

[54] **LAPPING METHOD FOR METALLIC WORKPIECES**

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[58] Field of Search.....51/281 R, 281 P, 281 C, 281 SF, 51/263, 267, 323, 326, 327

[56] **References Cited**

**UNITED STATES PATENTS**

387,555	8/1888	Cummings.....	51/263
546,025	9/1895	McKim et al. ....	51/267 X
1,945,510	2/1934	Angell.....	51/263 X

2,565,590	8/1951	Bullard .....	51/131
2,870,580	1/1959	Norton .....	51/131

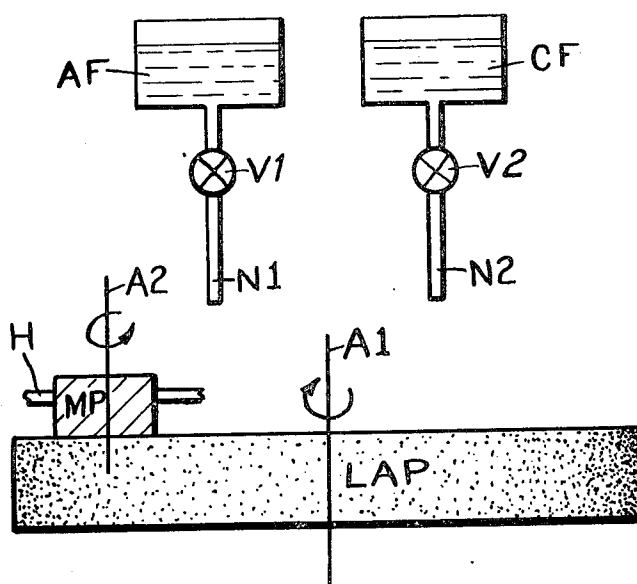
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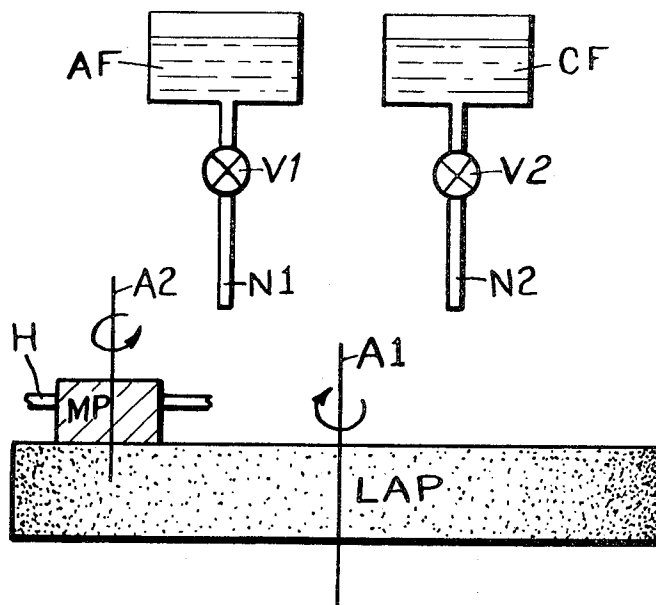
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[57] **ABSTRACT**

A process for providing clean lapped surfaces on metallic workpieces supported in operative relation to the working surface of a bonded abrasive lap for sliding and rotary movement relative to such working surface throughout a single continuous lapping operation including a first predetermined time period during which an abrasive slurry is supplied to the working surfaces of the lap and a second predetermined time period during which the working surface of the lap is flooded continuously with a nonabrasive cleaning fluid effective to wash clean the working surface of the lap and the lapped surfaces of the workpieces.

**1 Claims, 1 Drawing Figure**





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## LAPPING METHOD FOR METALLIC WORKPIECES

## BACKGROUND OF THE INVENTION

There are two well-known lapping methods for providing lapped surfaces on metallic workpieces of various different sizes and shapes.

One of these methods applies to lapping machines equipped with a bonded abrasive lap, made like a grinding wheel, effective first to remove stock from workpieces and then to produce a clean lapped surface, without the use of a loose abrasive on the working surface of the lap.

The other method is applicable to lapping machines equipped with a metal lap, usually either cast iron or steel, to which a loose abrasive is applied. On such lapping machines, this loose abrasive is usually either combined with a paste or with a liquid vehicle to form a slurry.

## SUMMARY OF THE INVENTION

The instant invention consists of a new lapping method combining the use of a bonded abrasive lap characteristic of the first well-known method described above with the use of loose abrasive in a slurry or paste characteristic of the second well-known method described above, and also introduces the use of a nonabrasive cleaning fluid to flood the working surface of the lapping element.

This new lapping method is most effective when it is applied to a lapping machine equipped with a relatively hard-bonded abrasive lap, in order to avoid producing excess quantities of loose abrasives from the lap itself, particularly while the working surface of the lap is flooded with a nonabrasive cleaning fluid which may comprise a thin filtered mineral seal oil.

## DRAWING

The single FIGURE of drawing shows schematically a bonded abrasive lapping element ("lap") which is lapping the lower surface of metallic workpiece MP.

The workpiece is held in a holder H, such as the planetary ring holder shown in Norton U.S. Pat. No. 2,870,580. The lapping action is accomplished by relative sliding motion between the surface to be lapped and the lap in the presence of abrasive particles. A first source of abrasive particles is the lap itself which is selected as noted above, to be of the bonded abrasive rather than of the metallic type. A second source of abrasive is a fluid reservoir containing abrasive grains in a fluid AF. The reservoir has a valve V1 and nozzle N1 for selectively dispensing fluid to the lap where the lap motion tends to distribute it to the lap/workpiece butting surfaces. The relative sliding motion may be of various directions but in accordance with conventional practice is shown here as ro-

tary/planetary with the lap being driven about a major or central axis of rotation of the machine A1 and the workpiece MP being driven about a second local axis A2. Details of the necessary drives and other conventional elements necessary to complete a lap machine are omitted and reference is made to said Norton patent for a description of these.

A reservoir of clear fluid CF with a valve V2 and nozzle N2 for selectively dispensing such clear fluid to the lapping region is also provided. Lapping cycles are carried out with initial feed of abrasive bearing fluid via valve V1, nozzle N1 and with valve V2 closed for a predetermined period of time and the cycles are then finished off with continuous feed of nonabrasive cleaning fluid via valve V2, nozzle N2 and valve V1 closed for a second predetermined period of time to wash clean the working (upper) surface of the lap and the lapped (bottom) surface of the metallic workpiece. While this drawing illustrates a single workpiece, it will be understood that multiple workpieces can be simultaneously lapped in a single lapping cycle.

The usual requirement for interrupting the lapping operation to true the bonded abrasive lap can be avoided by applying this new lapping method to a lapping machine equipped with cast iron or other metallic conditioning rings such as those shown and described in U.S. Pat. Nos. 2,565,590 and 2,870,580, so that lap conditioning is a continuous process during lapping operations according to this new method.

While this new method has been described thus far as it applies to lapping machines equipped with a single lap, it is also applicable to lapping machines equipped with opposing upper and lower bonded abrasive laps arranged in the manner already well known in the art to finish workpieces on opposite sides at the same time in a single lapping operation.

What is claimed is:

1. The method of producing a clean lapped surface on a workpiece with at least one surface to be finished by lapping comprising
  - supporting a given workpiece with its surface to be lapped in operative engagement with a working surface of a given lapping element composed of bonded abrasive material,
  - producing relative sliding movement between the given workpiece and the given lapping element,
  - supplying an abrasive slurry to the working surface of the given lapping element only during a first predetermined period of time, and then
  - flooded the working surface of the given lapping element with a nonabrasive cleaning fluid during a second predetermined period of time sufficient to produce a clean lapped surface on the given workpiece.

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