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[54] **TOOL REST FOR GRINDING WHEEL WITH AUTOMATIC WEAR COMPENSATION**

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[52] **U.S. Cl.** ..... **51/238 R**, 51/165.87

[51] **Int. Cl.** **B24b 41/06**

[58] **Field of Search** ..... 51/165.87, 165.88, 51/238 R, 98

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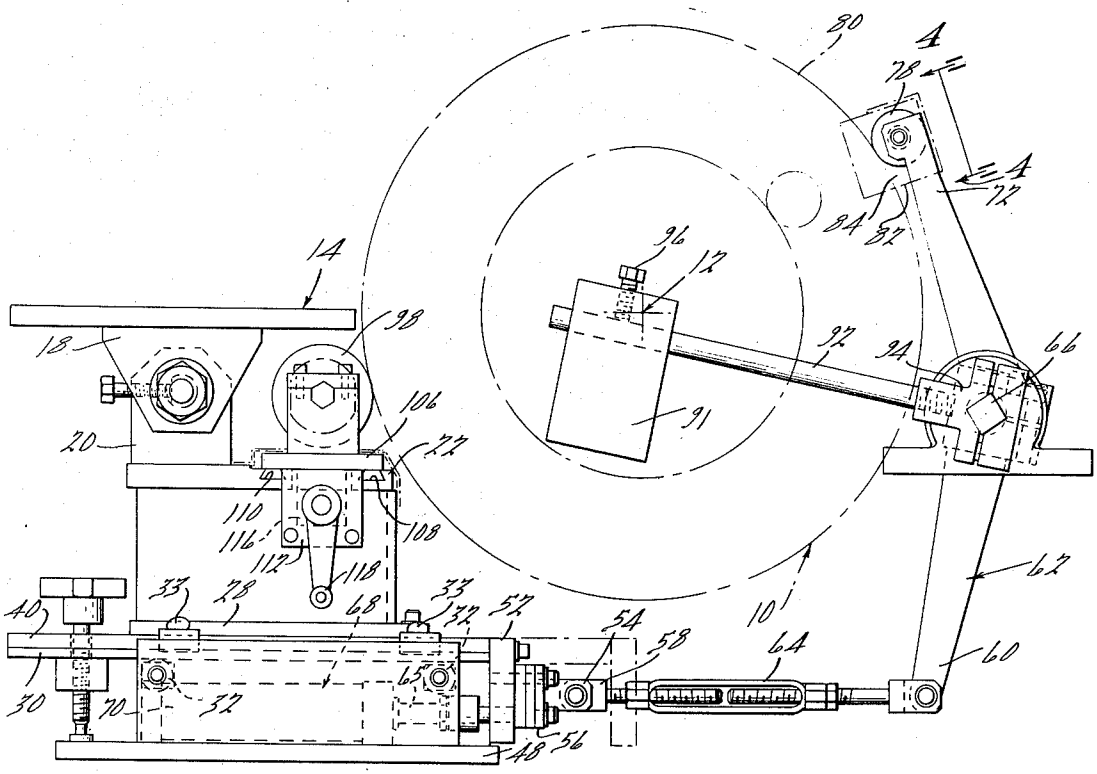
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Assistant Examiner—Nicholas P. Godici
Attorney—Keith L. Zerschling et al.

[57] **ABSTRACT**

A movable tool rest for a grinder having a grinding wheel and a tool platform mounted adjacent the periphery of the grinding wheel wherein provision is made for adjusting automatically the position of the platform with respect to the periphery of the wheel as the wheel decreases in diameter due to wear.

6 Claims, 5 Drawing Figures



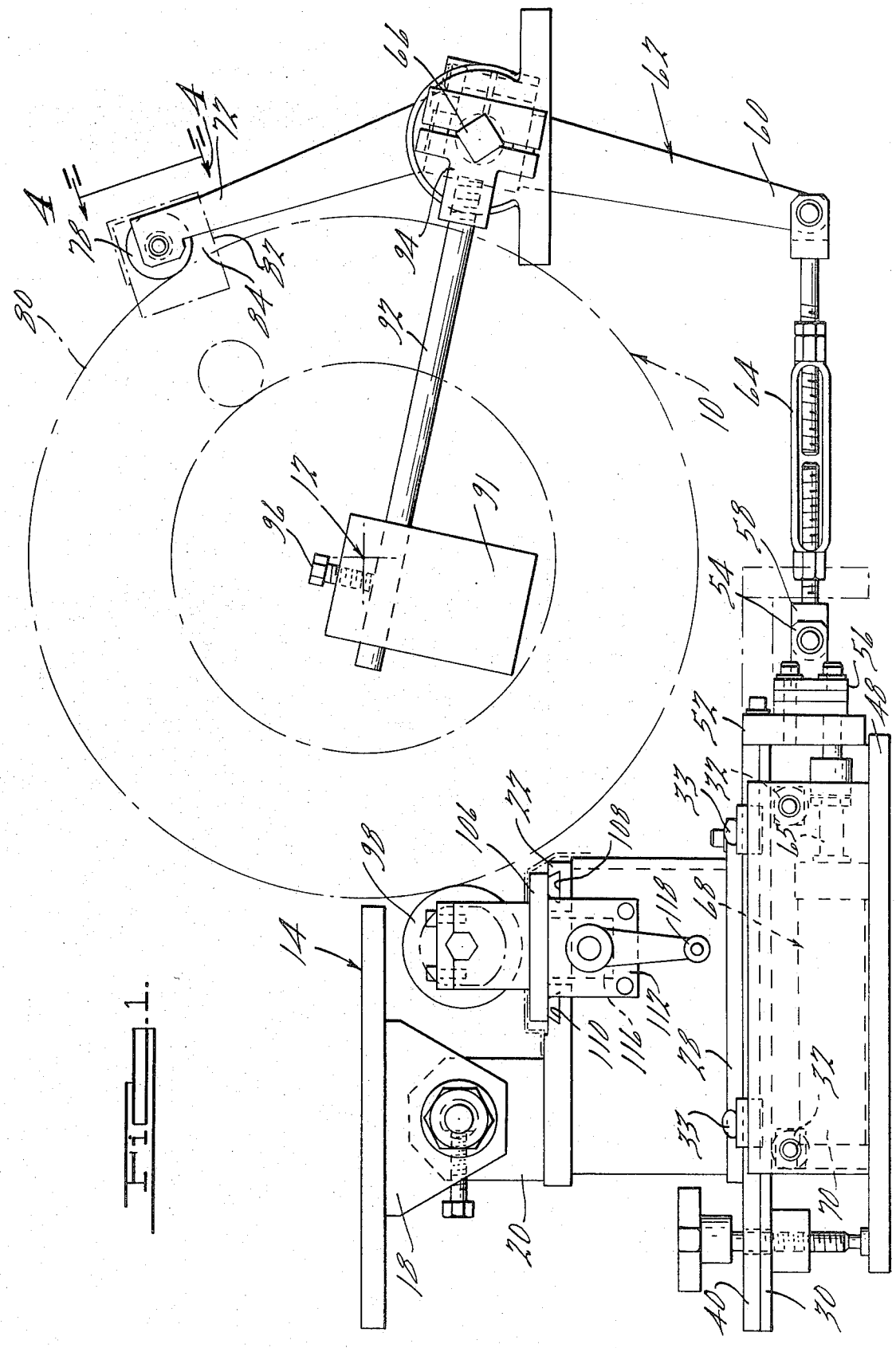
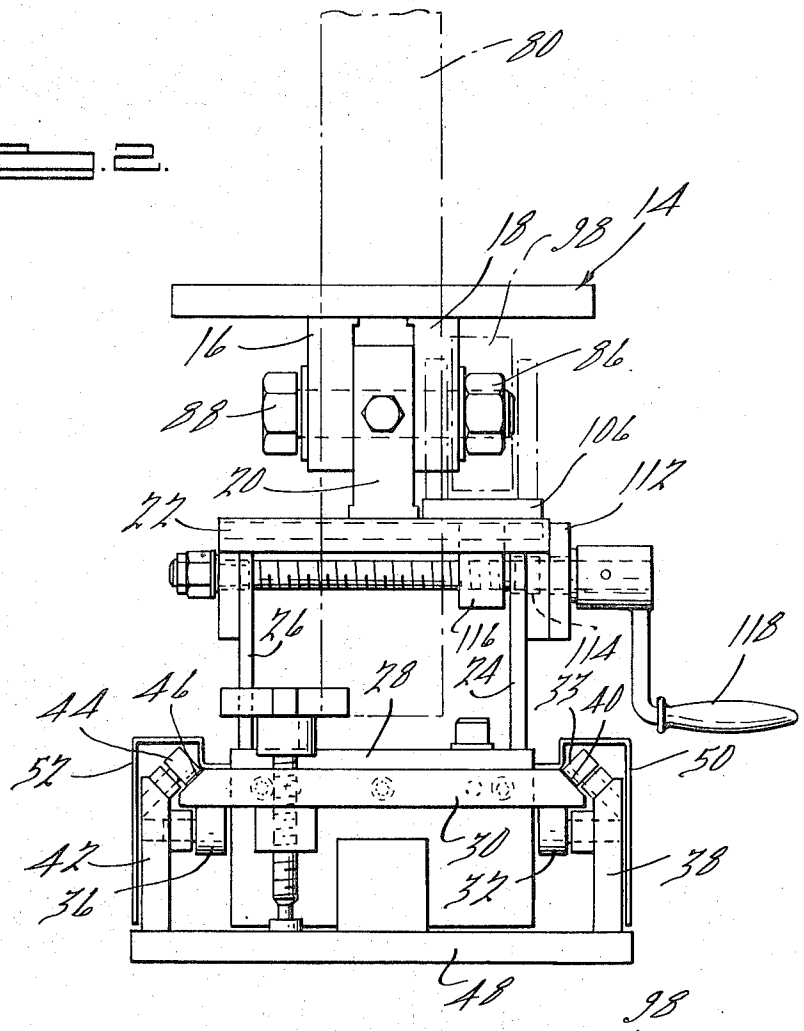


FIG. 1.

FIG. 2.



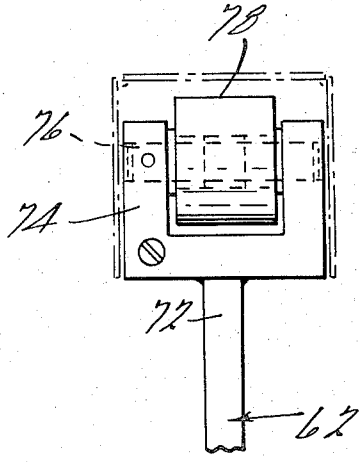


FIG. 4.

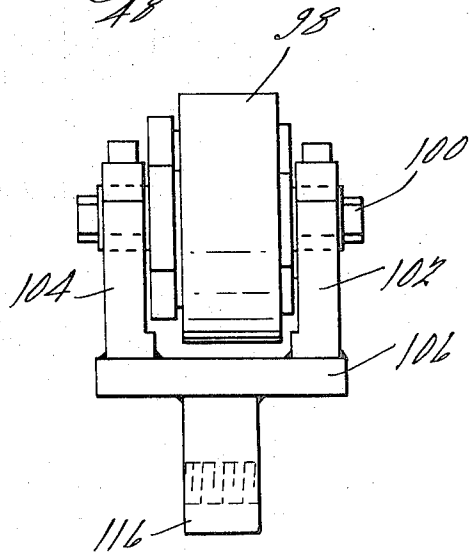


FIG. 5.

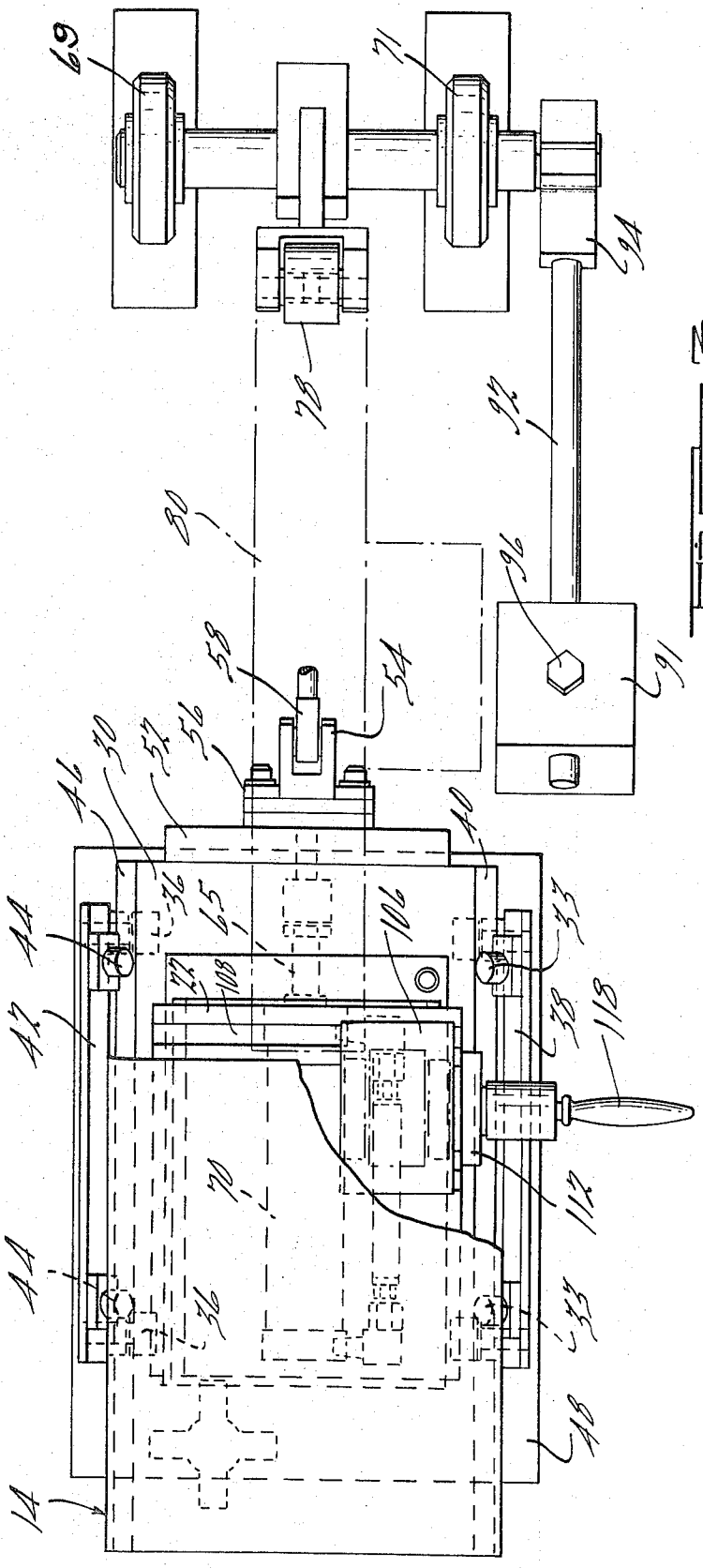

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Fig. 7

TOOL REST FOR GRINDING WHEEL WITH AUTOMATIC WEAR COMPENSATION

GENERAL DESCRIPTION OF THE INVENTION

Most grinding wheels found in tool rooms comprise a high speed abrasive disc mounted for rotation about a horizontal axis and a platform supported on a fixed base. Provision is made for adjusting manually the platform toward the periphery of the grinding wheel. The adjustment mechanism usually comprises a slide that is anchored to a fixed base by clamping bolts. The platform may be adjusted relative to the grinding wheel when the bolts are loosened to effect a predetermined clearance between the platform and the periphery of the wheel. When the adjustment is completed, the bolts again are clamped thereby holding the platform in a fixed position.

A tool or other object to be ground is supported on the platform and moved manually into engagement with the periphery of the wheel. This eventually reduces the diameter of the wheel due to wear. The space between the platform and the wheel changes as the diameter of the wheel is reduced. It is necessary periodically, therefore, to readjust the platform by loosening the clamping bolts and sliding the platform toward the wheel.

Our invention comprises an automatic mechanism for adjusting the platform relative to the periphery of the wheel. It maintains a predetermined clearance between the edge of the platform and the periphery of the wheel throughout the useful life of the grinding wheel regardless of changes in diameter due to wear. It avoids the necessity for manual adjustment of the platform and it prevents inadvertent contact of the platform with the wheel during such adjustments.

By providing automatic adjustments of the platform with respect to the wheel, the grinding wheel becomes safer to operate. It becomes less likely, or even impossible, for the tool or workpiece to become wedged between the periphery of the wheel and the edge of the platform. When the platform is maintained in close proximity to the periphery of the wheel at all times regardless of changes in diameter of the wheel, more precision in grinding of the tool or workpiece also can be achieved without the necessity for periodic manual adjustments of the platform. Furthermore, since manual adjustment is not required, the total time required to accomplish a given grinding operation is reduced accordingly.

A suitable dressing wheel can be mounted on the movable platform structure. It may be advanced across the peripheral surface of the wheel at periodic intervals whenever dressing is required. The automatic adjustment feature that maintains the platform in registry with the wheel is effective also to position the dressing wheel.

The automatic adjustment feature comprises a contact wheel which engages the periphery of the wheel when the wheel is at rest. It is carried by one end of an actuating lever for the movable platform structure. A shroud surrounds the contact wheel as well as the peripheral faces of the grinding wheel. As the grinding wheel rotates, the viscous sheer forces that exist between the ambient air and the rotating wheel create a peripheral air flow which passes into the shroud and separates the contact wheel from the periphery of the grinding wheel thereby creating a restricted air flow

passage. This passage is maintained relatively constant in size regardless of changes in the diameter of the wheel, and the presence of air flowing through the passage prevents actual frictional engagement of the contact wheel with the periphery of the grinding wheel thereby preventing wear of the contact wheel. Movement of the contact wheel toward the axis of rotation of the grinding wheel due to wear of the periphery of the grinding wheel results in movement of the lever that supports the contact wheel thereby creating an appropriate compensating adjustment of the workpiece supporting platform.

BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWING

FIG. 1 is a side elevation view, partly in section, showing the adjustable tool-supporting platform of our invention and the platform adjusting lever mechanism;

FIG. 2 is an end view of the structure shown in FIG. 1;

FIG. 3 is a plan view of the structure of FIG. 1;

FIG. 4 is a view of the actuating lever of FIG. 1 as seen from the plane of section line 4—4 of FIG. 1;

FIG. 5 is a subassembly view of the dressing wheel shown in FIG. 1 as seen from a direction that is perpendicular to the axis of rotation of the grinding wheel.

PARTICULAR DESCRIPTION OF THE INVENTION

In FIG. 1 reference character **10** designates a grinding wheel which is adapted to rotate about axis **12.** Numeral **14** designates a tool supporting platform. Supporting brackets **16** and **18** are carried by the platform **14** at its underside. These straddle bracket **20,** which is bolted or otherwise secured to plate **22.** Plate **22** is mounted in a horizontal position and is supported by side plates **24** and **26.** These in turn are supported by plate **28,** which is bolted or otherwise secured to slide plate **30.**

Rollers **32** and **34** engage the underside of one margin of the slide plate **30.** Another pair of rollers **36** engage the opposite margin of the slide plate **30.** Rollers **32** are supported by pins that are carried by the plate **38** at an angle of approximately 45°. This is best seen in FIG. **2.** The adjacent margin of plate **30** is formed with a flat **40** disposed at an angle that permits rolling engagement thereon of the rollers **33.**

Rollers **36** on the opposite side of the slide plate **30** are journalled on support wall **42** for rotation about a horizontal axis. Wall **42** also supports pins which journal side rollers **44** which engage a flat **46** formed on the slide plate **30** at an angle that complements the angle for the flat **40.**

The support walls **38** and **42** are joined to a horizontal base plate **48.** A sheet metal shroud **50** is attached to the slide plate **30** and envelops the rollers **33.** A corresponding sheet metal shroud **52** envelops the rollers **44.**

As seen in FIG. **1,** a connector plate **52** is carried by one end of the slide plate **30.** An eyelet **54** is secured to the plate **52** by means of a resilient coupling connection **56.** A link **58** is pinned to the eyelet **54** as indicated in FIG. **1.** The opposite end of the link **58** is connected by means of a pin to the lower end **60** of actuating lever **62.** The link **58** includes a turnbuckle **64** which is adapted to change the effective length of the link **58** when it is turned.

The plate 52 is connected also to one end of the piston rod 65 which forms a part of a hydraulic damper 68. The damper comprises, in addition to the rod 65, a cylinder 70 which cooperates with a piston in the cylinder 68 to define a fluid damper chamber. The cylinder 70 is connected to the stationary base plate 48. Damper 68 resists sudden movement of the slide plate 30 in one direction or the other, thereby preventing sudden movements of platform 14 due to shock loading or due to inadvertent manipulation by the operator.

Lever 62 is supported on rocker shaft 66. Shaft 66 in turn is end supported by spaced bearings 69 and 71 carried by bearing supports which are adapted to be secured to a stationary portion of the mechanism. The end 72 of the lever 62 carries a contact wheel support 74. This support comprises two arms which carry mounting pin 76. Contact wheel 78 is journalled on pin 76 and is adapted to engage the periphery 80 of the grinding wheel 10. A sheet metal shroud 82 is carried by the support 74 and it includes two side portions, one portion extending directly adjacent each side of the grinding wheel 10. The sides of the shroud 82 and the periphery of the grinding wheel 10 define an air pocket 84 which receives air that is set into peripheral motion due to the rotation of the grinding wheel 10. This develops a slight increase in the static pressure in the air pocket 84 relative to the ambient air pressure which in turn tends to create a force on the end 72 of lever 62 causing the periphery of the wheel 78 to separate from the periphery of the grinding wheel 10. This introduces a small air flow passage through which the air in pocket 84 may pass. As the periphery of the wheel 78 becomes separated from the grinding wheel, lever 62 pivots slightly in a clockwise direction, as viewed in FIG. 1. This motion is translated into axial motion of the slide plate 30. This motion then causes the corresponding adjustment of the platform 14.

The angular position of the platform 14 relative to a horizontal reference line is controlled by adjusting nuts 86 and 88 and adjusting bolt 90. The angular position of the platform 14 can be adjusted by loosening nuts 86 and 88 and then retightening them so that the members 16 and 18 frictionally engage the member 20.

When the grinding wheel is at rest with the contact wheel 78 engaging its periphery, the platform 14 may be adjusted by appropriately positioning the turnbuckle 64. When the grinding wheel begins to rotate, peripheral air circulation occurs due to the viscous drag of the wheel on the ambient air thereby creating a static pressure increase in chamber 84 which causes lever 62 to move slightly in a clockwise direction. This backs off the platform 14. A counterweight 91, which is carried at one end of the counterweight lever 92, causes a counterbalance torque to act upon the lever 62. The end of the lever 62 is secured to the clamping structure 94 that forms a connection between the rocker shaft 66 and the lever 62. The amount of oscillatory movement of the lever 62 is decreased as the counterweight 91 moves outwardly from the axis of the shaft 66. Locking bolt 96 holds the counterweight 90 in its adjusted position on the shaft 92.

A dressing wheel 98 is carried by a pin 100 which is end supported by supporting brackets 102 and 104. These brackets are carried by slide plate 105 which is adapted to slide transversely on the plate 22. Guideways 108 and 110 may be provided in the plate 22 to receive guide rails carried by the plate 106. The end of plate 106 carries an end plate 112 through which screw 114 is received. An internally threaded member 116 receives the screw 114 and is carried by the plate 106, the latter being mounted over an opening in plate 22 through which the member 116 extends. The end of the screw 116 carries adjusting crank handle 118. As the handle 118 is rotated in one direction or the other the dressing wheel 98 is moved across the periphery of the grinding wheel 10.

As the diameter of the grinding wheel 10 decreases, the lever 62 will be adjusted in a counterclockwise direction. This adjustment then is accomplished by a corresponding adjustment of the platform 14 toward the grinding wheel. Thus the clearance between the platform 14 and the grinding wheel is maintained constant regardless of changes in diameter of the grinding wheel.

The damper 68 normally will not provide appreciable resistance to slow adjusting movements of the lever 62. It will, however, provide substantial damping forces if the lever 62 for some reason should be moved abruptly. This prevents damage to the platform 14 and the grinding wheel 10 as well as to the tool being ground.

What we claim and desire to secure by U. S. Letters Patent is:

1. A workholder for a grinding wheel comprising a platform mounted for reciprocating movement toward and away from the axis of rotation of a grinding wheel with one part of the platform in close proximity to the periphery of the grinding wheel, an adjusting lever mounted for oscillation on a stationary axis, one end of said lever being connected mechanically to said platform, a contact member carried by said lever and engageable with the periphery of said wheel when the wheel is at rest, said contact member and the periphery of said wheel defining in part an air flow passage that receives air set in motion due to the shear forces that exist between the ambient air and the rotating wheel, the force established by the resulting air pressure on said lever causing compensating adjustments of said platform upon changes in the diameter wheel due to wear said contact member comprising a contact roller wheel carried by one end of said lever, the periphery of said roller wheel engaging the periphery of said grinding wheel when the grinding wheel is stationary and moving away from the periphery of said grinding wheel due to static pressure forces created by air circulation upon rotation of said grinding wheel.

2. A workholder for a grinding wheel comprising a platform mounted for reciprocating movement toward and away from the axis of rotation of a grinding wheel with one part of the platform in close proximity to the periphery of the grinding wheel, an adjusting lever mounted for oscillation on a stationary axis, one end of said lever being connected mechanically to said platform, a contact member carried by said lever and engageable with the periphery of said wheel when the wheel is at rest, said contact member and the periphery of said wheel defining in part an air flow passage that receives air set in motion due to the shear forces that exist between the ambient air and the rotating wheel, the force established by the resulting air pressure on said lever causing compensating adjustments of said platform upon changes in the diameter wheel due to wear, said platform includes a horizontal member defining a horizontal work supporting surface, a stationary base, friction reducing mounting means for establishing relatively friction-free translatory movement of

said platform along said base in a direction perpendicular to the axis of rotation of said grinding wheel, and means for normally urging said lever in one angular direction thereby tending to cause said contact member to engage the periphery of said wheel said contact member comprising a contact roller wheel carried by one end of said lever, the periphery of said roller wheel engaging the periphery of said grinding wheel when the grinding wheel is stationary and moving away from the periphery of said grinding wheel due to static pressure forces created by air circulation caused by rotation of said grinding wheel.

3. A workholder for a grinding wheel comprising a platform mounted for reciprocating movement toward aand away from the axis of rotation of a grinding wheel with one part of the platform in close proximity to the periphery of the grinding wheel, an adjusting lever mounted for oscillation on a stationary axis, one end of said lever being connected mechanically to said platform, a contact member carried by said lever and engageable with the periphery of said wheel when the wheel is at rest, said contact member and the periphery of said wheel defining in part an air flow passage that receives air set in motion due to the shear forces that exist between the ambient air and the rotating wheel, the force established by the resulting air pressure on said lever causing compensating adjustments of said platform upon changes in the diameter wheel due to wear, said contact member comprising a contact roller wheel carried by one end of said lever, the periphery of said roller wheel engaging the periphery of said grinding wheel when the grinding wheel is stationary and moving away from the periphery of said grinding wheel due to static pressure forces created by air circulation upon rotation of said grinding wheel, the connection between said lever and said platform comprising relatively rotatable threaded parts whereby the effective length of said connection may be varied as desired thereby providing a predetermined initial position of said platform relative to the periphery of said wheel.

4. A workholder for a grinding wheel comprising a platform mounted for reciprocating movement toward and away from the axis of rotation of a grinding wheel with one part of the platform in close proximity to the periphery of the grinding wheel, an adjusting lever mounted for oscillation on a stationary axis, one end of said lever being connected mechanically to said platform, a contact member carried by said lever and engageable with the periphery of said wheel when the wheel is at rest, said contact member and the periphery of said wheel defining in part an air flow passage that receives air set in motion due to the shear forces that exist between the ambient air and the rotating wheel, the force established by the resulting air pressure on said lever causing compensating adjustments of said platform upon changes in the diameter wheel due to wear, said platform includes a horizontal member defining a horizontal work supporting surface, a stationary base, friction reducing mounting means for establishing relatively friction-free translatory movement of said platform along said base in a direction perpendicular to the axis of rotation of said grinding wheel, and means for normally urging said lever in one angular direction thereby tending to cause said contact member to engage the periphery of said wheel, said contact member comprising a contact roller wheel carried by one end of said lever, the periphery of said roller wheel engaging the periphery of said grinding wheel when the grinding wheel is stationary and moving away from the periphery of said grinding wheel due to static pressure forces created by air circulation caused by rotation of said grinding wheel, the connection between said lever and said platform comprising relatively rotatable threaded parts whereby the effective length of said connection may be varied as desired thereby providing a predetermined initial position of said platform relative to the periphery of said wheel.

5. A workholder for a grinding wheel comprising a platform mounted for reciprocating movement toward and away from the axis of rotation of a grinding wheel with one part of the platform in close proximity to the periphery of the grinding wheel, an adjusting lever mounted for oscillation on a stationary axis, one end of said lever being connected mechanically to said platform, a contact member carried by said lever and engageable with the periphery of said wheel when the wheel is at rest, said contact member and the periphery of said wheel defining in part an air flow passage that receives air set in motion due to the shear forces that exist between the ambient air and the rotating wheel, the force established by the resulting air pressure on said lever cuasing compensating adjustments of said platform upon changes in the diameter wheel due to wear, said contact member comprising a contact roller wheel carried by one end of said lever, the periphery of said roller wheel engaging the periphery of said grinding wheel when the grinding wheel is stationary and moving away from the periphery of said grinding wheel due to static pressure forces created by air circulation upon rotation of said grinding wheel, said platform comprising a fluid damper having relatively movable parts, one part being connected to a stationary portion of said workholder and the other part being connected to movable portions of said platform whereby dampening forces resist displacement of said platform due to excessive loads.

6. A workholder for a grinding wheel comprising a platform mounted for reciprocating movement toward and away from the axis of rotation of a grinding wheel with one part of the platform in close proximity to the periphery of the grinding wheel, an adjusting lever mounted for oscillation on a stationary axis, one end of said lever being connected mechanically to said platform, a contact member carried by said lever and engageable with the periphery of said wheel when the wheel is at rest, said contact member and the periphery of said wheel defining in part an air flow passage that receives air set in motion due to the shear forces that exist between the ambient air and the rotating wheel, the force established by the resulting air pressure on said lever causing compensating adjustments of said platform upon changes in the diameter wheel due to wear, said platform includes a horizontal member defining a horizontal work supporting surface, a stationary base, friction reducing mounting means for establishing relatively friction-free translatory movement of said platform along said base in a direction perpendicular to the axis of rotation of said grinding wheel, and means for normally urging said lever in one angular direction thereby tending to cause said contact member to engage the periphery of said wheel, said contact member comprising a contact roller wheel carried by one end of said lever, the periphery of said roller wheel engaging the periphery of said grinding wheel when the

grinding wheel is stationary and moving away from the periphery of said grinding wheel due to static pressure forces created by air circulation caused by rotation of said grinding wheel, said platform comprising a fluid damper having relatively movable parts, one part being connected to a stationary portion of said workholder and the other part being connected to movable portions of said platform whereby dampening forces resist displacement of said platform due to excessive loads.

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