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Neuenburg

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[54] **MOTOR-DRIVEN CHISELING DEVICE**

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[58] **Field of Search**.....299/37, 38, 69, 67, 94; 30/277; 173/110

[56] **References Cited**

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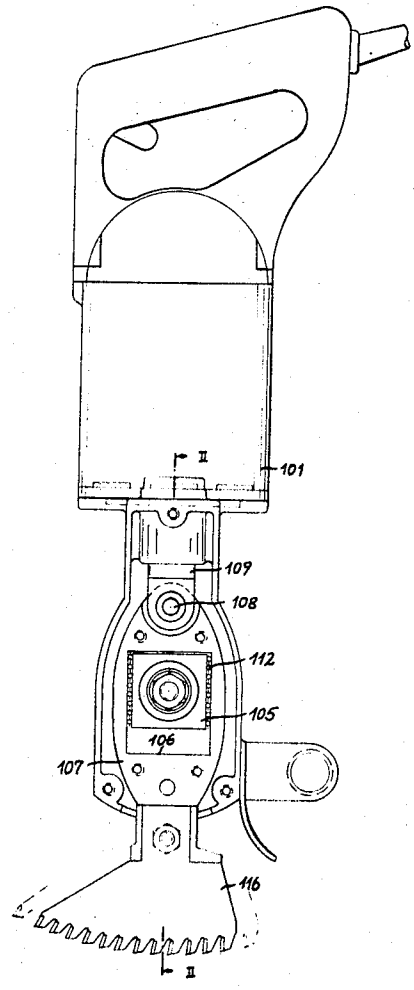
[57] **ABSTRACT**

A motor-driven chiseling device for making cuts and grooves in rocks and the like by means of a tool with teeth, which comprises transmission means operable to transform the rotary movement of a drive motor for driving the chiseling device into an oscillating movement of said tool in a plane extending through the longitudinal axis of said tool, said device also including a beating mechanism operable to exert upon the tool a plurality of beats during the oscillating movement of said tool.

11 Claims, 3 Drawing Figures



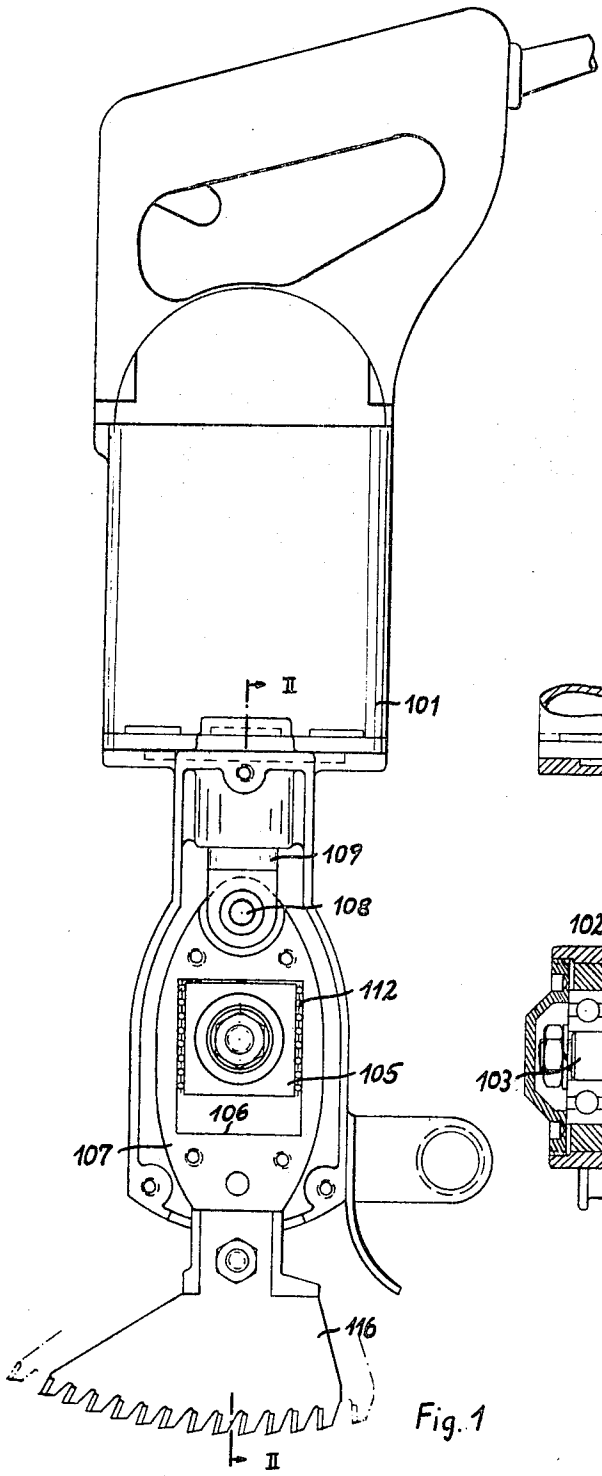


Fig. 1

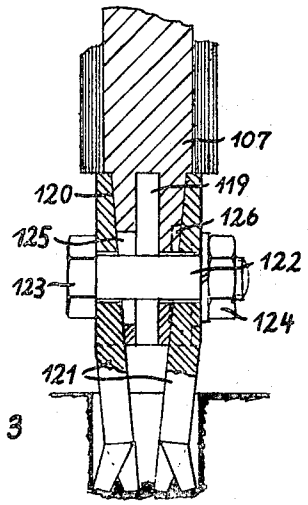


Fig. 3

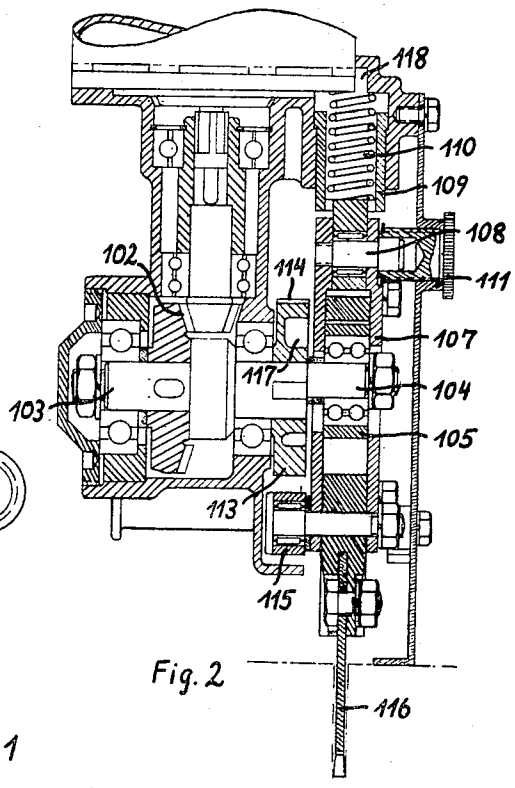


Fig. 2

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MOTOR-DRIVEN CHISELING DEVICE

The present invention relates to a motor-driven chiselling or calking device for producing cuts or grooves in rock or the like by means of a tooth-equipped tool.

In connection with the construction of houses and highways, in mining, etc., it is frequently necessary to produce cuts in the form of grooves, furrows, or the like. To this end, when soft stones and minerals are involved, for instance, wall cutters with rotating cutting discs, chain saws, or similar tools have been employed. When hard rock and concrete is involved, these devices with endlessly rotating tools, such as cutter discs or chain saws, fail and beating or impact tools, such as electrohammers or compressed air hammers, have to be used the output of which is, however, considerable lower than that of rotating or endlessly circulating tools. Moreover, such hammers are with regard to the cleanliness of their performance considerably inferior to milling or cutting tools.

It is, therefore, an object of the present invention to provide a device which is adapted to be driven by an ordinary rotating electromotor or a compressed air motor and which in addition to the advantages of tools working in the manner of a miller will have the advantages of beating or impact tools and which in combination with differently designed toothed tools will be able to produce wide grooves of shallow depth and also narrow cuts of greater depth not only in soft materials but also in harder rocks and concrete.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 shows a view of a device according to the present invention.

FIG. 2 represents a section taken along the line II — II of FIG. 1.

FIG. 3 illustrates on a larger scale than FIGS. 1 and 2 a detail of FIG. 2.

The device according to the present invention is characterized primarily in that it comprises a transmission which converts the rotary movement of the driving motor into an oscillating swinging movement of the tool in a plane extending through the longitudinal axis of the tool while a beating or impact mechanism is provided which is adapted during the oscillating movement of the tool to carry out a plurality of impacts in the longitudinal axis of the tool.

In this way a chiselling or calking device is provided which has the advantages of a milling or cutting tool and of an impacting tool and combines these advantages while being able, for instance, to carry out groove chiselling operations in a wall in a relatively short time and in a clean manner. Due to the fact that the cutter head of the tool does not remain at one and the same location but carries out an oscillating movement along a line, it will be assured that the cutting head of the tool will practically, with each impact of the beating mechanism, have changed its point of attack on the masonry whereby the chiselling out of the stone material becomes more favorable and more effective.

According to a particularly advantageous embodiment, the device is so designed that it has a working rod or bar which in spaced relationship to its pivot joint is

formed as a coulisse. The working bar has its free end adapted to be connected to a tool. The coulisse is located in a plane which passes through the longitudinal direction of the working bar. The working bar is adapted to carry out a pendulum-like movement about its pivot joint and is adapted to be movable in its longitudinal direction. The coulisse includes a sliding block which is driven by means of a crank pin pertaining to a shaft coupled to the driving motor of the device. The working bar cooperates with a mechanical beating or impact device driven by the driving motor and adapted to produce movements of the working bar in the longitudinal direction thereof. The sliding block in the coulisse is with a play displaceable in the longitudinal direction of the working bar, said play at least equalling the sum of twice the eccentricity of the crank pin and of the lifting stroke of the working bar in the longitudinal direction thereof as brought about by the impact mechanism. The pivot joint of the working bar may be displaceably journalled or mounted on a simple linear guiding means or sliding bar so as to be displaceable in the longitudinal direction of the working bar. The impact mechanism may in an advantageous manner be so designed that on the shaft which comprises the crank pin there will be arranged a cylindrical beating or impact body which rotates together with said shaft. The circumference of the beating body is provided with protruding beating extensions with which cooperates a bolt arranged on the working rod and, more specifically, cooperates by pressing back the working rod in its longitudinal direction. This device has the advantage that the beatings or impacts are exerted by the beating body directly upon the working bar so that neither the coulisse transmission nor the pivot joint will be exposed to beating stresses. Furthermore, the working bar may within the range of its linearly displaceable pivot joint be arrested in a simple manner by not pressing the bolt of the working rod against the beating body. In this way with soft and tough materials the work can be carried out in an oscillating manner only, for instance, by means of a milling blade of a circular sector configuration, said blade being connected to the working bar and effecting narrow deep cuts.

Furthermore, the rotating cylindrical impact body may also be so employed and designed that it has an unbalance of such a magnitude that it compensates for the unbalance of the crank pin and of the sliding block.

Finally, inasmuch as the beating body and the crank pin are mounted on the same shaft, for instance, for such blade-shaped tools of circular sector configuration, which due to the pendulum-like swinging movement produced in the device principally work in the manner of millers, the impact body may in a simple manner be so designed that only during the working oscillating movement but not during the return oscillating movement of the tool impacts are produced.

Referring now to the drawings in detail, the electric or compressed air motor **101** drives through a bevel gear transmission **102** a drive shaft **103** having its end provided with a crank pin **104**. This crank pin receives a sliding block **105** and moves the latter along a coulisse **106** of the working bar **107** back and forth. The working bar **107** is at its upper end suspended on a pivot joint **108** and is journalled to carry out pendulum

movements. The joint bolt **108** connects the upper end of the working bar to a hollow piston **109** which is linearly displaceably arranged in the housing of the device. A spring **110** is arranged in the piston **109** which spring has the tendency to press the piston **109** together with the working bar **107** in downward direction with regard to the drawing. By means of an arresting sleeve **111** arranged on the housing of the device the working bar **107** can in its pressed down position be held fast on the joint bolt **108** as shown in FIG. **2**. In the transverse direction, the sliding block **105** will with the interposition of roller bodies **112** engage the coulisse **106** in order to greatly reduce the friction losses caused by the high speed and sliding velocity. During a rotation of the working shaft **103**, the working bar **107** is by means of the crank pin **104** and the sliding block **105** caused to carry out a pendulum-like oscillating movement about the stationary or not stationary joint bolt **108**. A cylindrical beating or impact body **113** is provided on the drive shaft **103** which beating body has its circumference provided with protruding beating extensions **114** which may be designed as ratchet teeth or may consist of steel pins inserted into the beating body. The working bar **107** is provided with a bolt **115** in the form of a rotatable roller, which when the working bar **107** is pressed back against the thrust of spring **110** can be pressed against the beating body **113** in such a way that when the joint bolt **108** is not arrested by the arresting sleeve **111** and when the working bar **107** is pushed back due to the fact that the chiselling device is pushed back against the working surface, the beating body **113** by means of bolt **115** carries out vibration-like impacts upon the working bar and transmits said impacts. As will be evident from FIG. **2**, the beating body **113** is over a portion of its circumference provided with beating extensions **114** in such a manner that during the working oscillating movement of the milling blade **116** connected to the working bar **107**, according to FIG. **1** impacts toward the left are produced, while during the return oscillating movement of blade **116** according to FIG. **1** bolt **115** rolls toward the right on a small cylindrical circumferential portion of the beating body **113** so that no impacts are produced. The impact body **113** is provided with eccentric recesses **117** which are so arranged and dimensioned that the unbalance of the impact body **113** which is located diametrically opposite to said recesses will be able to compensate for the unbalance of the crank pin **104** and the sliding block **105**. The transmission chamber of the housing is provided with an entrance passage **118**, which communicates with the outlet for the ventilating air, for instance, an electro drive motor, or for the working exhaust air of a compressed air drive motor, in such a way that a portion of the ventilating or working air is blown into the transmission chamber through the hollow piston **109**. As a result thereof, an overpressure of such magnitude will be generated in the transmission chamber that dust or dirt cannot enter through the passage of the housing for the working bar into the transmission chamber.

FIG. **3** shows an advantageous design of the free end of the working bar **107**. This free end has a recess **119** for connecting purposes into which, as illustrated in FIGS. **1** and **2**, a one-piece blade-like milling tool can be inserted, for instance, a long circular sector-like milling blade for producing narrow deep cuts. Furthermore, the working bar may be provided with two diametrically oppositely located outer connecting surfaces **120** upon which the two halves of a multi-sectional tool (FIG. **3**) may be mounted which serves for producing less deep but wider grooves or cuts. These two halves of the tool **121** merge at their ends which are equipped with working or milling teeth so as to form a wide cutting edge. To this end, expediently the two outer connecting surfaces **120** are so designed that toward the free end of the working bar they extend at an angle or in a wedge-shaped manner toward each other. The teeth of the two tool halves may, as shown in FIG. **3**, additionally be cranked in order to increase the cutting width. The two halves of tool **121** are by means of a screw bolt **122** screwed to the working bar **107**. The screw head **123** and the nut **124** engage correspondingly flattened engaging surfaces of the two tool halves. By means of the same screw bolt, also the one-piece tool **116** may be connected to the working bar. Expediently, to this end, the working bar is provided with a recess **125** through which extends the screw head **123** and directly engages the tool **116**. By means of the oppositely located depression **126** there is created on the free end of the working bar an engaging surface for the screw nut **124**.

It is, of course, to be understood that that the present invention is, by no means, limited to the specific showing in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. A motor driven chiseling device for producing cuts and grooves in rocks and the like, especially by means of tools having teeth, which includes: tool holding means pivotally suspended in said device so as to be able to carry out a pendulum movement, said tool holding means being adapted to detachably receive and hold a tool, motor means, shaft means rotatable by said motor means, transmission means drivingly connecting said shaft means and said tool holding means and operable to convert the rotary movement of said shaft means into a pendulum movement of said tool holding means, and impact means drivingly connected to said transmission means and said tool holding means and operable to exert a plurality of impacts upon said tool holding means in the longitudinal direction of said tool holding means while the latter carries out a pendulum movement.

2. A device according to claim **1**, which includes pivot joint means pivotally supporting said tool holding means, and in which said tool holding means includes working bar means having a section spaced from said pivot joint means forming a coulisse located in a plane passing through the longitudinal direction of said tool holding means, said device also including a sliding block reciprocable in said coulisse, said transmission means including a shaft with an eccentric drivingly connected to said sliding block, and mechanical impact means operatively connected to said tool holding means and said motor means for superimposing an impact effect upon the pendulum movement of said tool holding means.

3. A device according to claim **2**, in which said sliding block is displaceable in the longitudinal direction of said tool holding means and in said coulisse with a play

which equals at least the total of twice the eccentricity of the crank pin and the stroke of the working bar means in the longitudinal direction thereof as caused by said mechanical impact means.

4. A device according to claim 2, in which the pivot joint means are displaceable in the longitudinal direction of the working bar means, and in which said shaft with said eccentric has cylindrical impact means connected thereto for rotation therewith, the periphery of said cylindrical impact means being provided with beating extension means, bolt means being provided on said working bar means for cooperation with said beating extension means.

5. A device according to claim 4, which includes straight guiding means displaceable in the longitudinal direction of said working bar means, housing means having said straight guiding means arranged therein, pressure spring means continuously urging said straight guiding means and working bar means to move from a first position in the direction toward the tool receiving end of said tool holding means to a second position, said pressure spring means being operable to lift said bolt means off said cylindrical impact means.

6. A device according to claim 5, which includes adjustable locking means operable to arrest said pivot joint means with said working bar means in said second position of the latter in which said bolt means is lifted off from said cylindrical impact means.

7. A device according to claim 4, in which the circumferential surface of said impact means adapted to cooperate with said bolt means has beating extensions distributed thereover so that said bolt means during a swinging movement of said tool holding means in one direction rides on a peripheral portion of said impact means which is free from said beating extensions.

8. A device according to claim 2, in which said impact means is provided with eccentric recess means which are so dimensioned that the diametrically oppositely located unbalance of said impact means is balanced by the unbalance of said eccentric and of said sliding block.

9. A device according to claim 2, which includes anti-friction means interposed between said coulisse and said sliding block to facilitate the movement of the latter.

10. A device according to claim 1, which includes outlet means for a gaseous medium passing through said motor means, said outlet means communicating at least partially with said transmission means.

11. A device according to claim 1, in which the free end portion of said tool holding means has two diametrically oppositely located connecting surfaces for two leaf-shaped sections of a multi-sectional tool with milling teeth at one end thereof forming a relatively wide cutting edge, said free end portion of said tool holding means having recess means between said diametrically oppositely located connecting surfaces for receiving a one-piece leaf shaped tool portion, and screw bolt means extending through said oppositely located connecting surfaces and said tool holding means for connecting a tool thereto.

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