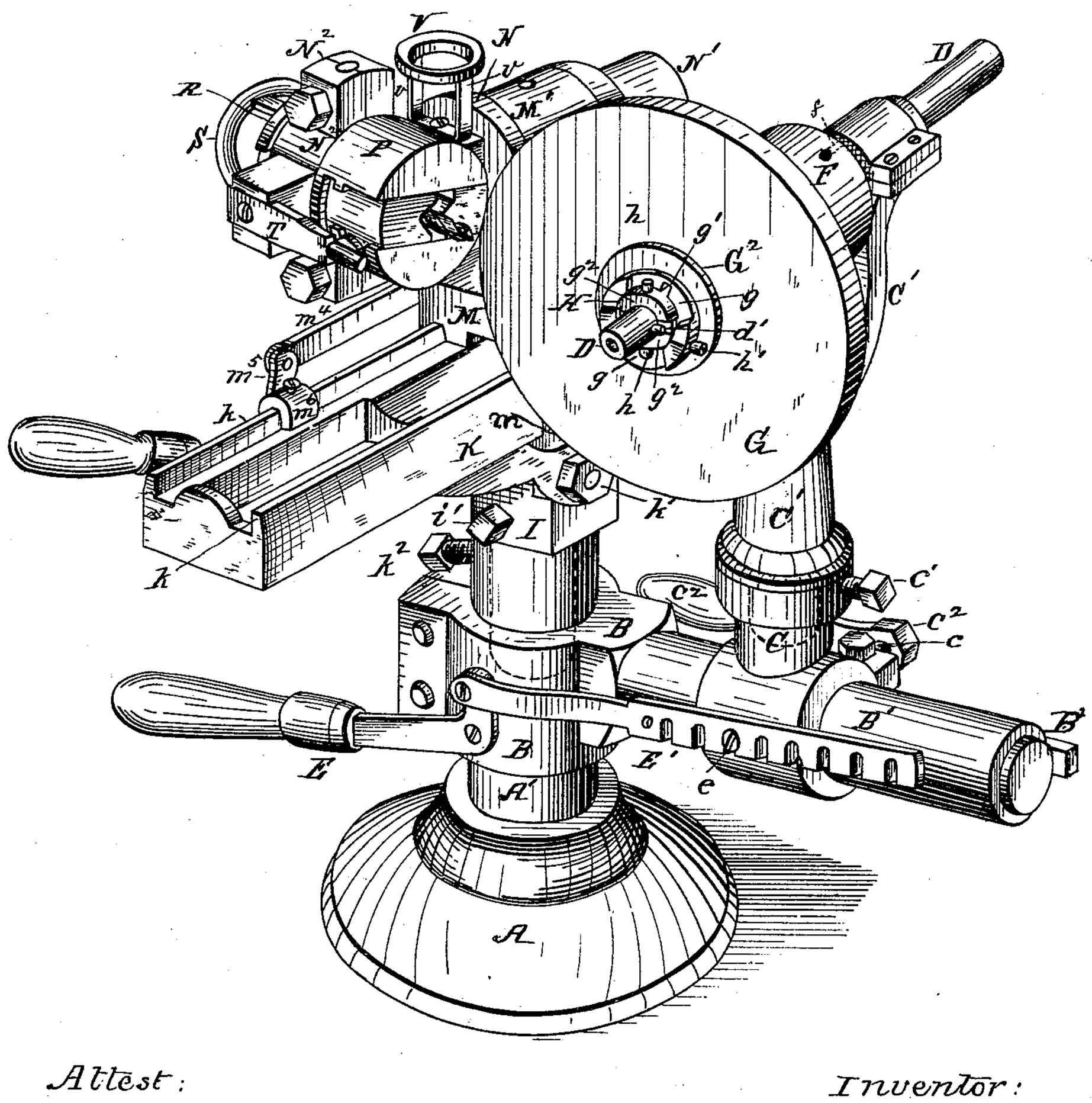
(No Model.) 4 Sheets—Sheet 1.

P. MALTBY.

MACHINE FOR GRINDING DRILLS.

No. 262,074. Patented Aug. 1, 1882.

Fig. 1.



Attest:

W. B. Masson

L. A. Marceron

Inventor:

Philo Maltby

by his atty J. R. Nottingham

(No Model.) 4 Sheets—Sheet 2.

P. MALTBY.

MACHINE FOR GRINDING DRILLS.

No. 262,074. Patented Aug. 1, 1882.

Fig. 2.

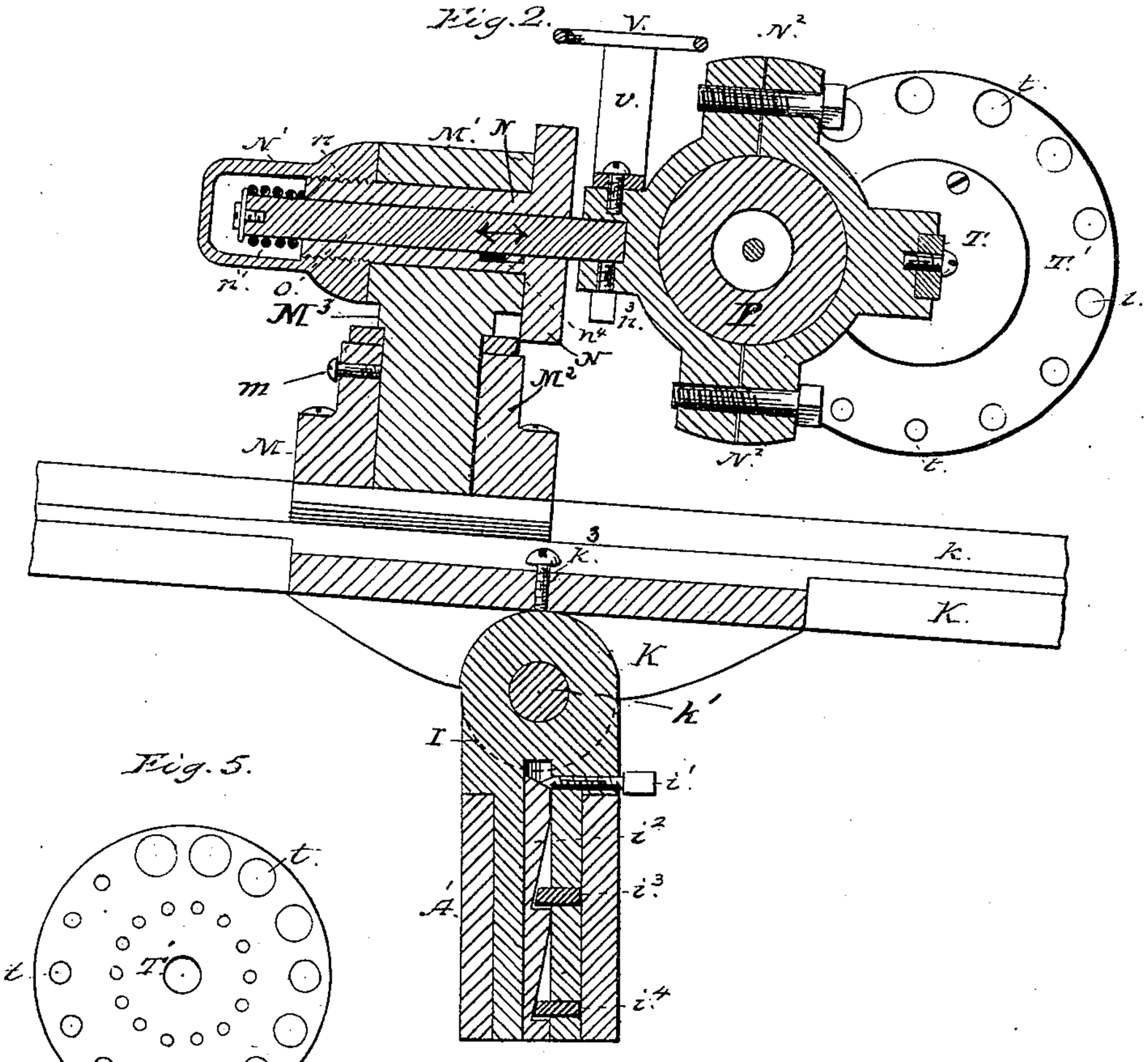


Fig. 5.

Fig. 3.

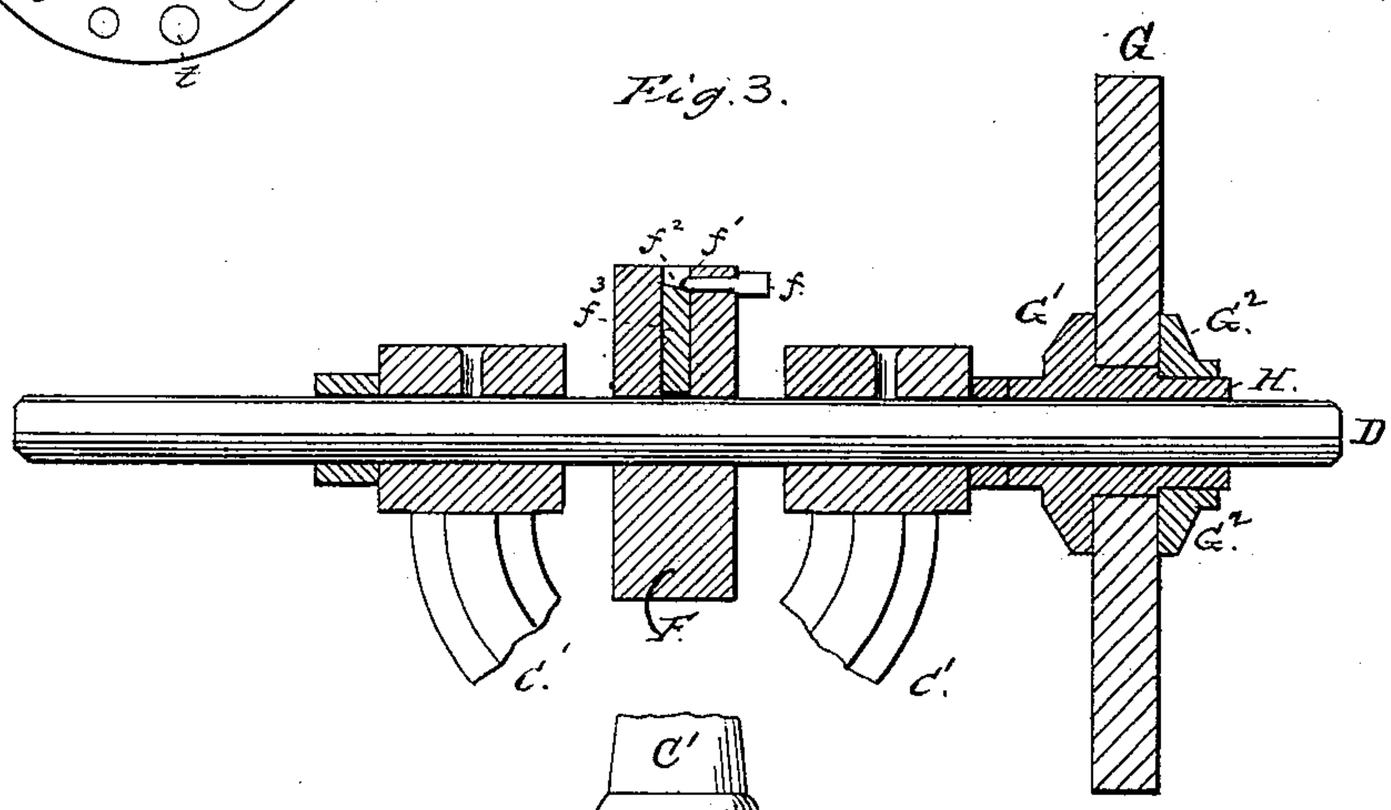
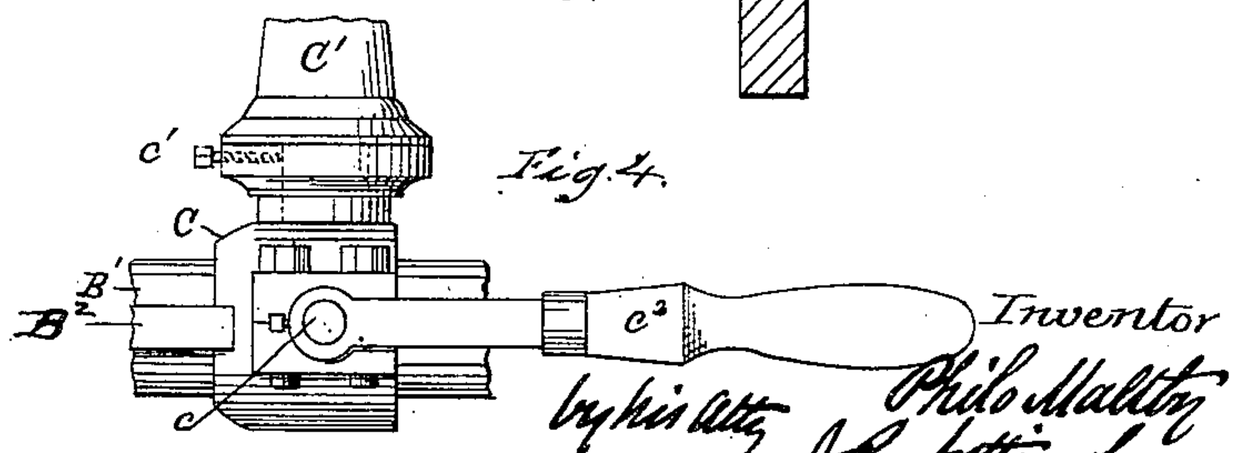


Fig. 4.



Attest:

L. A. Marceron

W. E. Chapple

Inventor

Philo Maltby

by his attys

J. R. Nottingham

(No Model.) 4 Sheets—Sheet 3.

P. MALTBY.

MACHINE FOR GRINDING DRILLS.

No. 262,074. Patented Aug. 1, 1882.

Fig. 7.

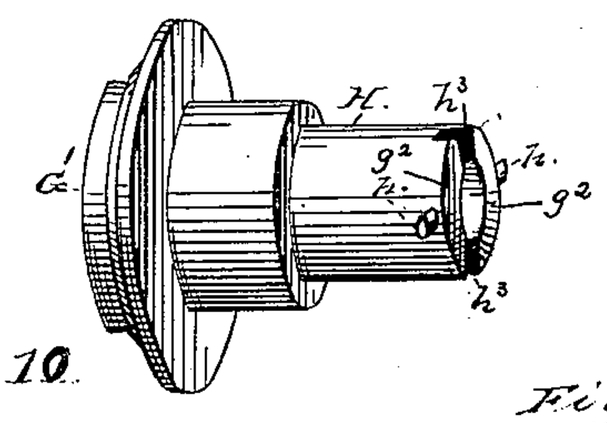


Fig. 8.

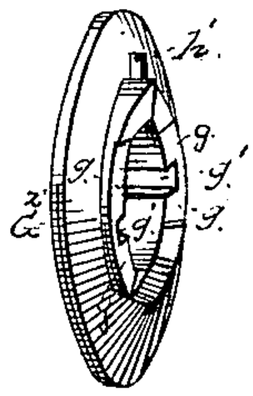


Fig. 10.

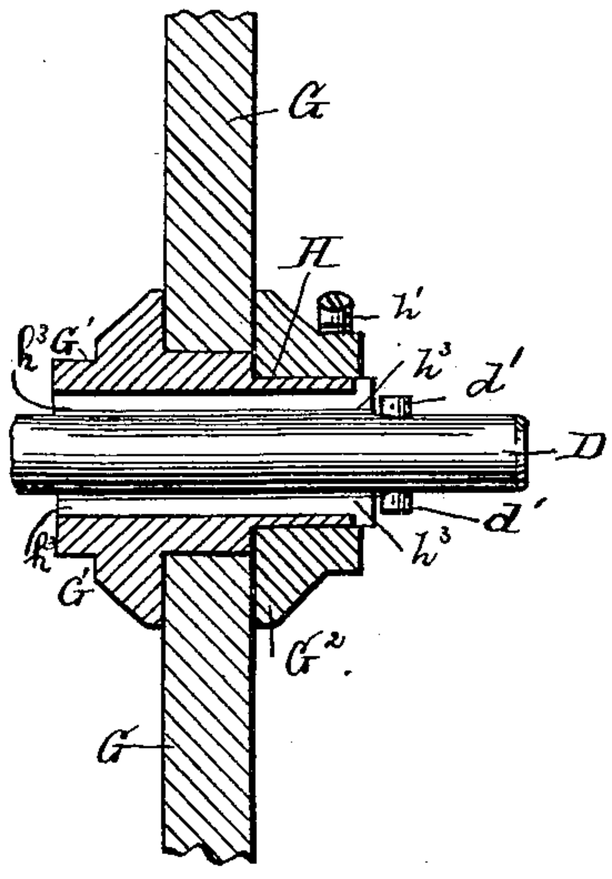


Fig. 6.

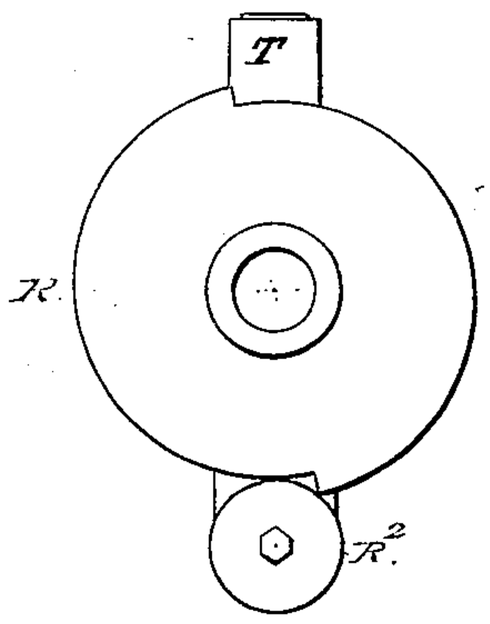
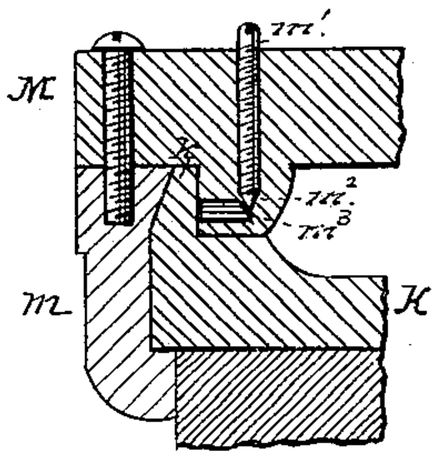


Fig 9.



Attest:

L. A. Marceron

W. B. Chapple

Inventor:

Philo Maltby

by his atty J. R. Nottingham

(No Model.) 4 Sheets—Sheet 4.

P. MALTBY.

MACHINE FOR GRINDING DRILLS.

No. 262,074. Patented Aug. 1, 1882.

Fig. 11.

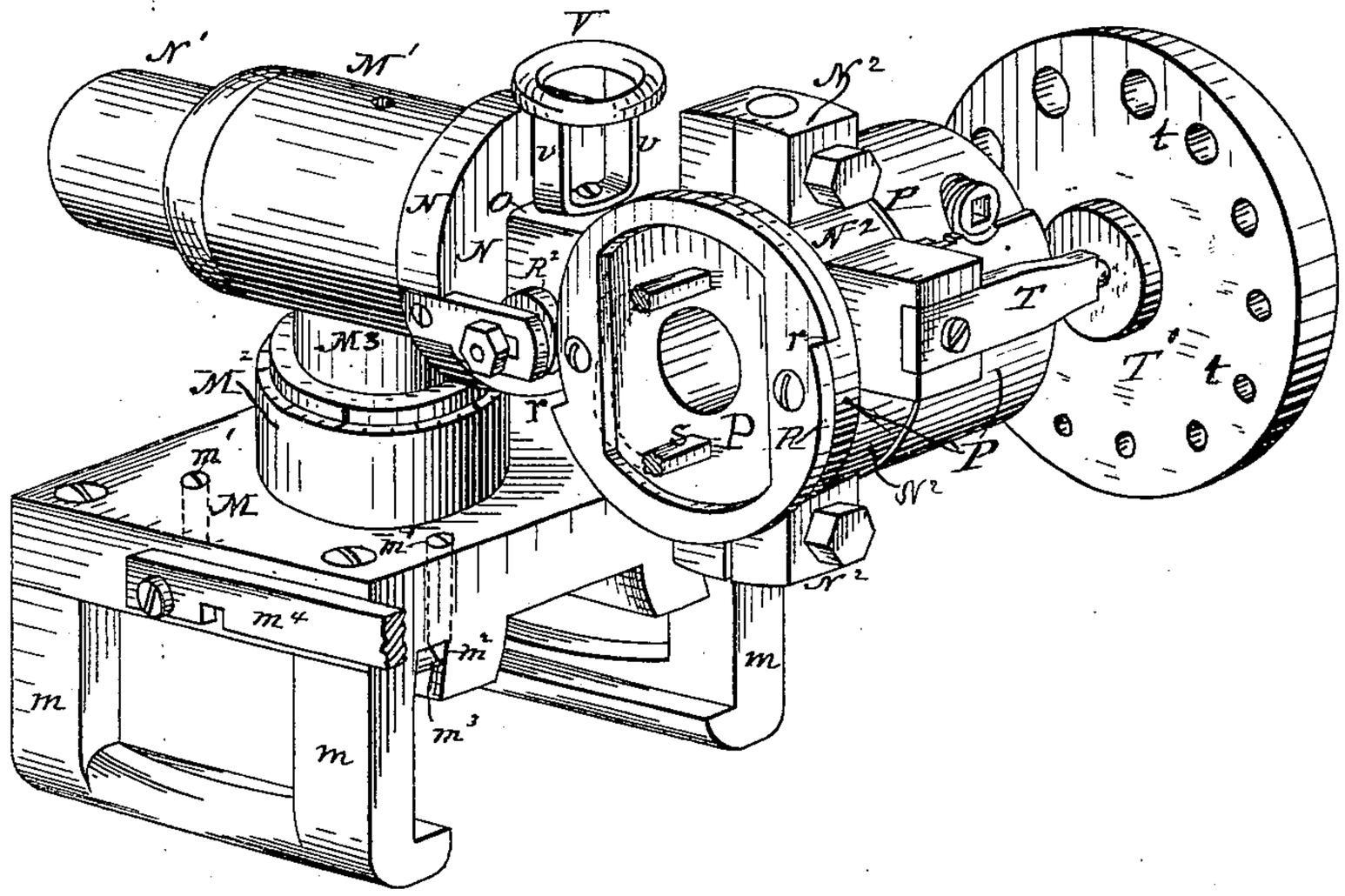
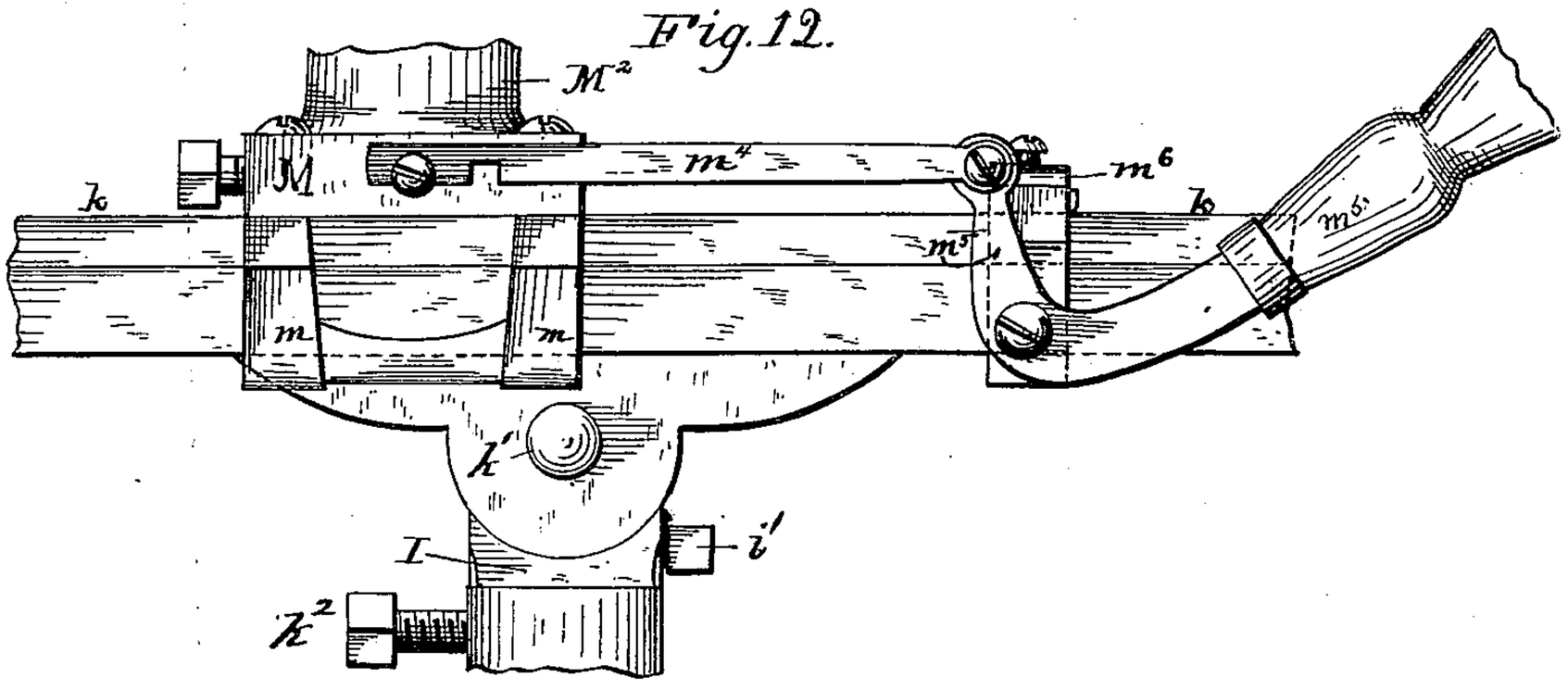


Fig. 12.



Attest:

W. B. Masson

L. A. Marceron

Inventor

Philo Maltby

by his atty J. R. Nottingham

UNITED STATES PATENT OFFICE.

PHILO MALTBY, OF CLEVELAND, OHIO.

MACHINE FOR GRINDING DRILLS.

SPECIFICATION forming part of Letters Patent No. 262,074, dated August 1, 1882.

Application filed April 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, PHILO MALTBY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Grinding Drills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to a tool-grinding machine; and the novelty consists in the construction, various adjustments, and arrangement of parts, as will be more fully hereinafter set forth, and specifically pointed out in the claims.

Among others, the objects of the invention are stated to be: first, to furnish a grinding-wheel which may be adjusted horizontally in a direct line in relation to the tool or other device in the chuck, and to give said grinding-wheel a multiple adjustment in relation to the chuck or tool, as may be desired; second, to provide a novel construction of a chuck or tool-holder having efficient means for presenting different surfaces of the tool to the grinding-wheel, as occasion may require, at the will of the operator; third, to furnish a novel eccentric movement by means of which the tool may be quickly changed from one position to another in relation to the grinding-wheels at the will of the operator; and, fourth, to provide for the tool-holding device or chuck a horizontal direct adjustment, a rotary adjustment, and a means for presenting the tool in relation to the grinding-wheel as the service may require; fifth, to provide a guideway for the tool-holding carriage, said carriage being held by friction and adapted to allow the operator to present the tool or other device to the grinding or polishing wheel at any angle at will by reason of the many adjustments; sixth, to provide a grinding-wheel which locks itself automatically upon the main shaft as it may be revolved in either direction, and is readily removed either from its shank or the shaft, as will be shown.

With these objects in view the invention consists in the several devices which are fully represented in the accompanying drawings, which form a part of this specification, and in which—

Figure 1 represents a general perspective view, looking from the rear, of my invention with the guide-disk removed; Fig. 2, a vertical section of the tool-carrying device and carriage; Fig. 3, a vertical section of the main shaft and its bearings, the pulley, and grinding-wheel; Fig. 4, a side view of the carriage and a portion of the frame forming the main-shaft bearing, showing the lever for operating the same; Fig. 5, a detached view of the guide-rest; Fig. 6, an end view of the cam-chuck; Figs. 7 and 8, detailed views of the grinding-wheel, hub, and its attachments; Fig. 9, a view showing the device for taking up lost wear in the carriage-frame; Fig. 10, a sectional view of the grinding-wheel and its attachments; Fig. 11, a perspective view of the tool-holding device and its carriage; and Fig. 12, a side elevation of a portion of the carriage-frame and guideways, showing the hinged joint and means for manipulating the carriage.

Referring to the drawings, A indicates a proper base, to which is rigidly secured a vertical standard, A′. A sleeve, B, upon this standard A′, which is adjustable thereon, carries a horizontal arm, B′, upon which reciprocates a carriage, C, having socketed therein a frame, C′, in which is journaled the main or pulley shaft D. This arm B′ is provided with longitudinal rib B^2, which operates in a recess in the carriage C and prevents the rotation of said carriage upon said arm, while it allows free longitudinal movement. The frame C′ is adjustable by rotation in its socket, and the grinding-wheel is held at any desired angle by set-screw *c′*. This main-shaft bearing C C′ may be locked at any desired location upon the arm B′ by means of a set-screw, *c*, operated by a lever, c^2, and when such means is released this bearing may be adjusted horizontally by means of a crank-lever, E, pivoted upon the sleeve B, to which lever is pivoted a rack-bar, E′, which engages with a screw or pin or lug, *e*, upon the carriage C.

The pulley F may be secured to or released

from the main shaft D by means of a set-screw, *f*, having a diamond point, *f'*, said point bearing upon a corresponding beveled surface, f^2, of a pin, f^3, having its end hollowed out to fit the radius of the shaft, and adapted to be forced into embracing contact with the said shaft as the screw *f* is forced inward, as shown in Fig. 3.

The grinding-wheel G is provided with a hub, G', and a flange, G^2, having beveled surfaces *g*, as shown, in the juncture of which are located apertures *g'*, in which operate pins *h* upon the shank H of the hub, to which the said flange G^2 may be locked at will by a set-screw, *h'*. This shank H upon its outer end also carries inclines g^2, upon which operates the pins *d'* on the shaft D, and said shank is provided with apertures h^3, which extend through the shank longitudinally, and through which the pins *d'* upon the shaft operate, the said pins impinging upon said inclines as the wheel is revolved in either direction and locking the wheel upon the shaft. The shank H is passed through the hole in the center of the grinding-wheel and the flange G^2 placed in position, the pins *h* upon the said shank passing through the longitudinal aperture *g'* in said flange. The wheel is then put onto the shaft, the pins *d'* passing through the longitudinal apertures h^3 in the shank H. As the shaft is rotated in either direction the centrifugal force of the wheel locks it to the shank and the shank to the shaft by means of the pins *h* and *d'*, impinging respectively upon the inclined surfaces *g* and g^2.

In a socket in the standard A rotates a post, I, which may be held in any position by a set-screw, k^2, and which is provided with means i' i^2 i^3 i^4, as shown in Fig. 2, for compensating for wear.

To the post I is hinged and held by frictional contact a frame, K, which provides guideways *k* for the chuck-frame carriage, which will be described hereinafter. The frame K may be held at any desired position by tightening the bolt *k'*, which forms a pivot for said frame and allows the operator to oscillate it, as occasion may require, in either direction and at any angle in order to bring the tool and wheel into the desired relation to each other. A set-screw, k^3, in the top of the frame K also serves to hold said frame at any desired position. The hinged joint between the post and frame permits an adjustment of the tool-holder rotarily in an upright plane.

A carriage, M, embraces the frame K by means of the hooked arm *m*, and lost wear is taken up by means of screws *m'*, having diamond points m^2 and pins m^3, which bear by frictional contact upon the sides of the guide-rails as the screws *m'* are forced in, as shown in Figs. 9 and 11. To this carriage is pivoted a pitman, m^4, which is connected to a crank-lever, m^5, the pivoted point of which is secured to a clamp-clutch, m^6, which may be adjustably secured to either guide. Within a standard, M^2, rigid with the carriage M rotates the post M^3, carrying the cylinder M', in which rotates a sleeve, N, having a screw-threaded portion, *n*, to which is secured the removable cap N'.

A spring, *n'*, serves to force a mandrel, O, constantly in one direction, the said mandrel being secured to the chuck-clamp N^2 by means of a binding-screw, n^3, as shown in Fig. 2. The post M^3 rotates in the standard M^2, and is held at any desired angle therein by set-screw m^7. The mandrel is provided with a feather-lug, n^4, which prevents its rotation in the sleeve; but the mandrel has limited free longitudinal movement in the sleeve and the sleeve a rotary movement in the cylinder, when desired, to allow the operator a greater facility for presenting the tool or other device to the grinding-surface.

The chuck-clamp N^2 embraces and confines the chuck or tool-holder P, which may be of any desired construction, and said chuck is provided with a double peripheral cam-disk, R, (see Fig. 11,) which may be removed readily and another replaced, as the kind of tool to be operated upon may suggest. As shown, the cam-disk R is adapted to the grinding of a two-lipped tool. This cam-disk R, by its cam-faces, operates upon a friction-roller, R^2, or equivalent device, which not only serves as a means for reciprocating the mandrel and allowing a ready manipulation of the chuck, but acts as a stop, after the cam-shoulder has passed it, to prevent a reverse movement of the tool.

Upon an arm, T, is secured a guide-disk, T', (see Figs. 2 and 11,) having differential-sized and suitably-arranged apertures *t*, which serve as a steady rest to hold the drill on a perfectly central position during the grinding operation and to accommodate drills of different sizes.

The tool having been inserted in the chuck and through the proper aperture *t* in the guide T, the frame K is tilted to a proper angle to bring the tool into a position upon the periphery of the wheel best adapted for the ready grinding of the tool, and the frame M rotated until the proper angle to suit the pitch or bevel upon the tool is reached, and then is set by the screw m^7. The cam-wheel R is then placed so that one of the shoulders, *r*, rests against the roller R^2, and the operator, by means of the handle S, rotates the drill upon the wheel for one-fourth of a revolution of said cam-disk R, which completes the grinding of one lip of the tool from the back of the lip to the cutting-edge, and the succeeding one-fourth of a revolution will bring the back of the succeeding lip of the drill into position for a similar manipulation. During this operation the operator manipulates, by means of lever m^5, the chuck-frame carriage back and forth upon the guideways in order to bring the drill across the periphery of the grinder or release it from contact therewith.

It will be observed that the operator may commence grinding the drill from the cutting-

edge as well as from the back of the lip. When this is to be done, the drill being properly secured in the chuck and the various parts of the machine brought into relative position, with the shoulder *r* of the cam-face resting against the wheel or stop R^2, the carriage-chuck is moved back by means of the lever m^5, which operation clears the drill of the grinder. The cam-disk is then turned to the left one-quarter of a revolution and the chuck-carriage moved forward, bringing the drill in contact with the stone at its cutting-edge. The cam and chuck are manipulated to the right. At the same time the drill is carried across the periphery of the stone by means of the lever m^5 until the cam-shoulder comes in contact with the wheel R^2. This operation takes off the rough of the drill, and to complete the grinding the drill is carried back, the cam being turned to the left, which operation grinds the drill from back of the lip to the cutting-edge.

A revolving crank, V, serves, when one of its arms, *v*, is turned against the cylinder-head N, to press the head N^2, carrying the mandrel O, away from head N and against the force of the spring *n'*, and holds the cam R out of engagement with the roller R^2. When the mandrel is thus held it will revolve without being reciprocated and the tool will be given a central point, as will readily be seen.

The upper edge surfaces of the standard M^2 are preferably provided with designating-marks of degrees or figures, which will enable the operator to readily adjust the chuck at will for successive grinding.

By the construction of my device the operator is not only able to adjust and lock the main-shaft frame so that the shaft shall be in a horizontal position, but by the construction of said frame he is enabled to rotate said frame at the joint C C' in such a manner that he may force the grinding-wheel to accommodate itself to the position of the tool and its holder.

The construction of the pivotal frictional carriage-frame is such that the operator may adjust the tool-holding device or chuck to the position of the wheel. The relative position of the wheel and the tool or other device contained in the chuck is at all times each with the other under the direct control of the operator.

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

1. The combination of a grinding-wheel, its shaft mounted in a frame having an upright stem adjustably secured in a standard on a carriage adapted to move on a horizontal arm, a lever and set-screws, whereby the wheel may be adjusted toward and from the tool-holder and rotary adjustment about its stem effected, and of a tool-holder and set-screw for its adjustment rotarily about its upright support, a carriage mounted upon guideways secured to said stem by a hinged joint, and a pitman-and-lever connection, whereby the tool-holder may be adjusted longitudinally across the grinding-surface, substantially as specified.

2. The combination of a grinding-wheel, its shaft mounted in a frame having an upright stem adjustably secured in a standard on a carriage adapted to move on a horizontal arm secured to an adjustable sleeve upon an upright support, by means of which sleeve a vertical adjustment of the wheel is effected, a lever and set-screw for adjusting the wheel toward and from the tool-holder, and a set-screw for effecting about its stem a rotary adjustment of a tool-holder and set-screw for its adjustment rotarily about its upright support, a carriage mounted upon guideways secured to the stem by a hinged joint, and a pitman-and-lever connection, whereby the tool-holder may be adjusted longitudinally across the grinding-surface, for effecting a rotary adjustment in an upright plane, substantially as specified.

3. The combination, with the grinding-wheel and the means for adjusting it vertically, rotarily, and horizontally back and forth, of the tool-holder mounted upon a standard mounted upon a carriage mounted upon guideways secured to an upright stem by means of a hinged joint, and the upright stem supported upon a suitable base in which the said stem is swiveled, and the set-screws, whereby the tool-holder may be adjusted rotarily or at an angle to the grinding-wheel, substantially as specified.

4. The combination of a grinding-wheel, its shaft mounted in a frame having an upright stem adjustably located in a standard on a carriage adapted to move on a horizontal arm, and a lever and pin, *e*, and a set-screw, whereby the wheel may be adjusted horizontally to and from the tool-holder and rotarily about its stem, and the tool-holder mounted on a sliding bed hinged to a standard located vertically in an upright, and the set-screws, whereby the tool-holder may be adjusted rotarily, the pitman and lever attachments, whereby it may be adjusted horizontally across the periphery of the grinding-wheel, and the hinge-joint, whereby it may be adjusted at any desired angle to the wheel, substantially as specified.

5. In combination with the chuck-carriage M, mounted on a carriage-way, as shown, hinged to an upright standard, and provided with set-screws, the lever fulcrumed to the carriage-way and connected with the carriage, whereby said carriage may be moved back and forth laterally across the periphery of the grinding-wheel, substantially as specified.

6. In a grinding-machine, the combination of a tilting carriage-way, a clamp, and a chuck-carriage, and means for forcing the said carriage and clamp together or apart, as and for the purpose set forth.

7. The combination, with the sleeve carrying a frictional roller and having a spring-restrained mandrel mounted therein, of a chuck-clamp and chuck carrying a cam-disk, and means for rotating the chuck and disk and

presenting different surfaces of the tool to the grinding-surface, substantially as and for the purpose specified.

8. The combination of a sleeve carrying a frictional roller and having a spring-restrained mandrel mounted therein, a chuck-clamp, and a chuck carrying a cam-disk, and means for rotating the chuck and disk, whereby the mandrel is reciprocated, and suitable means for throwing the mandrel in or out of operation, substantially as specified.

9. The combination of the grinding-wheel G, shaft D, mounted in the frame C′, having an upright stem adjustably secured in the standard of the carriage C, the arm B′, and means for adjusting the wheel vertically to and from the tool-holder and rotarily with the tool-holder, and carriage M, and ways K, having hinged joint, and set-screws and lever, whereby the said holder is adjusted rotarily, longitudinally and rotarily in an upright plane, substantially as specified.

10. The combination of the grinding-wheel G, hub G′, having shank H, provided with pins *h*, and the flange G², provided with apertures *g′*, inclines *g*, and set-screw *h′*, as and for the purpose set forth.

11. The combination of the wheel G, the hub G′, having shank H, provided with pins *h*, the inclines *g²*, and apertures *h³*, the flange G², provided with inclines *g*, apertures *g′*, and set-screw *h′*, and the shaft D, having pins *d′*, substantially as and for the purpose set forth.

12. The combination of the standard A′, the post I, carrying the bar *i²* and *i′*, pins *i³ i⁴*, and the chuck or tool-holding frame, substantially as and for the purposes specified.

13. The combination of the pitman *m⁴* and crank-lever *m⁵* with the frictional guide-frame K, the carriage M, having standard M², and with the adjustable clamp-clutch *m⁶*, as and for the purpose specified.

14. The carriage M, having standard M², the cylinder M′ and sleeve N, combined with the spring *n′*, the mandrel O, and chuck-clamp N², substantially as and for the purposes set forth.

15. The mandrel O, having a feather-lug, *n⁴*, combined with the cylinder M′, sleeve N, having a recess for the lug, cap N′, spring *n′*, and chuck-clamp N², as and for the purposes specified.

16. The cam-disk R and its operating means S, combined with the friction roller or stop R² and with the spring-restrained mandrel O, and a clamp for the tool-holder, as and for the purpose set forth.

17. The guide-disk T, having differentially-sized apertures *t*, combined with the chuck, chuck-clamp, and grinding-wheel, as and for the purposes set forth.

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

PHILO MALTBY.

Witnesses:

B. A. BENEDICT,

L. A. MARCERON.