Sept. 25, 1951 C. HERZSTARK 2,569,099

YIELDABLE LAPPING PLATE

Filed Feb. 3, 1950

Fig. 1

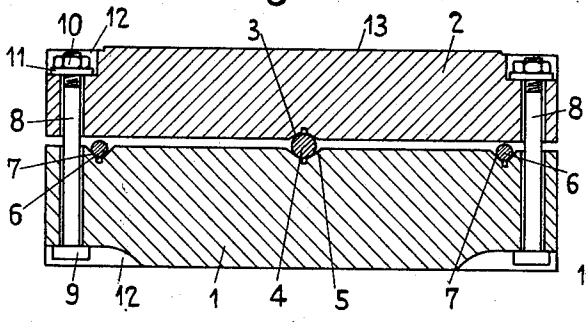


Fig. 3

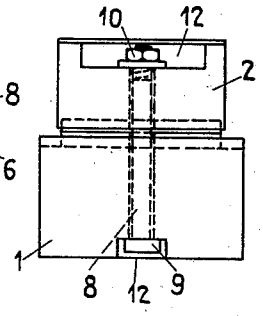
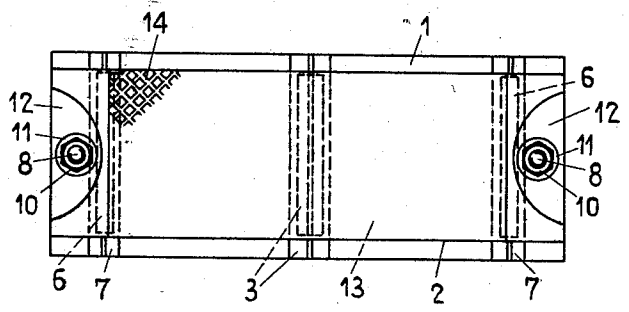


Fig. 2



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YIELDABLE LAPPING PLATE

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4 Claims. (Cl. 51—212)

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The present invention relates to lapping or polishing plates, and more particularly to an adjustable lapping plate which provides a convexly curved working surface.

The lapping plates with which the present invention is concerned are usually held stationary while a work piece is moved with respect thereto. The work piece may be reciprocated or rotated over the working surface of the lapping plate. When using lapping plates having a flat working surface, it is noted that the work piece will be lapped to a greater extent on the outer edges of the work piece than at the center thereof. This reduces the edge dimensions of the work piece, and in precision polishing or lapping operations frequently leads to the removal of more stock at the edge of the work piece than is allowable under the established tolerances. Furthermore, the lapping operation requires a considerable length of time since the work piece does not engage the working surface of the lapping plate uniformly over the entire area of the work piece. These disadvantages are caused by the difference in the speed between the peripheral and center portions of the work piece in rotary lapping and by the exertion of a greater pressure at the edges of the work piece than at the center thereof by the lapping device. The uneven pressure exerted by the lapping device causes the work piece to assume a concave configuration. A further reason for the distortion of the lapped surface of the work piece is that the frictional resistance between the work piece and the working surface of the lapping plate varies throughout the area of the work piece.

The primary object of the present invention is to provide a lapping plate having a working surface that is convexly curved so as to produce a completely plane surface on the work piece. It has been suggested that the working surface could be machined so as to present such a convex surface. The suggestion has the disadvantages that the lapping plate would be very costly to manufacture and would still not present a convex surface which would produce faces on differently sized work pieces, since each work piece requires an individual working surface curvature.

The principal object of the present invention, therefore, is to overcome these difficulties, by providing a lapping plate which is adjustable so as to present a convex surface which may be varied so as to conform to the particular requirements of the work piece being lapped.

The above and other objects of my invention will become evident after consideration of the

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following description, reference being made therein to the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view of the lapping plate of the present invention;

Fig. 2 is a plane view of the lapping plate; and

Fig. 3, an end view of the lapping plate.

Referring now to the drawing, there is provided a relatively thick base plate 1 upon which is mounted a lapping plate 2. The lapping plate 2 is provided in its lower surface with a wedge-shaped groove 3 extending along the transverse axis of the elongated plate 2. A cylindrical rod 4 is positioned within the groove 3 and protrudes with its circumference from the surface of the plate 2. The base plate 1 is also provided with a wedge-shaped groove 5 along its transverse axis which is arranged opposite the groove 3 in the plate 2. A portion of the circumference of the rod 4 is received within the groove 5, the rod 4 serving to space the plates 1 and 2 from each other.

A pair of rods 6 of lesser diameter than the rod 4 is positioned in wedge-shaped grooves 7 adjacent the ends of the base plate 1. The rods 6 serve to limit the degree to which the lapping plate 2 may be flexed. Rods of various sizes may be substituted for the illustrated rods 6 in order to vary the limits of curvature of the lapping plate 2.

The plates 1 and 2 are provided at their outer ends with coinciding bores within which is loosely received a pair of tensioning bolts 8. The bolts 8 are provided with heads 9 engaging the underside of the base plate 1 and with nuts 10 and washers 11 engaging the upper side of the polishing plate 2. The nuts 10 may be adjusted on the bolts 9 to vary the tension of the bolts 8 and to thus vary the force exerted on the lapping plate 2. Since the plates are spaced apart along their transverse axis one of them will tend to flex about this axis due to the tension exerted by the bolts 8. Since the lapping plate 2 is the thinner of the two plates it will flex about the rod 4 and thus present a convex upper surface. The degree of curvature of the plate 2 is determined by the adjustment of the nuts 11 on the bolts 8, the degree of curvature being limited by the rods 6.

The lower surface of the base plate 1 and the upper surface of the lapping plate 2 are provided with recesses 12 within which the heads 9 of the bolts 8 and the nuts 10 are positioned so as not to protrude beyond the outer surfaces of the plates and interfere with the efficient use of the lapping plate.

The upper surface of the lapping plate 2 is

provided with a working surface 13 which may be provided with a lattice-work of shallow grooves 14 within which the lapping compound is received.

From the foregoing description it is apparent that there is an adjustable lapping plate having either a flat or convex working surface, the curvature of which may be varied.

By providing a lapping plate having a variable convex curvature the disadvantages of prior devices are overcome and there is provided an apparatus which will allow the uniform and simultaneous lapping of a work piece throughout its entire surface and to make the same absolutely plane.

Having described only one preferred embodiment of my device I do not wish to be limited to the foregoing description since various modifications may be made in the preferred embodiment without departing from the spirit and scope of my invention.

What I claim is:

1. An adjustable lapping device comprising a base plate, a rod positioned along one center axis of said base plate, a lapping plate positioned on said rod and above said base plate, and a plurality of tensioning bolts connecting said plates at the ends thereof, said bolts being adapted to cause flexure of said lapping plate about said rod, whereby said lapping plate presents a convex working surface.

2. An adjustable lapping device according to claim 1, including means for limiting the flexure of said lapping plate.

3. An adjustable lapping device comprising an elongated base plate having a groove in one surface thereof along its transverse axis, an elongated lapping plate having a working surface and a groove in the surface opposite said working surface along its transverse axis, said grooves in said plates coinciding when said lapping plate is positioned on said base plate, a rod received within said grooves to space said plates from each other, said plates being provided with coinciding bores in each end of said plates, a plurality of tensioning bolts positioned within said bores and adjustable to cause flexure of said lapping plate about said rod, and means for limiting the flexure of said lapping plate.

4. An adjustable lapping device comprising a base plate, a lapping plate positioned on the base plate, means acting on a narrow central region of the lapping plate extending in one direction thereacross for tiltably supporting the lapping plate in spaced relation to the base plate, and adjustable tension means acting between the base plate and lapping plate adjacent opposite ends of the latter on a line transverse to the said narrow support region of the lapping plate for flexing the same in an arc and giving the same an outer convex lapping surface.

CURT HERZSTARK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
260,685	Inslee	July 4, 1882
608,513	Focke	Aug. 2, 1898
1,618,604	Riggs	Feb. 22, 1927
1,659,765	Canterbury	Feb. 21, 1928
1,707,207	Bianch et al.	Mar. 26, 1929
1,936,605	Newman	Nov. 28, 1933