April 9, 1929. F. J. HOHNHORST 1,708,575

MECHANISM FOR TRUING AND DRESSING GRINDING WHEELS

Filed Jan. 31, 1927 2 Sheets-Sheet 1

Fig. 1

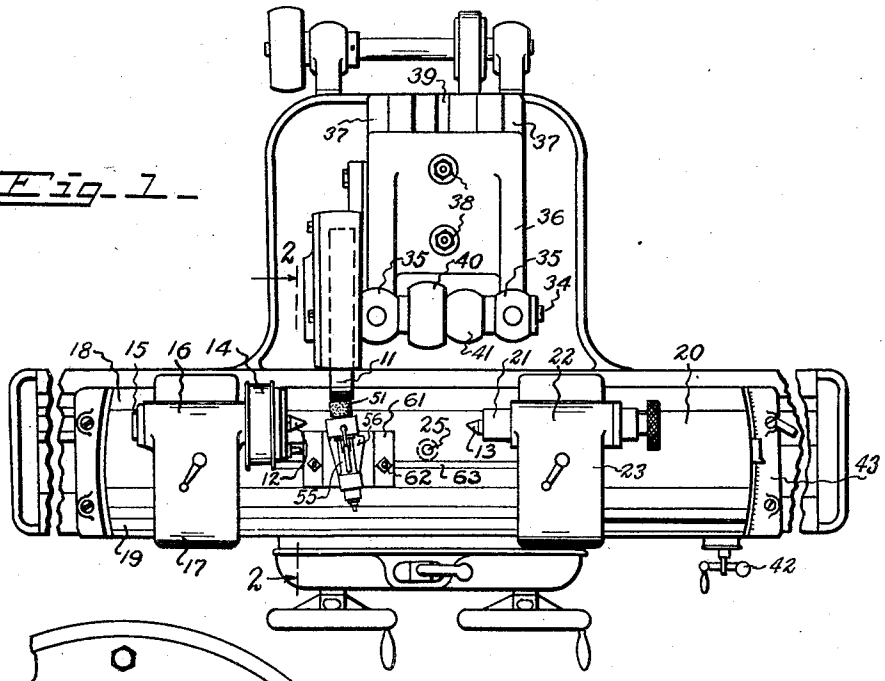
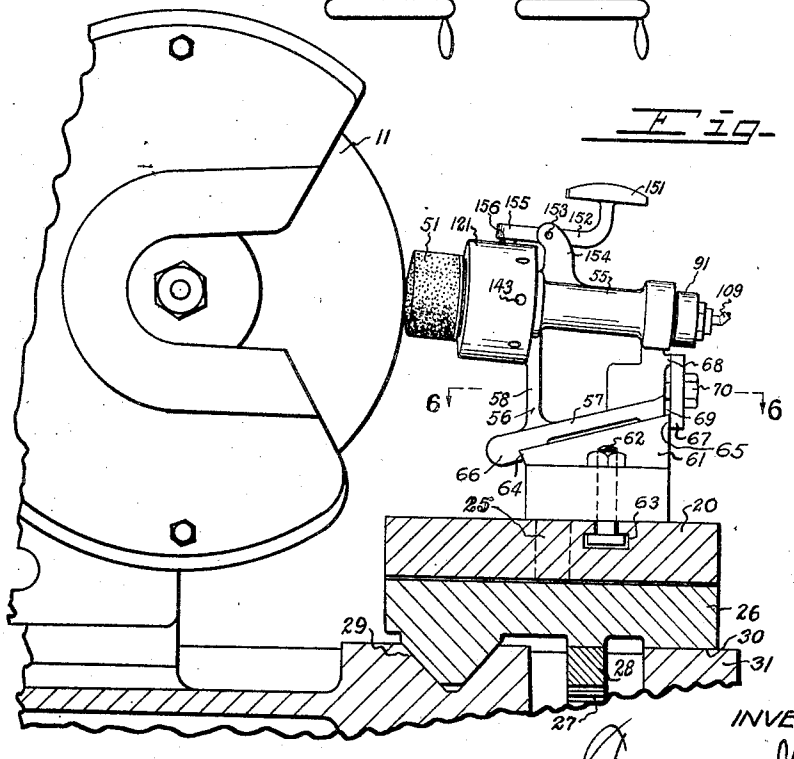


Fig. 2



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MECHANISM FOR TRUING AND DRESSING GRINDING WHEELS

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Fig. 3

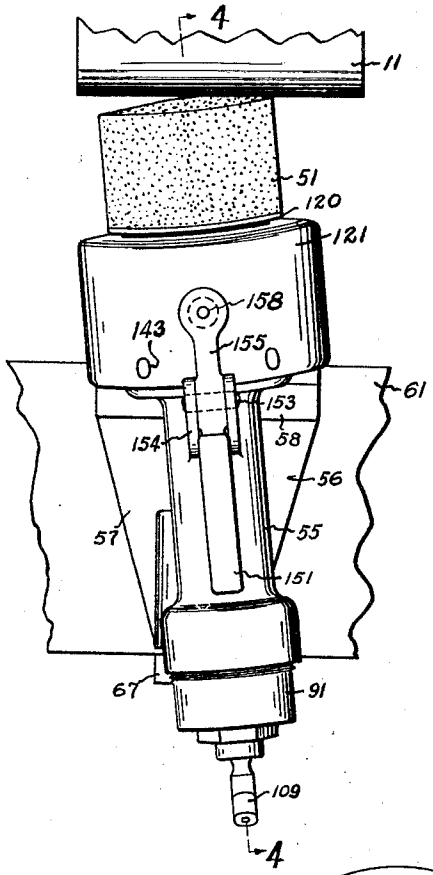


Fig. 5

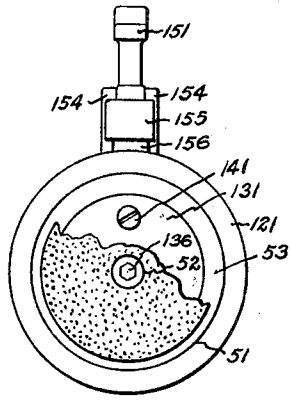


Fig. 6

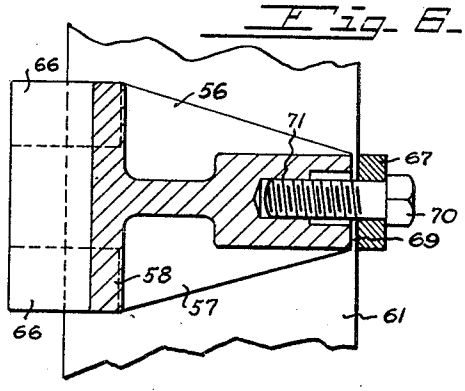


Fig. 4

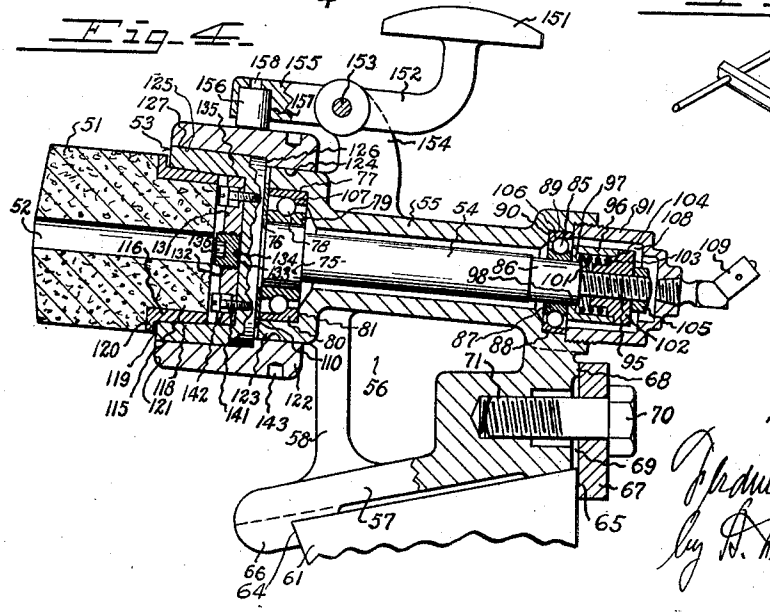
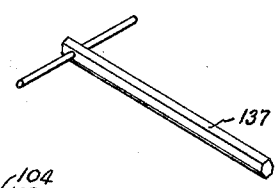


Fig. 7



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR TRUING AND DRESSING GRINDING WHEELS.

Application filed January 31, 1927. Serial No. 164,830.

The present invention relates to mechanism for truing and dressing grinding wheels, such as emery wheels employed in machinery for grinding or polishing surfaces of metal in precision grinding, and is exemplified as employable for truing or dressing the grinding wheel without removing the grinding wheel from the grinding or polishing machine.

It is the object of the invention to provide novel means whereby to releasably secure my improved device with relation to the grinding wheel; further, to provide novel means employed in removing my improved device from operative relation with the grinding wheel; further, to provide novel means for causing cessation of rotation of the abrading element employed in truing or dressing the grinding wheel; further, to provide novel means for rotatively mounting the holder for the abrading wheel; further, to provide novel means whereby to secure the rotary abrading part to its holder and for releasing the rotary abrading part from its holder; and the invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Fig. 1 represents a plan view of my improved device applied to an exemplified grinding machine, partly broken away.

Fig. 2 is a cross-section of the same, taken on the line 2—2 of Fig. 1, and partly broken away.

Fig. 3 is a plan view of the exemplified abrading nib and the mounting therefor, shown in a preferred relation to a grinding wheel, the latter partly broken away.

Fig. 4 is a vertical axial section of my improved device, taken on the line 4—4 of Fig. 3, and partly broken away.

Fig. 5 is an end elevation of my improved device, partly broken away, and viewing the interior of the chuck;

Fig. 6 is a horizontal section of my improved device taken on the line 6—6 of Fig. 2; and,

Fig. 7 is a perspective view of the releasing tool.

The invention is exemplified as employed in connection with a so-called grinding or polishing machine employing a rotary grinding wheel 11 for effecting the grinding or polishing.

The work to be ground or polished, which may for instance be a shaft, is arranged to be placed between suitable centers 12, 13, of which 12 may exemplify a head center, arranged to be rotated by suitable driving means, as by a pulley 14. A usual quill 15 in which the head-center is supported in usual manner is journaled in a bearing 16 of the head-stock 17, slidable laterally on guideways 18, 19, of a table 20.

The tail-center 13 is mounted in a suitable sleeve 21, movable axially in a bearing 22 in usual manner, the bearing being on a tail-stock 23 laterally adjustable on the guideways 18, 19. The table is exemplified as pivotally mounted by a pivot 25 on a saddle 26, which has lateral reciprocating motion imparted thereto by power means, in usual manner, as by a pinion 27, suitably driven, meshing with the rack 28 extending lengthwise of the saddle and fixed to the saddle. The saddle is slidable on guideways 29, 30, on the frame 31 of the machine.

The grinding wheel 11 is suitably fixed to a shaft 34, journaled in bearings 35 of a slide 36, adjustable toward and from the work-table on guideways 37, by any suitable means, the slide being arranged to be clamped by means of suitable T-bolts and nuts 38, the heads of the T-bolts coacting with the T-slot 39 in the frame, and the nuts clamping the slide to the frame. The shaft is rotatable in suitable manner, as by a belt passing about suitable pulleys 40, 41, fixed to the shaft.

In the exemplification, the work located between the centers may be caused to reciprocate axially in planes parallel to the axis of rotation of the grinding wheel for grinding or polishing straight work, or the table may be adjusted to an angle with relation to said parallelism, effected, for instance, by rotation of the handle 42 according to the reading on the gage 43.

In the present exemplification, a reciprocating table is illustrated on which to mount the work, the grinding wheel having a stationary position, although the relation of the parts may be reversed, the work being stationarily positioned and the grinding wheel having reciprocations imparted to it. I have instanced the abrading part as acting on the grinding wheel in the absence of work between the centers. The grinding machine may be of any desirable construction.

The rotary abrading part is exemplified as an abrading nib, stub or pencil 51, hereinafter referred to as a nib. The abrading nib is preferably of a texture harder than the

grinding wheel and of substantially smaller diameter than the diameter of the grinding wheel on which it operates. The abrading nib is exemplified as presented endwise to the grinding wheels to coact with the grinding surface of the grinding wheel. It is shown as provided with an axial bore 52, which coincides with the axis of rotation of the abrading nib.

The abrading nib is shown received in a chuck 53, which is part of or rigidly secured to a spindle 54. The spindle is journaled in a barrel 55, shown as part of a frame 56, which comprises a base 57, having an upright 58 extending upwardly therefrom and merging into said barrel, the frame being shown as a single casting.

A plate 61, which I shall term an adapter plate, is suitably secured to the table 20, as by means of one or more T-bolts and nuts 62, the heads of which are received in a usual T-slot 63 in the table 20, said bolts being received through holes in the adapter plate, the nuts being received about the threaded end of said bolts for clamping the adapter plate in adjusted positions on the table.

The adapter plate is provided with engaged edges 64, 65, at its respective edges. The base 57 is provided with fingers 66, which are shaped to match one of the engaged edges of the adapter plate. There is preferably a pair of these fingers in separated relation at the respective ends of the base. A clamping finger 67 coacts with the other engaged edge of the adapter plate, and is anchored on a lug 68 on the base, for providing a space 69 between the clamping finger and the rear end of the base. A clamp bolt 70, shown as provided with a wing head for easy and quick manipulation, is received through a hole in the clamping finger and is threaded into a threaded hole 71 in the base, for clamping the base to the adapter plate in suitable positions along the adapter plate. The adapter plate may also be adjustably secured in suitable positions lengthwise of the table. The rotatable abrading part may thus be caused to coact with the grinding wheel at various points desired in the reciprocating travel of the table with relation to the grinding wheel.

The spindle 54 is provided with an enlargement 75, at the outer end of which there is a shoulder 76, formed by the chuck 53. The barrel 55 is provided with an internal annular rabbet 77. A ball-bearing 78 is located between said enlargement and the walls of said rabbet and is preferably a radial and end thrust bearing. The inner raceway 79 of this ball-bearing is positioned on the enlargement 75 by the shoulder 76. The outer raceway 80 of said ball-bearing is positioned in the annual rabbet 77, the inner end of said raceway being held by the shoulder 81 forming the inner wall of said annular rabbet.

A ball-bearing 85 is received between the other end of said spindle and said barrel, and is preferably a radial and end-thrust bearing. The spindle is provided with a reduced cylindrical portion 86 about which the inner raceway 87 of the ball-bearing 85 is received in such manner as to permit sliding movement between said spindle and raceway in axial directions.

The outer raceway 88 of the ball-bearing 85 is received in an annular rabbet 89 in the outer end of the barrel, the inward movement of this latter raceway being limited by an annular shoulder 90 forming the inner wall of said rabbet. The outer raceway 88 is preferably clamped in said rabbet by a closing cap 91, which has threaded connection with the outer end of the barrel. This end of the spindle is provided with a threaded shank 95. A thimble 96 provided with an inwardly extending annular flange 97 and an axial hole 98 is received over the reduced portion 86 of the spindle, for coaction with the inner raceway 87.

A spring 101 is received in this thimble, one end of the spring being resisted by the inwardly extending flange 97. An adjusting nut 102 is threaded about the threaded shank 95 for adjusting the tension of the spring. This adjusting nut is provided with an annular shoulder 103 coacting with the other end of the spring and with an annular rabbet 104 in which the outer end of the thimble 96 is received. A clamp nut 105 is threaded about the threaded end of the spindle for clamping the adjusting nut 102 in adjusted positions.

The adjusting nut, the spring and the arrangement and mounting of the ball-bearings provides for resilient adjustable pressure upon the ball-bearings for maintaining the balls in proper relations with their raceways. The shoulders 81, 90, serve as anchors to resist approach between the raceways 80, 88. Adjustment of the spring to cause greater pressure upon the spring tends to move the raceway 87 toward the raceway 88, for urging the balls between said raceways toward the runway 106 at the inner end of the raceway 88, and also tends to urge the spindle in the opposite direction or toward the spring to urge sliding movement of the spindle in the inner raceway 87 and to urge the balls of the ball bearing 78 toward the inner runway 107 in the raceway 80.

The endwise pressure upon the abrading nib in the truing or dressing action urges endwise movement of the spindle toward the spring end thereof, and the spring resists endwise vibratory movement upon the spindle, should the rotary abrading nib encounter unevenness in the surface of the grinding wheel and when the rotary abrading nib is employed in such manner as to move part way or wholly off the grinding wheel in the

reciprocating movements between the rotary abrading nib and the grinding wheel during the truing or dressing operations.

The cap 91 is shown of cup shape to enclose the outer end of the spindle, the spring and its adjusting parts. There is a space indicated generally at 108 extending throughout the cap and the barrel and between the balls and raceways of the ball-bearings, forming a lubricant space which may be filled with lubricant, for instance a heavy oil, so that all moving parts in the barrel may be thoroughly lubricated. The lubricant may be supplied through a usual lubricant nipple 109 secured to the cap, as by a threaded connection, and communicating with said space. A washer 110, which may be of absorbent material, is located between the chuck 53 and the adjacent end of the barrel.

The rotary abrading part, exemplified as the nib, is normally quiescent. Rotation is imparted to the abrading nib by contact with the rotating grinding wheel. The abrading nib is presented toward the grinding wheel in such relation as to cause coaction between the abrading nib at one side of its axis of rotation and the rotating grinding wheel.

For effecting this contact and rotation, the rotary abrading nib is preferably presented with its axis of rotation at an angle at a plane perpendicular to the axis of rotation of the grinding wheel. The axis of rotation of the abrading nib may also be presented in a line which is slightly tangent to a circle whose center is coincident with the axis of rotation of the grinding wheel, exemplified by the upward slant of the abrading nib toward the grinding wheel in Fig. 2. The angles of the axis of rotation of the rotary abrading nib stated are preferably slight, being in practice about five degrees, although these angles may be more or less, depending on the fineness or coarseness with which the truing or dressing operation is to be performed. The greater that this angle of presentation is, the coarser will be the action upon the grinding wheel, and the more nearly the axis of rotation of the rotary abrading part approaches a line which is radial in a plane perpendicular to the axis of rotation of the grinding wheel, the finer will be the resultant effect upon the grinding surface of the grinding wheel. The endwise presented rotary abrading nib acts with a swirling motion upon the grinding surface of the grinding wheel.

The rotary abrading nib is preferably provided with an axial bore, so as to avoid the formation of a hump or point of resistance of abrading material at and immediately adjacent to the axis of rotation of the rotary abrading part, thereby avoiding streaks or scars or marring of the grinding surface of the grinding wheel, and insuring accurate truing and dressing of said grinding surface.

The body of this nib is preferably formed of closely united and hard abrading material which is not readily machined, but may be of other structure, and is provided with a shank 115, about which there is a collar 116 of machinable material, for instance Babbitt-metal, which is poured or molded about the shank so as to have fixed relation thereto and to form a stem, by means of which the nib may be readily held in the chuck.

The means for securing the nib in the chuck are in the present exemplification shown as comprising a socket 118 in the chuck, which has an inwardly contracting tapering wall, the outer periphery of the collar 116 about the shank being provided with a similarly tapered outer periphery, which is complemental to the inner tapered wall of the socket of the chuck, for forming intimate connection therewith, and for clampingly holding the abrading nib in the chuck. When the abrading nib is firmly seated in the chuck there is still preferably an annular space 119 between the annular shoulder 120 at the inner end of the rotary nib and the outer end of the wall of the socket of the chuck.

In order to provide maintenance of rotation of the rotary abrading part and smoothness of operation and accurate work between it and the grinding surface of the grinding wheel, a fly-wheel effect is provided for the chuck, instanced as an enlargement of the chuck, as by providing a fly-wheel collar 121 for the chuck. This collar has a rearward annular extension 122 received about the stationary tubular end 123 of the barrel 55 and the bearing 78 in said barrel. This tubular end may be provided with an annular groove 124 for oil or as an air cushion.

The collar is received about the chuck and is rigidly secured thereto. This is effected by providing the collar with an internal slightly inwardly tapered bore 125, preferably terminating at a shoulder 126, and by providing the outer face of the chuck with a complemental tapered outer periphery 127. The collar is received about the chuck and the chuck firmly wedged therein to form a rigid structure.

Means are provided for readily releasing the rotary abrading nib from its chuck, instanced as accomplished by an extractor plate 131, provided with a central threaded bore 132. An extractor bolt 133 is threaded in said bore, and is arranged to be resisted by the inner wall 134 of the chuck socket.

The extractor plate is axially movable in the inner socket portion 135 of the chuck, which is preferably cylindrical. The extractor bolt is provided with a socket 136, which is formed in cross-section so as to receive and be turned by a suitable tool, exemplified at 137. The coacting faces of the wrench and socket 136 are shown polygonal in cross-section. The shank of the wrench is received through the bore 52 in the abrading

nib for coaction with the extractor bolt, and the extractor bolt is turned with relation to the extractor plate, for moving the extractor plate away from the bottom of the socket, for exerting extracting force upon the abrading nib in the socket, for removing the abrading nib from the socket. Upon extraction of the abrading nib, the extractor plate is again moved toward the bottom of the clutch socket out of the way of the nib to be replaced in the clutch socket.

Relative rotation between the extractor plate and the clutch is prevented, for instance by means of retaining screws 141 received through holes in the extractor plate and threaded in the bottom of the socket of the chuck, these retaining screws being provided with heads normally received in enlargements 142 of the holes in the extractor plate. The combined chuck and fly-wheel is preferably provided with radial holes 143, for receiving a suitable spanner wrench, for holding the chuck against rotation during rotation of the extractor bolt for moving the extractor plate.

It is found desirable in practice to move the abrading mechanism from the grinding machine and to attach the same thereto. It is also desirable in practice where such removal is desired, to cause the removal immediately upon cessation of dressing action of the nib. The nib is caused to rotate at high speed by its coaction with the grinding wheel, and the fly-wheel effect upon the rotary nib is such, that it would ordinarily continue its rotations for a comparatively long period of time. It is desirable however that rotations of the rotary nib shall cease promptly so as to provide ease, promptness and safety for the handling of the abrading machine. Novel means are therefore provided for such removal and attachment, and lifting means are provided for the abrading machine which coact with a brake for causing cessation of rotation of the abrading nib and chuck.

A handle 151 is on a lever 152 pivoted at 153 to lugs 154 extending upwardly from the barrel 55, and having an arm 155 extending above the fly-wheel 121. A brake-shoe 156, shown as a plug received in a socket 157 in the arm 155, is arranged to coact with the chuck or fly-wheel thereof, for arresting rotation of the same when the handle 151 is grasped to raise the abrading machine. When the abrading machine is raised or carried by the handle, the weight of the abrading machine acts on the brake-shoe for braking action upon the abrading nib, its chuck and fly-wheel.

The parts and mounting thereof are so related that the lever 152 is normally overweighted at its handle end for normally causing separation between the brake shoe and clutch and fly-wheel thereof. The arm 155 is provided with a hole 158 through which a tool may be inserted for ejection of the brake shoe in case the same should be worn.

The chuck and extractor plate herein shown and described are not herein claimed, the same being fully shown, described and claimed in a copending application, divisional hereof, for United States patent on improvements in mechanism for truing and dressing grinding wheels, Serial No. 314,141, filed October 22, 1928.

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

1. In an abrading machine for grinding wheels, the combination of a frame, a rotary abrading part rotatable on said frame, a brake for said rotary abrading part, and a lifting handle for said machine acting by lifting movement thereof to apply said brake.

2. In an abrading machine for grinding wheels, the combination of a frame, a rotary abrading part rotatable on said frame, a brake for said rotary abrading part, and a lifting handle for the machine acting by lifting movement thereof to apply said brake, said lifting handle normally in brake release relation.

3. In an abrading machine for grinding wheels, the combination of a frame, a rotary abrading part rotatable on said frame, a brake for said rotary abrading part, and a lifting handle for the machine, said lifting handle having operative connection with said brake for applying said brake by the weight of the machine suspended by said handle.

4. In an abrading machine for grinding wheels, the combination of a frame, a rotary abrading part rotatable on said frame, a brake for said rotary abrading part, and a lifting handle pivoted to said frame, said lifting handle having operative connection with said brake for applying said brake by gravity weight of the machine suspended by said handle during lifting action thereon, said handle being normally in brake releasing relation.

5. In an abrading machine for grinding wheels, the combination of a frame, a rotary abrading part rotatable on said frame, a brake for said rotary abrading part, and a lifting handle on said frame in such relation that lifting action upon said handle causes braking action of said brake and releasing of said handle causes release of said brake.

6. In an abrading machine for grinding wheels, the combination of a frame, a spindle journaled in said frame, a chuck structure for a rotatable abrading nib on said spindle, a lifting lever pivoted to said frame, and a brake on said lifting lever coacting with said chuck structure by lifting movement applied to said lever.

7. In an abrading machine for a grinding

wheel, the combination of a frame, a spindle, a chuck structure at one end of said spindle for a rotary abrading nib, spaced-apart bearings for said spindle at one side of said chuck structure, a lifting handle pivoted to said frame adjacent to said chuck structure and one of said bearings, and a brake on said lifting handle arranged to coact with said chuck structure by lifting movement of said handle.

8. In an abrading machine for a grinding wheel, the combination of a frame comprising a barrel, a bearing at each end of said barrel, a spindle journaled in said bearings, a chuck structure at one end of said spindle comprising an end socket for reception of a rotary abrading nib and an annular apron about the end of said barrel adjacent to said chuck structure, a lifting lever having pivotal connection with said barrel adjacent to said chuck structure, said lifting lever comprising a lifting handle at one end, and a brake for said chuck structure at its other end, with said brake normally in release relation, and arranged for being shifted into brake relation with said chuck structure by lifting of said handle.

In testimony whereof, I have hereunto signed my name.

FERDINAND J. HOHNHORST.