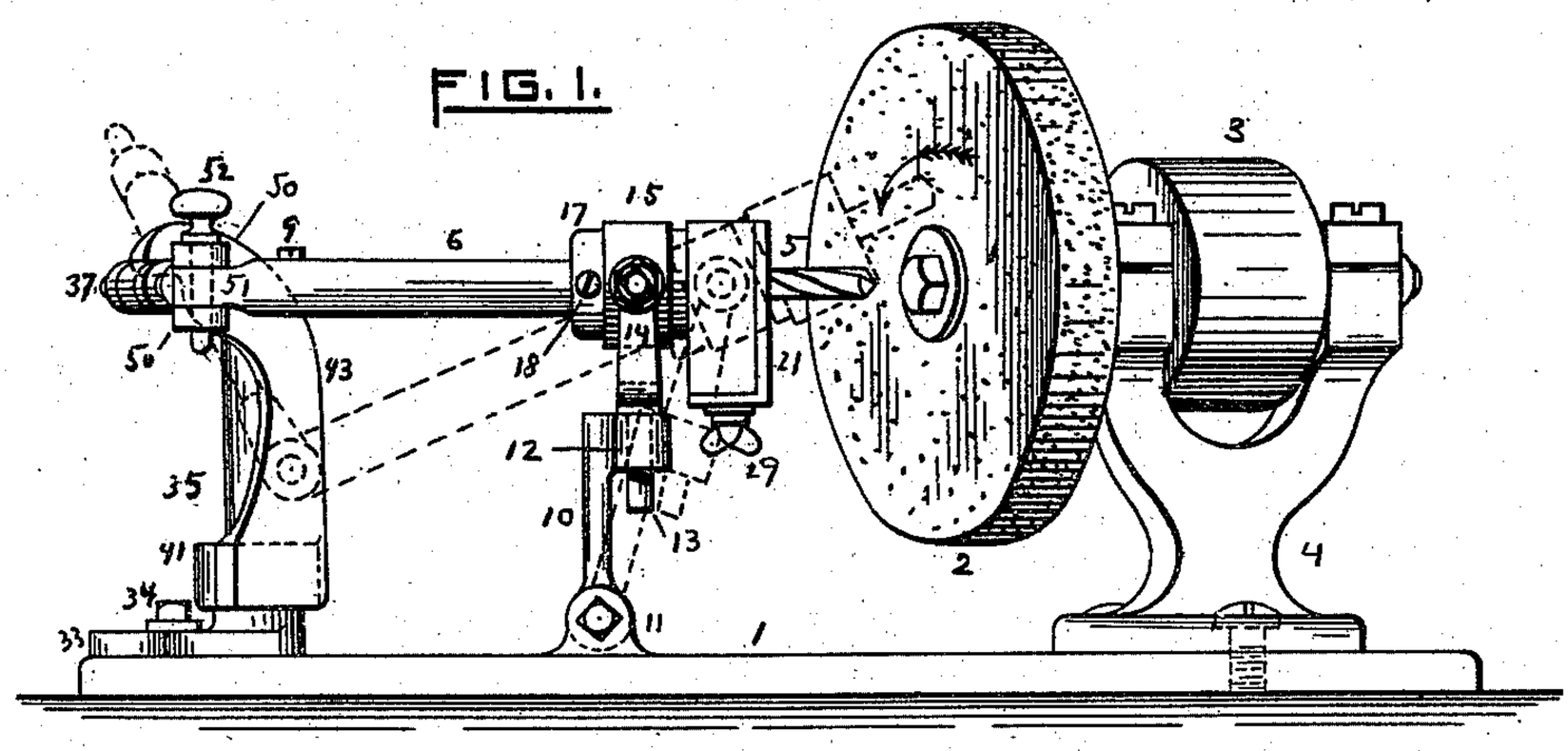
(Model.) 2 Sheets—Sheet 1.

W. G. BUDLONG.

DRILL GRINDER.

No. 571,336. Patented Nov. 17, 1896.

FIG. 1.



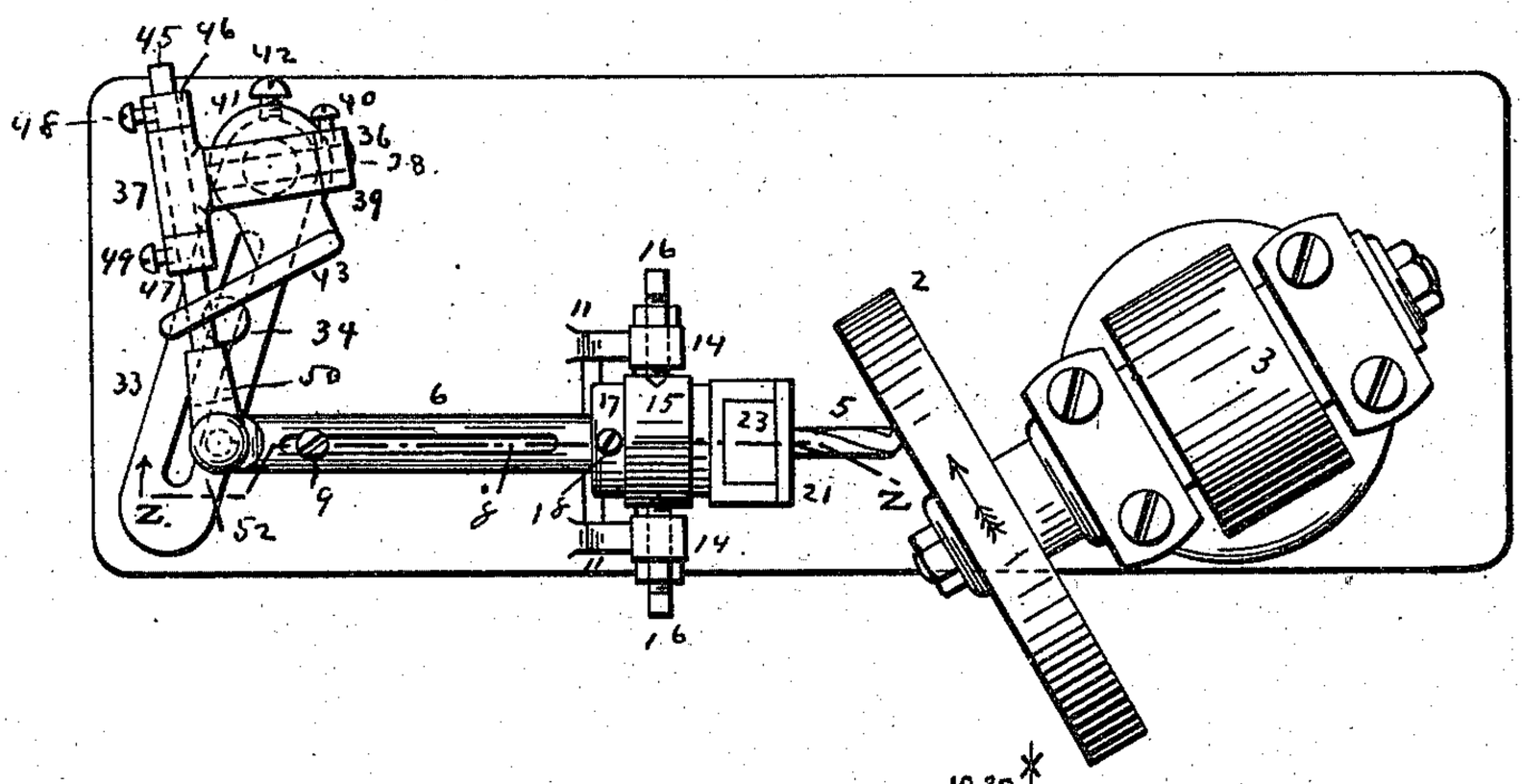


FIG. 2.

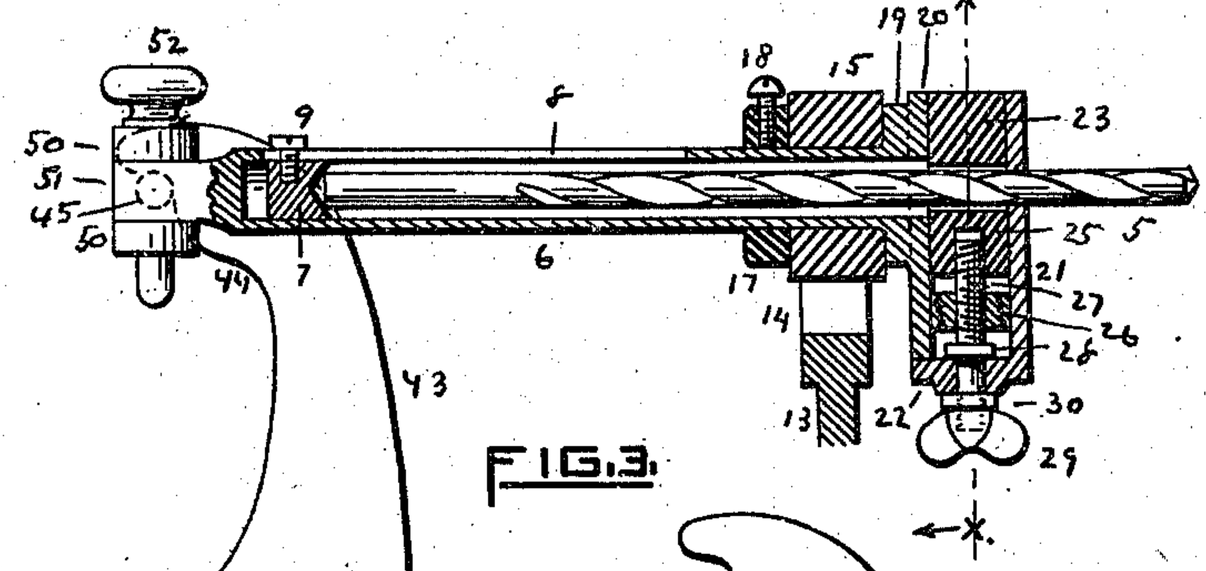


FIG. 3.

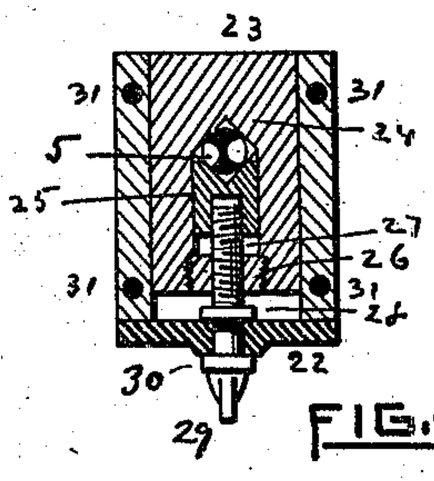


FIG. 4.

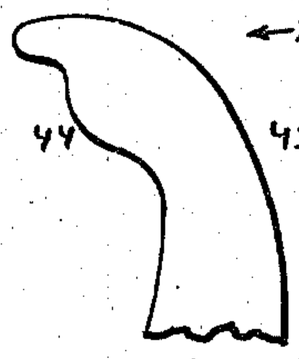


FIG. 5.

WITNESSES.

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Daniel W. Hinkle

INVENTOR.

William G. Budlong

by Warren R. Pine

Atty.

(Model.) 2 Sheets—Sheet 2.

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No. 571,336. Patented Nov. 17, 1896.

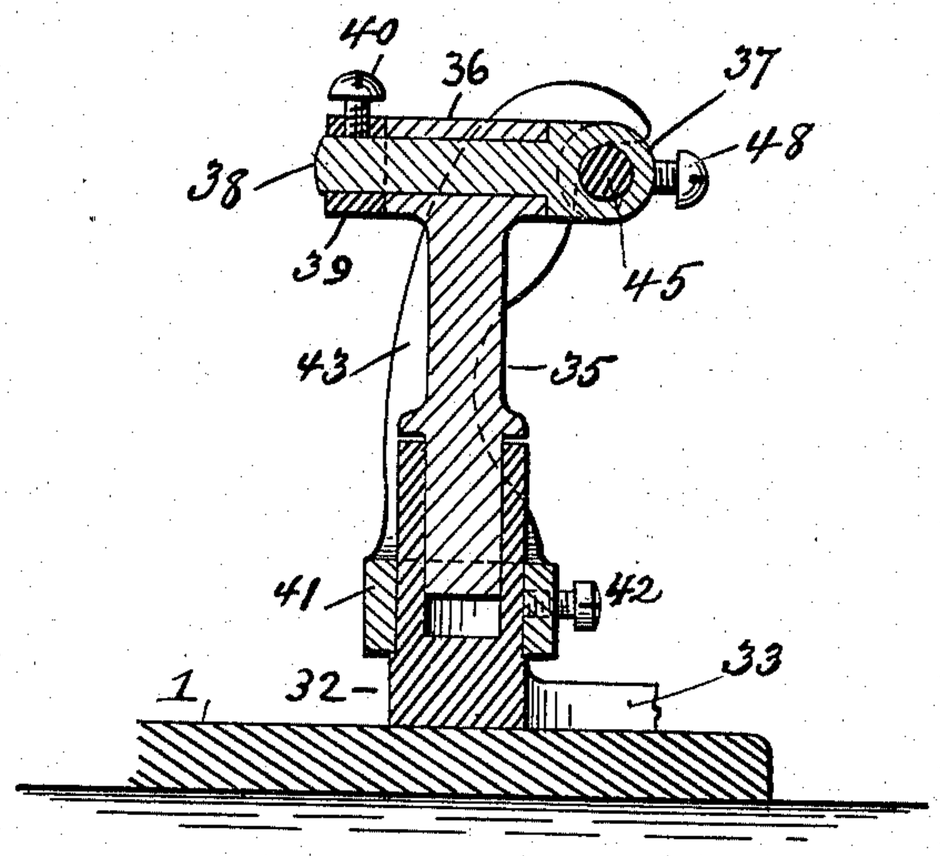

FIG. 6.

WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM G. BUDLONG, OF PROVIDENCE, RHODE ISLAND.

DRILL-GRINDER.

SPECIFICATION forming part of Letters Patent No. 571,336, dated November 17, 1896.

Application filed June 18, 1895. Serial No. 553,188. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM G. BUDLONG, of the city and county of Providence, in the State of Rhode Island, have invented a certain new and useful Improvement in Drill-Grinders; and I declare the following to be a specification thereof, reference being had to the accompanying drawings.

Like numerals indicate like parts.

Figure 1 is a side elevation of my improved drill-grinder. Fig. 2 is a top plan of the same. Fig. 3 shows the fixed guard or guide in side elevation and the tool-holder with its universal joint and head-piece in section on line *z z* of Fig. 2 with the drill shown in side elevation in position therein. Fig. 4 is a view of the head-piece of the tool-holding device as seen in section on line *x x* of Fig. 3. Fig. 5 is a side elevation of the upper portion of the guard or guide with its cam edge. Fig. 6 is a view in central vertical section through the stand, post, head, and connected parts.

My invention is a device for grinding drills; and it consists of the novel construction and combination of the several parts and elements hereinafter particularly described, and specifically set forth in the claims.

In the drawings, 1 is the bed of the machine. The emery-wheel or cutting-disk is shown at 2, mounted as usual upon a shaft to which the driving-pulley 3 is secured. Said shaft is mounted in suitable bearings, which are supported by a standard 4, secured to the bed 1, as shown in Fig. 1. This grinding mechanism is set at an angle upon the bed 1, as seen in Figs. 1 and 2, to enable the proper angular presentation of the drill to the emery-wheel 2 to be ground thereby, as hereinafter described.

The drill is shown at 5. It loosely enters a tubular tool-holder 6, and its rear end (which is conical, as usual) is brought into snug contact with a cylindrical block 7, which is movable in the bore of the tool-holder 6 and is provided with a conical depression, as shown plainly in Fig. 3. The tool-holder 6 has a longitudinal slot 8 on one side and a set-screw 9 passing through said slot into the block 7.

An oscillating stand 10 is pivotally supported at its bottom between lugs 11 on the bed 1, and is thereby capable of a swinging motion longitudinally of the bed 1. On the upper end of the stand 10 is a seat 12, having a circular bore. A spindle 13 passes through the bore of the seat 12 and has two upwardly-projecting curved arms forming a yoke 14. A ring 15 is mounted diametrically by pivots or set-screws 16 within said yoke 14. A collar 17 is fixed on the tool-holder 6 by a set-screw 18 or otherwise. The tool-holder 6 is rotatably mounted in the ring 15, and has at its forward or open end a collar 19 and a plate 20, all integral therewith.

The plate 20 constitutes a portion of the head-piece by which the forward or operative end of the drill 5 is supported. Said head-piece has in addition to the plate 20 the plate 21 and the flange 22. Between the plates 20 and 21 is a movable block 23, centrally slotted, as illustrated in Fig. 4, with the slot terminating in a V-shaped end, as indicated at 24. In said slot is a movable clamping-block 25, fitting therein and having a similar V-shaped recessed end. A nut 26 is secured to the block 23, as shown in Figs. 3 and 4. A screw 27, having a collar 28, passes with its cylindrical shank through said flange 22, and a thumb-piece 29, having a collar 30, is permanently fastened on the outer end of the screw-shank. The collars 28 30 thus lie on the outer and inner surfaces of the flange 22, respectively. The screw 27 has a left-handed screw-thread engageable with the nut 26, and at its end a right-handed screw-thread of the same pitch, which engages with the movable block or clamp 25. The head-piece is held together by the screws or pins (indicated at 31 in Fig. 4) to make it firm and secure.

At the rear end of the bed 1 a stand 32, having a slotted foot 33, is secured by a set-screw 34 to the bed. This stand 32 has a vertical bore. In this bore is loosely mounted a post 35, having a suitable collar by which it is seated on the top of the stand 32. The post 35 has at its top a head 36, provided with a tubular bore. A sleeve or tube 37 has a spindle (shown in dotted lines in Fig. 2 at 38) which extends through the head 36 of the post 35, and at its end is a collar 39, fastened to the spindle by a set-screw 40. Upon the stand 32 is rotatably mounted a collar 41, which has a set-screw 42, and to said collar is fastened a guard or guide 43, having a cam edge 44.

A rod 45 is longitudinally movable in the

sleeve 37, and has collars or stops 46 47 with set-screws 48 49, whereby its position in the sleeve 37 is adjustably determined. At the end of the rod 45 is the bifurcated ear-piece 50. The rear end of the tool-holder 6 is formed into a lug 51, and said lug and ear-piece are pivotally connected by a knobbed pin 52.

Having thus described the several parts of my device, I will now explain its method of operation.

The drill 5 to be ground is first placed in the proper position in the tool-holder 6, and the block 7 is brought up into contact with it, said block being movable lengthwise of the tool-holder in the bore thereof, but prevented from turning in said bore by the set-screw 9, which passes through the slot 8 of the tool-holder. When brought into the proper position, the block 7 is fastened by turning the set-screw 9. The engagement of the conical end of the drill with the conical depression in the block 7 automatically centers the drill in the true central or axial line of the tool-holder so far as the rear end of the drill is concerned. The forward end of the drill which is to be ground is centered by turning the screw 27 by its thumb-piece 29, and this movement of the screw (which has a right-handed and a left-handed screw-thread of the same pitch as before described) causes the clamps or blocks 23 and 25 to approach each other and to force, by their V-shaped transversely-slotted recesses, the drill 5 into the position shown in Figs. 3 and 4. As the geometrical center of the conical depression in the block 7 within the tool-holder 6 and the geometrical center of the double-V or diamond shaped aperture between the blocks or clamps 23 25 are in the one true axial line of the tool-holder 6 the drill is in this way accurately centered. The drill 5 thus held is now advanced in a straight line to the angularly-disposed edge of the emery-wheel or cutting-disk 2 by the hand of the operator, who seizes and moves the knob 52 in that direction. By moving said knob 52 downward the tool-holder and connected parts are brought into the position indicated by the dotted lines in Fig. 1. The motion thus communicated gives to the forward end of the drill that double-curved movement which causes it to be ground by the emery-wheel with the proper "clearance." This peculiar movement results from the combined operation of the universal joints mounted, respectively, on the oscillating stand 10 and the fixed stand 32, which may be analyzed as follows: The tool-holder 6 has a slight rotary movement in the ring 15. The rear end of the tool-holder 6 describes an arc whose radius is that portion of the rod 45 extending from a point thereof opposite to the axial line of the spindle 38 to the pin 52, and the slight swiveling of the post 35 in the stand 32, and the slight swiveling of the spindle 13 in the seat 12 of the oscillating stand 10. The exact degree of clearance is given to the sharpened end of the drill by the operator's pressing the rod 45 against the cam edge 44 of the guard or guide 43. By simply pressing and bearing down on the knob the rod 45 is made to follow the cam edge 44 of the guard or guide 43, and this gives the accurate movement to the drill as it is presented to the grinding edge of the wheel 2 to grind down the lip of the drill on one side to the desired degree of clearance. To grind the opposite lip of the drill, it is only necessary to remove the knobbed pin 52 and to disengage the lug 51 of the tool-holder 6 from the ear-piece 50 of the rod 45 and to turn the tool-holder 6 a half-revolution. Then by connecting the ear-piece 50 and lug 51 by the pin 52, again the opposite lip of the drill is ground in the same manner as already described. It is evident that the two lips of the drill are thus ground with exactly the same clearance, the drill during the entire operation being held firmly in a truly-centered axial direction.

The longer the radial distance of the rod 45 from its center of oscillation to the end thereof, which is jointed to the tool-holder 6, the greater will be the arc of the clearance of the drill. The shorter said radial distance the less will be the arc of the clearance, and this adjustment is effected by moving the collars 46 and 47 on the rod 45 and fastening them by the set-screws 48 49 in the proper position. The clearance can also be modified by sliding the foot 33 of the stand 32 and securing the stand in the new position by the set-screw 34. The clearance may be further modified by an adjustment of the guard or guide 43 upon the stand 32, thus varying the pitch or angle of the cam edge 44 thereof. The oscillation of the stand 10 accommodates and allows the proper advance and withdrawal of the drill to and from the grinding-wheel 2.

The sliding block 7, when secured in position within the tool-holder 6, not only serves to center the drill and support it at its rear end, but also resists the endwise back thrust of the drill when the latter is pressed forward against the grinding-wheel.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In a drill-grinder, a drill-clamping device, consisting of a movable block, properly mounted and having a central slot terminating in a V-shaped recess, a clamping-block, movable in said slot but not rotatable therein and made with a V-shaped recess, a nut fixed in said slot, and a screw, properly mounted and made with a right-handed and left-handed screw-thread, as shown, engageable with said nut and clamping-block and arranged centrally with respect to said slot, nut and clamping-block, substantially as specified.

2. The combination of an oscillating stand, a yoke provided with a spindle which is rotatably mounted in said stand and a ring pivotally and diametrically mounted in said yoke

and adapted to sustain a tool-holding device, substantially as described.

3. The combination of an oscillating stand, a yoke pivotally mounted thereon, a ring pivotally mounted in said yoke and a tubular tool-holder supported in said ring, substantially as described.

4. The combination of an oscillating stand, a yoke pivotally mounted therein, a ring pivotally mounted in said yoke, a tubular tool-holder supported in said ring and a sliding block within said tube to center and support a tool, substantially as shown.

5. The combination of an oscillating stand, a yoke pivotally mounted therein, a ring pivotally mounted in said yoke, a tubular tool-holder provided with a longitudinal slot, a sliding block within the tool-holder and a set-screw passing through said slot into said block, substantially as and for the purpose set forth.

6. In a drill-grinder the combination of an oscillating stand provided with a yoke pivotally mounted thereon, a ring pivotally mounted in said yoke, a tool-holder rotatably mounted and connected with said ring, a swiveling post, a rod pivotally mounted on said post and jointed at its end with the end of said tool-holder, substantially as specified.

7. In a drill-grinder, the combination of a rotatably-mounted tool-holder, a swiveling post, a rod pivotally mounted on said post and jointed to the end of the tool-holder and a guide having a cam edge, all operating substantially as and for the purpose specified.

8. In a drill-grinder, the combination of an oscillating stand, a tool-holder rotatably mounted thereon, a swiveling post, a rod pivotally mounted on said post and jointed to the end of the tool-holder and a guide having a cam edge, substantislly as shown.

9. In a drill-grinder the combination of an oscillating stand provided with a universal joint, a tool-holder rotatably mounted and connected with said joint, a swiveling post, a rod pivotally mounted on said post and jointed to the end of the tool-holder and a guide having a cam edge, substantially as specified.

10. In a drill-grinder the combination of a rotatably mounted tool-holder, a swiveling post, a rod pivotally mounted on said post and jointed to the end of the tool-holder and an adjustable guide having a cam edge, substantially as shown.

11. In a drill-grinder, the combination of an oscillating stand, a tool-holder rotatably mounted thereon, a swiveling post, a rod pivotally mounted on said post and jointed to the end of the tool-holder and an adjustable guide having a cam edge, substantially as specified.

12. In a drill-grinder, the combination of a rotatably-mounted tool-holder, a pivotally-mounted rod having a jointed connection with said tool-holder and provided with adjustable stops adapted to regulate the radius of the arc of curvature described by said jointed connection, substantially as set forth.

13. The improved drill-grinder, herein described, having a bed, a standard thereon supporting a grinding-wheel and also an oscillating stand and a rear stand, a rotatable tubular tool-holder, slotted longitudinally and having at its forward end a head-piece provided with adjustable clamps to seize and center the drill, a sliding block within the bore of the tool-holder and provided with a set-screw passing through said slot, a swiveling yoke mounted on the oscillating stand, a ring pivotally mounted in said yoke and surrounding the tool-holder, a swiveling post mounted in the rear stand, a rod pivotally mounted on said post and provided with adjustable stops and connected at its end by a joint with the rear end of the tool-holder and an adjustable guide having a cam edge, all combined and operating substantially as shown and for the purpose specified.

WILLIAM G. BUDLONG.

Witnesses:
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