

No. 677,276.

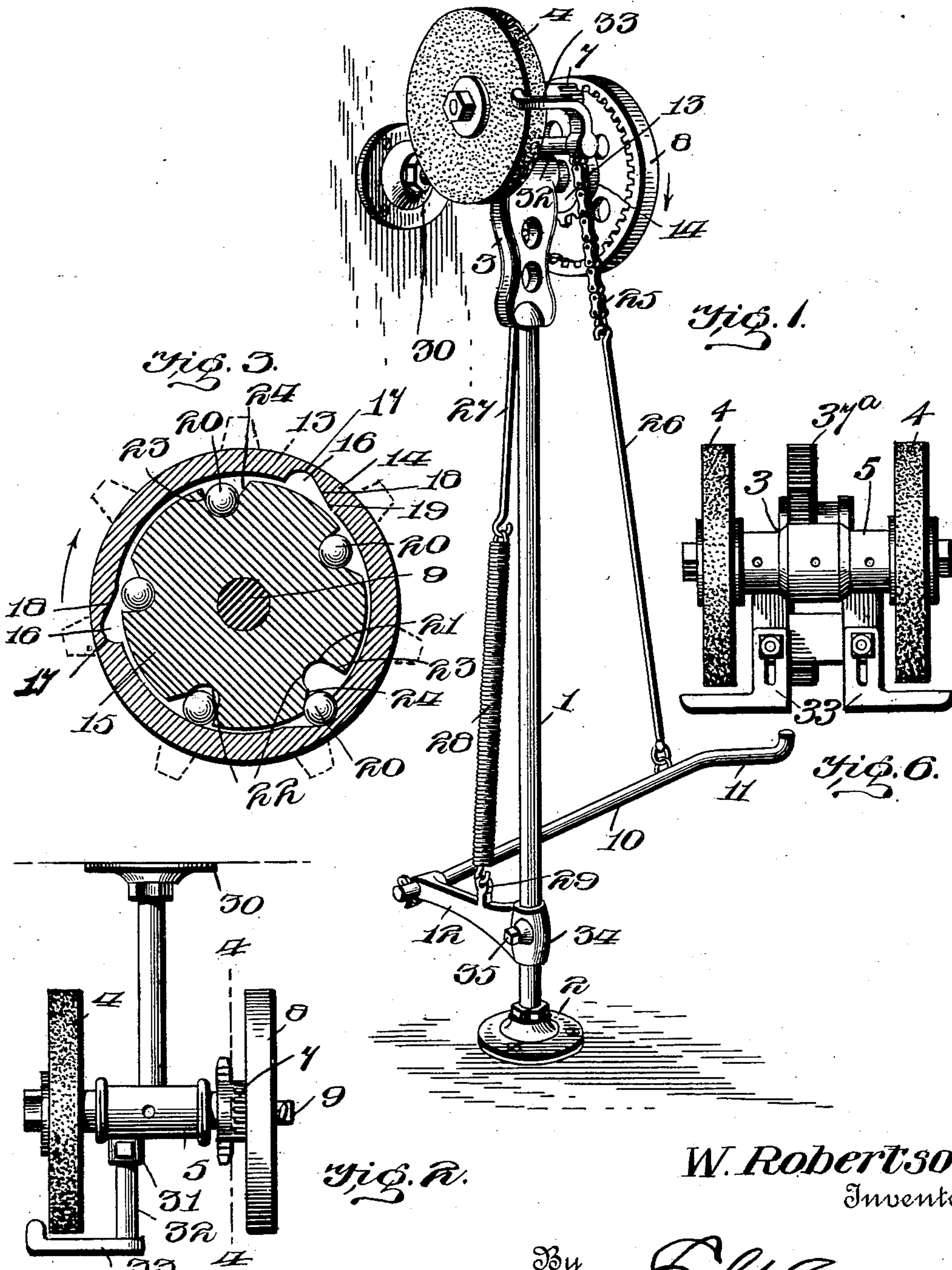
Patented June 25, 1901.

W. ROBERTSON.  
GRINDING MACHINE.

(Application filed Dec. 24, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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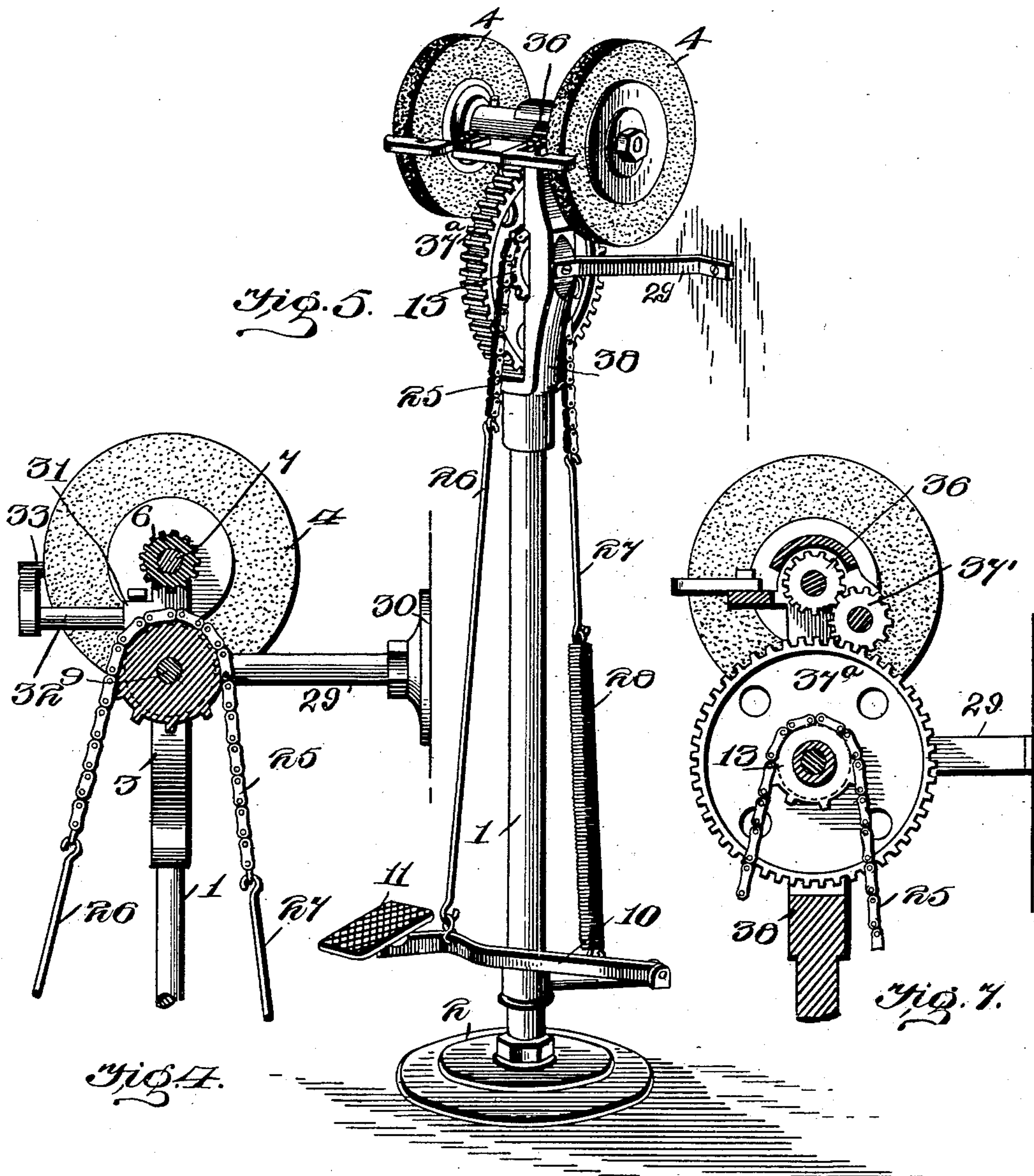
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# UNITED STATES PATENT OFFICE.

WILLIAM ROBERTSON, OF BUFFALO, NEW YORK, ASSIGNOR TO WILLIAM  
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## GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 677,276, dated June 25, 1901.

Application filed December 24, 1900. Serial No. 40,966. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ROBERTSON, a subject of the Queen of Great Britain, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Grinding-Machine, of which the following is a specification.

My present invention relates to a novel grinding-machine of simple yet durable construction and designed particularly for tool or other light grinding—as, for instance, in bicycle, hardware, stove, plumbing, carpenter, or general repair shops, or by various classes of artisans requiring a light, convenient, and easy-running grinder for drills, castings, machine parts, knives, scissors, &c.

One object of the invention is to produce a light inexpensive grinder capable of being operated at a high rate of speed by foot-power and without the interposition of belts or other forms of gearing liable to slip and to be rendered inefficient in a comparatively short space of time.

A further object of the invention is to equip the device with means whereby it may be quickly and rigidly mounted in place and with a novel form of effective light-running gearing disposed intermediate of the treadle and emery wheel or wheels.

Further and subordinate objects of the invention will hereinafter appear as the necessity for their accomplishment is developed in the succeeding description of the preferred embodiments of the invention, which I have illustrated in the accompanying drawings and defined in the appended claims.

In said drawings, Figure 1 is a perspective view of what is perhaps the preferred embodiment of the invention. Fig. 2 is a top plan view thereof. Fig. 3 is a detail sectional view illustrating the clutch mechanism. Fig. 4 is a vertical sectional view on the line 4 4 of Fig. 2 with the lower portion of the machine broken away. Fig. 5 is a perspective view of another form of the invention, in which are employed a pair of emery-wheels and a somewhat different form of gearing. Fig. 6 is a top plan view of the subject-matter of Fig. 5, and Fig. 7 is a central vertical section through the upper portion thereof.

Referring more particularly to the con-

struction illustrated in Figs. 1 to 4, 1 indicates a standard having a base 2, designed to be screwed or otherwise secured to the floor to constitute a stand for the support of a head-frame 3, carried at the upper end of the standard 1 and upon which are grouped an emery or other grinding wheel 4 and suitable gearing for transmitting motion thereto. At its upper end the head-frame 3 is formed with a tubular bearing 5, within which is journaled the horizontal wheel-shaft 7 of the emery-wheel 4. At the end of the wheel-shaft opposite the emery or other grinding wheel is fixed a comparatively small pinion 6, meshing with the teeth of the internal gear-wheel 8, revolvably supported upon a stud-shaft 9, extending from one side of the head-frame or casting 3. The emery-wheel 4 and the gear-wheel 8 being mounted at opposite sides of the head-frame serve to counterbalance each other and to prevent such lateral vibration of the device as might result from a less advantageous arrangement of these parts. The wheel 8 is designed to be driven by the oscillation of a treadle 10, having a foot-rest 11 at one end and connected at its opposite extremity to the end of a treadle-supporting bracket or arm 12, extending laterally from the standard 1, adjacent to its base. It is therefore necessary to provide intermittently-active driving mechanism intermediate of the treadle and gear in order that the oscillatory movement of the former may be converted into the rotary movement of the latter to permit the operator by an easy natural movement of the foot to drive the grinding-wheel at a high rate of speed, approximately three thousand revolutions a minute being possible in a machine of this character. This driving mechanism comprehends a sprocket-wheel 13, loosely mounted upon the stud-shaft 9 and of the usual cup form to define a clutch-ring 14, encircling the clutch-hub 15, extending from one side face to the gear 8.

The internal face of the sprocket, or, more properly, of the clutch-ring 14, is provided with a series of pockets 16, preferably three in number, having one side face 17 somewhat abruptly curved and the other, 18, gradually inclined, as best shown in Fig. 3 of the drawings. The pockets 16 are designed for the re-



ception, under certain conditions, of clutch-balls 20, preferably, though not necessarily, five in number, retained in peripheral pockets 21 in the hub 15. The pockets 21 in the hub are of sufficient depth to permit a ball resting in the bottom thereof to lie wholly inside of the ring 14, and their bottom walls 22 are of semicircular form, as shown, to permit the balls to rest snugly within the pockets while passing through that arc of their travel which does not subject them to outward movement under the force of gravity. One side wall 23 of each pocket 21 is disposed radially with respect to the axis of the hub; but the other side wall is inclined, as shown, to form a shoulder against which the ball is carried by the sprocket when said ball gravitates into one of the pockets 16 and is propelled by the abrupt face 17 thereof. Thus it will appear that when the sprocket is driven in the direction of the arrow in Fig. 3 any one of the balls 20 which happens to be in position to gravitate from its seat in the hub will be caught within an advancing pocket 16 of the clutch-ring and being urged against the contiguous inclined face or shoulder 24 of the hub will constitute an effective connection or clutch between the sprocket and the internal or driving gear 8. This effective or active connection will continue until the direction of rotation of the sprocket is reversed or until the gear-wheel moves with greater velocity than the sprocket. In either of these events the ball will either drop back into its pocket in the hub by gravity or, if it happens to be below the axis of the stud-shaft, the radial wall 23 of its pocket will strike the ball and cause it to move up the incline face 19 of the pocket in the clutch-ring until it moves to a position inside of the face of the hub, the result in each instance being the disconnection or unclutching of the sprocket from the gear.

The operative connection between the sprocket and treadle is preferably effected by passing a chain 25 over the sprocket and by attaching to the opposite ends thereof a pair of connecting rods or links 26 and 27, the former being loosely attached to the treadle 10 adjacent to the foot-rest 11 and the latter being attached at its lower end to the upper extremity of a reactive member—as, for instance, a stout spiral spring 28, attached at its lower end to a lug 29, upstanding from the treadle bracket or arm 12. It will now appear that the oscillation of the treadle by an easy natural movement of the foot will effect the alternate rotation of the sprocket 13 in opposite directions, the return movement of the treadle being effected by means of the spring 28. The effect of this will be, as we have seen, to rotate the gear 8 continuously in the direction of the arrow in Fig. 1, the momentum obtained by the gear and its connected parts serving to continue the movement thereof during the return or inactive movement of the sprocket. Thus the grinding-wheel is caused to revolve at a high rate

of speed—for instance, between two and three thousand revolutions per minute—and in order to prevent any vibration of the machine which might be occasioned at this high speed I prefer to employ a side brace or wall-bracket 29, connected to the head-frame 3 at its center and preferably in the horizontal plane of the stud-shaft 9, but at right angles thereto. This bracket or brace comprises a metal rod or tube, as best shown in Fig. 2 of the drawings, attached at its outer end to a foot or plate 30, screwed to the wall, as shown in Fig. 1. At the side opposite the wall-bracket the head-frame is provided with a socket 31 for the reception of the arm 32 of the tool-rest 33, which latter may be of any desired form and extends, as shown, adjacent to the periphery of the driving-wheel in order that the tool or other object being sharpened may be held firmly against the grinding-surface. I have also found it desirable to provide means for regulating the tension of the spring 28 in order to compensate for stretching of the latter, and also to permit the resistance opposed to the movement of the treadle to be regulated to suit the convenience of the individual user. The desired end may be attained in a variety of ways; but a simple and convenient means for accomplishing this end, as shown in Fig. 1, is to make the arm 12 vertically adjustable on the standard 1 by providing it with a tubular sleeve or socket 34, encircling the standard and retained in any desired position thereon by means of an abutment-screw 35, passed through the wall of the sleeve and bearing against the standard.

In the construction illustrated in Figs. 5 to 7 I have shown a possible variation of the device illustrated in the preceding figures, the difference residing in the employment of a pair of grinding-wheels mounted upon the wheel-shaft, which in this instance instead of being provided with the pinions 7 at one end thereof is fitted with a pinion 36 at its center, geared, through an intermediate pinion 37', to an ordinary spur gear-wheel 37<sup>a</sup>, located within a somewhat modified form of head-frame 38, but operated in precisely the same manner as the gear 8.

Attention is called to the fact that in both of the illustrated embodiments of the invention a pair of wheels are disposed at opposite sides of the head-frame in counterbalancing relation with the driving mechanism interposed between them and that in both cases the tension of the spring is regulated by means of a bracket adjustably mounted upon the standard.

From the foregoing it will appear that I have produced a simple, durable, and efficient high-speed grinding-machine constructed in a manner to permit of its being quickly and rigidly mounted for use and equipped with a novel form of positive driving mechanism for imparting a rotative speed to the grinding wheel or wheels from an easily-operated treadle; but while the illustrated em-



bodiments of my invention are believed at this time to be preferable I desire to reserve the right to effect such changes, modifications, and variations as may be suggested by experience and experiment, so long as they do not constitute a departure from the spirit of the invention. For instance, I have described the machine as being specially designed for the grinding of tools and the like; but it is evident that by reason of the high rate of speed which may be attained it may be employed with equal facility for buffing or other similar operations which merely necessitate the employment of a different character of operating-wheel.

What I claim is—

1. In a machine of the character described, the combination with a single standard and base, of a head-frame carried by the standard at its upper end, an operating-wheel revolvably supported upon the head-frame at one side thereof, a driving gear-wheel geared to the operating-wheel and located at the opposite side of the head-frame, a driving-sprocket having clutch means for effecting its engagement with the gear-wheel when rotated in one direction, a sprocket-chain engaging the sprocket, and a treadle and reactive device operatively connected to the opposite ends of the chain to urge the latter in opposite directions and thereby impart continuous rotary movement in one direction to the operating-wheel.

2. A machine of the character described, comprising a standard, a head-frame supported upon the upper end of the standard, a wall-bracket extending from the head-frame and arranged for attachment to a wall, an operating-wheel mounted upon the head-frame, and driving mechanism for said wheel, said standard and wall-bracket being disposed for engagement with the floor and wall, respectively, to prevent vibration of the upper end of the standard when the mechanism is operated at a high rate of speed.

3. In a machine of the character described, the combination with a standard having a base at one end and a head-frame at its opposite end, of a wall-bracket extended from the head-frame at right angles to the standard, a wheel-shaft journaled in the head-frame, an operating-wheel carried by said shaft, a driving gear-wheel geared to the wheel-shaft and having its axis approximately in the horizontal plane of the wall-bracket, a driving-sprocket provided with clutch means for engaging the driving gear-wheel, a treadle disposed adjacent to the lower end of the standard, and a sprocket-chain engaging the sprocket and operatively connected to the treadle.

4. In a machine of the character described, the combination with a standard, base and head-frame, of an operating-wheel carried by the head-frame, a driving-sprocket also carried by the head-frame, gearing intermediate of the sprocket and operating-wheel, clutch mechanism disposed to connect the sprocket

with the gearing when the former is rotated in one direction, a chain engaging the sprocket, a treadle-supporting bracket adjustably mounted on the standard, and a treadle and reactive device both carried by the treadle-supporting bracket and connected, respectively with the opposite ends of the chain.

5. In a machine of the character described, the combination with a standard, a base located at one end of the standard, a head-frame located at the opposite end thereof and a laterally-disposed wall-bracket extending from the head-frame, of a laterally-disposed treadle-support located at the lower end of the standard, a treadle connected to said support, a spring secured at its lower end adjacent to the lower end of the standard, an operating-wheel and a driving gear-wheel located at opposite sides of the head-frame and operatively related, a driving-sprocket having clutch means for engaging the driving gear-wheel, and a sprocket-chain engaging said sprocket and operatively connected at its opposite ends with the spring and treadle, respectively.

6. In a machine of the character described, the combination with a standard, base and head-frame, of an operating-wheel carried by the head-frame, a driving-sprocket also carried by the head-frame, gearing intermediate of the sprocket and operating-wheel, clutch mechanism disposed to connect the sprocket to the gearing when the former is rotated in one direction, a chain engaging the sprocket, a bracket having relative adjustment with respect to the standard, a reactive device connected to said bracket and having operative connection with one end of the chain, and a treadle having an operative connection with the opposite end of the chain.

7. In a machine of the character described, the combination with a standard, a base located at one end of the standard, a head-frame located at the opposite end thereof, and a laterally-disposed wall-bracket extending from the head-frame, of a laterally-disposed treadle-support located at the lower end of the standard, a treadle connected to said support, a spring secured at its lower end adjacent to the lower end of the standard, a wheel-shaft mounted in the head-frame, an operating-wheel and a pinion mounted upon the opposite ends of the wheel-shaft, a stud-shaft extending from the head-frame below the wheel-shaft at the side opposite the operating-wheel, an internal gear-wheel mounted upon the stud-shaft and meshing with the pinion, a driving-sprocket loosely mounted on the stud-shaft and having clutch means for engaging the internal gear-wheel, and a sprocket-chain engaging said sprocket and having operative connection at its opposite ends with the spring and treadle, respectively.

8. In a machine of the character described, the combination with a standard having supporting means at one end, and a head-frame at its opposite end, of a wall-bracket ex-



tended from the head-frame at an angle to the standard, a wheel-shaft journaled in the head-frame, an operating-wheel carried by the wheel-shaft, a driving-wheel having its  
5 axis approximately in the horizontal plane of the wall-bracket, gearing intermediate of the driving-wheel and wheel-shaft, a treadle disposed adjacent to the lower end of the standard, and means for operatively connecting  
10 the treadle with the driving-wheel.

9. In combination with a single standard, means for supporting the same at its lower end in an upright position, a head-frame at its upper end, a wall-bracket for retaining  
15 the head-frame, a pair of wheels disposed in counterbalancing relation at opposite sides of the head-frame and operatively related, a treadle, and means for operatively connecting the treadle with said wheels.

20 10. In combination with a single standard, means for supporting the same at its lower end in an upright position, a head-frame at its upper end, a wall-bracket retaining the head-frame, a pair of wheels disposed in counterbalancing relation at opposite sides of the  
25

head-frame, driving mechanism disposed intermediate of the wheels, and a treadle operatively connected with the driving mechanism.

11. In a machine of the character described, the combination with a standard having supporting means at one end, and a head-frame at its opposite end, of a wall-bracket extended from the head-frame at an angle to the standard, a wheel-shaft journaled in the head-frame, an operating-wheel carried by the  
35 wheel-shaft, a driving-wheel having its axis approximately in the horizontal plane of the wall-bracket, gearing intermediate of the driving-wheel and wheel-shaft, a treadle disposed adjacent to the lower end of the standard, means for operatively connecting the  
40 treadle with the driving-wheel, and reactive means for urging the treadle in one direction.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in  
45 the presence of two witnesses.

WILLIAM ROBERTSON.

Witnesses:

ARTHUR B. CLARK,  
C. E. SCHINTZSPAHN.