2 Sheets—Sheet 1.

P. PITKIN & J. B. DOUGHERTY.

Stone-Polishing Machine.

No. 203,934. Patented May 21, 1878.

Fig. 1.

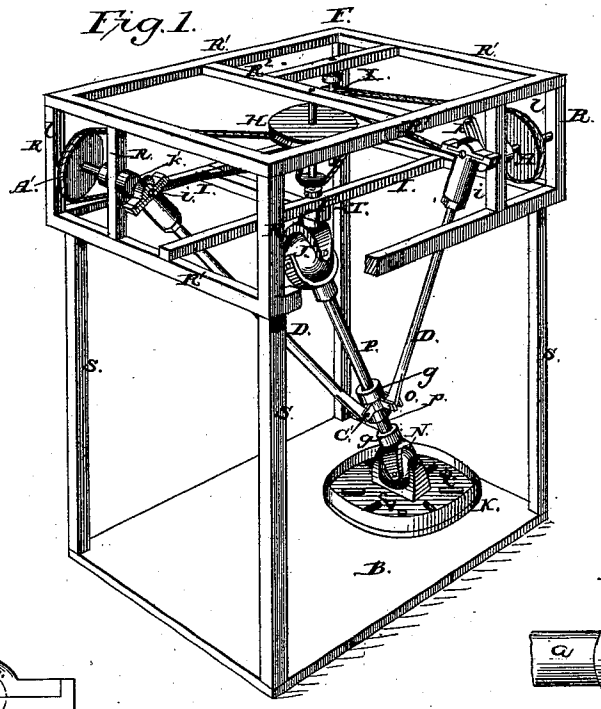


Fig. 8.

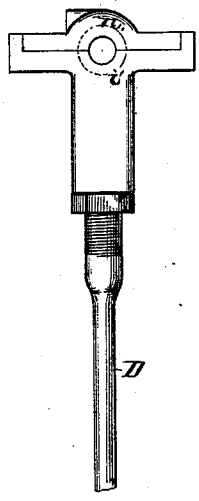


Fig. 9.

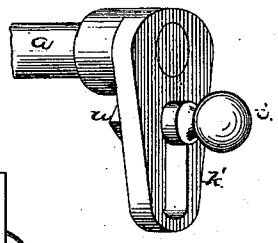
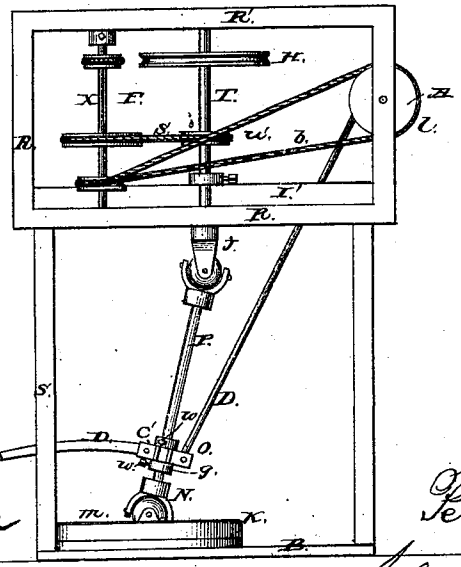


Fig. 2.



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2 Sheets—Sheet 2.

P. PITKIN & J. B. DOUGHERTY.

Stone-Polishing Machine.

No. 203,934. Patented May 21, 1878.

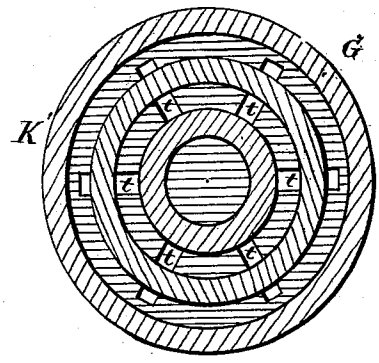


Fig. 5.

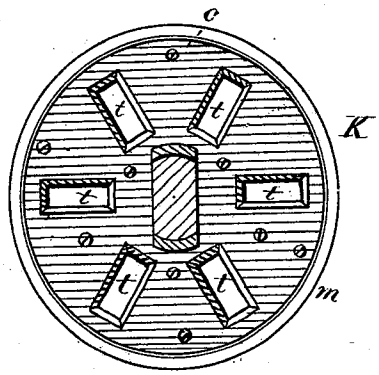


Fig. 4.

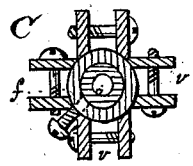


Fig. 7.

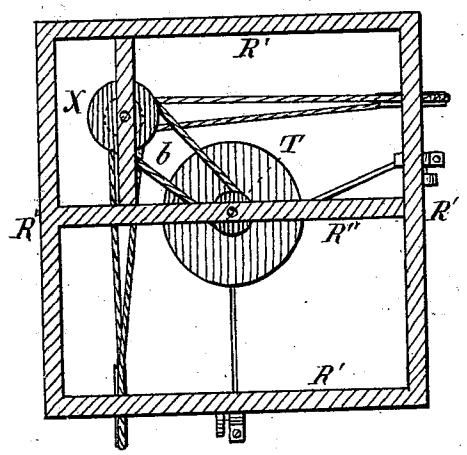


Fig. 3.

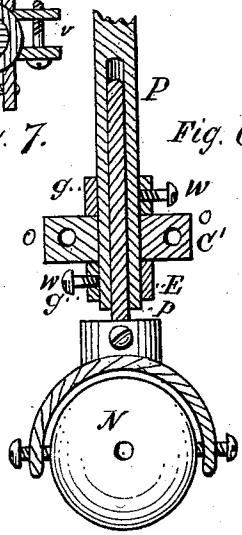


Fig. 6.

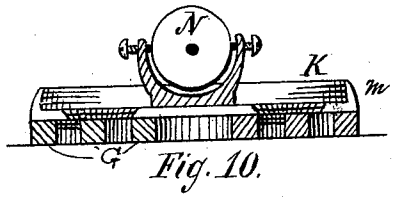


Fig. 10.

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UNITED STATES PATENT OFFICE.

PETER PITKIN AND JOHN B. DOUGHERTY, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN STONE-POLISHING MACHINES.

Specification forming part of Letters Patent No. **203,934**, dated May 21, 1878; application filed March 7, 1878.

To all whom it may concern:

Be it known that we, PETER PITKIN and JOHN B. DOUGHERTY, both of the city of Rochester, in the county of Monroe and State of New York, have jointly invented new and useful Improvements in Stone-Polishing Machines, of which the following is a specification:

This invention relates to mechanism by which a horizontally-rotating disk automatically traverses alike over all parts of a plane surface.

Heretofore stone-polishing machines have required an expert operator to give the rotary polishing-disk a traversing movement that would polish all parts of the surface alike, and the rim or border be as often passed over and receive the same frictional pressure as the central part. The rotation of the disk being constant, unless the traversing movement is also constant, the disk wears away more in the place where the oscillating movement ceases or is slackened than in places where a gyratory movement is kept up. The consequence is that a sunken place is formed, to remedy which the adjoining parts are rubbed down by hand; but unless the whole surface of the stone is also leveled down with the lowest part of the hollow place, the surface is imperfect, and presents a wavy appearance.

The ordinary hand traversing disk is more objectionable, because the rim in this wears away faster than its central part, thereby leaving a face rounded off at its outer edge, and consequently unfit for producing a true surface. This is caused by the greater amount of space rotated over by the rim than by the central part of the disk, and by the rim being first to come in contact with rougher surfaces; and the object of our invention is to furnish a device by which a stone or other material of ordinary dimensions, either in length or breadth, will be polished automatically, and also to provide means by which the face of a gyratory polishing-disk, after its rim is worn into a convex surface, may be restored to a true and straight one without the use of a lathe. It consists, first, in a gyratory polishing-disk, which is connected, by a universal joint, pintle, and sleeve, to an oscillating vertical shaft, which disk is made to gyrate by a second universal joint, and its face provided with a series of detachable rings, secured by screws at desired intervals to its solid part. This solid part or disk is provided with radial slots, through which and between said rings passes the sand or other material for polishing the stone; second, in connecting-rods, the lower ends of which, by a loose slotted collar, are connected to said vibrating shaft, while the top ends, by a ball-and-socket joint, are connected to slotted cranks near the top of the frame; third, in horizontal counter-shafts, each having a pulley, and the stationary part of the main shaft having the main driving-pulley, with a smaller one for conveying motion to a short vertical shaft having three pulleys, for transmitting motion to said counter-shafts; fourth, in extra slots on said loose collar for more connecting-rods, by which two or more of the same kind of disks may be connected and all run by the same machine, thereby being able to dispense with a counter-shaft for each machine or disk connected.

In the accompanying drawings, Figure 1 is a perspective view of a machine embodying our new invention. Fig. 2 is a side view of the same. Fig. 3 is a top view of the machine. Fig. 4 is the top of the polishing-disk. Fig. 5 is the bottom of the disk with the rings. Fig. 6 shows the disk, universal joint, rings, and slotted collar, with a section of the spindle. Fig. 7 is a cross-section through the slotted collar; Fig. 8, a detail section of the connecting-rods and joint with the slotted crank. Fig. 9 is a section of the slotted crank counter-shaft, crank-pin, and ball of the joint. Fig. 10 is a vertical section of the polishing-disk.

In these illustrations B is the base, and S S the standards upholding the frame F. This frame is composed of the vertical bars R, horizontal bars R^1, and cross-ties I, to which the parts of the machine are attached, and by which adjusted.

The central shaft T, extending from the top to the bottom of the frame F, is attached to and held in position by the top bar R^2 and cross-tie I′.

The oscillating spindle P, by a universal joint, J, is connected to said central shaft, and

the disk K, by a second universal joint, N, is connected to the lower end of said spindle. The disk, by means of these universal joints, conforms to any varied surface over which it passes.

K is the top of the disk, the rim *m* of which rises above the same, making it cup-shaped, for holding polishing material until it is fed through the radial slots *t* to the surface of the stone; and K′ is the bottom or face of the disk. On this face there are any number of adjustable rings, G, secured by screws C from the top through the plate of the disk, the object of which rings being to protect the solid bed part of the disk against the necessity of frequent renewals, to provide for truing the face without a lathe, and to admit polishing material from the top through the slots *t* and between the rings.

By securing these rings from the top instead of the bottom the screw-heads do not wear off, and as the rings wear away they can be slackened and leveled up by inserting slips between them and the main plate until too thin for use, when they are replaced by new ones of the full thickness.

The disk, in adjusting itself to the thickness of the stone, as it rises or falls is held in position by the pintle *p*, which slides up or down in the sleeve E. The disk at the same time is made to rotate by the feather *f* in the sleeve. By a longitudinal groove in the pintle the feather slides up or down in the same.

At the lower end of the spindle P the slotted collar C′ is held in place by the rings *g*, which rings are secured to the spindle by the set-screws W.

The lower ends of the connecting-rods D are connected by screw-bolts *o* to said collar, while the upper ends *i* of the same are connected to the slotted cranks *k* by ball-and-socket joints and wrist-pin. Said collar is provided with extra slots, whereby other disks or machines may be connected outside to this machine, and all operated by the same machinery, thereby superseding the necessity of a counter-shaft for each of the connected outside machines, as seen in Fig. 2.

The ball-and-socket joints *k* are connected to the slotted cranks by adjustable wrist-pins *n*, having a nut, *u*, on the opposite side of the crank.

The long crank *k* allows for adjusting a long connecting-rod, and is calculated for the long way of an oblong stone, while the short slotted crank *k′* is for adjusting a connecting-rod to the short side of the stone, the disk thereby conforming to the shape of the surface it polishes. By means of the wrist-pins acting in the slots of the cranks the said connecting-rods are adjusted to the dimensions of the stone.

The slotted cranks are secured on the ends of the horizontal counter-shafts A A′, the shafts being journaled on suitable bearings in the vertical bars R of the frame F, and have the pulleys *l l* for rotating said shafts, power being received for the same through belts from the vertical counter-shaft X.

H is the main driving-pulley. It is affixed to the main driving-shaft near its top, below which is a smaller pulley, *w′*, for transmitting power through the belts *b* to the vertical counter-shaft X.

The operation of the invention is as follows: The parts being constructed and arranged as described, power is imparted to the machine through the main driving-pulley H, from which, by the belt S, the same is transmitted to the vertical counter-shaft X, and thence, by belts *b*, to the horizontal counter-shafts A A′, by which the slotted cranks are revolved. By these tranks the traversing motion is produced; but the extent of such motion is regulated by the positions of the wrist-pins in the crank-slots, or by their distance from the center of the crank-shaft, the long slot being for the long side of the stone, and the short slot being for a short side. By the universal joints the disk accommodates itself to the surface over which it passes, and by the pintle and sleeve to the stone's thickness, and by the feather in the key-seat the pintle is prevented from rotating in the sleeve.

A rubber tube (not shown) conveys sand and water from a reservoir on top of the frame to the disk, by which the machine becomes self-feeding, and one person can attend to several machines.

The advantages are as follows: The polishing-disk gyrates over any surface of ordinary dimensions automatically. When the rim is worn off so as to leave the face convex, it is leveled up by slips between the rings and the solid disk-plate. It feeds itself with polishing material, and does the work of three or four ordinary machines.

Having described our improvement, what we claim is—

1. The automatic gyratory disk K, having a series of concentric detachable and vertically-adjustable rings G, and provided with radial slots *t*, and connected by a universal joint, N, to a gyrating spindle, P, essentially as and for the purposes described.

2. The slotted collar C, secured between the rings *g* at the lower end of the gyrating spindle P, having the connecting-rods D affixed thereto by screw-bolts, substantially as and for the purposes described.

3. The combination of the horizontal counter-shafts A A′, slotted crank-shafts *k k′*, connecting-rods D D′, and universal joint N, by which the polishing-disk is regulated to gyrate in any direction over a plane surface, substantially as described.

4. The counter-shafts A A′, crank-shafts *k k′*, and rods D, connecting said shafts, by wrist-pins *n* and collar C, to the spindle P, by which the extent of the reciprocal movements of the gyrating disk in any direction is regulated, as and for the purposes described.

5. The combination of the horizontal counter-shafts A A′ and vertical counter-shaft X, crank-shafts *k k′*, connecting-rods D D′, slotted collar C, universal joint N, and gyratory disk K, by which the polishing-disk is adjusted to any irregular reciprocal movement for traversing in any direction over a plane surface, as and for the purposes described.

In testimony whereof we severally have hereunto set our hands this 2d day of March, A. D. 1878.

PETER PITKIN.
JOHN B. DOUGHERTY.

Witnesses:
C. M. ALLEN,
BENJ. F. PARSONS.