Jan. 12, 1971 P. J. SOMMER 3,553,892

LAPPING MACHINE WITH DRESSING MECHANISM

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FIG. 1

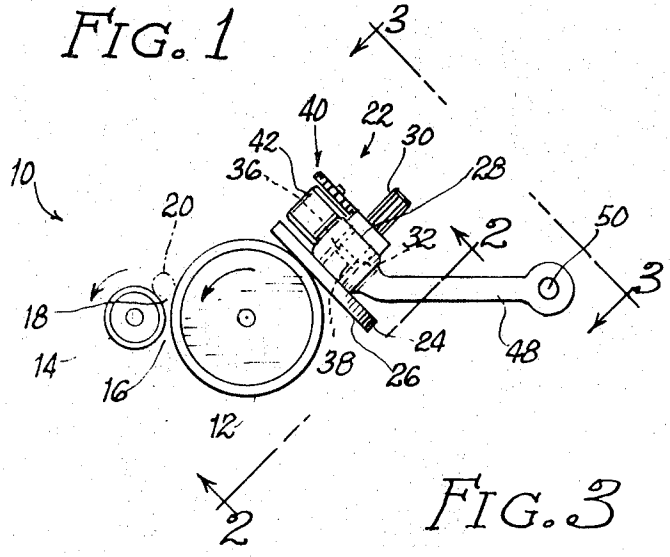


FIG. 2

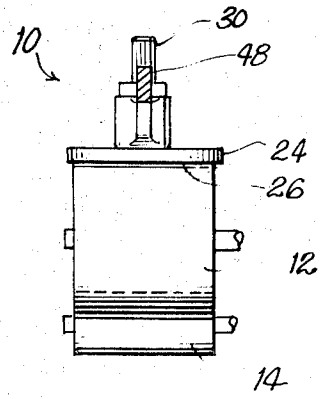


FIG. 3

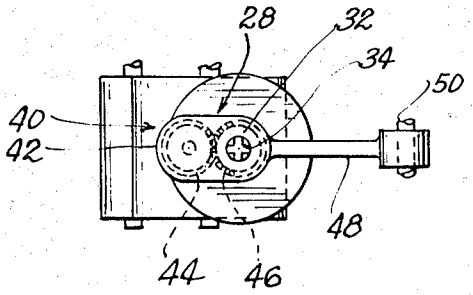
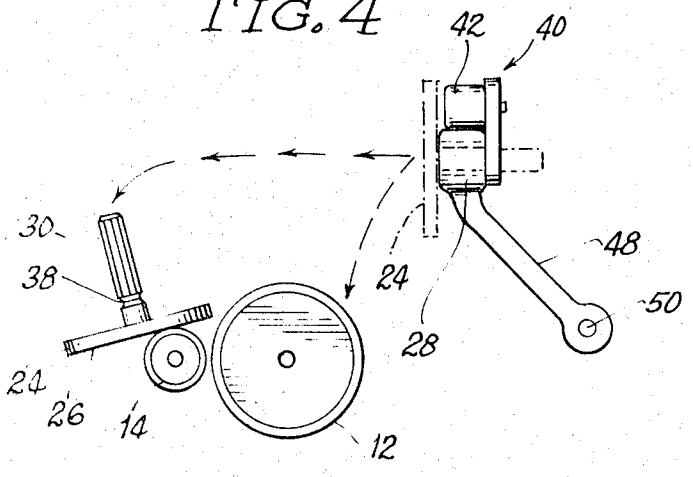


FIG. 4



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LAPPING MACHINE WITH DRESSING MECHANISM

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ABSTRACT OF THE DISCLOSURE

A lapping machine, comprising first and second lapping rollers, a dressing wheel having a flat radial surface for engaging said first lapping roller, a carriage for supporting said dressing wheel, a spline shaft secured to said wheel, a rotatable coupling member on said carriage for removably receiving said spline shaft, a drive motor on said carriage for rotating said coupling member and thereby rotating said wheel, an arm supporting said carriage and a shaft pivotally supporting said arm for swinging movement about an axis substantially parallel to the axis of said first lapping roller, whereby the dressing wheel is movable with said carriage into and out of engagement with said first lapping roller, said dressing wheel and said spline shaft being removable from said carriage whereby said dressing wheel can be employed to dress said second lapping roller.

This invention relates to lapping machines, particularly a centerless lapping machine of the type comprising two lapping rollers of different sizes, with a narrow gap between the rollers. The rollers are adapted to receive a lapping compound which is a fine abrasive. The workpieces are fed along the upper crotch between the two rollers. Due to the rotation of the rollers, the workpiece is frictionally driven so that it also rotates. A lapping action also occurs, primarily between the workpiece and the larger lapping roller, so that the cylindrical surface of the workpiece is lapped or polished.

Occasionally, it is necessary to dress the lapping rollers, so that they will be made truly cylindrical. The larger lapping roller requires dressing much more frequently than the smaller roller.

In accordance with the present invention, the lapping machine is provided with a dressing wheel which is engageable with one of the lapping rollers, preferably the larger roller. A carriage is provided to support the dressing wheel. The carriage is fitted with first means for rotatably supporting the dressing wheel, and second means for driving the wheel. Third means are provided for movably supporting the carriage so that the dressing wheel can be moved into and out of engagement with the lapping roller. Preferably, the dressing wheel is removable from the carriage so that the wheel may be employed as a hand held dressing tool, for use in dressing the smaller lapping roller. The movable support for the carriage preferably takes the form of an arm which is pivotally supported for swinging movement about an axis parallel to the axis of the larger lapping roller. In this way, the dressing wheel can be swung with the carriage, into engagement with the larger lapping roller. The dressing wheel is preferably made of metal. A lapping compound is employed between the wheel and the roller during the dressing operation.

Further objects and advantages of the present invention will appear from the following description, taken with the accompanying drawings, in which:

FIG. 1 is a diagrammatic elevational view, showing a lapping machine which is equipped with a dressing mechanism, arranged so as to constitute an illustrative embodiment of the present invention.

FIG. 2 is a fragmentary diagrammatic section, taken generally along the line 2—2 in FIG. 1.

FIG. 3 is a fragmentary diagrammatic view, taken at an inclined angle, generally as indicated by the line 3—3 in FIG. 1.

FIG. 4 is a view similar to FIG. 1, but showing changed positions of the dressing mechanism.

It will be seen that the drawings illustrate a centerless lapping machine **10** of the usual type having two lapping rollers **12** and **14**, both of which are preferably made of metal, such as cast iron, for example. Normally, one of the rollers is larger than the other. Thus, in the illustrated machine **10** the roller **12** is substantially larger than the roller **14**. Both of the rollers **12** and **14** are driven at fairly low speeds, preferably in the same direction. As shown in FIG. 1, the rollers **12** and **14** are driven counterclockwise.

The rollers **12** and **14** are close together, but with a definite space **16** therebetween. Thus, the rollers **12** and **14** do not engage each other.

The workpieces to be lapped are fed along the upper crotch **18** between the two rollers **12** and **14**. The illustrated rollers **12** and **14** are positioned with their axes parallel and at the same horizontal level. Thus, the workpieces will be retained by gravity in the upper crotch **18**. One such workpiece **20** is shown in FIG. 1. The workpiece **20** is illustrated in the form of a cylindrical pin. However, it will be understood that the machine may be employed to lap a wide variety of workpieces.

In order to perform the desired lapping operation upon the workpiece **20**, the rollers **12** and **14** are charged with a lapping compound, in the form of a fine abrasive composition. The workpiece **20** is frictionally driven by the rollers **12** and **14** so that the workpiece is continuously rotated. Due to the different sizes of the rollers **12** and **14**, a lapping action is also produced on the workpiece, so that the cylindrical surface of the workpiece is lapped or polished. The lapping operation occurs primarily between the larger roller **12** and the workpiece **20**. The smaller roller **14** performs the primary function of frictionally driving the workpiece so that it will be continuously rotated.

The lapping rollers **12** and **14** are subject to wear during normal operation. Thus, it is occasionally necessary to dress the lapping rollers **12** and **14** so that they will be made truly cylindrical. Because the lapping operation is primarily carried out by the larger roller **12**, it is necessary to dress the larger roller much more frequently than the smaller roller **14**.

The illustrated lapping machine **10** is provided with a mechanism **22** which is primarily intended for dressing the larger roller **12**, but also may be employed to dress the smaller roller **14**. The illustrated dressing mechanism **22** comprises a rotary dressing wheel or disc **24**, preferably made of metal, such as cast iron, for example. The rotation of the dressing wheel **24** may be in either direction. The dressing wheel **24** is formed with a flat radial surface **26** which is engageable with the cylindrical surface of the lapping roller **12**.

The dressing wheel **24** is rotatably mounted on a movable carriage **28** and is adapted to be continuously rotated during the dressing operation. The carriage **28** is movable toward and away from the roller **12**, so that the wheel **24** may be moved into and out of engagement with the lapping roller **12**. A lapping compound is employed between the wheel **24** and the roller **12** during the dressing operation.

In the specific construction illustrated in the drawings, the dressing wheel **24** is readily removable from the carriage **28**. As illustrated in FIG. 4, the dressing wheel

24 may be held by hand against the smaller roller 14, for use in dressing the smaller wheel.

It will be seen that a spline shaft 30 is secured to the illustrated dressing wheel 24. The axis of the shaft 30 is perpendicular to the flat face 26 of the wheel 24.

The spline shaft 30 is adapted to be removably received within a coupling member 32 which is rotatably mounted on the carriage 28. The coupling member 32 is formed with a splined bore 34 for receiving the shaft 30. Normally, the shaft 34 is retained within the coupling member 32 by detent means 36, engageable with an annular groove 38 in the shaft.

During the dressing operation, the dressing wheel 24 is continuously rotated by drive means 40, preferably comprising a motor 42 mounted on the carriage 28. The motor 42 is suitably connected to the rotatable coupling member 32, preferably by meshing gears 44 and 46.

In the illustrated construction, the carriage 28 is supported by an arm 48 which is swingably mounted on a pivot shaft 50. However, other means may be employed for movably supporting the carriage 28. The illustrated shaft 50 is positioned with its axis parallel to the axis of the roller 12. By swinging the arm 48 downwardly, the dressing wheel 24 may be moved into engagement with the lapping roller 12.

During the normal operation of the lapping machine 10, the carriage 28 is swung upwardly, so that the dressing wheel 24 is out of engagement with the lapping roller 12. When it is desired to dress the roller 12, the motor 42 is energized so that the dressing wheel 24 will be continuously rotated. The carriage 28 and the supporting arm 48 are then swung downwardly until the flat face 26 of the dressing wheel 24 engages the lapping roller 12. A lapping compound is employed between the dressing wheel 24 and the roller 12 to perform the dressing operation. When the dressing operation has been completed, the carriage 28 is again swung away from the roller 12.

When it is necessary to dress the smaller roller 14, the dressing wheel 24 may be removed from the carriage 28. As shown in FIG. 4, the dressing wheel 24 is held by hand against the smaller roller 14 to carry out the dressing operation.

It will be understood that the dressing mechanism of the present invention makes it possible to dress the rollers of the lapping machine with a high degree of precision, yet with great facility. The dressing operation is carried out very quickly and easily.

Various other modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention, as exemplified in the foregoing description and defined in the following claims.

I claim:

1. A lapping machine construction,
comprising a cylindrical lapping roller made of metal and adapted to receive a lapping compound,
means for rotating said roller about its cylindrical axis,
a dressing wheel made of metal and having a flat radial side surface for engaging said lapping roller,
a carriage for supporting said dressing wheel with said flat radial side surface parallel to the cylindrical axis of said lapping roller,
driving means on said carriage for rotating said dressing wheel about its own axis,
an arm supporting said carriage,
and pivot means supporting said arm and said carriage for swinging movement about a pivot axis parallel to the cylindrical axis of said lapping roller.

2. A lapping machine construction according to claim 1,
in which said driving means comprises a hollow rotatable member on said carriage,
and a shaft connected to said dressing wheel and removably received in said hollow rotatable member,
whereby said shaft and said dressing wheel may readily be removed from said rotatable member and said carriage for use of said wheel as a hand held dressing tool.

3. A lapping machine construction according to claim 1.
in which said driving means comprises a drive motor mounted on said carriage,
and means for coupling said drive motor to said dressing wheel.

4. A lapping machine construction according to claim 1.
in which said dressing wheel has a spline shaft secured thereto and extending substantially perpendicular to said flat radial side surfaces of said wheel,
said driving means comprising a rotatable coupling member on said carriage for removably receiving said spline shaft,
said driving means comprising a drive motor for rotating said coupling motor.

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U.S. Cl. X.R.

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