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56012 Fornacette (Pisa) (IT)

(54) **Improved lapping head**

(57) Improved lapping head, comprising means for supporting a plurality of abrasive wheels (19) each of

which is carried by a corresponding shaft (10) able to elastically oscillate in the direction of its vertical axis.

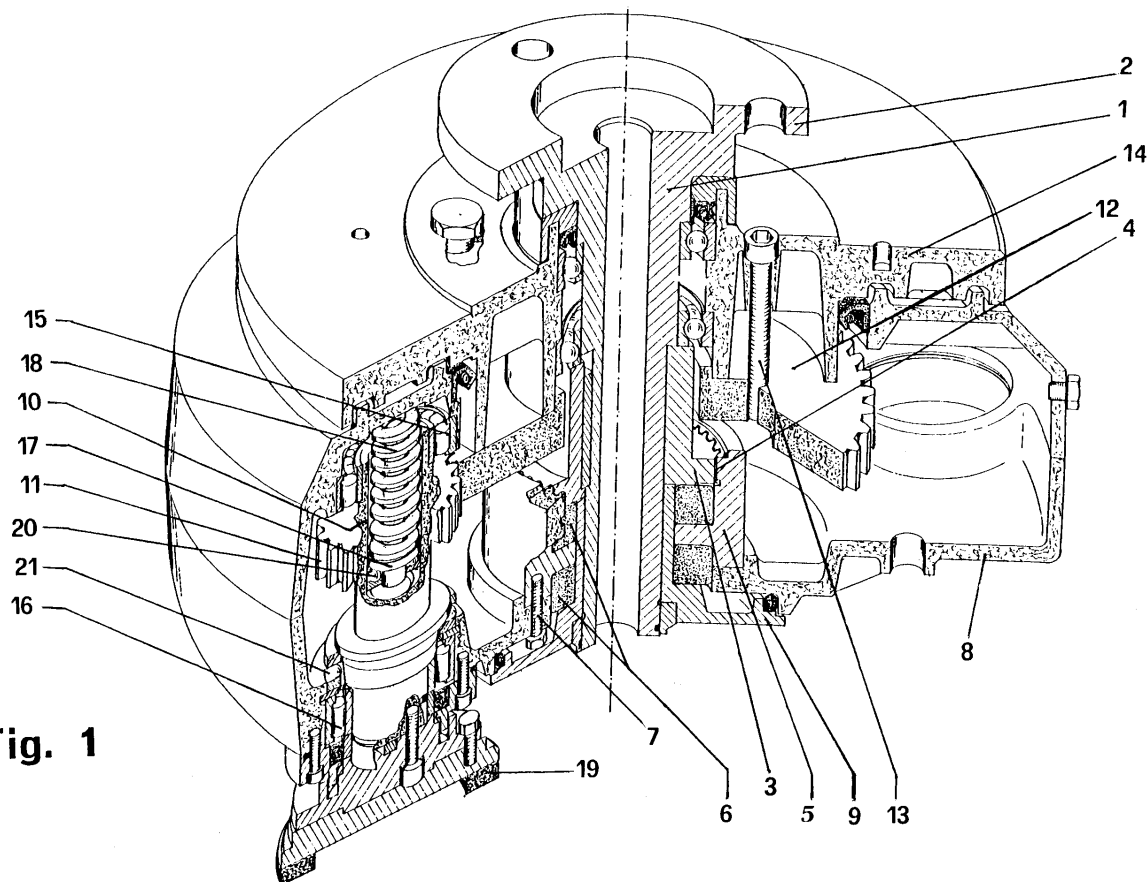


Fig. 1

EP 0 974 424 A1

Description

[0001] The present invention refers to an improved lapping head, especially of the type comprising a plurality of grinding wheels having vertical axis.

[0002] It is known to those skilled in the art that the conventional lapping heads having wheels with vertical axis and being used for lapping or coarse-grinding stone materials, comprise a plurality of abrasive wheels carried by relevant shafts whose axes, during operation, are vertically disposed, that is, substantially orthogonal to the surface of the material to be worked.

[0003] A drawback in the use of these known lapping heads lies in the fact that, in case of marked irregularities of the surface under formation, the wheels do not work simultaneously and their relevant axes do not result in vertical position as the roughness of the material tends to lift the same wheels which transit thereon, thereby moving them away from their relevant regions of intervention. Besides being a cause of imperfect working of the material, this is also a source of impacts and vibrations acting upon the mechanical and structural members of the head, and thus jeopardizing its reliability.

[0004] The above drawback can be found mostly in the treatment of granite sheets, but it can also occur in the lapping of other materials, such as grès and porcelain grès.

[0005] The main object of the present invention is to eliminate or at least reducing the above mentioned drawback.

[0006] This result has been achieved, according to the invention, by providing an apparatus having the features indicated in the characterizing part of claim 1. Further characteristics being set forth in the dependent claims.

[0007] The advantages deriving from the present invention lie essentially in that it is possible to ensure a perfect lapping of stone materials also when the surface to be treated exhibits marked irregularities or roughness; that an operating head according to the invention can also be used for surface finish operations by using wheels with fine-grain abrasive coating; that an operating head according to the invention is relatively simple to make, cost-effective and reliable even after a prolonged service life.

[0008] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 is a perspective view partially in section of an operating head according to the invention; and
- Fig. 2 is an enlarged detail of the head of Fig. 1.

[0009] Reduced to its basic structure, and reference being made to the figures of the attached drawings, an

operating head according to the invention has a central shaft (1) with a flange (2) on top allowing the connection thereof to a machine by which it is driven into rotation (such a machine usually comprising a plurality of battery disposed lapping heads). Solid and coaxial to said shaft (1) is a toothed bush (3) whose toothing is made to mesh with the corresponding inner toothing (4) of a coaxial crown (5) with which two elastic annular elements (6), coaxial to shaft (1), are associated on opposite sides. The said crown (5) extends downwardly so as to engage a case (8) from the inside by screw means (7). Said case (8) fully encloses the inner members of the head, is coaxial to the shaft (1) and moves along with the latter as it is driven by the element (5). The lower base of said case (8) is made up of a flange (9) connected to the body via the same case so as to press, that is, pre-load, said elastic rings (6). The presence of the elastic rings (6) allows the operating head to effectively absorb the axial and radial impacts taking place during operation and due to the contact between the abrasive wheels (19) and the roughness of the material under work. The case (8) exhibits a plurality of seats for as many vertical axes (10) equally spaced apart from the main shaft (1) and intended to support the same abrasive wheels (19). Solid and coaxial to each of said wheel-holder shafts is a gear (11) whose toothing is to mesh the corresponding toothing of a stationary crown (12) coaxial to the main shaft (1) and whose rotation is prevented by its being solid (through the body 14 and screws 13) with the machine to which the head is connected. In this way, as the case (8) rotates together with shaft (1), the wheels (11) roll around the crown (12) and each wheel-holder shaft (10) rotates about its vertical axis. As a consequence, each wheel-holder shaft is driven into rotation about its own vertical axis and, at the same time, about the axis of shaft (1). The same, of course, holds true for the wheels (19) carried by the shafts (10). The speed of rotation of shafts (10) is determined by the transmission ratio of each pair of gears (11, 12). Each wheel-holder shaft (10) is supported on top by a roller bearing (15) and below by a further roller bearing (16). Moreover, each wheel-holder shaft (10) is so mounted as to freely translate along its vertical axis, is associated to elastic means (18) - such as a spiral spring - and exhibits a stop rod (17) which limits the axial travel of the shaft (10) both downwards and upwards. More particularly, the upper part of the stop rod (17) is made to strike, upon reaching the end of its upward stroke, against the corresponding wall of the case (8) and, upon reaching the end of its downward stroke, against the surface of an axial ball bearing (20) located in correspondence of its lower portion. Resting upon a further axial ball bearing (21) is the lower base of the shaft (10).

[0010] Under operating condition, the shafts (10) translate along their vertical axes, so as to elastically absorb the roughness and irregularities of the surface under treatment and to ensure no substantial oscillation of the whole operating head will take place, so that all

the wheels (19) will result always adherent to the surface of the material under work.

Claims

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1. Improved lapping head, comprising means for supporting and operating a plurality of abrasive wheels (19) having vertical axis, with a vertical shaft (10) for each wheel (19), each wheel-holder shaft (10) being fitted into a corresponding seat of a case (8) driven into rotation by a central vertical axis (1), in which, under operating condition, each wheel-holder shaft (10) is driven into a rotary motion about its own vertical axis and into a rotary motion about the axis of said central shaft (1), characterized in that said wheel-holder shafts (10) are engaged to elastic means acting in their respective axial direction. 10 15
2. Operating head according to claim 1, characterized in that said elastic means consist of a spiral spring coaxially fitted on said wheel-holder shaft (10). 20
3. Operating head according to claim 1, characterized in that it is provided with upward and, respectively, downward stop means for each of said wheel-holder shafts (10) so as to keep their axial displacement within preset limits. 25
4. Operating head according to claim 1, characterized in that each wheel-holder shaft (10) draws its motion from said central shaft (1) via a gear drive. 30

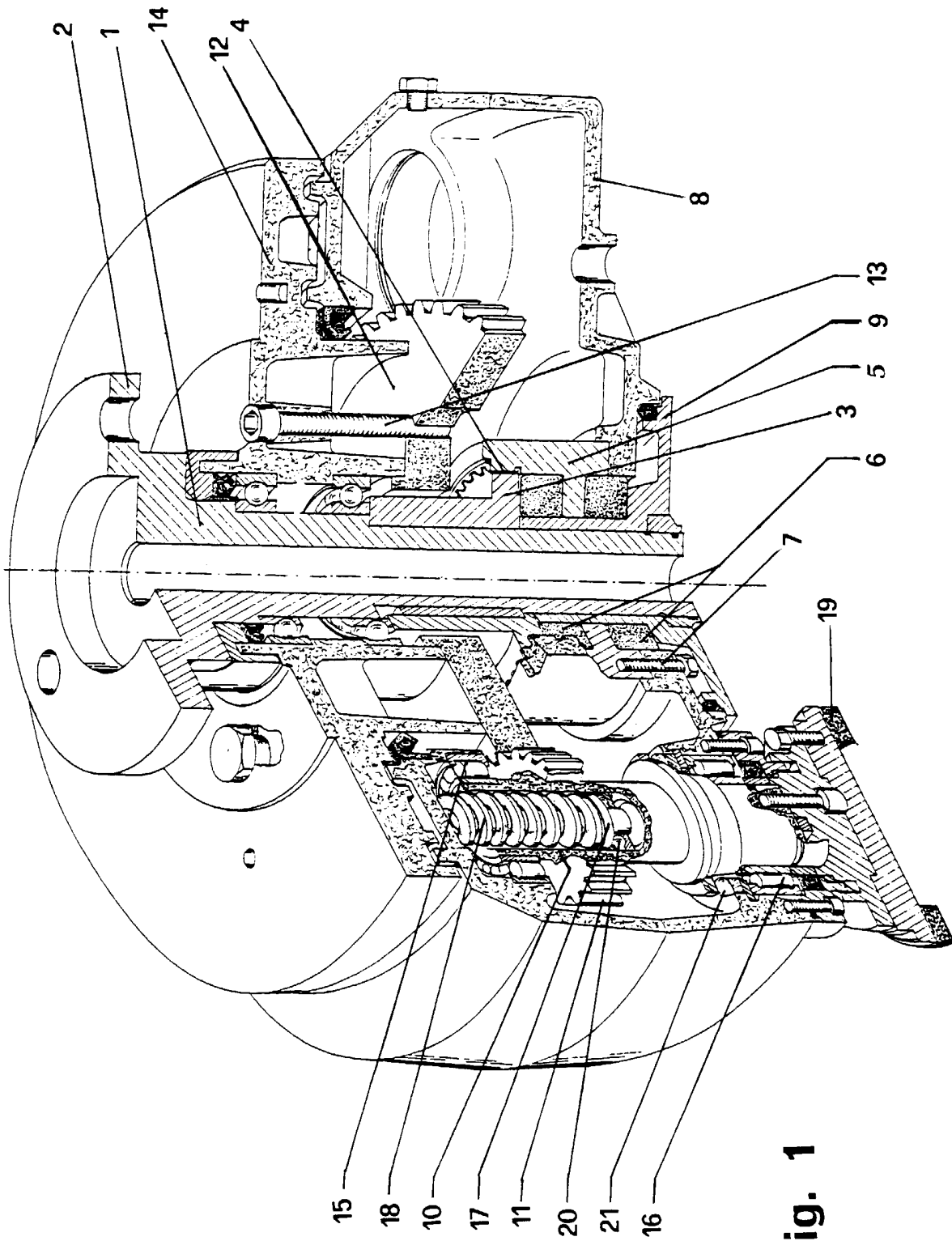
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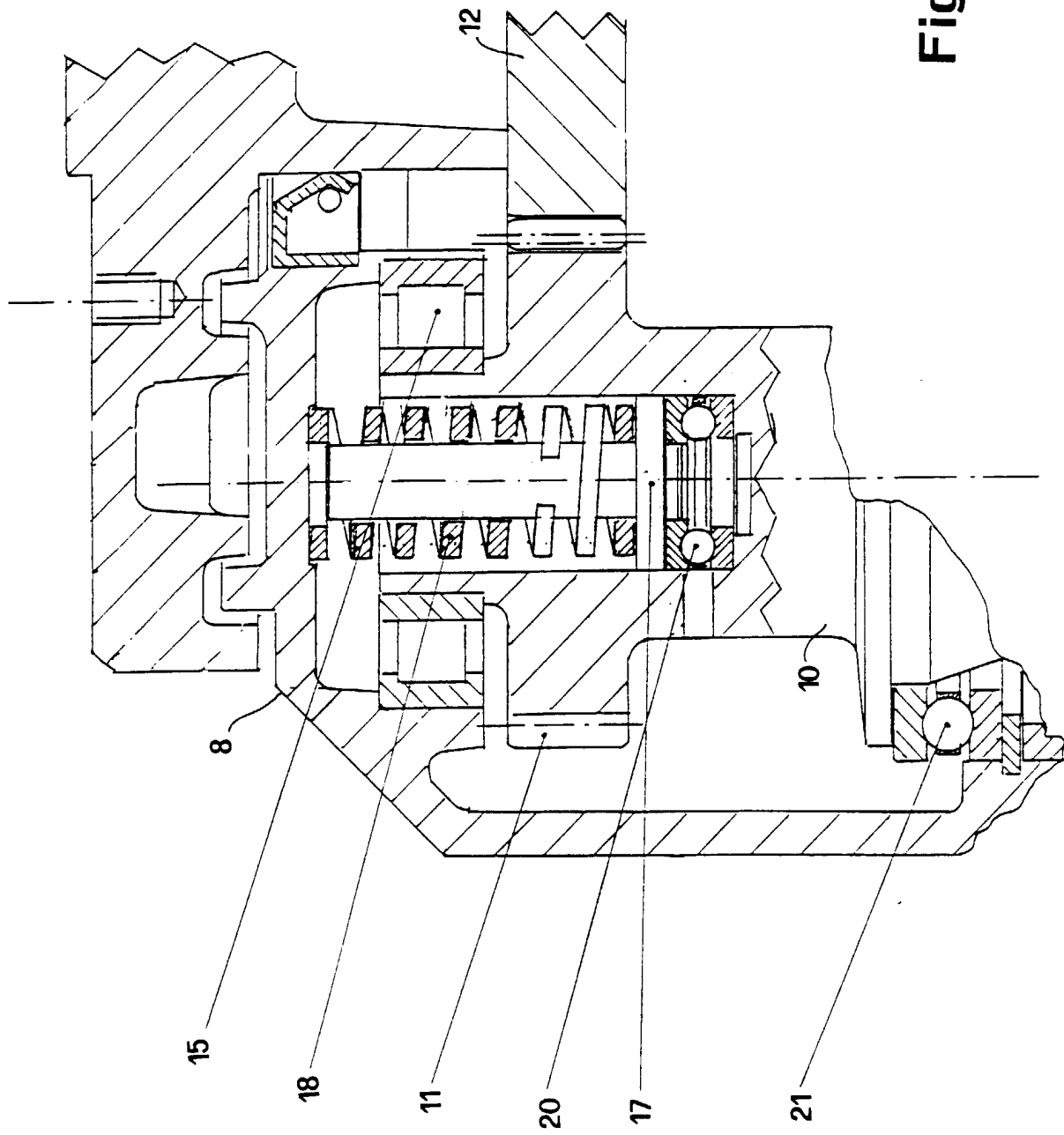


Fig. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 99 83 0385

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.7)
X	FR 627 428 A (KINON) 4 October 1927 (1927-10-04) * page 3, left-hand column, line 18 - line 27; figures *	1,3,4	B24B41/047
Y	---	2	
Y	FR 1 208 664 A (PETTENARO) 25 February 1960 (1960-02-25) * page 2, left-hand column, line 38 - line 45; figure 4 *	2	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B24B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 October 1999	Examiner Garella, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P4/C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 99 83 0385

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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22-10-1999

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