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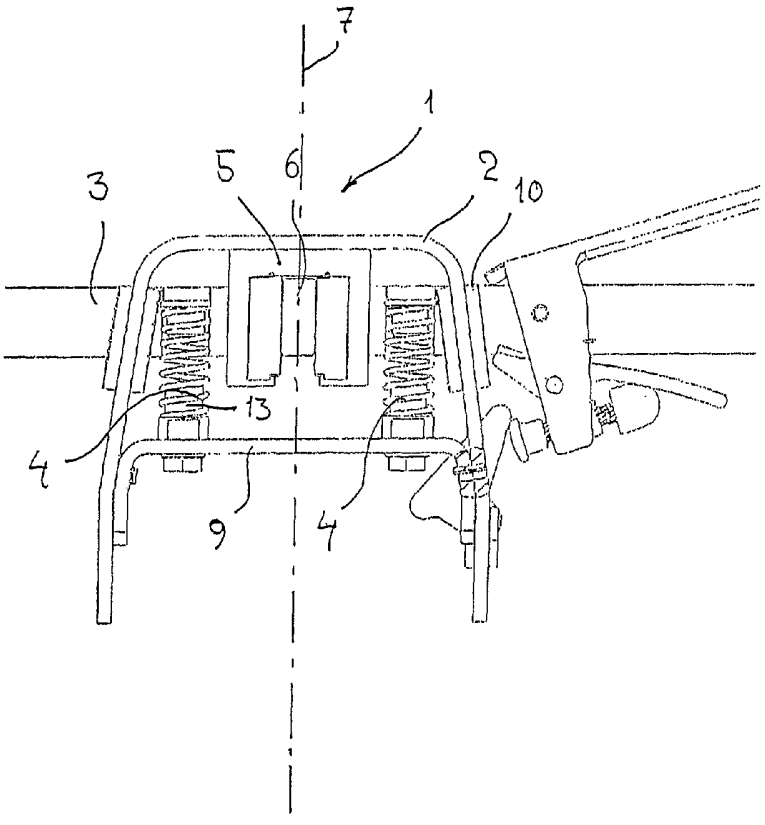
(54) Title: A HANDLE WITH VIBRATION-DAMPING FEATURES



(57) Abstract: A handle for a hand-held vibration tool or machine, such as a hydraulically, pneumatically or mechanically operating hammer, which is intended to be pressed against an object or a substrate, said handle comprising a fixed part (2) and a loose part (3), said parts being movably interconnected by means of spring elements (4), and guide elements (5, 6), said guide elements (5, 6) being capable of sliding relative to each other in a direction which coincides with or is parallel with a main axis (7) longitudinally through the hammer. Moreover, the guide element (5) is secured to the loose part (3) of the handle, and the guide means (6) is secured to the fixed part (2) of the handle. A clearance is provided between the guide means (5, 6), said clearance allowing tilting about an axis (8), which is essentially horizontal when the hammer is arranged in its working position, through the guide element (5) and the guide means (6). The spring elements (4) are secured to a lower part of the fixed part (2) of the handle or to an intermediate member (9), and the spring elements (4) engage a plurality of engagement faces (11) at their upper end.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A HANDLE WITH VIBRATION-DAMPING FEATURES

The prior art

The invention relates to a handle for a hand-held vibration tool or machine, such as a hydraulically, pneumatically or mechanically operating hammer, which is intended to be pressed against an object or a substrate, said handle comprising a fixed part and a loose part, said parts being movably interconnected by means of spring elements and guide elements.

The specifications of US 1 667 271 and 3 939 923 disclose examples of such tools.

The hammer comprises a vibration-damped handle, which vibration damping serves to reduce the transmission of the impacts which would otherwise be transferred to the user from the strongly vibrating tool through the handle.

Such a hammer is constructed with an active part which is intended to affect a tool by means of vibration. The tool is applied to the hammer at its lower end, and a form of handle is secured at the opposite end, the upper end of the hammer, so that the person using the hammer can manipulate it. Moreover, the handle may be used for transferring weight from the user to the hammer so as to keep this firmly against the substrate which is to be worked, thereby achieving an enhanced effect of the hammer.

The handle may be composed of two main components each of which comprises additional parts.

One main component is the fixed part of the handle, that is a part which is secured relative to the hammer itself at the upper end of the hammer. The

other main component is the handle itself, which may be regarded as a loose part, as the handle itself is mounted in the fixed part in such a manner that the loose part of the handle cannot rotate about the main axis of the hammer, and that the loose part of the handle cannot be displaced in the axial direction of the handle. The loose part of the handle may be moved in a direction in parallel with the main axis of the hammer, said main axis extending longitudinally through tool as well as hammer.

A vibration damper is arranged between the fixed part of the handle and the loose part of the handle, said vibration damper comprising a plurality of springs arranged at a distance from the main axis of the hammer.

Handles which are suspended resiliently, are known, but these handles are of a type which are suspended about one axis or two axes in such a manner that the two grips on the handle, where the operator grips, rotate relatively to each other, so that the operator twists his wrists.

The object of the invention

By having a vibration-damped handle where the loose part of the handle extends rigidly between the two grips and can simultaneously perform a limited angular rotation about an axis perpendicular to the main axis as well as to the loose part of the handle, harmful effects are diminished, which would otherwise be transferred to the user.

This movement means that the forces, which are nevertheless transmitted through the vibration damper and the handle, are split into components in several directions, whereby the vibrations are damped additionally.

The handle may thus be moved up and down as well as perform the above-mentioned limited angular rotation.

This is achieved according to the invention in that the handle, which comprises a fixed part and a loose part which are movably interconnected by means of spring elements and guide elements, is provided with guide means which may slide relative to each other in a direction which coincides with or is parallel with a main axis longitudinally through the hammer.

This results in an unprecedentedly high degree of damping of vibrations in the handle and thereby alleviation of the harmful impacts on the hands.

This is also achieved by the embodiment described in claim 2.

The invention as described in claim 3 ensures that the handle may perform a limited tilting or angular rotation.

Claims 4 and 5 define how the spring elements are arranged.

Claim 6 describes how the spring elements are kept in position, so that these do not slide away from the engagement face because of external impacts, which would have as a result that the vibration damping does not serve its purpose.

The embodiment as described in claim 7 ensures that, in use, the user or the operator does not twist his wrists, which would be an inexpedient strain in the use of such a hammer of an ordinary structure.

Claims 8 and 9 describe embodiments which ensure a suitable manipulation of the hammer via the handle together with the vibration damping properties of the invention.

Claim 10 provides for shielding of the hammer, which shielding serves as a noise damping feature as well as a heat shielding.

The drawing

The invention will be described more fully below with reference to the drawing, in which

fig. 1 shows a vibration damping feature according to the invention,

fig. 2 shows the vibration damping feature seen in section,

fig. 3 shows a further embodiment of the vibration damping feature, and

fig. 4 shows the further embodiment in section.

Description of exemplary embodiments

Preferred embodiments of the invention will be described below with reference to the drawing. In a hydraulically, pneumatically or mechanically operating hammer (not shown), a form of handle or manipulation grip 1 is secured at the upper end of the hammer, said handle 1 comprising two main parts, a fixed part 2 and a loose part 3. These parts 2, 3 are movably interconnected by means of spring elements 4 and a guide 5. At the end facing toward the hammer, the spring elements 4 are secured to the fixed part 2 or to a form of intermediate member 9 mounted on the fixed part 2. At the other end of the spring elements 4, these engage a plurality of engagement faces 11, said engagement faces 11 being secured to the movable part 3 of the handle. Means are provided at the lower end of the hammer to receive and hold a tool. The tool may have various forms of chisels or the like for breaking through a relatively firm substrate, which may be asphalt, concrete or the like. The tool, preferably together with the hammer itself, forms a unit through which a main axis extends longitudinally.

The fixed part 2 of the handle is secured to the hammer itself by ordinary mounting means. The loose part 3 of the handle is provided with guide means 6 in its central area for reception in the guide 5 secured on the fixed part 2. This ensures that the guide means 6 secured on the loose part 3 of the handle may be moved in the guide 5 in a direction which coincides with or is parallel with the main axis 7 of the hammer. It is also possible to perform tilting about an axis 8, which is substantially horizontal when the hammer is in its working position, through the guide 5 and the guide means 6. The guide means 6 may be formed by a thickening, groove, disc, flange, collar or the like which is provided on or in the loose part 3 of the handle. Space is provided in a slot on each side of the fixed part 2 of the handle such that the loose part 3 of the handle may be moved up and down as well as be tilted. The loose part 3 of the handle may optionally be provided with control means 10 which ensure that the movement does not exceed the desired travel. The control means 10 may also relieve or possibly entirely replace the guide 5 and the guide means 6.

The guide and the guide means 6 also ensure that the loose part 3 of the handle cannot be displaced in an axial direction, and that the loose part 3 of the handle cannot rotate about its own longitudinal axis.

As the loose part 3 of the handle is a coherent unit, it is ensured that the user or the operator does twist his wrists in use, as this strain is very unfortunate in case of repeated use of such a hammer of an ordinary structure.

In another embodiment, a plurality of spring elements 12 may additionally be arranged between the upper side of the engagement faces 11 and the inner side of the upper part of the fixed part 2 of the handle.

All or some of the engagement faces 11 may be provided with a small ele-

vation 13 or the like, said elevation 13 serving as a form of guide for the spring elements 4, 12, so that these do not slide away from the engagement face 11 because of external impacts, which would mean that the vibration damping does not serve its purpose.

Furthermore, a movable jacket (not shown) may be secured to the movable part 3, said jacket being movable relative to the hammer itself in the main direction of the tool. This provides for shielding of the hammer. This shielding thus serves both as a noise damping and as a heat shielding. As the movable part 3 is a coherent part, the jacket may be mounted on this movable part 3, which contributes to reducing the vibrations in the loose part 3 of the handle and thereby the vibrations to which the operator is subjected in the use of the hammer.

PATENT CLAIMS

1. A handle for a hand-held vibration tool or machine, such as a hydraulically, pneumatically or mechanically operating hammer, which is intended to be pressed against an object or a substrate, said handle comprising a fixed part and a loose part, said parts being movably interconnected by means of spring elements and guide elements, c h a r a c t e r i z e d in that the guide means (5, 6) may slide relative to each other in a direction which coincides with or is parallel with a main axis (7) longitudinally through the hammer.

2. A handle according to claim 1, c h a r a c t e r i z e d in that the guide element (5) is secured to the loose part (3) of the handle, and that the guide means (6) is secured to the fixed part (2) of the handle.

3. A handle according to claims 1-2, c h a r a c t e r i z e d in that a clearance is provided between the guide means (5, 6), said clearance allowing tilting about an axis (8), which is essentially horizontal when the hammer is arranged it its working position, through the guide element (5) and the guide means (6).

4. A handle according to claims 1-3, c h a r a c t e r i z e d in that the spring elements (4) are secured to a lower part of the fixed part (2) of the handle or to an intermediate member (9), and that the spring elements (4) engage a plurality of engagement faces (11) at their upper end.

5. A handle according to claims 1-4, c h a r a c t e r i z e d in that also a plurality of spring elements (12) are arranged between the engagement faces (11) and an upper part of the fixed part (2) of the handle, so that spring elements (4, 12) are present below as well as above the engagement faces (11).

6. A handle according to claim 4 or 5, c h a r a c t e r i z e d in that at least one of the engagement faces (11) is provided with an elevation (13), said elevation (13) serving as a form of guide for the spring elements (4, 12).

7. A handle according to claims 1-6, c h a r a c t e r i z e d in that the loose part (3) of the handle extends rigidly coherently from outer point to outer point.

8. A handle according to claims 1-7, c h a r a c t e r i z e d in that the loose part (3) of the handle is provided with limiting control means (10) for ensuring a limited travel in an essentially horizontal direction.

9. A handle according to claims 1-8, c h a r a c t e r i z e d in that the guide element (5) and the guide means (6) are in mutual engagement so that the loose part (3) of the handle cannot be displaced in an axial direction, and that the loose part (3) of the handle cannot rotate about its own longitudinal axis.

10. A handle according to claims 1-9, c h a r a c t e r i z e d in that the movable part (3) of the handle is secured to a movable jacket (not shown), said jacket being movable relative to the hammer itself in the main direction of the tool.

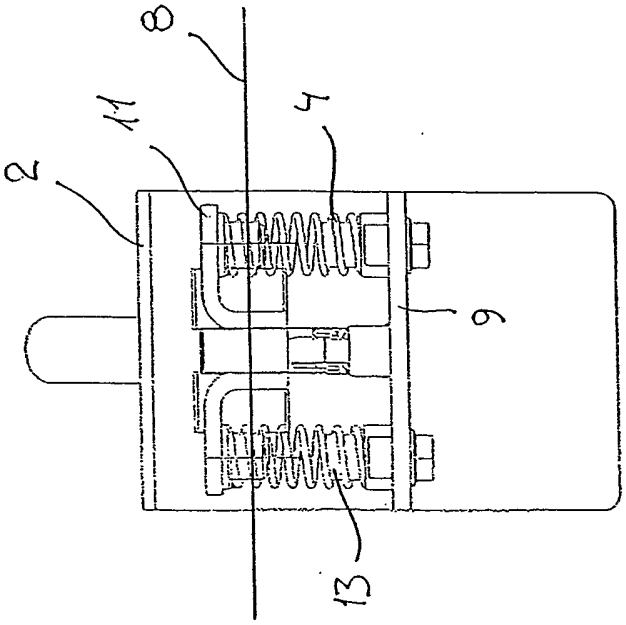

Fig. 2

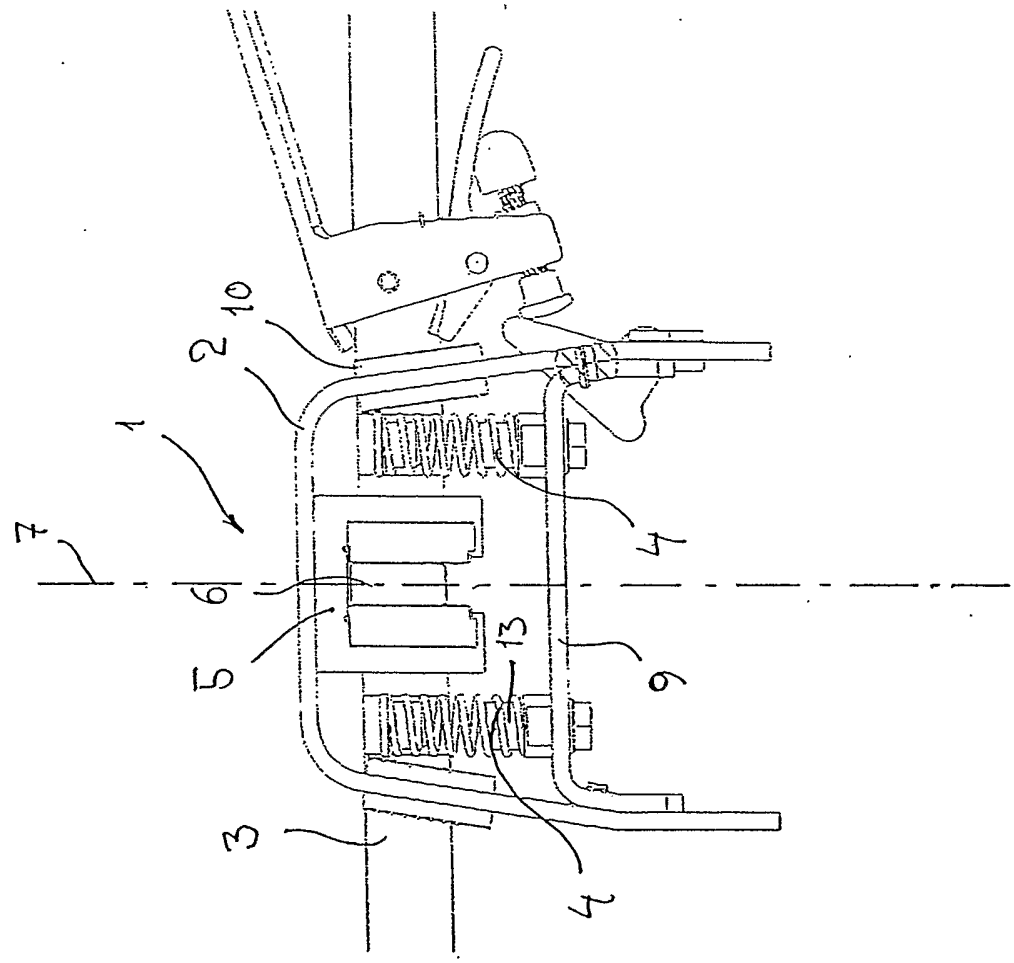

Fig. 1

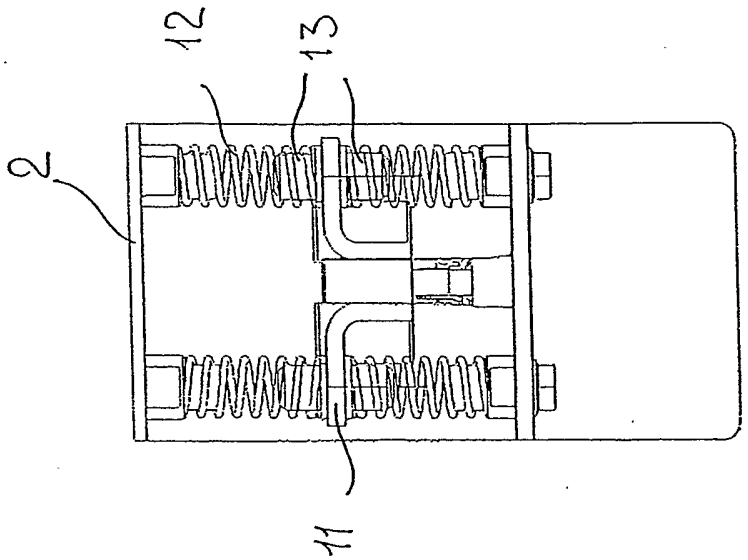

Fig. 4

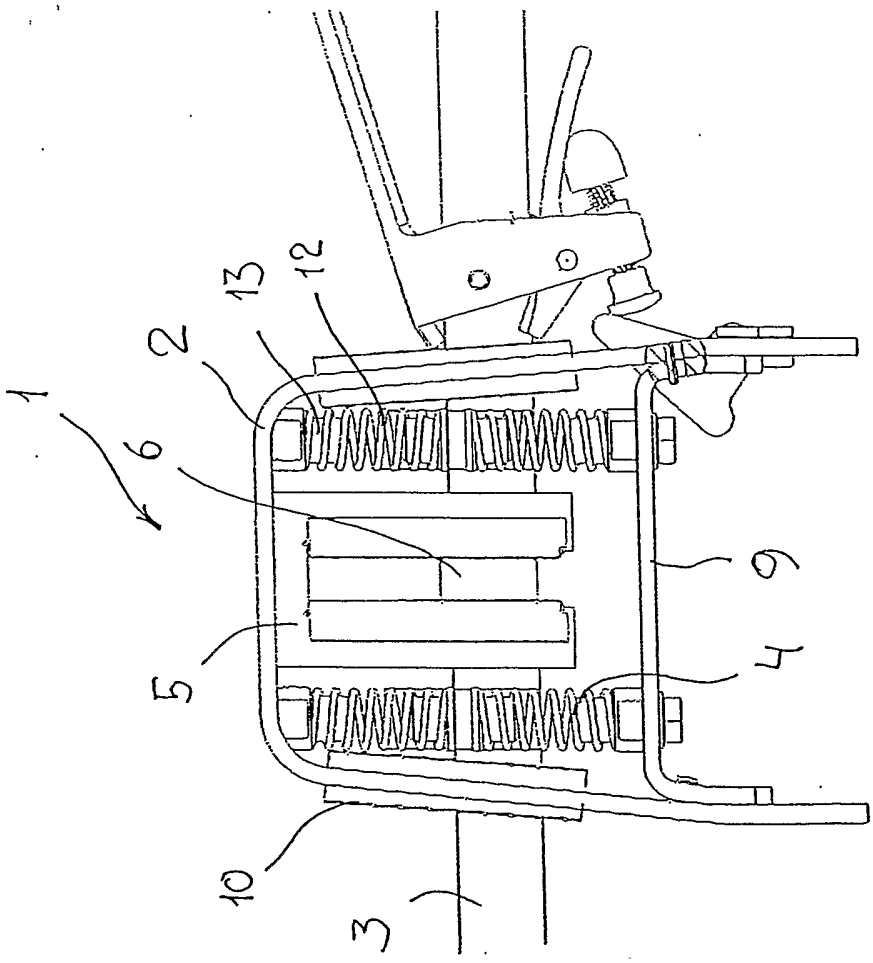

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 2005/000174

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B25D 17/04
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)

IPC7: B25D

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, 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	US 1656301 A (E.W. STEVENS), 17 January 1928 (17.01.1928), column 1, line 93 - line 109, figure 3	1-10
P,X	GB 2402098 A (BLACK & DECKER INC.), 1 December 2004 (01.12.2004), page 7, line 7 - line 16, figure 4	1-10
A	US 3939923 A (F.-W. ALDAG ET AL), 24 February 1976 (24.02.1976), figure 1, abstract	1-10
A	US 1667271 A (S. SEAVER), 24 April 1928 (24.04.1928), whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 June 2005	21 -06- 2005
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Björn Lindkvist / MRo Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/DK 2005/000174

US	1656301	A	17/01/1928	NONE		
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