

(No Model.)

5 Sheets—Sheet 1.

T. HANDLOSER.  
GRINDING MACHINE.

No. 423,243.

Patented Mar. 11, 1890.

Fig. 2.

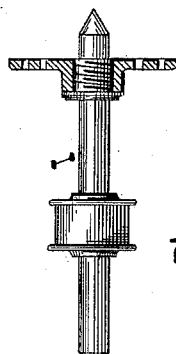
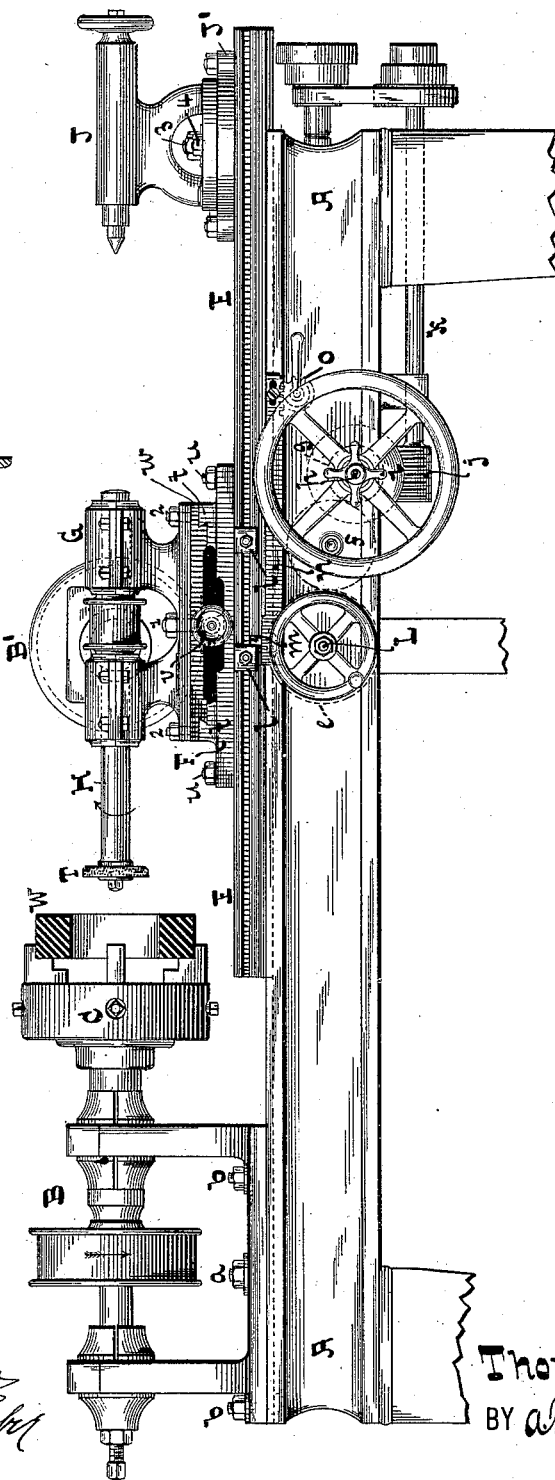


Fig. 1.



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his ATTORNEY

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Fig. 5.

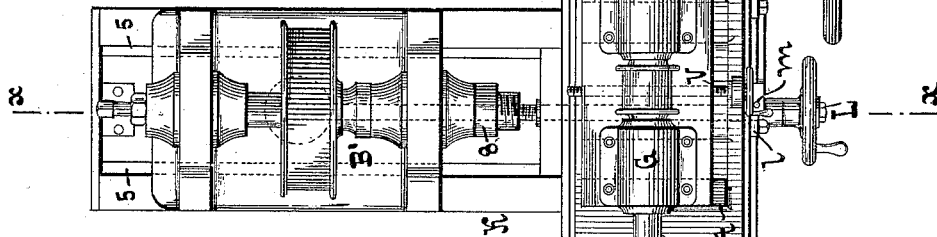
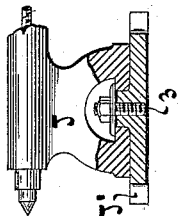


Fig. 4.

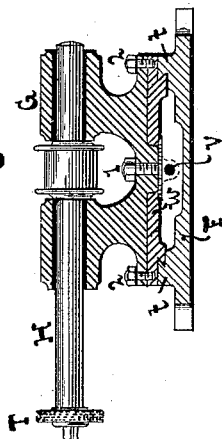
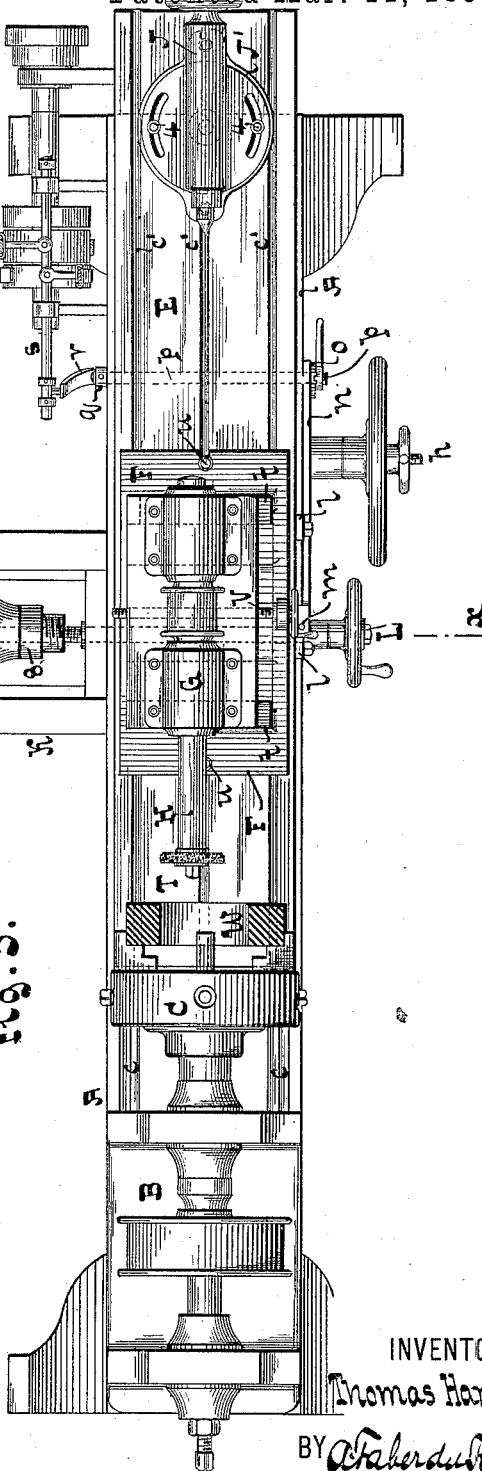


Fig. 3.



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5 Sheets—Sheet 3.

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Fig. 6.

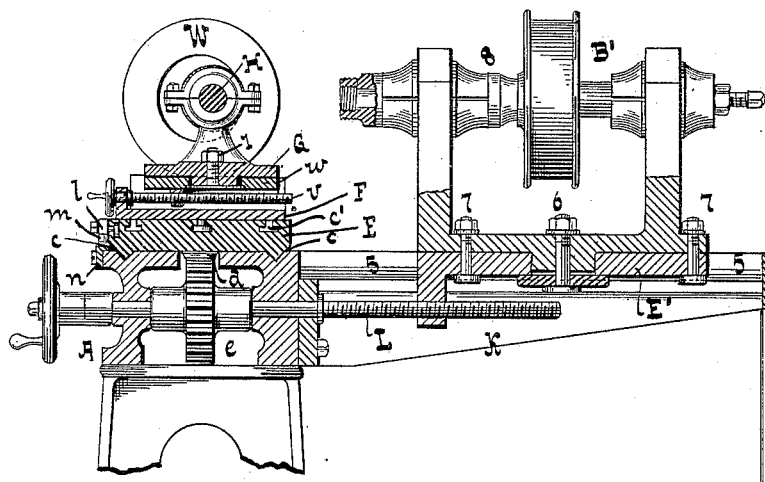


Fig. 7

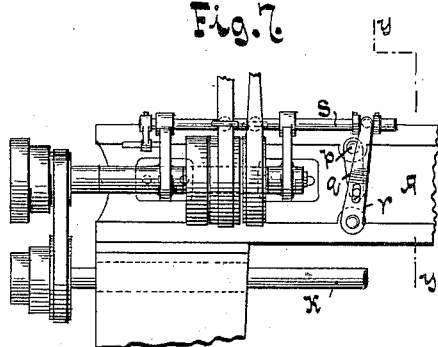


Fig. 8.

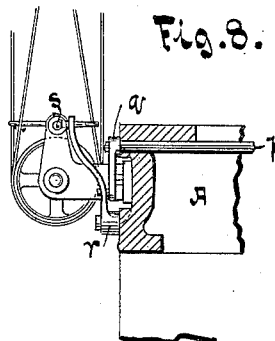


Fig. 9.

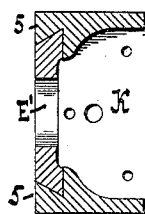
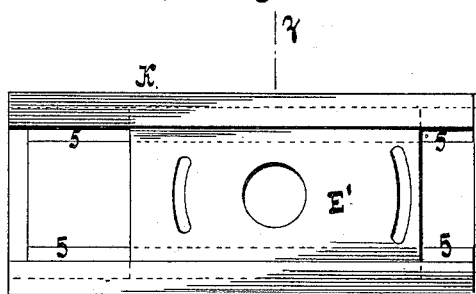


Fig.10.



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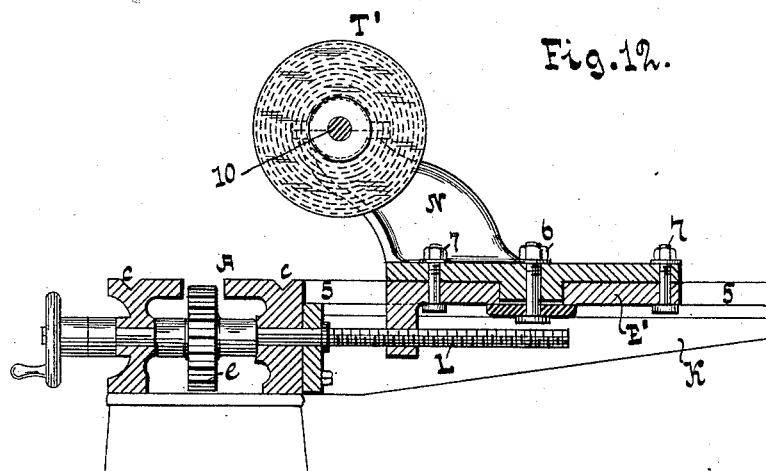
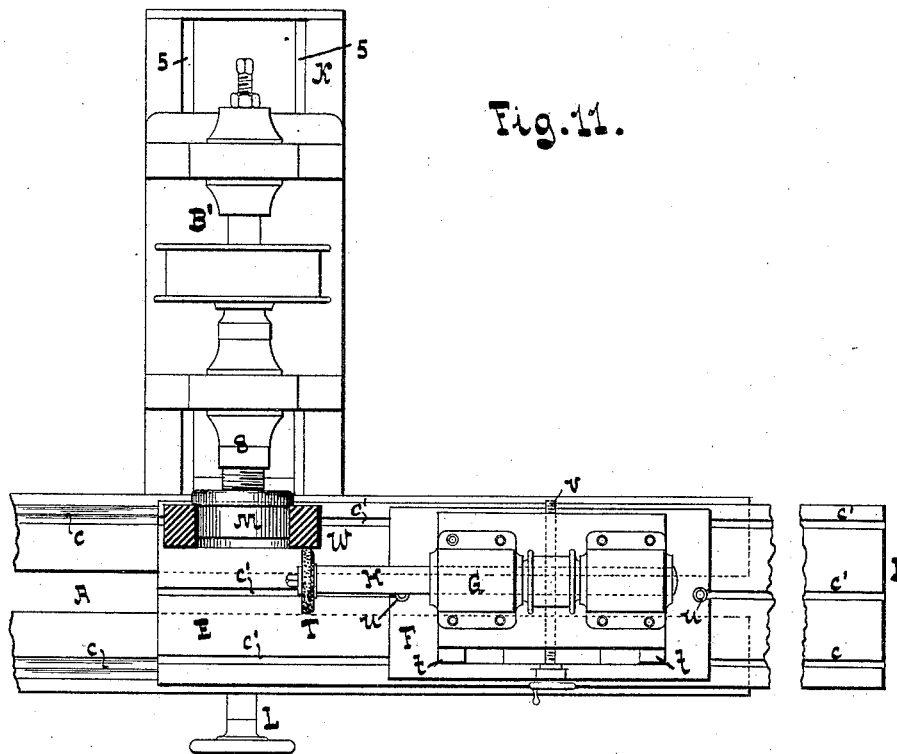
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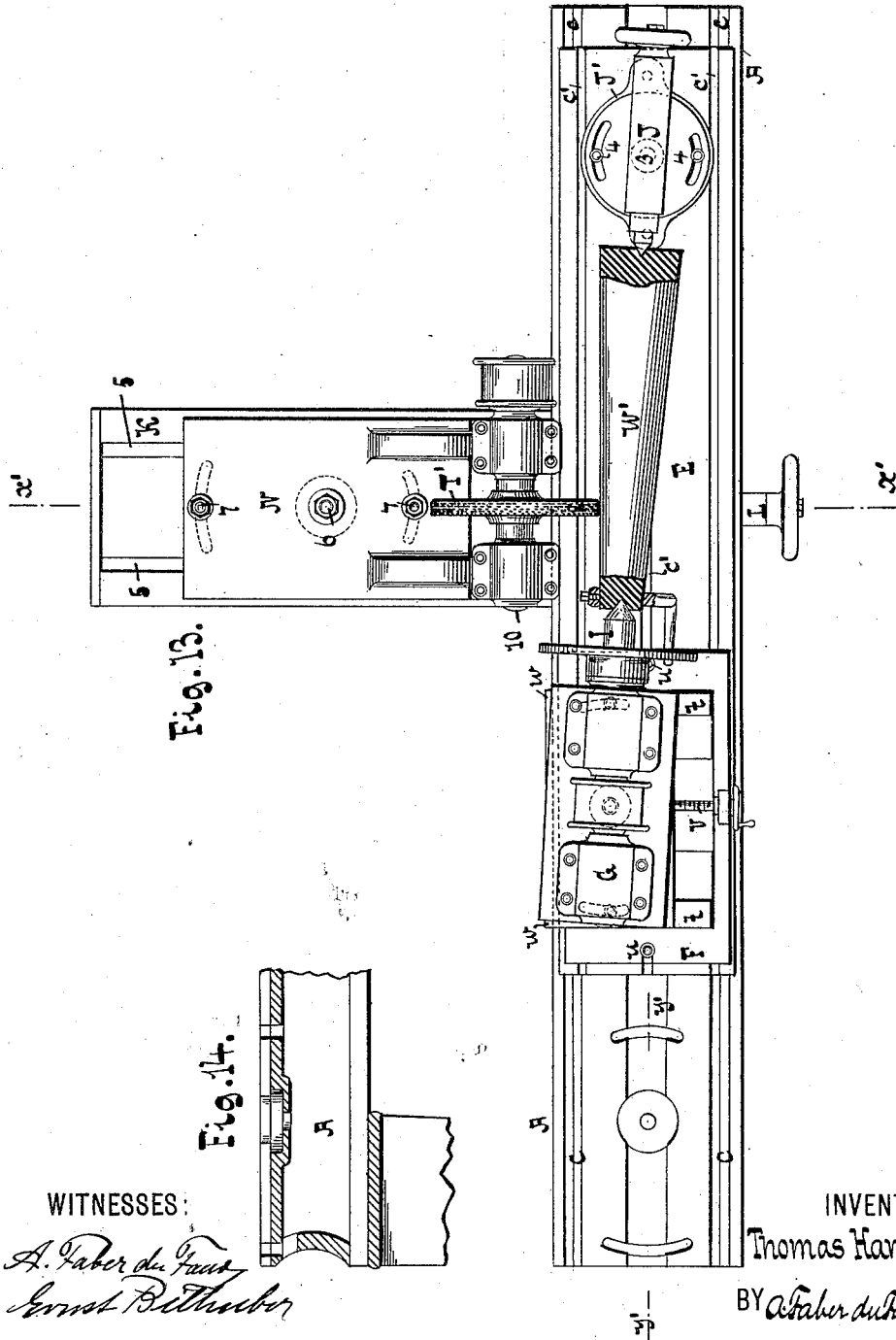
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T. HANDLOSER.  
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Patented Mar. 11, 1890.



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# UNITED STATES PATENT OFFICE.

THOMAS HANDLOSER, OF NEW YORK, N. Y.

## GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 423,243, dated March 11, 1890.

Application filed December 31, 1888. Serial No. 295,044. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS HANDLOSER, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented a new and useful Improvement in Universal Grinding-Machines, of which the following is a specification.

My invention relates to improvements in grinding-machines, and has for its object to adapt machines of this class both for boring and facing and for turning cylindrical and taper shafts.

The novel features of my invention are fully set forth in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my grinding-machine as set for boring. Fig. 2 is a sectional elevation of a spindle used in turning shafts. Fig. 3 is a plan view of Fig. 1. Fig. 4 is a sectional elevation of the spindle-carriage and its guides. Fig. 5 is a sectional elevation of the tail-stock. Fig. 6 is a vertical transverse section in the plane  $xx$ , Fig. 3. Fig. 7 is an elevation of part of the belt-shifting mechanism. Fig. 8 is a vertical section in the plane  $yy$ , Fig. 7. Fig. 9 is a section in the plane  $zz$ , Fig. 10. Fig. 10 is a detached plan view of the lateral extension of the bed-plate and its sliding table. Fig. 11 is a plan view of part of the machine as arranged for facing. Fig. 12 is a vertical section in the plane  $x'x'$ , Fig. 13. Fig. 13 is a plan of the machine arranged for grinding a taper shaft. Fig. 14 is a section in the plane  $y'y'$ , Fig. 13.

Similar letters indicate corresponding parts.

In the drawings, referring at present more especially to Figs. 1 and 3, the letter A designates the bed of the machine, which is supported upon suitable legs, as usual. At one end of the bed is located a head-stock B, of the usual construction, which is, however, swiveled to the bed by a center bolt  $a$ , and clamped by bolts  $b$ , playing in suitable slots, Figs. 1, 13, and 14.

In the example illustrated in the drawings, Figs. 1 and 2, the head-stock B is shown as provided with a chuck C for holding the work W. The bed A is provided with longitudinal grooves or ways  $c$ , extending over the whole length of the same, including that por-

tion beneath the head-stock B, said ways serving as guides for a table E, to which a reciprocating movement toward and from the head-stock is imparted by any suitable well-known means. As an instance of such a mechanism, I have shown in Figs. 1 and 6 the table provided on its lower side with a rack  $d$ , which is engaged by a loose gear  $e$ , Fig. 1, operated by train of gears  $f$  and  $g$ , the latter gear being fixed upon a shaft  $h$ , having a suitable hand-wheel. When the table is to be automatically fed and reversed, a clutch  $i$  is thrown into connection with the gear  $g$ , said clutch being formed with a worm-wheel engaging a worm  $j$ , formed on the end of a shaft  $k$ , that is rotated by a pulley and belt connection with the counter-shaft of a belt-shifting mechanism. This belt-shifting mechanism is also of a usual construction, and may be constructed as follows: On the table E, Figs. 1, 3, 7, and 8, are secured adjustable dogs  $l$ , which can engage with a pin  $m$ , projecting upward from a sliding rack-bar  $n$  on the side of the bed, which rack-bar engages with a pinion  $o$ , mounted on a shaft  $p$ , extending across the bed and having at its end an arm  $q$ , which engages with the arm  $r$ , which operates the belt-shifter  $s$ .

The reciprocating table E is provided on its upper surface with longitudinal T-slots  $c'$ , Figs. 3 and 6, for receiving the heads of the clamping-bolts. On the table is mounted a guide-plate F, having thereon guides  $t$ , extending transversely to the length of the bed. This guide-plate is adjustable in the length of the table by means of clamping-bolts  $u$ , the heads of which enter the T-slots in the table E. To the guides  $t$  of the guide-plate F is fitted a carriage G, which has bearings for a rotary arbor H, that carries the tool or emery-wheel T. The arbor extends beyond the bearings of the carriage, so that the wheel can be caused to enter recesses or holes in the work. The carriage G can be adjusted or fed transversely to the table E by means of a feed-screw  $v$ , which engages a nut on the carriage and has a bearing in a lug on the guide-plate. The upper portion of the carriage is swiveled to a plate or slide  $w$ , forming the lower part of the carriage, it being secured to said plate or slide by a center bolt 1 and clamping-bolts 2, (Fig. 4 especially,)

which play in suitable slots in the carriage, Fig. 13. The arbor H can be replaced by a spindle I, Figs. 2 and 13, having a center and a face plate, or else a chuck for holding and driving the work. On the table E is also mounted a tail-stock J, which can swivel about a plate J', adjustably secured to the table by bolts entering the slots c' in the latter. A center bolt 3 and clamping-bolts 4 4 permit the tail-stock to be set at any angle within limits, Figs. 1, 3, 5, and 13. To one side of the bed is affixed a lateral extension or bed K, which has ways or guides 5 5 extending at right angles to the ways of the bed A, Figs. 3, 6, 9, and 10. In these ways is fitted a table E', which can be fed in the direction of its length by a feed-screw L, that engages a nut on said table and extends forward to the front of the bed A, where it is provided with a hand-wheel. To this lateral table is removably secured a head-stock B', which can swivel about a center bolt 6, and is secured by clamping-bolts 7 7, extending through suitable slots in the table E'. This head-stock is provided with a rotary arbor 8, adapted to receive a mandrel or chuck M for holding the work, as indicated in Fig. 11. In place of this head-stock B' a tool-post N, Figs. 12 and 13, can be attached in the same manner to the table E'. As shown in these figures, it is provided with a rotary arbor 10, parallel to the main bed and carries an emery-wheel T' for grinding shafts.

In Figs. 1 and 3 I have shown the machine arranged to grind out the interior of the hub of an annular disk W. In this case the work is held in the chuck C of the head-stock B, Figs. 1 and 3, and the arbor provided with the tool or emery wheel T is placed in the bearings of the carriage G and properly fed at the end of each stroke of the table by means of the feed-screw v, the table moving toward and from the work and reversed automatically by the action of the belt-shifting mechanism described. When the hole is to be bored out taper, the head-stock B is placed at an angle. After the hole is properly bored out the face of the disk can be faced off, if desired, by placing it on a suitable mandrel, as M, Fig. 11, secured in the head-stock B' on the lateral table E'. The tool-carriage G being properly adjusted to cause the emery-wheel to act upon the face of the work, the feed and reversal are accomplished as before. If the face of the work is to be oblique with respect to the axis of the same, the head-stock B' is swung about its center bolt and secured at the desired angle.

In turning up a shaft, Figs. 12 and 13, the center spindle I is placed within the carriage G, which latter then acts in the capacity of a head-stock, and the tool-post N is secured to the lateral table E'. The shaft W' is placed between the center of the carriage G and that

of the tail-stock J in the usual way, and is rotated through its connection with the face-plate by a suitable dog. The post N, carrying the emery-wheel T', is fed toward the work by the feed-screw L, and the table E is reciprocated by the means previously described. When it is desired to turn a taper shaft, the axis of the work is set at an angle to the movement of the bed by laterally adjusting or shifting the carriage G and swiveling it about its center bolt 1, Fig. 13, and also setting the tail-stock J at a corresponding angle.

The shaft W' may be considered a mandrel for turning up the cylindrical portions of hollow disks, &c. It will be noticed that by extending the ways over the whole length of the main bed A the table can have a long movement when the head-stock is removed.

In the drawings I have not shown the various counter-shafts and drums for driving the several spindles, &c., such counter-shafts and drums being of the usual construction and arrangement.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a universal grinding-machine, the combination of a main bed constructed to receive a head-stock, longitudinal guides on the main bed, a table fitted to the guides of the main bed, constructed to slide in the direction of the length of the main bed and adapted to receive a stock and a carriage adjustable thereon, a lateral bed provided with ways at right angles to the main bed, a table fitted in the ways of the lateral bed and constructed to receive a stock, and mechanism for feeding the table at right angles to the main bed, substantially as and for the purpose set forth.

2. In a universal grinding-machine, the combination of a main bed with guides extending throughout the length of the same, a table fitted to the guides of the main bed and constructed to slide in the direction of the length of the bed, a carriage adjustable upon the table in the direction of the length of the latter, a transverse feed for the carriage, a rotary arbor having bearings in the carriage and projecting beyond the same, a lateral bed provided with ways at right angles to the guides of the main bed, a table fitted to the ways of the lateral bed, a stock secured to the table and provided with a rotary arbor, and mechanism for feeding the table at right angles to the guides of the main bed, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two witnesses this 15th day of December, 1888.

THOMAS HANDLOSER.

Witnesses:

A. FABER DU FAUR,  
ERNST BILHUBER.