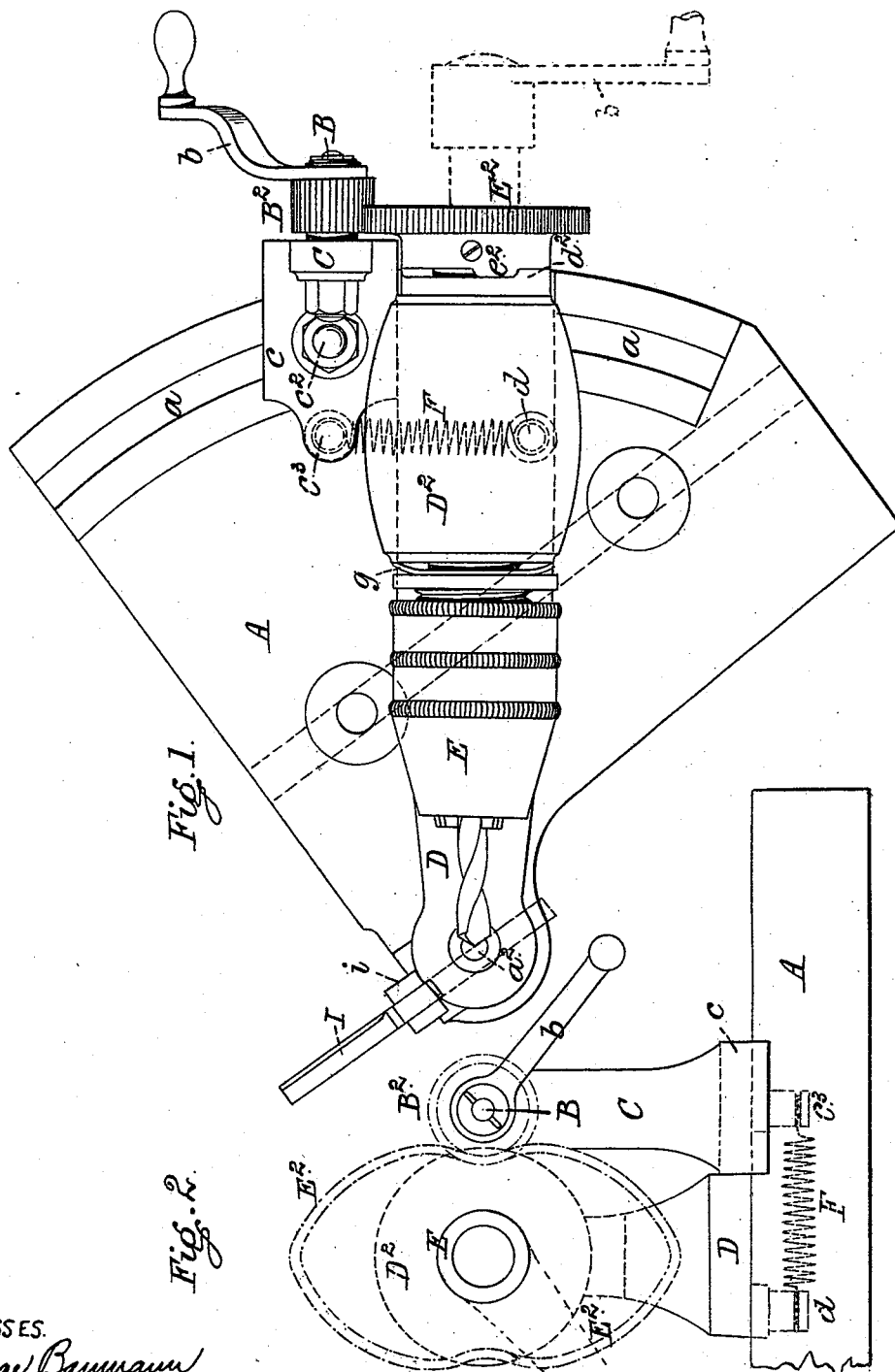


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APPARATUS FOR GRINDING THE POINT ENDS OF DRILLS, &c.

No. 490,588.

Patented Jan. 24, 1893.



WITNESSES.

George Baumann
James Grace

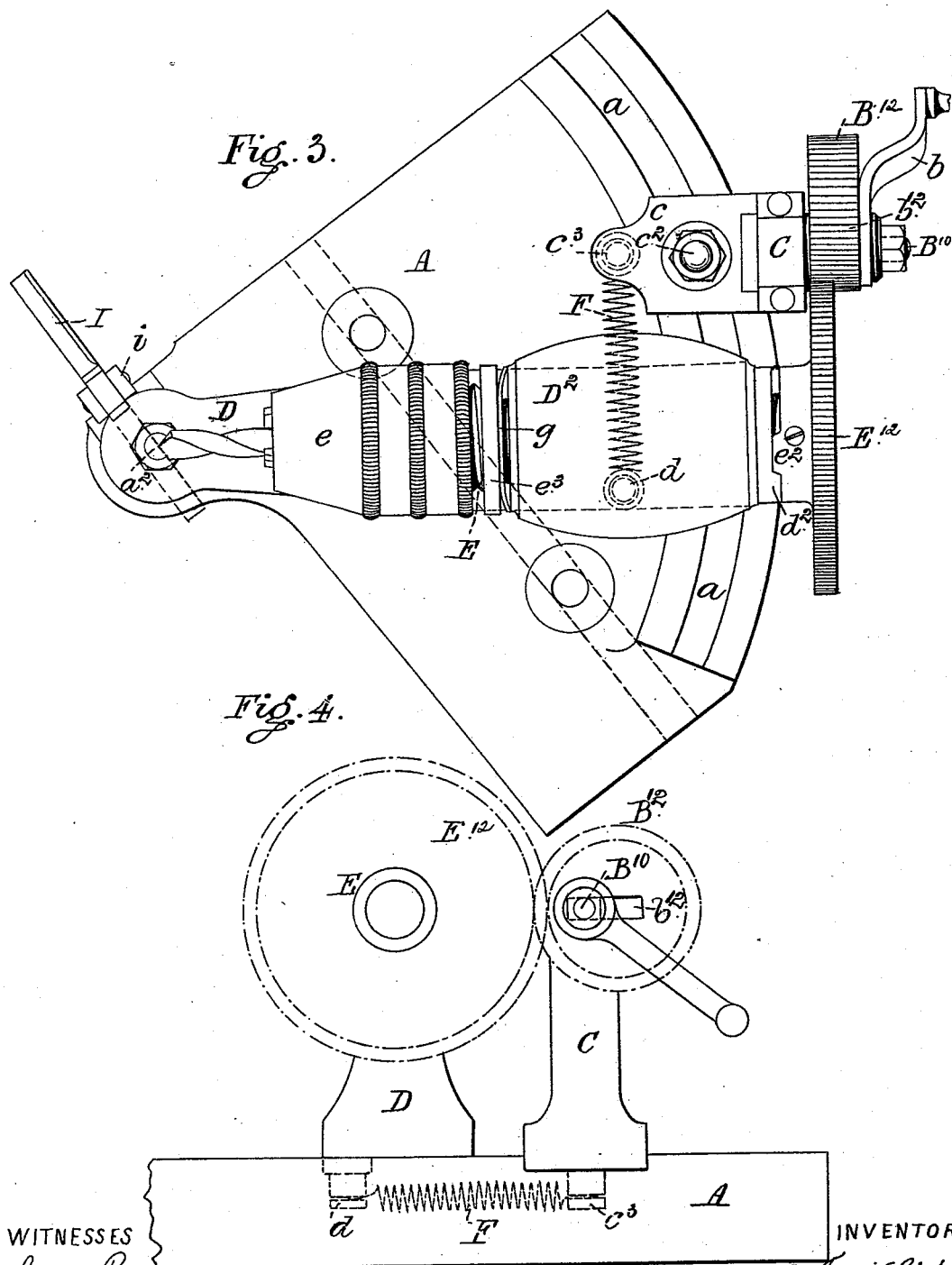
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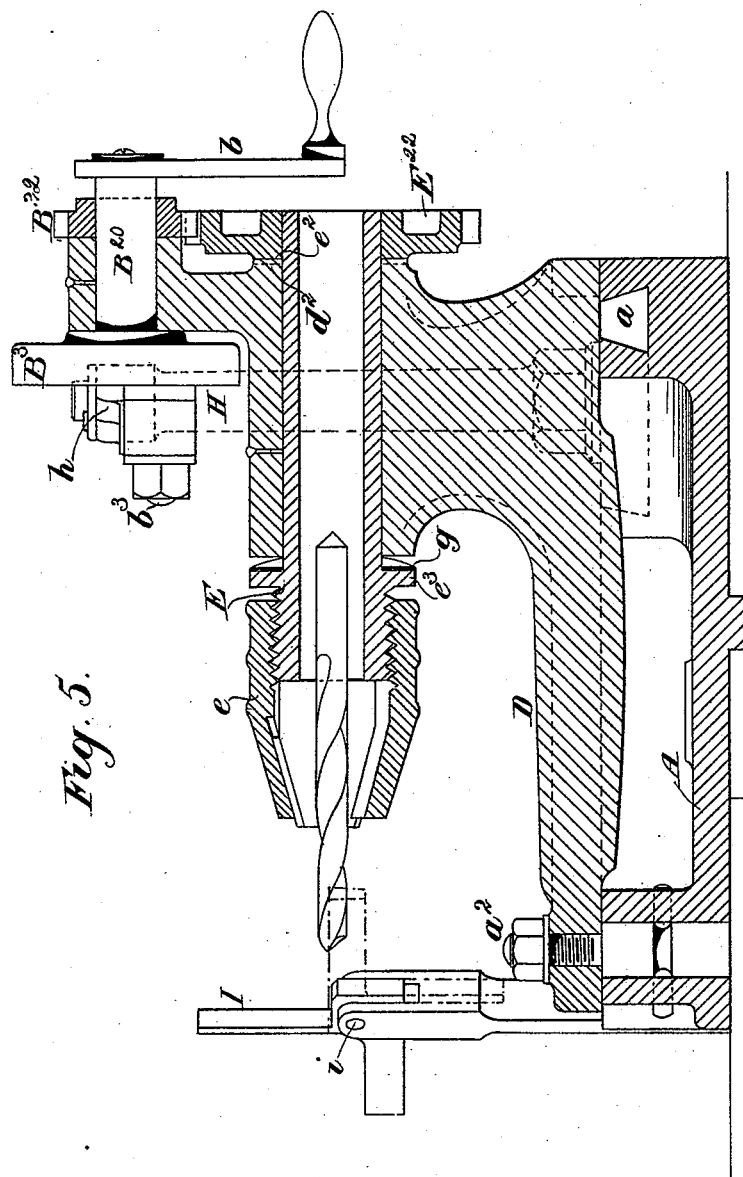


Fig. 5.

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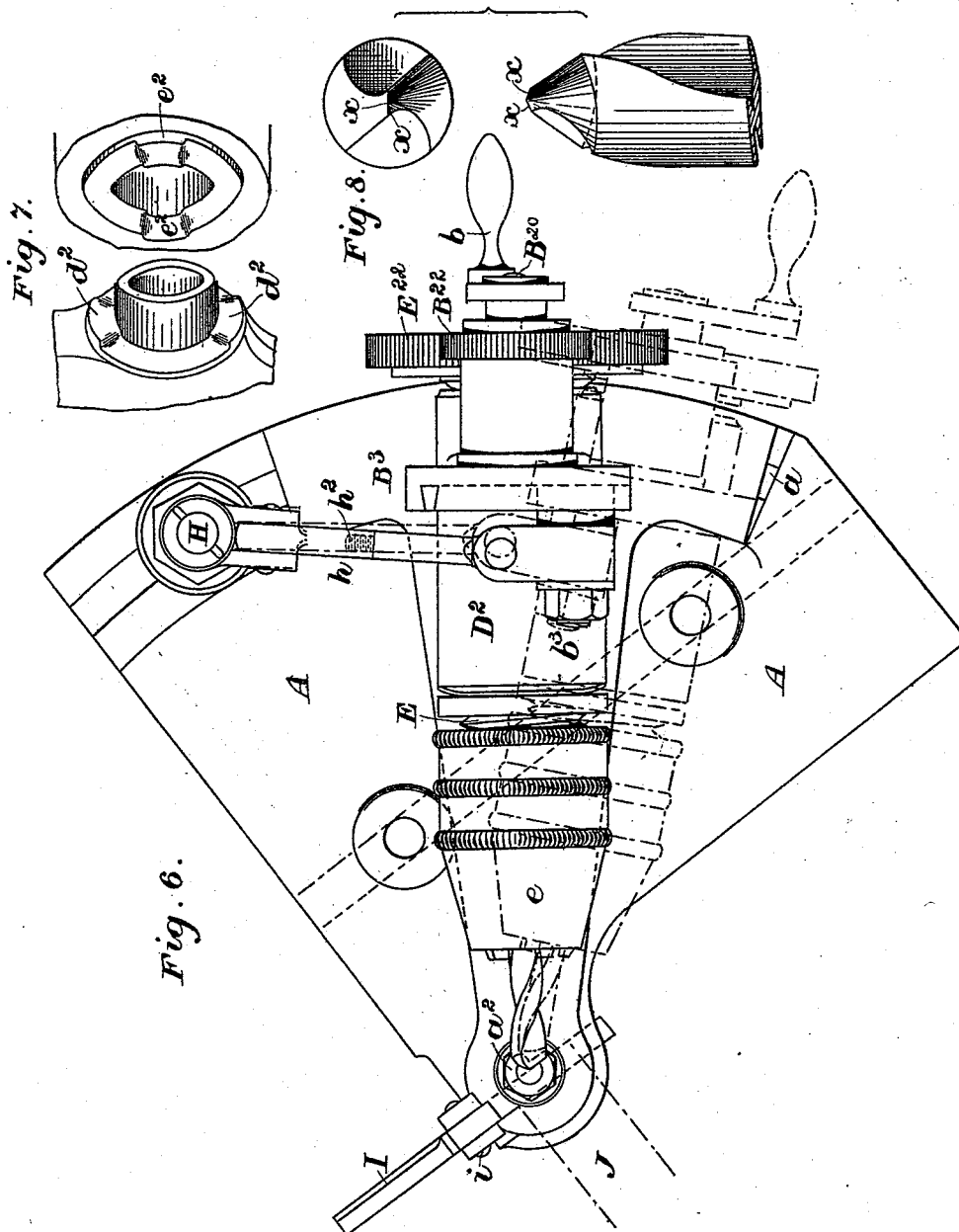
Howson & Howson

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UNITED STATES PATENT OFFICE.

ALFRED PALMER AND FRANCIS ERNEST BLACKMORE, OF READING,
ENGLAND.

APPARATUS FOR GRINDING THE POINT ENDS OF DRILLS, &c.

SPECIFICATION forming part of Letters Patent No. 490,588, dated January 24, 1893.

Application filed June 27, 1892. Serial No. 438,349. (No model.)

To all whom it may concern:

Be it known that we, ALFRED PALMER, biscuit-manufacturer, of the firm of Huntley & Palmers, residing at Reading, and FRANCIS ERNEST BLACKMORE, engineer, in the employ of the said firm, residing at 55 Queens Road, Reading, in the county of Berks, England, have invented certain Improvements in Apparatus for Grinding the Point Ends of Drills or for Like Grinding Operations, of which the following is a specification.

The object of this invention is to provide apparatus for grinding the point ends of drills or for like operations and is especially suited for efficiently grinding the point ends of twist drills so that they are ground or "backed off" by one continuous operation without requiring adjustment for different sized drills, but capable of ready adjustment to grind the point ends to any required angle and with any required degree of "backing off," the grinding being effected so as to give an equal amount of clearance and length of lip at both sides. The apparatus moreover enables the drill to be ground so that it has a true central point at its end so that the drill can be started to work in a very small center hole and the drill during its work continues to make its own center on which it works so as to keep the drill true and prevent its sides bearing upon the sides of the hole being bored, which is a defect in the use of drills as hitherto ground without a true central point.

An apparatus constructed according to this invention consists of a frame or bed plate which may be mounted in connection with an emery wheel or like grinding device as usual. The drill to be ground is held in a holder capable of revolving in a bearing on an arm centered to the bed plate at the end nearest to the emery wheel and at a point such that the point of the drill being ground is in the axial line of the center on which the said arm turns. The said arm is adjustable to the angle to which the point end of the drill is to be ground. This angle may be determined by a gage bar which is arranged to be brought into its gaging position so that its gaging edge is truly parallel with the transverse line of the periphery of the emery wheel and cuts at a right angle the aforesaid axial line. The

holder carrying the drill is rotated and as it rotates the arm carrying the bearing of the said holder is vibrated or oscillated upon its center to alter the angle at which the point end of the drill is presented to the emery wheel so as to give on each side of the point end the deviation from a cone corresponding to the amount of "backing off." To give the proper cutting edge at the part of the point end of the drill which is between the grooves in the drill the drill is withdrawn from the emery wheel or grinding device when each groove comes opposite the said wheel or device.

In order that our invention and the manner in which it may be carried into practical effect may be well understood we will describe with reference to the accompanying drawings machines constructed in accordance with our invention.

Figure 1 is a plan and Fig. 2 an elevation of one arrangement. Figs. 3 and 4 are corresponding views of a modified arrangement; and Figs. 5 and 6 are respectively a sectional elevation and a plan of a further modification in the arrangement. Fig. 7 shows a detail common to all the arrangements shown which are in principle the same and we have marked the parts which correspond in the several arrangements with the same letters of reference in all the figures; Fig. 8 shows a top and a side view of the point end of the drill.

Referring to Figs. 1 and 2, A is the bed plate and B is the first motion shaft or stud carried in a bearing upon a standard C having a foot *c* which is provided with a projection engaging in the groove *a* in the bed plate A and fixed in a position (according to the angle of the point end to be ground) by the screw and nut *c*². The groove *a* is an arc struck from the center *a*².

b is a handle secured to a pinion B³ mounted loosely on the shaft or stud B but the pinion may be provided with a pulley for operating it by power.

D is the movable arm centered to the bed plate A at *a*², the point of the drill being operated upon being situated in the same line as the axial line of the center *a*². The said arm D has in it a bearing D² in which rotates the drill holder E in which the drill is secured

by a chuck *e* or in any other convenient way. A spring *F* connected at one end to the pin *c*³ and at the other end to the pin *d*, respectively on the foot *c* and the arm *D* draws the said arm *D* toward the foot *c*. The pinion *B*² mounted on the first motion shaft or stud *B* engages with a toothed cam wheel *E*² on the end of the drill holder *E* which cam wheel is so shaped that as the eccentric or projecting portions thereof come into gear with the pinion *B*² the drill holder carrier *D* is moved away from the foot *c* and the angle at which the drill is presented to the grinding wheel is altered twice in each revolution of the drill holder and consequently the drill point is ground to the amount of backing off to be given to the said point end at each side of the drill during each revolution thereof, the arm *D* carrying the drill holder turning upon its center *a*² when the revolution of the cam wheel causes the said arm to be moved away from the foot *c*. By using cams of different throws the degree of backing off can be varied as desired.

The point of the drill being operated upon being as aforesaid situated in a line with the axial line of the center *a*² has a true point imparted to it. In order to make the sharp edges at *x x*, Fig. 8, of the drill it is necessary to withdraw the drill from the emery wheel when the gaps or channels of the drill between each of the sides being ground come opposite the said wheel. To effect this the drill holder is moved endwise in the direction of its axis at such time which may be effected by a face cam *e*² on a collar on the holder bearing on a corresponding face cam *d*² on the bearing *D*² of the said holder. The spring *g* between the bearing *D*² and the collar *e*³ on the holder presses the cam face *e*² against the cam face *d*². There are two cams on the faces *e*² *d*² corresponding to the two gaps or channels in the drill being ground as shown in Fig. 7.

The gearing or device for giving the movement described may be arranged in other ways, for instance the operating handle hand wheel or pulley by which rotation is given to the tool holder may be fixed on the axis of the tool holder and wheel *E*², as shown in dotted lines in Figs. 1 and 2, and then the wheels *E*² and *B*² can be without teeth the rotation of the cam wheel *E*² against the roller *B*² given the vibratory or oscillatory movement to the arm *D* as aforesaid.

Figs. 3 and 4 show an arrangement wherein both gearing, pinion *B*¹² and wheel *E*¹² are true circles, the pinion being mounted on an adjustable and fixable pin or being adjustable and fixable on a pin or stud *B*¹⁰ by the nut and screw as shown, the said pin having a squared part engaging in a slot *b*¹² in the pinion *B*¹² to adjust the degree of throw given to the drill holder by altering the eccentricity of the pinion *B*¹², or the axis of the toothed wheel on the holder may be capable of moving and of being adjusted in a slot. The pin-

ion *B*¹² and wheel *E*¹² are kept in gear by the spring *F* arranged as hereinbefore described.

Figs. 5 and 6 show an arrangement wherein the driving pinion *B*²² and its shaft or stud *B*²⁰ are carried in a prolongation of the bearing *D*², the vibration of the arm *D* upon its center *a*² being obtained by means of a disk *E*³ having in it a groove in which is adjustable the crank pin *b*³ connected by the rod *h* to a standard *H*, the connection being made so as to allow the rod *h* to swivel in either direction and to meet any twisting movement there may be in the rod *h* it can be formed in two parts connected by screwing the one into the other at *h*². When the pinion *B*²² is rotated it rotates the drill holder as in the other arrangements and the disk *B*³ being constrained by the movement rod *h* secured to the fixed standard *H* causes the arm *D* to vibrate on its center *a*² twice during each rotation of the drill holder the pinion *B*²² being half the diameter of the wheel *E*²². By adjusting the pin *b*³ in the groove in the disk *B*³ the amount of backing off can be varied. To bring the point of the drill into the correct position in its holder before being fixed so that it is in the same line as the axial line of the center *a*² a gaging bar *I* is provided which is shown by the full lines out of its gaging position. Its gaging position is shown in dotted lines, its gaging edge in that position cutting at a right angle the aforesaid axial line. *J* indicates the position of the emery wheel when the drill is being ground.

It will be evident that the machine may be made to grind drills having other number than two ribs and grooves, the gearing and cams being arranged to give a number of vibrations to the arm *D* in accordance with the number of wings or ribs and grooves in the drill to be ground and the cams *d*² *e*² being in number and position such as to withdraw the drill as each groove comes opposite the grinder.

The apparatus may be used for grinding twist drills, points or drill points generally or for such other grinding operations as it is or may be applicable to.

We claim as our invention:—

1. In an apparatus for grinding the points of drills and the like, a drill carrier capable of oscillating or vibrating on a center the extreme point of the drill being gaged so as to be situated in the same axial line as that of the center on which the said carrier oscillates or vibrates in combination with means for rotating the drill and means whereby as the drill rotates the angle of the carrier is altered by being turned upon the said center to give the required backing off at each wing or rib of the drill on each revolution thereof substantially as hereinbefore described.

2. In an apparatus for grinding the points of drills or the like, a carrier for the drill and means for rotating it and means whereby as the drill revolves the angle of the carrier is altered to give the required backing off at

each wing or rib of the drill at each revolution thereof and means for removing the drill from the grinder as each groove in the drill comes opposite to it, substantially as and for the purpose hereinbefore described.

5 3. In an apparatus for grinding the points of drills and the like, the combination of a bed plate, an arm centered on the bed-plate, a rotating drill holder carried by the said arm, and a groove in the bed plate the said groove being an arc having its center in axial line with the center of oscillation of the arm, with a standard adjustable in the said groove and connections between the standard and the drill holder and arm to rotate the drill holder and oscillate the arm, all substantially as and for the purposes set forth.

10 4. In an apparatus for grinding the points of drills, the combination of a bed plate having an arm centered thereon and a groove be-

ing an arc having its center in axial line with the center of oscillation of the said arm, a rotating drill holder carried by the arm, two cam surfaces, one on the arm and one on the drill holder, adapted to act upon each other, with a standard adjustable in the said groove, and connections between the standard and the drill holder and arm to rotate the drill holder and oscillate the arm, all substantially as and for the purposes set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALFRED PALMER.

FRANCIS ERNEST BLACKMORE.

Witnesses:

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