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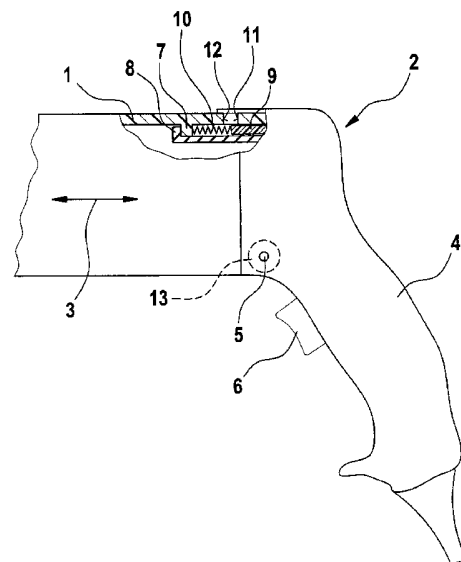
(56) Documents Cited:
EP 1602450 A2 **EP 1533084 A1**
DE 010036078 A1 **US 5697456 A**
US 20030132016 A1

(58) Field of Search:
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(54) Abstract Title: **Hand held power tool with vibration-damped pistol grip**

(57) A percussive tool eg. a hammer drill, comprises a body housing 1, with a pistol grip handle 4 attached thereto via transverse pivot 5. Spring element 10 is located between flanges 7 and 8 and is oriented along the percussion direction 3 of the tool. Spring 10 provides a resilient damping mechanism between the handle and the tool body, the force exerted by which, may be adjusted via stop 9. A secondary damping mechanism is provided by resilient bushings 13 around pivot 5.

Fig. 1



GB 2 419 564 A

Fig. 1

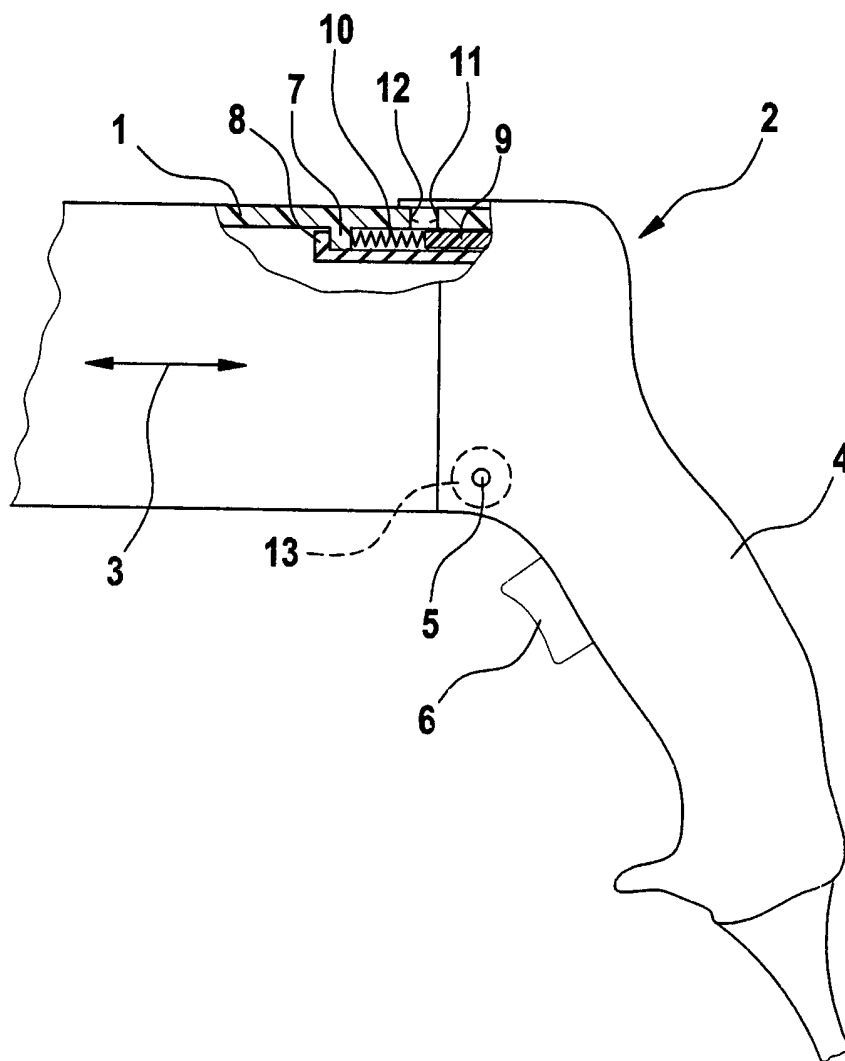


Fig. 2

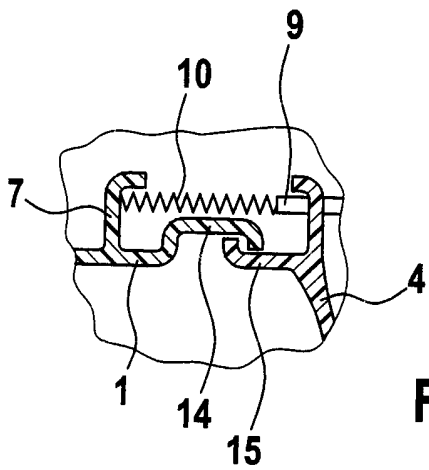
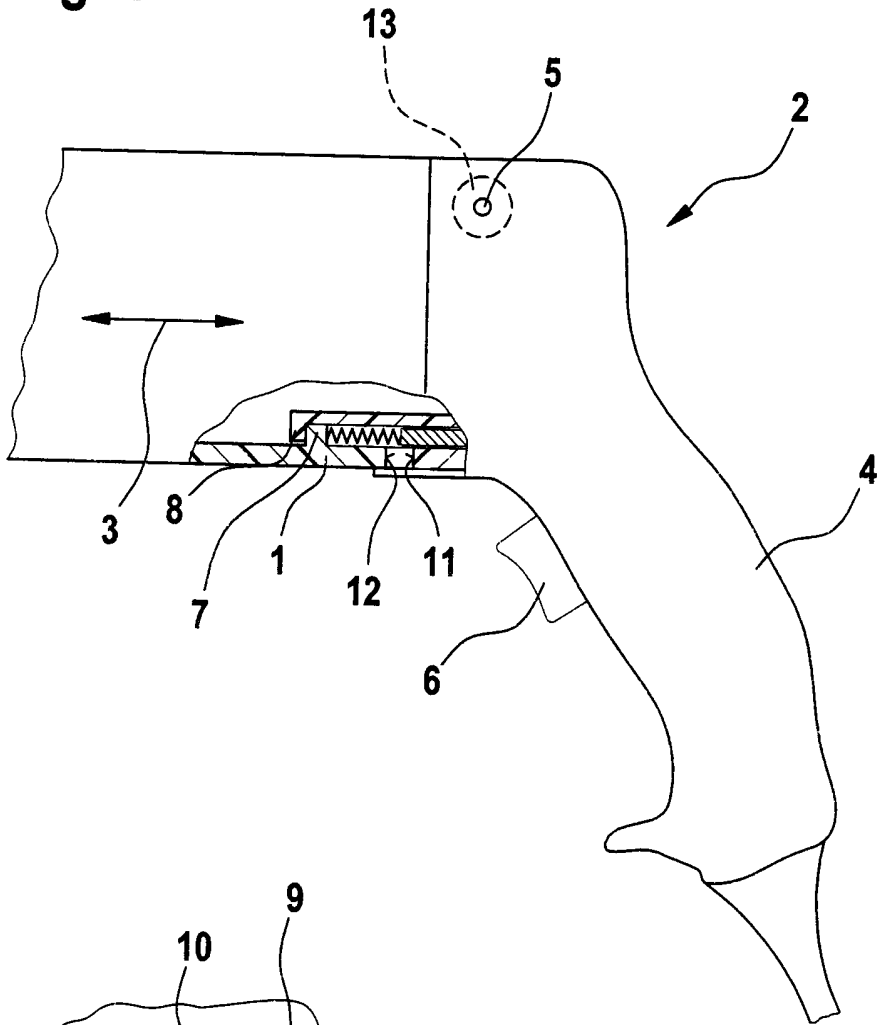


Fig. 3

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Hand tool machine with vibration-damped pistol grip

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Background art

The present invention relates to a hand tool machine, in particular a hammer drill, percussion drilling machine or impact screw driver, having a pistol grip that is connected in a vibration-damped manner to the machine housing.

Particularly in hand tool machines with an impact mechanism, such as for example hammer drills, percussion drilling machines or impact screw drivers, extreme vibrations of the machine housing occur and are transmitted to the handle and from there, unless some kind of vibration-damping means are provided, undamped to the hands and/or arms of the user. According to DE 40 00 861 C3, the pistol grip of a hand tool machine is connected in a vibration-damped manner to the machine housing in that an envelope housing firmly connected to the pistol grip surrounds the machine housing and this envelope housing is uncoupled from the machine housing by means of rubber-elastic bodies.

The underlying object of the invention is to indicate a hand tool machine of the initially described type, in which

the pistol grip is connected in a vibration-damped manner to the machine housing.

Advantages

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The stated object is achieved by the features of claim 1 in that the pistol grip is supported pivotably about an axis on the machine housing, wherein the axis extends transversely of the principal direction of vibration of the hand tool machine, and that disposed between the machine housing and the pistol grip is at least one spring element acting in the direction of vibration. The vibration-damping measures are realized here by very simple technical means.

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Advantageous developments of the invention arise from the sub-claims.

The swivelling axis is situated either in the lower region of the machine housing, i.e. in a portion of the pistol grip close to the gripping region, or in the upper region of the machine housing, i.e. in a portion of the pistol grip remote from the gripping region.

25 The at least one spring element may for example comprise a tension spring or compression spring and/or an elastic body.

In an advantageous manner, a means of adjusting the bias of the at least one spring element is provided.

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A further vibration-damping effect is achievable in that the swivelling axis is elastically supported.

Drawing

There now follows a detailed description of the invention
5 by way of several embodiments that are illustrated in the
drawings. The drawings show:

Figure 1 a detail of a hand tool machine having a pistol
grip that is connected by a swivelling axis to the lower
region of the machine housing,

10 Figure 2 a detail of a hand tool machine having a pistol
grip that is pivotably connected by a swivelling axis to
the upper region of the machine housing, and

Figure 3 a variant of the resilient support of the pistol
grip on the machine housing.

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Description of embodiments

Figure 1 shows a detail of a hand tool machine, which is
for example a hammer drill or a percussion drilling machine
20 or an impact screw driver. Connected to the machine
housing 1 of the hand tool machine is a pistol grip 2.
Disposed in the machine housing 1 there is usually a motor,
a gear unit and an impact mechanism for setting the tool
(e.g. a drill bit or chisel) in rotation and/or in axial
25 percussive motion. By virtue of the axial percussive
motion the machine housing 1 experiences an axial vibration
indicated by the arrow 3. The principal direction of
vibration is therefore the direction of the tool
longitudinal axis. If the pistol grip 2 is connected
30 rigidly to the machine housing 1, the vibration of the
machine housing 1 is transmitted undamped to the pistol
grip 2. Precisely this is to be avoided for protection of
the user. For this reason, the measures described below

are taken in order to couple the pistol grip 2 to the machine housing 1 in a vibration-damped manner to the greatest extent possible.

5 In the embodiment illustrated in Figure 1, the pistol grip 2 is connected in the lower region of the machine housing 1, i.e. in the vicinity of the gripping region 4 of the pistol grip 2 that has a switch 6, by a swivelling axis 5 to the machine housing 1. The swivelling axis 5 is
10 disposed transversely of the principal direction of vibration 3 so that the grip 2 may execute in relation to the machine housing 1 a swivelling motion about the axis 5.

At its opposite end to the swivelling axis 5, the pistol
15 grip 2 is supported resiliently on the machine housing 1. The effect of this resilient support is that between the machine housing 1 and the upper part of the pistol grip 2 there is motional play substantially in the principal direction of vibration 3. The resilient support of the
20 upper part of the pistol grip 2 on the machine housing 1 may be designed, for example, in the manner illustrated in Figure 1. Formed on the machine housing 1 is a radially inwardly extending collar 7, and formed on the pistol grip 2 there is likewise a collar 8, which extends radially
25 outwards. The collar 8 on the pistol grip 2 engages behind the collar 7 on the machine housing 1. There is further situated on the pistol grip 2 a stop pin 9, which is set back in relation to the two collars 7 and 8 in the direction of the pistol grip 2. In the space between the
30 two collars 7 and 8 and the stop pin 9 a spring element 10 is fitted, which is supported at one end against the collar 7 of the machine housing 1 and at the other end against the

stop pin 9 and hence presses the pistol grip 2 away from the machine housing 1.

The spring element 10 may be a compression spring or an elastic body (e.g. of rubber or elastomer). Instead of a single spring element 10, a plurality of spring elements may alternatively be provided. A combination of a compression spring and an elastic body may also be used. Equally, the resilient coupling between the pistol grip 2 and the machine housing 1 may be realized by one or more tension spring elements, depending on how the coupling between machine housing 1 and pistol grip 2 is fashioned.

The resilient reciprocating motion of the pistol grip 2 relative to the machine housing 1 in the principal direction of vibration 3 is limited on the one hand by the two collars 7 and 8, which meet one another, and on the other hand by a stop 11 on the pistol grip that meets a stop 12 on the machine housing 1. The distance between the two stops 11 and 12 delimits the motional play between the pistol grip 2 and the machine housing 1.

It is advantageous when the stop pin 9 is displaceable in axial direction, thereby allowing the bias of the spring element 10 to be adjusted. With the bias of the spring element 10 it is possible to vary the damping of the vibration transmitted from the machine housing 1 to the pistol grip 2. The previously described resilient coupling between the machine housing 1 and the pistol grip 2 is one possible form of construction.

A, compared to Figures 1 and 2, modified construction of the resilient support between the pistol grip 4 and the

machine housing 1 is shown in Figure 3. Here, the axial movement of the pistol grip 4 relative to the machine housing 1 is limited in that on the machine housing 1 an indentation 14 is formed, into which a hook-shaped arm 15 of the pistol grip 4 engages. The indentation 14 forms a front and a rear stop for the hook-shaped arm 15, thereby limiting the relative movement between the pistol grip 4 and the machine housing 1.

10 An elastic bearing arrangement of the swivelling axis 5 may also contribute towards additional vibration damping. The elastic bearing arrangement of the swivelling axis 5 is realizable by disposing the swivelling axis 5 in an elastic bush (e.g. of rubber or elastomer) 13, which is disposed in
15 the machine housing 1.

According to the embodiment of Figure 1, the swivelling axis 5 is disposed in the lower region of the machine housing and the pistol grip 2, in the vicinity of the gripping region 4 of the pistol grip 2, and the spring
20 element 10 is situated, viewed transversely of the principal direction of vibration 3, on the upper end of the pistol grip 2. As the embodiment illustrated in Figure 2 reveals, the sides for the swivelling axis 5 and the spring
25 element 10 may also be swapped, so that the swivelling axis 5 is situated in the upper region of the machine housing 1 and the pistol grip 2, and the spring element 10 is disposed in the lower region of the machine housing 1, in the vicinity of the gripping region 4 of the pistol
30 grip 2.

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Claims

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1. Hand tool machine, in particular a hammer drill, percussion drilling machine or impact screw driver, having a pistol grip (2) that is connected in a vibration-damped manner to the machine housing (1), characterized in that the pistol grip (2) is supported pivotably about an axis (5) on the machine housing (1), wherein the axis (5) extends transversely of the principal direction of vibration (3) of the hand tool machine, and that disposed between the machine housing (1) and the pistol grip (2) is at least one spring element (10) acting in the direction of vibration.
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2. Hand tool machine according to claim 1, characterized in that the swivelling axis (5) is situated in the lower region of the machine housing (1), i.e. in a portion of the pistol grip (2) close to the gripping region (4).
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3. Hand tool machine according to claim 1, characterized in that the swivelling axis (5) is situated in the upper region of the machine housing (1), i.e. in a
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portion of the pistol grip (2) remote from the gripping region (4).

4. Hand tool machine according to one of the preceding
5 claims, characterized in that the at least one spring
element (10) comprises a tension spring or compression
spring and/or an elastic body.
5. Hand tool machine according to one of the preceding
10 claims, characterized in that means (9) of adjusting
the bias of the at least one spring element (10) are
provided.
6. Hand tool machine according to one of the preceding
15 claims, characterized in that the swivelling axis (5)
is elastically (13) supported.
7. A hand tool machine substantially as herein described
with reference to the accompanying drawings.



For Innovation

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Application No: GB0520804.6

Examiner: Dr Richard Gregson

Claims searched: 1-7

Date of search: 20 February 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-4	US 2003/132016 A1 (MEIXNER et al) - see diagrams and abstract in particular.
X	1-4 and 6	US 5697456 A (RADLE et al.) - see diagrams, abstract and column 4, line 59 to column 5, line 14 in particular.
X	1-4 and 6	EP 1533084 A1 (ITW) - see diagrams and paragraphs 15-17 in particular.
X	1-5	DE 10036078 A1 (BOSCH) - see diagrams and English language abstracts in particular.
X	1-4	EP 1602450 A2 (BLACK & DECKER) - see Figure 2 in particular.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

B4C; B4K

Worldwide search of patent documents classified in the following areas of the IPC

B25D; B25F; B25G

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI