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3,619,952

MACHINE FOR SURFACING BRAKE DISCS

Filed July 10, 1969

2 Sheets-Sheet 1

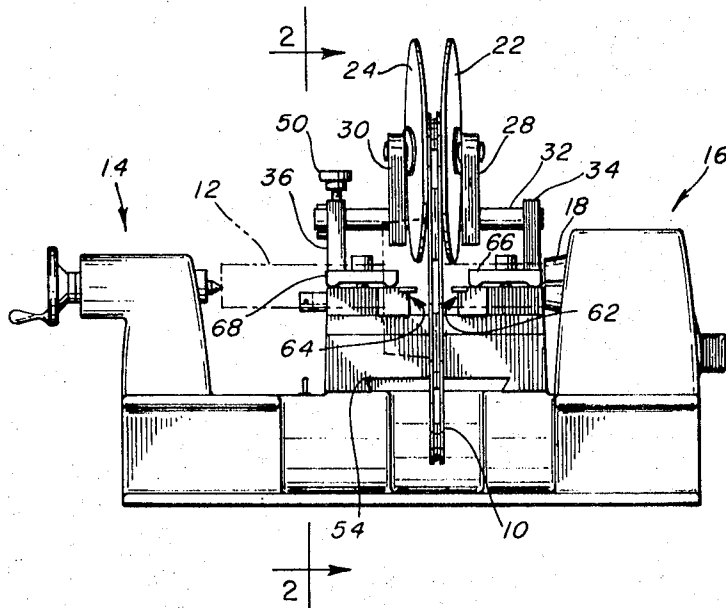


Fig. 1

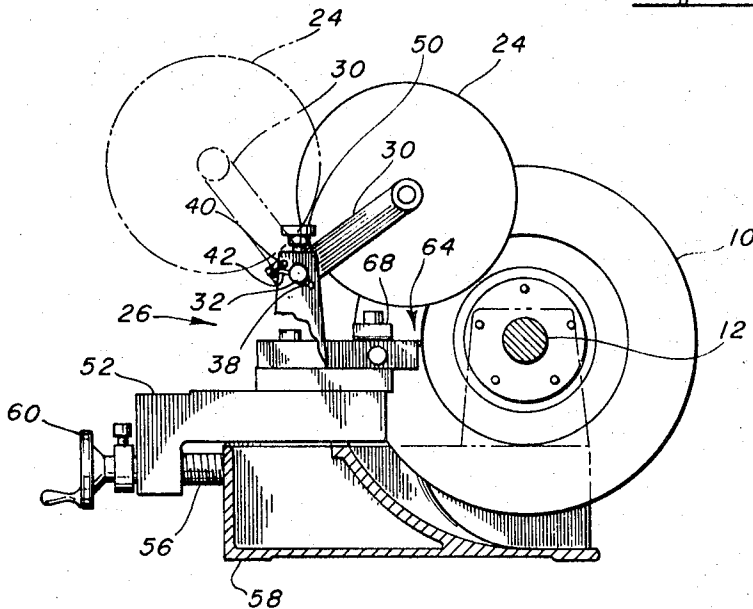


Fig. 2

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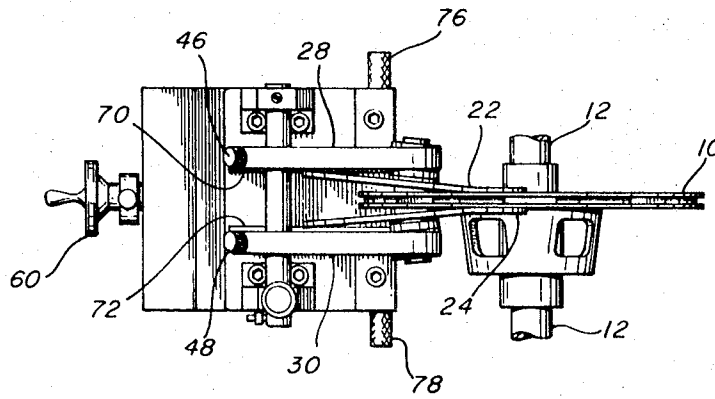


Fig. 3

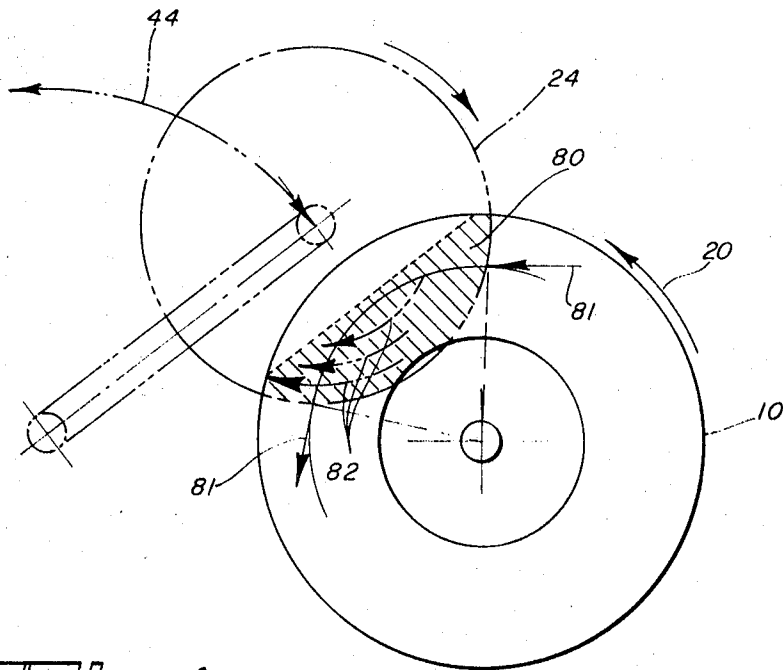


Fig. 4

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MACHINE FOR SURFACING BRAKE DISCS
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8 Claims

ABSTRACT OF THE DISCLOSURE

A machine for surfacing brake discs has a transversely movable carriage upon which a pair of adjustable cutters are provided for rough surfacing of the disc, and upon which a pair of resilient sanding discs are provided for finishing the brake disc surfaces. The resilient abrasive discs are mounted on a pair of pivotal arms respectively, which arms can be adjusted on a rockshaft so as to vary the spacing between the abrasive discs, and can also be moved pivotally on said rockshaft from and to active positions wherein segments of the facing abrasive surfaces of said discs engage segments of the opposed faces of the brake disc or workpiece to be finished.

SUMMARY OF THE INVENTION

This invention relates generally to machines for surfacing opposed faces of a disc shaped workpiece, and deals more particularly with a machine for supporting the workpiece and turning it with means being provided for both rough surfacing and finish surfacing of the workpiece.

The general object of the present invention is to provide a machine for surfacing disc shaped workpieces wherein the workpiece is rotatably supported and driven in one direction, and wherein a pair of resilient abrasive grinding discs are mounted to be moved toward and away from each other and to be moved into active engagement with the brake discs so as to be driven thereby and to finish the opposed faces of the disc shaped workpiece.

Another object of the present invention is to provide a machine of the foregoing character wherein means is also provided for rough surfacing of the brake disc by the use of conventional lathe type cutters adapted to act simultaneously upon the opposed faces of the disc shaped workpiece.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a machine for surfacing brake discs constructed in accordance with the present invention showing a brake disc in the process of being resurfaced by a pair of resilient abrasive discs.

FIG. 2 is a vertical sectional view taken on the line 2-2 of FIG. 1.

FIG. 3 is a plan view of the cross-feed carriage upon which the resilient abrasive discs are mounted in the machine of FIGS. 1 and 2.

FIG. 4 is a schematic view showing the manner in which the disc shaped workpiece drives the resilient abrasive disc, and also shows the area of contact therebetween, whereby the abrasive disc resurfaces the workpiece.

DETAILED DESCRIPTION

Turning now to the drawings in greater detail, FIG. 1 shows a machine for surfacing the axially opposed faces of a disc shaped workpiece indicated generally at 10. The workpiece 10 is provided on a spindle 12 supported for rotation between a tailstock 14 and a head portion 16. The spindle 18 at the head portion 16 of the machine is driven by suitable means (not shown) for rotation of the

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annular workpiece 10 in the direction of the arrow 20 best shown in FIG. 4. Thus, the head 16 and associated tailstock 14 may comprise conventional components of the type normally provided on a lathe or the like, and as will be seen from the description to follow, it is sufficient for purposes of practicing the present invention that means be provided for rotatably supporting the annular workpiece 10 and for driving it in at least one angular direction.

In accordance with the present invention, a pair of resilient abrasive discs 22 and 24 are supported for rotation on respective axes which are located adjacent to one another as best shown in FIG. 3. Preferably, and as best shown in FIG. 2, the means for so supporting the abrasive discs comprises a frame, indicated generally at 26, with side-by-side members 28 and 30 for rotatably supporting the discs, 22 and 24 respectively. The disc support members also serve to move the discs from and to active abrasive disc positions, shown in full lines in FIG. 2, wherein segments of the abrasive disc surfaces engage segments of the workpiece face for rotation of the former in response to driven rotation of the latter. In the embodiment shown, the side-by-side disc support members 28 and 30 are pivotally supported on a rockshaft 32 comprising part of the frame 26 referred to hereinabove. The said rockshaft 32 is rotatably supported adjacent its opposite end portions in the upstanding support blocks 34 and 36. As best shown in FIGS. 1 and 2, the left hand support block 36 is provided with diametrically opposed pins 38 and 40 which engage a stop pin 42 provided for this purpose in the rockshaft 32 so as to limit the pivotal movement of the rockshaft members 28 and 30 to angular rotation between the relative positions shown in full and in broken lines in FIG. 2, in the direction of the arcuate double ended arrow 44 in FIG. 4.

The rockshaft 32 also provides convenient means for slidably mounting the side-by-side members 28 and 30 so as to permit movement of the resilient abrasive discs 22 and 24 toward and away from one another in the frame 26 by loosening a pair of lock screws 46 and 48 respectively, so as to permit movement of these members 22 and 24 in an axial direction generally parallel to the axis of rotation of the workpiece itself. Thus, these lock screws 46 and 48 provide a convenient means for releasably clamping the pivotally mounted ends of the disc support members 28 and 30 to locate the abrasive discs in spaced relationship to one another for surfacing of the opposed faces of the workpiece 10. A hand knob 50 is provided to allow turning a screw for locking the rockshaft 32 in its active position with respect to the workpiece 10.

In further accordance with the present invention, the frame 26 can be seen from FIG. 2 to be provided on a cross-feed carriage 52, which carriage is in turn slidably received in ways defined in the bed of the machine 54 for transverse movement in a perpendicular direction with respect to the axis of rotation of the workpiece. A lead screw 56 is rotatably supported in the frame 58 of the machine for this purpose, and threadably received in the cross-feed carriage 52 so as to be conveniently positioned as a result of turning the handknob 60 provided for this purpose. Thus, convenient means is provided for locating the axes of the abrasive discs in different radial positions with respect to the workpiece so as to accommodate workpieces of various size.

A still further feature of the present invention is in the provision for rough facing of the workpiece prior to use of the abrasive discs discussed hereinabove for finish facing of the workpiece faces. As best shown in FIGS. 1 and 2 means is provided for adjustably mounting two cutting tools 62 and 64 on the cross-feed carriage 52 so as to permit simultaneous rough facing of both faces of

the workpiece 10 somewhat in the manner of a conventional lathe. The cross-feed carriage 52 is movable toward and away from the axis of rotation of the workpiece 10 by rotating the knob 60 in the manner set forth above and this motion can be used to provide a rough surface on a particularly poor workpiece such as a warped brake disc to be resurfaced.

Turning next to the means for adjustably mounting the cutting tools 62 and 64 in the cross-feed carriage 52, each such tool preferably comprises a conventional lathe type cutter which is adapted to be releasably clamped in position by a tool holder, of the type indicated generally at 66 and 68, for the cutters, 62 and 64 respectively. As best shown in FIG. 3, each of these cutting tools 62 and 64 includes a pivotally mounted end portion, indicated generally at 70 and 72 respectively. The forward end of the cutting tools 62 and 64 are adapted to be adjustably positioned toward and away from one another as a result of rotating lead screws 76 and 78 respectively. The inner ends of the screws are connected to the free end portions of the elongated cutting tools 62 and 64 for this purpose. As so configured, each cutting tool can be independently adjusted in position for rough facing of the workpiece 10 prior to engagement of the workpiece by the resilient abrasive discs 22 and 24 discussed hereinabove. The cross-feed carriage 52 can be advanced once these cutting tools 62 and 64 have been prepositioned by means of the handwheel 60 in the manner of a conventional lathe. The cutting tools then can be moved out of engagement with the rotating disc shaped workpiece 10 and the handwheel 60 used to position the cross-feed carriage 52 in the position shown in FIG. 2 wherein the resilient abrasive discs 22 and 24 are adapted to be moved into their active positions to be driven by the rotating workpiece 10 as best shown in FIG. 4.

Referring more particularly to FIG. 4, the area of engagement between the workpiece 10 and the resilient abrasive disc 24 is indicated generally by the shaded area 80, and the force imparted to the resilient abrasive disc 24 by the rotating workpiece is indicated generally by the directional arrows 81, 81. It will be apparent from FIG. 3 that the resilient abrasive discs are so mounted in their respective support members 28 and 30 so as to be arranged at a slight inclination or cant angle with respect to the opposed faces of the workpiece 10 to be surfaced, and that the resiliency of these abrasive discs is such that the portion of the disc 24 which, at any instant of time, is in engagement with the workpiece will be canted as shown creating a substantial force between the workpiece 10 and the abrasive discs 22 and 24 so as to permit the frictional force therebetween to rotate the discs in response to rotation of the workpiece 10. Since the majority of points in the shaded area 80 of FIG. 4 will be at varying radial distances from the centers of rotation of the workpiece 10 and the abrasive disc 24 it will be apparent that relative movement will be achieved between the workpiece 10 and the disc 24 so as to cause an abrasive action therebetween for surfacing or finishing the opposed faces of the workpiece 10. The arrows 82, 82 indicate schematically the direction of relative movement between the rotating workpiece discs 10 and the abrasive discs 22 and 24.

We claim:

1. Apparatus for surfacing the axially opposed faces of a disc shaped workpiece comprising means for rotatably supporting the workpiece and for driving it in one angular direction, a pair of resilient abrasive discs, means for supporting said abrasive discs for rotation on respective proximate axes, said abrasive disc supporting means also providing for movement of said proximate disc axes

from and to active abrasive disc positions wherein segments of the facing abrasive surfaces of said discs engage segments of the opposed faces of the workpiece for rotation of the former in response to rotation of the latter, said means for movably supporting said abrasive discs including a frame with side-by-side members for rotatably supporting said discs, and said frame further including means for slidably mounting said members to permit movement of said discs toward and away from one another, and means for adjustably mounting two cutting tools on said frame for simultaneously rough facing the opposed faces of the workpiece, and means for moving said cutting tools toward and away from the workpiece axis of rotation, said cutting tool mounting means includes a pair of pivot pins in said frame, and a pair of threaded plungers in the frame for engaging the tools to move them toward and away from one another in said frame.

2. Apparatus according to claim 1 wherein said cutting tool mounting means further includes a pair of tool clamping the tools at a desired spacing.

3. Apparatus according to claim 1 wherein said means for slidably mounting said disc support members comprises a rockshaft pivotally supported in said frame for limited rotation about an axis parallel to the axis of rotation of the workpiece, and means for releasably clamping the ends of said disc support members to spaced locations on said rockshaft whereby said discs can be moved between said active and inactive positions by rotating said rockshaft.

4. Apparatus according to claim 3 wherein said abrasive discs are rotatably supported in opposite ends of said disc support members for rotation on disc axes which are not only proximate with respect to one another but which are also canted with respect to one another and with respect to the axis of rotation of the workpiece to increase the frictional driving torque exerted by the workpiece upon the abrasive discs.

5. Apparatus according to claim 4 wherein said means for pivotally supporting said disc support members further includes stop means carried in part by said frame and in part by said rockshaft for limiting the angular rotational travel of the latter to define said active and inactive disc positions.

6. Apparatus according to claim 4 wherein said frame is movable toward and away from the workpiece to provide a convenient adjustment in the active position of said discs to accommodate workpiece of various diameters.

7. Apparatus according to claim 6 wherein said frame includes means for adjustably mounting two cutting tools thereon for simultaneously rough facing the opposed faces of the workpiece.

8. Apparatus according to claim 7 wherein said cutting tool mounting means includes a pair of pivot pins in said frame for pivotally receiving the cutting tools, and a pair of threaded plungers in the frame for engaging the tools to move them toward and away from one another in said frame.

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