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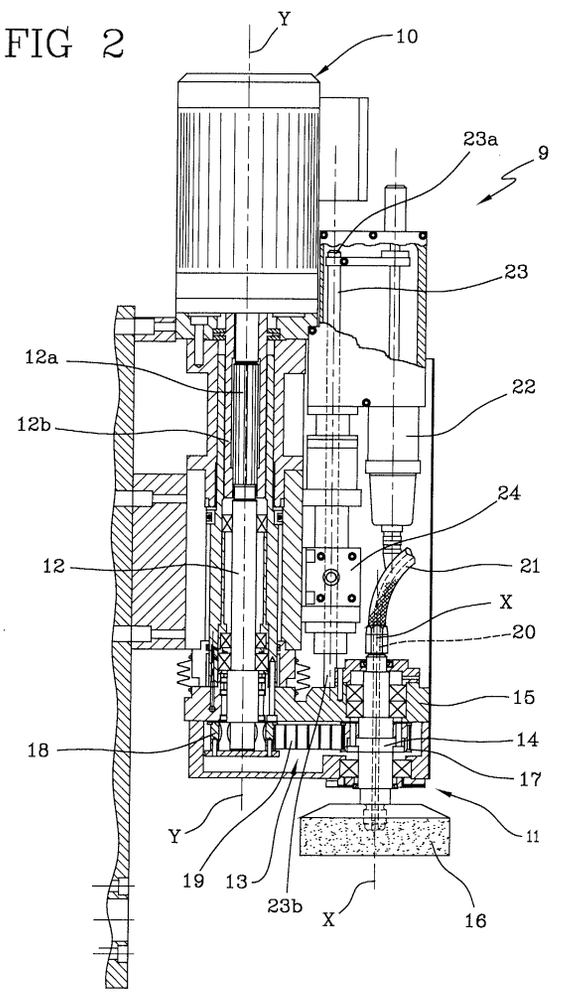
(54) A machine for working edges of marble-like slabs

(57) In a machine for working edges of marble-like slabs, use of a grinding wheel (16) is provided which is operated by a spindle (9) carried by a carriage (8) movable along a support framework (2), to which a slab being worked (4) is fastened. The wheel (16) is supported by a wheelhead (11) which is offset relative to a propeller shaft (12) driven by a motor (10) being part of the spindle (9). A toothed belt (19) looped around respective pulleys (17, 18) transmits motion from the propeller shaft (12) to the wheelhead (11). The offset positioning of the wheelhead (11) allows the grinding wheel (16) to reach corners constituted by the edges of the slab under working (4) without involving mechanical interferences of the spindle (9) components against projecting portions (4b) of the slab being worked.

FIG 2



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Description

[0001] The present invention relates to a machine for working edges of marble-like slabs, of the type comprising the features set out in the preamble of claim 1.

[0002] To the aims of the present invention, to be included in the term "marble-like material" are, in addition to marble in the proper sense of the world, also other natural or artificial materials such as stones, granite and the like.

[0003] It is known that shaping and/or polishing of the edges of slabs of marble-like material, commonly used for example in the furnishing and building field and to erect funerary monuments, is usually carried out by automatic machines provided with a tool-carrying carriage which is movable along one side of a support framework defining a working plane on which a workpiece is positioned and fastened.

[0004] Operatively associated with the tool-carrying carriage is a spindle essentially including a wheel-carrying head or "wheelhead" fastened to the end of a telescopically extensible shaft, the opposite end of which is connected to an electric motor. A fluid-operated actuator controls extension of the drive shaft to axially move a grinding wheel fastened to the wheelhead, between a rest condition at which it is spaced apart from the workpiece, and a work condition at which it operates in thrust relationship on one edge of the workpiece, so as to cause working of same by effect of the rotation imparted to the grinding wheel in combination with translation of the carriage relative to the support framework.

[0005] To enable working of edges that are chamfered or profiled following a toroidal outline or other different shape, a kinematic oscillation mechanism may be interposed between the tool-carrying carriage and the spindle, by which mechanism the spindle can be moved in a plane perpendicular to the carriage-movement direction, so that the wheel substantially describes an arc around the workpiece edge.

[0006] It has been found however, that while the above described machines are efficient and appreciated in working workpieces in the form of plates of a rectangular plan configuration, they are not able to execute a complete and satisfactory working on the edges of profiled slabs having a T-shaped or L-shaped plan configuration for example, or in any case a configuration determining the presence of projections such disposed as to delimit, externally of the slab, a right angle or at all events an angle greatly smaller than a straight angle.

[0007] In accordance with the present invention, the Applicant aims at overcoming the above described drawbacks so as to obtain a machine adapted to carry out working of slabs of marble-like material even of differently-shaped profiles. in a completely automatic and satisfactory manner.

[0008] The above and still other aims that will become more apparent in the course of the present description are substantially achieved by a machine for working edges of slabs of marble-like material, as defined in claim 1.

[0009] Further features and advantages will be best understood from the detailed description of a preferred but not exclusive embodiment of a machine for working edges of slabs made of marble-like material, in accordance with the present invention. This description will be set out hereinafter with reference to the accompanying drawings, given by way of non-limiting example, in which:

- Fig. 1 is a diagrammatic plan view of a machine made in accordance with the present invention;
- Fig. 2 shows to an enlarged scale, a detail seen in Fig. 1 highlighting the structure of the spindle of the concerned machine.

[0010] With reference to the drawings, a machine for working edges of marble-like slabs in accordance with the present invention has been generally identified by reference numeral 1.

[0011] The machine 1 has a support framework 2 defining a horizontal working plane 3 at the upper part thereof, on which plane a slab of marble-like material 4 (represented in chain line) is disposed. A plurality of movable abutment elements 5 supported by a bridge girder 6 extending above the working plane 3 facilitates positioning of slab 4 so that an edge under working 4a of same is disposed parallel to one side of the working plane itself. Also provided is a plurality of presser elements 7 or locking means of other type, also supported by the bridge girder 6 to be brought into action by fluid-operated means to cause locking of slab 4 during working.

[0012] The machine 1 further comprises a tool-carrying carriage 8 supported in cantilevered fashion by the framework 2 and movable along the latter, in parallel to the edge being worked 4a of the marble-like slab 4.

[0013] Laterally mounted on carriage 8 is a spindle 9 essentially comprising a motor 10 and a wheelhead 11 operatively connected to a propeller shaft 12 to be set in rotation by the motor itself. In accordance with the present invention, the wheelhead 11 is disposed along an axis X-X which is parallelly offset with respect to,the axis Y-Y of the propeller shaft 12 and connected to the latter by a kinematic mechanism for transmission of the rotary motion, generally identified by 13.

[0014] In more detail, the wheelhead essentially comprises an auxiliary stem 14 rotatably carried by a connecting plate 15 in turn rotatably in engagement with an end portion of the propeller shaft 12, on the opposite side with respect to motor 10. The motion-transmitting kinematic mechanism 13 preferably comprises a first pulley 18 integral with the propeller shaft 12, a second pulley 17 integral with the auxiliary stem 14, and a driving belt 19 operatively looped around the first and second pulleys 18, 17. Preferably, the belt 19 and pulleys 18, 17 are of the toothed type.

[0015] The auxiliary stem 14 is adapted to engage at least one diamond wheel 16 or other appropriate tool, preferably with the aid of quick-coupling members not further described or shown in detail because known by themselves and conventional.

[0016] At least one channel 20 opening close to the wheel 16 is provided to be advantageously formed along the auxiliary stem 14; said channel is connected on its side opposite to the wheel, with a feeding duct 21 through which, by known means not further described, a cooling fluid is supplied during working.

[0017] At least one fluid-operated actuator 22 is also provided to operate on the connecting plate 15 upon command of which translation of the wheelhead 11 is caused between a rest condition at which, as shown in Fig. 2, said head is moved away from the working plane 3, and an operating condition at which, as shown in chain line in Fig. 1, it is pushed towards the working plane 3 to cause the wheel 16 to act with a predetermined pressure against the edge under working 4a of the marble-like slab 4.

[0018] In more detail, actuator 22 operates on a first end 23a of a rod 23 sliding along guide members 24 integral with motor 10. A second end 23b of the rod, opposite to the first end, is fastened to the connecting plate 15 to cause movement thereof upon command of actuator 22.

[0019] The propeller shaft 12 consists of a first portion 12a and a second portion 12b telescopically connected with each other, so as to follow the connecting plate 15 movement away from and close to motor 10 without adversely affecting transmission of the rotary motion.

[0020] The quick-coupling members enable the wheelhead 11 to automatically engage wheel 16 when the latter is brought to the operating condition, carriage 10 being positioned in front of a tool-storing unit 25 fastened to a first end portion 2a of the support framework.

[0021] It is also preferably provided that a kinematic angular-oscillation mechanism 26, not described in detail because known by itself, should be interposed between the tool-carrying carriage 8 and spindle 9; upon command of said mechanism the angular oscillation of the whole spindle 9 around an axis substantially coincident with the longitudinal extension of the slab edge 4a being worked can be operated so as to enable chamfered or rounded-off edges to be worked.

[0022] Operation of the machine in accordance with the present invention is essentially as follows. Once fastening of the marble-like slab 4 to the working plane 3 has been carried out by the locking means 7, the grinding wheel 16 previously mounted on the wheelhead 11 is driven in rotation upon the action of motor 10 and brought into thrust relationship against the edge under working 4a by the fluid-operated actuator 22.

[0023] Simultaneously, the tool-carrying carriage 8 performs a translation parallel to the edge under working 4a so as to move the wheel 16 along the latter. Advantageously, the offset axial arrangement of the wheelhead 11 relative to axis Y-Y of motor 10 and of the propeller shaft 12 causes the wheel itself to jut out, at least at its outer diameter, beyond the overall side dimensions of spindle 9 as a whole. This circumstance enables the wheel 16, during working of marble-like slabs having an angled shape as shown in Fig. 1, to reach the end of the edge under working 4a at the corner formed by said edge with a projecting portion 4b of the slab, extending perpendicular to or in an angled direction with respect to the edge itself, without creating any mechanical interference between the projecting portion of slab 4b and the different parts of spindle 9.

[0024] Working may involve execution of one or more runs of tool 16 along the edge being worked 4a, concurrently with possible angular displacements of the whole spindle 9 by means of the kinematic angular-oscillation mechanism 26, to give the edge 4a a rounded profile, for example.

[0025] During working, replacement of wheel 16 may be also provided, in order to use differently-grained wheels in succession, for example. For the purpose, the tool-carrying carriage 8 is positioned at the first end 2a of the support framework 2 and the wheelhead 11 is brought close to the storage unit 25, so as to enable deposit of the used wheel into the unit itself and picking up of a new wheel to be used.

[0026] In order to avoid interferences with the projecting portion 4b of the slab under working 4, the wheelhead and the whole spindle 9 therewith are advantageously provided to be mounted on one side of the tool-carrying carriage 8 facing the second end portion 2b of the framework opposite to the first end portion 2a.

[0027] In other words, the storage unit 25 is disposed on the opposite side relative to the projecting portion 4b of the slab 4 under working, so as to avoid any risk of mechanical interferences with the latter during the tool-changing operation.

[0028] The present invention achieves important advantages.

[0029] The machine in reference is in fact adapted to carry out working of slab edges of angled shape, until close to the corner determined by the intersection between edges extending in converging directions. Therefore working of this type of slabs is allowed without manual interventions for adjustment and finishing of the workpiece being required, which interventions are on the contrary necessary when machines of the known type are used where, due to mechanical interferences between the spindle components and the projecting portion of the slab, moving forward of the wheel along the edge under working must be interrupted some distance far from the intersection point.

Claims

1. A machine for working edges of marble-like slabs, comprising:

- a working plane (3) set to engage a slab of marble-like material (4) to be worked;
- means (7) for locking the slab under working (4) onto the working plane (3);
- a tool-carrying carriage (8) movable in parallel with an edge (4a) of the slab under working (4) fastened to the working plane (3);
- a motor (10) carried by the tool-carrying carriage (8);
- a wheel-carrying head (11) operatively connected to a propeller shaft (12) to be driven in rotation by the motor (10);

characterized in that the wheelhead (11) is disposed along an axis parallelly offset with respect to the axis of the propeller shaft (12) and connected to the latter by a kinematic mechanism for transmission of the rotary motion (13).

2. A machine as claimed in claim 1, wherein the wheelhead (11) comprises an auxiliary stem (14) carried by a connecting plate (15) rotatably in engagement with the propeller shaft (12).

3. A machine as claimed in claim 2, further comprising a duct (21) for feeding of a cooling fluid, which is connected with at least one channel (20) formed along said auxiliary stem (14).

4. A machine as claimed in claim 2, further comprising a fluid-operated actuator (22) operating on the connecting plate (15) to cause translation of the wheelhead (11) in parallel with a rotation axis thereof (X-X).

5. A machine as claimed in claim 1, wherein the kinematic mechanism for transmission of the rotary motion (13) comprises a driving belt (19) operatively looped around a first (18) and a second pulleys (17) integral with the propeller shaft (12) and the wheelhead (11), respectively.

6. A machine as claimed in claim 1, further comprising a tool-storing unit (25) fastened to a first end portion (2a) of the support framework (2), said wheelhead (11) being mounted on one side of the tool-carrying carriage (8) facing a second end portion (2b) of the framework (2) opposite to the first end portion (2a).

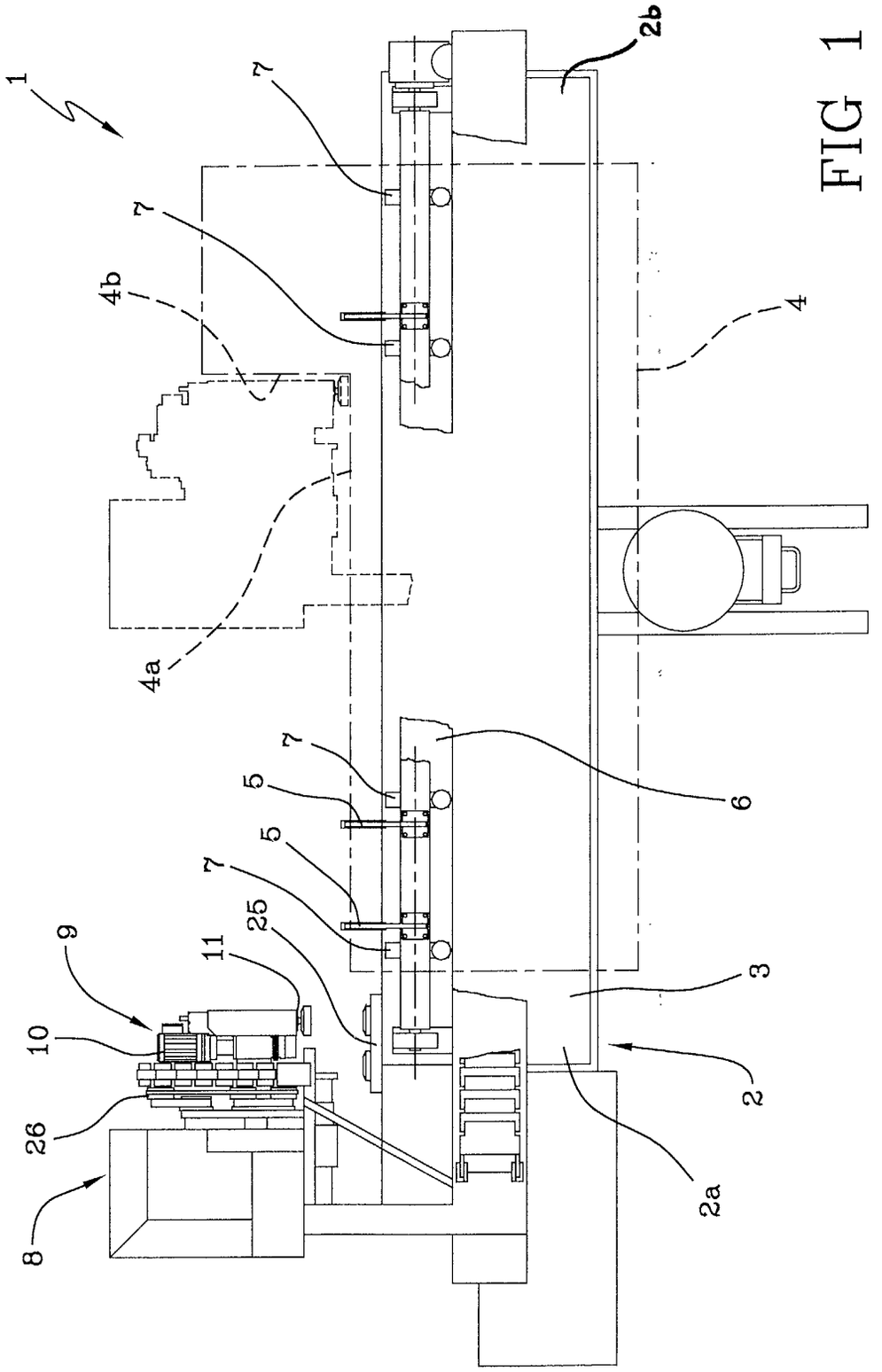
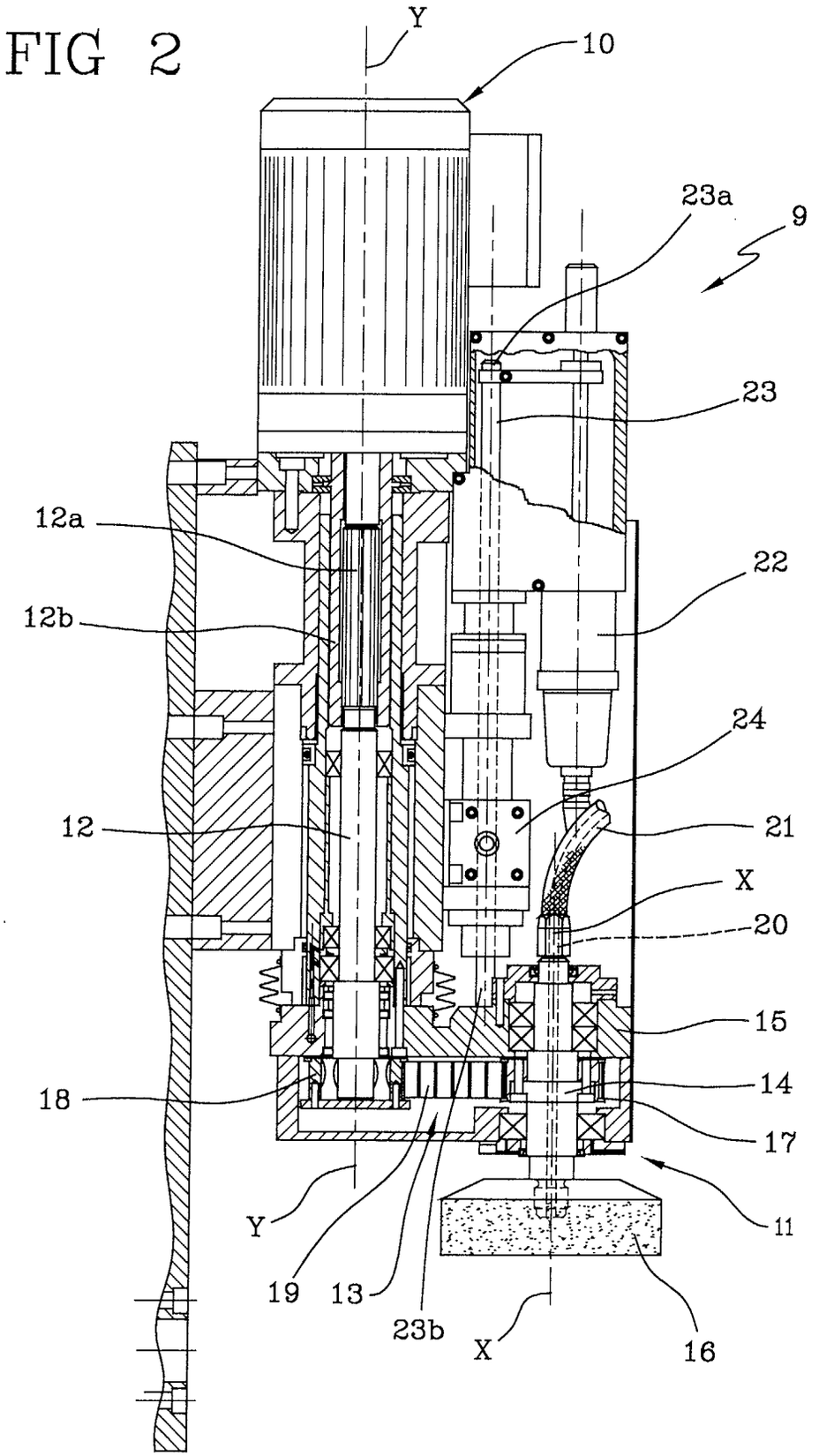


FIG 1

FIG 2



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EUROPEAN SEARCH REPORT

Application Number
EP 02 42 5570

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 063 054 A (BAVELLONI Z SPA) 27 December 2000 (2000-12-27) * claims 1,2; figure 1 *	1-6	B24B9/06 B24B41/00 B24B45/00
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 February 2003	Do Huu Duc, J

CATEGORY OF CITED DOCUMENTS

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