(No Model.) 4 Sheets—Sheet 1.

W. PORTEOUS.

GRINDING MACHINE.

No. 427,904. Patented May 13, 1890.

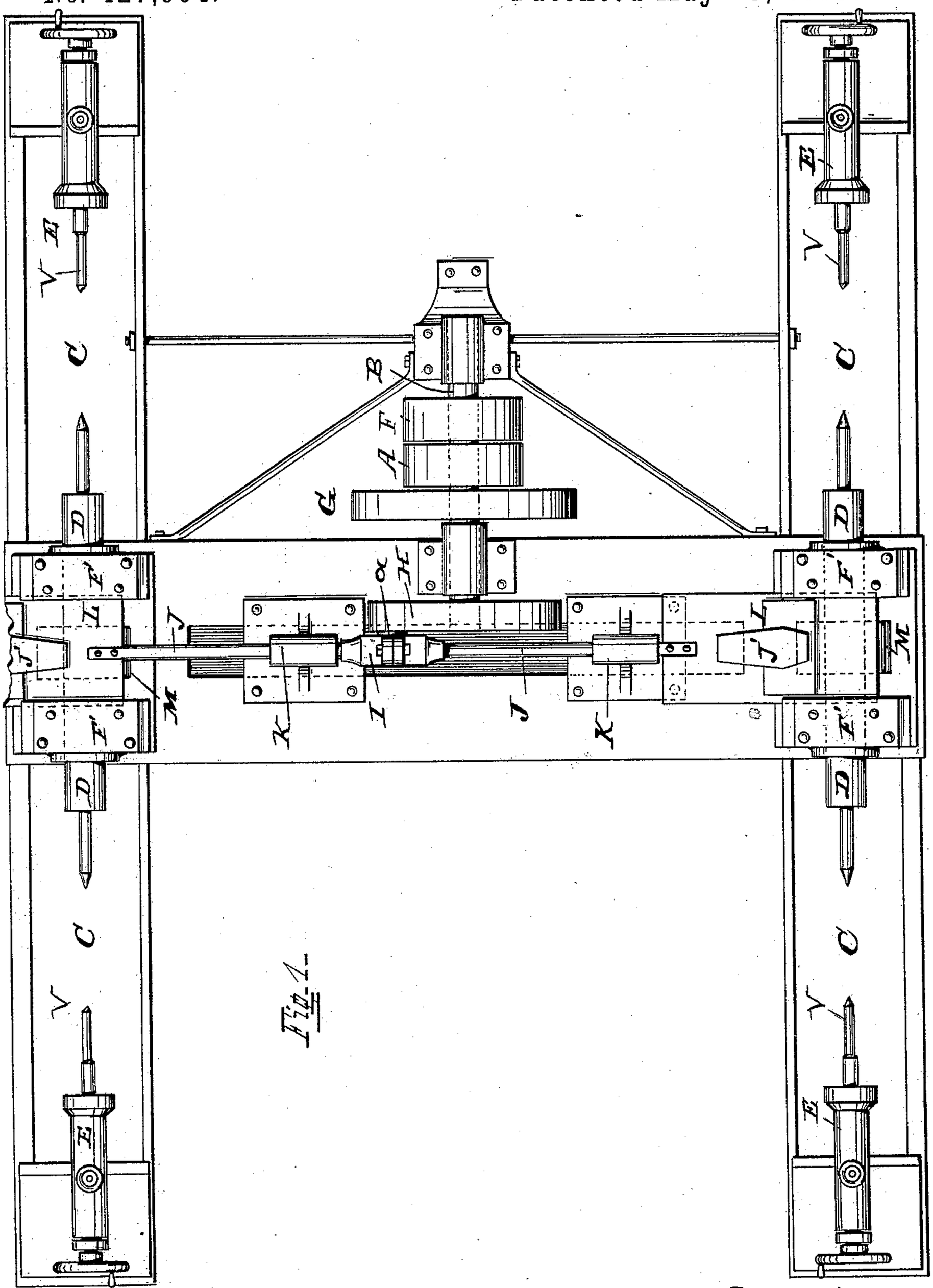

Fig. 1.

Attest
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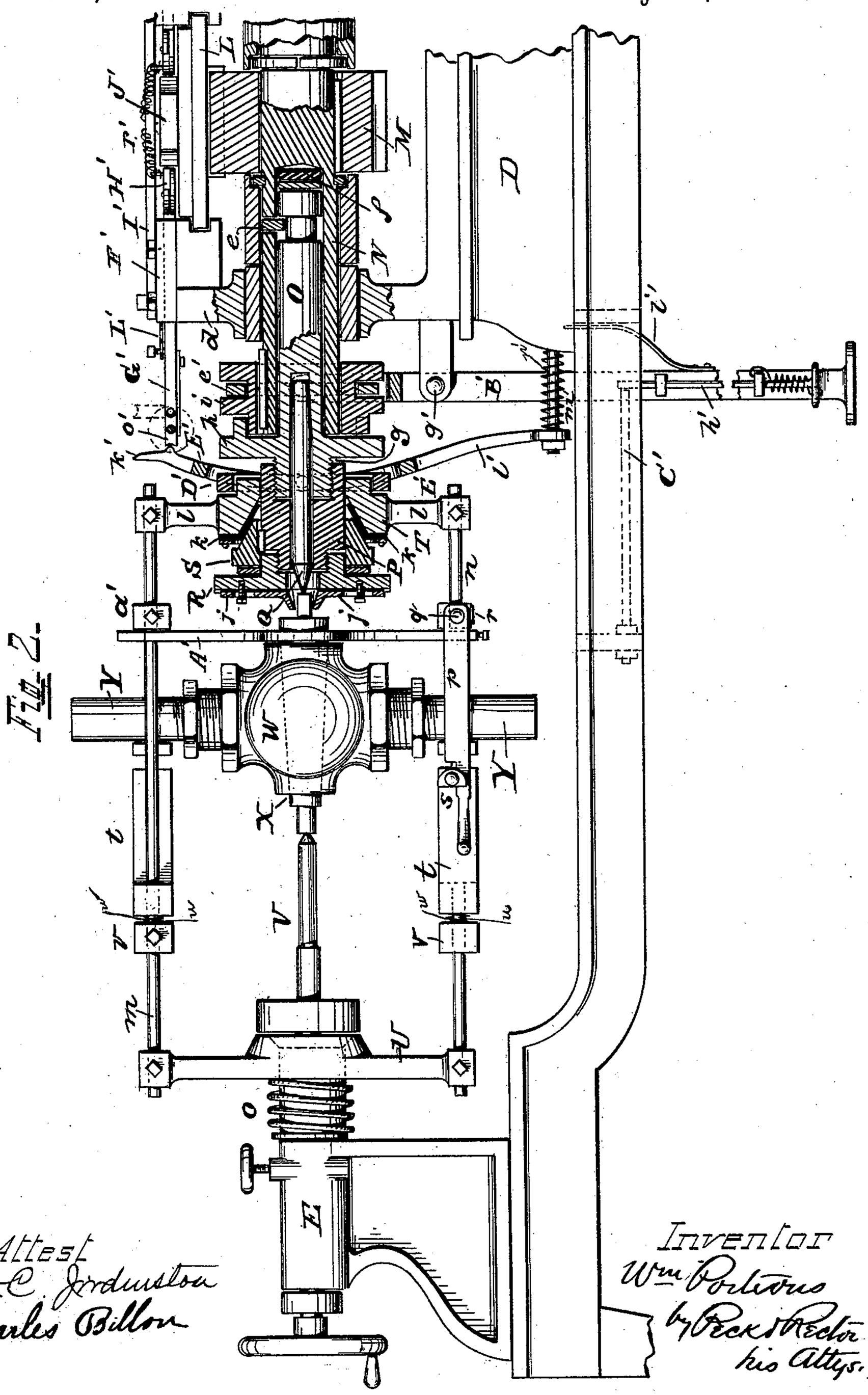

Fig. 2.

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W. PORTEOUS.

GRINDING MACHINE.

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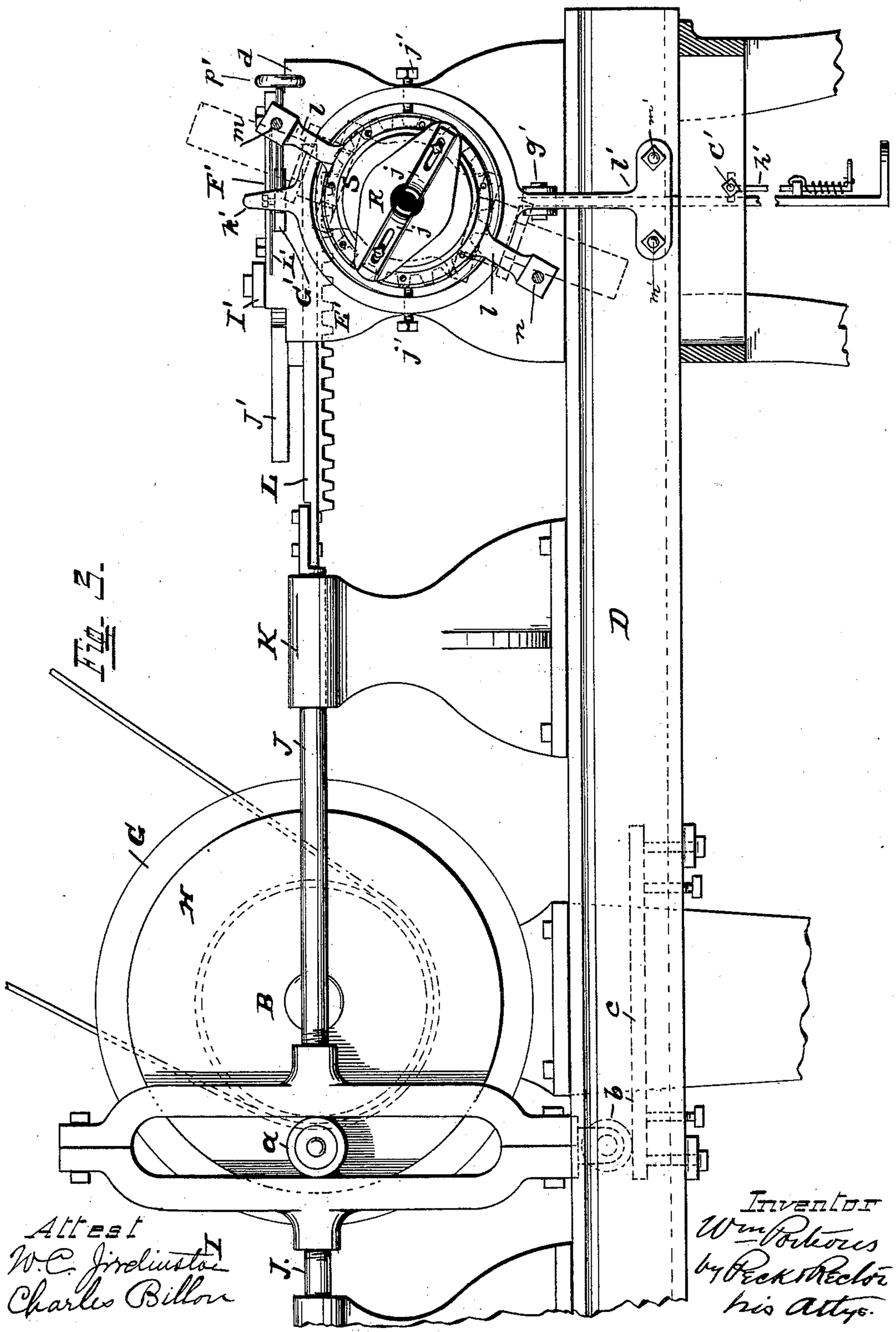

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W. PORTEOUS.

GRINDING MACHINE.

No. 427,904. Patented May 13, 1890.

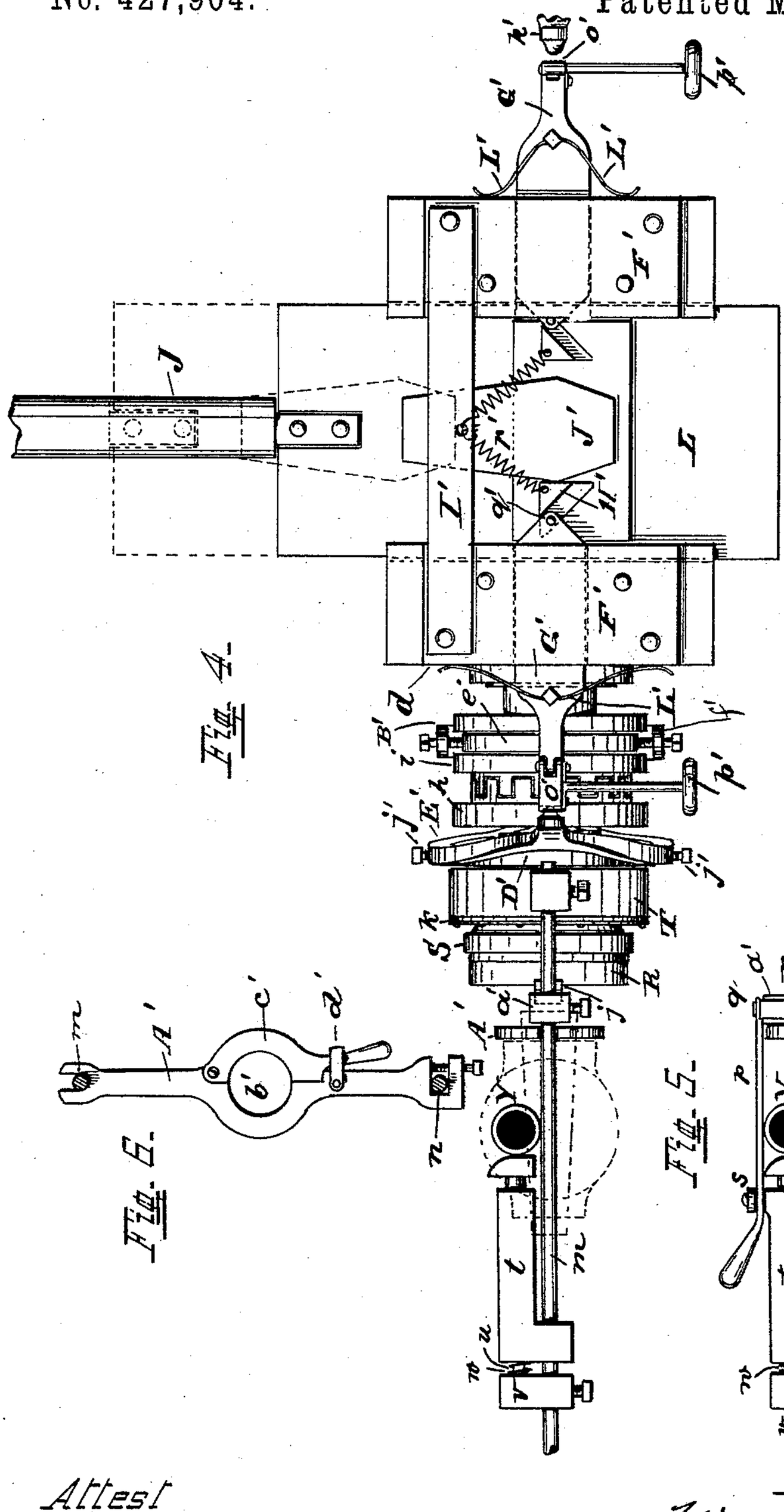

Fig. 4.

Fig. 6.

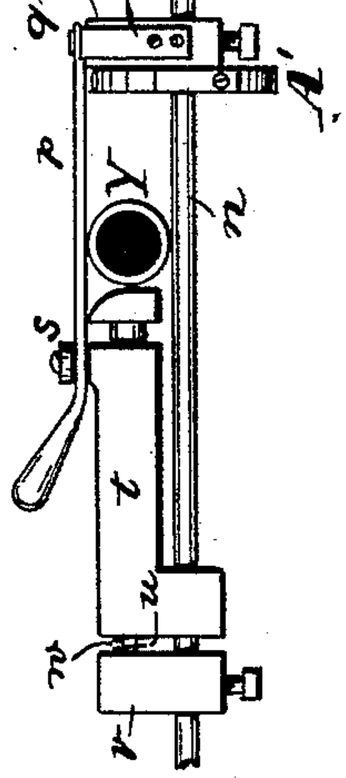

Fig. 5.

Attest
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UNITED STATES PATENT OFFICE.

WILLIAM PORTEOUS, OF CINCINNATI, OHIO.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 427,904, dated May 13, 1890.

Application filed November 21, 1889. Serial No. 331,081. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM PORTEOUS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of grinding-machines in which parts to be fitted together with grooved joints are made to act on each other by means of attritive material—such as fine sand, emery, or the like—applied between them in a moistened condition, and, as coming primarily within the object of my invention, it relates to machines for grinding the seats and keys of cocks by means of simple and efficient automatic mechanism.

The novelty of my invention will be hereinafter set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1, Sheet 1, is a plan view showing the general arrangement of a quadruple machine embodying my invention, but with several of the parts omitted. Fig. 2, Sheet 2, is an end elevation, partly in section, of one of the grinders. Fig. 3, Sheet 3, is a side elevation of the same with the tail-stock removed. Fig. 4, Sheet 4, is a plan view of the same with the tail-stock removed. Fig. 5, Sheet 4, is a detail elevation of a part of the work-supporting frame. Fig. 6, Sheet 4, is a detail of the transverse bar of the work-supporting frame.

The same letters of reference are used to indicate identical parts in all the figures.

In Fig. 1 I have shown the machine arranged to operate four grinders from a single source of power, and as each grinder is a duplicate of the other it is only necessary in describing this figure to say that A is the driving-pulley, fast upon a horizontal shaft B, suitably journaled in a frame-work midway between and parallel to two beds C C, upon which the head and tail stocks D E, respectively, are secured. On one side of the pulley A is a loose pulley F, and on the other a fly-wheel G, while on its end is a crank-disk H, whose pin *a* (see Fig. 3) is confined in a vertical slot in a head-stock I, from which a rod J projects on each side and is guided in a fixed bearing K. Upon the outer end of each rod is a rack-bar L, guided between the uprights of the head-stock, and having on its under side a rack engaging with a pinion M, whose axis is concentric with each pair of head-stock spindles, and by which they are rotated first in one direction and then in the opposite direction as the rods J are reciprocated by the revolution of the crank-disk H. In Fig. 3 the head-block I is shown provided with a roller *b*, pivoted on its lower end and resting on a flat support *c* to keep the inner ends of the bars J from sagging.

Now, as each head and tail stock constitutes a complete machine and is independent of the others in its action, I would thus describe it, referring to Figs. 2, 3, 4, 5, and 6. Journaled in the uprights *d* is a horizontal shaft N, upon which is keyed or otherwise fastened the pinion M. The shaft N is bored out to receive and form a bearing for another shaft O, which is inserted therein and is held from displacement by a key *e*, inserted through an aperture in the shaft N and projecting into a circumferential groove in the shaft O. The rear end of the shaft O bears against leather or other non-cutting washers *f*, while its forward end is threaded, as at *g*, and has secured to or formed integral with it one half *h* of a clutch. The other half *i* of the clutch is feathered and slides on the shaft N, so that it can be engaged with or disengaged from the half *h*, in a manner to be presently explained. Screwed upon the threaded portion *g* is a cylindrical block P, having its outer end shouldered and threaded, and having a central bore through it communicating with a bore in the shaft O to receive the center-pin Q. A face-plate R is screwed upon the block P and is provided with radially-adjustable jaws *j*. Just behind the face-plate and feathered upon the block P is a frusto-conoidal collar S, forming one half of a friction-clutch, the other half of which is a hub T, journaled upon the block P, and having a frusto-conoidal bore to slip over and become locked to the collar S by friction. A rubber or other elastic facing *k* is applied to either of the faces of this friction-clutch. The hub T, which is the head of the work-carrier, has

two diametrically-projecting arms *l*, from which extend two parallel rods *m n*, whose opposite ends are secured to a transverse bar U, provided with a hub centered and journaled on the tail-stock. A coiled spring *o* upon the tail-stock bears against the bar U and forces back the hub T to keep it disengaged from the collar S, except as presently explained.

The tail-stock E is of the usual construction employed in lathes, and is provided with a screw-adjusted center-pin V.

Before describing the machine any further I will describe the character of the work to be done. We will suppose that it is desired to accurately grind together the seat of an ordinary brass cock W, Fig. 2, and its taper key X. The attritive compound is applied to both seat and key, and the latter is inserted in the cock with the head of the key centered on the pin Q and engaged by the jaws *j* and with its opposite end centered upon the tail-center V. Now it is the office of the machine to rotate the key rapidly backward and forward in its seat, and at the end of each rotation to knock the cock loose from the key and partially turn it, so that as it is forced back on the key they occupy a fresh relative position. This constantly-repeated action of rotating the key backward and forward in its seat and disengaging it and shifting its position effectually grinds the key and its seat, so as to be both air and steam tight.

The cock, in addition to its being held upon the key, is supported by plugs Y, screwed in its ends and engaged by the rods *m n*, to the latter of which one of the plugs is removably secured by a swinging latch *p*, Figs. 2 and 5, pivoted at *q* to a block *r*, secured upon the rod *n*, and which latch swings over the plug and is engaged by a catch *s* upon a sliding block *t* upon the rod *n*. The rear end of the block *t* is perforated to receive a guide-pin *u*, projecting from a block *v*, secured upon the rod *n*, and a coiled spring *w* around said pin holds the block *t* forward, so that its forward end is in contact with the plug, as shown. The rod *m* is likewise provided with the parts *v*, *w*, *u*, and *t*, similarly constructed and arranged, Figs. 2 and 4. It will be observed that the blocks *v* are adjustable on the rods *m n* for the purpose of regulating and adjusting the pressure of the two grinding-surfaces, for by them the tension of the springs *w* is regulated.

A′ is a transverse bar whose ends engage with and are free to slide upon the rods *m n*, and which is held forward by the block *r* and a similar block *a′* upon the rod *m*, so that it engages with the end of the cock W and has a central opening *b′* for the free passage of the head of the key X. I prefer to hinge one side of this opening, as seen at *c′*, Fig. 6, so that it may embrace irregular-shaped keys whose heads are too large to be passed through the opening, and any suitable catch *d′* is employed to hold the hinged side locked.

By reference to Fig. 2 one manner of shifting the half-clutch *i* will be readily understood. Here the half-clutch *i* is provided with a circumferential groove, in which is a ring *e′*, pivoted on each side to the upper end of a yoke *f′* upon the upper end of a pedal-lever B′, pivoted at *g′* to a projection from the frame. A stop-rod C′ engages with the upper end of a spring-projected latch *h′*, guided upon the lever B′, to hold the half-clutch *i* in engagement with the half *h*, and against the tension of a spring *i′*, bearing against the lever B′. When it is desired to disengage the clutch, it is only necessary for the operator to press down the latch *h′* with his foot until its upper end is freed from the bar C′, whereupon the spring *i′* throws the lower part of the lever B′ forward, and so disengages the clutch. It is re-engaged by merely pressing back the lower part of the lever B′, whereupon the latch *h′* becomes re-engaged with the bar C′. Any other suitable means for shifting the clutch, however, may be employed.

Secured around the rear shouldered part of the hub T is a ring D′, to which is pivoted on each side, as at *j′*, a second ring E′, having an upward central extension *k′* and a lower inverted-T-shaped extension *l′*, Figs. 2 and 3. Pins *m′*, projecting from the frame, have their forward ends inserted through perforations in the extremities of the extension *l′*, and then have nuts screwed on them, while coiled springs *n′* surround the pins *m′* and bear against the rear side of extension *l′*.

Secured in a bearing-plate F′ upon the upright *d* is a horizontal slide-bar G′, whose forward end has a knuckle-joint *o′*, normally engaging with the extension *k′* of the ring E′, but which can be turned up by a handle *p′* to a vertical position, as shown by the dotted lines, Fig. 2, whenever it is desired to disengage the bar G′ from the ring E′. The inner end of the bar G′ is V-shaped and projects over the rack-bar L, and has pivoted to it at *q′* a triangular dog H′, normally held back in the position shown in Fig. 4 by a spring *r′*, secured in this instance to a cross-piece I′.

Upon the top of the rack-bar there is secured a double wedge-shaped block J′, which on the outer stroke of the rack-bar merely presses forward the dog H′ against the resistance of the spring *r′*, but which on the return-stroke, owing to the engagement of the edge of the dog with the rear side of the V-shaped end of the bar G′, gives the dog and bar G′ a sharp blow, thereby forcing the latter outward, and, through the medium of the rings E′ and D′, engages the hub T with the clutch-collar S, and, through the medium of the blocks *r a′* and cross-bar A′, knocks the cock loose from the key. During the time that the cock is loose from the key and the clutch S T is in engagement the cock-carrier is given a partial rotation, so that as soon as the block J′ has passed and released the dog H′ the spring *o* is freed and forces the cock

back upon the key through the medium of the blocks *v* and *t* in a different position of adjustment. The travel of the rack-bar is rapid, and the stroke of the bar G′ is almost like a tap of a hammer, so that very slight rotation is imparted to the cock-carrier at each stroke.

It will be seen from the above-described construction that when the rack-bar is being reciprocated the pinion M and shaft N are necessarily rotated first in one direction and then in the other; but if the clutch *h i* is disengaged and the joint *o′* turned up the remaining parts of the machine are at a standstill. By engaging the clutch *h i* the shaft O and its connected parts become locked to the shaft N and partake of its motion. As soon, however, as it is desirable to start the knocker it is only necessary to turn down the joint *o′*, thereby pressing the bar G′ back against the resistance of a spring L′, whose office is to keep the dog H′ out of the path of travel of the block J′ when joint *o′* is turned up, thereby bringing the dog H′ into position to be operated on by the block J′, as before described.

Having thus fully described my invention, I claim—

1. In a grinding-machine, the combination of a backwardly and forwardly revoluble work-carrying spindle for one part of the work and a revoluble supporting-carrier for the other part of the work, substantially as described.

2. In a grinding-machine, the combination of a backwardly and forwardly revoluble work-carrying spindle in two parts connected by a separable clutch for one part of the work and a revoluble supporting-carrier for the other part of the work, substantially as described.

3. In a grinding-machine, the combination of a backwardly and forwardly revoluble work-carrying spindle for one part of the work, a revoluble supporting-carrier for the other part of the work, and means for intermittently disconnecting the two parts of the work and shifting their relative positions, substantially as described.

4. In a grinding-machine, the combination of a backwardly and forwardly revoluble work-carrying spindle for one part of the work, a revoluble supporting-carrier for the other part of the work, a spring for holding the two parts of the work in grinding contact, and means for intermittently disconnecting the two parts of the work and shifting their relative positions, substantially as described.

5. In a grinding-machine, the combination of a backwardly and forwardly revoluble work-carrying spindle for one part of the work, a revoluble supporting-carrier for the other part of the work, having one end supported upon said spindle, a spring for holding the two parts of the work in grinding contact, a clutch for uniting said spindle and carrier, and means for engaging and disengaging said clutch and for disengaging and re-engaging the two parts of the work, substantially as described.

6. In a grinding-machine, the combination of a backwardly and forwardly revoluble spindle for one part of the work, a pinion fast on said spindle, a reciprocating rack-bar engaging said pinion, a supporting-carrier for the other part of the work, having one end supported on said spindle, a spring for holding the two parts of the work in grinding contact, a clutch for uniting said spindle and carrier, and a knocker-bar actuated by said rack-bar to disengage the two parts of the work and to engage said clutch, substantially as described.

7. In a grinding-machine, the combination, with a backwardly and forwardly revoluble work-carrying spindle for one part of the work and a supporting-carrier for the other part of the work, of the pinion M upon said spindle, a reciprocating rack-bar engaging said pinion, wedge-block J′ upon said rack-bar, knocker-rod G′, carrying the dog H′, a clutch S T upon said spindle, and means for communicating the blow of bar G′ to engage said clutch, substantially as described.

8. In a grinding-machine, the combination, with a backwardly and forwardly revoluble work-carrying spindle for one part of the work, of a revoluble work-carrying frame engaging the other part of the work positively on one side and yieldingly on the other side, and means for disengaging the two parts of the work and shifting their relative positions, substantially as described.

9. In a grinding-machine, the combination, with a backwardly and forwardly revoluble work-carrying spindle for one part of the work, of the work-carrying frame for the other part of the work, consisting of the arms *m n*, supported by the transverse bars *l* U, the transverse bar A′, engaging the work carried by the frame on one side, and the spring-projected slides *t*, engaging the work on the opposite side, substantially as described.

10. In a grinding-machine, the work-carrying spindle for one part of the work, consisting of the concentric shafts N O, the latter journaled in the former, and the half-clutch *h*, fast to the shaft O, the half-clutch *i*, feathered and sliding upon the shaft N, and a lever B′, for engaging and disengaging the clutch, substantially as described.

11. In a grinding-machine, the combination, with the clutch-hub T of the work-carrying frame, of the rings D′ E′, extension *k′*, and the knocker-bar G′, provided with knuckle-joint *o′*.

WM. PORTEOUS.

Witnesses:
EDWARD RECTOR,
CHARLES BILLON.