

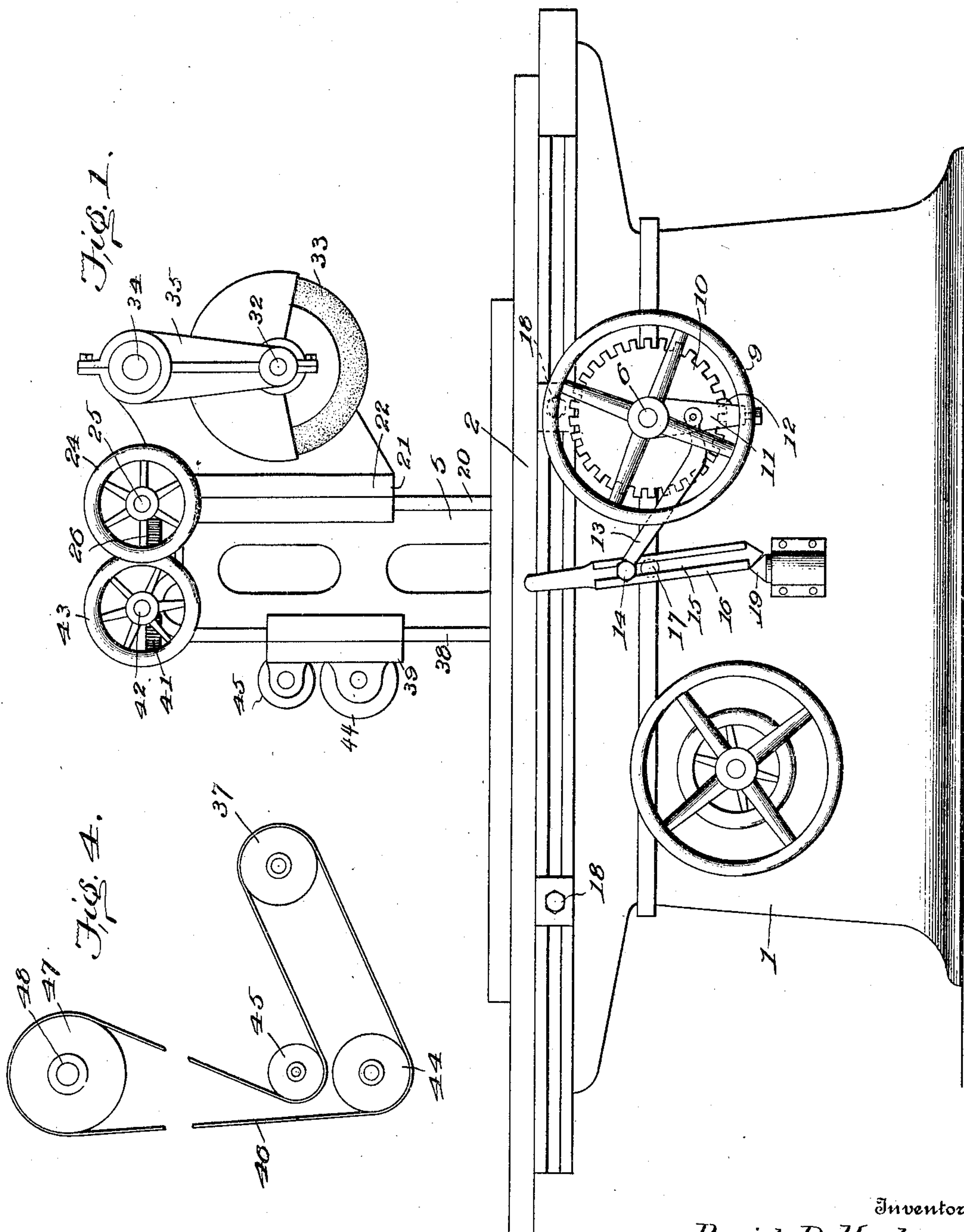
No. 789,737.

PATENTED MAY 16, 1905.

D. B. HYDE.
GRINDING MACHINE.

APPLICATION FILED AUG. 22, 1903.

3 SHEETS—SHEET 1.



Witnesses

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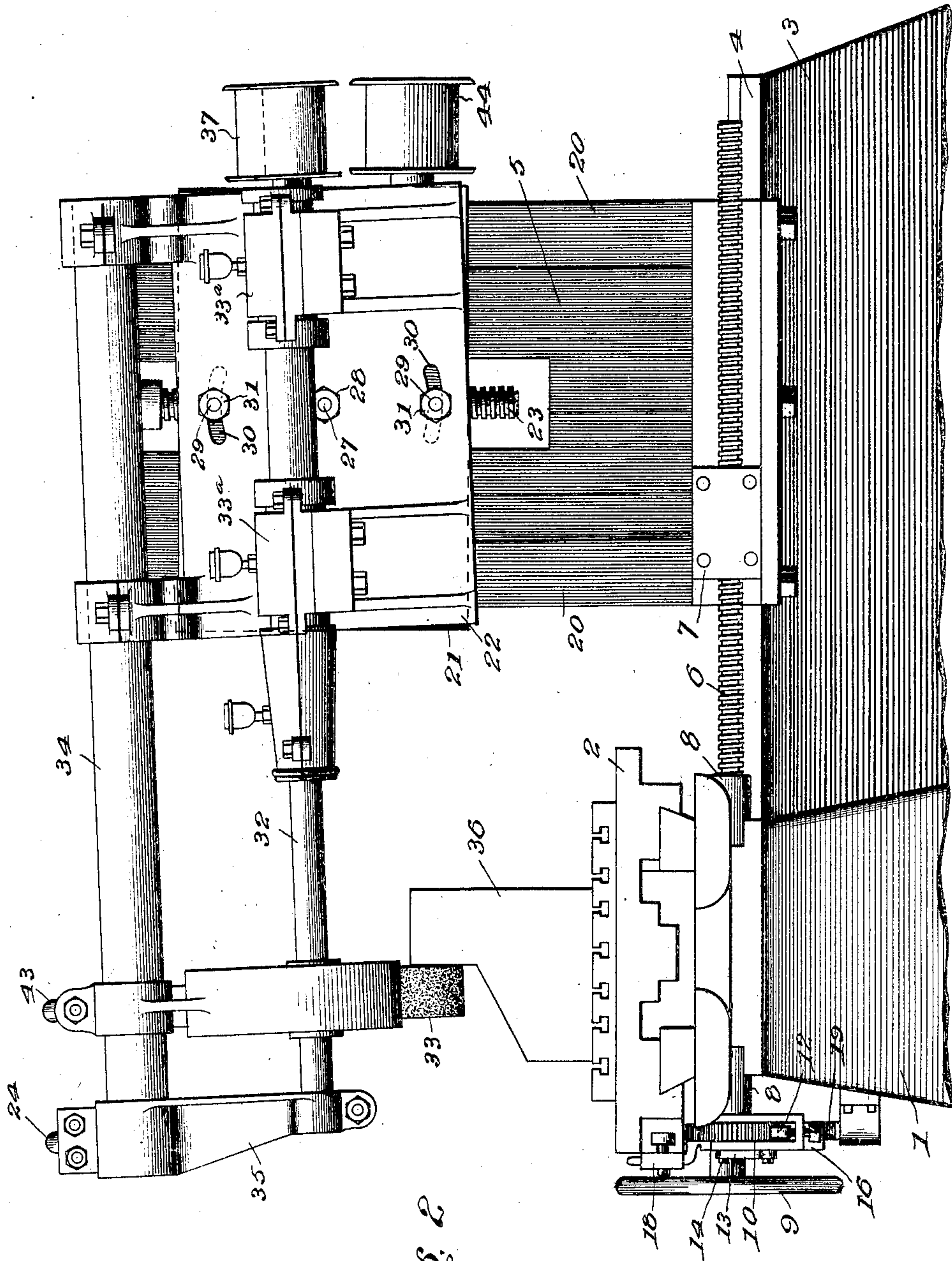


Fig. 2

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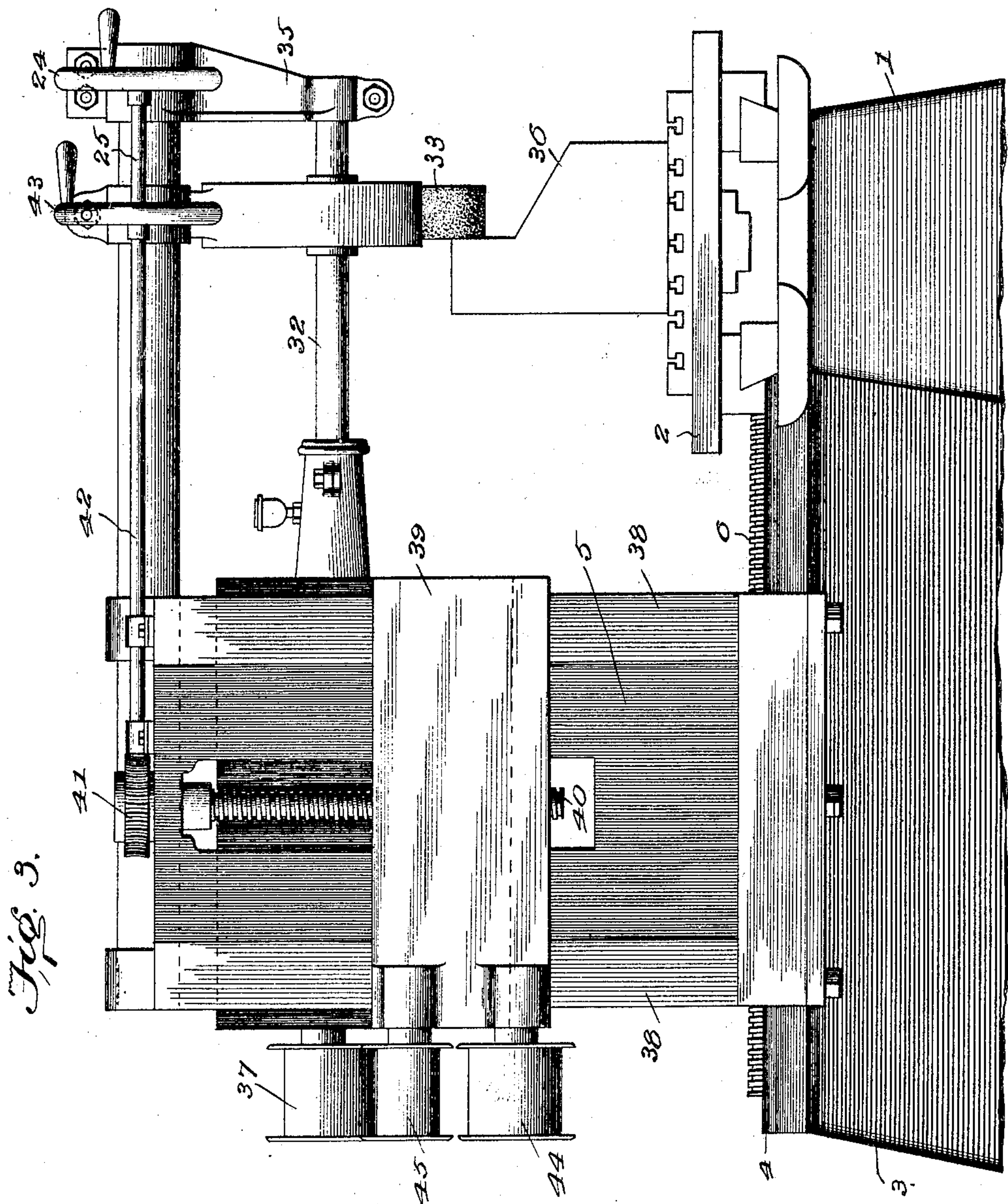
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

DAVID B. HYDE, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE SAFETY EMERY WHEEL COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 789,737, dated May 16, 1905.

Application filed August 22, 1903. Serial No. 170,404.

To all whom it may concern:

Be it known that I, DAVID B. HYDE, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to grinding-machines, and more particularly to that class known as "surface grinders," and has for its object primarily to provide a construction whereby the sides of a piece of work may be ground, as well as the top, without the necessity of re-setting the work.

A further object of the invention is to provide a simple and efficient means for giving any desired tension to the driving-belt, so that the machine may be adapted to the making of heavy cuts.

A still further object of the invention is the provision of an automatic feeding of the grinding-wheel transversely to the line of travel of the work-holding carriage.

To these and other ends the invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of a machine embodying my invention in one form. Fig. 2 is a side elevation showing the grinding-wheel tilted to give clearance thereto. Fig. 3 is a view from the opposite side, showing the grinding-wheel arranged vertically; and Fig. 4 is a detail view illustrating the drive.

In the said drawings, 1 indicates a suitable base, having a work-holding carriage 2 reciprocating thereon, the same being provided with any suitable feed mechanism for imparting to it a traversing movement at right angles to the axis of rotation of the grinding-wheel. The base 1 is provided with a rearward extension 3, having ways 4 thereon at right angles to the line of travel of the carriage 2, and on these ways there is mounted an upright head 5, preferably box-like or hollow in form. This head is adapted to be fed auto-

matically along the ways 4 by means of a feed-screw 6, passing through a suitable nut 7, carried by the head 5. The feed-screw 6 is mounted to rotate without moving longitudinally in suitable bearings 8 on the base 1 and is provided at the front of the machine with a hand-wheel 9, by which it may be operated by hand to adjust the position of the head 5. Provision is also made for an adjustable automatic feed of the head 5 along the ways 4 in either direction. To this end the screw 6 is provided at the front of the machine with a ratchet-wheel 10, secured thereon. An arm 11, hung loosely on the screw 6, is provided with a reversible pawl 12, which may be turned so as to operate the ratchet-wheel in either direction. The arm 11 has pivoted to it one end of a link 13, the other end of which is connected to a pivot-bolt 14, which may be adjusted longitudinally in a slot or way 15 in a lever 16, pivoted on the front of the base 1, the fulcrum of the lever 16 being indicated at 17. The upper end of the lever 16 lies in the path of two adjustable tappets 18, mounted on the carriage 2. The lower end of the lever 16 has located in its path a spring-actuated detent 19, which serves to hold the lever 16 into either one of the two positions into which it is alternately moved by the tappets 18. By this mechanism the head 5 may be fed automatically along the ways 4 in either direction, the direction being controlled either by reversing the pawl 12 or by moving the pivot-bolt 14 to one side or the other of the fulcrum 17 of the lever 16. The extent of the feed may be regulated by the distance from the fulcrum 17 of the pivot-bolt 14 and the time of the feed is controlled by the position to which the tappets 18 are adjusted on the carriage.

The head 5 has on one of its lateral faces vertical ways 20. Upon these ways travels the wheel-carriage, which is composed of two parts, a base 21 and a swiveling table 22. The base 21 fits and travels vertically on the ways 20, being moved thereon by means of a feed-screw 23, mounted in suitable bearings in the head 5, so as to rotate without longitudinal

movement, and passing through a suitable nut carried by the base 21. This feed-screw is adapted to be operated from the front of the machine by means of a hand-wheel 24, mounted
 5 on the front end of a shaft 25, provided at its rear end with a worm meshing with a worm-wheel 26 on the upper end of the feed-screw 23. The table 22 fits against the vertical face of the base 21 and is pivotally connected there-
 10 with by means of a central bolt 27, provided with a clamping-nut 28. Bolts 29 extend from the top and bottom of the base 21 through curved slots 30 in the table 22 and are provided with clamping-nuts 31. The grinding-
 15 wheel shaft 32 is mounted in suitable bearings 33^a, carried by the table 22, and extends out over the work-holding carriage 2, above which it is provided with a grinding-wheel 33, which rotates in a substantially vertical plane
 20 and which has working faces on its periphery and on both of its lateral surfaces. The swiveling table 22 also carries a supporting-arm 34, which carries an end support 35 for the front end of the grinding-wheel shaft 32.

25 In the employment of machines of this character for finishing off the flat surfaces of work of various kinds the surfacing of the top or horizontal surfaces of the work is accomplished with the grinding-wheel shaft 32 in a
 30 horizontal position, as shown in Fig. 3, the work being done by the peripheral surface of the wheel. When it is desired to finish off the lateral or vertical surfaces of the work, it has heretofore been necessary to reset the work
 35 upon the carriage in a position such that these lateral surfaces will stand at such an angle to the vertical as to give the necessary clearance between said surface and the sides of the grinding-wheel with which this portion of the work
 40 is done. If the work is brought flat against the sides of the wheel, as shown in Fig. 3, no proper clearance can be obtained. By the construction which I have devised I avoid the necessity of resetting the work on its carriage,
 45 since by loosening the nuts 28 and 31 the swiveling-table 22 may be turned upon the base 21 so as to cause the wheel 33 to rotate in a plane inclined to the vertical, as shown in Fig. 2, thus giving the necessary clearance without
 50 resetting the work, which latter is represented at 36. It is obvious that for working on the opposite side of the work the angle of inclination of the wheel may be reversed. In whatever position the wheel is adjusted it may be
 55 firmly held by tightening up the nuts 28 and 31. The grinding-wheel thus inclined may be fed up to the work after each cut or traverse of the carriage by the automatic feed hereinbefore described, which moves the head 5 along
 60 the ways 4 at right angles to the direction of travel of the carriage, the depth of each cut being regulated by the mechanism already described.

In order to give the grinding-wheel shaft
 65 sufficient belt-power to permit it to make

heavy cuts, I have provided a tension device by means of which the frictional engagement of the belt with the driving-pulley 37 of the shaft 32 may be regulated. For this purpose
 70 the head 5 is provided on the side opposite to that on which the ways 20 are located with similar vertical ways 38. On these ways there moves vertically a tension-head 39, operated by a feed-screw 40, mounted to rotate with-
 75 out longitudinal movement in suitable bearings in the head 5 and engaging a suitable nut on the head 39. This feed-screw is provided at its upper end with a worm-wheel 41, which meshes with a worm on a shaft 42, ex-
 80 tending to the front of the machine and there provided with a hand-wheel 43, by means of which it is operated. The tension-head 39 is provided at its rear end with an idle pulley 44 of relatively large diameter and a second idle
 85 pulley 45 of relatively small diameter, located above the pulley 44. The relative position of these idle pulleys and the shaft-pulley is illustrated in Fig. 4, in which 46 indicates the driving-belt, and 47 an overhead pulley on
 90 the power-shaft 48. It will be seen that the belt passes first under the small idle pulley 45, and thence around the grinding-shaft pulley 37, and thence under the idle pulley 44, passing thence up around the pulley 47, from
 95 which the power is derived. By adjusting the tension-head 39 downward the tension on the belt may be so increased as to give to the grinding-wheel shaft sufficient belt-power to make heavy cuts, and this adjustment may
 100 be readily made by the operator from the front of the machine.

I do not wish to be understood as limiting myself strictly to the precise details of construction hereinbefore described, and shown
 105 in the accompanying drawings, as the same may obviously be modified without departing from the principle of my invention.

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

1. A grinding-machine of the open-side surface-grinding type, comprising a base, a reciprocating work-holding carriage mounted
 110 on said base, a grinding-wheel located above said carriage, supported from said base wholly at one side of the line of travel of the carriage, whereby unobstructed access to the carriage along one side thereof is provided, said
 115 grinding-wheel rotating on an axis transverse to the line of travel of said carriage, and means for tilting said wheel to vary its plane of revolution, substantially as described.

2. A grinding-machine of the open-side surface-grinding type, comprising a base having
 120 ways extending longitudinally thereof, and other ways arranged laterally with respect to the first-mentioned ways and at right angles thereto, a work-holding carriage reciprocating on the first-mentioned set of ways, an up-
 125 right head reciprocating on the other set of

ways, a shaft projecting from said head transversely over the carriage and provided with a grinding-wheel above said carriage, and means for adjusting said shaft angularly in a vertical plane relatively to its supporting-head, substantially as described.

3. A grinding-machine comprising a reciprocating work-holding carriage, a head movable at right angles to the line of travel of said carriage and provided with a grinding-wheel located above said carriage, said wheel having peripheral and lateral grinding-surfaces, means for tilting said wheel on either side of a vertical plane, and feed mechanism for feeding said head and wheel transversely with respect to the carriage in either direction, substantially as described.

4. A grinding-machine comprising a reciprocating work-holding carriage, an upright head located adjacent thereto and provided with vertical ways, a wheel-carriage vertically adjustable on said ways, and a shaft mounted on said wheel-carriage and provided with a grinding-wheel located above the work-holding carriage, substantially as described.

5. A grinding-machine comprising a base having ways thereon at right angles to each other, a reciprocating work-holding carriage mounted on one set of ways, an upright head mounted on the other set of ways, and itself provided with vertical ways, feeding mechanism for moving said head on its ways, a wheel-carriage vertically adjustable on the vertical ways of the head, and a shaft carried by said wheel and provided with a grinding-wheel located above the work-holding carriage, substantially as described.

6. A grinding-machine comprising a reciprocating work-holding carriage, an upright head provided with vertical ways, a wheel-carriage mounted on said ways and comprising a base fitting thereon, and a swiveling table mounted on the base and adjustable thereon around a horizontal axis, and a shaft carried by said table and provided with a grinding-wheel located above the work-holding carriage, substantially as described.

7. In a grinding-machine, the combination, with a reciprocating work-holding carriage, of a head movable transversely relatively thereto and provided with a grinding-wheel located above said carriage, means for impart-

ing to said head and wheel a variable step-by-step feed, and means for correspondingly varying the tension of the driving-belt of said wheel, substantially as described.

8. In a grinding-machine, the combination, with a reciprocating work-holding carriage, of a head located at the rear of said carriage, movable toward and from the same, and provided with a grinding-wheel located above said carriage, feeding mechanism for said head comprising means for varying the extent of each feeding step, said means being controlled from the front of the carriage, and means also controlled from the front of the carriage for correspondingly varying the tension of the grinding-wheel driving-belt, substantially as described.

9. In a grinding-machine, the combination, with a reciprocating work-holding carriage, of an upright head located adjacent thereto and having vertical ways on its opposite sides, a wheel-carriage vertically adjustable on the ways on one side of said head and provided with a shaft having a grinding-wheel and a belt-pulley, and a tension-head vertically adjustable upon the ways on the other side of said head and having idle pulleys around which the driving-belt of the grinding-wheel shaft passes, substantially as described.

10. In a grinding-machine, the combination, with a base having transverse ways at its front, and ways extending rearwardly therefrom, of a work-holding carriage mounted on the first-mentioned ways, an upright head mounted on the rearwardly-extending ways, said head having vertical ways on its opposite sides, a wheel-carriage vertically movable on the ways on one side of said head and having a shaft provided with a grinding-wheel and driving-pulley, a tension-head vertically movable on the ways on the opposite side of said head and having idle pulleys, and means controlled from the front of the machine for independently adjusting said wheel-carriage and tension-head on their ways, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID B. HYDE.

Witnesses:

GERTRUDE YOUNG,
F. W. SCHAEFER.