Feb. 26, 1957 O. P. HANSON 2,782,571

LAPPING MACHINES

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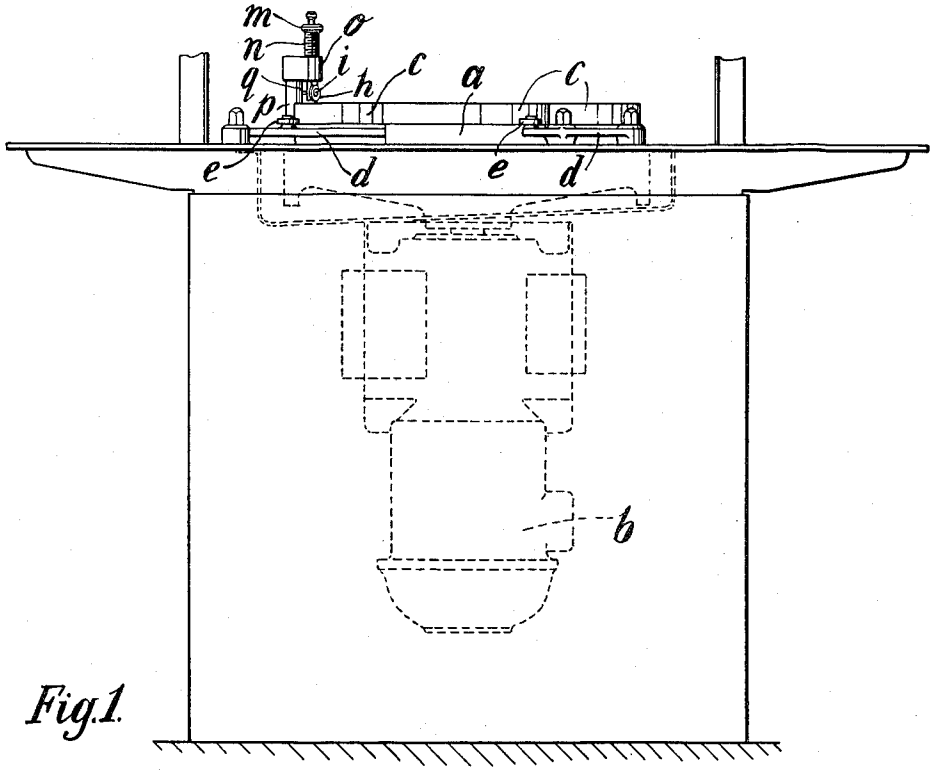


Fig. 1.

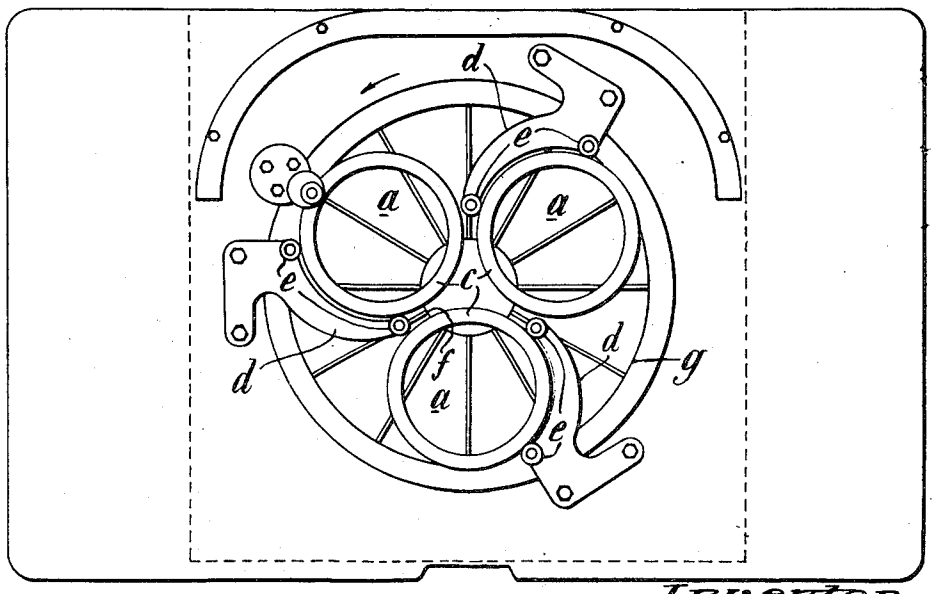


Fig. 2.

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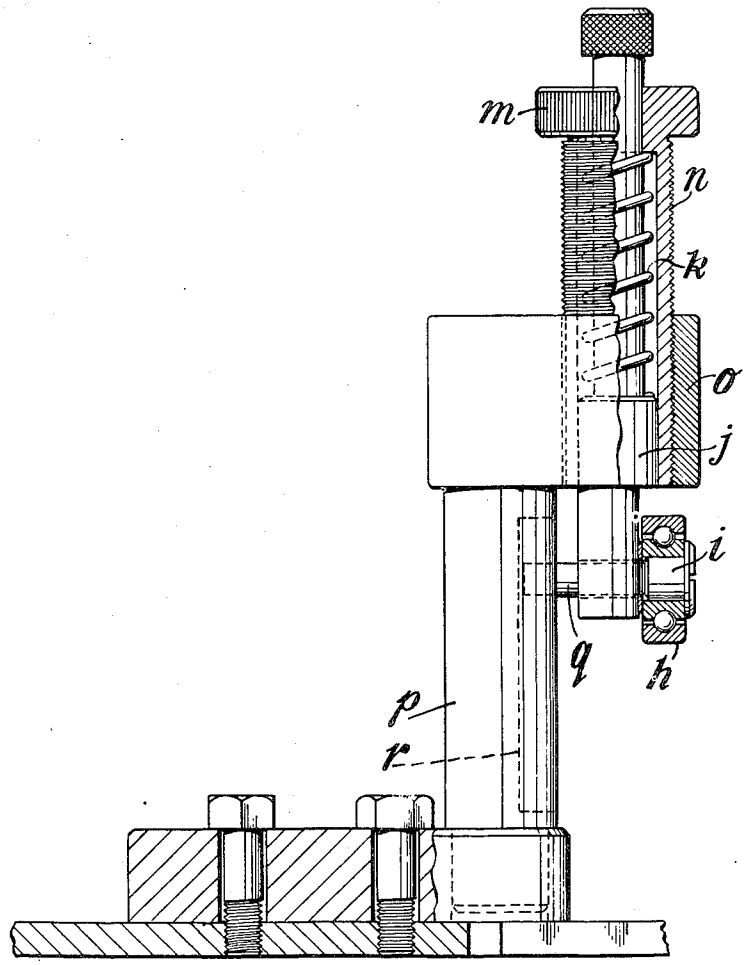


Fig. 3.

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LAPPING MACHINES

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6 Claims. (Cl. 51—131)

In lapping machines of the type comprising a horizontal rotary lapping plate with wear rings riding on the plate but restrained from revolving about the axis of the plate, the work to be lapped is placed face downwards within such rings, which hold the work in position during the lapping operation. The diameter of the rings must be such that they overlap the inner and outer peripheral edges of the effective portion of the lapping plate, in order to prevent formation of recesses in the lapping plate at the parts upon which the wearing rings ride. In practice it is usual to make the wear rings overlap the outer edge of the lapping surface to a small extent but to overlap the inner edge of the lapping surface to a greater extent, the object being to obtain so far as possible a uniform wear of the whole lapping plate surface which is necessary for the effective performance of the lapping operation. The wear rings can if desired overlap the outer edge of the lapping surface to a greater extent than the inner edge. It is found, however, in practice that the lapping plate does tend to wear unevenly, the edge of the lapping surface where the greater extent of projection of the wear rings occurs wearing more than the other edge thereof.

The object of the present invention is to provide simple and effective means for adjusting the wear effect of the wear rings so that the lapping surface can be maintained flat from edge to edge which ensures efficiency in operation.

In accordance with my present invention, the top of at least one wear ring at the side where it projects the less from the lapping surface is adjustably loaded, such loading increasing locally the pressure of the wear ring on the lapping plate and increasing the wear of the latter in the region of said pressure.

Referring to the accompanying explanatory drawings:

Figure 1 is an elevation and Figure 2 a plan view of a lapping plate with wear rings thereon, having the present invention incorporated therein in one convenient form.

Figure 3 is a detail sectional view of the means for applying pressure to a wear ring to counteract its tendency to alter the contour of the lapping surface of the lapping plate.

The lapping plate *a* is supported and driven from below by an electric motor *b*. Wear rings *c* ride on the upper surface of the lapping plate, such wear rings being prevented from moving with the lapping plate as it revolves, by fixed brackets *d* having rollers *e* thereon which engage the peripheral edges of the rings. As illustrated there are three wear rings *c*, each with its associated bracket *d*. It will be noted that the wear rings *c* overlap both the inner peripheral edge *f* of the lapping surface of the lapping plate and also the outer peripheral edge *g* in order to prevent the formation of rings on the lapping plate, but the overlap at the inner edge is much greater than at the outer edge. The wear of the lapping plate surface is then found to be greater at its inner portion than at its outer portion. To neutralise this, I provide a roller *h* on a spindle *i* which is secured in a vertically movable plunger

like part *j* loaded by a spring *k*, the compression of which is adjustable by turning the knurled part *m* of a hollow spindle *n* which threads into a bracket *o* on a pedestal *p* secured to the machine frame around the lapping plate. The end *q* of the spindle *i* moves in a slot *r* in the pedestal *p* to prevent the plunger *j* from turning and so maintains the roller *i* substantially parallel to a tangent to the ring *c* on which it rides.

By adjusting the compression of the spring *k* which loads the roller *h*, the wear of the plate *a* can be increased towards its outer edge which will neutralise the tendency which I have noted for the surface of said plate to wear less at its outer than at its inner portion. This ensures continued efficiency in the lapping position.

It will be appreciated that the wear rings revolve about their own axes as the lapping plate revolves.

What I claim is:

1. In a lapping machine, a frame, a rotatable lap plate having an annular lap surface adapted to receive an article and capable of producing a desired surface on the article by relative movement between the lap surface and article, means for rotating the lap plate, a generally circular lap surface conditioning and article holding ring positioned on said surface, means supported by the frame and cooperatively associated with said ring to restrain the same from revolving with the plate while permitting the ring to rotate about its axis, said ring having a diameter such as to overlap one edge of said surface more than the other, and adjustable pressure applying means supported by the frame and engaging the top of the ring only at the side thereof that has the least overlap relative to an edge of said surface for increasing the wear on the surface adjacent said last mentioned edge thereof to compensate for the greater wear imparted to the surface at the side of the ring that has the greater overlap relative to the opposite edge of the surface so that the lapping surface is worn substantially uniformly and maintained substantially flat from edge to edge.

2. In a lapping machine as claimed in claim 1, in which the said ring overlaps the inner edge of the lap surface to the greater extent, and said adjustable pressure applying means including a vertically movable adjustably spring loaded roller engaging the top of the ring at a position above the outer portion of the lapping surface.

3. In a lapping machine as claimed in claim 2, and said adjustable pressure applying means including means maintaining said roller parallel to a tagent to the periphery of the ring adjacent the area of contact between the roller and ring.

4. In a lapping machine, a horizontal frame member having an opening therein, a lap plate having an annular lap surface including inner and outer edges rotatably mounted within the opening, a combined wear ring and article holder positioned on the surface, said ring having an outer diameter greater than the radial distance between the edges of the annular lap surface, means for rotating the plate, means carried by the frame member and cooperatively associated with the ring for restraining the ring against revolution with the plate while permitting the ring to rotate about its axis, and for positioning the ring relative to the surface so that one side of the ring overlaps one edge of the surface more than the other one, supporting means carried by the frame adjacent the ring and extending thereabove, a vertically movable plunger carried by the supporting means and overlying the top of the ring adjacent the side thereof that has the least overlap with respect to an edge of the lap surface, rolling contact bearing means carried by the plunger for engaging the top of the said ring, and adjustable means for moving the spindle toward the ring to adjustably apply localized pressure to the ring to compensate for the

greater wear imparted to the surface by the portion of the ring that has the greater overlap relative to an edge of the surface, so that the lap surface is maintained flat from edge to edge.

5. In a lapping machine as claimed in claim 4, and said supporting means having an internally threaded vertically extending bore therethrough, an externally threaded hollow spindle in threaded engagement with the threads in the bore, said spindle including an apertured top, and an internal shoulder within the spindle adjacent the top, said plunger including a shank portion extending through and beyond the aperture in the top of the spindle and a head portion slideably engaging the interior of the spindle and carried on the shank remote from the top of the spindle, a spring biased between the head portion of the plunger and the internal shoulder on the spindle, said plunger including an outer portion projecting beyond the bore in the supporting means, and said rolling contact bearing means being carried by the outer portion of the plunger.

6. In a lapping machine, as claimed in claim 5, and said rolling contact bearing means including a horizontal spindle carried by the projecting portion of the plunger and extending beyond opposite sides thereof in a direction radially of the ring, a roller carried on the end of the last mentioned spindle that is adjacent the ring, and said supporting means including a standard having a vertical groove therein receiving the opposite projecting portion of the said last mentioned spindle to guide the plunger vertically and maintain the roller parallel to a tangent to the periphery of the ring adjacent the area of the ring engaged by the roller.

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