.

Fig. 1.

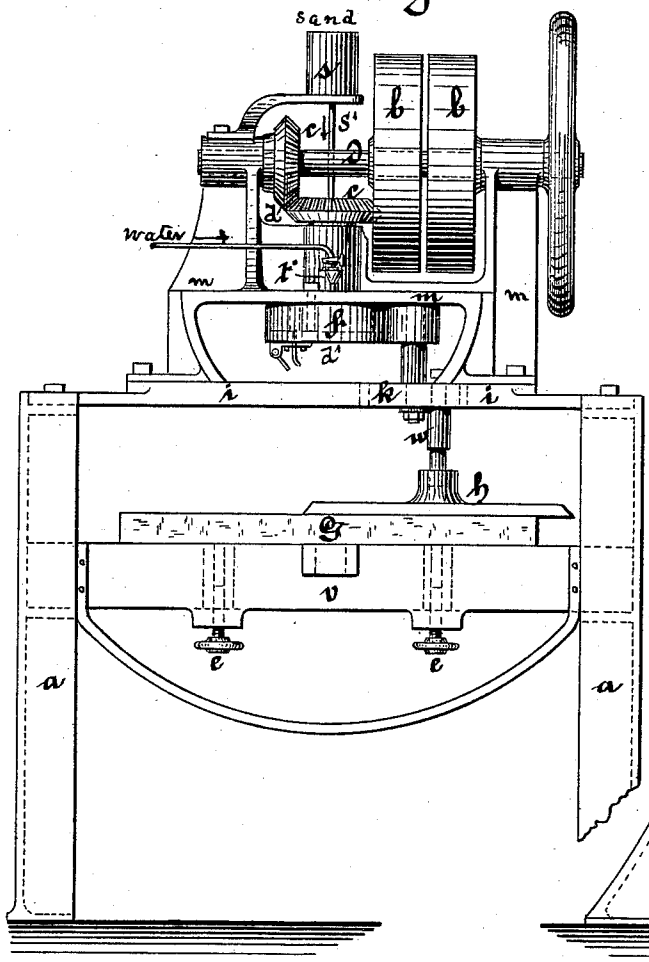


Fig. 2.

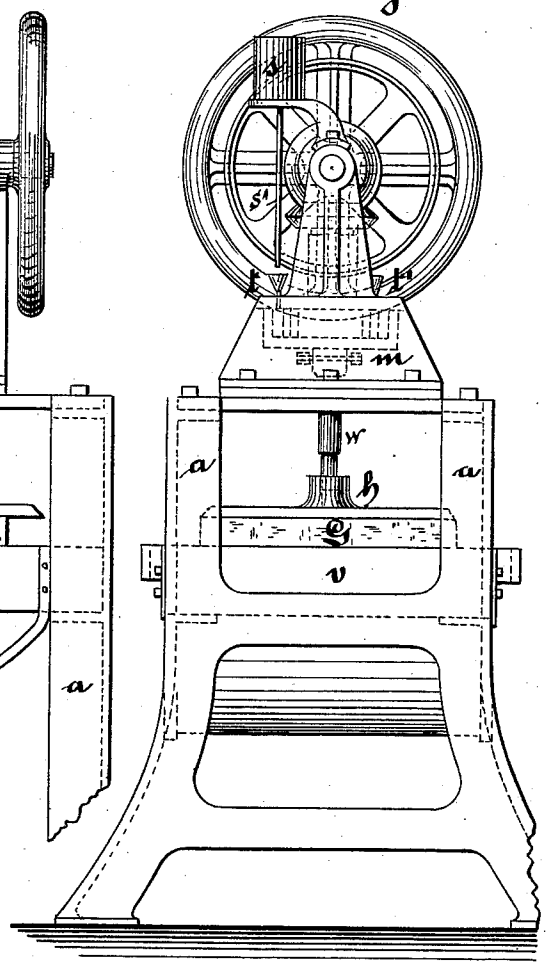
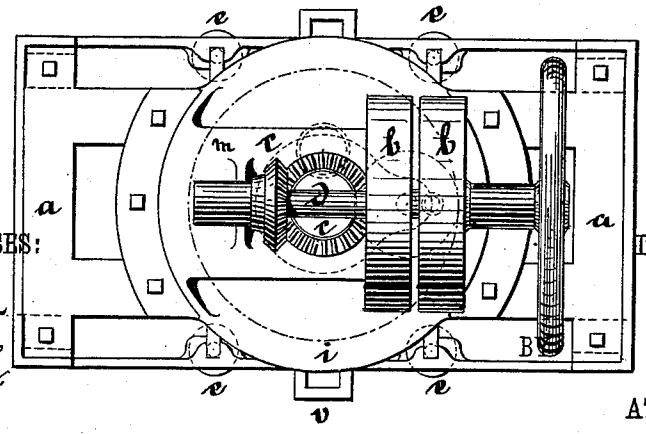


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

P. C. MÖLLER.

MACHINE FOR GRINDING LITHOGRAPHIC STONES.

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Fig. 4.

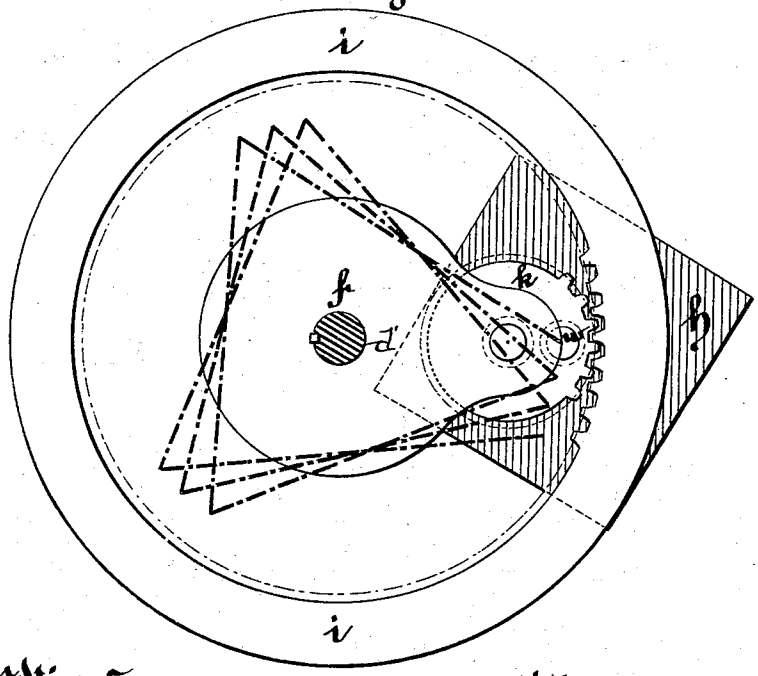


Fig. 5.

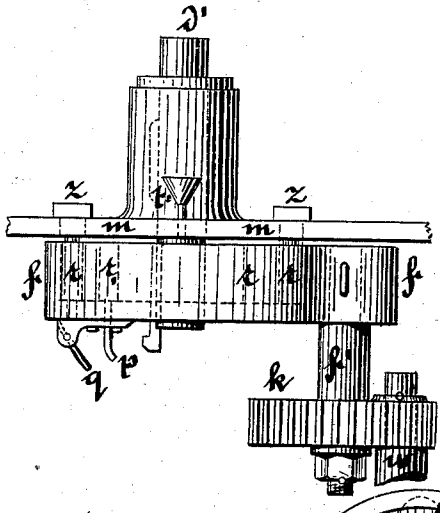


Fig. 6.

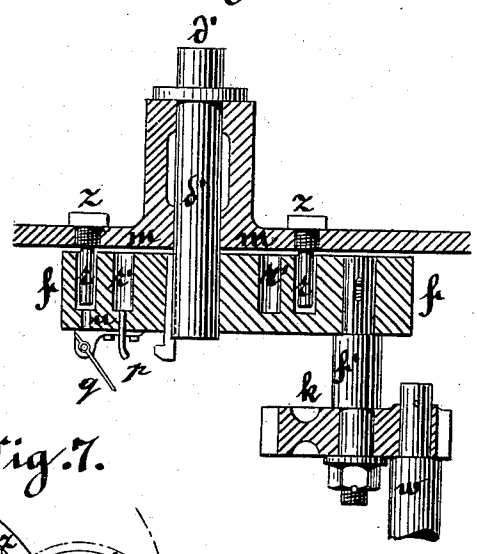
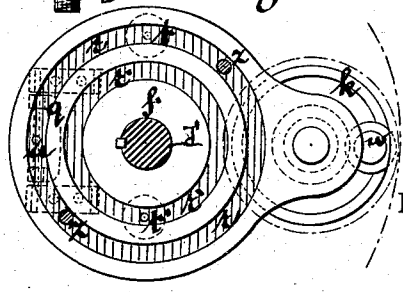


Fig. 7.



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UNITED STATES PATENT OFFICE.

PETER C. MÖLLER, OF LEIPSIC, SAXONY, GERMANY, ASSIGNOR TO C. G. RÖDER, OF SAME PLACE.

MACHINE FOR GRINDING LITHOGRAPHIC STONES.

SPECIFICATION forming part of Letters Patent No. 268,119, dated November 28, 1882.

Application filed June 10, 1882. (No model.)

To all whom it may concern:

Be it known that I, PETER CORFITZ MÖLLER, of Leipsic, Saxony, in the Empire of Germany, have invented certain new and useful Improvements in Machines for Grinding Lithographic Stones, of which the following is a specification.

The machines used for grinding off the surfaces of lithographic stones were objectionable for the reason that the grinding-plates soon lose their plane surface and assume a convex or concave surface, so that it was impossible to grind off the stones in a perfectly flat and uniform manner. The convex or concave shape of the grinding-plates arose from the fact that they were compelled to move by the actuating mechanism continually in one and the same path over the stone, following exactly the same lines of motion without any variation therefrom.

The object of this invention is to obviate the objection mentioned and furnish an improved grinding-machine for lithographic stones, in which, by the use of a peculiarly-constructed actuating mechanism, the grinding-plate receives an epicycloidal motion, and changes its path with each full revolution of the actuating mechanism, so that in consequence thereof no irregularities on the surface of the grinding-plate can take place. Besides the improved motion of the grinding-plate, the machine is furthermore provided with means for automatically supplying certain regulated quantities of sand and water to the face of the stone, so that the machine requires little supervision, while much better results are obtained than by the old method, in which the sand is supplied by hand in irregular quantities and at irregular intervals of time, so as to get in between the movable parts of the machine and exert an injurious influence upon the same.

The invention consists therefore, first, of an improved mechanism in connection with an epicycloidal wheel, whereby the axially-turning grinding-plate receives an epicycloidal motion which changes its path with each revolution of the driving-shaft; secondly, of automatically-operating devices for supplying sand and water to the stone at regular intervals of time, and in uniform quantities to that part of the lithographic stone which is not covered by the grinding-plate.

In the accompanying drawings, which fully illustrate my invention, Figures 1, 2, and 3 represent respectively a side elevation, an end elevation, and a plan, of my improved machine for grinding lithographic stones. Fig. 4 is a diagram showing the epicycloidal motion of the grinding-plate and the change in the path of the same for each revolution of the driving-shaft; and Figs. 5, 6, and 7 are respectively a detail side view, a vertical central section, and a plan, of the mechanism for imparting motion to the grinding-plate, and of the sand and water supplying devices.

Similar letters of reference indicate corresponding parts.

The entire grinding mechanism is supported on a frame, *a a*, which is braced at the middle of its height and adapted to support a foundation or bed-plate, *v*, for the reception of the lithographic stone G, the surface of which has to be ground, and whose accurate adjustment is obtained by set-screws *e e* and blocks. The supporting-frame *a a* carries at its upper end a circular top plate, *i*, which is toothed at its inner circumference, so that it forms at the same time the main gear-wheel of the actuating mechanism of the grinding-plate. To the circular top plate, *i*, is rigidly secured the top bearing-frame, *m*, which carries the different motion-transmitting parts of the machine.

The actuating mechanism of the grinding-plate *h* is set in motion by a horizontal shaft, *d*, which carries a fly-wheel and driving-pulley, and which is supported in bearings of the frame *m*. From the driving-shaft *d* motion is transmitted by bevel-gears *c c* to the vertical shaft *d'*, and the crank-disk *f*, keyed to the lower end of the same. The crank-disk *f* is provided with an eccentric crank-pin, *f'*, to which a pinion, *k*, is so applied that it turns loosely on a journal of the pin. The pinion *k* meshes with the interior gear of the circular top plate, *i*, and travels along the inner circumference of the same. To the pinion *k* is eccentrically secured a spindle, *w*, which carries at its lower end the grinding-plate *h*, so that the latter can turn loosely thereon around its axis.

The described transmitting mechanisms impart a compound motion to the grinding-plate *h*, as shown in Fig. 4—viz., a simple circular motion by the crank-disk *f*, and a second rolling or cycloidal motion by means of the interior gear-wheel of the plate *i* and the eccentric position of the rod *w* on the pinion *k*. The number of teeth of the pinion *k* and of the interior gear-wheel of the top plate, *i*, are intentionally so selected relatively to each other that the path on line of motion of the grinding-plate moves forward for each full revolution of the crank-disk *f* the distance of the width of one or more teeth, whereby the different paths or lines of motion of the grinding-plate will never coincide with each other. The grinding-plate is consequently compelled to attack continually different points of the lithographic stone, so that any irregular grinding off of the stone or an irregular shape of the grinding-plate is fully prevented. Besides the compound motion which is imparted to the grinding-plate by the transmitting mechanisms described, the same may also turn freely around its own axis, so that consequently the object of moving the grinding-plate in continually varying and never overlapping curves over the stone is fully achieved.

The angles of the triangles (shown in dotted lines in Fig. 4) show the successive positions reached by the spindle *w* at each revolution of the pinion K, as said pinion advances. Since the spindle *w* is attached to the grinding-plate these angles mark the successive positions of the center of the grinding-plate in its revolution about the crank-disk *f*.

The automatically-operating devices for supplying sand and water to the stone are shown in Figs. 5, 6, and 7, and are applied to the crank-disk *f*. The latter is for this purpose provided with two deep concentric grooves or troughs, *r r* and *r' r'*, of which the exterior one is intended for receiving sand, the interior for the reception of water. The water is conducted to the groove *r'* by a tube provided with a stop-cock, the tube discharging the required quantity through a funnel, *t'*, (shown in Figs. 1 and 5,) to the groove *r'*, from which it passes through a small tube, *p*, to the stone. The sand is supplied from a vessel or reservoir, *s*, supported at the top of the frame *m* through a vertical connecting-tube, *s'*, into a funnel, *t*, and thence into the groove *r*, which is provided at one point thereof with a small discharge-perforation, *u*.

To the horizontal plate of the frame *m*, immediately above the crank-disk *f*, are secured two vertically-adjustable clearing-pins, *z z*, which extend downward and nearly to the bottom of the groove *r*, so that at each revolution of the crank-disk a certain determined quantity of sand is supplied twice through the hole *u* to the stone. The sand drops after leaving the hole *u* on a deflecting-plate, *q*, which may be set to any suitable angle of inclination, according to the point to which the sand is to be deposited on the stone. The discharge-openings of the water and sand are so arranged relatively to the grinding-plate that they are not discharged upon the same, but always directly upon the stone. The result is a uniform and automatical supply of water and sand to the stone, so that the grinding operation proceeds throughout in a regular and highly satisfactory manner.

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

1. In a machine for grinding lithographic stones, a fixed bed-plate for supporting the stone, adjusting set-screws and blocks, a main shaft, and a vertical shaft carrying bevel-gears, a crank-disk, an eccentric crank-pin, a pinion turning loosely on a journal of the pin, a circular top plate geared on its inner circumference meshing with the pinion, a spindle secured to the pinion, the grinding-plate turning loosely on the spindle, and devices by which sand and water are automatically supplied to the stone, substantially as described.

2. In a machine for grinding lithographic stones, the combination of the driving-shaft *d*, bevel-gears *c c*, vertical shaft *d'*, crank-disk *f*, having pin *f'*, eccentrically-connected pinion *k*, circular top plate, *i*, having a gear-wheel at its inner circumference, and grinding-plate *h*, turning loosely on the eccentric spindle *w* of pinion *k*, substantially as set forth.

3. In a machine for grinding lithographic stones, the combination of a sand-vessel, *s*, connecting-tube *s'*, funnel *t*, crank-disk *f*, having a circular trough, *r*, adjustable clearing-pins *z*, extending into the groove *r*, discharge-hole *u*, and deflecting-plate *q*, substantially as set forth.

4. In a machine for grinding lithographic stones, the combination of a water-supply pipe, funnel *t*, crank-disk *f*, having a circular trough, *r'*, and a small discharge-pipe, *p*, substantially as specified.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

PETER CORFITZ MÖLLER.

Witnesses:

JOHANNES BECK,

FRED. WILKIE.