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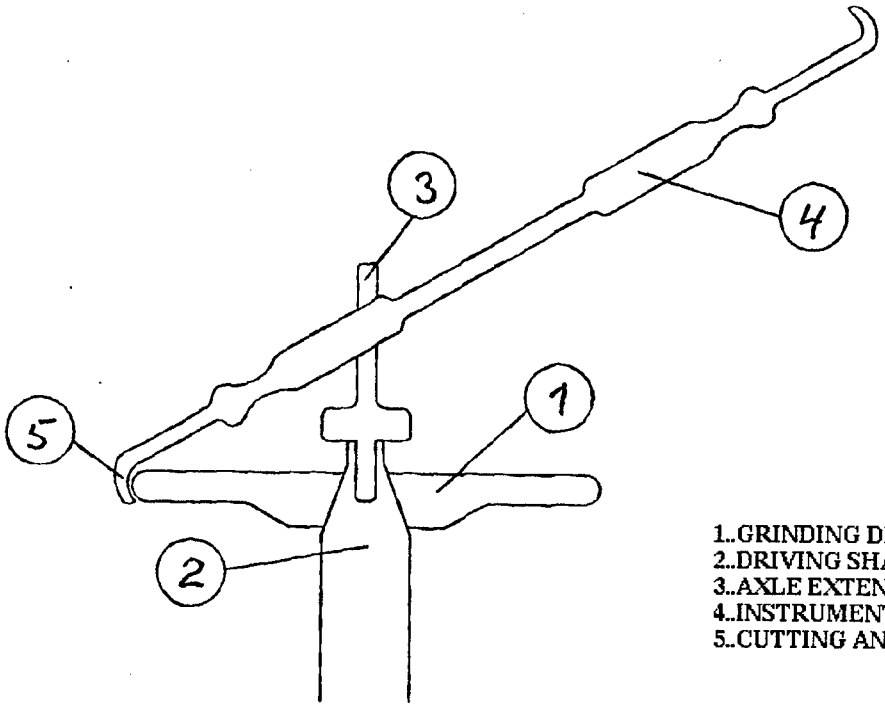
(54) Title: SHARPENING MACHINE FOR SHARPENING OF CUTTING EDGES OF INSTRUMENTS, E.G. DENTAL INSTRUMENTS



1..GRINDING DISK
2..DRIVING SHAFT
3..AXLE EXTENSION
4..INSTRUMENT
5..CUTTING ANGLE

(57) Abstract

Sharpening machine for sharpening of cutting edges of instruments, e.g. dental instruments. The machine comprises a rotating grinding disk with supports that makes it possible to reproduce inner and outer grinding facets with close accuracy, and where parts to be contaminated can be dismounted for sterilization with no use of tools.

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Sharpening machine

for sharpening of cutting edges of instruments, e.g. dental instruments

The invention refers to an apparatus of the in the introduction of **Claim 1** described type. From the United States Patent Application No. 1,556,471 a similar apparatus is known. This well-known apparatus is suitable for sharpening the edges of instruments with outer cutting edges. However, it is not possible to sharpen instruments with inner, curved cutting edges of different cutting angles. The reproduction of the outer grinding angles is also doubtful, as it is not stated where to place the cutting edge on the grinding disk during the grinding process. The requirements of hygiene in connection with e.g. dental intruments cannot be met by this well-known technique, either. The purpose of the invention is to present an apparatus of the above mentioned well-known type, but by which the disadvantages of the well-known technique are rectified.

According to the invention this is obtained by an apparatus, which is characteristic of what is stated in the characterizing part of **Claim 1.**

By designing the apparatus this way the adjustment of the distance of the instrument from the axis of rotation makes it possible to grind the inner cutting edge by an arbitrary wedge angle.

By designing the extended axle, as described in **Claim 2,** a suppport is obtained, by which a specific wedge angle can be reproduced very simply by choosing a suitable diameter of the shaft extension.

The in **Claim 3** described design makes it possible to extend the axle of the grinding disk in a very simple way.

By designing the apparatus as described in **Claim 4**, the entire parts of the apparatus can be dismounted to be sterilized and remounted in a simple way.

The in **Claim 5** described design of the grinding disk is especially advantegeous, because it ensures an acceptable rotation without twisting (uneven running), which is very important especially for dental instruments with inner cutting edges. By removal of tartar and smoothening of root cement it is important that the cutting edge is sharp and regular with no cuts or grinding checks.

The in **Claim 6** described placement of the instrument above the diagonal line of the grinding disk makes it possible with close accuracy of repetition to sharpen the cutting edge of the outer sharpened facet.

The in **Claim 7** described design makes it possible to start the grinding process very advantegeously without touching the apparatus itself. Consequently, the risk of contamination is minimized, when the grinding process is carried out during the treatment of patients.

The invention will be further explained below, with reference to the drawings, described in the following:

Fig. 1 shows the grinding disk mounted on the driving shaft, displayed from the side with an shaft extension, which is to set off the instrument in relation to the diagonal line of the grinding disk.

Fig. 2 shows that the radius of the grinding disk is shorter than the radius of curvature of the instrument.

Fig. 3 shows the grinding disk seen from above with the extended axle, providing the offset angle in relation to the diagonal angle. The larger displacement, the larger angle.

Fig. 4 shows the sharpener displayed from the side, an instrument to be sharpened being placed on the outer facet of the cutting angle, the surface making up the clearance angle. The instrument is supported by a support sheet that is activating the direction of rotation.

Fig. 5 shows an enlargement of the same as Fig. 4, and the cutting edge is placed in the diagonal line, when the instrument is placed against the diagonal stop.

Fig. 6 shows the grinding disk seen from above with the instrument placed for outer grinding. The grinding direction is chosen individually.

Word list

1. Grinding disk
2. Driving shaft
3. Shaft extension
4. Instrument
5. Cutting angle
6. Radius of grinding disk
7. Outer cutting edge
8. Support sheet
9. Sensor
10. Support point
11. Diagonal line
12. "Off set" distance = angle
13. Point of fixation
14. Diagonal stop

Patent claims

Sharpening machine for sharpening of cutting edges of instruments, e.g. dental instruments, and of a type provided with a rotable grinding disk mounted on a vertical axle, including an essential upwards turned grinding surface and a support sheet, against which the instrument can be supported without hinderance in a chosen angle in relation to the disk, when the cutting edge of the instrument is placed above the diagonal line of the grinding disk, while the instrument is in touch with the grinding part of the disk.

1. The apparatus according to **Claim 1** is characterized by the fact that the axle of the grinding disk can be extended above the plane surface of the disk and form a support of the instrument, the longitudinal axle of the instrument being displaced radially away from the axis of rotation, and by the fact that moreover the grinding disk is designed with a grinding periphery, which in an axial cut has a circular cross section with a radius that is shorter than the radius of curvature of the cutting edge of the instrument.

2. The apparatus according to **Claim 2** is characterized by the fact that the support is formed by a shaft extension, which decides the wedge angle by its diameter.

3. The apparatus according to **Claim 3** is characterized by the fact that the shaft extension is mounted in the hub bore of the grinding disk in extension of a driving shaft.

4. The apparatus according to **Claim 4** is characterized by the fact that the grinding disk and instrument support of any kind that are to be

contaminated while being used and consequently has to be sterilized, can be mounted and dismounted using no tools or fastening device on the connection point.

5. The apparatus according to **Claim 5** is characterized by the fact that the lower part of the hub bore of the grinding disk is conically divergent against the under side of the latter and constructed to cooperate with a complementarily designed end part of the driving shaft.

6. The apparatus according to **Claim 6** is characterized by having a diagonal stop, which secures the reproduction ability by grinding of the outer cutting facet, when the handle of the instrument is placed in a chosen support point and at the same time is in touch with the diagonal stop.

7. The apparatus according to **Claim 7** is characterized by the fact that the grinding disk is activated in the correct direction of rotation, when the handle of the instrument is placed in the support sheet, to avoid formation of burrs on the cutting edge.

Fig. 1

1. Grinding disk
2. Driving shaft
3. Axle extention
4. Instrument
5. Cutting angle

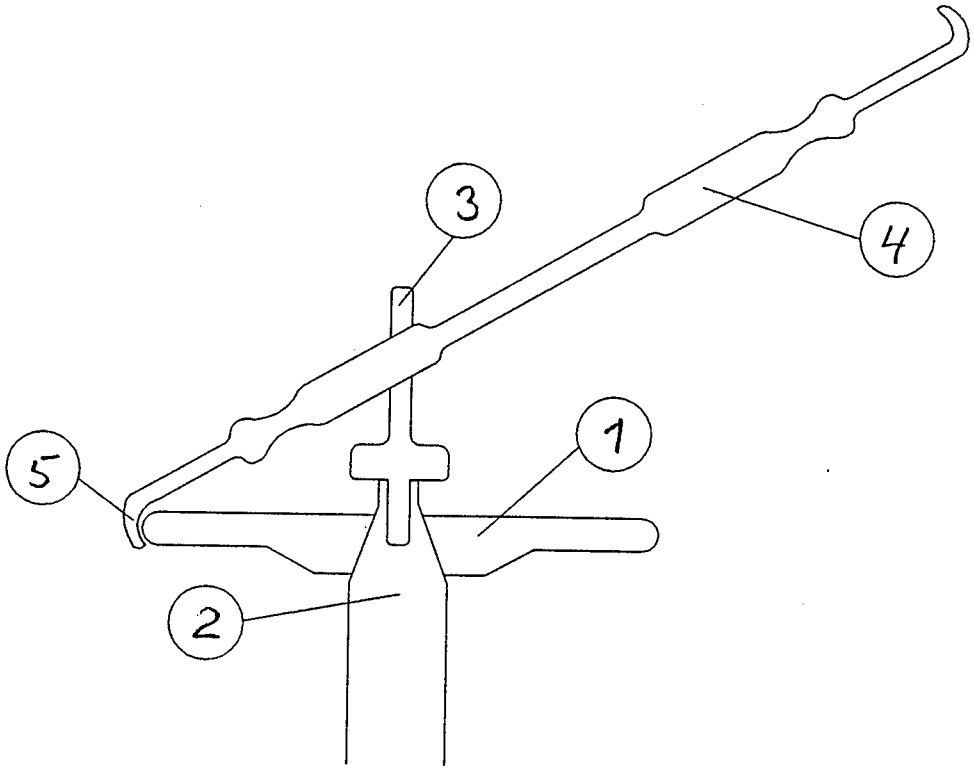


Fig. 2

1. Grinding disk
5. Cutting angle
6. Radius of grinding disk

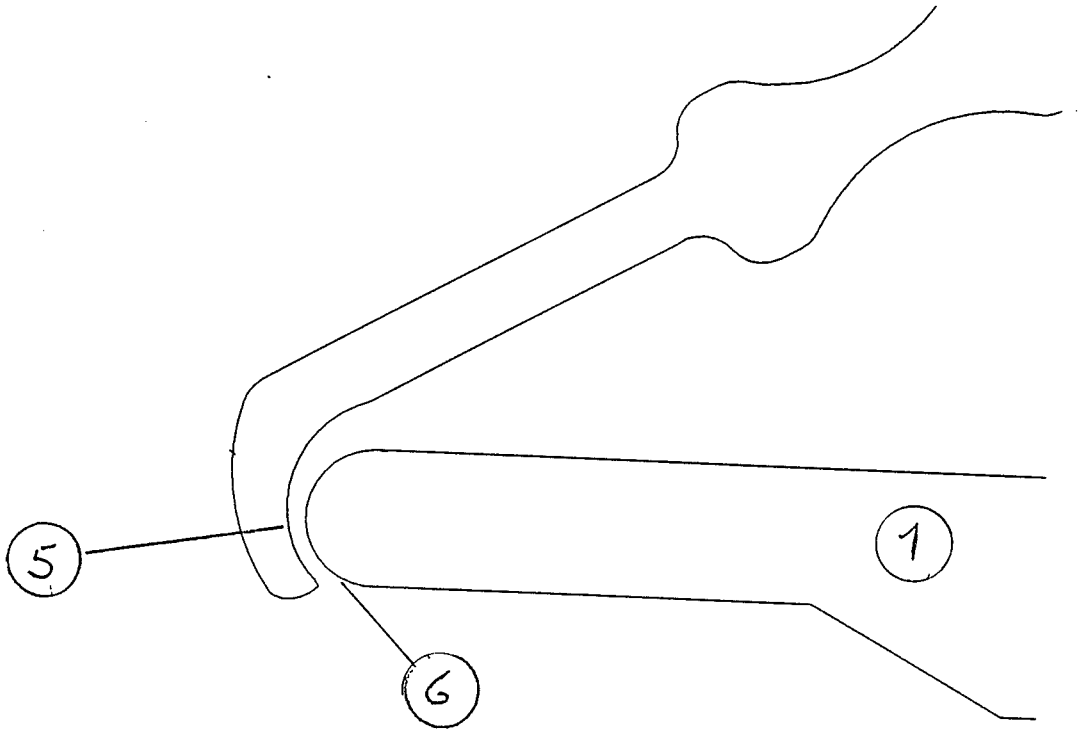


Fig. 3

1. Grinding disk
2. Shaft extension
12. "Off set" distance = angle

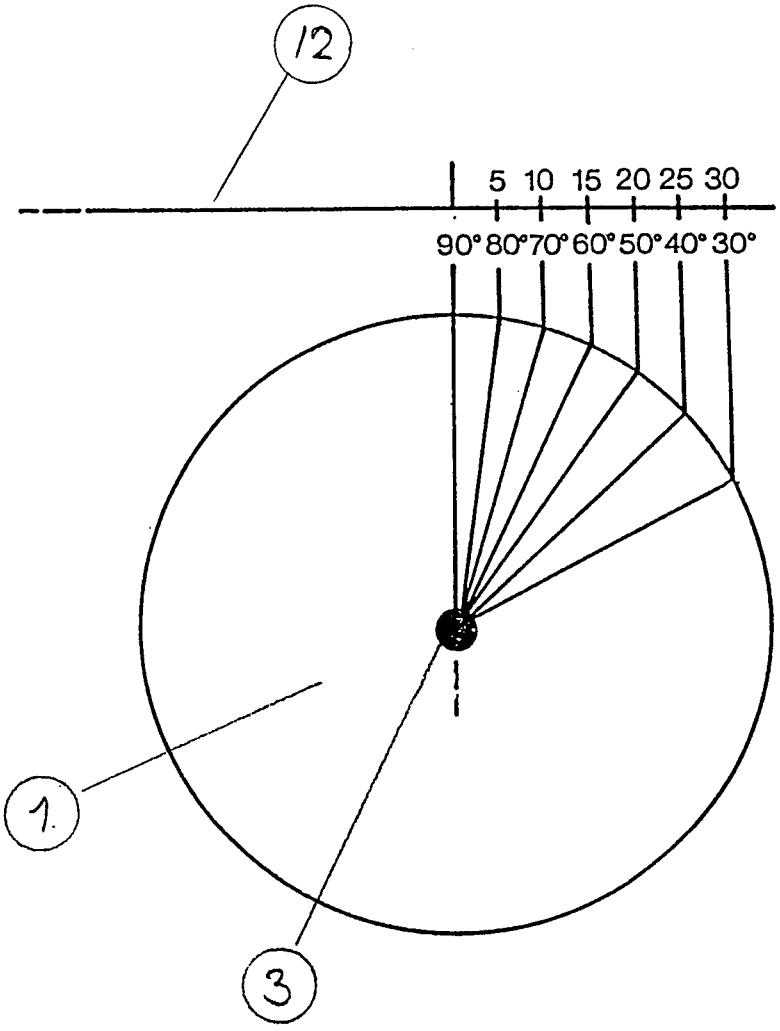


Fig. 4

1. Grinding disk
2. Driving shaft
3. Shaft extension
4. Instrument
7. Outer cutting edge
8. Support sheet
9. Sensor
13. Point of fixation
14. Diagonal stop

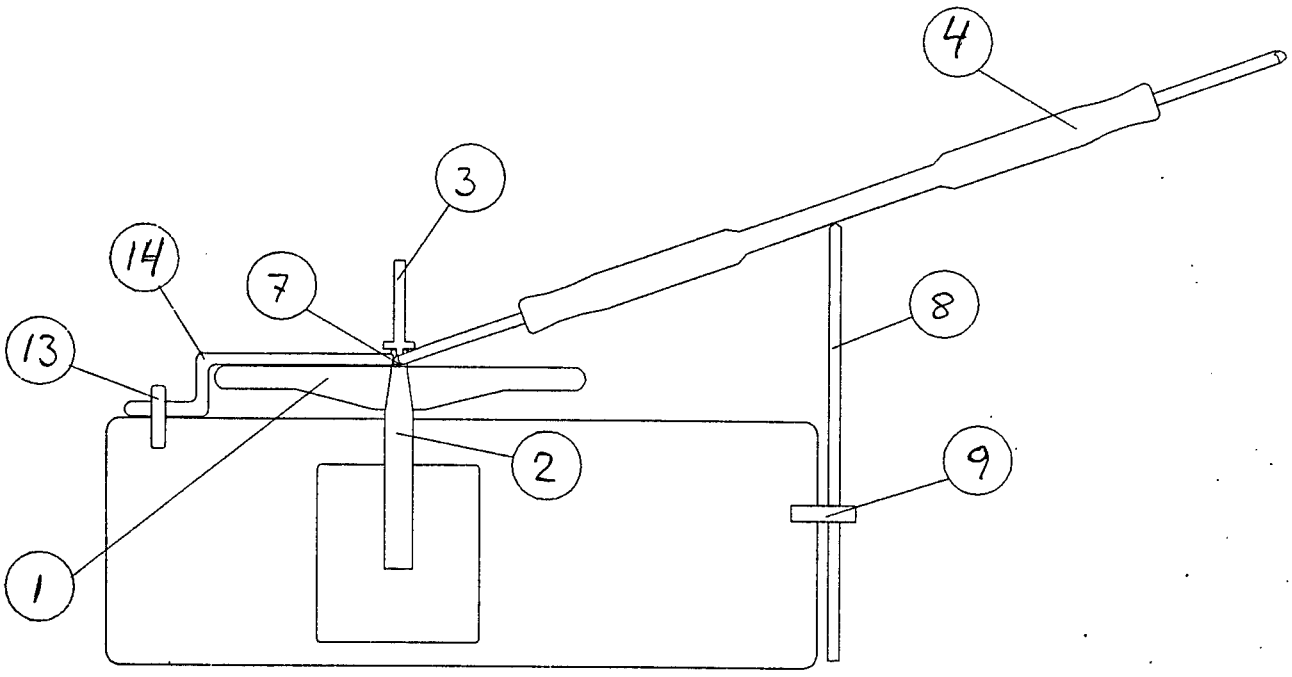


Fig. 5

1. Grinding disk
2. Driving shaft
3. Shaft extension
5. Cutting angle
7. Outer cutting edge
14. Diagonal stop

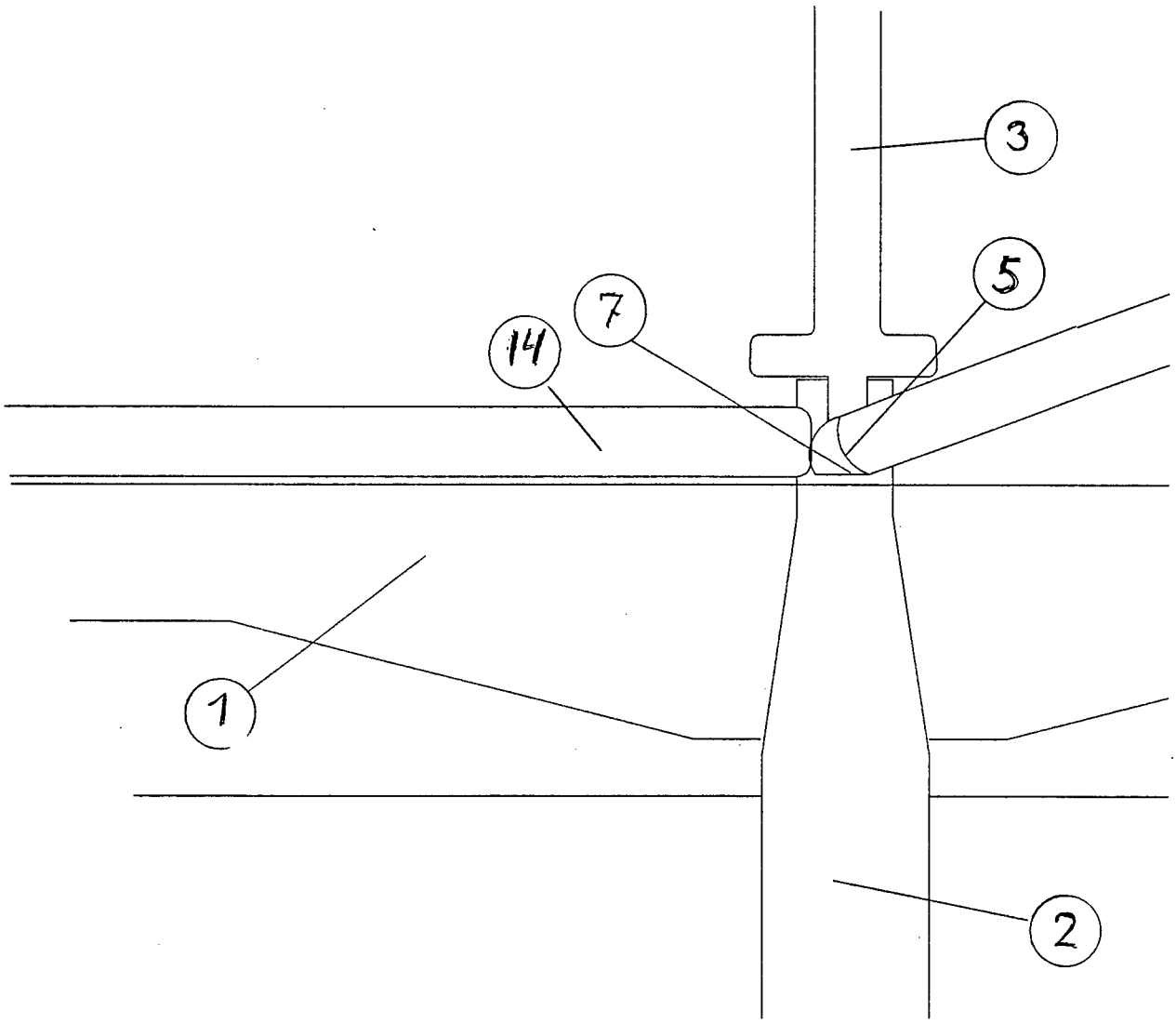
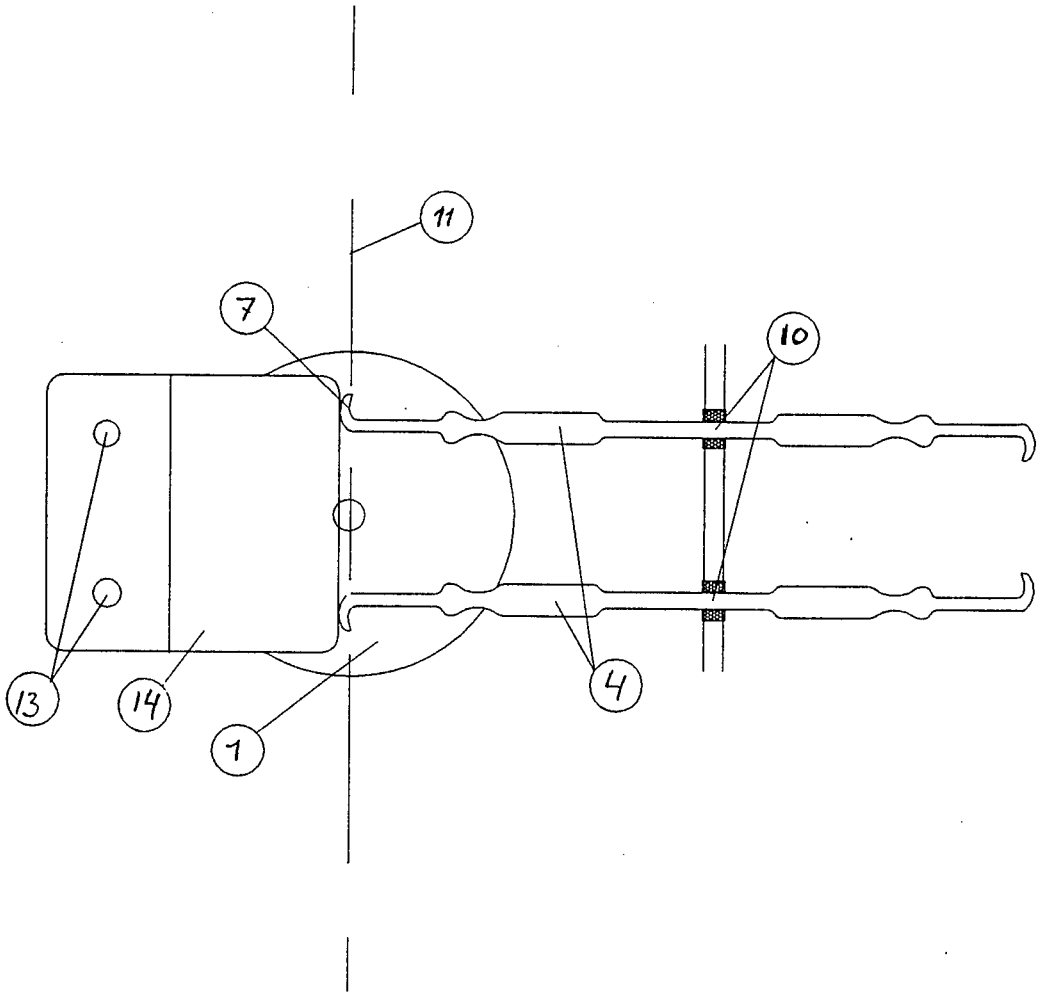


Fig. 6

1. Grinding disk
4. Instrument
7. Outer cutting edge
10. Support point
11. Diagonal line
13. Point of fixation
14. Diagonal stop



INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 94/00315

A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61C, B24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 1556471 (EDWIN MERRITT ANDRUS), 6 October 1925 (06.10.25) --	1
A	US, A, 1659687 (WILLIAM G. HART), 21 February 1928 (21.02.28) --	1-3
A	US, A, 2271810 (THOMAS J. WALDRON), 3 February 1942 (03.02.42) --	1
A	US, A, 2578309 (ANTON M. KROCZEK), 11 December 1951 (11.12.51), column 1, line 1 - line 23, figures 1-5 --	1

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	DE, C, 3934365 (SCHMITZ, BERTHOLD), 28 February 1991 (28.02.91), column 3, line 10 - line 14, figures 1-11, abstract	1
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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 1556471	06/10/25	NONE	
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US-A- 2578309	11/12/51	NONE	
US-A- 4773186	27/09/88	DE-A- 3721013 DE-U- 8708834 JP-A- 63015947	14/01/88 20/08/87 23/01/88
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