

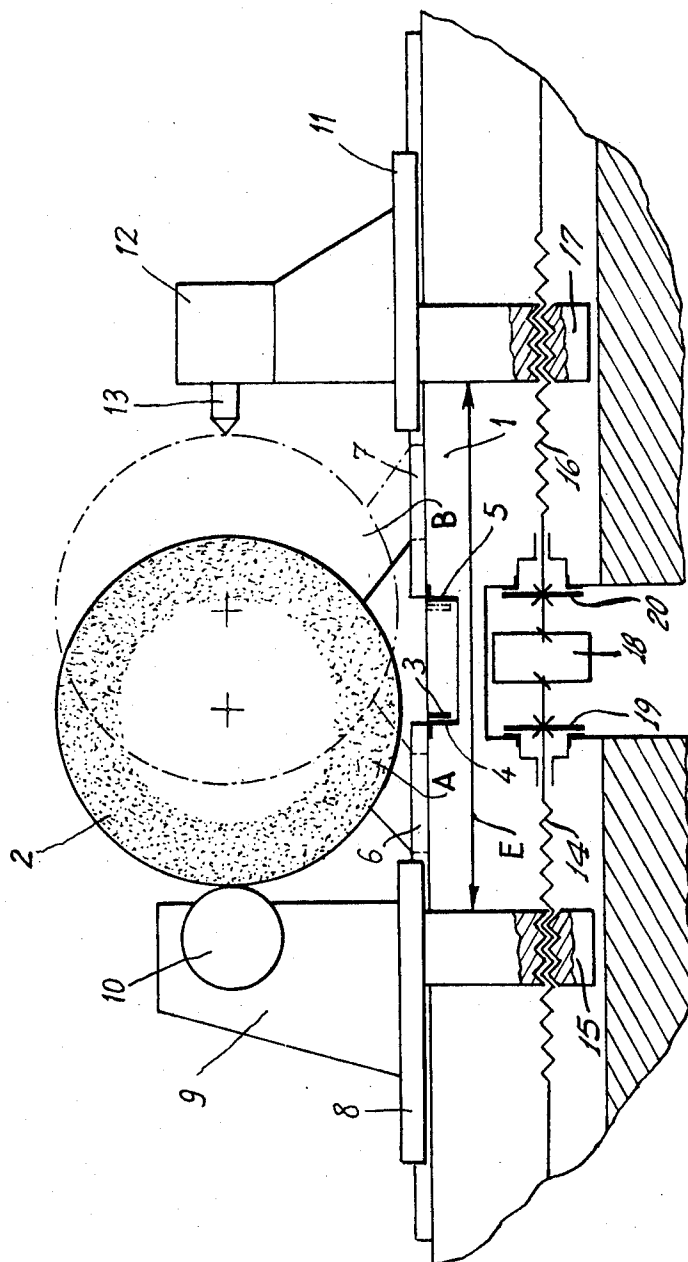
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J. BEAUCHET ET AL

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GRINDING MACHINE WITH GRINDING-WHEEL WEAR COMPENSATING DEVICE

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INVENTORS

JEAN BEAUCHET, GEORGES GARCIN

By *Starnes, Davis, Miller & Schaefer*
ATTORNEYS

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GRINDING MACHINES WITH GRINDING-WHEEL WEAR COMPENSATING DEVICE

Jean Beauchet and Georges Garcin, Annecy, France, assignors to Societe Nouvelle de Roulements, Annecy, Haute-Savoie, France, a corporation of France
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3 Claims

ABSTRACT OF THE DISCLOSURE

Grinding machine equipped with a diamond-type truer-up for compensating the wear of the grinding wheel, which comprises on the frame structure of the machine a grinding-wheel supporting head, a workpiece support and a diamond carrier, characterized in that said workpiece support and said diamond carrier are on the one hand movably mounted on said frame structure on either side of the grinding wheel and in the plane of rotation of this wheel, and on the other hand operatively and separately connected to a common control mechanism capable of producing their symmetrical feeds or displacements, said mechanism being driven from a single control member.

This invention is concerned with a grinding machine having a device for compensating the wear of the grinding wheel.

In a grinding machine the workpiece machined by the grinding wheel determine as a counterpart a certain wear of this wheel which leads to a more or less rapid loss of precision, shape and condition of the wheel surface.

To avoid this inconvenience it is conventional practice to recut the wheel periodically by using a diamond truer-up which reduces the wheel diameter and therefore necessitates another adjustment for restoring the previous machining conditions; thus, a loss of production time and of workpieces is experienced.

In the mass-production of ground workpieces requiring a high degree of precision both in shape and in dimension, this drawback is avoided by automatically performing the diamond truing-up and the necessary adjustments, these adjustments preceding the diamond truing-up operation and being referred to as a compensation step.

This compensation is obtained by moving the workpiece support and the diamond carrier through the same distance in relation to the grinding wheel before each diamond truing-up. Many types of known compensation machines are characterized by either of the following arrangements:

The diamond truer-up rigid with the grinding-wheel support and the workpiece support, are moved at each compensation to the same extent. This equal feed is obtained from inherent and different control systems the value of which is synchronised by using any suitable electromechanical or hydraulic means. The major drawback of this arrangement lies in the lack of fidelity due to the synchronisation of the two control systems having each their inherent dispersion. However, a characteristic advantage of this arrangement is that the working zone is particularly free.

The diamond truer-up is rigid with the workpiece support and each compensation is attended by a relative feed of the assembly in relation to the grinding-wheel support. Although this arrangement is characterized by a high degree of fidelity and a better dispersion than the preceding one, due mainly to its unitary control system, it is objectionable in that it occupies a considerable portion of the working space.

It is the object of the present invention to provide a machine equipped with a diamond compensation or truer-

up device characterised in that it combines the advantages of both arrangements set forth hereinabove while avoiding their drawbacks.

The grinding machine equipped with a grinding-wheel wear compensation device according to this invention, which comprises on the frame structure of the machine a grinding-wheel supporting head, a workpiece-support and a diamond-carrier, is characterised in that the workpiece-support and the diamond-carrier are movably mounted on the frame structure on either side of the wheel and in the plane of rotation thereof, and are operatively and separately connected to a single-control mechanism capable of producing their symmetric feed.

A typical form of embodiment of a machine equipped with the compensation device of this invention will now be described by way of example with reference to the attached drawing of which the single figure illustrates diagrammatically the machine as seen in the axial direction of the grinding wheel, with a fragmentary section taken along the axis of the compensation or truer-up device.

On the frame structure or bed 1 of the machine the grinding wheel 2 is supported by a grinding-wheel head (not shown) of any known and suitable type and which, as far as this invention is concerned, is adapted to move on the machine bed in a direction at right angle to the axis of the grinding wheel between two end positions controlled by stop means and corresponding the one A to the end of the operative stroke of the wheel (shown in thick lines) and the other B to the diamond truer-up position (shown in chain-dotted lines). These positions are shown diagrammatically in the figure as being obtained by providing a stop 3 rigid with the wheel carrier and adapted to engage a pair of registering faces 4 and 5 formed on the frame structure 1. If desired, an adjustment device may be provided on said stop 3 or on the abutment face 4 for setting the position corresponding to the end of the wheel working cycle at the beginning of the grinding of a series of pieces.

Slidably mounted on the frame structure or bed of the machine, in slideways 6 and 7 extending across the axis of the grinding wheel and on either side thereof, are a workpiece-supporting table 8 provided with a suitable workpiece spindle 9 (a workpiece being shown diagrammatically at 10) and a diamond carrier table 11 supporting the diamond carrier 12, the diamond holder proper being designated by the reference numeral 13.

These tables 8 and 11 are operatively connected to a mechanism adapted to feed them symmetrically on the frame structure and comprising in the case of table 8 a nut-and-screw mechanism 14, 15 and in the case of table 11 another nut-and-screw mechanism 16, 17, these mechanisms having opposite pitches and a common member 18 for rotatably driving same, which is shown only in diagrammatic form in the drawing.

Furthermore, both tables 8 and 11 are responsive to a control play take-up device urging said tables away from each other with a constant force, this device, shown diagrammatically, as far as its action is concerned, by the double arrow E, being of any known and suitable type as currently used in the field of machine tools. In this case, the screws 14 and 16 are each in sliding driving connection for example by means of splines with the rotation drive member 18, and these tables are provided with stop means 19 and 20 respectively for absorbing the stress tending to move these tables away from each other, which is caused by the aforesaid play take-up device and urging said stops against the frame structure.

These stops may also be adjustable with a view to permit the accurate positioning of the assembly consisting of said tables 8 and 11 in relation to the frame structure and therefore to the grinding-wheel positioning members 3, 4 and 5.

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It is clear that the wear compensation of the grinding wheel in case of diamond truing thereof will result automatically from the rotation of drive member 18 acting symmetrically upon the workpiece carrier table and the diamond-supporting table.

Besides, many modifications and variations may be contemplated in the practical actuation of the arrangement constituting the subject-matter of this invention without departing from the spirit and scope thereof as set forth in the appended claims.

We claim:

1. A grinding machine equipped with a diamond-type truer-up for compensating the wear of the grinding wheel, which comprises, on the frame structure of the machine, a grinding-wheel supporting head, a workpiece support and a diamond carrier, said workpiece support and said diamond carrier, on the one hand, being movably mounted on said frame structure on either side of the grinding wheel and in the plane of rotation of this wheel, and, on the other hand, being operatively and separately connected to a common control mechanism capable of producing their symmetrical relative displacement, said mechanism being driven from a single control member, said mechanism being of the nut and screw type with the screws associated respectively with said workpiece support and said diamond carrier having opposite pitches, and a common member for controlling the rotation of said screws.

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2. A grinding machine equipped with diamond-type truer-up according to claim 1, further comprising a play take-up device which normally urges said workpiece support and said diamond carrier away from each other, said screws being slidably mounted with respect to, and on either side of, said common member controlling their rotation, and being provided with end stops for engagement with said frame structure.

3. A grinding machine equipped with diamond-type truer-up according to claim 1, in which said grinding-wheel support is movable on said frame structure in a direction at right angles to the axis of said wheel, between two end positions corresponding on the side of said workpiece support to the end of the operative stroke of the grinding wheel and on the diamond-carrier side to the truing-up position.

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JAMES L. JONES, JR., Primary Examiner

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