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(71) Applicant: **LUPATO ANTONIO EREDI S.n.C., di SCIESSERE MARIA & F.**
Viale Grigoletti, 138
I-33170 Pordenone(IT)

(72) Inventor: **Lupato, Gian Siro**
Via Montello, 48/a
I-33170 Pordenone(IT)

(74) Representative: **Da Riva, Ermanno**
AGENZIA BREVETTI "PORDENONE" Via S. Quirino, 9
I-33170 Pordenone(IT)

(54) Bushhammering device.

(57) Bushhammering system in which such working operation is effected by means of a plurality of sharpened elements (221), which are pushed in succession against the surface to be treated with a suitable pressure, so that each of them penetrates fairly in the material and by shifting itself chips such material, by removing correspondent particles therefrom.

The device performing such system is composed of a discoidal plate (10), fixable on a correspondent rotating support (30) and provided at its lower part with some rotating units (20), each comprising as associated roll (22) radially pivoted to said discoidal plate (10) on an associated support (21), which is slidable in a corresponding radial guide groove (11) provided on said discoidal plate (10) and fixable removably thereto by means of a unit stud bolt (23)-nut (231), said roll (22) being also provided on its surface of rotation with a plurality of sharpened elements (221) having a considerable superficial hardness and a high mechanical strenght.

The resulting group of rolls (22) engages with a fair pressure the surface of the part to be worked and, by imparting an adequate relative movement between said part to be worked and said device which is contemporaneously put in rotation, one can obtain the bushhammering operation for the entire desired surface thereof.

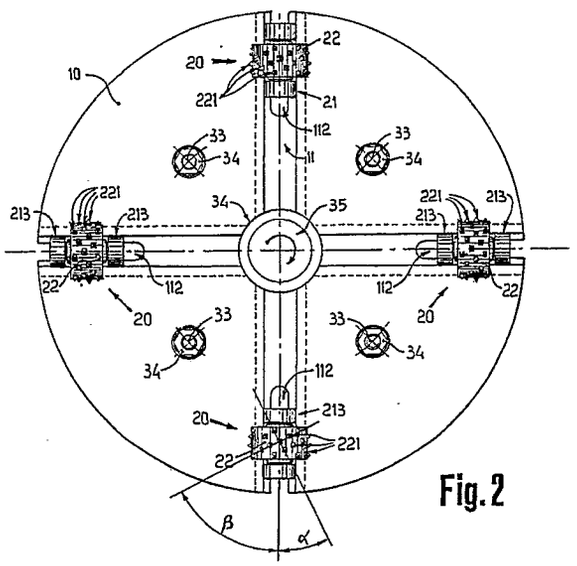

Fig. 2

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BUSHHAMMERING SYSTEM AND DEVICE FOR PERFORMING SUCH SYSTEM

The present invention corcerns a new system for effecting the bushhammering and a relevant device for performing such system.

It is known that a particular operation called bushhammering is effected, in order to make rough the surface of parts or plates of various kind of stones or of cement concrete.

As already known, such an operation may be performed manually by beating the surface to be bushhammered with a suitable tool formed by a pestle or hammer, provided with a plurality of pyramidal points at the end of the mouth thereof, or also with the aid of suitable machines called "bushhammering machines" essentially constituted by a framework slidable on guide members, on which the part or the plate to be bushhammered is disposed, and by a truck supporting the tools formed generally by steel blocks provided with points made of adequate hard material, generally of Widia, which are operated to beat against the surface of the part to be bushhammered, which truck is shifted transversally to the movable framework.

The known machines serve for the pre-established scope only, that is they may perform the bushhammering operation only and moreover have a reduced working capability, i.e. of the ratio between the worked surface and the required time for performing it.

Finally, the minimum thicknesses of the plates which may be worked are sufficient, since the beating action causes breakage thereof if such thicknesses are choosen smaller than certain values which vary depending on the kind of the treated material.

The scope of the present invention is that to obviate the above mentioned limitations and drawbacks and this is obtained through the new bushhammering system referred to and the relevant device permitting it to be performed.

According to such system, the bushhammering operation is not more made by beating but by means of pointed elements, which are only pushed in succession with an adequate pressure against the surface to be worked on which they penetrate fairly by generating corresponding slight parts chipped off and such system is practically performed with a device characterized in that it comprises at least a roll disposed preferably pivoted radially on an adequate rotating means, adapted to shift it circumferentially, said roll being provided at its surface of rotation with a plurality of sharpened elements, adapted to engage the surface to be treated which is disposed parallel to the circumferential shifting plane pf said roll, so that by imparting to said device a suitable thrust against the surface of the part to be treated, said sharpened elements penetrate fairly in the correspondent material and therefore the rotation of the associated roll imparted to it by said rotating means causes at the level of the impact point of each sharpened element the chipping of the material, said device and/or part of material to be treated being also operated to be reciprocally shifted so as to increase the zone worked solely by the rotation of the device to the entire desired surface.

In order to undestand better the features and advantages attainable with the system which is object of the present invention, a device adapted to perform it will be hereinafter described in a possible preferred embodiment thereof, by way of a not limitative example only and with reference to the accompanyng drawings, wherein:

- fig. 1 shows such device in a partially broken side view thereof and
- fig 2 shows a view taken from the lower part of the same device of fig. 1, that is that which will rest on the surface to be worked.

With reference to such figures, wherein the items in common are marked with the same references, it is noted that the device referred to is basically constituted by a discoidal plate 10 on which some rotating units 20 equally spaced to each other are radially fixed in an adjustable manner at an adequate distance from its centre, which units are adapted to effect the bushhammering operation according to the new system which is object of the present invention.

More in detail, the discoidal plate 10 is provided at its lower part with four radial guide grooves 11 have a "T" shaped cross-section, in which associated supports 21 are slidably engaged, on which respective rolls 22 of cylindric shape are applied and are arranged with their axis parallelly to said radial guide grooves 11, namely radially to the same plate, said rolls 22 being also provided on their cylindric surface with a plurality of points constituted by respective sharpened elements 221 having high hardness and mechanical strength.

As clearly pointed out from the above mentioned figures, said supports 21 are constituted by associated substantially parallelepiped blocks at whose upper part two flanges 211 are laterally projected therefrom, which are adapted to engage the longitudinal hollows 111 provided on the inner sides of said radial longitudinal grooves 11 and inside which a cavity 212 is provided, which passes therethrough orthogonally to said radial guide grooves and extends for the entire portion thereof being projected from said discoidal plate 10, thus

providing two plates 213 for supporting said rolls 22.

Respective holes are provided near the free ends of said plates 213 and centrally thereto, in which holes a cylindric shaft 214 is engaged, which is arranged with its axis parallel to the axis of the correspondent radial guide groove 11 on which said support 21 is fitted and an associated roll 22 is applied to said cylindric shaft 214, which therefore can freely rotate thereon.

A stud bolt 23 extends othogonally outwards on the upper part of each support 21 and enters respective radial cavities 112 provided on the upper part of said radial guide grooves 11 and extended for an adequate portion thereof, coaxially thereto, from the outer peripheral edge of the discoidal plate 10, and said stud bolt 23 is projected from said discoidal plate 10 with a suitable portion engaged by an associated nut 231.

Said rotating units 20, described above in detail, thus are radially slidable along the associated radial guide grooves 11 and can be fixed at the suitable desired position thereof by tightening the bolts 231 on the respective stud bolts 23.

Finally, said discoidal plate 10 is removably fixed to an associated rotating support 30 by means of adequate fixing means provided on this support.

In the figures to which reference is made, said rotating support 30 is illustrated by a thin line and by way of example it is composed of a discoidal flange 31 extended from a shaft 32 and provided with stud bolts 33 entering correspondent holes provided on said discoidal plate 10 and engaged by associated bolts 34, adapted to permit the connected of said discoidal plate 10 to said discoidal flange 31.

Clearly, said rotating support 30 may have a different shape depending on the kind of machine which, as explained hereinafter, could be employed for performing the bushhammering operation.

The above described device operates as follows.

The unit constituting the device referred to is laid on the surface of the part to be worked, so that it presses on this part with an adequate pressure, then the rotating support 30 connected thereto is put in rotation while imparting at the same time a relative shifting between said device and the part to be worked.

It follows that the sharpened elements 221 which come into contact with the surface to be worked, due to their superficial hardness and the relevant limited resistance of penetration on the material being worked and to the pressure imparted thereto, penetrate fairly therein.

Then, when said discoidal plate 10 is put in rotation, the rolls 22 in turn are put in rotation so that the sharpened elements 221 provided thereon successively angage the surface being worked, by causing on the impact of each of them against such surface the chipping thereof and the removal of corresponding particles of the material of the part being worked.

Finally, the contemporaneous relative shifting between the device and the part being worked permits to extend the treatment to the whole surface which one desires to treat. As pointed out particularly from the fig. 1, the discoidal plate 10 is provided centrally with a through hole 4 which then is connected to the hole 35 which can be provided on the shaft 32 and an adequate fluid such i.e. water or also air may be directed through the so resulting conduit toward the surface being worked, thus such fluid being adapted to perform particular functions which are helpful for the same working operation.

In the figures to which reference has been made the device referred to comprises four rotating units 20, but, obviously, it is well understood that such number may vary anyhow.

A most reduced and for some aspects more rational arrangement thereof could be i.e. that composed solely of three rotating units 20, always disposed equally spaced to each other.

Besides, always referring to such figures, said rotating units are illustrated all positioned at the same distance from the centre of the discoidal plate 10, but, clearly, they may also be disposed at different distances. In addition to a specific deliberately designed machine, the described device can be applied also to various kinds of machines which normally are employed for effecting other working operations.

In fact, for instance the various kinds of the well known dressing machines are particularly suitable for this purpose, to which machines the device referred to may be applied instead of the dressing disc or discs provided thereon.

It is to point out that the pressure of the rolls 22 on the surface to be worked is limited and, consequently, with the described device it is permitted to effect the bushhammering operation on plates of different materials having thicknesses which are considerably lower than those which can be normally performed by utilizing known systems and devices (of percussion type), without causing neither cracks nor other inconveniences.

Moreover, with this device and especially with the new bushhammering system which is object of the present invention, the working speed namely the surface treated in the time unit is quite greater than that which can be normally obtained with the known and normally utilized systems and appliances.

Furthermore, it is to point out that said shar-

pened elements 221 may have different shape and more precisely pyramidal or conic shape, and may be made integrally with the same roll 22 from which they are extended and in such case, clearly, they are made of the same material thereof or, more conveniently, may be achieved singly and separately by employing materials which are more suitable than those which form the roll 22, such as an appropriate hard material and, thereafter, they can be applied to and irremovably fixed with per se known means and systems on the same roll 22.

In addition, such sharpened elements 221 can be disposed on the cylindrical surface of said roll 22 along circumferential lines which are equally spaced and parallel to each other or, more advantageously, along helical lines. A remarkably effective particular arrangement thereof is that illustrated by way of example by the fig. 1 and 2, wherein said sharpened elements 221 are disposed along two groups of helicoidal lines equally spaced to each other, a first group of helicoids being spaced of an angle of 30° from the axis of the roll 20, and thus, the other group being spaced of an angle of 60° therefrom.

It is well understood that the arrangement of the sharpened elements 221 may change anyhow as well as their shape, sizes and reciprocal distances and the sizes and shape of the rolls 22 may change too.

In fact, the shape of the rolls 22 may be that cylindric as illustrated by way of example by the fig. 1 and 2 to which reference is made, or also a frusto-conical shape with the vertex thereof turned preferably inward, that is toward the rotation axis of the discoidal plate 10, or turned outward. Moreover, instead of being positionable radially in different manners on the discoidal plate 10, said rolls may be connected also at determinate positions thereto.

These and other variants may be brought to the device which is object of the present invention, however without departing from the sphere of what described and hereinafter claimed with reference to the accompanying drawing and therefore from the protection field of the present industrial invention.

Claims

1) Bushhammering system and device for performing such system, said system being characterized in that the bushhammering operation is effected by means of sharpened elements which are pushed in succession with a suitable pressure against the surface to be worked, in which they penetrate fairly by generating correspondent slight chippings, such new system being practically attainable with a correspondent device characterized in that it comprises at least a roll (22), which is disposed preferably pivoted radially on an adequate rotating means adapted to shift it circumferentially, said roll (22) being provided at its rotation surface with a plurality of sharpened elements (221) adapted to engage the surface to be treated, which is arranged parallel to the circumferential shifting plane of said roll (22), so that by imparting to said device an adequate thrust against the surface of the part to be treated said sharpened elements (221) penetrate fairly in the correspondent material thereof and, thus, the rotation of the associated roll (22) imparted to it by said rotating means causes, at the level of the impact point of each sharpened element (221), the chipping of the material, said device and/or the part of material to be treated being also operated to be reciprocally shifted, so as to extend the zone worked solely by the rotation of the device to the entire desired surface thereof.

2) Device according to claim 1, characterized in that said rotating means is constituted by a discoidal plate (10), to which adequate supports (21) for said rolls (22) are connected at a suitable distance from its rotation axis, said discoidal plate (10) being fixable to a rotating support (30), said rotating support (30) being able to be constituted also by the means provided for fitting abrasive discs of per se known dressing machines of various kind.

3) Device according to claim 1, characterized in that said rolls (22) may have a cylindric or frusto-conical shape, with the vertex thereof which is turned toward the rotation axis of said discoidal plate (10) or in a direction opposite thereto.

4) Device according to claim 1, characterized in that said sharpened elements (221) have high mechanichal strenght and superficial hardness.

5) Device according to claims 1 and 4, characterized in that said sharpened elements (221) may be obtained integrally with the associated roll (22).

6) Device according to claims 1 and 4, characterized in that said sharpened elements (221) are constituted preferably by a suitable material having particularly high superficial hardness and mechanichal strenght characteristics as those of a well known hard metal, so that they are consequently made separately and successively connected with per se known manners and means to the associated roll (22).

7) Device according to claims 1,4,5 and 6, characterized in that said sharpened elements (221) are disposed on the surface of the associated rolls (22) preferably along two groups of helicoidal lines which are equally spaced to each other, a first group being spaced preferably of an angle of 30° from the axis of the correspondent roll (22), the other one being spaced of an angle of 60° therefrom.

8) Device according to the claims 1 and 2, characterized in that said supports (21) of said rolls (20)

slidably engage corresponding radial guide grooves (11) provided on said plate (10), being also able to be removably connected at the desired position by means of adequate fixing means (23-231).

9) Device according to claims 1 and 2, characterized in that said discoidal plate (10) is provided centrally with a through hole (4), adapted to permit the passage of a suitable fluid therethrough, which is fed through a suitable hole (35) provided coaxially to said rotating support, said fluid having characteristics adapted to make easy the working operation and therefore being directed against the surface being worked.

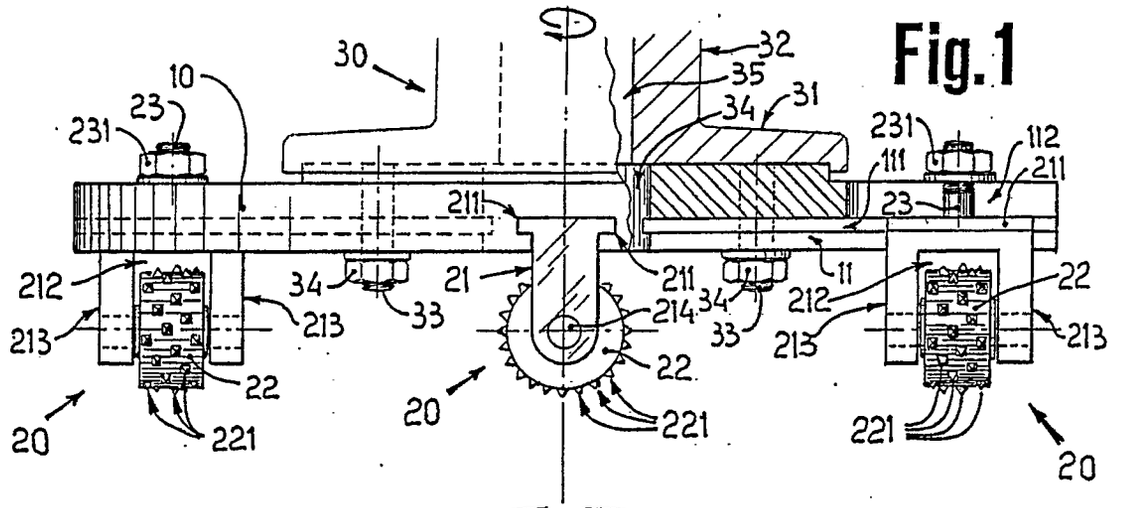
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Fig.1

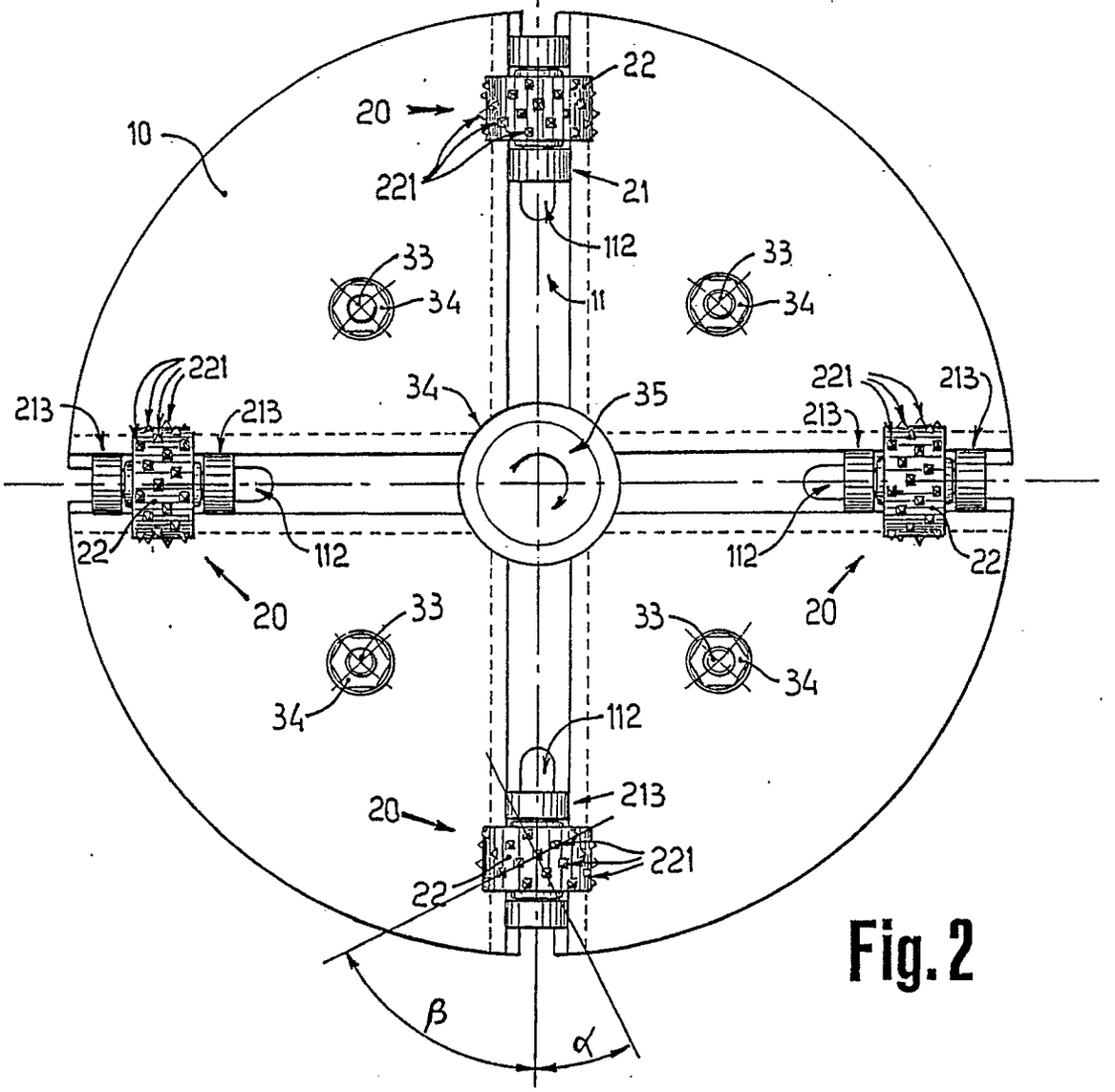
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Fig.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 12 1172

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)
X	FR-A-2 563 546 (DYNAPAC AB) * page 3, line 25 - page 8, line 5 * * figures 1-6C *	1-6	B 28 D 1/18
X	US-A-4 405 177 (H. YAMASHITA) * column 2, line 22 - column 3, line 59 * * figures 1-8 *	1,3-7	
X	US-A-1 581 699 (J. STURBOCK) * page 1, line 39 - page 2, line 75 * * figure 1 *	1-5,9	
A	FR-A-6 708 62 (J. GUILLET ET AL.) * page 1, line 61 - page 62 * * page 2, lines 1 - 8; figures 1, 2 *	5	
A	US-A-3 221 619 (A.T. ERICKSON) * column 5, lines 30 - 75; figures 6, 7 *	5,7	
A	US-A-2 244 617 (C.M. HANNUM) * page 1, right-hand column, lines 6 - 14 * * page 1, right-hand column, lines 31 - 33 @ page 2, left-hand column, lines 25 -41 * * figures 1-4 *	3-7,9	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B 28 D E 01 C B 24 B

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	13 February 91	MOET H.J.K.

CATEGORY OF CITED DOCUMENTS

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