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[54] POLISHING MACHINE LOAD PLATE

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[52] **U.S. Cl.** **51/129,** 51/235

[51] **Int. Cl.** **B24b 7/04**

[58] **Field of Search** 51/129, 131, 235

[56] **References Cited**

UNITED STATES PATENTS

2,998,680	9/1961	Lipkins	51/131
3,518,798	7/1970	Boettcher	51/131
3,110,988	11/1963	Boettcher	51/131
2,405,417	8/1946	Fruth	51/235 X
2,687,603	8/1954	White	51/131 X
3,571,978	3/1971	Day	51/129

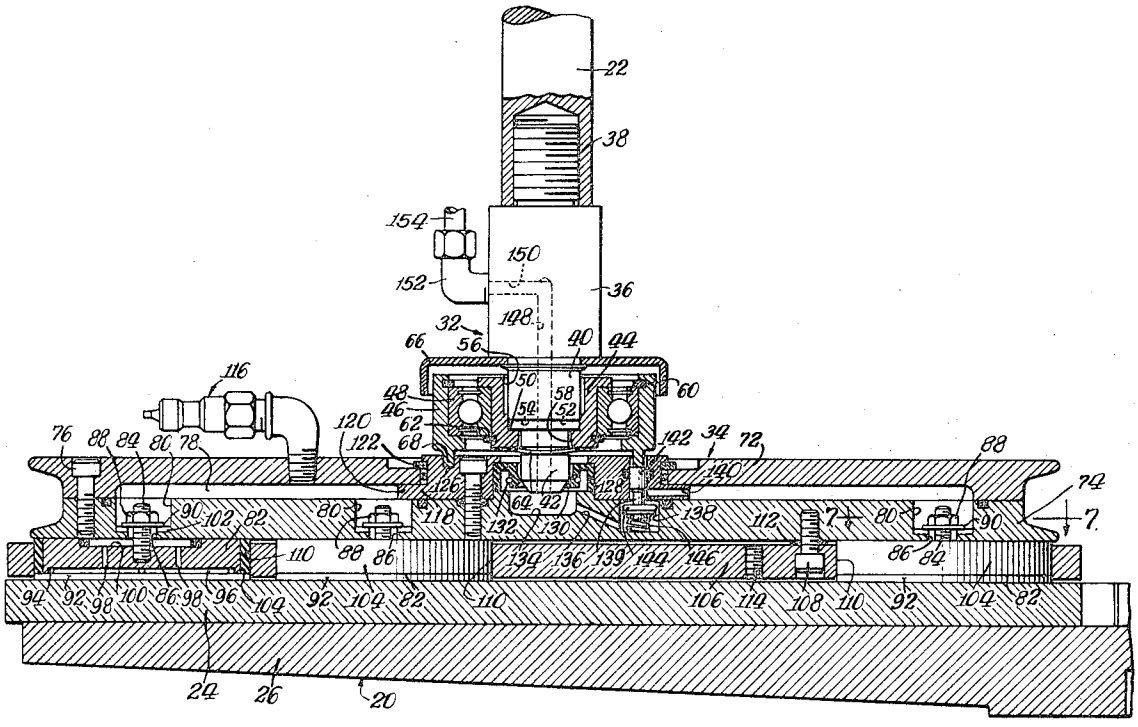
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[57] **ABSTRACT**

A load plate having depending pedestals with vacuum passage means communicating with the lower surfaces of the pedestals, and valve means for effecting a negative pressure on work pieces mounted on the pedestals for retaining the work pieces thereon during finishing. A mask plate establishes work piece receiving pockets with the pedestals, and sealing means maintain the negative pressure mounting and prevent leakage between the work pieces and the pedestal mounting surfaces.

19 Claims, 7 Drawing Figures



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2 Sheets-Sheet 1

Fig. 1.

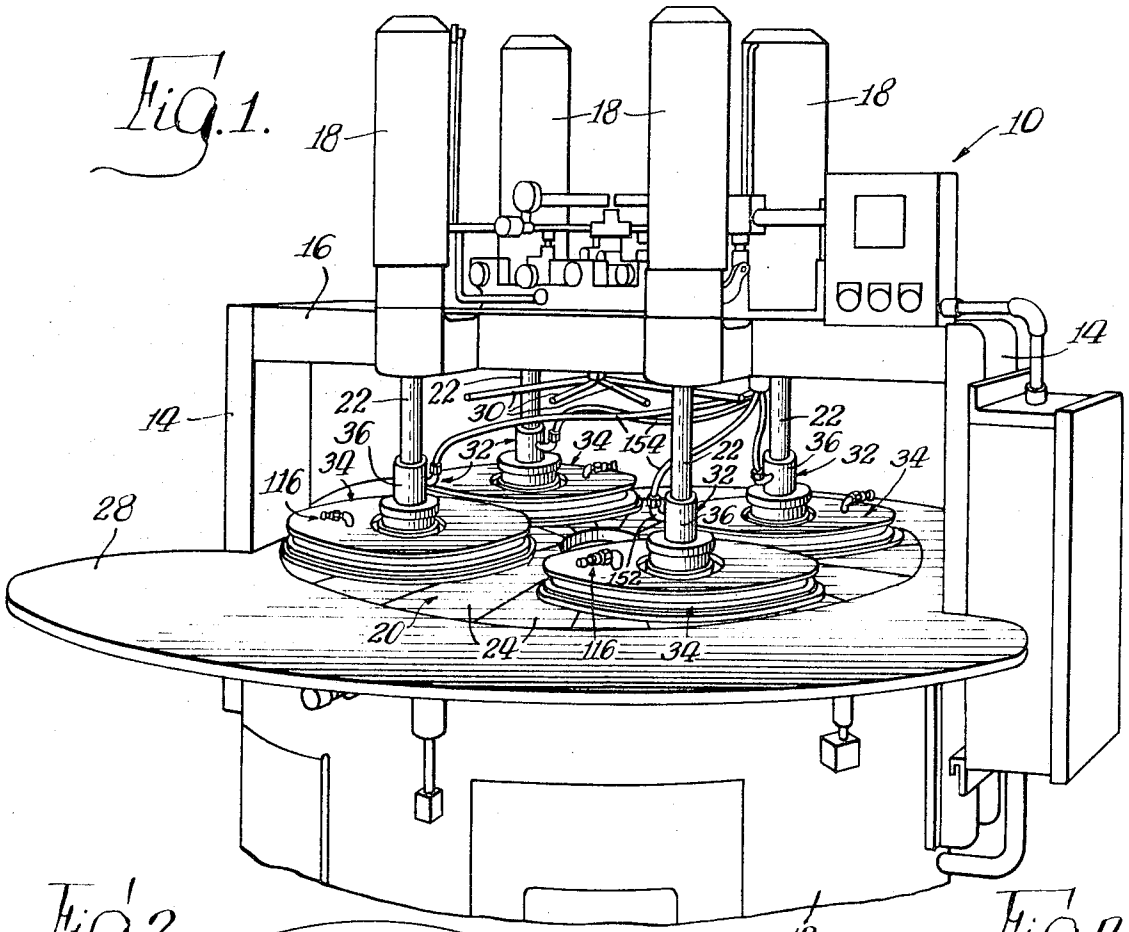


Fig. 2.

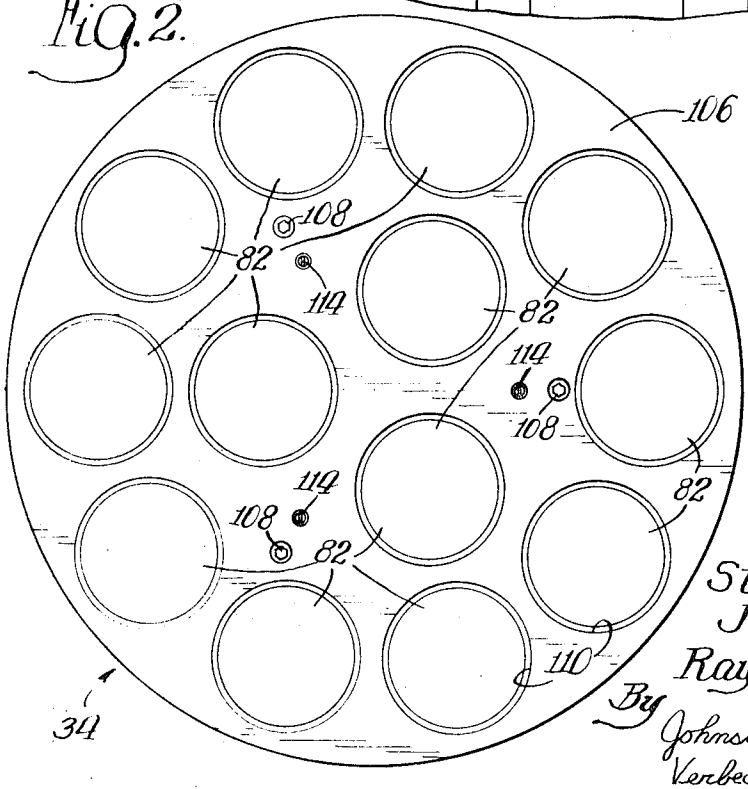
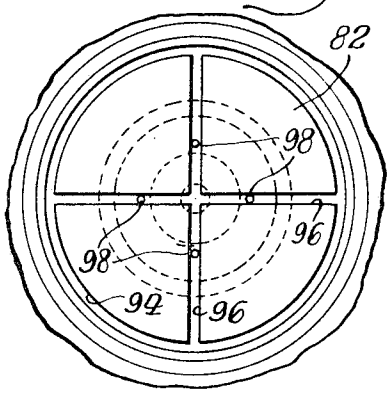
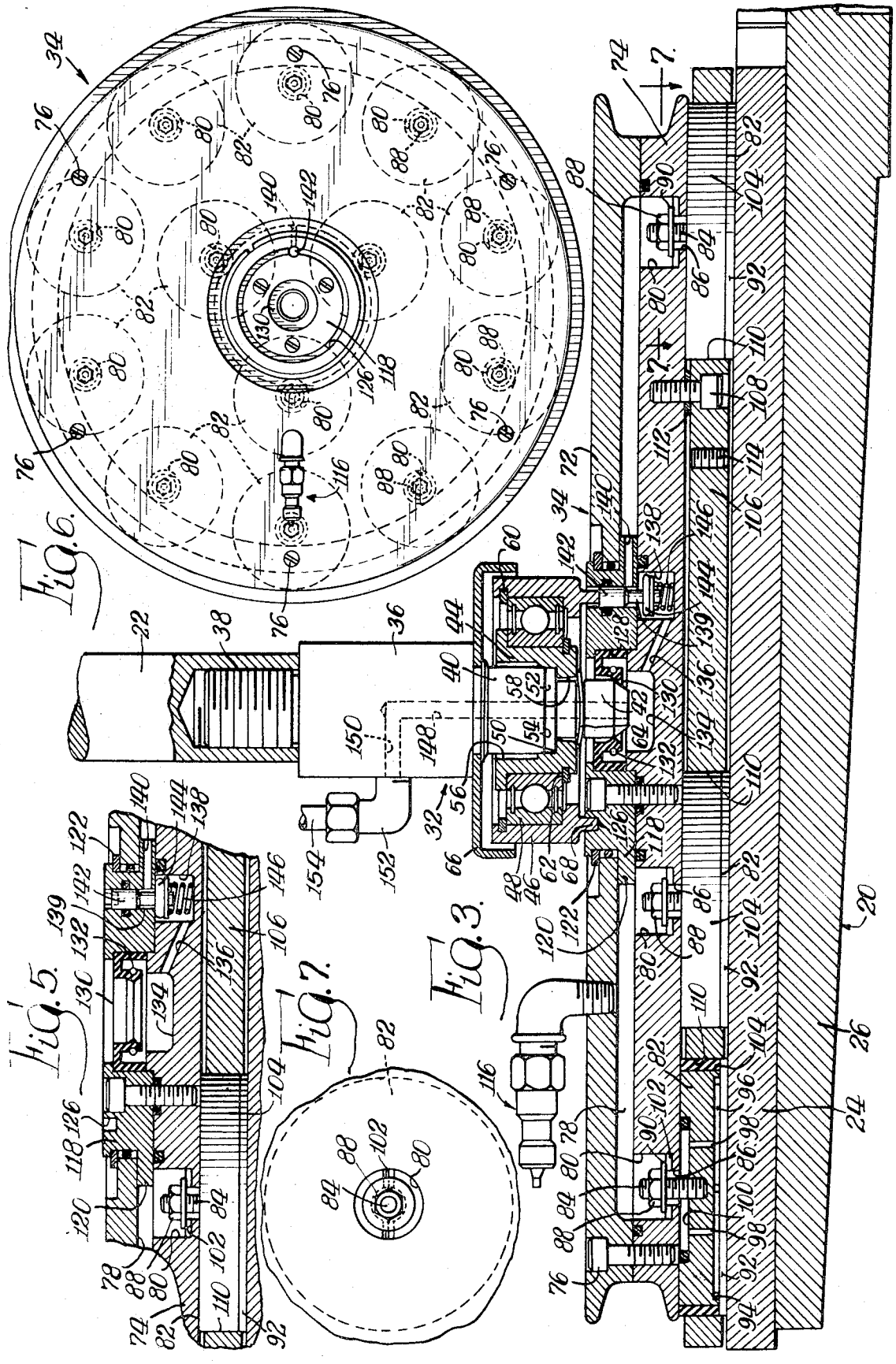


Fig. 4.



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POLISHING MACHINE LOAD PLATE

BACKGROUND OF THE INVENTION

The present invention relates to load plates having novel means for retaining work pieces thereon for finishing the work pieces on polishing machines and the like.

The general type of machine with which the present invention is used includes an abrading, lapping, or polishing wheel assembly which is rotatably driven about a vertical axis such that work pieces may be engaged with the upper surface of the wheel assembly and polished or abraded by means of an abrasive slurry. It is known to employ load plates with such machines which are connected to vertically movable spindles and are adapted to have work pieces mounted on the lower surfaces thereof for engagement with the polishing wheel assemblies. In the finishing of relatively thin wafer plates or discs such as used in photo transfer processes and lens constructions, a plurality of discs are generally mounted on the lower surface of a load plate at a loading station removed from the polishing wheel and the loaded plate is then placed on the polishing wheel for finishing the work pieces. One known method of securing the wafers or discs to the load plate is to apply a hot paraffin coating to the lower surface of the load plate and embed the wafers or discs into the paraffin coating where they are retained upon hardening of the paraffin. This method has presented numerous drawbacks among which are that it is difficult to provide a uniform thickness of paraffin or wax on the mounting surface of the load plate with the result that the work pieces are not uniformly spaced from the mounting surface. The presence of foreign particles in the paraffin coating further prevents uniform spacing of the discs from the lower mounting surface of the load plate. In addition, after finishing the mounted wafers or discs, the paraffin must be re-melted to allow removal of the discs and cleaning of the mounting surface preparatory to mounting the next group of wafers or discs. The use of paraffin to mount the work pieces and removal of the paraffin from the load plate mounting surfaces is time consuming and thereby substantially increases manufacturing costs.

The present invention overcomes the disadvantages in the prior art methods of mounting and retaining work pieces on a load plate by providing an improved load plate construction whereby work pieces may be readily mounted and retained on the load plate for finishing, and thereafter easily removed without further cleaning of the load plate mounting surface.

Summary of the Invention

One of the primary objects of the present invention is to provide a load plate for use with a polishing machine and the like which includes novel work piece retaining means operative to retain one or more work pieces on the load plate.

Another object of the present invention is to provide a load plate which may be readily assembled and disassembled and which employs a plurality of work piece mounting surfaces which may be readily re-finished to insure coplanar relation of the mounting surfaces.

Another object of the present invention is to provide a load plate having novel means for retaining work pieces on the load plate by negative pressure, the load plate having means for connecting vacuum passage means to a vacuum source during mounting of the work pieces and during operation on a finishing machine.

A feature of the present invention is the provision of a sealing ring member about each of a plurality of work piece mounting pedestals to retain the vacuum mounting of the work pieces and prevent abrasive slurry from getting between the work pieces and the mounting surfaces of the associated pedestals.

Another feature of the present invention is the provision of a mask plate cooperative with the mounting pedestals to provide a work piece retaining pocket on the lower surface of each pedestal.

Another feature of the present invention is the provision of pressure disc assembly means for effecting cooperation between the load plates and the vertically movable pistons, the pressure disc assemblies having novel means for allowing swivel movement of the associated load plates.

In carrying out the objects and advantages of the present invention, there is provided a load plate having a plurality of downwardly depending pedestals the lower surfaces of which are adapted to have work pieces mounted thereon. Vacuum passage means are disposed within the load plate in communication with the lower mounting surfaces of the pedestals. A normally closed vacuum connector valve is supported on the upper surface of the load plate for connection to a vacuum source whereby to retain work pieces on the pedestals by negative pressure. A mask plate is secured to the lower surface of the load plate and has a plurality of openings therein to receive the depending pedestals and establish work piece retaining pockets on the lower mounting surfaces of the pedestals. Resilient sealing rings are mounted on the annular peripheral surfaces of the pedestals for sealing engagement with the work pieces. A central opening in the upper surface of the load plate receives the center spindle portion of a pressure disc assembly and communicates with the vacuum passage means through a flow passage having a normally closed control valve therein operable to effect communication between the vacuum passage means and a source of vacuum during finishing of the work pieces. The pressure disc assembly is connected to the lower end of a vertically movable spindle and is adapted to apply a downward force on the load plate while providing a swivel connection between the load plate and the spindle.

Further objects and advantages of the present invention, together with the organization and manner of operation thereof, may best be understood from the following detailed description when taken in conjunction with the accompanying drawings wherein like reference numerals designate like elements throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial perspective view of a polishing machine having load plates in accordance with the present invention associated therewith;

FIG. 2 is a bottom view of one of the load plates shown in FIG. 1;

FIG. 3 is a partial vertical sectional view through a load plate mounted on the polishing machine of FIG. 1;

FIG. 4 is an enlarged bottom view of a work piece support spindle;

FIG. 5 is a partial sectional view of the load plate of FIG. 3 with the pressure disc assembly removed to show the center vacuum control valve in a closed position;

FIG. 6 is a top plan view of a load plate removed from the polishing machine; and

FIG. 7 is a partial sectional view taken substantially along the line 7—7 of FIG. 3, looking in the direction of the arrows.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings, and in particular to FIG. 1, the present invention is illustrated, by way of illustration, as being embodied in a polishing machine indicated generally at 10. The polishing machine 10 includes a framework having a generally cylindrical lower base portion 12 which supports two diametrically opposed upstanding columns or channels 14 between which is supported a horizontal bridge member 16. Four pneumatic cylinder assemblies 18 are supported by the bridge member 16 so as to substantially vertically overlie four quadrants of a circular polishing wheel assembly, indicated generally at 20. The pneumatic cylinder assemblies 18 are of known construction and include vertically movable pistons 22. The polishing wheel assembly 20 is also of known construction and includes a plurality of coplanar wedge shaped segments 24 supported by a back-up wheel 26 (FIG. 3) which is supported by the framework for rotational movement about a vertical axis. Suitable means (not shown) are supported within the base portion 12 for effecting selective rotational movement of the wheel assembly 20. A staging table or apron 28 is supported to substantially surround the polishing wheel assembly with its upper surface generally coplanar with the upper surface of the polishing wheel segments. The staging table provides a station for mounting and removing work pieces before and after polishing or finishing the work pieces. A plurality of tubular conduits 30 extend downwardly from the bridge member 16 to overlie the polishing wheel segments 24 for feeding a free flowing polishing or abrading mixture to the upper surface of the polishing wheel assembly 20. The polishing or abrading mixture may comprise any suitable polishing or abrasive slurry such as one having an abrasive base of iron oxide, cerium oxide or zirconium oxide suspended or mixed in water.

Noting FIG. 1, taken in conjunction with FIG. 3, pressure disc assembly means, indicated generally at 32, is secured to the lower end of each of the vertically movable piston rods 22. Load plate means, indicated generally at 34, is operatively associated with each of the pressure disc assembly means 32. The load plate means 34 are adapted to have work pieces affixed thereto for engagement with the upper surface of the polishing wheel assembly 20 as will be more fully described hereinbelow. Each of the pressure disc assemblies 32 include a cylindrical spindle 36 having a threaded upper end portion 38 for connection to one of the piston rods 22. Each of the spindles 36 has reduced diameter lower end portions 40 and 42 upon which are mounted pressure discs means. The pressure disc means comprises an inner annular support member 44 and an outer annular pressure transmitting member 46 interconnected by a radial and axial thrust bearing 48 retained between members 44 and 46 by retainer rings 60 and 62.

The inner support member 44 has a lower radially inwardly directed annular lip portion forming an annular shoulder surface 50 which abuts the lower surface of an annular relatively hard rubber washer 52 received over the lower portion 42 of the spindle 36. The rubber washer 52 has a durometer rating of approximately 60 and has its upper surface seated against an annular surface 54 formed between the stepped portions 40 and 42 of the spindle. The inner peripheral surface of the support member 44 adjacent the washer 52 has a diameter substantially equal to that of the cylindrical portion 40 of the spindle 36 so as to capture and enclose the annular peripheral surface of the rubber washer and prevent expansion or extrusion thereof when subjected to compressive forces. The inner peripheral surface of the support member 44 above and below the washer 52 is spaced outwardly from the spindle surfaces 40 and 42, as at 56 and 58, to allow swivel motion of the support member 44 relative to the axis of the spindle 36 through the action of the rubber washer 52. The annular support member 44 is retained axially on the lower end portions of the spindle 36 by a conically shaped retainer ring 64 received within an annular groove in the lower portion 42 of the spindle. An annular cap or shroud 66 is suitably supported on the spindle 36 to overlie the thrust bearing 48 and shield the bearing from polishing or abrasive slurry and other foreign materials, the shroud being spaced slightly upwardly of the bearing and associated support members to allow swivel action thereof relative to the axis of the spindle 36.

The outer pressure transmitting member 46 has a downwardly extending annular flange or rib 68 adapted to engage the load plate means 34 and exert a downward force thereagainst upon downward movement of the associated spindle 22 as will be described more fully hereinbelow.

The load plate means 34 includes upper and lower circular plate portions 72 and 74, respectively, which are secured together in sealed relation by a plurality of cap screws 76. The upper and lower load plate portions 72 and 74 define a generally annular vacuum passage 78 therebetween which communicates with a plurality of cylindrical recesses 80 formed in the lower plate portion 74. Secured to the lower planar surface of the load plate portion 74 beneath each of the recesses 80 is a cylindrically shaped pedestal 82 having upper and lower parallel planar surfaces. Each of the pedestals 82 is secured to the lower load plate portion 74 through suitable means such as a threaded stud 84 which is fixed centrally to the pedestal and received upwardly through an enlarged opening 86 in the lower plate portion. A nut 88 and washer 90 are secured on the upper end of each stud 84 to retain the pedestals against the lower surfce of the plate portion 74. The openings 86 which receive the studs 84 of the pedestals 82 are of sufficiently greater diameter than the studs to allow lateral positioning of the pedestals for cooperation with a mask plate to be described. The lower surfaces of the pedestals 82 are coplanar and provide mounting surfaces for work pieces, shown at 92 in FIG. 3, which are retained on the lower surfaces of the pedestals during finishing of the work pieces. Noting FIG. 4, the lower mounting surface of each of the pedestals 82 has an annular groove 94 and cross grooves 96 formed therein which are in communicating relation with the annular

vacuum passage 78 through passages 98 and a circular recess 100 formed in each of the pedestals, and through the associated opening 86 and a cross V-shaped groove 102 (FIG. 7) formed in the lower surface of the associated recess 80 in the lower load plate portion 74.

Each of the cylindrical pedestals 82 has a relatively hard rubber ring or sleeve 104 secured to its annular peripheral surface. The lower annular edge surface of each resilient sleeve 104 projects downwardly below the lower surface of the associated pedestal 82 approximately .001 inch to establish sealing engagement with a work piece when mounted on the lower surface of the pedestal and prevent abrasive slurry from getting between the upper surface of the work piece and the lower mounting of the pedestal.

Noting FIGS. 2 and 3, a circular mask plate 106 is secured to the lower surface of the lower load plate portion 74 through a plurality of set screws 108. The mask plate 106 has upper and lower parallel planar surfaces and further has a plurality of circular openings 110 therethrough each of which is adapted to receive a pedestal 82 therein with the outer peripheral surfaces of the sealing sleeves 104 being snugly received within the associated openings in the mask plate. The mask plate 106 is spaced downwardly from the lower surface of the load plate portion 74 by spacer shims 112 disposed about the cap screws 108 such that the lower surface of the mask plate lies in a plane spaced below the lower surfaces of the pedestals 82. In this manner, a work piece receiving pocket is formed adjacent the lower surface of each of the pedestals 82. The mask plate is preferably positioned such that its lower surface is spaced below the lower surfaces of the pedestals 82 a distance equal to approximately two-thirds of the desired finished thickness of the work pieces after polishing or abrading. A plurality of jack screws 114 are threadedly received in the mask plate 106 and may be threaded upwardly, as considered in FIG. 3, to force separation of the mask plate from the lower load plate portion 74 during disassembly after the set screws 108 have been removed.

The load plate means 34 has a self-closing valve 116 of conventional construction supported on the upper plate portion 72 generally intermediate the center and outer peripheral edge of the load plate. The valve 116 communicates with the annular vacuum passage 78 such that connection of the valve to a vacuum source effects a vacuum within the passage 78 when work pieces are mounted on the pedestals 82 to retain the work pieces on the pedestals by negative pressure. The load plate 34 finds particular application in the finishing of the work pieces 92 which comprise relatively thin wafer plates or discs which require high accuracy in finishing. The unfinished work pieces 92 may be mounted on the pedestals 82 of the load plate means 34 at a work station removed from the polishing wheel assembly 20, such as on the staging table 28. In accomplishing mounting of the work pieces on the load plate, the load plate is inverted and the work pieces are placed on the lower surfaces of the pedestals 82 with the outer peripheral edge portions of the work pieces engaging the annular seal members 104. After so mounting the work pieces on the lower surfaces of the pedestals, the self-closing vacuum valve 116 is connected to a suitable vacuum source and the vacuum passage 78 evacuated to effect retention of the work pieces on the lower surface of the pedestal through negative pressure. Disconnection of the valve 116 from the vacuum source effects self-closing of the valve whereby to maintain the negative pressure retention of the work pieces. Thereafter, the load plate 34 is inverted to its normal upright position and positioned to underlie one of the pressure disc assemblies 32 secured to the lower end of one of the pistons 22.

As noted, each of the pressure disc assemblies 32 is adapted to engage a load plate means 34 and effect downward pressure thereon whereby to effect selective pressure engagement of the work pieces against the upper surface of the polishing wheel assembly 20. To this end, the upper plate portion 72 of each load plate means 34 has an annular pressure disc engaging member 118 secured within a central opening in the upper plate portion by a radial flange 120 formed on the member 118 and a retaining ring 122 cooperable with member 118. Each pressure disc engaging member 118 has an annular groove 126 in the upper surface thereof adapted to receive the depending rib 68 on the pressure transmitting member 46 carried by the associated spindle 36 upon downward movement of the corresponding piston 22 from a raised position. The pressure disk engaging member 118 further has a stepped central bore 128 therethrough which retains a lip seal 130 for sealing engagement with the lower end portion 42 of the associated spindle 36 upon engagement of the pressure disc means with the load plate means 34. The lip seal 130 has an annular garter spring 132 to urge the lip seal radially inwardly against the peripheral surface of the lower end of the spindle, as is known.

The lower load plate portion 74 has a central chamber 134 therein which is adapted for communication with the annular vacuum passage 78 through second passage means comprising an inclined passage 136, a second chamber 138 provided in the lower load plate, a vertical bore 139 in the member 118 underlying the groove 126, and a horizontal passage 140 formed in the radial flange 120 of member 118. Valve means including an upwardly biased valve member 142 carrying a seal ring 144 is normally urged to a closed position by a compression spring 146 whereby to normally prevent communication between the chamber 134 and the annular vacuum passage 78 as shown in FIG. 5. When the pressure disc assembly means 32 and load plate means 34 are brought into cooperating relation as shown in FIG. 3, the annular depending rib 68 opens the valve 142 whereby to effect communication between the central chamber 134 and the annular vacuum passage 78. An axial passage 148 is provided in the spindle 36 and intersects the lower end surface of the spindle and a radially disposed passage 150 in the spindle. A tubular elbow connection 152 is suitably secured to the spindle 36 such that its central passage intersects the radial passage 150. Connection of the elbow 152 to a suitable vacuum source through flexible tubular conduits 154, as shown in FIG. 1, serves to assure that a vacuum or negative pressure is maintained within the passage means 78 when the pressure disc assembly means 32 and the load plate means 34 are in cooperating relation as shown in FIG. 3. In this manner, work pieces mounted on the lower surfaces of the

pedestals 82 are retained thereon by negative pressure derived from both the initial vacuum mounting and after connection of the load plate means 34 to a pressure disc assembly means 32 during finishing of the work pieces.

Thus, in accordance with the described embodiment of the present invention, load plate means are provided upon which a plurality of disc-like work pieces can be mounted at a work station removed from the polishing wheel assembly, and retained on the load plate by negative pressure during transfer to and from the polishing wheel assembly and also during finishing of the work pieces. Swivel movement of a load plate means relative to the axis of its associated piston 22 during operation is readily accommodated by the rubber ring 52 as described. By providing the vacuum connection 154 to the spindle 36, the vacuum passage 78 may be continually subjected to a vacuum source during finishing of the work pieces should a small leak reduce the initial vacuum retention of the work pieces.

The load plate means 34 may be readily disassembled and cleaned to remove any clogging from the abrasive slurry mixture as may result during operation. In addition, the lower work piece mounting surface of the pedestals may be easily refinished to insure coplanar relation.

While a preferred embodiment of the invention has been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made therein without departing from the invention in its broad aspects.

We claim:

1. In a polishing machine and the like having a polishing wheel assembly mounted for rotation about a vertical axis, and at least one vertically movable spindle supported above the polishing wheel assembly, the combination therewith of load plate means having at least one depending pedestal the lower surface of which is adapted to have a work piece mounted thereon, said load plate means having vacuum passage means therein communicating with said lower surface of said pedestal, vacuum connection means supported by said load plate means and communicating with said vacuum passage means intermediate the center and outer peripheral edge of said load plate means, said vacuum connection means being releasably connectible to a source of vacuum for effecting a vacuum within said passage means and retaining a work piece on the lower surface of said pedestal by negative pressure, said connection means including self-closing valve means for maintaining said negative pressure after disconnection of said connection means from the vacuum source such that the load plate may be transferred to and from the machine with a work piece mounted on said pedestal for engagement with the polishing wheel assembly.

2. The improvement of claim 1 including means supported by said spindle and releasably cooperable with said load plate means to selectively exert a downward pressure on the mounted work piece against the wheel assembly.

3. The improvement of claim 1 including mask plate means secured to said load plate means adjacent said depending pedestal, said mask plate means having an opening therethrough to receive said pedestal therein and being positioned such that the lower surface of said mask plate lies in a plane spaced below the plane of the lower surface of said pedestal to form a work piece receiving pocket with the lower surface of said pedestal.

4. The improvement of claim 1 including a resilient ring member secured to the peripheral surface of said pedestal adjacent said lower surface thereof, said resilient member having a lower surface disposed below the lower surface of said pedestal for sealing engagement with a work piece when mounted on the lower surface of said pedestal.

5. In a polishing machine and the like having a polishing wheel assembly mounted for rotation about a vertical axis, and at least one vertically movable spindle supported above the polishing wheel assembly, the combination therewith of load plate means having at least one depending pedestal the lower surface of which is adapted to have a work piece mounted thereon, said load plate means having vacuum passage means therein communicating with said lower surface of said pedestal, vacuum connection means supported by said load plate means and communicating with said vacuum passage means, said vacuum connection means being connectible to a source of vacuum for retaining a work piece on the lower surface of said pedestal by negative pressure, said connection means being further adapted to maintain said negative pressure after disconnection from the vacuum source such that the load plate may be transferred to and from the machine with a work piece mounted on said pedestal for engagement with the polishing wheel assembly, means supported by said spindle and releasably cooperable with said load plate means to selectively exert a downward pressure on the mounted work piece against the wheel assembly, said load plate means having a central opening in the surface thereof opposite said depending pedestal, said load plate means having second passage means in communication with said vacuum passage means and said central opening, normally closed valve means disposed within said second passageway means, said central opening being connectible to a source of vacuum pressure, and said valve means being operable to connect said vacuum passage means to said central opening to effect negative pressure retention of a work piece mounted on the lower surface of said pedestal during finishing of the work piece when said load plate means is supported on the polishing wheel assembly in cooperating relation with said releasable cooperating means supported by said spindle.

6. The improvement of claim 1 wherein said load plate means includes a plurality of depending pedestals the lower surfaces of which are coplanar and adapted to receive work pieces thereon, said vacuum passage means communicating with the lower surface of each of said pedestals, and said vacuum connection means being connectible to a vacuum source for effective a negative pressure operative to retain the work pieces on the lower surfaces of said pedestal during transfer of said load plate means to and from the polishing machine.

7. The improvement of claim 6 including a mask plate secured to said load plate means adjacent said downwardly depending pedestals, said mask plate having a plurality of openings therethrough corresponding

to said pedestals and each adapted to receive a pedestal therein with slight clearance therebetween, said mask plate having a lower surface lying in a plane below the plane of the lower surfaces of said pedestal to provide work piece receiving pockets with said pedestals.

8. The improvement as defined in claim 7 wherein said mask plate has at least one jack screw therein operative to effect separation of said mask plate from said load plate means for disassembling the same.

9. The improvement of claim 7 including a resilient ring member supported on the peripheral surface of each of said depending pedestals adjacent the lower surface thereof, each of said resilient members having a sealing surface lying in a plane spaced below the lower surface of the associated pedestal for sealing engagement with a work piece mounted on the associated pedestal.

10. The improvement of claim 6 wherein said pedestals comprise cylindrical members secured to the lower surface of said load plate means, each of said pedestals being laterally positionable relative to the axis of said load plate means.

11. The improvement of claim 2 wherein said load plate means has an annular groove in the upper surface thereof opposite said depending pedestals, and wherein said means supported by said spindle and cooperable with said load plate means includes pressure disk means having depending engagement means cooperable with said annular groove in said load plate means for exerting a downward pressure on said load plate means upon vertical downward movement of the associated spindle.

12. The improvement of claim 2 wherein said means supported by said spindle and releasably cooperable with said load plate means includes pressure disc means connected to the spindle through swivel connection means.

13. A load plate for retaining work pieces during finishing thereof on a polishing machine and the like, comprising plate means having at least one depending pedestal the lower surface of which is adapted to have a work piece mounted thereon, said plate means having vacuum passage means communicating with said lower surface of said pedestal, and vacuum connection means supported by said plate means and communicating with said vacuum passage means intermediate the center and outer peripheral edge of said plate means, said vacuum connection means being releasably connectible to a source of vacuum pressure for effecting a vacuum within said passage means and retaining a work piece on the lower surface of said pedestal by negative pressure, said connection means including self-closing valve means for maintaining said negative pressure after disconnection of said connection means from the vacuum source.

14. A load plate as defined in claim 13 wherein said plate means has a plurality of depending pedestals thereon the lower surfaces of which are coplanar and adapted to have work pieces mounted thereon, and wherein said vacuum passage means communicates with the lower surface of each of said pedestals for retaining work pieces thereon by negative pressure.

15. A load plate as defined in claim 14 wherein said plate means includes upper and lower plate portions which define said vacuum passage means therebetween, and wherein said pedestals comprise generally cylindrical pedestal members secured to said lower plate portion in a manner to allow lateral positioning of said pedestals relative to the axis of the load plate.

16. A load plate as defined in claim 14 including a mask plate secured to said plate means adjacent said pedestals, said mask plate having openings therethrough to receive said pedestals therein and being positioned such that the lower surface of said mask plate is spaced below the plane of the lower surfaces of said pedestals so as to define work piece receiving pockets with said pedestals.

17. A load plate as defined in claim 13 including sealing means secured to the peripheral surface of said pedestal, said sealing means having an annular surface portion spaced below the plane of the lower surface of said pedestal for sealing engagement with a work piece mounted on the lower surface of said pedestal.

18. A load plate for retaining work pieces during finishing thereof on a polishing machine and the like, comprising, plate means having at least one depending pedestal the lower surface of which is adapted to have a work piece mounted thereon, said plate means having vacuum passage means communicating with said lower surface of said pedestal, vacuum connection means supported by said plate means and communicating with said vacuum passage means, said vacuum connection means being releasably connectible to a source of vacuum pressure for effecting a vacuum within said passage means and retaining a work piece on the lower surface of said pedestal by negative pressure, said plate means having a central opening in the surface thereof opposite said depending pedestal, said plate means including second passageway means communicating between said vacuum passage means and said central opening, and normally closed valve means disposed within said second passageway means and operable to effect open communication between said vacuum passage means and said central opening such that connection of said central opening to a source of vacuum pressure effects a negative pressure within said vacuum passage means for retaining a work piece on said pedestal.

19. The improvement of claim 12 wherein said swivel connection means includes resilient washer means operatively associated with said pressure disc means and the spindle, said resilient washer means allowing swivel movement of said load plate means relative to the axis of the associated spindle.

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