J. P. FAY.

Tool-Grinding Machines.

No. 147,921. Patented Feb. 24, 1874.

FIG. 1.

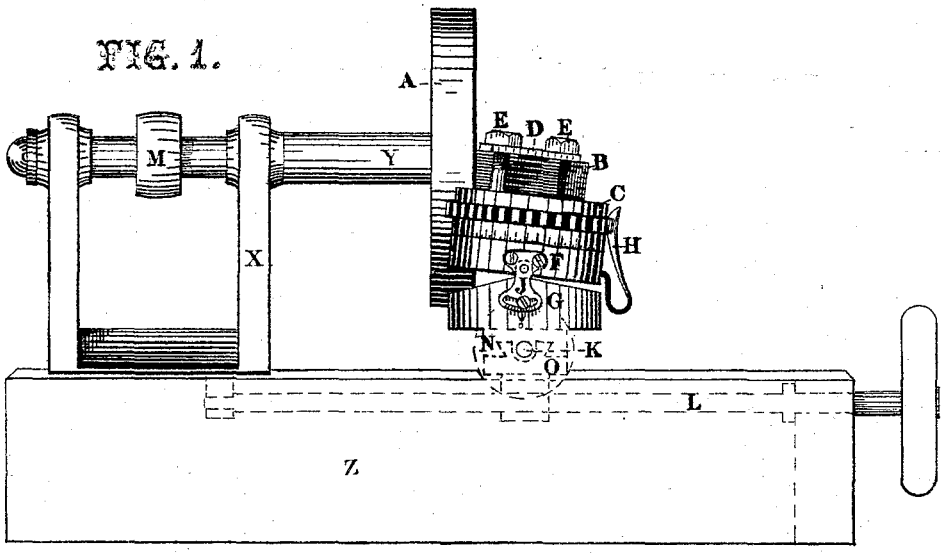

FIG. 2.

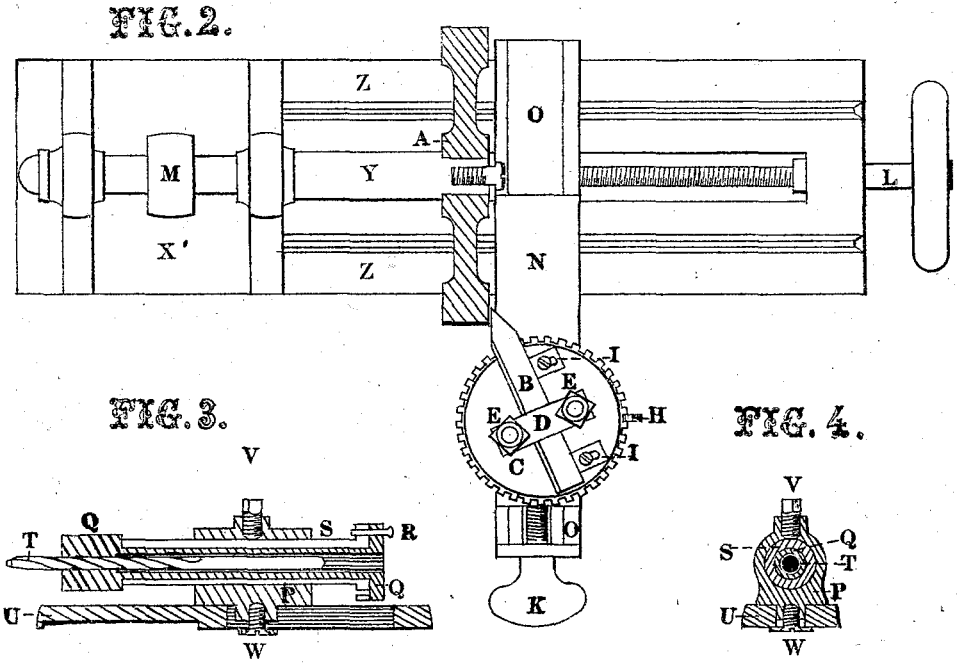

FIG. 3.

FIG. 4.

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IMPROVEMENT IN TOOL-GRINDING MACHINES.

Specification forming part of Letters Patent No. **147,921**, dated February 24. 1874; application filed January 5, 1874.

To all whom it may concern:

Be it known that I, JOHN P. FAY, of the city and county of Worcester and State of Massachusetts, have invented a Tool-Grinding Machine, of which the following is a specification:

The object of my invention is to grind with accuracy and rapidity cutting-tools used for turning, boring, planing, and similar work, by the application, in a grinding-machine, of a stone or emery wheel, A, of peculiar form, an adjustable, traversing, tool-holding device, C F G, Figs. 1 and 2, and a drill-holding attachment, Figs. 3 and 4, of the accompanying drawing.

Figure 1 is a front elevation, and Fig. 2 a plan view, showing the principal parts of a machine according to my invention. Fig. 3 is a longitudinal vertical section, and Fig. 4 a transverse vertical section, at the line V in Fig. 3, of the drill-holding device, which is attached, for the purpose of grinding drills, to tool-block C, in place of tool B, by means of bolts E E.

Z is the bed of the machine, having ways similar to a lathe. X is a head-stock, firmly bolted to the bed Z, and serves as a bearing to the shaft Y, which shaft is revolved by a belt and pulley, M. A is a stone or grinding-wheel fastened upon shaft Y, and revolving with it. Grinding may be done upon the periphery, or on either face of this wheel, but my invention is more especially designed to grind on the faces of the wheel. B shows a machinist's screw-thread-cutting tool in position to have one edge ground. Said tool B is held upon the tool-block C by means of the strap D and bolts E. The tool-block C is secured to the upper face of a similar circular block, F, by means of a central vertical bolt, upon which it may revolve freely for the purpose of bringing the edge of the tool B to any desired angle with the face of the grinding-wheel A. Projecting from the circumference of the block C is a circle of seventy-two numbered teeth, between which the spring-latch H falls to mark the angle, and to hold the block C from turning, the latch H being fastened at its lower end to the block F. At its lower edge the circumference of the block C is graduated by one-degree marks, to be read from a 0-mark upon the block F, when very accurate work is desired. From the front and rear edges of the top of the block G rise two ears, one of which is shown by a dotted curve above J, between which ears the block F is pivoted to rock from a vertical position either to the right or left, for the purpose of canting the tool B, so it may be ground with any degree of clearance. J is a sweep, securely attached to the block F at its upper end, and provided with an opening at its lower end in the form of a circular arc, through which a set-screw passes into the block G, by which means the block F may be securely bound when canted to the position desired. The lower arc of the sweep J has graduated markings by which the cant may be regulated, so that a tool may be ground twice alike, and its two sides made to correspond. The block G is firmly secured to the crrriage N, which is driven by the hand-screw K, to slide upon a dovetailed or gibbed way on the carriage O, across the bed Z, for the purpose of carrying the tool across the face of the wheel A while grinding. The carriage O is fitted to slide longitudinally upon the base of the bed Z, moved by means of the screw and hand wheel L, for the purpose of adjusting the carriage, so that the tool B may be ground first on one edge against one face of the wheel A, and then on the other edge against the other face of the wheel. In order to grind a perfectly-straight edge on a tool, the whole length of the edge must be passed completely across the grinding-face of the wheel. To make this possible, I make my wheel with an annular recess in each face, so as to leave the wheel full thickness only at the hub and rim, as shown in the horizontal section at A, Fig. 2, the grinding-face being about equal in breadth to the thickness of the rim of the wheel, and the annular cavities being broader in a radial direction than the length of any straight edge to be ground. To grind any general tool, bind upon the block C, with its edge as near in line with the face of the grinding-wheel as practicable, cant the block so as to give the right under-clearance, turn the screw L till the edge of the tool touches the wheel, then feed across with the screw K. If not ground enough, turn the screw L forward a little, and repeat the operation. Should it be desirable to grind the tool exactly the

same way another time, set the gage-pieces I I against the side of the tool before removing it, and note the angles marked both by sweep J and by latch H. These being remembered, it is easy to set the tool-holder the same as before.

By the adjustments described, this machine is capable of grinding with perfect accuracy any tool whose edges are made up of straight lines. For grinding drills, and particularly the twist-drills known in commerce, I have adapted the drill-holder, shown in Figs. 3 and 4, to be fastened upon the block C in place of the tool B. T is the twist-drill, inserted in a hollow spindle, Q, on the forward end (at the left in Fig. 3) of which is any concentric chuck for holding the drill firmly. The spindle Q passes through a concentric sleeve, S, in which it is fitted to revolve. Sleeve S is fitted to revolve and to slide longitudinally in a block, P, and may be fastened at any point by set-screw V. The block P has a spline projecting below it, fitted to a longitudinal groove in the bed-piece U, to which it may be securely bound by screw and washer W. The rear end of the sleeve S is provided with a flange, through which are two holes at opposite edges of the circle. Through a similar flange on the spindle Q is one hole, corresponding with either hole in the flange of the sleeve, and a pin, R, fastens the two together. The drill T being set into the chuck far enough to be firmly held, is there fastened. The spindle Q and sleeve S, being pinned, are revolved and pushed forward together till, by comparing the edge of the drill with the side of the grinding-wheel A, the block C may be revolved and set at the proper angle. Then fasten the sleeve S by the set-screw V, and grind the edge. Now pull out the pin R and revolve the drill to the right while grinding, which will give just enough clearance behind a good edge. Then turn the spindle Q over and insert the pin R in the opposite hole of the sleeve S, and proceed as before, when the two edges of the drill will be ground with equal length and equal angles.

I maintain that a twist-drill ground with a plane face at a sufficient angle to clear the back corner will be too thin at its edge to cut and last well, therefore, I set my machine at such an angle as will just give an edge to the drill. Then, by turning the drill forward as described, I give the least possible clearance by forming the cleared portion of the drill-lip into the form of the segment of a right cone.

I claim as my invention—

1. The combination, substantially as herein described, of the circular graduated-toothed tool-block C, strap D, and bolts E E, with the supporting-block F and latch H, for the purpose specified.

2. The combination of the canting-block F and binding-sweep J, with the supporting traversing-carriage N, substantially as and for the purpose described.

3. The drill-holding device, consisting in the combination, substantially as described, of the hollow spindle Q, sleeve S, pin R, binding-screw V, block P, and bed U, with the traversing tool-carriage and grinding-wheel hereinbefore described, for the purpose set forth.

JOHN P. FAY.

Witnesses:

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