EUROPEAN PATENT SPECIFICATION

Hammer with resilient swivel pivoted joint
Hammer mit elastischem schwenkbarem Verbindungsstück
Marteau comprenant un joint pivotant élastique

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Description

[0001] The present invention relates to a hammer having a resilient swivel pivoted joint, and in particular to a hammer having a resilient swivel pivoted joint that swings, at a pivot of the resilient swivel pivoted joint, to release a counter force instantaneously created as the hammer strikes an object, so as to avoid possible injury to a user of the hammer.

[0002] A conventional hammer usually has a handle and a head rigidly connected to each other, or has a flexible member inserted in a structure where the head and the handle are connected to each other. In either case, the instantaneous counter force created when the hammer strikes an object will be transmitted back to the handle. As a result, particularly in intensive and heavy strikes, one could easily get his fingers and arm hurt.


[0004] An aim of the present invention is to provide a hammer having at least a resilient swivel pivoted joint, so that the hammer head swings at the swivel point in the same direction as that of the striking to release the counter force instantaneously generated as the hammer strikes a work piece, so as to avoid hurting the user’s fingers and limbs.

[0005] The present invention provides a hammer comprising:

- a handle having a pivot joint at an end thereof;
- a hammer head having pivot joint at a base thereof;
- a pivot shaft extending through the pivot joint of the handle and through the pivot joint of the hammer head for pivotally connecting the handle to the hammer head;
- a flexible member disposed between the handle and the hammer head for generating a counter force when the hammer is used to strike a body; characterised in that
- a flexible sleeve member is disposed around the pivot shaft, and extends into the pivot joint of the handle and into the pivot joint of the hammer head.

[0006] The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:

Fig. 1 is a view of a first preferred embodiment of the present invention;
Fig. 2 is a cross-section taken on the line A-A’ of Fig. 1;
Fig. 3 is a view of the resilient swivel pivoted joint of Fig. 1 in an alternative position;
Fig. 4 is a cross-section taken on the line B-B’ of Fig. 3;
Fig. 5 is a view of a second preferred embodiment of the present invention;
Fig. 6 is a cross-section taken on the line C-C’ of Fig. 5;
Fig. 7 is a view of the resilient swivel pivoted joint of Fig. 5 in an alternative position;
Fig. 8 is a cross-section taken on the line D-D’ of Fig. 7;
Fig. 9 is a view of a third preferred embodiment of the present invention;
Fig. 10 is a cross-section taken on the line E-E’ of Fig. 9;
Fig. 11 is a view of the resilient swivel pivoted joint of Fig. 9 in an alternative position;
Fig. 12 is a cross-section taken on the line F-F’ of Fig. 11;
Fig. 13 is a view of a fourth preferred embodiment of the present invention;
Fig. 14 is a cross-section taken on the line F-F’ of Fig. 13;
Fig. 15 is a view of the resilient swivel pivoted joint of Fig. 13 in an alternative position;
Fig. 16 is a cross-section taken on the line G-G’ of Fig. 15;
Fig. 17 is a view of a fifth preferred embodiment of the present invention;
Fig. 18 is a cross-section taken on the line H-H’ of Fig. 17;
Fig. 19 is a view of a sixth preferred embodiment of the present invention;
Fig. 20 is a cross-section taken on the line I-I’ of Fig. 19;
Fig. 21 is a view of the resilient swivel pivoted joint of Fig. 19 in an alternative position;
Fig. 22 is a cross-section taken on the line J-J’ of Fig. 21;
Fig. 23 is a view of a seventh preferred embodiment of the present invention;
Fig. 24 is a cross-section taken on the line K-K’ of Fig. 23;
Fig. 25 is a view showing how the present invention is incorporated in a handle made of different materials;
Fig. 26 is a cross-section taken on the line L-L’ of Fig. 25;
Fig. 27 is a view showing where a claw is located to the present invention.

[0007] A hammer according to the present invention includes one or more than one swivel pivoted joint, that allows a hammer head to swing in a direction in which the hammer strikes so as to release a counter force instantaneously at the time of the striking. The counter force is released in the swinging direction, having the swivel pivot as a centre of rotation, thus to avoid possible injury to one’s fingers and limbs.

[0008] The hammer of the first preferred embodiment includes a swivel hammerhead structure 100 having two striking ends 102, a pivot 103 and a pivot shaft 105. The pivot shaft 105 may be inserted into a resilient or flexible member (sleeve) 204. The pivot 103 is adapted so as to
allow the hammer head 100 to execute an angular displacement by swinging in a striking direction when either of the striking ends strikes a work piece.

[0009] A handle structure 200 includes a swivel pivot. One end of the handle structure 200 is adapted for a user to hold onto it, while the other end is an output end, and includes a pivot 104 that can be coupled to the pivot 103 using the pivot shaft 105. The pivot shaft 105 is attached either by locking, riveting or caulking, and further is inserted into the resilient or flexible sleeve member 204. The pivot shaft 105 allows angular displacement between the swivel hammerhead structure 100 and the handle structure 200 subject to the striking force.

[0010] A flexible limiting member for the pivoted joint angular displacement is provided between the swivel hammerhead structure 100 and the handle structure 200, which maintains both in a stabilised state when they are not subject to a striking force, and to cause both to execute a flexibly angular displacement when subject to a striking force.

[0011] The flexible limiting member includes a curved plate spring or an equivalent coil spring, or a laminated spring 201. The flexible limiting member is disposed between the swivel hammerhead structure 100 and the handle structure 200.

[0012] As illustrated in Fig. 5, a second preferred embodiment of the present invention is shown. Either or both of the swivel hammerhead structure 100 and the handle structure 200 with swivel pivot extends towards a striking direction. A resilient structure 202 between the swivel hammerhead structure 100 and the handle structure 200 functions as the flexible limiting member for the pivoted joint displacements. A laminated spring 203 may be added between the resilient structure 202 and the swivel hammerhead structure 100.

[0013] As illustrated in Fig. 9, a third preferred embodiment of the present invention is shown. A selected resilient or flexible member 201, such as one made of PU or other plastics material or rubber is disposed between the swivel hammerhead structure 100 and the handle structure 200 to function as the flexible limiting member for the pivoted joint displacement.

[0014] Fig. 13 shows a fourth preferred embodiment of the present invention. A space is defined for executing an angular displacement in the striking direction by a pivoted structure formed by both pivots and between both of the swivel hammerhead structure 100 and the handle structure 200. The resilient structure as disclosed in the preceding paragraphs or the resilient or flexible member 201 as previously disclosed is further disposed in the space for executing an angular displacement. Consequently, the handle structure 200 is capable of maintaining a stable force application state on the flexibility of the swivel hammerhead structure 100 before the striking.

[0015] A spacing or the selected resilient or flexible sleeve member 204 such as that made of PU, other plastics or rubber material or structure is disposed between the handle structure 200 and the hammerhead structure 100 to function as the flexible limiting member for the pivoted joint displacement.

[0016] Alternatively, the handle structure 200 is adapted with a multi-sectional structure as illustrated in Fig. 17 for a fifth preferred embodiment of the present invention. A lateral opening 501 (or a tapered opening) having larger external gradation and smaller internal gradation is provided in the middle section of the hammerhead structure 100, into which opening a relay rod 300 is inserted, the relay rod having one end capped and the other end formed as a pivot structure. The sectional form of the middle section of the relay rod 300 and the form of the opening 501 of the hammerhead structure 100 are square or approximately square, or any other geometric section form that prevents relative rotation of the relay rod 300 and the swivel hammerhead structure 100. The outer diameter of the capped end of the relay rod 300 is greater than the smaller diameter of the lateral opening 501 of the swivel hammerhead structure 100 to prevent the relay rod falling off, while the other end of the relay rod provided with the pivot is coupled to the pivot 103 of the handle structure 200 by means of the pivot shaft 105. The pivot shaft 105 may be inserted into the resilient or flexible sleeve member 204 to enable the hammerhead structure 100 to execute an angular displacement swinging in the striking direction between the hammerhead structure 100 and the handle structure 200. A flexible limiting mechanism for the pivoted joint displacement provided between the hammerhead structure 100 and the handle structure 200, while the flexible limiting member is placed between the relay rod 300 and the hammerhead including the selected resilient or flexible sleeve member 201 made of PU, other plastics material or rubber to function as the flexible limiting member for the pivoted joint displacement. One or more than one of those flexible limiting members for the pivoted joint displacement as previously disclosed is provided between the hammerhead structure 100 and the handle structure 200.

[0017] Fig. 19 shows a sixth preferred embodiment of the present invention. The multi-sectional structure of the handle structure 200 further comprises an additional relay joint 400 disposed between the hammerhead structure 100 and the handle structure 200, and a pivot joint is provided respectively at both ends of the relay joint 400 to be coupled to the pivot joint 103 of the hammerhead structure 100 and to the pivot joint 109 of the handle structure 200 by means of two pivot shafts 105. Each pivot shaft 105 may be inserted into a resilient or flexible sleeve member 204. The middle section of the relay joint 400 extends externally to be coupled to both the hammerhead structure 100 and the handle structure 200, so to provide a flexible limiting member for the pivoted joint displacement comprised of one or more of the configurations previously disclosed.

[0018] The handle structure of multi-sectional structure may further comprise an additional relay joint 600 between the hammerhead structure 100 and the handle structure 200. Both ends of the relay joint 600 are pro-
vided with a pivot structure for insertion to corresponding pivot joints 601 and 602 the handle structure 200 and the hammerhead structure 100 by means of two pivot shafts 105. Each pivot shaft 105 may be inserted into a resilient or flexible sleeve member 204, and is comprised of one or more of the configurations previously disclosed.

Fig. 23 shows a seventh preferred embodiment of the present invention. The handle structure in multi-sectional structure is that of the preferred embodiment illustrated in Figs. 9 and 10, and further comprise, between the hammerhead structure 100 and the handle structure 200, one or more than one section of a laminated or relay block 800 which is provided at its front and rear ends with a respective pivot coupled to corresponding pivots of the swivel hammerhead structure 100 and the handle structure 200, by means of two pivot shafts 105. Each resilient or flexible sleeve member 204 is respectively placed between the coupled pivots so that their swivel angles can be limited. The pivot shafts 105 may be inserted into the resilient or flexible sleeve members 204.

Furthermore, to cope with various needs, the present invention may be adapted with a handle made of different materials, as shown in a preferred embodiment illustrated in Fig. 25. One end 200’ of a grip of the handle structure 200 is made of different material, while the other end is constituted by an output section 701 comprised of a pivot structure, then further coupled to the hammerhead structure 100. A co-axial opening 700 provided in the handle is disposed in the output section 701, and the pivot joint 103 is provided at the output section 701 for coupling to the hammerhead structure 100. The coupling between the output section 701 and the hammerhead structure 100 is made by means of the pivot shaft 105, which may be inserted into the resilient or flexible sleeve member 204. The handle made of different materials may be achieved by a packing means, or by insertion of a fixed packing, or by taking advantage of adhesion or thermal contraction or other fixing means generally known.

In practice, the form and material for the hammerhead structure may vary depending on the application. A conventional claw may be provided to one end of the hammerhead structure of the present invention; or, as illustrated in Fig. 27, the claw is provided on the handle structure 200 that further includes the output section of the pivot structure.

**Claims**

1. A hammer comprising:
   - a handle (200) having a pivot joint (103) at an end thereof;
   - a hammer head (100) having pivot joint (104) at a base thereof; and
   - a pivot shaft (105) extending through the pivot joint of the handle and through the pivot joint of the hammer head for pivotally connecting the handle to the hammer head; **characterised in that**
     - a flexible member (201, 202, 203) is disposed between the handle and the hammer head for generating a counter force when the hammer is used to strike a body; and
     - a flexible sleeve member (204) is disposed around the pivot shaft, and extends into the pivot joint of the handle and into the pivot joint of the hammer head.

2. A hammer as claimed in claim 1, wherein the hammer head (100) has two striking ends (102).

3. A hammer as claimed in claim 1 or claim 2, wherein the flexible member (201, 202, 203) is adapted to maintain both the handle (200) and the hammer head (100) in a stabilised state when they are not subject to a striking force, and to allow both the handle and the hammer head to displace angularly in a striking direction and relative to each other when subject to a striking force.

4. A hammer as claimed in any one of claims 1 to 3, wherein the flexible member comprises a spring (201).

5. A hammer as claimed in claim 4, wherein the spring (201) extends longitudinally in the striking direction, and is disposed between the pivot shaft (105) and the hammer head (100).

6. A hammer as claimed in claim 4, wherein the spring (201) extends longitudinally in the striking direction, and is disposed between the pivot shaft (105) and the handle (200).

7. A hammer as claimed in any one of claims 1 to 3, wherein the flexible member is constituted by a flexible structure (202) forming part of the handle (200).

8. A hammer as claimed in any one of claims 1 to 3, wherein the flexible member comprises a flexible structure (202) forming part of the handle (200) and a spring (203).

9. A hammer as claimed in any one of claims 1 to 8, wherein the flexible member (201, 202, 203) is such as to limit angular displacement between the handle (200) and the hammer head (100) in the striking direction when subject to a striking force.

10. A hammer as claimed in any one of claims 1 to 9, wherein the flexible member (201, 202, 203) is made of at least one of a plastics material and rubber.
11. A hammer as claimed in any one of claims 1 to 10, wherein the hammer head (100) has a lateral opening (501) therethrough, and a relay rod (300) is disposed in the lateral opening, one end of the relay rod being pivotally connected to the handle (200) using the pivot shaft (105), the flexible member (201) being disposed in the lateral opening and surrounding the relay rod.

12. A hammer as claimed in claim 11, wherein the relay rod (300) has an enlarged head that has a diameter that is greater than a diameter of the lateral opening (501).

13. A hammer as claimed in any one of claims 1 to 12, wherein the handle (200) has a multi-sectional structure, and includes a relay joint (400) pivotally connected to the hammer head (100) using the pivot shaft (105), the handle further including a lower section pivotally connected to the relay joint.

14. A hammer as claimed in any one of claims 1 to 13, wherein one end of the hammer head (100) has a claw.

Patentansprüche

1. Ein Hammer bestehend aus:
   - einem Griffstück (200), versehen mit einem schwenkbaren Verbindungsstück (103) an seinem Ende;
   - einem Hammerkopf (100), versehen mit einem schwenkbaren Verbindungsstück (104) an seiner Basis; und
   - einem schwenkbaren Schaft (105), der sich durch das schwenkbare Verbindungsstück des Griffstückes und durch das schwenkbare Verbindungsstück des Hammerkopfes erstreckt und hierdurch das Griffstück mit dem Hammerkopf schwenkbar verbindet, dadurch gekennzeichnet, dass ein flexibles Bauteil (201, 202, 203) zwischen dem verschwenkbaren Schaft (105) und dem Griffstück (200) angeordnet ist.

2. Ein Hammer wie in dem Anspruch 1 beansprucht, wobei der Hammerkopf (100) zwei Aufprallenden (102) aufweist.

3. Ein Hammer wie in den Ansprüchen 1 oder 2 beansprucht, wobei das flexible Bauteil (201, 202, 203) dafür geeignet ist, sowohl das Griffstück (200) als auch den Hammerkopf (100) in einem stabilisierten Zustand zu halten, wenn diese dazu verwendet werden sollen, einen Kraftstoß nicht auszuführen und es beiden, sowohl dem Griffstück als auch dem Hammerkopf es somit ermöglicht wird relativ zueinander abgewinkelt versetzt angeordnet zu sein und in die Kraftstoßrichtung bringbar sind, sobald der Kraftstoß ausgeführt wird.

4. Ein Hammer wie in einem der Ansprüche 1 bis 3 beansprucht, wobei das flexible Bauteil eine Feder (201) umfasst.

5. Ein Hammer wie in Anspruch 4 beansprucht, wobei die Feder (201) sich longitudinal in Schlagrichtung erstreckt und zwischen dem verschwenkbaren Schaft (105) und dem Hammerkopf (100) angeordnet ist.

6. Ein Hammer wie im Anspruch 4 beansprucht, wobei die Feder (201) sich longitudinal in Schlagrichtung erstreckt und zwischen dem schwenkbaren Schaft (105) und dem Griffstück (200) angeordnet ist.

7. Ein Hammer wie in einem der Ansprüche 1 bis 3 beansprucht, wobei das flexible Bauteil eine flexible Struktur (202) gebildet wird, die ein Teil des Griffstückes (200) ausbildet.

8. Ein Hammer wie in einem der Ansprüche 1 bis 3 beansprucht, wobei das flexible Bauteil eine flexible Struktur (202) umfasst, die einen Teil des Griffstückes (200) und der Feder (203) ausbildet.

9. Ein Hammer wie in einem der Ansprüche 1 bis 8 beansprucht, wobei das flexible Bauteil (201, 202, 203) so ausgebildet ist, dass es den Winkelwert zwischen dem Griffstück (200) und dem Hammerkopf (100) in Schlagrichtung beschränkt, sobald dieser einen Kraftstoß ausführen soll.

10. Ein Hammer wie in einem der Ansprüche 1 bis 9 beansprucht, wobei das flexible Bauteil (201, 202, 203) aus wenigstens einem Plastik- und Gummi- Material hergestellt ist.

11. Ein Hammer wie in einem der Ansprüche 1 bis 10 beansprucht, wobei der Hammerkopf (100) eine laterale Öffnung (501) umfasst, durch die ein Flachkopfbolzen (300) einfühbar ist und ein Ende des Flachkopfbolzens schwenkbar mit dem Griffstück (200) verbunden ist, unter Einbeziehung des verschwenkbaren Schafts (105)und das flexible Bauteil (201) in der lateralen Öffnung angeordnet ist und den Flachkopfbolzen umgibt.
12. Ein Hammer wie im Anspruch 11 beansprucht, wobei der Flachkopfbolzen (300) einen vergrößerten Kopf aufweist, der im Durchmesser größer ausgebildet ist als der Durchmesser der lateralen Öffnung (501).

13. Ein Hammer wie in einem der Ansprüche 1 bis 12 beansprucht, wobei das Griffstück (200) eine mehrteilige Struktur aufweist, die ein weiter leitendes Verbindungsstück (400) umfasst, welches schwenkbar mit dem Hammerkopf (100) verbunden ist, und das den schwenkbaren Schaft (105) mit verwendet und das Griffstück des Weiteren einen unteren Teilabschnitt umfasst, der schwenkbar mit dem weiter leitenden Verbindungsstück verbunden ist.

14. Ein Hammer wie in einem der Ansprüche 1 bis 13 beansprucht, wobei ein Ende des Hammerkopfes (100) eine Kralle ist.

Revendications

1. Marteau comprenant :
   . un manche (200) présentant une articulation de pivotement (103) à une de ses extrémités ;
   . une tête de marteau (100) présentant l’articulation de pivotement (104) au niveau de sa base ; et
   . un axe de pivot (105) traversant l’articulation de pivotement du manche et l’articulation de pivotement de la tête de marteau pour relier à pivotement le manche à la tête de marteau ;

caractérisé en ce qu’un élément flexible (201, 202, 203) est logé entre le manche et la tête de marteau pour produire une force antagoniste lorsque le marteau est utilisé pour frapper un corps ; et en ce qu’une douille flexible (204) est logée autour de l’axe de pivot et s’étend à l’intérieur de l’articulation de pivotement du manche et à l’intérieur de l’articulation de pivotement de la tête de marteau.

2. Marteau selon la revendication 1, dans lequel la tête de marteau (100) présente deux extrémités de frappe (102).

3. Marteau selon la revendication 1 ou la revendication 2, dans lequel l’élément flexible (201, 202, 203) est prévu pour maintenir le manche (200) et la tête de marteau (100) dans une position stable lorsqu’ils ne sont pas soumis à une force de frappe, et pour permettre à la fois au manche et à la tête de marteau de se déplacer de manière angulaire dans le sens de la frappe et l’un par rapport à l’autre lorsqu’ils sont soumis à une force de frappe.


5. Marteau selon la revendication 4, dans lequel le ressort (201) s’étend longitudinalement dans le sens de la frappe, et est logé entre l’axe de pivot (105) et la tête de marteau (100).

6. Marteau selon la revendication 4, dans lequel le ressort (201) s’étend longitudinalement dans le sens de la frappe, et est logé entre l’axe de pivot (105) et le manche (200).

7. Marteau selon l’une quelconque des revendications 1 à 3, dans lequel l’élément flexible est constitué par une structure flexible (202) faisant partie du manche (200).

8. Marteau selon l’une quelconque des revendications 1 à 3, dans lequel l’élément flexible comporte une structure flexible (202) faisant partie du manche (200) et un ressort (203).

9. Marteau selon l’une quelconque des revendications 1 à 8, dans lequel l’élément flexible (201, 202, 203) est prévu pour limiter le déplacement angulaire entre le manche (200) et la tête de marteau (100) dans le sens de la frappe lorsqu’ils sont soumis à une force de frappe.

10. Marteau selon l’une quelconque des revendications 1 à 9, dans lequel l’élément flexible (201, 202, 203) est réalisé au moins à partir de matière plastique et de caoutchouc.

11. Marteau selon l’une quelconque des revendications 1 à 10, dans lequel la tête de marteau (100) présente une ouverture latérale (501) traversante, et dans lequel une tige de liaison (300) est logée dans l’ouverture latérale, une extrémité de la tige de liaison étant reliée à pivotement au manche (200) au moyen de la tige de liaison (105), l’élément flexible (201) étant disposé dans l’ouverture latérale et entourant la tige de liaison.

12. Marteau selon la revendication 11, dans lequel la tige de liaison (300) présente une tête élargie de diamètre supérieur à celui de l’ouverture latérale (501).

13. Marteau selon l’une quelconque des revendications 1 à 12, dans lequel le manche (200) présente une structure multi-sectionnelle, et comporte une articulation de liaison (400) reliée à pivotement à la tête de marteau (100) au moyen de l’axe de pivot (105), le manche comprenant en outre une partie inférieure reliée à pivotement à l’articulation de liaison.
14. Marteau selon l’une quelconque des revendications 1 à 13, dans lequel une extrémité de la tête de marteau (100) présente un pied-de-biche.
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description