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BACK REST FOR GRINDING MACHINES

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2 SHEETS—SHEET 1



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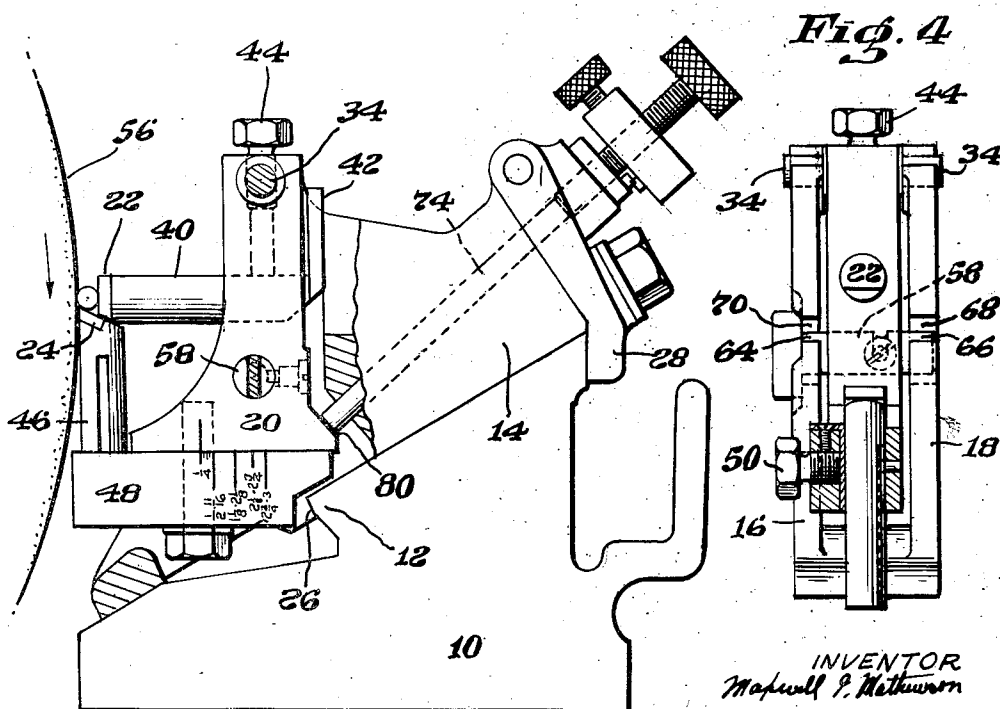
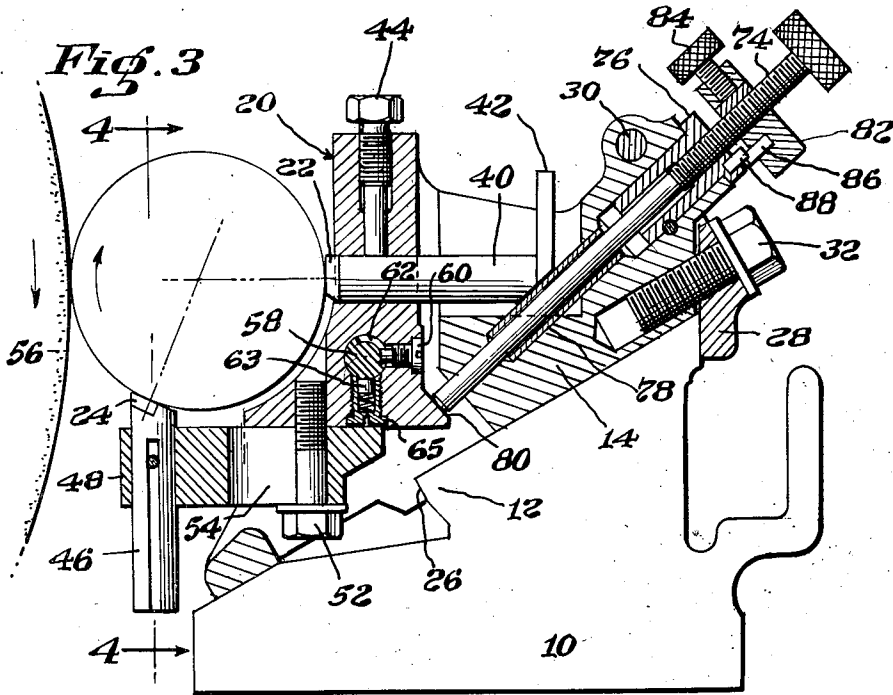


Fig. 5

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BACK REST FOR GRINDING MACHINES

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The present invention relates to an improved backrest for grinding machines, and more particularly to a backrest of a general type adapted for the support of a rotating cylindrical work piece during a grinding or similar operation.

The invention is herein disclosed in a preferred form as embodied in a backrest of the general type which consists of two work engaging shoes, one shoe being disposed to engage a portion of the work diametrically opposite the point of contact of the grinding wheel with the work and the other being disposed to engage an under portion of the work, preferably spaced approximately 115 degrees about the axis of the work piece from the horizontal shoe.

It is a principal object of the invention to provide a novel and improved backrest for the support of cylindrical work during a grinding operation which is simple and compact in construction, is capable of a wide range of adjustment in accordance with the diameter of the work being operated upon, and is well adapted for rapid and accurate setting by the operator.

More specifically it is an object of the invention to provide an improved backrest provided with work engaging shoes adapted for precise adjustment for the support of a wide range of finish diameters, which is at the same time of sufficiently compact construction to be housed within a narrow stand adapted for supporting work between close shoulders, and to be further confined within the space included between the path of the grinding wheel and the inclined supporting way of the conventional grinding machine work table.

With these and other objects in view as may hereinafter appear, the several features of the invention consist of the devices, combinations, and arrangement of parts hereinafter described and claimed which, together with the advantages to be attained thereby, will be readily understood by one skilled in the art from the following description taken in connection with the accompanying drawings in which: Fig. 1 is a side elevation looking from the right of my backrest mounted in operating position on the work slide of a grinding machine and adjusted for the support of a work piece of large diameter; Fig. 2 is a plan view of the backrest shown in Fig. 1; Fig. 3 is an elevation of the backrest looking from the left, the stand and pivoted support for the work engaging shoes being shown in section; Fig. 4 is a view partly in section taken substantially on a line 4—4 of Fig. 3; Fig. 5 is an elevation of the backrest looking from the left, with one of the supporting side walls of the stand and associated

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parts broken away to show particularly the manner of mounting the shoes, the backrest having been adjusted for operation on a minimum size work piece; and Fig. 6 is a detail plan view of the bayonet locking element by means of which the support is located for the adjustment of the work engaging shoes.

The backrest illustrated in the drawings as embodying in a preferred form the several features of the invention comprises a stand adapted to be mounted upon and rigidly secured to the grinding machine work supporting table, a support pivotally mounted on the stand for movement toward and away from the rotating work piece, and a pair of work engaging shoes which are carried on the support. The shoes are mounted from the support for adjustment along lines extending radially toward the rotating work axis at a 115-degree angle from one another. In accordance with the invention the two shoes, for each position of adjustment, are further located with respect to the support pivot so that a pivotal movement of the support has the effect of simultaneously moving both shoes by substantially equal amounts toward the rotational axis of the work piece.

In the illustrated form of the invention, one of the shoes referred to is movable in a horizontal direction on its supporting shank against a portion of the work diametrically opposite from the point of grinding contact. The other shoe is formed on a vertically disposed shank which is adjustably mounted on a transversely movable shoe slide carried on the underside of the pivoted support. In order that the vertically disposed shoe may be readily adjusted along an upwardly and rearwardly inclined line passing through the rotational axis of the work piece, the shoe slide referred to is provided with scale markings for the convenient adjustment of the slide in accordance with the finish diameter of the work piece being operated upon.

Further, in accordance with the invention, a positioning device is provided in the form of a bayonet lock which is readily operable to locate the support in a predetermined angular position on its pivot while adjustment is made of the backrest for the support of a particular work piece to be ground on the machine. The bayonet lock referred to comprises a key member having a cylindrical middle portion rotatably mounted in the support and flattened end portions which engage in slots formed in the supporting walls of the stand. In order to locate the support, the bayonet locking element is turned so that the flattened

ends are disposed horizontally in locking engagement with the sides of the slots in the walls of the stand. A 90-degree rotational movement of the bayonet locking member from the locking position releases the support so that it is free to move toward and away from the work piece.

Adjustment of the support and shoes mounted thereon against a rotating work piece as the work is ground down to size is effected by means of a single adjusting screw provided with a knurled head. The screw is turned down by the operator as the grinding operation proceeds to a limiting position which is determined by the setting of an adjustable stop device carried on the screw.

Referring more specifically to the drawings, Fig. 1 shows the backrest mounted on a grinding machine work table 10 of ordinary description formed with a table way 12. The backrest comprises a stand 14 in the form of a relatively narrow upright block which is set transversely of the grinding machine table. The vertical edge of the stand adjacent the work is deeply slotted to provide two supporting walls 16, 18 between which is mounted a support 20 for the two work engaging shoes 22, 24. The stand 14 is formed on its underside with a notched surface 26 which is arranged for clamping engagement against the lower edge of the table way 12. A U-shaped clamping member 28, the ends of which are pivotally secured by a pivot pin 30 to the stand 14 is arranged for clamping engagement with the upper edge of the table way 12. A tightening screw 32 which extends through an aperture in the clamping member 28 and is threaded into the rear edge of the stand serves to force the clamping member 28 against the upper edge of the table way 12 in order to clamp the stand rigidly in position thereon.

The support 20 for work engaging shoes 22, 24 takes the form of a plate which is pivotally supported or hung between the walls 16, 18 of the stand 14 from a pair of trunnions 34 formed on the support 20. The trunnions 34 are arranged to engage respectively between converging contact surfaces of open bearings 38 formed in the respective side walls 16, 18.

The work engaging shoe 22 consists of a hardened insert which may be of sapphire or tungsten carbide having a flat contact surface and mounted on a horizontally disposed cylindrical shank 40 which is adjustably supported in a bore formed in the support and is further provided at its rear end with an upwardly extending stem 42 for the convenience of the operator in adjusting the shoe. A vertically disposed clamping screw 44 threaded into the support 20 and arranged at its lower end for engagement with the shank 40 serves to clamp the shoe 22 rigidly in its adjusted position on the support.

The shoe 24, adapted for engagement with an under portion of the work approximately 115 degrees around the periphery of the work from shoe 22, similarly takes the form of a hardened insert which is formed with a flat contact surface tangentially arranged with relation to the cylindrical work piece and is mounted on a vertically disposed cylindrical shank 46. The supporting structure for the shoe 24 includes two separately adjustable supports, one being adjustable in a horizontal direction and the other in a vertical direction. As best shown in Figs. 3 and 4 the vertical shank 46 for the shoe 24 is supported for vertical adjustment in a horizontally movable shoe slide 48, being held in its posi-

tion of vertical adjustment with relation to the slide by means of a set screw 50 (see Fig. 4). The shoe slide 48 is supported for sliding movement along a grooved under surface of the support 20 in a horizontal direction, being secured thereto by means of a clamping bolt 52 which extends upwardly through a slot 54 in the shoe slide 48 and is threaded into the underside of the support 20.

In order to facilitate adjustment of the lower work engaging shoe 24 along the inclined radial path indicated in dot and dash lines in Fig. 3 with respect to the work rotating axis, the shoe slide 48 is first adjusted to a position which is related to the finished diameter of the work piece to be ground. The correct adjusted position of the slide 48 for different size work pieces is indicated by means of scale markings on the shoe slide and on an adjacent portion of the support 20 (see Fig. 5). From a comparison of Figs. 3 and 5, it will be seen that the slide 48 is retracted as the diameter of the work piece being ground is reduced, so that the slide is always located outside of and clear of the path of the grinding wheel 56.

It is contemplated in accordance with the invention that the setting up of the backrest for the support of any particular work piece will take place only while the support 20 is located in one predetermined angular position on the stand 14. After the support 20 has been located in this position, the respective work engaging shoes 22, 24 will be adjusted inwardly into engagement with a master work piece placed in the machine for purposes of adjustment, so that as the work is subsequently brought down to size, the two work engaging shoes will move with the greatest possible degree of exactness to the correct position for the finish grinding operation. The locating device referred to comprises a bayonet lock in the form of a key member 58 which is rotatably supported in a journal in the support 20, being held from axial movement with relation thereto by a small stop screw 60, the inner end of which rides in a groove 62 in the key member 58 (see Figs. 3 and 6). The key member 58 is fixedly supported against inadvertent rotation by means of a friction device which comprises a spring pressed friction element 63 which is seated in a recessed machine screw 65 threaded into the underside of the support 20. The two ends of the key member 58 are flattened to form keys 64, 66 which are arranged when turned to lie in a horizontal plane for engagement with the sides of two slots 68, 70 formed in the support walls 16, 18 to locate the support 20. It will readily be seen that a 90-degree rotation of the locking member to the position specifically shown in Figs. 1, 4 and 5 will release the support 20 for movement about its pivot.

A feature of the invention consists in the construction and arrangement of the backrest to permit the ready removal of the support 20 from the stand as for example for the adjustment of the shoe slide 48. Trunnions 34 are mounted in open bearings, and the slots 68, 70, in which the flattened end portions of the key member 58 are engaged, are formed with laterally extending gateways at their upper ends. In order to effect removal of the support, it is necessary only to rotate the key member 58 ninety degrees from the release position shown, for example, in Figs. 1 and 4 and at the same time to lift the support 20 bodily so that the flattened ends of the key

member 58 are permitted to slide out through the relatively narrow gateways of the slots 68, 70.

Further, in accordance with the invention, a single operating device under the control of the operator is provided for moving the support 20 and work engaging shoes 22, 24 carried thereby inwardly towards the axis of the rotating work piece as the grinding operation proceeds to reduce the outer diameter of the work piece. The adjusting mechanism provided comprises an adjusting screw 74, which is screw threaded into a stationary nut 76, fixedly mounted in the stand 14. The lower end of the adjusting screw 74 is of somewhat reduced diameter and passes through a bushing 78 being arranged at its lower end for engagement with a contact surface 80 on the support 20. The depth to which the adjusting screw 74 is fed to advance the shoes 22, 24 against the work is controlled by means of an adjustable locking collar 82, which is screw threaded to and is supported in adjusted position on the adjusting screw 74 by means of a set screw 84, which is mounted on the adjustable locking collar 82 and is arranged for locking engagement with the adjusting screw 74. The parts are arranged so that as the work is fed into depth a stop pin 86 mounted on the lower face of the adjustable locking collar 82 will ride into contact with a cooperating stop pin 88 carried in the fixed collar.

The nature and scope of the invention having been indicated, and an embodiment of the invention having been specifically described, what is claimed is:

1. A backrest for supporting a rotating work piece in a grinding machine comprising a stand, a support movable on the stand along a fixed path toward and away from the work, a pair of shoes arranged for engaging contact with portions of the work spaced from one another about the periphery of the work piece, a locating device connecting the support with the stand including a locking element having alternative locking and release positions to lock the support in a predetermined adjustment position on the stand and to release the support to move relatively to the stand, means supporting the said shoes from the support constructed and arranged to permit adjustment of the positions of said shoes from the support substantially along lines which for said located position of the support pass radially through the work axis, and an adjustable element under the control of the operator interposed between the support and stand for advancing said support and shoes supported therefrom against the work.

2. A backrest for supporting a rotating work piece in a grinding machine comprising a stand, a support movable on the stand in a predetermined path toward and away from the work, a pair of shoes having flat work contacting surfaces arranged for engaging contact tangentially with portions of the work spaced from one another about the periphery of the work piece, a locating device operable to locate the support in a predetermined adjustment position on the stand, a shank element for supporting one of said shoes adjustable on the support along a line which for said located adjustment position of the support passes substantially through the work axis, a shoe slide adjustable on the support in a plane normal to the work axis along a line in said plane passing to one side of the work axis, a shank supporting element for the second shoe adjust-

able in said plane angularly to the slide against the underside of the work, and means for advancing said support and shoes supported therefrom against the work.

3. A backrest for supporting a rotating work piece in a grinding machine comprising a stand having parallel supporting walls and a pair of axially aligned open bearings in said walls, a support, trunnions on the support pivotally supported in said bearings, a support locating device comprising a pair of open ended slots in said walls and a support locating element rotatably mounted in the support and provided with flattened end portions arranged for a transverse position thereof for locking engagement with the sides of said slots, a pair of shoes arranged for engaging contact with portions of the work spaced from one another about the periphery of the work piece, and means for supporting said shoes from the support constructed and arranged to permit adjustment of said shoes from the support along lines which for said located position of the support pass substantially radially through the work axis, and means for swinging said support and shoes supported thereon against the work.

4. A backrest for supporting a rotating work piece in a grinding machine comprising a stand bifurcated to provide parallel supporting walls, a support, a pair of axially aligned open bearings in said walls, and trunnions on the support from which the support is pivotally hung mounted in said bearings, means for locating the support comprising a pair of vertically disposed slots having transverse gateways therefrom formed in the said walls, and a locating element rotatably mounted in the support with flattened end portions engaging in said slots, a work engaging shoe mounted from the support for adjustment along a line which for said located position of the support passes substantially through the axis of rotation of the work piece, a shoe slide supported from the underside of the support for adjustment transversely beneath the work piece, indicating means for adjusting said slide in accordance with the diameter of the work piece, and a second work engaging shoe adjustable on said slide against the underside of the rotating work piece.

5. A backrest for supporting a rotating work piece in a grinding machine comprising a stand, a support pivotally mounted on the stand for movement in a fixed path toward and away from the rotating work piece, a locating device connecting the support with the stand including a locking element having alternative locking and release positions to lock the support in a predetermined adjustment position on the stand and to release the support to move relatively to the stand, a work engaging shoe mounted from the support for adjustment along a line which for said located adjustment position of the support passes substantially through the axis of rotation of the work piece, a second work engaging shoe mounted from the support for adjustment along a line which for said located adjustment position of the support intersects the line of adjustment of the first mentioned shoe and passes through the axis of the work piece, and a device interposed between the stand and the support manually operable for positively swinging the support and shoes mounted thereon against a work piece.

6. A backrest for supporting a rotating work piece in a grinding machine having in combination, a stand having the portion thereof adjacent

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the work bifurcated to provide parallel supporting walls, a support pivoted between said walls for movement toward and away from the rotating work piece, a work engaging shoe on the support laterally adjustable against a portion of the rotating work piece opposite the point of grinding contact, a shoe slide on the support laterally adjustable beneath the work piece, and a second work engaging shoe vertically adjustable on said slide against the underside of the rotating work piece.

7. A backrest for supporting a rotating work piece in a grinding machine, having in combination, a stand, a support pivotally mounted on the stand for movement toward and away from the rotational axis of the work piece, a shoe adjustable on the support substantially along a radial line passing through the rotational axis of the work piece, a shoe slide on the support adjustable along a line parallel to said radial line and passing to one side of the work piece, a scale for determining the position of the slide relative to the support graduated for positioning the slide in accordance with the finish diameter of the work piece, a second shoe mounted on said shoe slide for adjustment relative to the slide along a line normal to the line of adjustment of the first mentioned shoe, and adjustable means for supporting the support and shoes against the work piece.

8. A backrest for supporting a rotating work piece in a grinding machine comprising a stand, a support pivotally mounted on the stand for movement in a fixed path toward and away from the rotating work piece, a locating device operable to locate the support in an adjustment position in a predetermined angular relation to the stand, a work engaging shoe mounted from the support for adjustment along a line which for said located adjustment position of the support passes substantially through the axis of rotation of the work piece, a shoe slide adjustable on the support along a line which for said located ad-

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justment position of the support passes to one side of the work axis, a second shoe supported on the shoe slide for adjustment relative thereto against the work, and means for swinging the support and shoes mounted thereon against the work piece.

9. A backrest for supporting a rotating work piece in a grinding machine comprising a stand, a support pivotally mounted on the stand for movement toward and away from the rotating work piece, a positioning device for locating the support in a predetermined angular relation to the stand, a work engaging shoe having a hard flat work engaging surface mounted from the support for adjustment along a line which for said located position of the support passes substantially through the axis of rotation of the work piece, a shoe slide on the support adjustable along a line parallel to said line of adjustment of the shoe on the support, a second shoe having a hard flat work engaging surface engaging an under portion of the work spaced substantially 115 degrees about the periphery of the work, being mounted on the shoe slide for adjustment relative to the slide along a line substantially at right angles to said line of adjustment of the first mentioned shoe, and an adjusting screw connection between the stand and the support for moving the support and shoes against the work piece.

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