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R. GROETCHEN

1,773,176

LAP

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Fig. 1

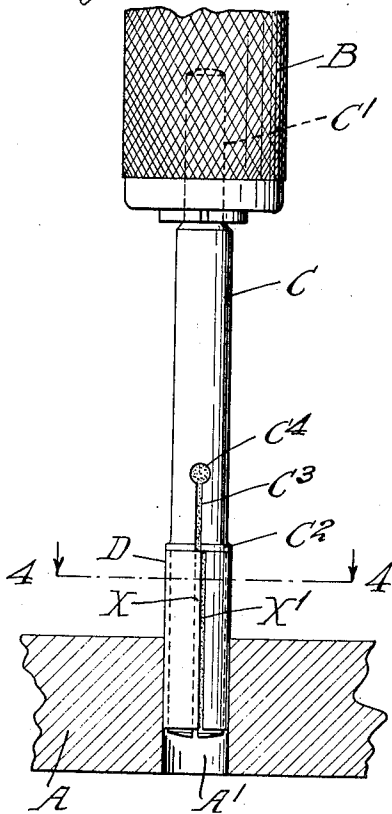


Fig. 6



Fig. 2

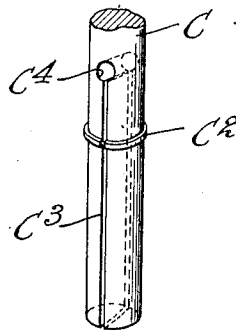


Fig. 3

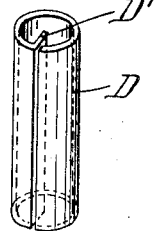


Fig. 4

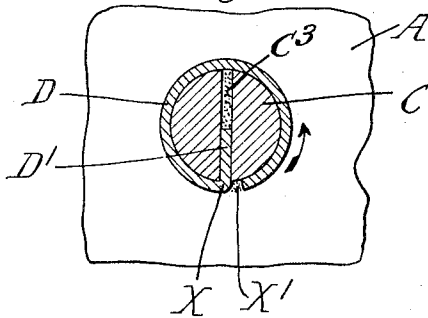
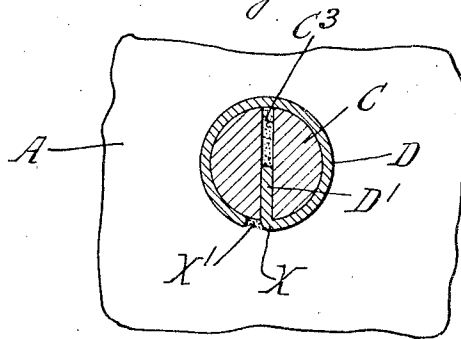


Fig. 5



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LAP

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This invention relates to a smoothing, lapping or polishing process and to an apparatus for carrying out such process. It has for one object to provide a lap, the major portion of which is permanent and in which the part subjected to abrasion and wear is removable. Another object is to provide a lap which will automatically accommodate itself in lapping to holes of a relatively wide variation in size. Another object is to provide a process whereby a constantly moving and shifting layer of abrasive is brought up to carry out the lapping operation. Other objects will appear from time to time throughout the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a vertical cross-section of a piece during the lapping operation showing the lap and associated parts in elevation.

Figure 2 is a perspective view of the permanent portion of the lapping device with the wearing removed.

Figure 3 is a perspective of the wearing part of the lap.

Figure 4 is a transverse cross-section taken on line 4-4 of Figure 1 and on an enlarged scale.

Figure 5 is a view similar to Figure 4 in which the wearing part has been reversed in relation to the permanent part of the lap.

Figure 6 is a view similar to Figure 3, showing a modified form of the wearing member.

Like parts are indicated by like characters throughout.

A is a piece in which a perforation A¹ has been formed.

B is any suitable rotating device in which the lap C is removably positioned.

The lap consists of a main shank portion C which may have a reduced upper end C¹ and which normally has formed about it an outwardly extending flange or ring C². It is provided in its outer or lower end with a slot C³, and preferably at the inner end of the slot it has an enlargement C⁴.

D is a softer wearing member or part formed in a generally cylindrical shape, pro-

vided with an inwardly bent flange or edge D¹ which is circular with the axis of the member D. The member D is preferably so proportioned that when it is positioned upon the outer or lower end of the lap C with the tongue or flange D¹ lying within the slot C³, its free edge will not meet the point X at which the flange D¹ is inwardly turned and there is thus left a narrow slot or groove like portion X¹. When the tool is in use, an abrasive or preferably a lubricant is applied to it, being inserted into the slot and this works down into the space X¹ and forms a vertical strip of abrasive material extending throughout the length of the member D. In the modified form shown in Figure 6, a wearing element is used in which the abrasive material forms a part of the wearing element and thus in effect, the wearing element is impregnated with abrasive and forms in itself an abrasive element. This element may be used with or without additional abrasive.

Although I have shown an operative device, still it will be obvious that many changes might be made in size, shape and arrangement of parts without departing materially from the spirit of my invention; and I wish, therefore, that my showing be taken as in a sense diagrammatic.

For normal conditions the shank member C may be of steel and the wearing member D of a softer material. For one purpose it may be made of copper.

The use and operation of the invention is as follows:

When it is desired to smooth or lap the interior of a circular opening, a tool such as that shown, of suitable size is provided and the wearing part is positioned about it. This composite part is then inserted in the hole to be treated. A lubricant is applied, being most conveniently inserted through the enlargement at the inner end of the slot and with this abrasive preferably in the form of powder, is normally also applied although either may be used alone. The lap is then set in rotation and the materials work downward along the slot and outward into the area X¹ and form an axially extending abra-

sive strip or zone which carries out the lapping effect as the part is rotated. Under normal conditions rotation is in the direction of the arrow shown in Figure 4. Where the tool is somewhat too small for the hole or for other reasons, it is sometimes desirable to reverse the rotation of the part. When the part is rotated in the direction of the arrow, the rotation tends to cause the free edge of the member D to approach the edge X. When the rotation is in the reverse direction, it tends to force the free edge of the member D away from the edge X and thus in effect, to swell or enlarge the size of the wearing element and so to carry out more completely the lapping effect. During these operations, the abrasive normally finds its way to all parts of the exterior of the wearing element D but it is collected in the greatest quantity in the zone X¹.

I claim:

1. In a lapping device, a driving member constituting a mandrel, a flexible metallic sleeve, having a flange thereon, constituting an operating member removably mounted thereon, said driving member having a passage formed therein, said flange anchored in the passage whereby the sleeve is attached to the driving member, said sleeve extending about the driving mandrel throughout the major portion of the periphery thereof, one end of the sleeve being free to permit relative movement thereof with reference to the mandrel.
2. In a lapping device, a driving member constituting a mandrel, a flexible metallic sleeve, constituting an operating member removably mounted on the mandrel, the sleeve and mandrel being formed with interfitting parts preventing relative rotation of the sleeve and mandrel, said sleeve extending about the driving mandrel throughout the major portion thereof, one end of the sleeve being free to permit relative movement thereof with reference to the mandrel.
3. In a lapping device, a driving member constituting a mandrel, a split metallic sleeve, constituting an operating member, removably mounted thereon, said sleeve and mandrel being formed with interfitting parts preventing relative rotation of the sleeve and mandrel, said sleeve embracing the mandrel circumferentially, with the opposite ends of the split sleeve terminating in spaced relation, one end of said sleeve being free to permit relative movement thereof with reference to the mandrel.
4. In a lapping device, a driving member constituting a mandrel, a split metallic sleeve constituting an operating member, removably mounted thereon, cooperative means formed on the sleeve and mandrel for securing one end of the sleeve against movement circumferentially of the mandrel, said sleeve embracing the mandrel circumferentially

with its opposite end free and movable circumferentially of the mandrel to expand the operating member when the driving mandrel is rotated in a direction in which the free end of the sleeve leads the secured end thereof.

5. In a lapping device, a driving member constituting a mandrel, a split metallic sleeve, constituting an operating member, removably mounted on the mandrel, the sleeve and mandrel being formed with interfitting parts preventing relative rotation of the sleeve and mandrel, said sleeve having one of its ends free and adapted when the lapping device is rotated in one direction to hug the mandrel more closely and when rotated in the opposite direction to tend to move outwardly away from the mandrel to expand the sleeve.

Signed at Chicago, county of Cook, and State of Illinois, this 27th day of January, 1927.

RICHARD GROETCHEN.