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FLAT LAPPING MACHINE

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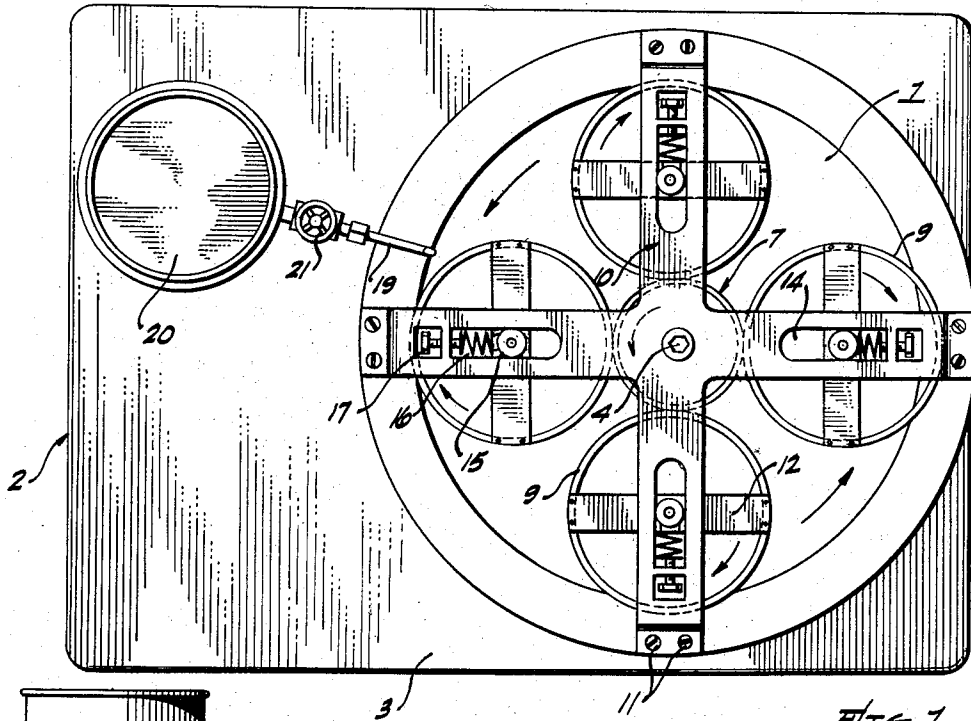


FIG. 1.

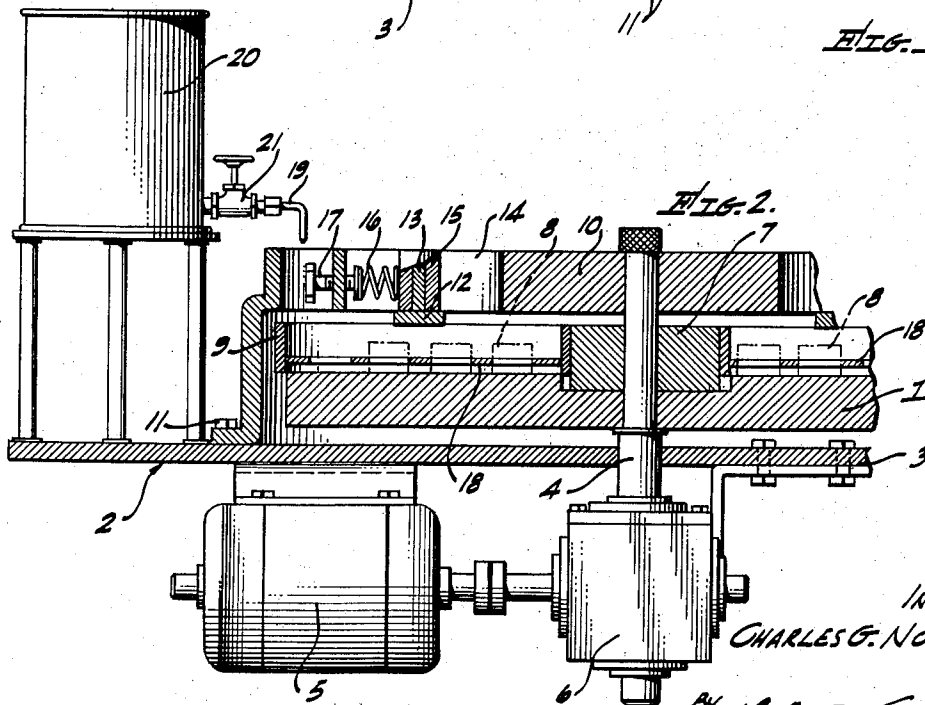


FIG. 2.

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FLAT LAPPING MACHINE

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This invention relates to a flat lapping machine for the purpose of grinding and lapping various machine parts wherein the work holding means are so positioned and held on the surface of the lap table that these means cause the lap surface to be maintained in a true configuration.

In the present invention the lap holding means are caused to be rotated counter to the rotation of the lap table, and the work holding means are yieldably pressed against the driving element which is centrally positioned on the lap table.

An object of my invention is to drive the work rings by engagement of the rings with a driving hub on the lap table, the work rings being pressed against the driving hub by yieldable means.

Another object of my invention is to provide a means for frictionally driving the work rings by means of a central hub on the lap table, the rings being pressed against the central hub by means of a spring, or the like.

Still another object of my invention is to provide a novel means of yieldably pressing the work rings against a central driving hub on the lap table, consisting of a spring engaging the shaft which rises from the work ring to thus yieldably press the work ring against the central hub.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing:

Figure 1 is a top plan view of my flat lapping machine.

Figure 2 is a fragmentary transverse sectional view of the same.

Referring more particularly to the drawing, the numeral 1 indicates a lap or lap table which is either circular or annular in form. This lap table is carried upon a frame 2, which frame includes a top plate 3 as shown. A driving shaft 4 projects through the plate 3 and the lap 1 is fixedly attached thereto so that the lap will rotate with this shaft. The shaft 4 is rotated by an electric motor 5 which drives through a suitable reduction gear 6 so that the shaft 4 will be driven at the proper speed. A central driving hub 7 is either an integral part of the lap table 1 or it may be a separate part fixedly attached to the lap table so that the hub rotates with the table and is also driven by the shaft 4. The hub 7 projects above the top surface of the lap 1, substantially as shown.

The work which is to be ground or lapped, as indicated by the parts 8, are carried within the work rings 9. These work rings are annular in form and are preferably metallic and rest upon the top flat surface of the lap 1 to continuously abrade or wear that surface so as to maintain the top surface of the lap in a flat condition or a proper contour to meet the requirements of the particular work. The work rings 9 are continuously rotated and driven as follows: This drive is a frictional one and consists of the following structure: The work rings 9 will engage the periphery of the hub 7 and are frictionally driven thereby.

This frictional contact is accomplished by a spring which presses each of the work rings against the hub 7 as follows: A multiarmed spider 10 is fixedly secured to the table top 3 by means of bolts or screws 11. A plate 12 is fixedly attached to each of the work rings 9 and extends diametrically across the ring. A post or trunnion 13 rises from each of the plates 12 and projects into a radial slot 14 formed in each arm of the spider 10. A roller 15 surrounds each of the trunnions 13 and this roller is positioned within the slot 14, as shown. A spring 16 bears against each of the rollers 15 and urges the trunnion 13, the plate 12, and the work ring 9 inwardly against the hub 7 and thus holds the ring 9 against the hub 7 so that the ring 9 is frictionally driven. The tension of the spring 16 may be adjusted by means of the set screw 17 which is mounted in the spider 10 and bears against one end of said spring.

The machine parts 8 are held within the work ring 9 by a disc 18 which rests loosely within the ring 9. The disc 18 is formed of a nonmetallic substance and is provided with suitable holes in which each machine part 8 rests.

A suitable abrasive in a fluid carrier is continuously poured upon the top of the lap table 1 and this grit flows onto the surface of the lap 1 through a pipe 19 which extends from a tank 20 positioned above the table top 3. A control valve 21 in the pipe 19 can be adjusted to determine the amount of fluid which flows onto the lap table 1. Since the work rings 9 rotate counter to the lap table 1 the grinding fluid will be pushed inwardly towards the hub 7 and thereafter centrifugal force will throw the grinding fluid outwardly and off of the table 1. If desired, the hub 7 may be slightly eccentric on the lap table 1, thus imparting a slight radial movement to the work rings 9 to provide additional grinding action.

In operation the lap table 1 is continuously rotated by the motor 5 through the reduction gearing 6. The work rings 9 are resting on the top of the lap 1 and engage the central hub 7. Each of the work rings 9 is yieldably pressed against the hub 7 by a spring 16, and the work ring is thus continuously rotated by this frictional contact with the rotating hub 7. The work rings 9 are held against rotation with the lap table 1 by the stationary spider 10 which is fixed to the top 3. The trunnion 13 which rises vertically above the work ring 9 and is secured thereto fits in the roller 15 within the elongated slot 14, permitting radial movement of the work ring 9 on the surface of the lap 1. The rings 9 thus rest on the top of the lap 1 and continuously abrade or grind the top surface of the lap to maintain that surface in its proper flat or other shape, and these work rings also effectively hold the various machine parts in position so that they also may be ground or lapped. The lapping compound is fed onto the top of the lap 1 adjacent its outer edge and this compound is pushed inwardly due to the counter rotation of the rings 9 relative to the rotation of the lap 1.

Having described my invention, I claim:

1. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, means rotatably mounting and supporting said lap table, means for holding the article on the lap table, a support on the lapping machine for said holding means, a post rising from the holding means and journaled in the support, said holding means being freely rotatable on the support and relative to the lap table, means for rotating said holding means comprising a hub on the lap table rotatable with said table, and spring means engaging said mounting post and pressing said holding means against the hub.

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2. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, means rotatably mounting and supporting said lap table, a work ring for holding the articles on the lap table, a support on the lapping machine for the work ring, a post rising from the work ring and journaled in the support, said work ring being freely rotatable on the support and relative to the lap table, means for rotating said work ring comprising a hub on the lap table rotatable therewith, and spring means engaging the post and pressing said work ring against the hub.

3. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, means rotatably mounting and supporting said lap table, a work ring to hold the articles on the lap table, a support on the lapping machine for the work ring, a post rising from the work ring and journaled in the support, said work ring being freely rotatable on the support and relative to the lap table, means for rotating said work ring comprising a hub on the lap table rotatable therewith, and spring means engaging the post to press the work ring against the hub.

4. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, a spider, means rotatably mounting and supporting said lap table, means fixedly mounting the spider above the lap table, a work ring to hold the article on the lap table, a post rising from the work ring and journaled in said spider, said post being freely rotatable in the spider, means for rotating the work ring comprising a hub on the lap table and rotatable therewith, and spring means engaging said post and pressing said work ring against the hub.

5. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, means rotatably mounting and supporting said lap

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table, a central hub on the lap table rotatable therewith and projecting above the top surface of the lap table, a spider fixedly mounted above the lap table, a work ring resting on the lap table and frictionally engaging said hub, a post rising from said work ring and journaled in said spider, a spring in the spider engaging the post and yieldably pressing said ring against the hub.

6. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, a spider, means rotatably mounting and supporting said lap table, means fixedly mounting the spider above the lap table, a work ring for holding the articles on the lap table, a post rising from the ring and journaled in said spider, means to rotate the work ring comprising a hub on the lap table and rotatable therewith, and spring means engaging said post and pressing said work ring against the hub, and means directing a grinding fluid onto the top surface of the lap table and adjacent the outer periphery of the lap table.

7. A lapping machine for forming a true surface upon an article, said machine comprising a rotatable lap table having a surface capable of producing the desired true surface, means rotatably mounting and supporting said lap table, a central hub on the lap table rotatable therewith and projecting above the top surface of the lap table, a spider fixedly mounted above the lap table, a work ring resting on the lap table and frictionally engaging said hub, a post rising from said work ring and journaled in said spider, a spring in the spider engaging the post and yieldably pressing said ring against the hub, and means directing a grinding fluid onto the top surface of the lap table and adjacent the outer periphery of the table.

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