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(54) **Gauging head for stone materials**

Planierschleifkopf für Gesteinmaterialien

Tête d'aplanissage pour matériaux pierreux

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Description

[0001] The present invention refers to a gauging head for stone materials, especially but not exclusively, for granite tiles or sheets.

[0002] It is known to those skilled in the art that the so-called "gauging" of stone materials consists of an operation of surface flattening that precedes the one for the lapping or polishing. To this end, gauge mandrels are used which comprise a plurality of rotating or sweeping tools, the shafts of which are borne by a case rotating about a vertical axis, so that the tools will result driven into a rotary motion about their respective shafts and, at the same time, into a rotary motion about the case's axis. The case and the cutting tools as well are driven with different angular speeds via two distinct motion-transmission lines which lead to two corresponding power takeoffs able to be engaged with two attachments suitably provided on the machine.

[0003] In general, such machine comprises a number of gauge mandrels.

[0004] DE-A-4209273 discloses a gauging head for stone materials, comprising a plurality of tools mounted on corresponding shafts supported by a rotating case, said case being kinematically connected to driving a shaft so as to draw a motion therefrom having a predetermined angular velocity, whereby to said shaft are kinematically connected also the shafts of said tools, which derive their own motion from the same shaft with an angular velocity different from that of the case, in whereby said case is connected to the driving shaft via a round-per-minute reducer located inside the same head, and whereby said tools are connected to the driving shaft via a round-per-minute overgear.

[0005] However, the said known gauge mandrels result of complex fabrication, also when considering the need of providing two distinct kinemtaic lines for transmitting the motion to the case and the tools. This brings about a greater constructional and functional complexity for machines which are equipped with said lines. Moreover, these machines can be used only for gauging stone materials.

[0006] Besides, especially in the ceramic sector, use is made of gauge rollers which are cascade-mounted and have a width sligthly shorter than the material to be gauged.

In this case, however, it is necessary to flatten the tiles according to two different directions of the tool marks so as to cross the lays.

[0007] A further requirement is the replacement of all the gauge rollers when changing the size of the tiles to be treated, which implies longer times and higher costs of treatment.

[0008] The main object of the present invention is to overcome the said drawbacks.

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.

[0009] The advantages deriving from the present invention lie essentially in that it is possible to use only one line of motion transmission in order to move differently the case and respectively the tools and, accordingly, to provide for only one attachment for each gauging head in correspondence of the machine's mandrel, with the advantage of a constructional and functional design of the equipment used for gauging stone materials. Moreover, the machines used for the gauging operation can be advantageous used also for lapping these materials after suitably replacing the gauge heads with lapping heads already available on the market. The result is a higher flexibility in the use of plants provided for such purpose and, in general, a more rational and economical exploitation thereof.

[0010] 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 schematic view in diametral section of a gauging head according to the invention;
- Fig. 2 is a diagram showing the directions of rotation of the case and of the driving shaft of the apparatus of Fig. 1 represented in plant view;
- Fig. 3 is a diagram of the directions of rotation of the driving shaft and of the cutting tools of the apparatus of Fig. 1 represented in side view.

[0011] Reduced to its basic structure, and reference being made to the figures of the attached drawings, a working head for treating stone materials, according to the invention, comprises a central driving shaft (1) having a flange (2) for attachment to the mandrel of the machine in use.

Solid to the driving shaft (1) is a bevel gear (3) acting as an overgear to pinions (4) which mesh with the same bevel gear (3) and have cutting tools (5) mounted on relevant shafts. The drawing accompanying this description shows only one tool (5), but it is understood that the cutting tools may be in any number, compatibly with the dimensions of the head in question.

The tools (5) may be indifferently replaced by discs or rollers, as illustrated in Fig. 1.

The development of the bevel toothing (4) is selected so as to have the shafts of tools (5) between two end supports (6, 7) facing to each other. This makes it possible to eliminate the vibrations which usually derive from the working of stone materials, especially in case of surface irregularities of the material under treatment.

A gauging head according to the invention also comprises a rotating case (8) located below said flange (2) which supports the shafts of tools (5).

The rotational speed of said case (8) is different from that of the driving shaft (1). This effect is achieved by

using a pinion (9) solid and coaxial to the shaft (1) and in meshing engagement with a gear (10) idly mounted on a fixed pin (11). Solid to the gear (10) is a pinion (13) which, in turn, is in meshing relationship with a gear (14) coaxial with the shaft (1), idly mounted on the latter and fixed, that is solid, to the case (8). In this way, the same case, although drawing its motion from the shaft (1), rotates at a speed lower than the latter.

As illustrated in the accompanying drawing, said pin (11) can be made solid to a closed structure (12) lying above the rotating case (8) and resulting connectable to a stationary portion of the machine by means of a coupling block (15).

The transmission system above described is applicable both in case of tool-holder shafts parallel to the work table, as illustrated in Fig. 1, and in case of tool-holder shafts inclined (provided with conical abrasive wheels for treating the surface of the material to be lapped), as weel as in the case of tool-holder shafts parallel to the driving shaft (provided of cylindrical abrasive wheels). In the latter case, the toothing of gear (3) will be cylindrical instead of conical.

By varying the speed-reducing ratio of transmission between the pinion (9) and the gear (14) of case (9), it results impossible to correspondlingly change the rotational speed of the latter.

In practice, the case (8) rotates with less angular rotation than central shaft (1), while the cutting tools (5) rotate with higher rpm with respect to the same shaft.

[0012] Illustrated in the diagrams of Figs. 2 and 3 are the directions of rotation of the case (8) - arrow "F" - - of the tools (5) - arrow "H" - and of the gauging head of Fig. 1.

In the example of Fig. 1, the gear (3) meshes, instant by instant, with the upper part of pinion (4) and, in order to make the case (8) able to rotate as previously indicated, the toothing of gear (14) is internal. This makes it possible to have - the overall dimensions of the head being equal - a reduction ratio between the cylindrical gears of chain (9, 10, 13, 14) higher than that obtainable in the case of gears (13, 14) having external toothings. The latter solution does not leave out the possibility of having the same advantages indicated for the structure shown in Fig. 1 but, in such a case, the bevel gear (3) is made to mesh, instant by instat, with the lower portion of pinion (4).

Claims

1. Gauge head for stone materials, comprising a plurality of tools (5) mounted on corresponding shafts supported by a rotating case (8), said case (8) being kinematically connected to a driving shaft (1) so as to draw a motion therefrom having a predetermined angular velocity, said shaft being kinematically connected also to the shafts of said tools (5), which derive their own motion from the same shaft (1) with an angular velocity different from that of the case (8), said case (8) being connected to the driving shaft (1) via a round-per-minute reducer located inside the same head, said tools (5) being connected to the driving shaft (1) via a round-per-minute overgear, **characterized in that** to said shaft (1) is solid a bevel gear (3) acting as an overgear to pinions (4) which mesh with the same bevel gear (3) and on the shafts of which the cutting tools (5) are mounted, the development of the bevel toothing (4) being selected so as to have the shafts of tools (5) between two end supports (6, 7) facing to each other, a pinion (9) being solid and coaxial to the shaft (1) and intended for meshing with a gear (10) idly mounted on a pin (11), said pin (11) being solid to a structure connectable to a stationary portion of the machine, said gear (10) being solid to a pinion (13) which, in turn, is made to mesh with a gear (14) coaxial to the shaft (1), idly mounted on the latter and fixed, that is, solid to the case (8).

2. Gauging head according to claim 1, **characterized in that** said pin (11) is solid to a closed structure (12) lying above the rotating case (8) and resulting connectable to a stationary portion of the machine by means of a coupling block (15).

3. Gauging head according to claim 1, **characterized in that** said gear (3) meshes, instant by instant, with the upper part of said pinions (4) of tools (5) and **in that** the toothing of the gear (14) solid to the case (8) is internal.

4. Gauging head according to claim 1, **characterized in that** said bevel gear (3) is made to mesh, instant by instant, with the lower portion of said pinions (4) of tools (5), and **in that** the toothing of said gear (14) solid to the case (8) is external.

Patentansprüche

1. Zurichtkopf für Steinmaterialien, der eine Vielzahl von Werkzeugen (5) umfasst, die auf entsprechenden Wellen montiert sind, die von einem sich drehenden Gehäuse (8) getragen werden, wobei das Gehäuse (8) kinematisch mit einer Antriebswelle (1) so verbunden ist, daß es von dieser eine Bewegung ableitet, die eine vorbestimmte Winkelgeschwindigkeit besitzt, wobei diese Welle kinematisch auch mit den Wellen der Werkzeuge (5) verbunden ist, die ihre eigene Bewegung von der gleichen Welle (1) mit einer Winkelgeschwindigkeit ableiten, die von der des Gehäuses (8) verschieden ist, wobei das Gehäuse (8) mit der Antriebswelle (1) vermittels einer Umdrehung-pro-Minute-Untersetzung verbunden ist, die in dem Kopf angeordnet ist, wobei die Werkzeuge (5) mit der Antriebswelle (1)

vermittels einer Umdrehung-pro-Minute-Übersetzung verbunden sind, **dadurch gekennzeichnet, daß** mit der Welle (1) ein Kegelrad (3) verbunden ist, das als ein Übersetzungsantrieb für Ritzel (4) wirkt, die mit diesem Kegelrad (3) kämmen und an den Wellen, an denen die Schneidwerkzeuge (5) montiert sind, wobei die Erstreckung der Kegelzahnung (4) so gewählt ist, daß die Wellen der Werkzeuge (5) zwischen zwei Endträgem (6, 7), die aufeinander zuweisen, ein Ritzel (9) aufweisen, das mit der Welle (1) fest verbunden und zu dieser koaxial ist, und dazu dient, mit einem Zahnrad (10) zu kämmen, das leerlaufend auf einem Zapfen (11) montiert ist, wobei der Zapfen (11) fest mit einer Struktur verbunden ist, die mit einem feststehenden Teil der Maschine verbindbar ist, wobei das Zahnrad (10) fest mit einem Ritzel (13) verbunden ist, das seinerseits mit einem Zahnrad (14) kämmt, das koaxial zur Welle (1) und auf dieser frei laufend montiert und befestigt ist, d.h. mit dem Gehäuse (8) fest verbunden ist.

2. Zurichtkopf nach Anspruch 1, **dadurch gekennzeichnet, daß** der Zapfen (11) fest mit einer geschlossenen Struktur (12) verbunden ist, die über dem sich drehenden Gehäuse (8) liegt und mit einem feststehenden Teil der Maschine mit Hilfe eines Kopplungsblocks (15) verbindbar ist.

3. Zurichtkopf nach Anspruch 1, **dadurch gekennzeichnet, daß** das Zahnrad (3) Augenblick um Augenblick mit dem oberen Teil der Ritzel (4) der Werkzeuge (5) kämmt und daß die Zahnung des Zahnrades (14), das mit dem Gehäuse (8) fest verbunden ist, eine Innenverzahnung ist.

4. Zurichtkopf nach Anspruch 1, **dadurch gekennzeichnet, daß** das Kegelrad (3) Augenblick um Augenblick mit dem unteren Teil der Ritzel (4) der Werkzeuge (5) kämmt und daß die Zahnung des Zahnrades (14), das mit dem Gehäuse (8) fest verbunden ist, eine Außenverzahnung ist.

Revendications

1. Tête de calibrage pour matériaux pierreux, comprenant une pluralité d'outils (5) montés sur des manches correspondants soutenus par un logement rotatif (8), ledit logement (8) étant relié de façon cinématique à un arbre d'entraînement (1), de manière à tirer de celui-ci un mouvement présentant une vitesse angulaire prédéterminée, ledit arbre étant relié de façon cinématique également aux manches desdits outils (5), qui tirent leur propre mouvement du même arbre (1), avec une vitesse angulaire différente de celle du logement (8), ledit logement (8) étant relié à l'arbre d'entraînement (1) via un réducteur de tour-par-minute placé à l'intérieur du même capteur, lesdits outils (5) étant reliés à l'arbre de commande (1) via une surmultiplication de tour-par-minute, **caractérisé en ce que** ledit arbre (1) est solidaire d'un engrenage conique (1) agissant comme une surmultiplication sur des pignons (4) qui s'engrènent avec le même engrenage conique (3) et sur les manches duquel les outils de coup (5) sont montés, le développement de la denture conique (4) étant sélectionné de manière à ce que les manches des outils (5) entre deux supports terminaux (6, 7) soient orientés les uns vers les autres, un pignon (9) étant solidaire de l'arbre (1) et coaxial à celui-ci et destiné à s'engrener avec un engrenage (10) monté de façon folle sur une broche (11), ladite broche (11) étant solidaire d'une structure pouvant être reliée à une partie stationnaire de la machine, ledit engrenage (10) étant solidaire d'un pignon (13) qui, à son tour, est réalisé pour s'engrener avec un engrenage (14) coaxial à l'arbre (10), monté de façon folle sur ce dernier et fixe, c'est-à-dire, solidaire du logement (8).

2. Tête de calibrage selon la revendication 1, **caractérisé en ce que** ladite broche (11) est solidaire d'une structure fermée (12) située au-dessus du logement rotatif (8) et par conséquent peut être reliée à une partie stationnaire de la machine au moyen d'un bloc raccord (15).

3. Tête de calibrage selon la revendication 1, **caractérisé en ce que** ledit engrenage (3) s'engrène, instant par instant, avec la partie supérieure desdits pignons (4) des outils (5) et **en ce que** la denture de l'engrenage (14) solidaire du logement (8) est interne.

4. Tête de calibrage selon la revendication 1, **caractérisé en ce que** ledit engrenage conique (3) est réalisé pour s'engrener, instant par instant, avec la partie inférieure desdits pignons (4) des outils (5), et **en ce que** la denture dudit engrenage (14) solidaire du logement (8) est externe.

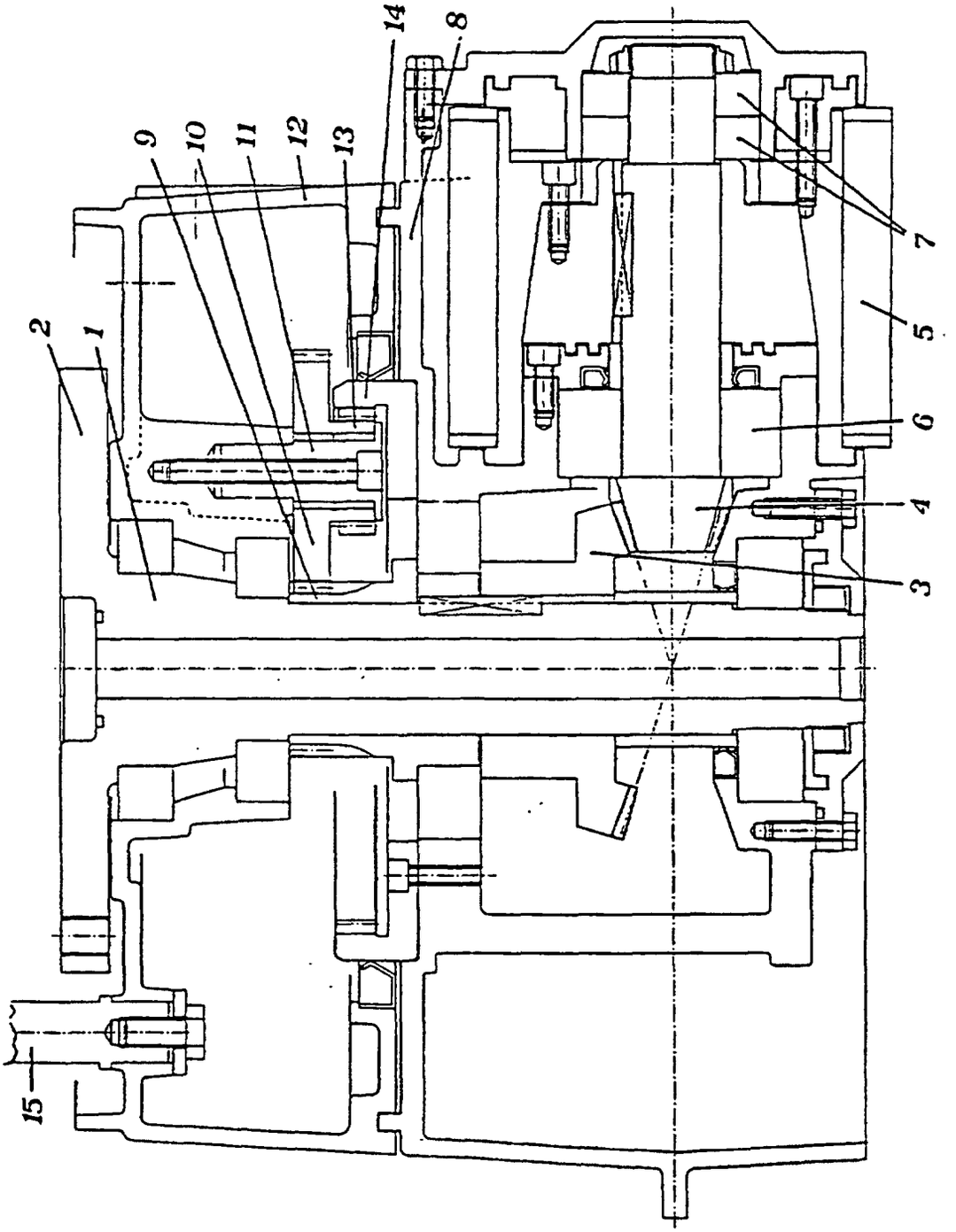

Fig. 1

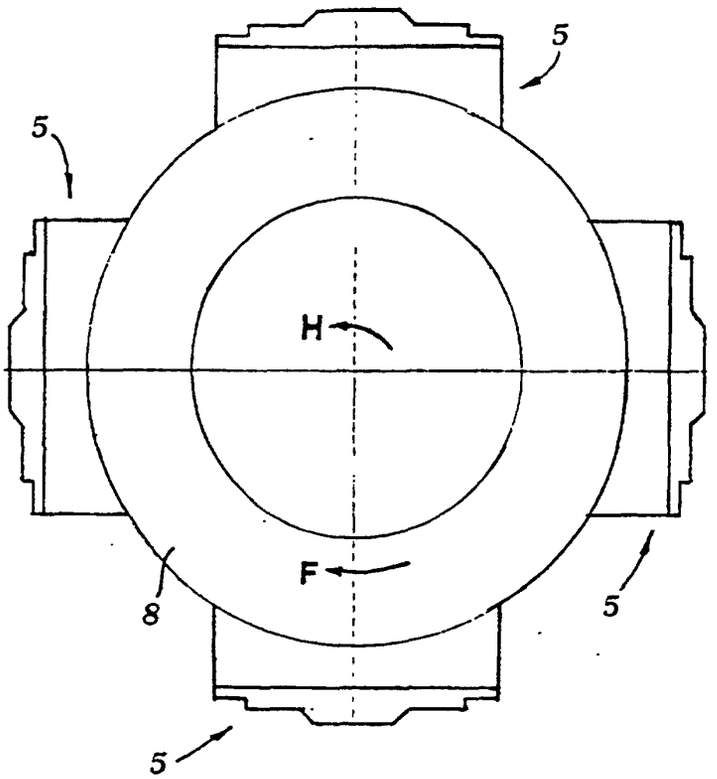

Fig. 2

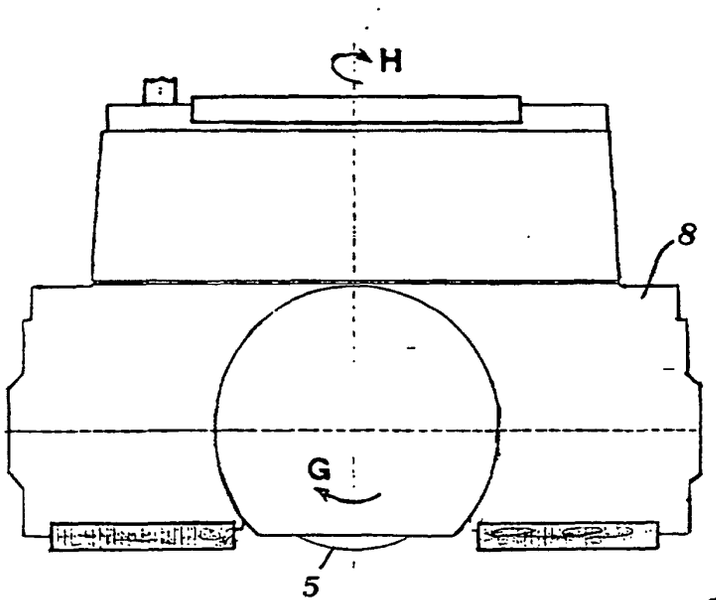

Fig. 3