

[54] **SHARPENING DEVICE FOR GRINDING WHEELS**

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[58] Field of Search..... 125/11 R, 11 CD, 11 AT, 125/11 A

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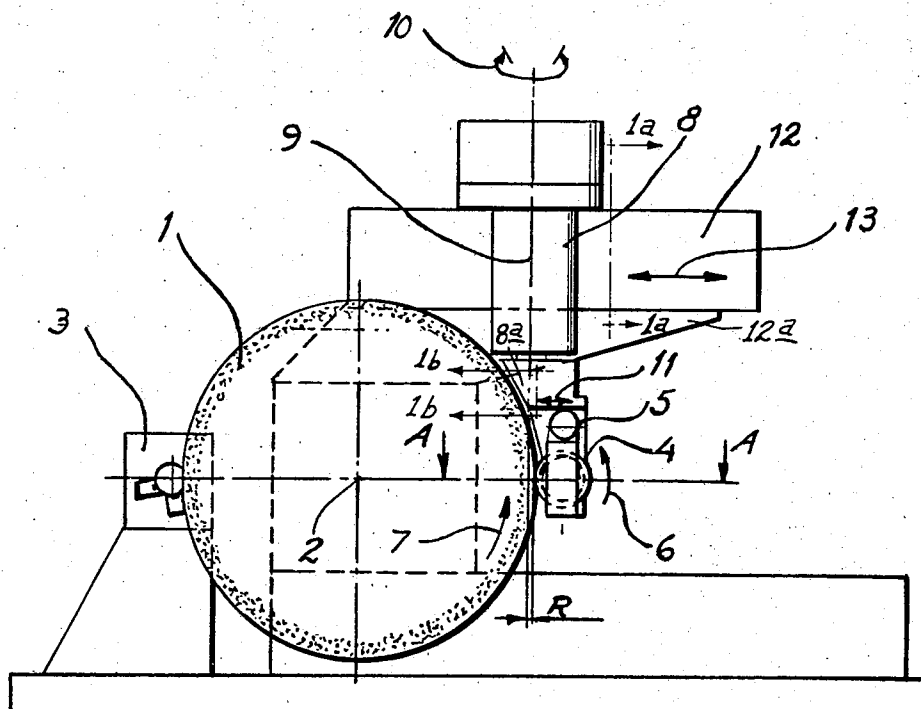
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[57] **ABSTRACT**

A device for sharpening a grinding wheel with a profile surface consisting of two straight lines and an intermediate arcuate segment. The device comprises a sharpening roller rotatably mounted in a support and having two peripheral sharpening surfaces disposed at a predetermined angle relative to one another and defining an edge at the radially outer rim of said sharpening roller and means mounting the support for rotation through a predetermined angle between first and second limit positions about an axis disposed parallel to a tangent to the surface of the grinding wheel. One of said sharpening surfaces contacts one straight line segment of the grinding wheel when the support is located in the first limit position and the other sharpening surface contacts the other straight line segment of the grinding wheel when the support is located in said second limit position, and said rim of the sharpening roller contacts the arcuate segment of the grinding wheel when the support is rotated between the first and second limit positions.

5 Claims, 7 Drawing Figures



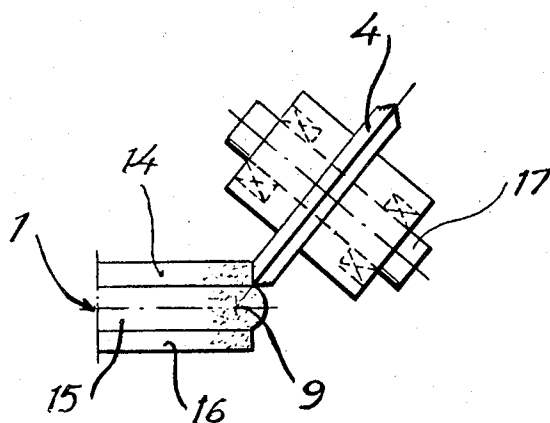


FIG. 2

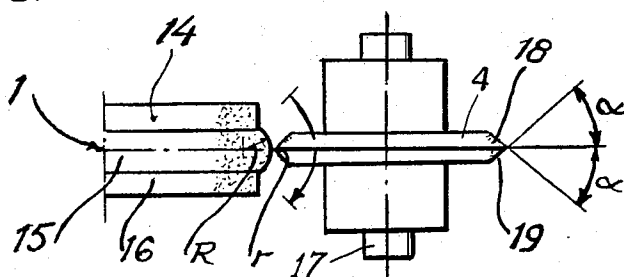


FIG. 3

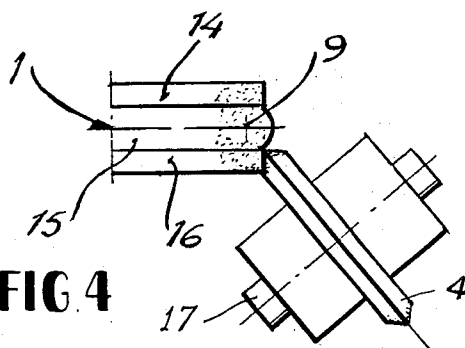


FIG. 4

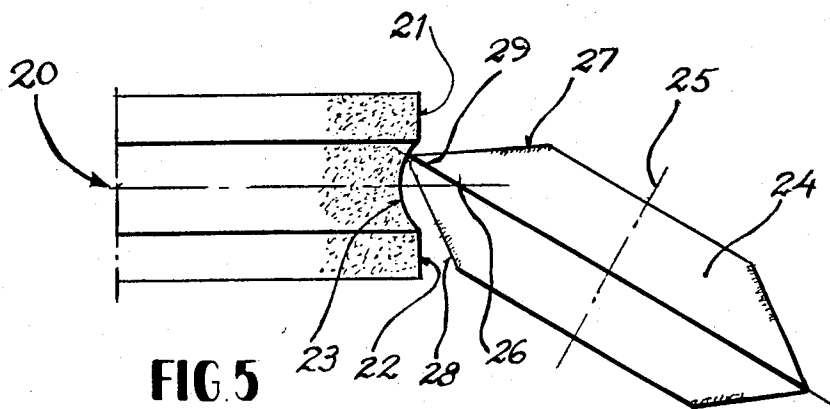


FIG. 5

SHARPENING DEVICE FOR GRINDING WHEELS

BACKGROUND OF THE INVENTION

The invention relates to a device comprising a rotating sharpening roller for sharpening a grinding wheel with a profile comprising two straight lines and an intermediate circular arc. Such grinding wheels are used for different purposes for example grinding ball bearing rings which are provided with ball grooves. In order to retain its abrasive ability such a grinding wheel has to be sharpened with predetermined intervals. It is previously known when sharpening grinding wheels with a profile according to the above to use special sharpening rollers which have a profile corresponding to the object which is to be ground by the grinding wheel. Such a sharpening roller is provided on its envelope surface with a great number of diamond points which, when the roller and the grinding wheel are contacting each other and are rotating relatively to each other, cuts off a surface layer on the envelope surface of the grinding wheel which is thereby given the desired profile and sharpness. The axis of rotation of the sharpening roller and the grinding wheel are always parallel but the distance between the axes may be altered by displacing the sharpening roller perpendicularly to its axis of rotation. It is difficult to achieve the desired accuracy on the circular profile part of the grinding wheel if it is sharpened with such a sharpening roller. Moreover, each sharpening roller is usable only for one single radius of the circular profile part of the grinding wheel which means that a great number of different sharpening rollers are necessary for sharpening grinding wheels with different profile radii. Since the sharpening rollers are comparatively expensive, this is a disadvantage. When sharpening the circular profile parts of the grinding wheel it is also known to use a diamond point which is pressed against the periphery of the grinding wheel and moves perpendicularly to the direction of motion of the periphery of the grinding wheel along a circular arc which corresponds to the profile of the grinding wheel whereby a surface layer of the grinding wheel is cut off. The straight profile of the grinding wheel may be sharpened with a cylindrical sharpening roller in the same way as described above in connection to the sharpening wheel which was profiled in the same way as the workpiece. A plurality of sharpening devices must be used in such case which makes the device unnecessarily expensive. It is also possible to make the above mentioned diamond point describe a path which corresponds to the whole profile of the grinding wheel, i.e., two straight lines and an intermediate circular arc. Such a device is complicated and expensive.

SUMMARY OF THE INVENTION

According to the present invention a device is achieved which comprises one single sharpening roller with a simple configuration with which a grinding wheel with a profile as above may be sharpened with high precision and in which the same roller may be used for different radii on the circular part of the profile. The characterizing features of the invention will appear in the below claims.

DESCRIPTION OF THE FIGURES

A preferred embodiment of the invention will now be described in connection to the accompanying drawing

in which FIG. 1 shows in principle a grinding machine provided with a sharpening device according to the invention;

FIG. 1a is a sectional view taken on lines 1a—1a of FIG. 1;

FIG. 1b is a sectional view taken on lines 1b—1b of FIG. 1;

FIGS. 2—4 show different positions of the sharpening roller in relation to the grinding wheel in one embodiment of the invention, and

FIG. 5 shows one position of the sharpening roller in relation to the grinding wheel in another embodiment.

DESCRIPTION OF A SPECIFIC EMBODIMENT

The grinding machine according to FIG. 1 comprises a grinding wheel 1 which is rotatable around an axis 2 and is intended for grinding the envelope surface of rings, which for the grinding procedure in a manner known per se, are fixed in a ring retainer 3. The grinding wheel 1 is sharpened with a sharpening roller 4 which will be further described in connection to the FIGS. 2—4. The sharpening roller is rotatably mounted in a support device 5, in which also a driving motor for the sharpening roller is provided. The sharpening roller is rotating in the direction of arrow 6, and the grinding wheel is rotating in the direction of arrow 7. The support device 5 is in its turn rotatably mounted in a turning device 8, whereby rotation occurs around the axis 9, as shown by the arrow 10. The axis 9 is perpendicular to the axis 2. The distance between the axis 9 and the nearest parallel tangent to the roller 4 is marked with an r and constitutes the radius in the circular arc which constitutes a part of the profile of the grinding wheel. The radius r may be varied by the fact that the support device 5 is displaceable on the turning device 8 perpendicularly to the axis 9, as shown by the arrow 11. To this end the support device 5 is provided with a dovetail projection 8b which engages in a complementary slotted opening 8c in the lower portion 8a of the turning device 8. The turning device 8 is in itself displaceable perpendicularly to the axis 9 and perpendicularly to the rotational axis of the grinding wheel 2 along a linear guide 12, as shown by arrow 13, which makes it possible to use grinding wheels with different diameters which may be sharpened by the same sharpening device, and makes it possible to move the position of the sharpening roller to compensate the wear of the grinding wheel at each sharpening operation. In order to facilitate displacement of the turning device 8 in the direction of the arrow 13, the linear guide 12 may be provided with a dovetail projection 12b which slides in a complementary slotted opening 12c in the frame 12a. The figures 2, 3 and 4 show a section according to line A—A in FIG. 1 and show the position of the sharpening roller when sharpening one of the straight profile parts 14, the circular profile part 15 and the second straight profile part 16 on the grinding wheel 1 respectively. FIGS. 2 and 4 thereby show the end position of the sharpening roller when this is turned around the axis 9. As appears from FIG. 2, the sharpening roller 4 is rotatably mounted on a shaft 17, whereby the driving of the roller is achieved by a motor which is not shown. FIG. 3 shows the profile of the sharpening roller which is constituted by two tapered parts 18 and 19, with a mutual base. Both of the cone angles are equal, which means that both angles α are equal. In order to give the

desired profile on the grinding wheel, the sharpening roller has to be turned the angle $90^\circ - \alpha^\circ$ in each direction from the neutral position which is shown in FIG. 3. The outer edge of the sharpening roller, which is constituted by the section between the cones 18 and 19, is suitably rounded by a radius R, see FIG. 3 whereby also the profile of the grinding wheel will have a corresponding radius 3 in the area between the straight and the circular profile parts. The tapered surfaces 18 and 19 of the sharpening roller and the intermediate rounded surface with the radius R are covered with a number of diamond points, which, when the roller contacts the grinding wheel, are cutting off a surface layer on the wheel. The turning around the axis 9 is carried out by a turning device 8 in a manner which need not be further described, whereby the turnangle $90^\circ - \alpha^\circ$ at each direction is adjustable in a manner known per se.

As mentioned above the same sharpening roller may be used for sharpening grinding wheels with profiles with different radii R by varying the position of the support 5 on the turning device 8. Also the length of a circular arc with the radius R in the profile of the grinding wheel may be varied when using the same sharpening device if the sharpening roller 4 is exchangeable, whereby for a longer circular arc a sharpening roller with a smaller angle α is used, which means that the turning angle $90^\circ - \alpha^\circ$ of the sharpening roller may be increased. The FIGS. 2 - 4 show the sharpening of a grinding wheel with a profile comprising a convex circular arc.

Within the scope of the invention it is also possible, by using a suitably designed sharpening roller, to sharpen a grinding wheel with a profile comprising a concave circular arc. The principle for such a device is shown in FIG. 5, which shows a portion of a grinding wheel 20 with two straight profile parts 21 and 22 and a concave circular profile part 23. The sharpening roller 24 is rotatable around an axis 25, and the sharpening roller and its support are rotatable around an axis 26. When the roller takes one of its end positions one of its tapered parts 27 contacts one of the straight portions 21 on the profile of the grinding wheel. At the other end position the other tapered portion 28 contacts the other straight part 22 of the profile of the grinding wheel. When the roller is turned from one end position to the other, its outer edge 29 describes a cir-

cular path corresponding to the profile part 23 on the grinding wheel, whereby this is contacted by the edge 29. The edge 29 of the sharpening roller and those parts of its tapered parts 27 and 28 which contact the respective straight parts of the profile of the grinding wheel, and covered by a number of diamond points, which, when contacting the grinding wheel cuts off a surface layer on this. A sharpening roller according to FIG. 5 may be used in a device which is designed in principle in the same manner as described in connection to FIG. 1.

I claim:

1. A device for sharpening a grinding wheel with a profile surface consisting of two straight line segments and an intermediate arcuate segment comprising a sharpening roller rotatably mounted in a support and having two peripheral sharpening surfaces disposed at a predetermined angle relative to one another and defining an edge at the radially outer rim of said sharpening roller, means mounting said support for rotation through a predetermined angle between first and second limit positions about an axis disposed parallel to a tangent to the surface of the grinding wheel, one of said sharpening surfaces contacting one of the straight line segments of the grinding wheel when said support is located in said first limit position and the other of said sharpening surfaces contacting the other straight line segment of said grinding wheel when said support is located in said second limit position, and said rim of said sharpening roller contacting said arcuate segment of the grinding wheel when said support is rotated between said limit positions.

2. A device according to claim 1, characterized by that the profile of the outer rim of the sharpening roller constitutes a circular arc (r).

3. A device according to claim 1, characterized by that the turning axis (9,26) of the support for the sharpening roller is displaceable perpendicular to the rotational axis (2) of the grinding wheel.

4. A device according to claim 1, characterized by that the angle of rotation ($180^\circ - 2\alpha^\circ$) of the support for the sharpening roller is adjustable.

5. A device according to claim 1, characterized by that the support (5) for the sharpening roller is displaceable on a turning device (8), the displacement being perpendicular to the axis of rotation (9,26).

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