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A request for correction in claim 4, the figure "30" into "120"has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 2.2).

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(54) Auxiliary device for grinding machines.

(57) The present invention relates to an auxiliary device for use in respect of grinding machines and more particularly to a device which assists clamping a workpiece and performing the grinding of the internal bore thereof.

The device comprises an exteriorily conical ring having an external circumferentially extending flange or ring, such that the axial cross section of said conical portion is that of a frustum of a cone.

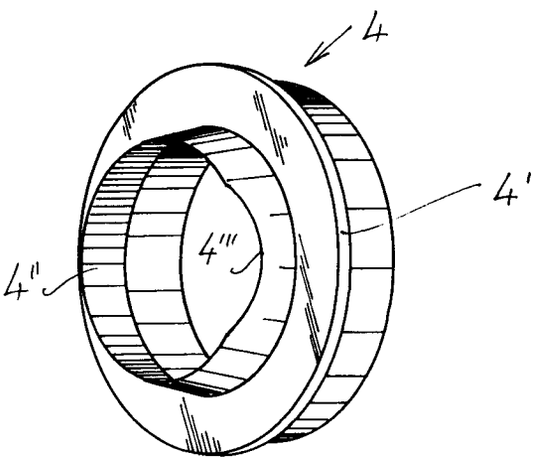

FIG 1

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The present invention relates to an auxiliary member for use in connection with grinding machinery and more particularly for grinding the internal bore, i.e. the lumen of hollow workpieces which are also of external circular cross-section.

As is well known, in grinding the internal circular surface of such a workpiece - which, in most cases, is intended to serve as a machine-part - it is of utmost importance that not only maximal precision is observed, but also that the internal longitudinal axis, i.e. that of the bore or lumen and that of the external circle coincide. It has been customary therefore to resort to different, but in all cases rather complicated clamping and centering means when attempting to grind the internal surface of such a workpiece on which the outer grinding had already been done. Obviously for each of the operations, the external grinding and the internal one, the workpiece had to be centered and clamped separately, hence the difficulty in obtaining the required precision of work and required concentricity.

Furthermore, it is common for all the different systems to clamp the workpiece to the revolving cam of the grinding machine, the outside diameter of which workpiece has already been ground, this being done to secure the necessary concentricity and precision run-out between the inside arid outside diameters.

OBJECTS OF INVENTION

It is an object of the present invention to provide an auxiliary device to be fitted on an internal grinding machine permitting the performance of grinding operations on a workpiece of the type referred to above, without separately centering it for the external and the internal operations.

It is a further object of the invention to reduce the cost of the grinding by eliminating repeated clamping and centering and employ of complicated and costly equipment therefor.

TYPE AND ADVANTAGES OF NEW DEVICE

The system and device according to the invention is a new concept of clamping, driving and grinding for internal grinding machines where the system makes it possible to clamp and drive the workpiece on an internal grinding machine between two dead centres on the workpiece's axis as is known and used in outside grinding operations or other machining processes.

The possibility of clamping and driving the workpiece between its two centres on, the workpiece axis as it is used in outside diameter operation makes it possible to use the same basis and datum point for all grinding operations and, of course, creates or ensures the utmost precision and achieve the best run out between outside diameter and inside diameter which is very important in precision grinding.

It also gives the user flexibility in the order of operation, as it is no longer important whether the outer or inner diameter operations are performed first.

The advantage of employing the new auxiliary device resides therein, that it permits the use of the same base and data point for the two grinding operations and as a consequence to attain precision and coincidence of the central axes of the two circles ascribing the outer periphery and that of the lumen of the workpiece.

A further advantage of the use of the auxiliary device is the fact that an operator is free to attend to the external surface of the workpiece first and then to the internal wall of the bore, or vice versa.

Yet a further advantage of the use of the auxiliary device will reduce substantially operation costs by eliminating many different special and complicated clamping chucks and accessories.

The new system is based on "hollow conical centre ring" which is used to clamp the workpiece on one end or side and a dead centre on the other end or side of the workpiece with different driving rings or fingers to drive the workpiece.

The "hollow conical centre ring", which is mounted in a steady rest on the internal grinding machine table, aligned and centred with the machine workpiece driving centre, clamps the workpiece by using the internal bore to be ground as a centre point, while still making it possible to perform internal grinding on the inner diameter through the "hollow conical centre ring". A recess should be ground on the cone of the "hollow conical centre ring" with the internal grinding wheel for which the diameter is never more than two thirds of the workpiece bore to be ground, leaving at least two thirds of the cone of the "hollow conical centre ring" for the workpiece clamping and making it possible to clamp the workpiece with enough rigidity to perform the necessary precision grinding operation..

This system is applicable to most of the existing internal grinding machines by simple adaptors and it also can be used in light and precision bore tuning operations on lathes and other machines.

SHORT SUMMARY OF INVENTION

According to the invention the new device consists of an at least partly exteriorily conical ring having an external circumferentially extending flange or ridge, such that the axial cross section of the said conical portion is that of a frustum of a cone.

In a practical embodiment the forward part of said conical portion has a cut-out of about 30° of the circumference.

In a preferred embodiment a recess is provided on the internal wall of the new ring device extending up to about one third of the circumference of the circular internal wall of the device (i.e. up to about 120°).

In practice the extension of the arcuate recess will be about 30°, the said recess serving to facilitate the introduction of a grinding wheel into the internal space of the device.

In practice the ring, which rests on a steadying support is introduced with the smaller circumferential edge of the frustum into the lumen of the workpiece whose opposite end is turnably held by a dead-center of the machine arid is in driving contact with an appropriately driving ring and finger.

SHORT DESCRIPTION OF DRAWINGS

The invention will now be described with reference to the annexed drawings, wherein:

- Fig. 1 is a perspective illustration of the new device
- Fig. 2 an end view of the device, indicating also a grinding tool within the confines of the inside lumen of the workpiece.
- Fig. 3 is an axial sectional view of the new device
- Fig. 4 finally, is a schematical view of a lathe-like grinding machine, with the new device in operational position thereon.

DETAILED DESCRIPTION OF INVENTION

The machine comprises in a conventional manner, a chucking cylinder 1, which includes a shaft 1', terminating in dead center 2. There is provided a transmission gear 7 and a driving mechanism 6 for imparting rotational movement to a workpiece 8. The necessary drive is provided by an electromotor 9. All these parts arid their function is known and requires no further detailed description.

The new device shown in Figures 1, 2 and 3 consists of a partly frustoconically shaped ring 4 which is surrounded by a circumferential ridge 4' positioned intermediate the two edge faces of the ring. The frustoconical portion marked 4'' of ring 4 extends on the forward part of it and is delimited by the said ridge 4'. As can be seen in Fig. 1 there exists a cut-out 4'' ' in the forward portion 4''. As can be seen in Figure 4, the smaller peripheral edge face of ring 4 enters the circular lumen of the workpiece, the ring being fixedly supported on a steadying support 3.

In a conventional way tie grinding tool 5 fixed on a spindle 5' and driven in a generally known way is carried with its drive on a hydraulic table and can be brought to enter the interior of the workpiece to be ground, traversing the inner space of ring 4.

To facilitate the introduction of the grinding tool into the interior bore of the workpiece part of the internal wall of the latter is recessed by grinding (or otherwise) an arcuate recess extending along of not more than a third (120°) of the inner circular wall of the workpiece; the said recess indicated by the letter R in Fig. 2 will in practice extend over an arc of about 30°. Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. An auxiliary member for use in grinding the internal bore of a workpiece in a grinding machine of conventional type, such member comprising an at least partly exteriorily conical ring having an external circumferentially extending flange or ridge, such that the axial cross section of the said conical portion is that of a frustum of a cone.

2. The member claimed in claim 1, wherein the internal wall of the ring also ascribes a frustum of a cone.

3. The member claimed in claim 1, characterised thereby that a recess is provided on the internal wall of the member.

4. The member claimed in claim 3, characterised thereby that the said recess extends over about 30° of the circumference of the circular internal wall of the member.

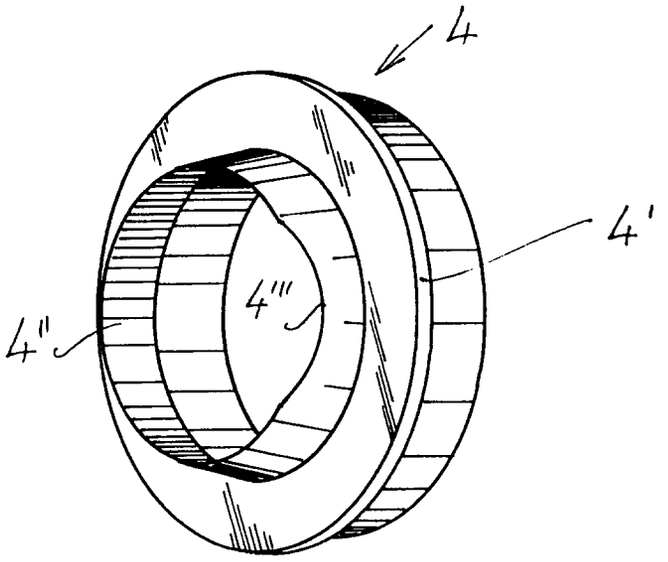

FIG 1

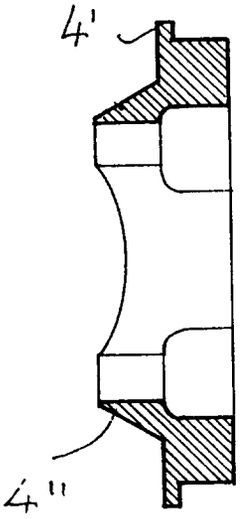

FIG 3

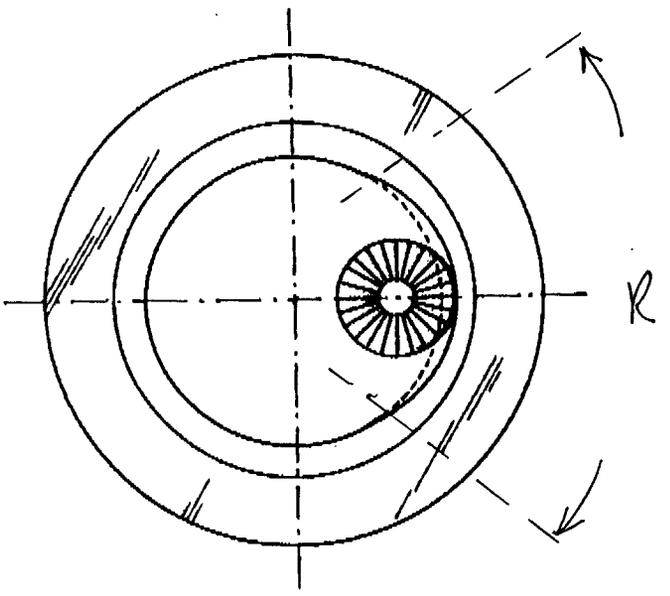

FIG 2

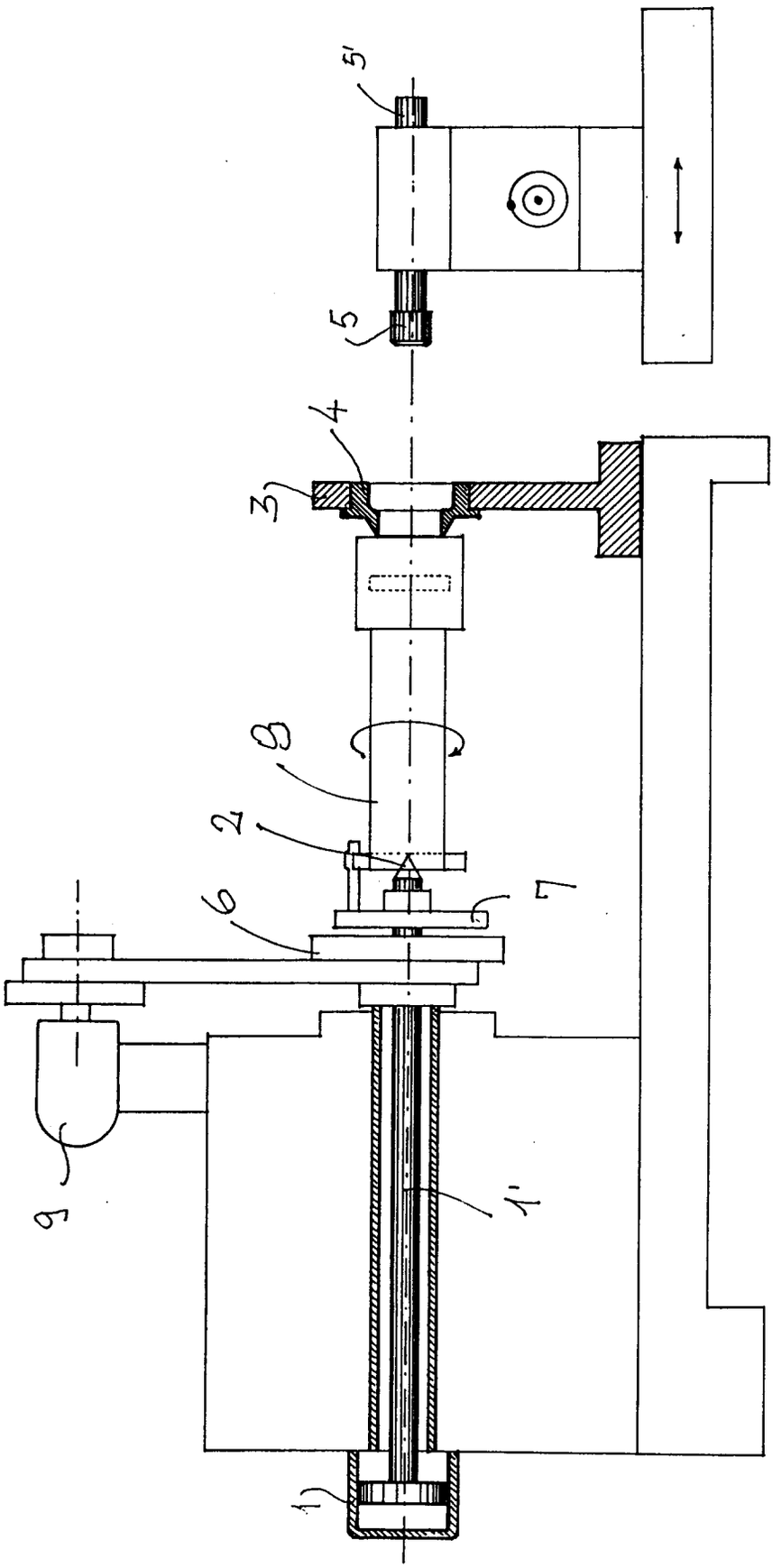

FIG 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 10 4173

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	FR-A-1 142 202 (ULVSUNDA VERKSTÄDER A.B.) * page 2; figures * ---	1-4	B24B41/0 B24B5/06 B24B41/06
Y	US-A-1 818 084 (A.L.NELSON) * page 1, line 53 - line 64; figures * ---	1-4	
A	GB-A-1 021 545 (ULVSUNDA VERKSTÄDER A.B.) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 NOVEMBER 1992	ESCHBACH D.P.M.

CATEGORY OF CITED DOCUMENTS

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