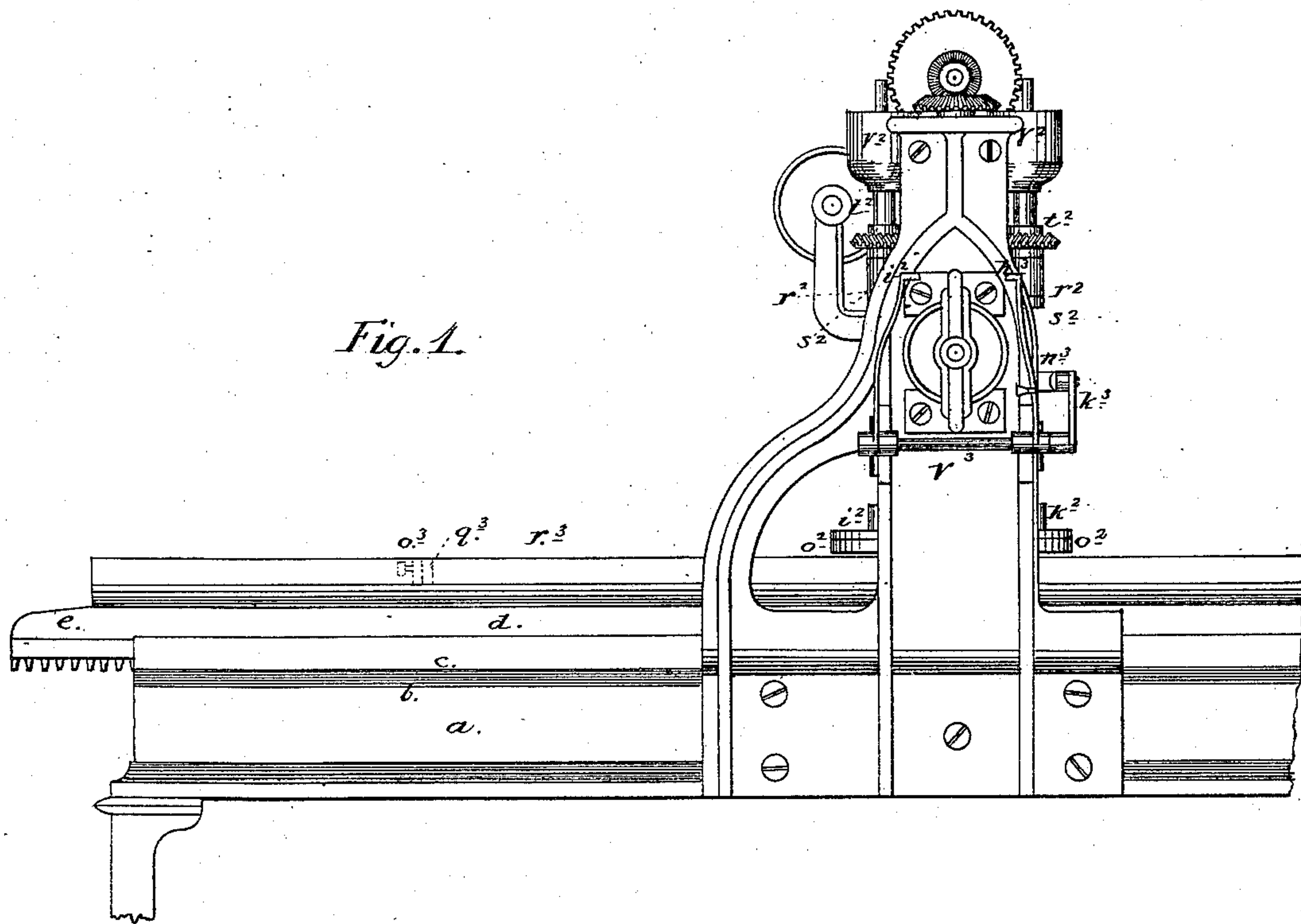


A. HATHAWAY.

Machine for Grinding and Polishing Glass.

No. 127,344.

Patented May 28, 1872.



Attest;

*Oliver Peck
Andrew T. Lewis*

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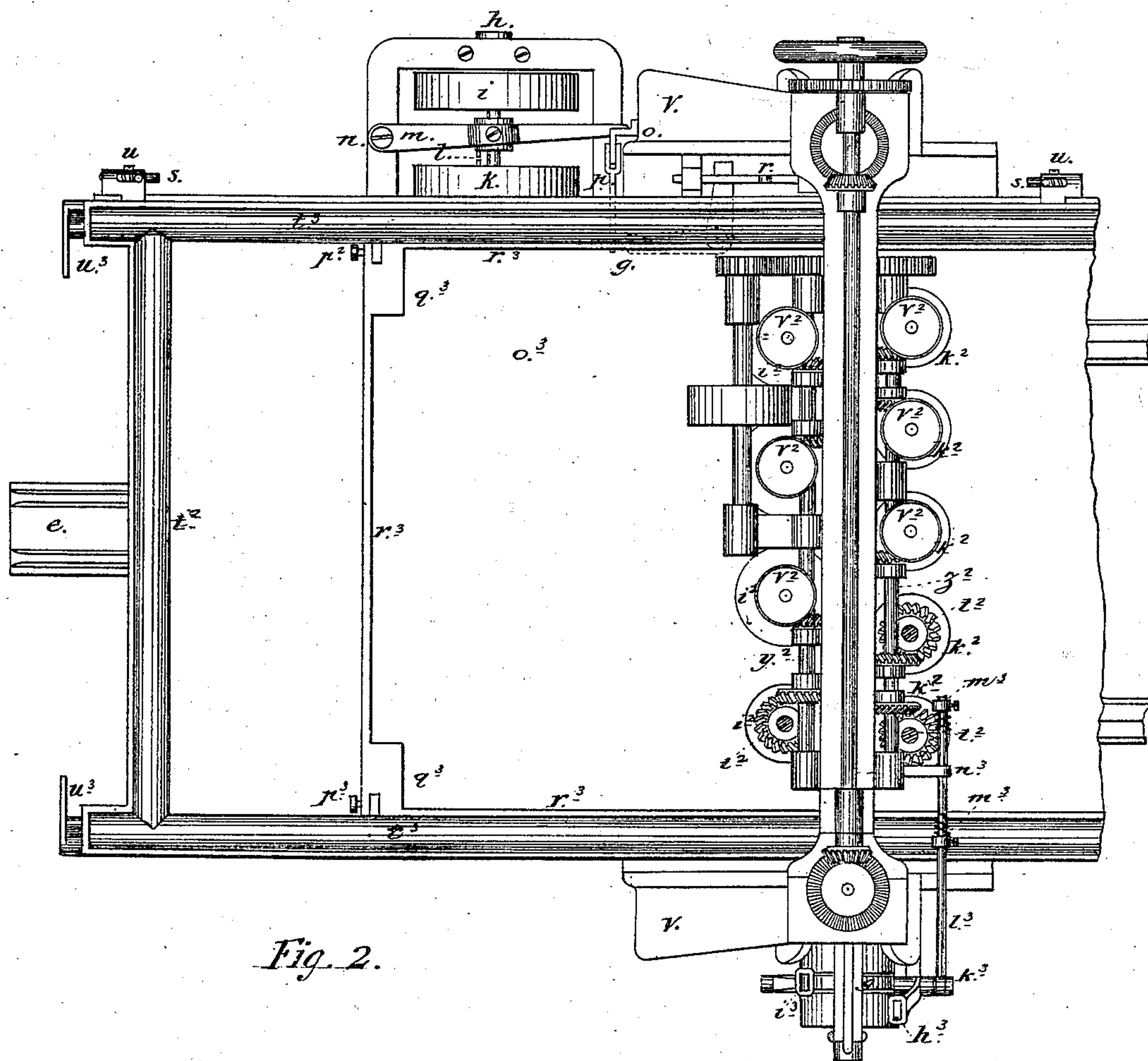


Fig. 2.

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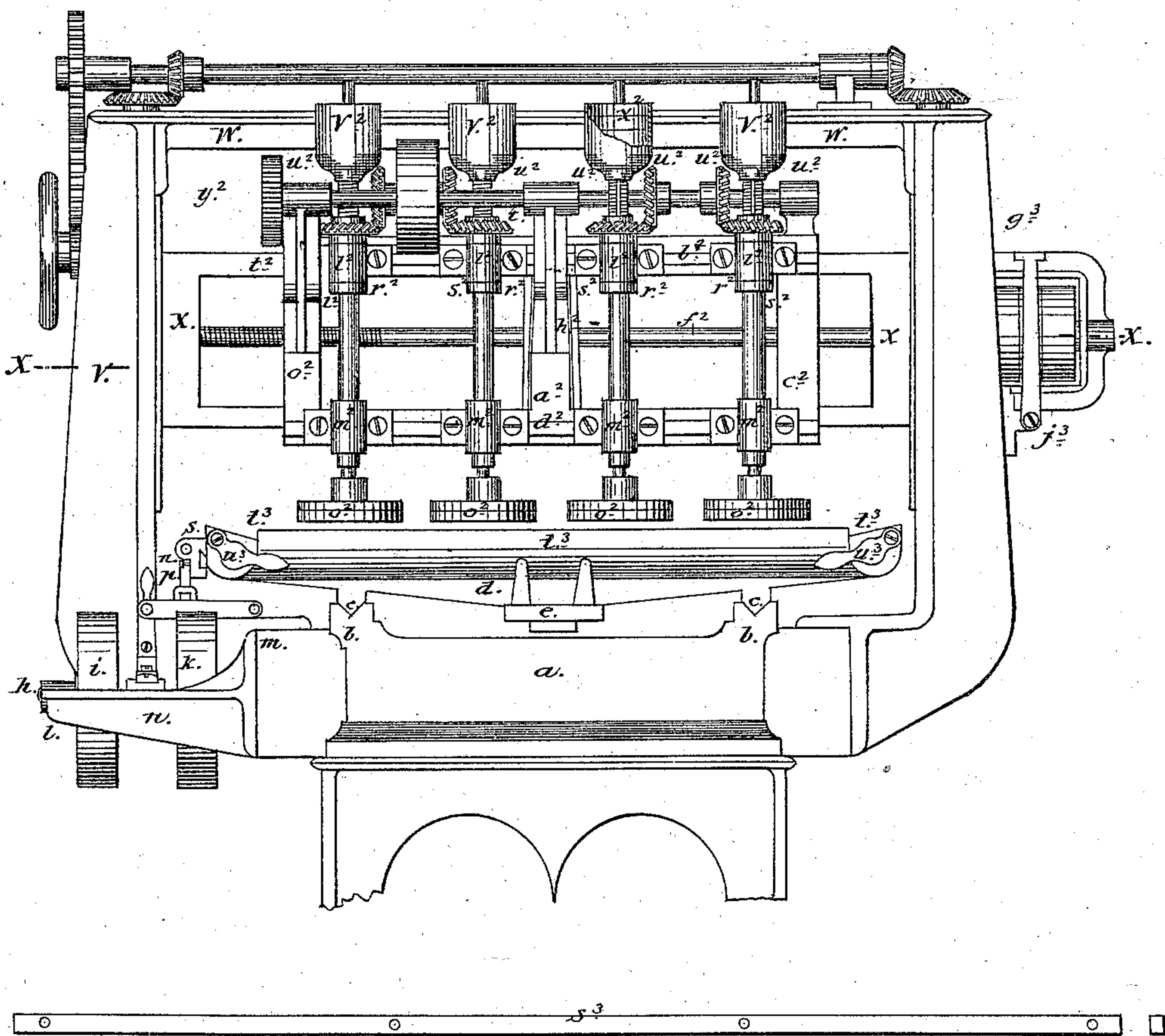
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Fig. 3.



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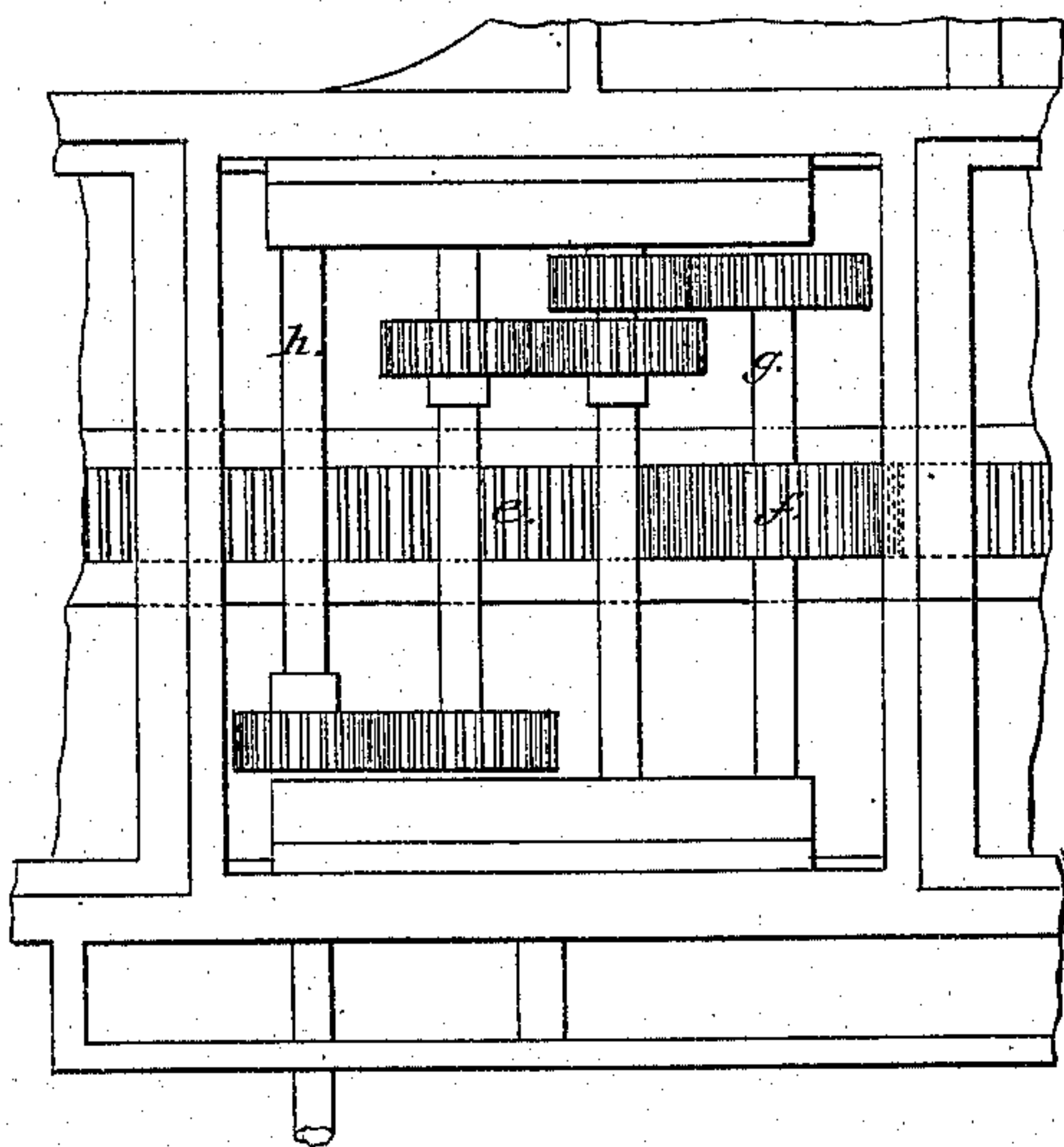


Fig. 5.

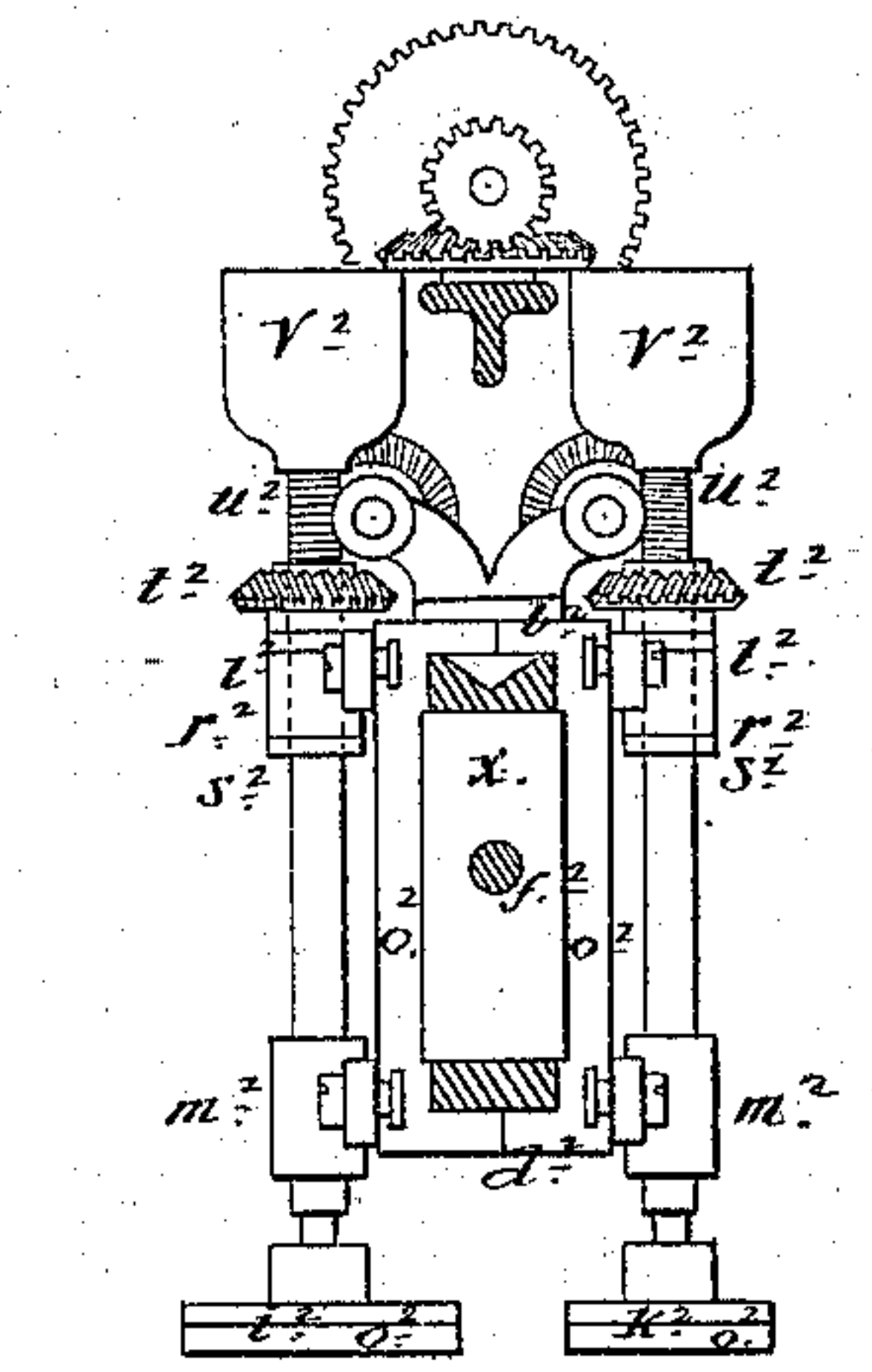


Fig. 7.

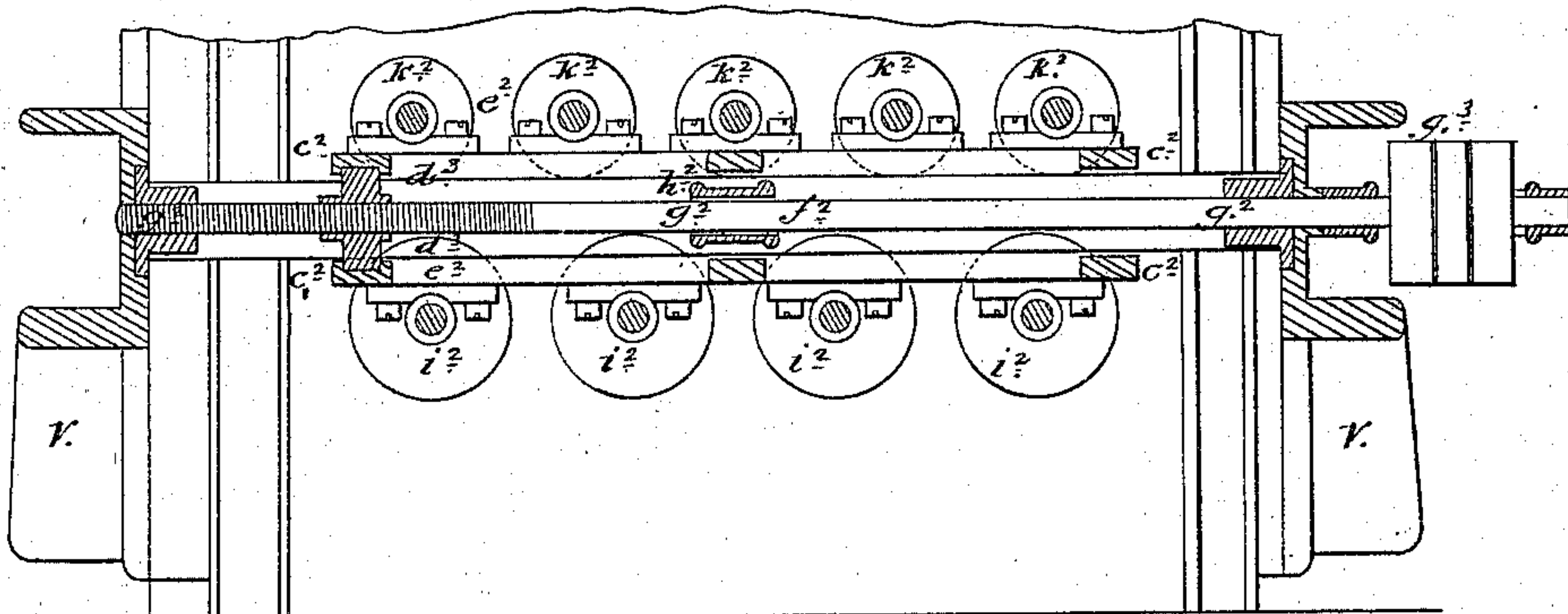


Fig. 6.

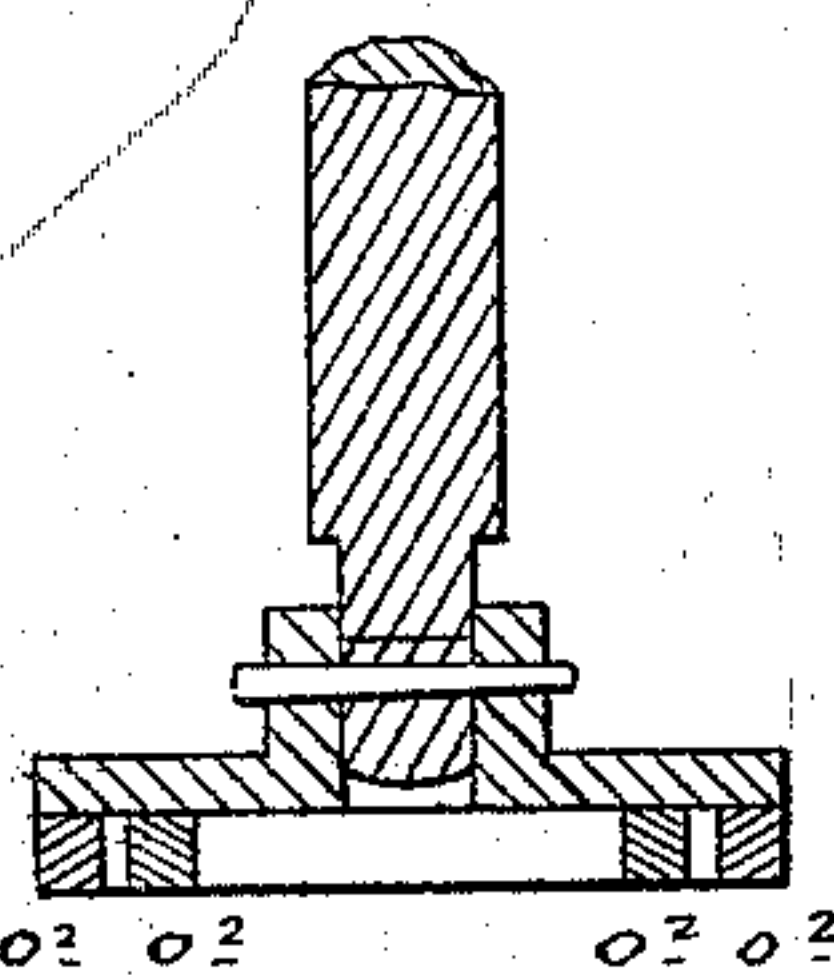


Fig. 4.

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UNITED STATES PATENT OFFICE.

ADDISON HATHAWAY, OF LENOX, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR GRINDING AND POLISHING GLASS.

Specification forming part of Letters Patent No. 127,344, dated May 28, 1872.

To all whom it may concern:

Be it known that I, ADDISON HATHAWAY, of Lenox, in the county of Berkshire and State of Massachusetts, have invented an Improvement in Machines for Fine Grinding and Polishing Glass, Porcelain, Stone, and Metals; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

This invention relates to details of construction and organization of mechanism of that class of machines designed for polishing plates of glass, stone, porcelain, and metal, in which machines there are employed a horizontal and longitudinally-reciprocating plate-supporting table, and a series of rotary and laterally-reciprocating disk-grinders or polishers, each secured to the foot of a vertical spindle, the series polishing the whole surface of the plate as the plate-supporting table reciprocates, one instance of such a machine being shown in Letters Patent No. 79,132, granted to Jonas Kendall and myself, January 23, 1863.

The novel details of my present construction will be described in connection with the drawing, which represents a machine embodying the improvements.

Figure 1 shows the mechanism in side elevation. Fig. 2 is a plan. Fig. 3 is an end view. Fig. 4 is a section of one of the rotary polishers. Fig. 5 shows in under-side view the table-driving gearing. Fig. 6 is a horizontal section on line *xx*. Fig. 7 is a cross-section through the cross slider.

a denotes the stationary frame, having side rails *b*, at the tops of which are the ways or grooves *c*, upon which the work-supporting carriage *d* is supported, and in and over which said carriage reciprocates. On the under side of the carriage *d* is a gear-rack, *e*, into which meshes a gear-wheel, *f*, on a shaft, *g*, which carries a pinion driven through a gear-train from the pulley-shaft *h*, upon which are two loose pulleys, *i* *k*, into connection with each of which is thrown, at proper time, a sliding clutch-sleeve, *l*, (splined to the shaft) accordingly as the carriage is to be fed in one direction or the other. The movement of the sleeve is automatically produced by the movement of the carriage, so that the carriage shall be automatically recip-

rocated, by means of a clutch-lever, *m*, pivoted at *n*, and having its opposite end jointed to one end of a lever, *o*, whose other end is connected by a link, *p*, to one arm of a bent lever, *q*, to which is attached a rod parallel with the rail of the carriage, from which projects a finger, *r*, this finger being in the path of movement of dogs *s*, constructed with springs of metal or other material in such a manner as to receive the force of the moving table against the finger of the lever fastened upon a guide-rail at the side of the carriage *d*, each of said dogs being fastened by a screw, *u*, by loosening which either dog may be slid along the rail and fastened at any desirable position. As the carriage travels in one direction, the dog, advancing toward the finger *r*, strikes the finger and throws the lever-arm forward, carrying the clutch-sleeve out of connection with one pulley and into connection with the other, and thereby reversing the movement of the carriage, the two pulleys having independent belts, which drive them in opposite directions, and the reverse being effected in accordance with the position of the two dogs, so that, whatever may be the length of the plate to be ground and polished, the reciprocating movements of the carriage correspond to such length, this provision for automatic reverse of the movement in the carriage by means of adjustable dogs, which enable the extent of movement of the carriage in each direction to be adjusted to the length of the plate to be ground or polished, constituting one of the features of my invention. Upon the top of the main carriage or table *d* is an auxiliary work or plate-supporting table, *o*³, and this table *o*³ is hinged or pivoted to the carriage *d* by hinge-pins *p*³, passing through ears *q*³ projecting up from the carriage, the pins being, preferably, slid into position, and placed at each edge of the table, so that by withdrawing the two pins at either side the table may be tipped up on the others to facilitate the operation of placing plates in position upon the table and removing them therefrom, and lessening the liability to break such plates, the carriage being fed out so as to bring the tipping-table clear from the grinding mechanism whenever a plate is to be applied or removed.

The bed or surface of the table upon which the plate rests I form of plaster of Paris or

equivalent material, which may be floated onto the table when in semi-liquid or plastic condition, and brought to a plane, the table being made with side and end flanges r^3 , and adjustable bars s^3 , having straight-edged top surfaces to facilitate the application and surfacing of the plaster. This plaster-bed may be readily broken out and renewed whenever it becomes uneven or defaced.

The main table or carriage is made with side and end trough or gutters t^3 , which receive all water and the powder resulting from the grinding and polishing process, rendering it unnecessary to employ conductors under the machine, and preventing accumulation of water beneath the machine, and these troughs are provided with outlet-cocks w^3 , by which the water in the troughs may be drawn off when the machine is not in operation.

Over the main carriage d , and mounted in a frame composed of the two uprights v and the head or cross-beam w , is a vertically-moving carriage, x , each end plate of which slides in vertical ways or bearings in the uprights v , this carriage x supporting the series of rotary spindles, which spindles have at their lower ends the rotary grinding or polishing disks, the carriage being made capable of vertical movements to enable the gang of grinders or polishers to be brought into operative position when the plate is ready, and to be raised when the work is finished, and for introduction of a new plate. The vertical movements of the carriage x and grinders is effected by means of a cross-shaft carrying bevel-pinions, which mesh into and drive bevel-gears at the tops of two vertical screw-shafts, turning in bearings in the uprights v , the screw-threads of said shafts working in nut-threads in the end slides of the carriage, the cross-shaft being actuated by a hand-wheel fixed on said shaft or connected therewith by a gear-train.

In addition to the automatic rotating movements of the grinders, they also have imparted to them a reciprocating lateral movement, to permit of which movement the disk-spindles, instead of being journaled directly in bearings on the vertically-sliding carriage, are journaled in bearings in an auxiliary carriage, a^2 , which is composed of a top rail, b^2 , vertical bars, c^3 , and a bottom rail, d^2 , the top rail sliding on top of the cross-beam of the vertically-moving carriage x . Between the two vertical bars, at one end of the carriage a^2 —which carriage I term a "cross-slider"—is a nut, d^3 , the opposite vertical edges of which extend between lips or flanges e^2 on the inner surfaces of the bars c^2 , these nuts being stationary as relates to the vertical movements of the cross-slider, (the bars sliding upon the nut edges) but moving laterally with the cross-slider or as a part of it.

The slider is moved to and fro laterally by means of a horizontal screw-shaft, f^2 , the thread of which works through the nut d^3 , this screw-shaft rotating in stationary bearings in the uprights v , the shaft running through slots

g^2 , in the end pieces of the carriage x , and in a center strut, h^2 , these slots permitting the said carriage to rise and fall relatively to the shaft, or by means of crank or eccentric motion in place of the screw.

There are two sets of grinding-disks and rings, i^2 k^2 , on opposite sides of the carriage x , the grinders of one set, i^2 , being of greater diameter than those of the other set, k^2 . By making the disks of different diameters, their edges in their work lap or project by each other, and any lines which the edges of either disk may have a tendency to form, are obliterated by the action of the disk or disks, which subsequently work over the same surface. The spindle of each grinder rotates in upper and lower boxes, l^2 m^2 , each of the grinders of each set being made adjustable in position with relation to each other, so that they can be set nearer together or further apart, or to cover a less or greater lateral surface, in accordance with the nature of the work to be produced, or the character or breadth of the plate to be treated. Each grinder is preferably surfaced with a flat-faced steel ring or rings, o^2 , so arranged as to allow the grinder to have a rocking movement and a vertical movement, independent of the spindle. Each spindle, beside its positive rotative movement, is also arranged to slide vertically in its boxes, for which purpose it is splined to a rotary sleeve, r^2 , in one of the boxes, so that while it rotates with such sleeve, it slides vertically in it, the sleeve having flanges s^2 that fit upon the top of the box and keep it in vertical position. Each grinder is kept down by gravity, and the extent of its capability of downward movement may be adjustably regulated by a nut, t^2 , and a screw-thread, u^2 , on the spindle, the nut resting on top of the sleeve, (or upon a gear on said sleeve,) and the spindle and grinder dropping only as far as the position of the nut upon the screw-thread will permit.

To determine and regulate the pressure with which each disk may be forced against the surface of the plate by gravity, I mount upon the top of each spindle a weight-receiving cup, v^2 , made to receive a series of weights, x^2 , the number of which may be increased or diminished, as circumstances may require. The spindles of the two sets of grinders are driven from two horizontal shafts, y^2 z^2 , (geared together by gears a^3 b^3 , and driven by a pinion, c^3 , on a pulley-shaft, d^3 , the pinion meshing into and driving the pinion c^3 ,) each shaft carrying a series of bevel-gears, e^3 , meshing into and driving bevel-gears f^3 , on the rotary splined sleeves r^2 . As the position of the spindles precludes the possibility of bringing the shafts y^2 z^2 into center line with the spindles, each shaft is set as near as can be to the spindles, and the bevel-gears are then made with skew or twist teeth, which enable them to mesh with the teeth of the driving bevel-gears, as well as if in center line with them.

To drive the screw-shaft f^2 , (to impart lat.

eral motion to the cross-slider,) a pulley, g^3 , is fixed on said shaft, and at each side of said pulley is a loose pulley, there being two belts, (an open and a cross belt,) one for each pulley, one of which belts is thrown from one loose pulley onto the center pulley, as the other is thrown from the center or fast pulley onto the other loose pulley—one belt turning the shaft in one direction and feeding the cross-slider and its two sets of grinders across its ways or frame in one direction, and the other belt turning the shaft in the opposite direction to impart a reverse lateral movement to the cross-slider and the grinders.

To make the changes automatically, two shipper arms, h^3 i^3 , are employed, one belt running through a guide at the end of one arm, and the other through a similar guide at the end of the other arm, the two guides being so placed relatively that when either belt is on the fast pulley the other belt is held by its guide on its loose pulley, these arms extending from a rocker-shaft, j^3 , having at its end an arm, k^3 , to which is jointed a rod, l^3 , having on it adjustable stops, m^3 , in contact with one or the other of which a stud, n^3 , projecting from the cross-slider comes, at the extreme of movement of the slide in either direction, such contact moving the stud, (through which the rod extends,) and thereby actuating the shipper-arm, transferring the belts and changing the direction of motion of the cross-slider. The cross-slider is suspended upon the grooved rail or slide-way, by means of its upper slide or cross-piece b^2 , and as the weight rests upon this sliding piece and the rail upon which it slides, the parts in contact must be kept well oiled. Now, as it is injurious to the work for the oil to drop thereupon, provision is made for the retention of the oil between the parts moving in contact, and for this purpose I make the supporting-rail with the groove answering as a guide to the cross-slider, and to keep it in position laterally, and in this groove is placed the lubricating material, which is kept in the top of the rail, (by the grooved construction of the rail,) said groove not extending through the ends of the rail, and serving, therefore, as a reservoir which shall hold enough oil in surplus to insure the lubrication of the parts at all times without the possibility of overflow and dropping of the oil.

Claims.

1. In a glass-grinding-and-polishing ma-

chine, I claim, in combination with the automatically-reciprocating work-supporting carriage, the adjustable slide-dogs s , by change of position of which the extent of movement of the carriage can be varied in accordance with the length of surface to be ground or polished.

2. In combination with the carriage, the auxiliary plate-supporting table o^3 .

3. A hinged plate-supporting table, which may be thrown up at one or either side for reception or removal of the plate, in combination with carriage.

4. A plate-supporting table, the surface of which is formed of plaster or equivalent material, substantially as described.

5. In a glass-grinding-and-polishing machine, the rotary grinder-disks, made adjustable as to lateral position or distance apart.

6. The T-slots in the cross-slider, and the boxes fastened in said slots entering the nut in the groove, loosening the screws, permitting the boxes to be adjusted in position along the groove, substantially as described.

7. The rotary grinding or polishing disks, each made loosely, movable vertically upon or relatively to its spindle.

8. The rotary grinder or polisher disks, each having a grinding surface formed of a flat-faced steel ring or rings.

9. The rotary grinder-spindles, each made adjustable as to the extent of its capability of downward movement.

10. I claim the rotary grinder-spindles arranged with cups and weights for weighting them, as set forth.

11. In combination with each spindle, the rotating sleeve r^2 , that drives the spindle rotatively, but permits its vertical movement.

12. The two sets of rotary grinders or polishing disks made of different diameters, substantially as shown and described.

13. The oil and slider groove in the upper surface of the top rail of the vertical carriage, substantially as shown and described.

14. The laterally-reciprocating cross-slider or frame, hung upon the vertical carriage by a V-groove on the upper bar or rail of the carriage, and a V-slide on the cross-slider.

A. HATHAWAY.

Witnesses:

OLIVER PECK,
ANDREW T. SNOW.