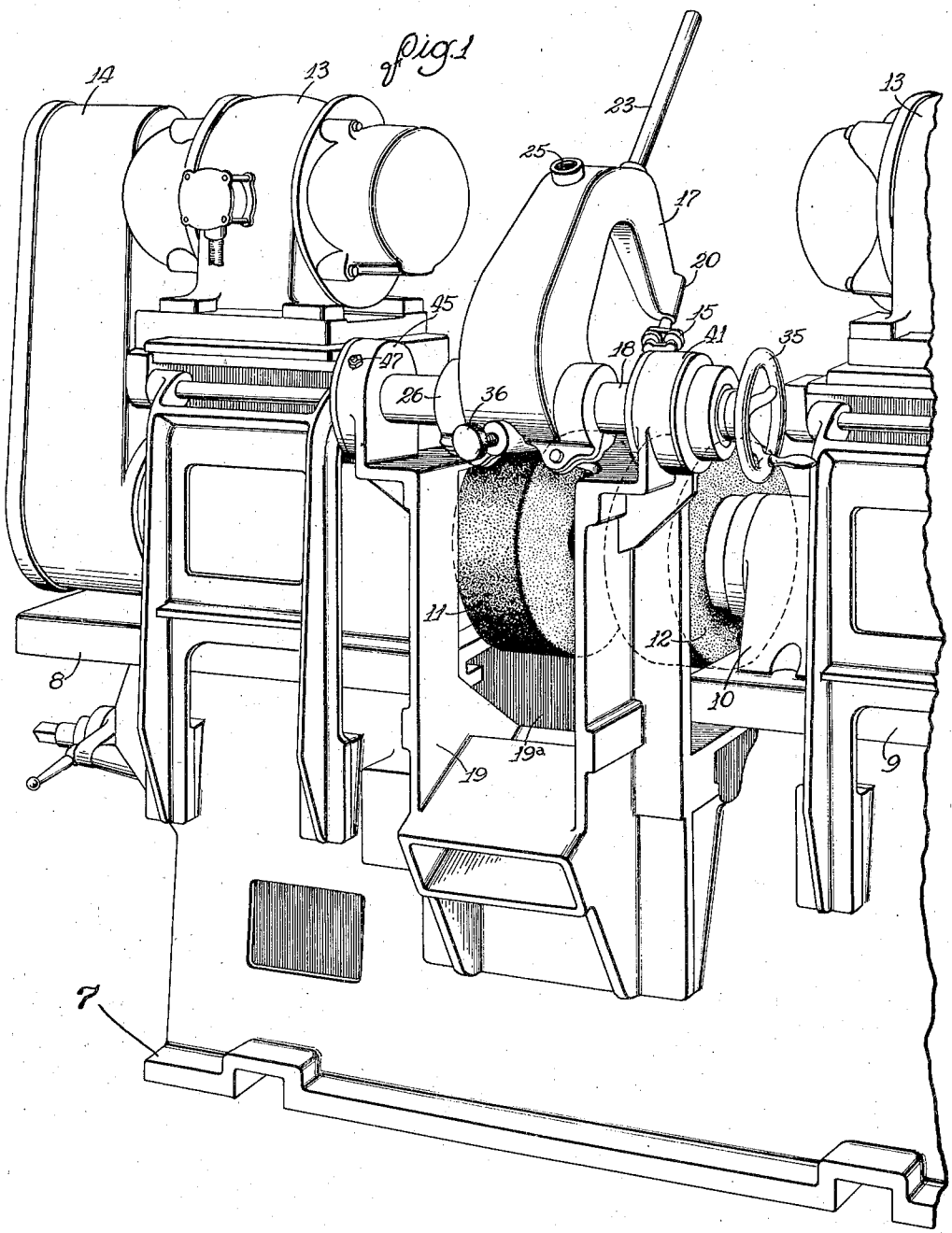
Feb. 21, 1939. D. R. HALL 2,148,120

WHEEL DRESSING DEVICE

Filed July 24, 1936 3 Sheets-Sheet 1

Fig. 1



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WHEEL DRESSING DEVICE

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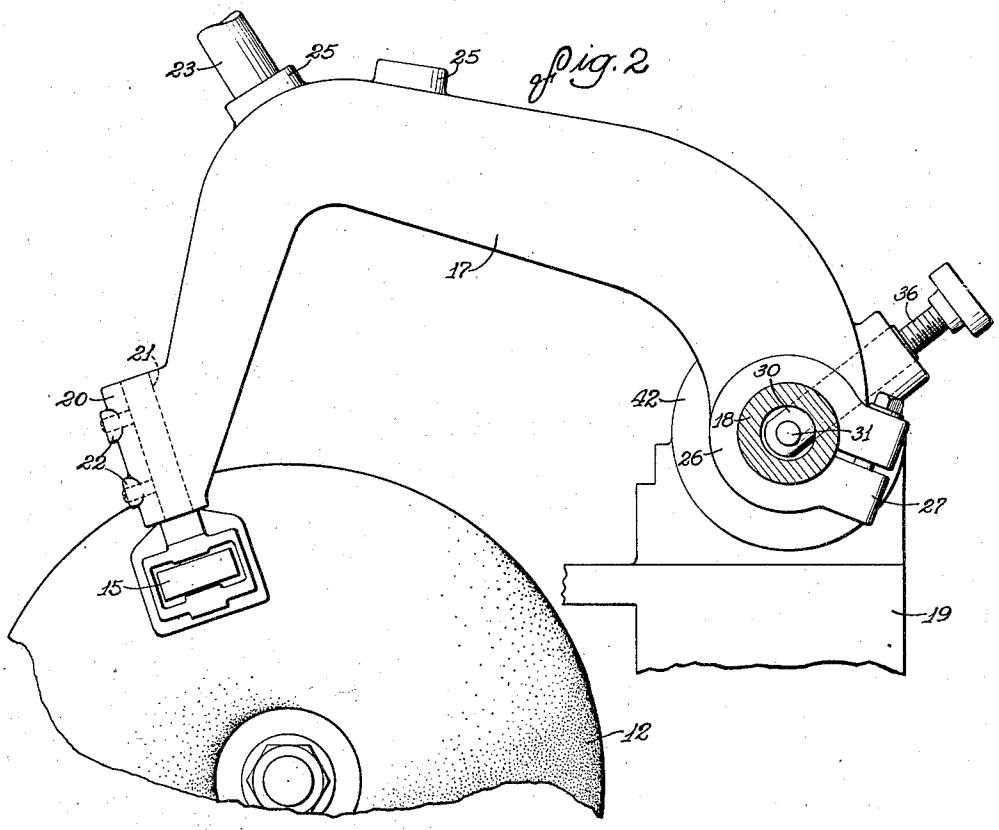


Fig. 2

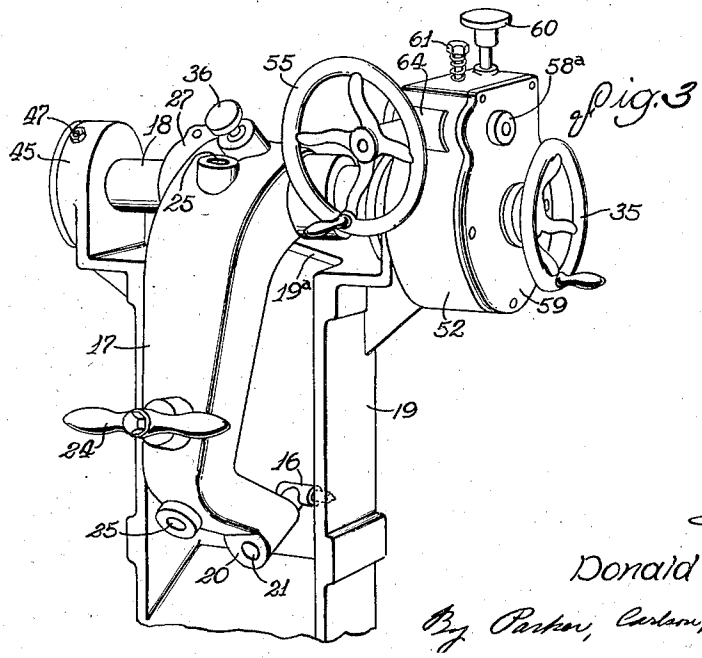


Fig. 3

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Fig. 4

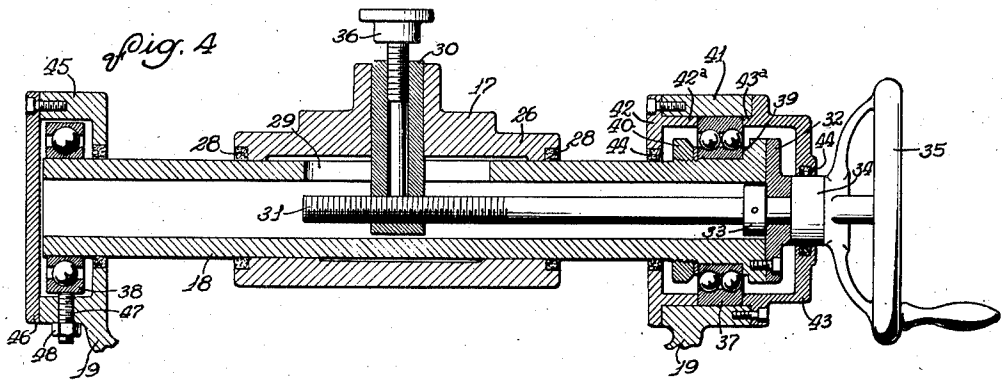


Fig. 7

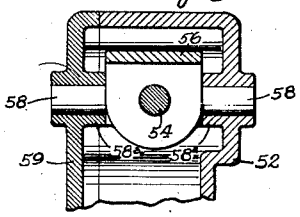


Fig. 5

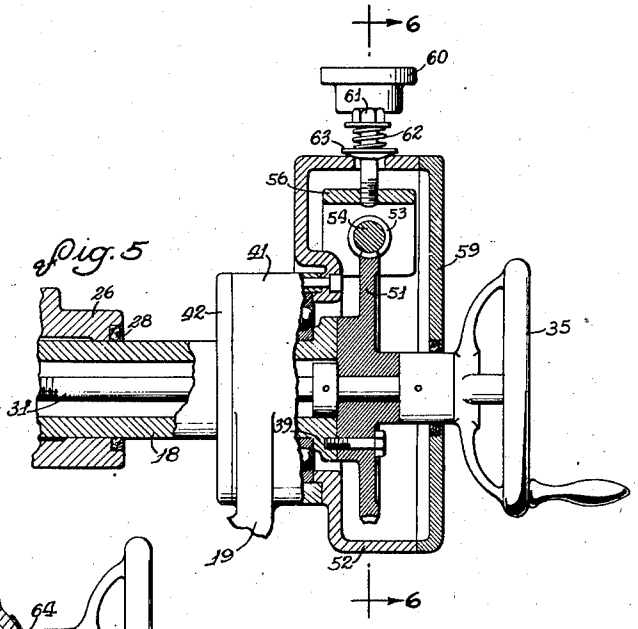
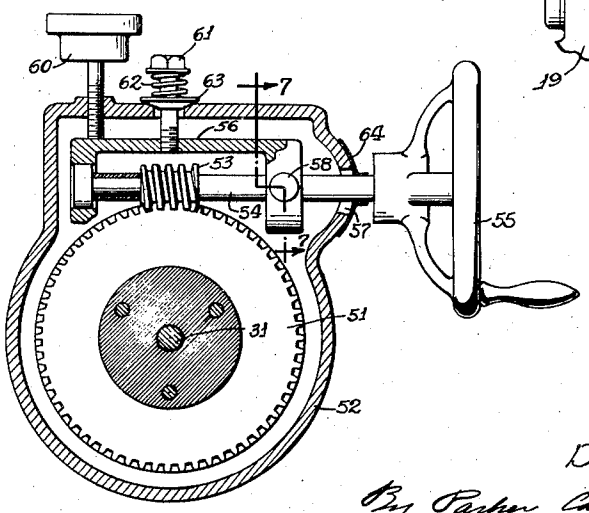


Fig. 6



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2,148,120

UNITED STATES PATENT OFFICE

2,148,120

WHEEL DRESSING DEVICE

Donald R. Hall, Beloit, Wis., assignor to Gardner Machine Company, South Beloit, Ill., a corporation of Illinois

Application July 24, 1936, Serial No. 92,326

7 Claims. (Cl. 125—11)

The invention relates to dressing devices for grinding wheels and more particularly to devices for dressing and truing the faces of grinding wheels of the ring or disk type.

The principal object of the invention is to provide a device of the above general character embodying improved mounting and actuating means for a dressing tool enabling the tool to perform the dressing operation quickly and efficiently and having adjusting means of an advantageous character for effecting accurate alinement of the tool and wheel to insure the production of a true flat surface on the wheel.

A further object is to provide a dressing tool mounting and actuating means of improved construction in which the parts are readily interchangeable to enable the tool to be presented to the wheel and actuated from the most convenient position.

Another object is to provide an improved dressing tool mounting and actuating means in which all bearing surfaces are effectually protected from the entrance of grit or grinding chips.

Still another object is to provide improved means for feeding a dressing tool across the face of a grinding wheel to produce a uniform true surface thereon.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a fragmentary perspective view of a grinding machine showing one form of the dressing tool mounting and actuating means wherein the tool is arranged to be actuated from the front of the machine.

Fig. 2 is a side elevational view of the tool supporting arm.

Fig. 3 is a perspective view of a modified form of the mounting and actuating means showing an auxiliary feed device for actuating the tool supporting arm which, in this instance, is arranged for actuation from the rear of the machine.

Fig. 4 is a longitudinal sectional view of the arm supporting shaft.

Fig. 5 is a sectional view of the actuating mechanism shown in Fig. 3.

Fig. 6 is a transverse sectional view taken along the line 6—6 of Fig. 5.

Fig. 7 is a fragmentary sectional view taken along the line 7—7 of Fig. 6.

By way of illustration, the improved dressing tool mounting and actuating means have been shown incorporated in a double spindle, horizontal, grinding machine having the grinding wheels arranged in opposed relation. It is to be understood, however, that this is not intended as a limitation of the invention to this particular type of machine, it being contemplated that various changes may be made by those skilled in the art to adapt the invention to other types of machines without departing from the spirit and scope of the invention as defined by the appended claims.

Referring more particularly to Fig. 1 of the drawings, the machine with which the invention is illustrated includes a base 7 supporting a pair of reciprocatory tables 8 and 9. The tables carry wheel heads 10 for the support of grinding wheels 11 and 12 which are mounted on the usual rotatable spindles journaled in the heads. The grinding wheels are carried at adjacent ends of the respective wheel heads with their grinding faces in opposed relation, the work being fed between the two wheels in the usual and well-known manner. In this instance the grinding wheels 11 and 12 are rotated by individual electric motors 13 through the medium of suitable driving connections, one of which is indicated at 14.

In the machine illustrated, the dressing device is mounted intermediate the ends of the machine for operating on either of the grinding wheels as desired. Any suitable dressing tool may be used with the device as, for example, a rotary cutter 15 as shown in Figs. 1 and 2, or a diamond nib 16 as shown in Fig. 3. The dressing tool is carried by a rigid arm 17 which is pivotally supported at one end for movement in a plane substantially parallel to the grinding faces of the wheels 11 and 12. As herein shown, the pivotal support for the arm is provided by a main shaft 18 disposed with its axis substantially parallel to the axes of the grinding wheels and journaled in spaced bearings carried by a bracket 19 on the rear of the machine base 7. The bracket 19 may be of any suitable rigid construction and, as herein shown, is provided with a central opening 19a through which the dressing tool may be applied to the grinding wheels from the rear of the machine as will appear hereinafter.

The tool supporting arm 17 is preferably in the form of a hollow casting of generally rectangular cross section tapering gradually from its base to its free end. With this construction, the arm is relatively light in weight and properly balanced for easy manipulation and, at the same time, it provides a very rigid support for the tool which is essential for accurate work.

Referring now to Fig. 2, the arm 17, as viewed

from the side, is of generally L-shaped form, the pivotal support for the arm being at the end or base of the longer leg. Thus, only the relatively narrow end portion of the arm enters between the grinding wheels when the tool is applied thereto. As herein shown, the free end of the arm 17 terminates in a generally cylindrical projection 20 having formed therein a socket 21 adapted to receive the shank of the dressing tool which is securely clamped in place by means of clamping screws 22. Preferably, the effective length of the arm from the axis of the pivotal shaft to the axis of the tool socket is such that the arc described by the cutting point of the tool in the pivotal movement of the arm intersects the axis of the grinding wheel whereby the tool traverses a path substantially radial to the grinding wheel. Thus, the tool is enabled to operate with maximum efficiency and produce a uniform, true surface on the wheel.

For actuating the dressing device, particularly when a dressing tool of the rotary cutter type is used, a hand lever either in the form of a straight bar 23 as shown in Fig. 1, or a T-shaped member 24 as shown in Fig. 3 is secured to the arm 17. To this end, the arm is provided with a number of tapped holes 25 at conveniently spaced points into any one of which the threaded end of the lever may be screwed.

To secure the arm 17 to the shaft 18 which provides the pivotal support therefor, the enlarged rear end of the arm is formed with an integral transverse cylindrical section 26 constituting a split collar 27 adapted for clamping the arm to the shaft. This collar is not intended to hold the arm rigid with the shaft but provides a tight bearing fit between the parts and, together with packing rings 28 carried by the collar, effectually protects the bearing surfaces from the entry of grit or grinding chips.

Referring now to Fig. 4, it will be observed that the shaft 18 is of hollow or tubular construction. An elongated slot 29 intermediate the ends of the shaft communicates with the hollow interior of the shaft and is adapted to slidably receive a connecting member or pin 30 tightly fitted in a transverse opening extending through the section 26 of the arm. The pin thus operates to prevent relative rotational movement between the arm and the shaft while permitting relative longitudinal movement between these parts by reason of its slidable engagement in the slot 29.

In addition to its keying function, the pin 30 comprises a part of the arm adjusting mechanism for moving the arm longitudinally of the shaft. To this end, the pin has a threaded connection at its inner end with a rod 31 extending axially of the shaft and through a plate 32 secured to one end thereof. As herein shown, the rod 31 is rotatably anchored to the plate 32 by collars 33 and 34 fast on the rod. Accordingly, when the rod is rotated, the pin 30 is caused to travel either to the right or left as viewed in Fig. 4 by reason of the threaded connection with the rod, and the arm 17 is thereby shifted longitudinally of the shaft 18. A hand wheel 35 keyed to the projecting end of the rod provides a convenient means for manually rotating it to effect this shifting of the arm.

It will be apparent that the arm adjusting mechanism provides a convenient and efficient means by which the tool may be accurately adjusted with reference to the grinding surface of the wheel being dressed to insure the removal of the proper amount of stock. After the arm is adjusted to a desired position, it is, of course, desirable to lock it in place against accidental movement and to this end a clamping screw 36 is provided. The clamping screw is threaded into a tapped hole formed longitudinally of the pin 30 and has a reduced end portion engageable with the rod 31. Accidental rotation of the rod with a resultant movement of the arm 17 is thus effectually prevented.

In the preferred form of the invention, the shaft 18 is rotatably supported in antifriction bearings 37 and 38 enclosed in suitable housings carried by the bracket 19. As shown in Fig. 4, the bearing 37 is of the self-alining type having a double row of ball bearings disposed between the usual inner and outer race rings. The bearing 37 is clamped between an annular flange 39 formed on the end of the shaft and a nut 40 threaded onto the shaft and is supported in an annular housing member 41 formed integrally with the bracket 19. The ends of the annular member 41 are closed by a rear cover plate 42 and a front cover plate 43 secured thereto, the cover plates having integrally formed flanges 42^a and 43^a, respectively, adapted to fit into the annular member 41 and hold the bearing 37 against lateral movement therein. Suitable apertures are provided in the cover plates to receive the shaft 18 and collar 34 carried by the rod 31, and are fitted with packing rings 44 which provide a tight seal with the shaft and collar and thereby protect the bearing from the entry of grit or grinding chips and likewise prevent the escape of grease or other lubricant from the chamber formed by the member 41 and the cover plates 42 and 43.

The bearing 38, in the present instance, comprises a single row of ball bearings held between the usual inner and outer race rings. This bearing is adjustably mounted in a cup-shaped member 45 formed integrally with the bracket 19 and covered by a plate 46 to provide a grease-tight chamber for the bearing. To provide for adjusting the shaft 18 to aline it with the grinding wheels, the bearing unit 38 is supported on adjusting screws 47 threaded into the member 45 as shown in Figs. 1, 3 and 4. In the operation of the adjusting screws, the shaft 18 swivels on the bearing 37 without placing undue strain on any of the parts of the device. Thus, the axis of the shaft may be shifted to aline it exactly parallel with the axes of the grinding wheels so that a true, flat surface can be produced on the wheels. Lock nuts 48 threaded on the outer ends of the screws prevent accidental movement of the same and maintain the shaft in adjusted position.

In Figs. 5 and 6, there is shown an auxiliary form of actuating mechanism particularly suitable for use with a diamond dressing tool. As herein shown, the mechanism is in the nature of an attachment which may be readily installed in or removed from the dressing device as hereinbefore described without necessitating any major changes therein.

Referring now to Figs. 5 and 6, the actuating mechanism includes a worm wheel 51 adapted to be bolted or otherwise secured to the flange 39 at the end of the shaft 18 in place of the plate 32. In this case, the cover plate 43 shown in Fig. 4 is replaced by a casing 52 (see Figs. 5 and 6) enclosing the worm wheel 51 and a worm 53 by which the wheel is rotated.

As herein shown, the worm 53 is carried on a transverse shaft 54 provided with a hand wheel 55 for manual actuation. The shaft 54 is jour-

naled in spaced bearings formed in the depending legs of a U-shaped frame **56** with one end projecting through a slot **57** in the side wall of the casing. The frame is pivotally supoprted in the casing **52** by means of trunnions **58** as shown in Fig. 7. Suitable bearings **58a** are formed for the trunnions in the end wall of the casing **52** and a cover plate **59** secured thereto, respectively so that the frame may be rocked transversely of the main shaft **18** to move the worm **53** into or out of engagement with the worm wheel **51**.

The position of the frame **56** is controlled by means of a manually operable adjusting screw **60** threaded into the top wall of the casing. The frame is yieldably held against the end of the adjusting screw and caused to follow the movements of the screw by spring actuated means including a headed bolt **61** projecting through a suitable aperture in the casing wall and threading into the frame intermediate the ends thereof. A compression spring **62** interposed between the head of the bolt and a washer **63** covering the aperture in the casing, tends to raise the frame and lift the worm **53** out of engagement with the worm wheel **51**. This action is opposed by the adjusting screw **60**. Thus by turning the screw **60** in one direction the worm and wheel can be completely disengaged thereby disabling the actuating mechanism and conditioning the device for manual operation by means of the levers **23** or **24**.

The various openings in the casing **52** are effectually sealed against the entrance of grit or grinding chips and to prevent the escape of lubricant from the casing. The washer **63** operates to seal the aperture through which the bolt **61** projects and to this end is preferably conical in form so as to seat tightly around the edges of the aperture. The slot **57** is closed by plate **64** carried by the shaft **54** and to enable the plate to fit tightly against the casing wall in all positions of the shaft, the wall is formed on a radius centered at the pivotal axis of the frame **58** on which the shaft is mounted. The plate **64** is similarly formed and thus maintains contact with the casing wall when the shaft is oscillated to engage or disengage the actuating mechanism.

In the operation of the dressing device, the tool is initially set in the socket **21** provided for this purpose in the arm **17**, and the arm is adjusted by actuation of the hand wheel **35** so that the tool will remove the desired amount of stock from the grinding wheel. When the rotary tool **15** is used as shown in Figs. 1 and 2, the arm may be rocked by means of the hand lever **23** to traverse the tool radially across the face of the wheel until a true flat surface is formed thereon.

In case the diamond tool **16** is used, the device will be equipped with the actuating mechanism shown in Figs. 3, 5 and 6. In this case, the tool is initially adjusted relative to the grinding wheel by the operation of the hand wheel **35** as above explained. After being properly adjusted, the tool is traversed slowly and uniformly across the grinding wheel by operation of the hand wheel **55**.

When it is desired to employ a rotary tool with the device equipped with the worm driven actuating mechanism, the mechanism may be temporarily disconnected by releasing the worm from engagement with the worm wheel through the medium of the screw **60**. The tool may then be traversed across the face of the grinding wheel by operating the hand lever **24** to rock the arm about its pivot.

It will be apparent that the position of the arm **17** may be readily interchanged to enable the tool to be actuated either from the front or from the rear of the machine. Fig. 1 shows the arrangement whereby the arm **17** is actuated from the front of the machine and Fig. 3 shows the arm arranged for actuation from the rear of the machine. To interchange the arm from one position to another, it is only necessary to disconnect the adjusting rod **31** from the pin **30**, withdraw the pin from the slot **29**, and slip the arm from the shaft **18**. The arm can then be replaced on the shaft in the reverse manner and reconnected with the adjusting rod.

It will be apparent from the foregoing that I have provided an improved mounting and actuating means for dressing tools by which the dressing tool is held rigidly for accurate operation on the surface of a grinding wheel and is easily and quickly traversed across the surface thereof. The arm on which the tool is carried may be readily adjusted to effect accurate alinement with the grinding wheel, thus insuring the production of a true flat surface thereon. Moreover, the mounting and actuating means incorporate parts which are readily interchangeable so that the tool may be actuated from the most convenient position either from the front or the rear of the machine. Likewise, actuating means of an improved character is provided which may be readily installed in the device without necessitating any major changes in the structure. The device is of simple and rugged construction, it is efficient in operation, and all of the bearing surfaces are effectually protected from the entrance of grit or grinding chips.

I claim as my invention:

1. In a grinding machine having a base and a rotatable grinding wheel supported thereon, in combination, a wheel dressing device comprising, a tubular shaft rotatably supported in spaced bearings carried on said base, an arm slidably mounted on said shaft intermediate said bearings and carrying a tool for dressing said wheel, said arm having a pin engaging in a slot formed in the shaft to prevent relative rotational movement of the arm and shaft whereby the arm is effective to traverse the tool across the face of said wheel incident to the rotation of the shaft, means for adjusting the position of one of said bearings to accurately aline said shaft parallel with the axis of the wheel, and means disposed within said shaft operative in cooperation with said pin for shifting said arm longitudinally of said shaft to position said tool relative to the face of said wheel.

2. In a grinding machine having a base and a grinding wheel rotatably supported thereon, in combination, a wheel dressing device comprising a bracket secured to the base of the machine laterally of the grinding wheel, a shaft journaled in a pair of spaced bearings carried by said bracket, the axis of said shaft being substantially parallel to the axis of the grinding wheel, an arm secured at one end to said shaft and having a socket at the other end for holding a dressing tool, said arm being operative to traverse the tool radially of the grinding wheel incident to the rotation of said shaft, means for adjusting the position of one of said bearings to aline said shaft exactly parallel with the axis of the grinding wheel whereby the tool is enabled to dress a true flat surface on the wheel, and means for shifting said arm longitudinally of said shaft to determine the depth of the cut taken by the tool in the wheel.

3. In a grinding machine having a base and a grinding wheel rotatably supported thereon, in combination, a wheel dressing device comprising, a shaft journaled in a pair of spaced bearings supported on said base, the axis of said shaft being substantially parallel to the axis of the grinding wheel, an arm secured at one end to said shaft and carrying at the other end a tool for dressing said wheel, said arm being operative to traverse the tool across the face of the wheel incident to the rotational movement of said shaft, and means for adjusting the position of one of said bearings to accurately aline said shaft with said wheel whereby the tool is enabled to form a true flat grinding surface on said wheel.

4. In a grinding machine having a base and a grinding wheel rotatably supported thereon, in combination, a wheel dressing device comprising a shaft rotatably supported on the base of the machine with its axis substantially parallel to the axis of the grinding wheel, an arm secured at one end to said shaft, a dressing tool mounted on the other end of said arm, means for rotating said shaft to traverse the tool across the face of the grinding wheel, and means for shifting said one end of said shaft laterally of its axis to aline the shaft exactly parallel with the axis of said wheel.

5. In a grinding machine having a rotatable grinding wheel, in combination a wheel dressing device comprising, a main shaft supported for rotation on an axis substantially parallel to the axis of the grinding wheel, an arm secured at one end to said shaft and rotatable therewith, said arm carrying at its other end a dressing tool for operating on said wheel, and actuating mechanism for rotating said shaft and said arm to traverse said tool across the face of said wheel including a manually operable auxiliary shaft having a driving connection with said main shaft, and means for disabling said connection to free said shaft for rotation independently of said actuating mechanism.

6. In a grinding machine having a frame supporting a pair of opposed grinding wheels, in combination, a wheel dressing device comprising, a hollow shaft journaled on the frame at one side of the grinding wheels with its axis generally parallel to the axis of the wheels, an arm supported on said shaft for movement longitudinally thereof, said arm having one end arranged to be projected between the grinding wheels, a dressing tool carried on the projecting end of said arm, a pin rigid with the arm extending into said shaft through a longitudinal slot formed therein and operative to hold the arm against rotation relative to the shaft, means for rocking said shaft to swing the arm and thereby traverse the dressing tool across the faces of the grinding wheels, a threaded rod rotatably anchored on the frame and extending into the shaft, said rod having a screw-threaded connection with said pin, and means for rotating said rod to shift said arm longitudinally of the shaft and thereby move the tool into operative engagement with either of the grinding wheels.

7. In a grinding machine having a frame supporting a pair of opposed grinding wheels, in combination, a wheel dressing device comprising, a hollow shaft journaled on the frame at one side of the grinding wheels with its axis generally parallel to the axis of the wheels, an arm supported on said shaft for movement longitudinally thereof, said arm having one end arranged to be projected between the grinding wheels, a dressing tool carried on the projecting end of said arm, a pin rigid with the arm extending into said shaft through a longitudinal slot formed therein and operative to hold the arm against rotation relative to the shaft, means for rocking said shaft to swing the arm and thereby traverse the dressing tool across the faces of the grinding wheels, means for shifting said arm longitudinally of said shaft to move the tool into operative engagement with either of said wheels including a threaded rod extending into the shaft, said rod being rotatably anchored to the frame and having a screw-threaded connection with said pin, and a locking screw threaded into said pin and operative to engage said rod to lock the arm in a set position.

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