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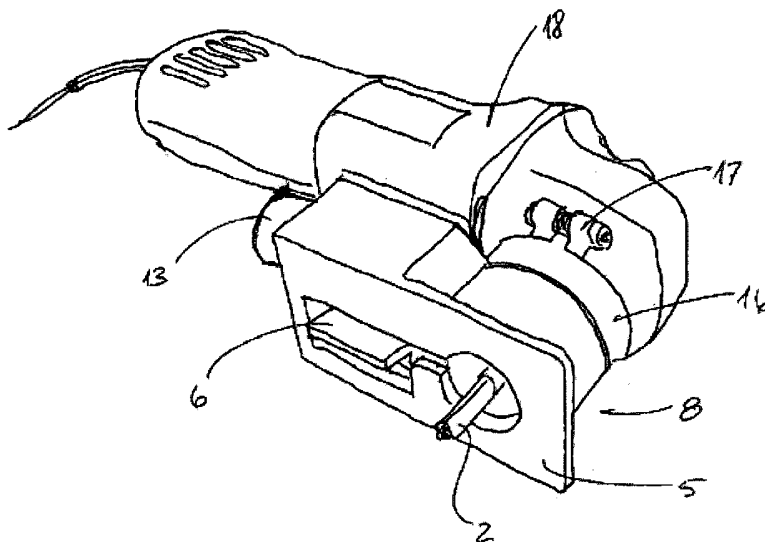
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(54) Title: DEVICE FOR REPOINTING OF MASONRY AND CUTTING GROOVES IN WALL STRUCTURES



(57) Abstract: The device (1) according to the invention is especially developed for being used in connection with repointing of masonry whereby means for centring a rotating grinding, cutting or milling tool (2) in an opening in a plane sole (4) is provided, and that the tool (2) is arranged for rotation about a first axis (3) substantially perpendicular to said plane sole (4), whereby said sole has a working side (5) adapted to engage and slide on a member to be worked on, whereby said tool (2) extends outward from said working side (5) of the sole, and whereby a guide member (6) is provided, said guide member (6) being pivotable about a second axis (7) substantially perpendicular to said first axis (3). As will be evident to the skilled person, the device (1) may however be used for a multitude of other purposes where it is desirable to cut a groove in a surface such as for example light-weight concrete structures and the like. These aspects will be further discussed below.



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DEVICE FOR REPOINTING OF MASONRY AND CUTTING GROOVES IN WALL STRUCTURES

The present invention relates to a device in particular for cutting grooves as well as methods for using such a device.

5 The device according to the invention is especially developed for being used in connection with repointing of masonry. As will be evident to the skilled person, the device may however be used for a multitude of other purposes where it is desirable to cut a groove in a surface such as for example light-weight concrete structures and the like. These aspects will be further discussed below.

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Masonry is the general term for a building method where bricks are held together by mortar. The mortar which in addition to keeping a certain distance between the bricks also has certain adhesive properties is a very important factor to the integrity of the construction. If the wrong mortar mix has been chosen or the finishing has been carried out in a wrong way, the mortar joints may deteriorate whereby the structure may become severely weakened. For this purpose, it has been known for centuries to replace the mortar joints at regular intervals. Typical the interval was 100 years, but due to increased pollution, bad workmanship, new materials etc. and etc., the need for repointing has increased.

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Traditionally, repointing comprises a number of steps where the first step is to remove the deteriorated mortar between the bricks. The old mortar should be removed to a minimum depth of two to two and a half times the width of the joint as a general rule. This is done in order to assure that the influence of pollution, carbonation, frost damage etc. on the mortar is not present in the repointed structure. Furthermore, by removing this amount of the joint, an adequate bond between the mortar and the surrounding bricks is assured as well as so-called pop-outs of the mortar may be avoided. Needless to say, it may in some places be necessary to remove more mortar, and this general rule therefore depends on the general state of the joint as well as the general state of the building all together.

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The traditional way of removing old mortar is by the use of hand chisels and mash hammers. Though labour intensive in most senses, this method poses the least threat or damage to the building which is especially important when renovating historic masonry. It is also commonly known to remove the mortar by using power saws and
5 grinders. The use of power tools by unskilled masons can be disastrous for historic masonry particularly where the bricks are made from a very soft material. Using power saws on walls with thin joints such as most brick walls will almost always result in damage to the masonry units by breaking the edges of the bricks or by over cutting on the head or vertical joints. Furthermore, small pneumatically powered chisels are also
10 widely used, but again they require experienced masons. Also using thin diamond blade grinders especially for cutting the horizontal joints where the mortar comprises Portland cement is also known.

In order to minimize the damage from all of the above methods, it is customary to first
15 remove the majority of the mortar joint by any of the means mentioned above by cutting the middle of the joint. The final removal of the sides of the joints is thereafter carried out for example by a hand chisel and a hammer. As a general rule, care should be taken by any of the above-mentioned methods, not to cut or hammer into the original brick work. After removing the joint material, a new mortar should be prepared.
20 This mortar depending on the renovation work must have certain properties. Firstly, it must have the bonding ability to the bricks as well as the existing joint such that a firm connection may be established between the new and the old mortar. Furthermore, when hardened, the mortar must achieve material characteristics which will ensure a long service life. Finally, for most applications, it is also very important to use a mortar
25 which will have the same colour as the surrounding joints. For the purpose of this invention, the only aspects of the repointing procedure which are interesting are the removal of the mortar.

As mentioned above, all the prior art methods have some drawbacks which the present
30 invention sets out to relieve.

The present inventions addresses this by providing a device, in particular for cutting grooves, characterised in that means for centring a rotating grinding, cutting or milling

tool in an opening in a plane sole is provided, and that the tool is arranged for rotation about a first axis substantially perpendicular to said plane sole, where said sole has a working side adapted to engage and slide on a member to be worked on, and that said tool extends outward from said working side of the sole, and that further a guide member is provided, where said guide member is pivotable about a second axis substantially perpendicular to said first axis, whereby the guide member may be pivoted into a first position where the guide member extends outward from said working side of the sole, and that a longitudinal side of said guide member is level with the periphery of the tool, and into a second position where the guide member does not project from the working side of the sole.

By providing the guide member such that the guide member will slide along the already cut section of the joint, a very stable and easy to control removal of the joint material may be exercised. Furthermore, as the tool is held and guided by the plane sole of the device in relation to the surface of the masonry, a substantially uniform removal of material may be achieved. In the position where the guide member is pivoted and thereby extends outward from the working side of the sole, a fixed reference level is established between the underside of the joint and the tool. By providing the guiding member with a certain extent in the working direction, a firm and stable tool is provided such that it is relatively easy to operate the device and achieve a substantially complete removal of the old mortar simply by sliding the device along the joint to be renovated.

When the device during the processing encounter a vertical joint, it is possible to slide the device upwards such that the tool will remove the mortar in the vertical joint. By this vertical movement of the device, the guiding member will pivot into its second position such that it does not extend outside the working surface of the sole. In this manner, it is possible as work progresses along the joint to carry out both the removal of the horizontal joints and the relatively shorter vertical joints. Also due to the relative short extend of the vertical joints, namely corresponding to the height of the bricks, it is possible to achieve a relatively good result without the need for special guide means. It should, however, be mentioned that the sole may be provided with a guide means for guiding in a vertical direction for example by manually pushing a

biased second guide member arranged in parallel to the first axis of the tool into the vertical joint. When the second guide member is not manually pushed into the joint, it will be in a neutral position not protruding from the sole.

- 5 In a further advantageous embodiment of the invention, the sole is one side of a box structure where on one side different from the sole an interface for a vacuum unit is arranged.

10 The removal of mortar whether it be old or new may create a lot of dust and under any circumstance creates a lot of powdered silicon from the grinding of the sand used in the mortar. This is very unhealthy for the masons working on the repointing operation. Therefore, by providing an interface as well as a box structure, it is possible by means of a vacuum unit such as for example a vacuum cleaner to create an under pressure right around the grinding tool such that removal of the dust is assured.

- 15 In a still further advantageous embodiment of the invention, the means for centring the tool is adjustable, such that different tools may be attached, and that the angle of the first axis may be angled different from perpendicular to the plane of the sole. By angling the tool slightly in relation to the working surface of the sole, especially by angling the tool slightly rearwards in relation to the working direction, tests have shown that it is easier to remove the dust created by the working tool such that the immediate environment around the working unit and thereby the working conditions for a mason is greatly improved. Furthermore, the efficiency of the device is also improved in that the dust and particles being grinded off is faster such that a freshly exposed face of mortar for the tools to work on is available whereby the efficiency is improved.
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In a further advantageous embodiment, the guide member comprises first and second sections arranged perpendicularly to each other, where each section is substantially rectangular and that the second axis in the shape of a cylindrical shaft is arranged through the intersection of two sides of said first and second sections or adjacent the intersection of said two sides. The first section is intended to be able to pivot from the first to the second position, i.e. from an exposed to an unexposed position in relation to working side of the sole such that the first section of the guide member is supposed

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to engage the newly grinded and thereby exposed upper side of a layer of bricks. By providing the first section of the guide member in a substantially rectangular shape whereby a relatively large engagement surface for contact with the newly exposed upper side of the bricks is provided, a firm and stable guiding of the cutting tool is provided. Due to the pivotal arrangement of the guide member, the second section of the guide member will cause the guide member to pivot to its second position due to the weight of the second section for example when the tool is moved vertically. The engagement of the first section of the guide member against the upper side of the exposed brick layer will maintain the guide member in its exposed condition. As soon as the pressure is relieved, i.e. the guide member is lifted from its engagement, the guide member will pivot and thereby return to its non-exposed second position. This makes it possible to grind off material in a vertical direction for example in the vertical joints in masonry. In alternative embodiments, the pivotal action may be provided by a spring or by additional weight being provided on the second section on the guide member such that the pivotable action of the guide member is assured.

In a further advantageous embodiment of the invention, the first section of the guide member is adapted to slide on a surface in the groove created by the rotating tool, and the second section rests against a member in the device, where said member is in the shape of a round or oval axle, and that the second section optionally may be provided with a counterweight. The member against which the guide member rests decides the level of the guide member in relation to the tool removing the mortar. By providing an oval axis, it is possible to adjust the relative positioning of the underside of the guide member adapted to engage the exposed side of the bricks in relation to the first axis of the tool. This is done by turning the axle such that the long respectively the short axis of the oval is placed for engagement with the second section of the guide member. In this manner, it becomes possible to remove substantially the complete mortar joint or alternatively leave a slight rest of mortar in order to protect the bricks from the abrasive action of the tool.

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In a still further advantageous embodiment of the invention, the tool is arranged in an angular grinder, and that the angular grinder is fastened to the device by the means for centring. In this manner, the device according to the invention becomes an add-on

device to an already existing power tool such as for example an angular grinder. The means for centring a rotating, grinding, cutting and milling tool therefore is also adapted to be arranged around the rotating axis of the angular grinder. Most angular grinders are provided with a collar surrounding the axle which extends from the angular grinder, and it is foreseen that the means for centring may be adapted to be fastened around the collar. In this manner, the device is in the shape of an adapter which may be provided at substantially lower costs than if also the power tool unit was integrated with the device.

10 In a further advantageous embodiment, the tool projects through an opening in the box structure, and that the guide member is pivotable between a position from fully contained inside the box structure to a position where the guide member projects outside the box member. The box structure thereby comprises all the implements in one contained unit such that it is possible to carry out a thorough repointing of a masonry structure.

In a further advantageous embodiment, the box structure is made from a plastic material, and the guide member is made from metal, preferably an iron based material.

20 By choosing plastic or a plastic-like material for the box structure, it is achieved that the device will not unnecessarily create scratches on the surface of the masonry. This is especially important for aesthetic reasons, and in particular where older masonry buildings using soft bricks are being repointed. On the other hand, by providing the guide member as for example a steel member, the guide member will be long lasting towards wear such that a long service life of the device may be expected.

In a further advantageous embodiment, a method for repointing of masonry is disclosed wherein use is made of an inventive device according to the present invention, where said method comprises the following steps:

- 30 a) optionally a hole is drilled in a joint to be repointed or using the grinding tool to form such a hole;
- b) the tool of the device is chosen such that the diameter of the tool substantially corresponds to the thickness of the joint, and the extend of the tool in relation

to the working side of the tool is adjusted according to the desired depth of the repointing;

- c) the tool is inserted into the hole, until the working surface of the sole is in contact and substantially flush with the masonry to be repointed;
- 5 d) the device with activated tool is advanced along the joint, whereby the joint material is removed;
- e) the guide member is pivoted into contact with an inside of joint, typically a horizontal lower side in the masonry joint;
- f) the device is advanced along the joint;
- 10 g) when/if a vertical joint is encountered, the tool is moved upwards in the joint, whereby the guide member pivots into the second position where it does not extend from the working side of the sole;
- h) when the overlying horizontal joint is reached, the tool is brought down to the first horizontal joint again, and the guide member is pivoted into contact with
- 15 an inside of the joint, as in method step e) and the method is continued.

As is evident from the description of the method, it does not require special skills in order to use the inventive device in a method for repointing of masonry. It is therefore straight forward to prepare the masonry for the more skilled demanding task of actually selecting, mixing and placing the new mortar.

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An alternative to first drilling a hole is to use the grinding tool in order to grind away the mortar whereby a hole is formed such that the removal of the point material (mortar) may proceed.

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Although the invention has mainly been described with reference to repointing of masonry, the method is equally useful for making grooves in a surface. The surface may be any type of surface in that the grinding, cutting or milling tool consequently must be chosen according to the material of which the surface is made. For example when

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installing electrical installations in partition walls made from light-weight concrete or wood, the channel/groove in which the electrical pipes are placed may advantageously be cut by using the inventive device according to the present invention. A method for

making such a groove in a surface wherein use is made of the device comprises the steps of:

- 5 a) optionally drilling a hole at the intended place of the groove or using the grinding tool to form such a hole, where the diameter of the hole corresponds to the width of the groove;
- b) inserting a tool in the device corresponding to the diameter of the hole, and placing the tool in the hole and the sole of the device in contact with the surface;
- c) advancing the tool along the intended path of the groove;
- 10 d) pivoting the guide member into the groove, and resting the guide member on an inside of the newly cut groove;
- e) advancing the tool along the path of the groove.

Traditionally, grooves for electrical installations are cut by means of a specially developed double bladed saw which cuts two parallel cuts. Thereafter, a hammer and chisel is used to remove material between the cuts. This method is quite labour intensive and furthermore requires that a reference line or land is established such that the two parallel cuts may be cut in a straight line. With the present invention, however, this is not necessary in that the guide member will automatically create a substantially straight line as the groove is formed. Furthermore, with a hammer and a chisel, the depth of the groove is not uniform and extra hand work may be required in order to be able to make the groove consistently deep. With the present invention, the groove will have a uniform depth corresponding to the extent of the tool in relation to the working surface of the sole. Furthermore, where connection boxes are to be placed in order to connect branch, pipes or the like, the cutting tool may be moved in circles whereby the guide member is in its second and non-exposed position such that the cutting tool can freely move and thereby remove enough material such that a connection box may be integrated into the wall.

30 DETAILED DESCRIPTION OF THE DRAWING

In fig. 1, the principle of how the device according to the invention functions is illustrated. The device generally indicated by 1 comprises a tool 2 suitable for cutting,

grinding or in any other way removing the material which is to be worked. The tool 2 is arranged for rotation around a first axis 3 which axis 3 is substantially perpendicular to a plane sole 4 provided in the device 1. The plane sole 4 has a working side 5 which in use will be held against the surface to be worked by a user using the device 1. In this example, a guide member 6 is projecting from the working side 5 of the plane sole 4. The guide member 6 is pivotable about a second axis 7 which axis is arranged substantially perpendicularly to the first axis 3. By providing a second pivot axis 7, it is possible to pivot the guide member 6 from an engagement position where it projects from the working side 5 of the plane sole 4 as illustrated in fig. 1, and into a position where it is fully contained behind the working surface 5 of the plane sole 4. In this manner, the guide member 6 may be fully contained in a box structure as indicated by the dashed lines 8.

In order to use the device according to the invention for repointing joints between bricks and masonry or in order to create a substantially straight groove, the underside of the guide member 6 must, as illustrated in fig. 2, be flush with the periphery of the tool 2. The guide member 6 which is pivotable around the second axis 7 is in this embodiment illustrated as being flush with the periphery of the tool 2 such that the guiding surface of the guiding member 6 is on the same line indicated by the dotted line 9 as the periphery of the tool 2.

In fig. 3, a cross-section through the inventive device according to the invention is illustrated. A box structure 8 is provided which comprises all the components of the device. As is evident from the cross-section illustrated in fig. 3, the guide member 6 is projecting from the box 8 such that the device is ready to be guided along for example a joint in a masonry construction. The guide member 6 will pivot about the second axis 7. The pivotal movement may be provided by providing on the second section 10 of the guide member 6 an extra weight 11 such that a very simple lever arrangement is provided in order to assure that the guide member when this is possible will project from the box structure 8. As the box is moved upwards, it may engage an upper edge of the joint whereby the guide member 6 is pushed downwards and thereby forced into the box structure 8 such that the working side 5 of the plane sole 4 is completely flushed such that upwards movement may be carried out unhindered.

The pivotal action of the guide member 6 is limited by a member 12 in the shape of an axle. The axle may be round, as illustrated in fig. 3, or oval. In the embodiment not illustrated where the axle 12 is oval, rotating the axle may adjust the level of the guide member 6 in relation to the cutting, grinding or milling tool. The rotating axis of the tool is indicated by the dotted line 3.

During tests, it has been found that the guiding member may advantageously be curved such that for a guide member having a length of 40 mm, the curvature should correspond to a bending radius of 150 mm where the centre is placed above the bottom part of the guide member. By rocking the tool, i.e. using the curvature, the personnel carrying out the repointing process may easily remove all point material and additionally compensate for variations and tolerances in the width of the joint.

In order to be able to remove the dust created by the working tool, an interface 13 for e.g. a vacuum cleaner is provided at the end of the box 8.

In order to fasten the device to a power tool such as for example an angular grinder, fastening means 14 has been provided. The fastening means may at the same time be the segments for centring the tool such that the tool will be able to be angled at the desired angle. In this embodiment, the fastening means 14 is in the shape of a collar 15 around which a tightenable metal collar 16 is provided. By tightening the bolt arrangement 17, the diameter of the collar 15 will be lessened such that for example the collar surrounding the working axle of an angular grinder be fitted into the hole 18 centrally in the collar 15 will be gripped by the collar 15 such that a firm connection is made between the box structure 8 and the power tool.

In fig. 5, the box structure 8 is illustrated as being attached to a power tool 18. The power tool is a conventional angular grinder which by means of the collar and bolt connection 16,17 is connected to the box structure 8. As is evident from the illustration, the guide member 6 extends from the working side 5 of the sole, and the entire device is operational and ready to carry out a removal of mortar from a mason structure.

CLAIMS

1. Device, in particular for cutting grooves, c h a r a c t e r i s e d in that means for centring a rotating grinding, cutting or milling tool in an opening in a plane sole is
5 provided, and that the tool is arranged for rotation about a first axis substantially perpendicular to said plane sole, where said sole has a working side adapted to engage and slide on a member to be worked on, and that said tool extends outward from said working side of the sole, and that further a guide member is provided, where said guide member is pivotable about a second axis substantially perpendicular to said first
10 axis, whereby the guide member may be pivoted into a first position where the guide member extends outward from said working side of the sole, and that a longitudinal side of said guide member is level with the periphery of the tool, and into a second position where the guide member does not project from the working side of the sole.
- 15 2. Device according to claim 1 c h a r a c t e r i s e d in that the sole is one side of a box structure where on one side different from the sole an interface for a vacuum unit is arranged.
- 20 3. Device according to claim 1 or 2 c h a r a c t e r i s e d in that the means for centring the tool is adjustable, such that different tools may be attached, and that the angle of the first axis may be angled different from perpendicular to the plane of the sole.
- 25 4. Device according to any preceding claim c h a r a c t e r i s e d in that the guide member comprises first and second sections arranged perpendicularly to each other, where each section is substantially rectangular and that the second axis in the shape of a cylindrical shaft is arranged through the intersection of two sides of said first and second sections or adjacent the intersection of said two sides.
- 30 5. Device according to claim 4 c h a r a c t e r i s e d in that the first section of the guide member is adapted to slide on a surface in the groove created by the rotating tool, and the second section rests against a member in the device, where said member is in the shape of a round or oval axle, and that the second section optionally may be provided with a counterweight.

6. Device according to any proceeding claim c h a r a c t e r i s e d in that the tool is arranged in an angular grinder, and that the angular grinder is fastened to the device by the means for centring.
- 5
7. Device according to any of claims 2 to 6 c h a r a c t e r i s e d in that the tool projects through an opening in the box structure, and that the guide member is pivotable between a position from fully contained inside the box structure to a position where the guide member projects outside the box member.
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8. Device according to any proceeding claim c h a r a c t e r i s e d in that the box structure is made from a plastic material, and the guide member is made from metal, preferably an iron based material.
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9. Method for repointing of masonry wherein use is made of a device according to any of claims 1 to 8, where said method comprises the following steps:
- a) optionally a hole is drilled in a joint to be repointed or using the grinding tool to form such a hole;
 - b) the tool of the device is chosen such that the diameter of the tool substantially corresponds to the thickness of the joint, and the extend of the tool in relation to the working side of the tool is adjusted according to the desired depth of the repointing;
 - c) the tool is inserted into the hole, until the working surface of the sole is in contact and substantially flush with the masonry to be repointed;
 - d) the device with activated tool is advanced along the joint, whereby the joint material is removed;
 - e) the guide member is pivoted into contact with an inside of joint, typically a horizontal lower side in the masonry joint;
 - f) the device is advanced along the joint;
 - g) when/if a vertical joint is encountered, the tool is moved upwards in the joint, whereby the guide member pivots into the second position where it does not extend from the working side of the sole;
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- 25
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- h) when the overlying horizontal joint is reached, the tool is brought down to the first horizontal joint again, and the guide member is pivoted into contact with an inside of the joint, as in method step e) and the method is continued.

- 5 10. Method for making a groove in a surface wherein use is made of a device according to any of claims 1 to 8 where said method comprises the steps of:
- a) drilling a hole at the intended place of the groove or using the grinding tool to form such a hole, where the diameter of the hole corresponds to the width of the groove;
 - 10 b) inserting a tool in the device corresponding to the diameter of the hole, and placing the tool in the hole and the sole of the device in contact with the surface;
 - c) advancing the tool along the intended path of the groove;
 - d) pivoting the guide member into the groove, and resting the guide member on
15 an inside of the newly cut groove;
 - e) advancing the tool along the path of the groove.

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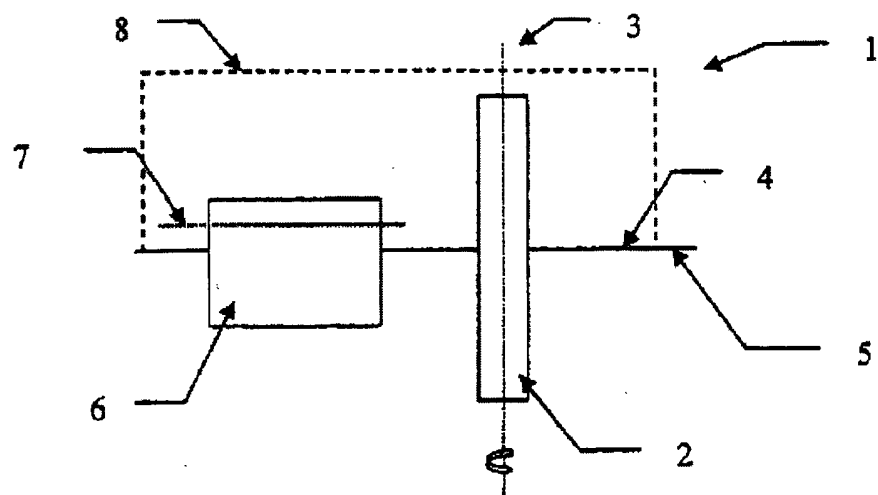


FIG. 1

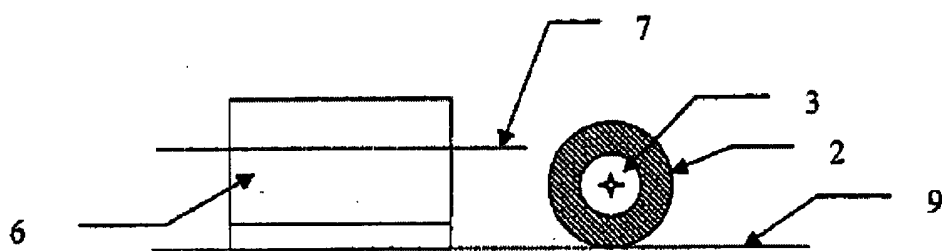
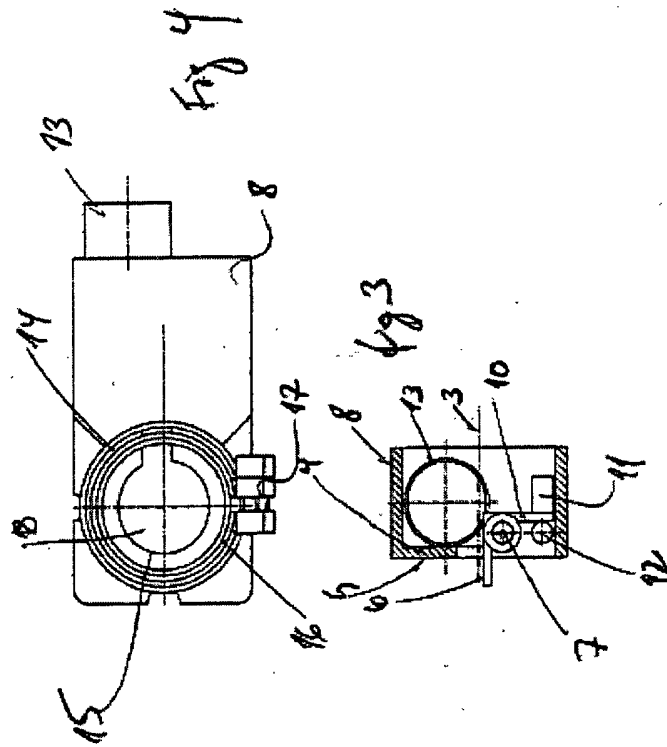


FIG. 2

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3/3

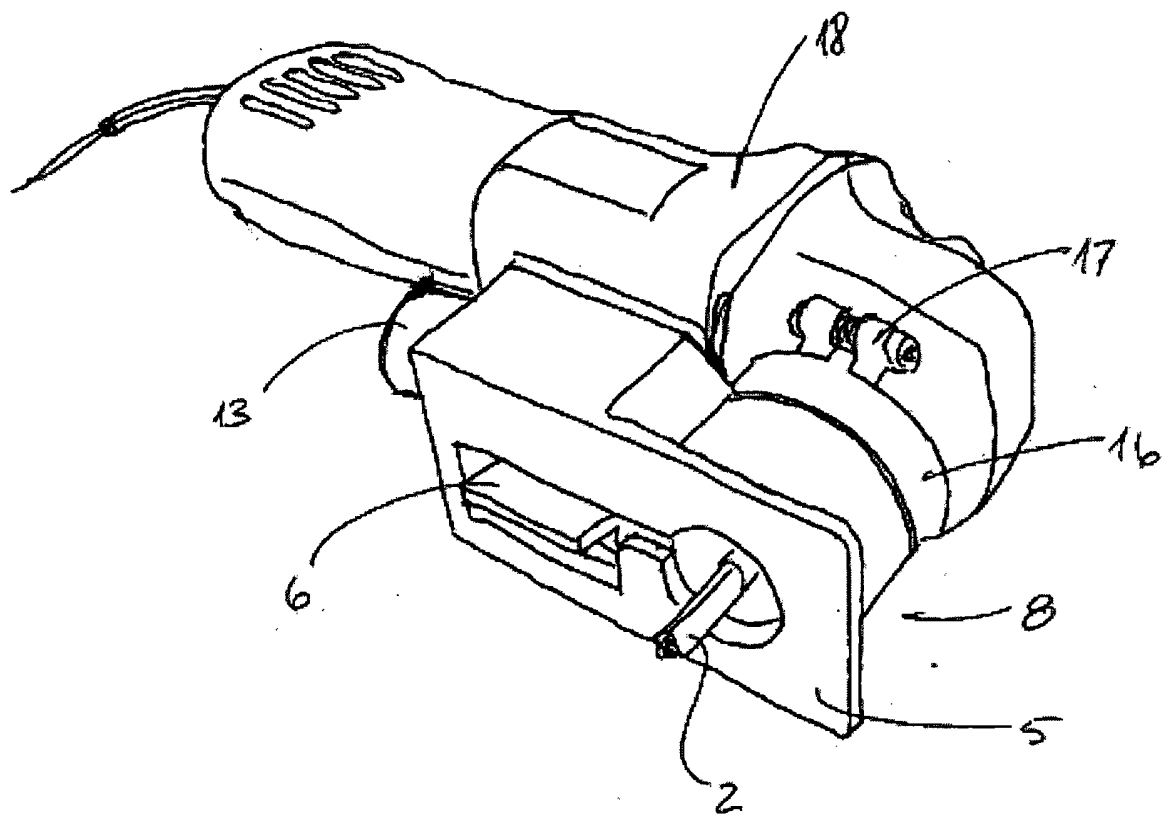


Fig 5

INTERNATIONAL SEARCH REPORT

International Application No
/DK2004/000517

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E04F21/00 B28D1/18 E04F21/165

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04F B28D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 167 005 A (AKBAR * DARABI-FARD) 21 May 1986 (1986-05-21) page 1, lines 5-34,81-85 page 2, lines 32-50,78,79,87-90,101-105 page 3, lines 12-14 figures 1,4	1,8,9
Y	-----	2,3,6,7
X	DE 826 350 C (MASCHINENFABRIK SCHMOTZER, INH. HANS SCHMOTZER) 3 January 1952 (1952-01-03) page 3, lines 31-40,46-64 figure	10
A	----- -/--	1,9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

17 March 2005

Date of mailing of the international search report

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ational Application No

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