(No Model.) 3 Sheets—Sheet 1.

G. H. DYER.

GRINDING AND POLISHING DEVICE.

No. 602,213. Patented Apr. 12, 1898.

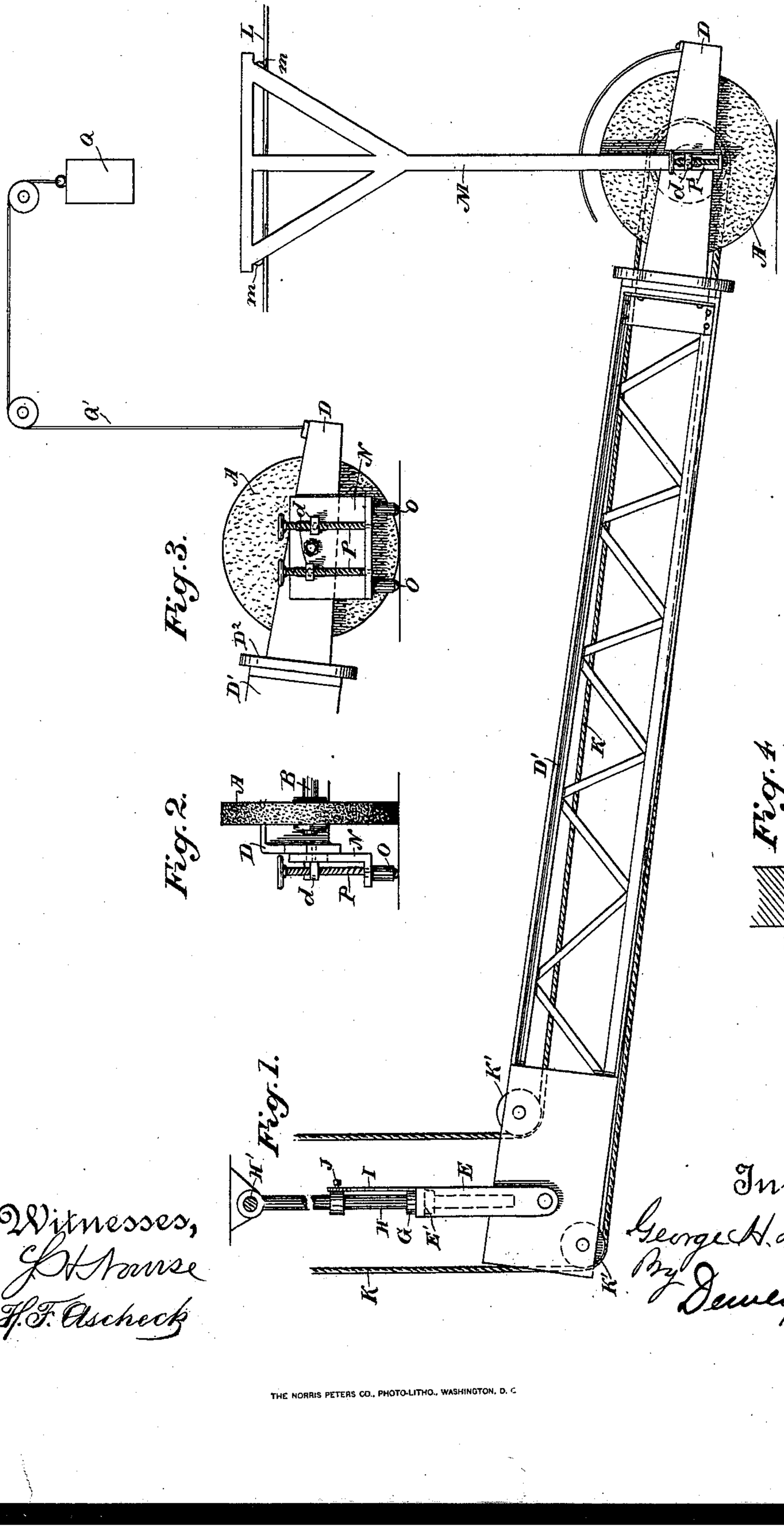

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 5.

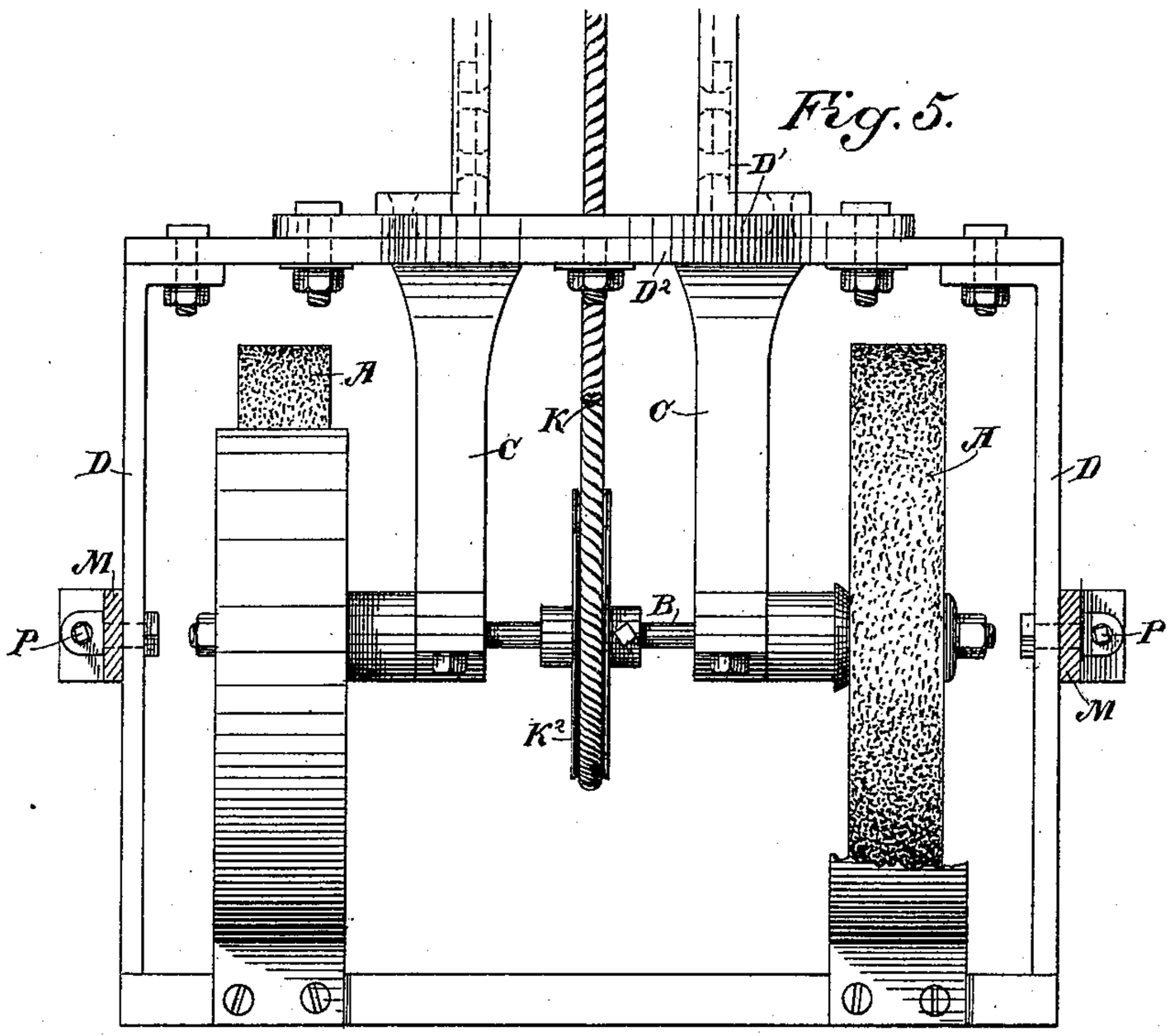


Fig. 6.

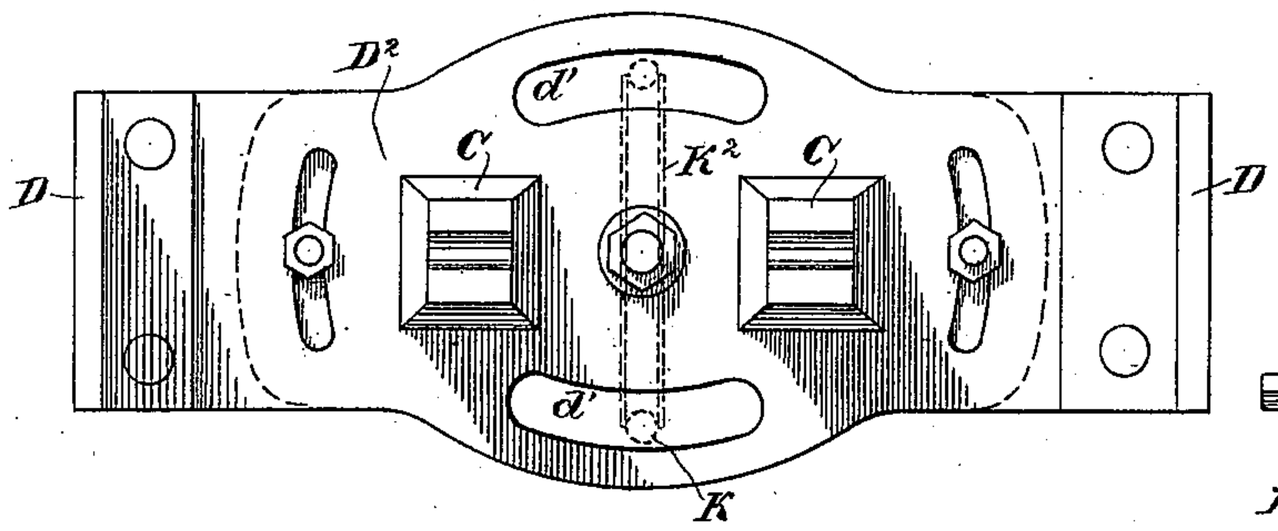


Fig. 9.

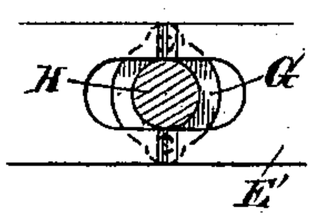


Fig. 7.

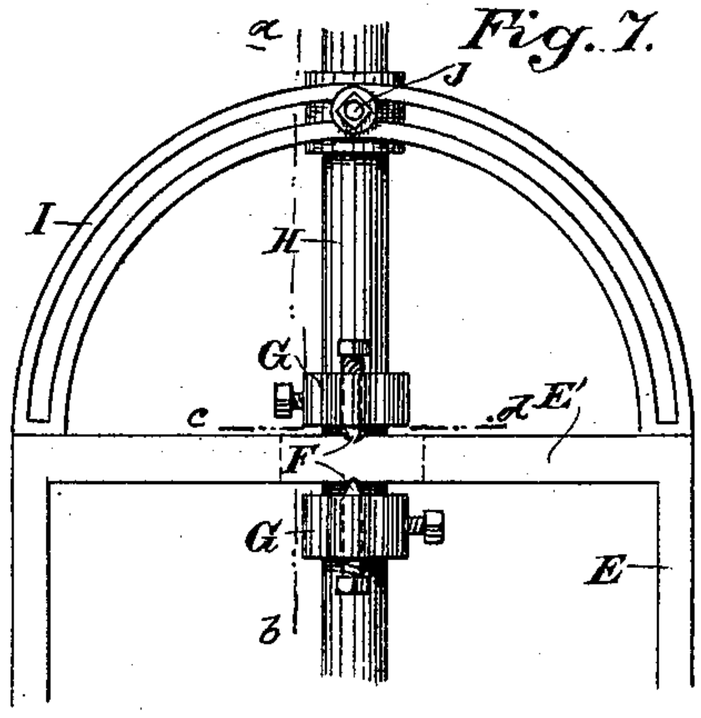
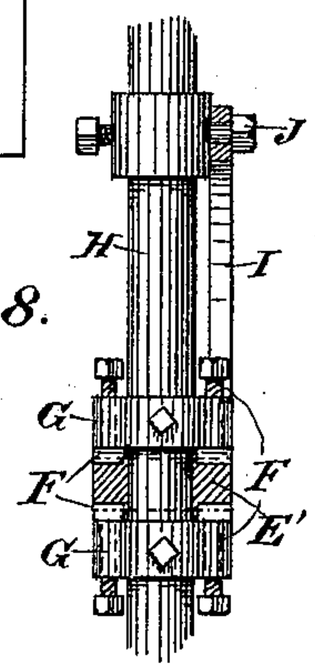


Fig. 8.



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(No Model.) 3 Sheets—Sheet 3.

G. H. DYER.

GRINDING AND POLISHING DEVICE.

No. 602,213. Patented Apr. 12, 1898.

Fig. 11.

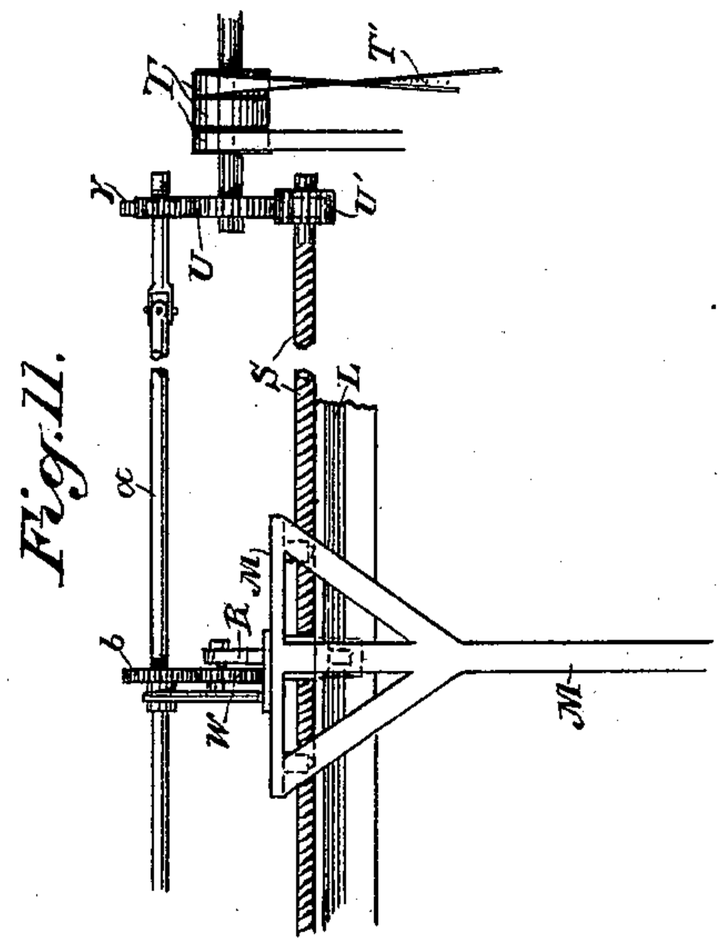


Fig. 12.

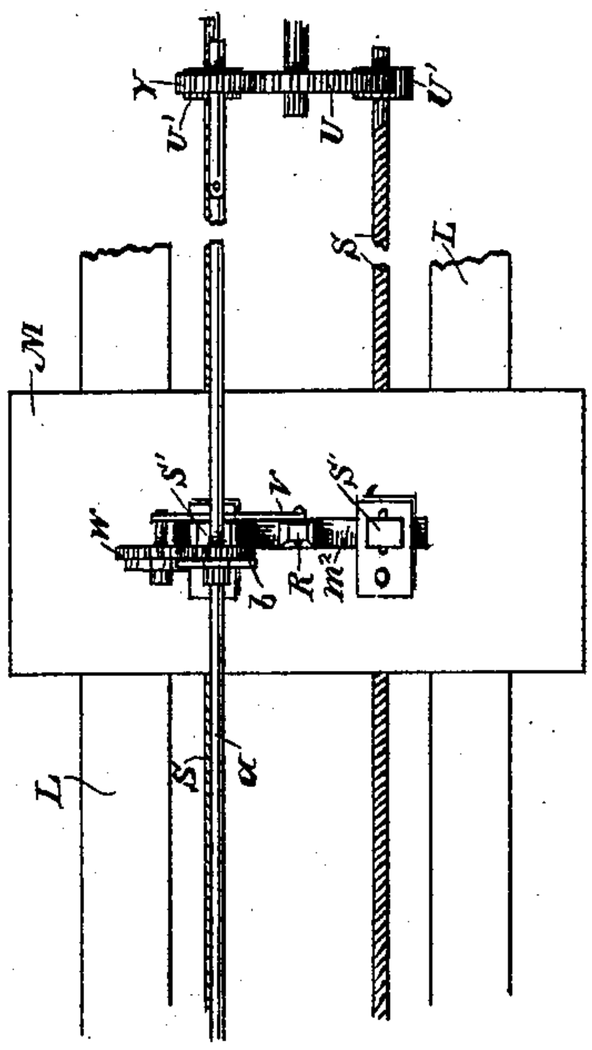
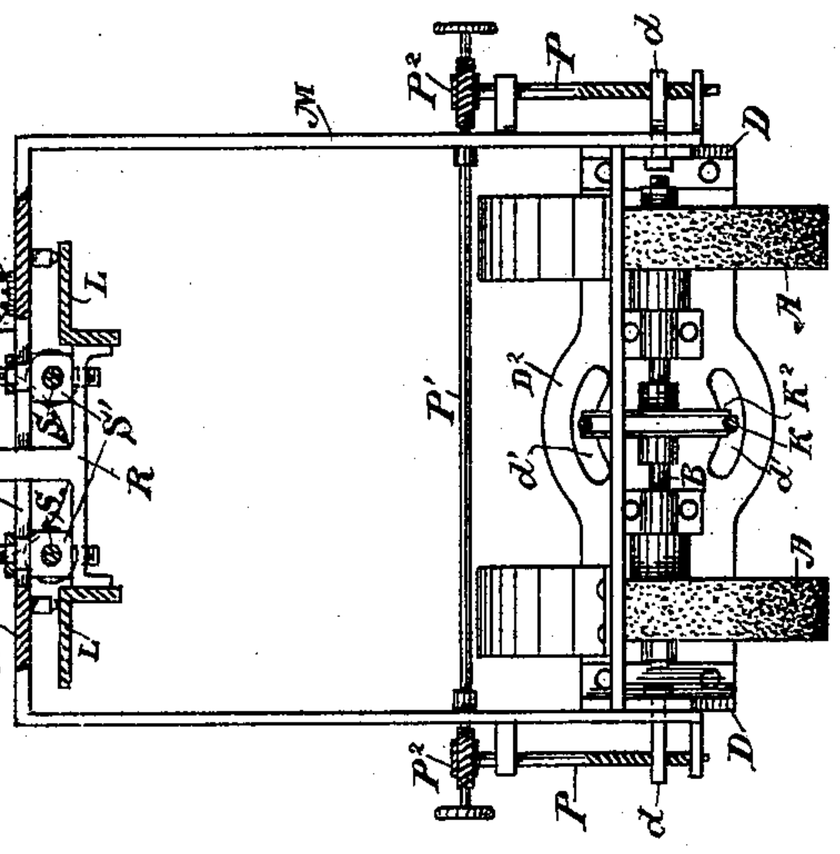


Fig. 10.



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UNITED STATES PATENT OFFICE.

GEORGE H. DYER, OF SAN FRANCISCO, CALIFORNIA.

GRINDING AND POLISHING DEVICE.

SPECIFICATION forming part of Letters Patent No. 602,213, dated April 12, 1898.

Application filed June 22, 1897. Serial No. 641,765. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. DYER, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Grinding and Polishing Devices; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus which is especially designed for grinding and polishing surfaces of iron or other material too large to be handled and moved about.

It consists in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a general side view of the apparatus. Fig. 2 is an end view showing one of the grinding-wheels and a means for adjusting. Fig. 3 is a side view of the same. Fig. 4 is a detail of one of the adjustable ball-bearing supports. Fig. 5 is a plan view showing the grinding-disks, driving, and angular adjusting device. Fig. 6 is a view of the adjusting-plates of the driving-frame. Fig. 7 is a view of the main tilting adjustment at the driving end of Fig. 1. Fig. 8 is a vertical section on the line *a b* of Fig. 7. Fig. 9 is a horizontal section on the line *c d* of Fig. 7. Figs. 10, 11, and 12 are end, side, and plan views, respectively, of the device for automatic feed.

The object of my invention is to provide an apparatus which is especially designed for grinding and polishing of surfaces, and mechanism by which the apparatus can be moved from side to side, forward and back, and tilted and generally adjusted to any surface or contour which it is desired to operate upon.

A are grinding-disks having an emery or other suitable grinding or polishing surface. These disks are here shown as fixed upon a shaft B, which is journaled in hangers C in an exterior frame D, and this frame is adjustably fixed to an extended arm or frame D′, which connects with a suspending link or hanger E at the opposite end. The length of the arm or frame D′ may be regulated to suit the amount of surface to be worked over and the character of the work to be done. The hanger E has a cross-bar E′ at the top, with grooves or channels adapted to receive knife-edge steel bearings F, which rest in these grooves in the manner of the knife-edges of a scale-beam. These bearings are adjustable from collars G, the collars being secured to a suspending-shaft H above and below the transverse bar E′, as shown plainly in Fig. 7, and the bar E′ is slotted, as shown in Fig. 9, so as to allow the hanger E to be tilted upon its knife-edge bearings with relation to the suspending-shaft H. When the weight rests upon the lower bearing F, the collar G, which carries the upper one, may be slipped up on the shaft H and fixed out of contact with the bar E′. When both bearings are in contact, as shown, the upper one prevents the frame from lifting. When tilted to one side or the other upon the bearing, the whole frame D′, with the grinding-disks A, is correspondingly tilted from one side to the other, so that the disks will travel upon any surface which may be inclined with relation to the suspending-rod H.

In order to hold the hanger E and connected parts at any point to which it may be inclined, I have shown a slotted arc I, extending above the hanger E, as shown, and by means of a bolt J, passing from the suspending-rod H through the slot in the hanger, and a nut upon said bolt, the parts may be locked at any desired angle. The suspending-rod H is journaled to the ceiling or any suitable supporting-point above, as shown at H′.

Power to drive the grinding-disks is transmitted through the endless rope, chain, or other flexible driver K, passing around direction-pulleys K′, thence around the driving-pulley K^2 upon the shaft B of the grinding disk or disks. By loosening the collars which carry the bearings F and the locking-nut J the hanger or yoke E may be slipped down along the suspending-shaft H, so as to tighten the driving-belt whenever necessary, the length of shaft H allowing for many adjustments. These grinding-disks may be set at an angle with the longitudinal axis of the frame D′ by means of a slotted adjusting-plate D^2, to which the yoke or frame D is adjustably fixed by bolts and nuts. Slots *d′* allow the driving-rope K to pass through the plate D^2 and connect with the shaft of the grinding-disks, although the latter may be turned to a considerable horizontal angle with the axial line of the frame D′.

The grinding-disks A may be supported with relation to the surface upon which they

are to operate either by means of tracks L and hangers M, extending upwardly from the frame D and provided with travelers *m*, or they may be supported by extensions N, projecting downwardly from the supporting frame or carriage D, in which the disks A are journaled, said extensions M having ball-bearings O, adapted to rest and move freely upon the surface below. In either case adjustment is made by screws, as shown at P, so as to allow the disks A to cut into the surface over which they are being moved sufficiently to make the surface smooth, or to polish it, as the case may be.

As shown in Fig. 1, the screw P passes through a suitable nut *d* upon the frame D and through a corresponding guide projecting from the hanger M, so that by turning the nuts upon opposite sides the device may be raised or lowered with relation to the permanent guide-tracks L, from which the hanger M is suspended.

In the construction as shown at Figs. 2 and 3, where the bearings O rest upon the surface, the screws P pass through nuts upon the supplemental plate N, carried by the frame D, so that the ball-bearings O may be raised or depressed with relation to the cutting or polishing periphery of the disks A. In this case, where the bearings O are supported upon the plate which is being operated upon, a counterbalance-weight Q may be employed and a cord Q′, connecting it with the frame D.

In Fig. 10 I have shown the screws P upon opposite sides of the frame D as being operated simultaneously by means of worm-gears P^2, the worm-shaft P′ of which extends entirely across the frame D, so that by means of milled hand-wheels upon either end the screws may be turned simultaneously and the grinding-disks raised or depressed evenly.

By the constructions heretofore described I am enabled to set the grinding-disks with any relation to the surfaces or bevels which it is desired to grind or polish and to adjust them so as to cut away as much of the surface as may be desired, this being a considerable amount where the disks are employed for smoothing or grinding away the rough surfaces of casting and other rough metal, and the bearing may be correspondingly reduced if the disks are simply buffing or polishing surfaces.

In order to preserve the disks from moving into irregular or grooved forms and to increase the width of the surface operated on, it is found desirable to move the disks over the surface from side to side while advancing them automatically and regularly. In order to do this, I have shown the frame in which the rollers A are carried, with the upward extension or suspending arms M traveling upon guides L, as previously described. These guides are parallel with each other, as shown in Fig. 10, and between them is a sliding T-shaped bar R, which extends from one to the other and serves to prevent side movement of the bar R with relation to the guides L, but will allow the hanger or arm M to be oscillated transversely and also caused to travel longitudinally by means hereinafter described. The longitudinal motion is effected by screws S passing through nuts, (shown at S′,) and these nuts, extending through the plate R, also pass up through a slot m^2 in the top of the hanger or carrier M. The screws are turned by means of pulleys T upon a driving-shaft which carries at one end the spur-gear U, this gear engaging, respectively, upon opposite sides with the gears or pinions U′, through which motion is transmitted to the screws S, and the hanger or framework, with the disks A, is gradually moved along.

To give the grinders a certain oscillation or side movement, as previously stated, this is effected by means of a pitman V, one end of which is connected with the upwardly-projecting T-bar R and the other with a crank or eccentric wheel W, the journal-boxes of which are carried upon the hanger or frame M, as shown. This crank or eccentric wheel is driven by power derived from the spur-gear U, transmitted to the pinion Y, as shown in Fig. 11, and thence by a jointed tumbling-rod *a* to the pinion *b* on a feather on this rod and engaging with the crank-wheel W. The joint in this rod or shaft *a* allows the wheels *b* and W, which are mounted upon the movable frame M, to move from one side to the other by the action of the crank-wheel and pitman V without disengaging them from each other, the shaft *a* being of sufficient length to allow of the movement without throwing it much out of line and leaving all the gears and pinions in mesh with each other. This movement with relation to the fixed guides L and the T-bar R will cause the frame D, which carries the disks, to be moved from side to side, while at the same time the screws S cause it to advance over the surface, thus polishing a considerable portion of the surface at one longitudinal movement, as well as preserving the faces of the disks from uneven wear. As soon as this part has been sufficiently completed, by shifting the driving-belts, (shown at T′, Fig. 11,) operating in the usual way of such reverse belts, the disks may be returned to the point of starting, the main supporting-frame D′ being turned about its fulcrum-point, so as to carry the disks upon a new surface.

This apparatus enables me to first grind and polish in a perfectly level manner large rough surfaces, or to follow curvatures or irregularities in surfaces which have to be polished in conformity therewith, or to change it so as to work upon any angle or plane with reference to the main surface or horizontally.

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

1. In a polishing or grinding apparatus, a suspending-rod and a main frame having one end carried thereby, disks or grinders jour-

naled and supported in the opposite end adapted to rest upon the surface to be ground or polished, a flexible driving-belt and direction-pulleys over which it passes, through which power is transmitted to actuate the grinding-disks, and means comprising a yoke carried by the rod and serving to connect the latter with the frame and collars adjustable on the rod for varying the length of the latter to regulate the tension of the belt.

2. In a grinding and polishing apparatus, a main frame and suspending rod and yoke, knife-edge bearings by which the yoke is supported, an arc or segment connected therewith, a bolt and locking-nut connecting with the suspending-rod, whereby the yoke and frame may be tilted from one side to the other and fixed at any desired angle, and grinding-disks supported in the opposite end of the adjustable frame adapted to rest upon the surface to be ground or polished, and movable thereon.

3. In an apparatus for grinding and polishing, a main frame, a suspending-rod by which one end is supported, a yoke and adjusting and locking arc whereby the frame may be turned from one side to the other, grinding-disks journaled and supported in the opposite end of the main frame with the peripheries of the disks adapted to be adjusted and rest upon the surface to be ground or polished, supports for this end of the main frame and screws whereby adjustment may be made to increase or decrease the amount of cut which the disks will make upon the surface to be operated on.

4. In a grinding and polishing apparatus, a main frame having one end adjustably suspended and capable of being tilted from side to side with an adjusting and holding mechanism, disks journaled at the opposite end of said frame, adapted to rest upon and be movable over the surface to be polished, a flexible driving-belt and direction-pulleys through which power is transmitted to rotate the disks, shanks or standards having ball-bearings adapted to rest and move upon a supporting-surface or guide, and screws whereby the disk-carrying frame may be raised or depressed to increase or decrease the amount of cut made by the disks upon the surface operated on.

5. In a device for grinding and polishing, a main frame having one end suspended with a tilting and locking mechanism whereby it may be turned from side to side about its suspending rod or hanger, grinding or polishing disks journaled at the opposite end of the frame so that they may be moved over a surface upon which they are to act, and a flexible driving-belt and direction-pulleys through which the disks are rotated, a supplemental adjusting frame or plate turnable about the vertical center whereby the grinding-disks may be caused to rotate in planes at an angle with the line of the main supporting-frame.

6. In a grinding or polishing apparatus, a main frame suspended and adjustable with relation to its point of suspension at one end, grinding or polishing disks journaled at the opposite end and independently adjustable therein, a flexible driving-belt and direction-pulleys through which power is transmitted to rotate the disks, so that by means of the independent adjustments at opposite ends of the main frame, any form of surface may be acted upon by the disks.

7. In a grinding or polishing apparatus, a main frame having one end adjustably and movably suspended, grinding or polishing disks journaled in the opposite end and independently adjustable, a suspending yoke or hanger and guides or tracks upon which the upper end of the hanger is supported and movable, a slidable bar adapted to travel between the fixed guides and prevent it from transverse motion therein, a crank mechanism connected with the hanger-frame and this guide whereby the frame and the grinding-disks are moved alternately from side to side.

8. In a grinding and polishing apparatus, a main frame adjustably suspended at one end and movable about its point of suspension, grinding or polishing disks journaled in the opposite end and independently adjustable, a yoke or frame extending upwardly through said disks, fixed supporting-tracks with ball-bearing devices by which the frame is supported upon said tracks and mechanism by which the frame is caused to oscillate transversely, and screws connected therewith by which it is also advanced in the direction of the screws during its oscillations.

9. In a device for grinding and polishing, a main frame adjustably suspended at one end, grinding or polishing disks journaled at the opposite end and movable over the surface to be ground, a suspending yoke or frame having antifrictional bearings, fixed guides or tracks upon which these bearings are movable, horizontal screw-shafts passing through nuts which are connected with the hanger and mechanism by which the screw-shafts are rotated whereby the hanger is caused to move in the line of the supporting-tracks whereby the grinding or polishing disks are advanced in one direction, a yoke slidable between the tracks and prevented from transverse motion thereby, a crank-wheel or eccentric journaled upon the hanger, with a pitman connecting the yoke with its crank whereby the main frame and disks are caused to oscillate transversely while being advanced by the screws, and a jointed shaft through which motion is transmitted to the crank-wheel without throwing the driving mechanism out of engagement.

In witness whereof I have hereunto set my hand.

GEORGE H. DYER.

Witnesses:
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JESSIE C. BRODIE.