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A. J. DE WILLE.  
LAP.  
FILED APR. 28, 1920.

1,440,820.

FIG. 1.

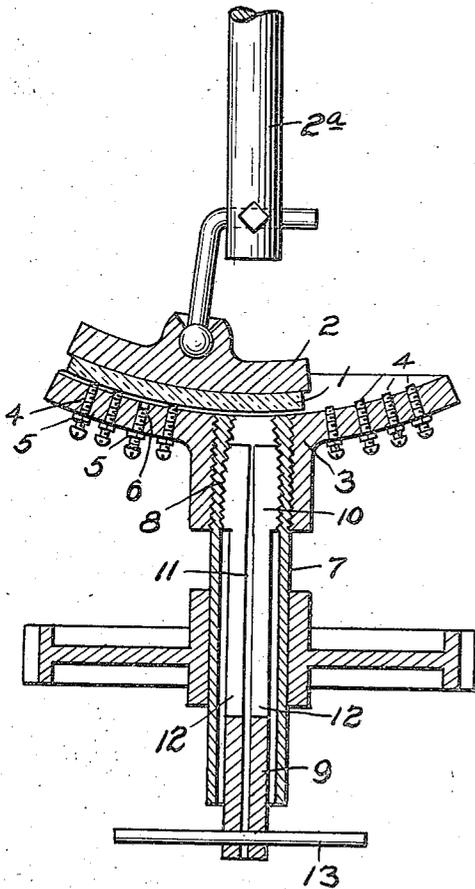


FIG. 2.

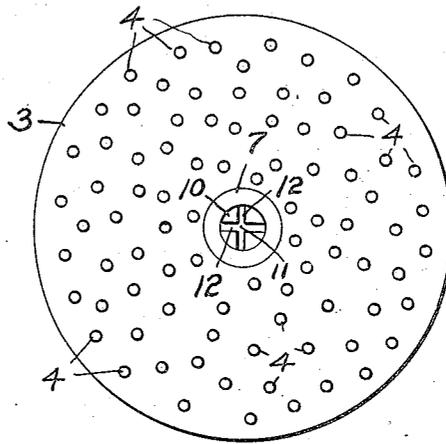
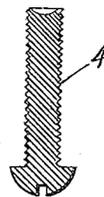


FIG. 3.



WITNESSES

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INVENTOR

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## UNITED STATES PATENT OFFICE.

ANTOINE JOSEPH DE WILLE, OF SUTERSVILLE, PENNSYLVANIA.

## LAP.

Application filed April 28, 1920. Serial No. 377,241.

*To all whom it may concern:*

Be it known that I, ANTOINE JOSEPH DE WILLE, a citizen of Belgium, and a resident of Sutersville, in the county of Westmoreland and State of Pennsylvania, have made a new and useful Improvement in Laps, of which the following is a specification.

My invention consists of a lapping tool having an adjustable lapping face and provided with means for controlling the supply of lapping or cooling material thereto.

I illustrate my invention as applied to a lens grinding machine of the type shown and described in my copending application Serial No. 291,657 altho I contemplate its use in other than spherical laps and in other industries besides glass grinding and polishing.

In the drawings, Figure 1 is a vertical sectional view thru a lap and lens holding spindle and a lens which is being ground and Figure 2 is a top plan of the lap shown in Figure 1. Fig. 3 is an enlarged view in longitudinal section of one of the elements entering into the makeup of the device.

It will be understood by reference to the above mentioned application that the machine in which the lap is used provides relative rotation of the lap and lens holder. A lens 1 is cemented on a holder 2 and its convex, lower face is presented to a concave lap 3. The lapping surface of the lap 3 consists of the slightly concave ends of a number of elements here shown as comprising a plurality of screws 4 which are adapted to be so inserted in the body of the lap 3 that their upper extremities project slightly above the body face and are so positioned about the lap area that each annular element of the lens will contact with at least one lap element. The radius of curvature of the concaved ends of the elements 4 is preferably less than that of the body of the lap 3.

The holder 2 is mounted on a spindle 2<sup>a</sup> by means of a ball and socket joint which effects a flexible contact between the lens 1 and the lapping elements 4. This yieldable connection also permits the holder 2 and the lens 1 to rotate about the lens axis and also about the lap axis, thus providing varying lap contacts for a given point on the lens.

One of the objects of my invention is to provide means for maintaining the spherical

curve of the effective lapping surface and this object is attained by the manipulation of the adjustable elements 4 against a templet of the proper curvature. The extremities of the screws 4 are then adjusted to the surface of a sphere defined by the outline of the templet. This adjustment may be repeated as often as is necessary to provide for the wear of the lapping elements. An original contour may thus be preserved without the heavy cost of renewing the entire lap as is the usual case where the lapping surface is integral with the lapping tool. Each of the screws 4 is provided with a lock nut 5 to maintain it in adjusted position.

In the illustrated use of my lap, it is customary to supply lapping material in a solution which may be washed off and exhausted when its grinding properties are exhausted. In some forms of laps it is the practice to charge the lapping surface with a lapping material by pressing the material into the lapping surface. My lap is adapted for use in either method.

One of the adjustable elements 4 is shown with its upper extremity set below the surface of body 3 as indicated at 6, thereby forming a reservoir for lapping material which may be withdrawn by the relative rotation of the lap and lens and tend to prevent exhaustion of the lapping material from the lapping elements. It will be understood that a number of the elements 4 may be partially withdrawn for this purpose and they may be so scattered about the surface of the lap as to effect a fairly even distribution of the lapping solution.

The lap 3 is mounted upon a hollow spindle 7, the interior wall of which is provided with a tapered thread 8. The interior diameter of the spindle 7 below threaded portion 8 is greater than that of the threaded portion and is adapted to receive a plug 9. The upper end of the plug 9 is threaded as at 10 for engagement with the threaded portion 8 of spindle 7.

The plug 9 is provided with a central longitudinal aperture 11 which drains the upper face of lap 3. The upper portion of the plug 9 is formed with intersecting cuts 12 which render the split portion of the plug compressible laterally. When the plug portion 10 is screwed into spindle portion 8, the tapered surface of the latter gradually

compresses the four sectors of the plug which restricts the size of the aperture 11. I insert a pin 13 in a transverse aperture in plug 9 for rotating the plug but any other suitable turning means may be employed.

If the flow of the lapping material is so sluggish that a restricted drain is unnecessary, plug 9 may be removed. In some classes of work, a cooling fluid is freely applied to lapping or polishing tools and in such cases the removal of the plug 9 will permit of the free drainage of the fluid and of its supply in larger quantities than would be otherwise possible.

I am aware of the large number of variations in the shape and application of the lapping elements which may arise in its commercial development and do not wish to limit my future use to the particular form shown. I contemplate the usual equivalents of the screws 4 having the same functions in the lapping tool.

Having described my invention in its preferred form, I now claim:

1. In a lapping tool for an object having a spherical surface, a body member, a plurality of elements each provided with a lapping face and adjustably mounted upon said body so that their lapping faces are presented towards a common central point for movement toward and from said point.

2. In a lapping tool, a body provided with a curved face and a plurality of lapping elements adjustably mounted on said body each having a curved lap face of a different radius of curvature from that of the curved face of the body but presented in substantially the same direction.

3. In a lap, a body having a concave face to be presented towards the object to be ground, a plurality of elements adjustably mounted on said body each having a concave lapping face presented in the same direction as said body face and means for retaining said elements in adjusted position.

4. In a lapping tool, a hollow, mounting spindle, internally threaded, a lapping surface having a central hole alined with said spindle, and a hollow, compressible plug having a threaded exterior portion adapted to be screwed in said spindle and compressed as advanced therein.

5. A lap provided with a plurality of depressions in its lapping surface adapted to retain a supply of lapping material and provided with an adjustable means for determining the depth of said depressions.

6. A lap provided with a draining element for lapping material and means for adjusting the draining capacity of said element.

7. A lapping tool, comprising a body having a plurality of irregularly spaced holes drilled and tapped therein, threaded inserts mounted in said holes and having

their points shaped to form lapping surfaces and projecting beyond the surface of said body; and means for securing said screws in desired position.

8. In a lapping tool adapted to be used with a fluid lapping material, a body having a face adapted to be presented towards an article to be lapped and which is provided with a plurality of recesses which extend inwardly from said face, a plurality of elements mounted in said recesses each adapted to extend above said face to form a lapping element or to be withdrawn below said face to form, with its respective recess, a reservoir for lapping material and means for securing said elements as desired.

9. A lap adapted to drain lapping material to a central point and provided with a drainage valve located at its central point, and means for adjusting the capacity of said valve.

10. A lapping tool comprising a body member, a plurality of independently adjustable lapping elements carried thereby and means for selectively securing said elements in adjusted positions above and below the surface of said body member.

11. A lapping tool comprising a body member having a plurality of independently adjustable lapping elements mounted thereon and irregularly disposed with respect to each other.

12. A lapping tool comprising a lap member, a tubular drain therefor and a valve member disposed within said tubular drain to regulate the flow of lapping material therethrough.

13. A lapping tool comprising a lap member, a tubular drain therefor having a restricted opening communicating with the face of said lap and a valve member disposed in said tubular drain having a portion adapted to co-act with the restricted portion of said tubular drain to regulate the flow of lapping material therethrough.

14. A lapping tool comprising a lap member, a tubular drain therefor having a restricted opening communicating with the surface of said lap and a valve member having a compressible portion adapted to co-operate with the restricted portion of said tubular drain to regulate the flow of lapping material therethrough.

15. A lapping tool comprising a lap member, a tubular drain therefor having a restricted opening communicating with the surface of said lap and a valve member having a slotted portion adapted to co-operate with the restricted portion of said tubular drain and be compressed thereby to restrict the width of said slots to regulate the flow of lapping material therethrough.

16. A lapping tool comprising a lap member, a tubular drain therefor having a restricted opening communicating with the

surface of said lap and a valve member having a plurality of longitudinally extending fingers spaced from each other to provide a passage-way therebetween, the ex-  
5 tremities of said fingers being adapted to engage said restricted portion of said tubular drain to move said fingers toward and away

from each other to regulate the flow of a lapping material therebetween.

In testimony whereof, I have hereunto 10  
subscribed my name this 17th day of April,  
1920.

ANTOINE JOSEPH DE WILLE.