(No Model.)

O. S. WALKER.

GRINDING MACHINE.

No. 581,838. Patented May 4, 1897.

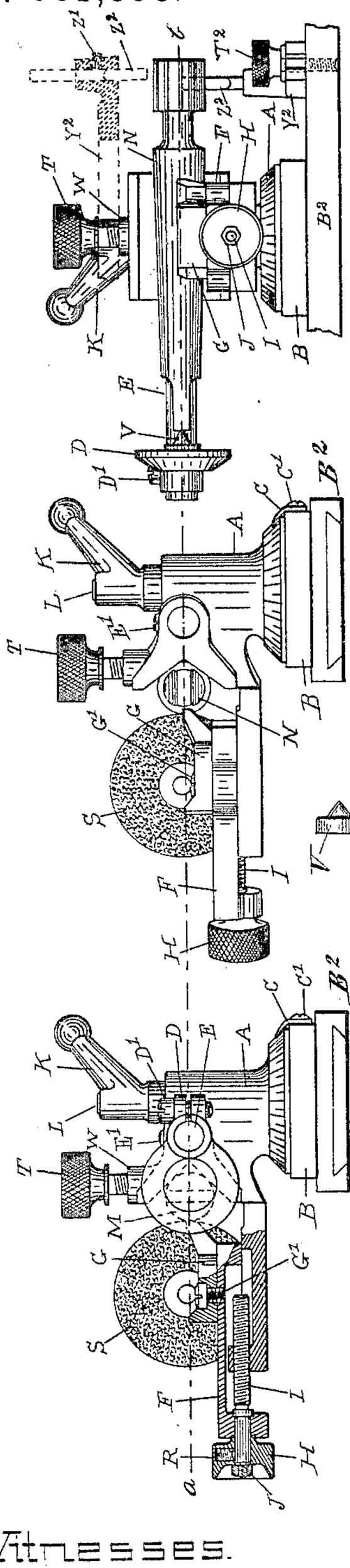

Fig. 6.

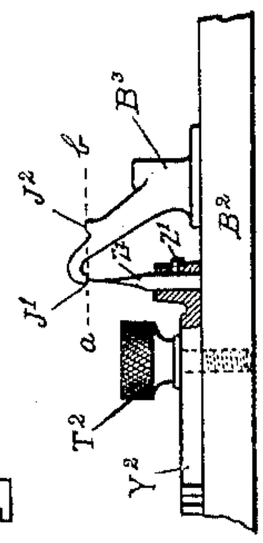

Fig. 7.

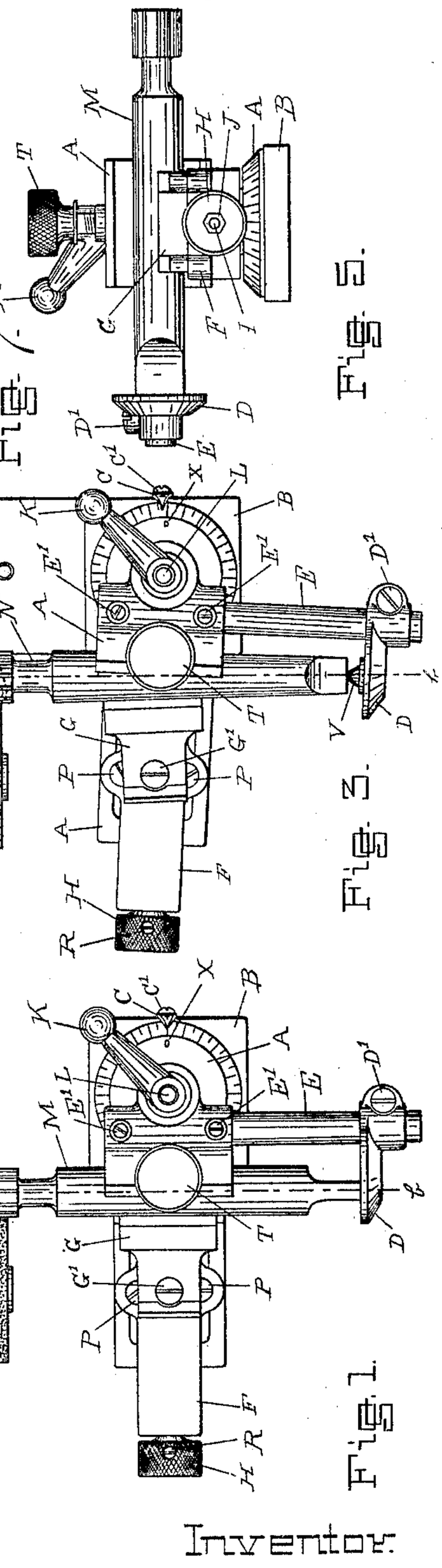

Fig. 5.

Fig. 4.

Fig. 3.

Fig. 2.

Fig. 1.

Witnesses.

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OAKLEY S. WALKER, OF WORCESTER, MASSACHUSETTS.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 581,838, dated May 4, 1897.

Application filed March 5, 1894. Serial No. 502,411. (No model.)

To all whom it may concern:

Be it known that I, OAKLEY S. WALKER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Milling-Cutter and Reamer Grinding Attachment for Tool-Grinding Machines, of which the following is a specification.

My invention relates more particularly to means for chucking or holding milling-cutters and reamers while being ground and to means for adjusting the various parts, the object being to obviate the use of sleeves or sockets ordinarily used in chucking these tools and to provide improved means for adjusting the cutter and reamer tooth rest.

In setting a cutter and reamer grinding machine to grind a taper the top portion of the sliding carriage is usually made to swivel to correspond to the taper required. In sharpening or grinding the clearance on a taper-fluted reamer or milling-cutter it is essential that the face of each tooth while being ground should be exactly in the same plane as the centers upon which the tool is made to rotate, the said plane being parallel to the plane of the swivel adjustment of the sliding carriage before mentioned. To maintain the teeth of the cutters or reamers in the correct position while being ground, a thin spring-steel tooth-rest is usually provided, and the face of each tooth while being ground slides over the said rest. The end of the tooth-rest is adjusted to the exact height required by various means, in many cases by measuring with a rule. In my invention improved means are employed to attain these ends.

In the accompanying drawings, like letters of reference indicating like parts in each, Figure 1 is a plan view of my improved milling-cutter and reamer grinding attachment and showing the same holding a straight-shank milling-cutter. Fig. 2 is an end elevation of Fig. 1. Fig. 3 is a plan view showing the attachment holding a taper-shank milling-cutter with a tooth-rest in place on sliding carriage. Fig. 4 is an end elevation of the attachment with stop D removed. Fig. 5 is a side elevation of Fig. 1, and Fig. 6 is a side elevation of Fig. 3.

A is the main body of the holder, V-grooved upon one side and pivotally clamped to the base-piece B by the ball-handle nut K and bolt L. The base-piece B is intended to be fastened to any suitable sliding carriage, as B^2, Figs. 3 and 6, and arranged to be moved past an abrasive wheel, as S.

Mounted on a projecting arm of the main body of the holder A is the transverse sliding jaw F, operated by the knob H, fastened to screw I, which is threaded into the body A of the holder, as shown. Jaw F is held in place by the screws P, which pass through slots in main part A and are threaded to nuts (not shown) sliding in grooves in under side of part A.

Mounted upon the jaw F is the secondary jaw G, pivoted to jaw F by the screw-stud G′ in such a manner that it adjusts itself automatically to conform to any tapering shank that may be inserted in the holder. For instance, should the straight-shank cutter M, Fig. 1, be removed and the taper-shank cutter N, Fig. 3, be substituted and the jaw G be brought in contact with the tapering side of the cutter it will swing about the screw-stud G′ until the contact-face of the jaw assumes an angular position to coincide with the taper of the cutter-shank, as plainly shown in the plan view, Fig. 3, the other side of the taper-shank being held in the V-grooved portion of the holder integral with the main part A.

It will be seen that the cutters M and N, Figs. 1 and 3, are held with their axes parallel to each other, the correct alinement of cutter N being maintained by swiveling the holder upon its base B to compensate for the divergence of alinement due to the taper of the cutter-shank, the amount of swivel of the holder being gaged by the index-pointer C and graduations on the bottom part of the holder.

Referring to Figs. 2, 4, and 6, it will be seen the bisecting line of the angle of the V-groove in the main part A of the holder is a horizontal line, and also that it coincides with the axial line *a b* of the milling-cutters M and N. It is evident then that the axes of all cutters held in this holder will be in the same horizontal plane, an important advantage in sharpening the teeth of the cutters, as the cutter-tooth rest requires no vertical adjustment except for wear, whatever sized cutter may be held in the holder.

Y^2 is a tooth-rest support which may be clamped either upon the top of the boss W or upon the top of the sliding carriage B^2 by means of the knurled clamping-screws T or T^2, as shown in Fig. 6, one position being shown in dotted lines. Right or left hand teeth are thus provided for.

B^3, Fig. 7, is a tooth-rest gage held down by hand upon the top surface of the sliding carriage B^2. This gage is provided with lugs J′ and J^2, one having a flat surface on the under side and the other having a flat surface on the upper side, both flat surfaces lying in the line *a b* or at the exact height of the axis of the cutters and the center of the V-groove in the holder.

Adjustably fitted in the end of the tooth-rest support Y^2 is the tooth-rest Z^2, a thinned end of which is adjusted in line with the center of the cutter by means of the gage B^3, before mentioned, which also serves to detect any wear of the said rest.

D is an adjustable stop for the longitudinal movement of the cutters while being rotated from one tooth to another. It is clamped to the bar E by the gripping-screw D′.

V is a separate flanged center the point of which is inserted in the countersunk hole in the end of a cutter-shank. The flanged portion of the center abuts against the stop D and will adjust itself thereon to a concentric position with the cutter-shank N when the same has been forced in a horizontal direction toward the stop D.

The operation of my improved milling-cutter and reamer grinding attachment is as follows: The transverse sliding jaw F is first backed off by means of the knurled knob H until a cutter-shank, as M or N, can be freely inserted in the V-groove of the holder A. The said jaw is then moved up until a corner of the secondary jaw G touches the side of the cutter-shank, when a further movement of the jaw F will cause the jaw G to swing upon the pivot-stud G′ until the complete end surface of the jaw G is in contact with the cutter-shank, as shown in Fig. 3. Should it be desired to remove the taper-shank cutter N and insert the straight-shank cutter M, the same operation is repeated and the jaw G assumes the position as shown in Fig. 1, automatically adjusting itself to the contour of the cutter-shank by pressure of the feed-screw. Having fastened the cutter-shank in the V-groove of the holder, the stop D is next moved along the bar E until it comes in contact with the end of the cutter-shank. It is then clamped by screw D′. A self-adjusting center, as V, Figs. 3 and 6, may be inserted in the center hole in cutter-shank when required, as, for instance, when the tapered shank is flattened, as shank of the cutter N, or when the end of the shank is other than circular. This is a necessary feature in connection with taper-shanks to prevent longitudinal movement when the cutter is rotated in the holder. It is not necessary with straight-shank cutters.

Having adjusted the cutter in the holder, the latter is now swiveled, if required, to bring the axis of the cutter in the correct position. The cutter M, Fig. 1, being straight, both as regards the cutting end and the shank, the holder A is set with the pointer C at the zero-mark X. The cutter N, however, having a straight cutting end and a tapering shank, the holder must be swiveled to bring axis of cutter in correct position for grinding the straight teeth, as previously described, the pointer in this case indicating a certain number of degrees from zero-mark X, which may be calculated from the known taper of the cutter-shank.

Referring to Fig. 6, the cutter N being adjusted in position for grinding, the tooth-rest is set to the proper height to correspond with the lug J′ of gage B^3 and fastened with the set-screw Z′. The tooth-rest support Y^2 is then clamped in position, so that the thinned end of the tooth-rest lies against the face of the tooth to be ground, the jaw F being loosened and the cutter being rotated when necessary. The whole device is now moved up to the grinding-wheel by the adjustments of the sliding carriage, and after being adjusted vertically for cutting clearance of the teeth, which is obtained by adjusting the axes of cutter and grinding-wheel in different and horizontal planes, the same is then moved past the periphery of the grinding-wheel in contact with the same and ground in the usual manner.

To adjust for grinding a new tooth, the knob H is loosened slightly to allow the cutter-shank to turn in the V-groove, which operation is performed by hand. The tooth-rest Z^2 being of spring-steel and thinned at the end easily snaps into the various grooves of the cutter-teeth when the same are rotated. The knob H is tightened after each adjustment and the grinding is proceeded with, the gage B^3 being frequently used to detect any wear of the thinned end of the tooth-rest Z^2. When the cutter-teeth are gaged from the top, as shown in the dotted lines, Fig. 6, the lug J^2 of the gage B^3 is employed.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a cutter and reamer chuck provided with swivel-jaw for holding taper-pieces, the combination of a stop D to limit the movement of the piece longitudinally and a separate detachable center abutting adjustably on said stop, its position on said stop being determined by the position of the center hole in the work being held all as and for the purpose above set forth.

2. In a cutter and reamer chuck for grinding purposes, the combination with a stop D, to limit the movement of the tool longitudinally and a separate detachable center abutting adjustably on said stop in contact with the cutter or reamer shank as and for the purpose set forth.

3. In combination with a milling-cutter and reamer holder, an adjustable tooth-rest arranged to gage the setting of a cutter or reamer tooth, and a tooth-rest gage for setting the said tooth-rest as above fully described.

4. The combination with a cutter and reamer tooth rest of a supporting-holder and a tooth-rest gage arranged with its gaging contact face or faces permanently adjusted in the same horizontal plane with the axis of the cutter to be ground as above set forth.

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Witnesses:
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