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Handheld cutting tool

Abstract

Handheld cutting tool for driving a disc blade, including a housing, a hood for covering the disc blade, wherein the hood is rotatably mounted on the housing, a holding fixture for arresting rotation of the hood on the housing, wherein the holding fixture includes a toothing that is arranged on the hood and a spring-loaded pawl for engaging the toothing, wherein the pawl is arranged on the housing, characterized in that the holding fixture includes a flat spring, wherein the pawl is formed by the flat spring.

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Background/Summary

[0001] This claims priority to European application EP 24156791.6, filed on Feb. 9, 2024 which is hereby incorporated by reference herein.

[0002] The invention relates to a handheld cutting tool for driving a disc blade.

BACKGROUND

[0003] Rotating disc blades which are driven by handheld cutting tools are usually protected against being touched by means of a protective hood. Such a protective hood can also be useful for catching the particle stream that arises during cutting.

SUMMARY OF THE INVENTION

[0004] In order to adjust the rotational position of such a hood, handheld cutting tools might be provided with a holding fixture, which might provide discrete or continuous arresting of the hood. The holding fixture might include a swivel bearing comprising a latching mechanism or a friction damper. The holding fixture might be exposed to the particles produced during cutting and or the generally harsh conditions that prevail at the construction site.

[0005] A holding fixture including a latching mechanism usually comprises a plurality of unique mechanical components. An example of such a latching mechanism is disclosed in CN113000928 B.

[0006] It is an object of the invention to provide a handheld cutting tool with an arrestable rotatable protective hood that provides, at particularly low manufacturing effort, particularly satisfactory performance and/or reliability.

[0007] The invention provides a handheld cutting tool for driving a disc blade, comprising a housing, a hood for covering the disc blade, wherein the hood is rotatably mounted on the housing, a holding fixture for arresting rotation of the hood on the housing, wherein the holding fixture comprises a toothing that is arranged on the hood and a spring-loaded pawl for engaging the toothing, wherein the pawl is arranged on the housing, characterized in that the holding fixture comprises a flat spring, wherein the pawl is formed by the flat spring.

[0008] The invention provides a latch-type holding fixture, and to integrate the spring functionality and the pawl functionality of the holding fixture into a monolithic flat spring. This in term allows to have a particular small number of parts, in particular moving parts, in the holding fixture, which in term can provide particularly high reliability or low maintenance effort at particularly low manufacturing effort.

[0009] In accordance with usual professional understanding, a flat spring is a spring made of a flat spring material (preferably spring steel). Preferably by one or more straight bending steps or also by free forming.

[0010] The disc blade can preferably be a diamond cutting disc. Throughout this document, and unless indicated otherwise, the terms “axially”, “longitudinally”, “radially”, “tangentially” and “circumferentially” can refer, in particular, to the axis of rotation of the protective hood relative to the housing or/and to the axis of rotation of disc blade relative to the housing, wherein these two axes might advantageously coincide.

[0011] It is particularly preferred that the flat spring comprises a push pad for manually withdrawing the pawl from the toothing. Accordingly, the flat spring has a designated and accessible area, namely the push pad, which can be manually pushed in order to release the holding fixture so as to allow free rotation of the hood on the housing. This can further improve handling. The push pad can preferably be generally flat. In particular, the push pad can be a free end of the flat spring, which might further reduce manufacturing effort. Optionally, an additional element made of plastic material might be provided on the push pad, e.g., in order to improve ergonomics.

[0012] The flat spring might advantageously comprise a V-shaped section that forms the pawl. This can further improve performance or/and reduce manufacturing effort. In particular, the V-shaped section might include a first leg and a second leg which are, in particular, connected by a straight bend (which may define a bend line).

[0013] In a first advantageous embodiment, the flat spring comprises a L-shaped section comprising a first leg and a second leg, wherein the push pad is provided on the first leg of the L-shaped section, and wherein the second leg of the L-shaped section is the first leg of the V-shaped section. This second leg of the L-shaped section, which is the first leg of the V-shaped section, is preferably flat. This can further reduce manufacturing effort and/or improve operation. In particular, the pawl might be configured to be displaced radially or/and tangentially in this embodiment. A stop element might be provided, in particular on the housing, to provide an abutment for the flat spring in order to avoid overextension of the flat spring during operation.
[0014] In a second advantageous embodiment, the flat spring comprises a Y-shaped section, comprising a first leg, a second leg, and a third leg, wherein the pawl is provided on the first leg of the Y-shaped section, and wherein the push pad is provided on the second leg of the Y-shaped section, and wherein the flat spring is mounted on the housing on the third leg of the Y-shaped section. This can further reduce manufacturing effort and/or improve operation. In particular, the pawl might be configured to be displaced axially in this embodiment. It is particularly preferred that the first leg of the Y-shaped section forms the second leg of the V-shaped section. This can provide a particularly compact design and or low manufacturing effort.
[0015] The flat spring is arranged on the housing. Advantageously, the flat spring is mounted on the housing by means of at least one screw fastener, more preferably by means of two screw fasteners. The at least one screw fastener is preferably headed and/or extends through the flat spring. Alternatively or additionally, the flat spring might be positioned in a slit in the housing. At least one barb tab might be provided on the flat spring for locking the flat spring on the housing. It is also possible to mount the flat spring on the housing by means of riveting, caulking, gluing, soldering, and by other connecting methods.
[0016] According to another preferred embodiment of the invention, the pawl and the toothing form a ratchet mechanism, which allows the hood to be moved in one direction of rotation without the need to manually operate the pawl. Said “one direction of rotation” might in particular be a direction that advances a handle knob of the hood away from a handhold arranged on the housing, i.e., a direction of rotation that advances the hood forwards, away from the handhold or/and from the motor. In particular, said “one direction of rotation” might be a direction which brings the hood from a relatively exposed position into a relatively safe position.
[0017] It is particularly preferred that the toothing is an inclined toothing, so that the pawl and the toothing form a ratchet mechanism. This might provide a particular reliable and easy to manufacture ratchet mechanism.
[0018] The invention is explained in greater detail below with reference to preferred exemplary embodiments, which are depicted schematically in the accompanying drawings. Individual features of the exemplary embodiments presented below can be implemented either individually or in any combination within the scope of the present invention.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0019] FIG. **1** is a perspective, partly cutout view, of a first embodiment of a handheld cutting tool.
[0020] FIG. **2** is a detail view of the flat spring of the handheld cutting tool of FIG. **1**.
[0021] FIG. **3** is a detail view of the hood and of the flat spring of the handheld cutting tool of FIG. **1**.
[0022] FIG. **4** is a detail view of the housing, in particular of the gear housing with bearing flange thereof, and of the flat spring of the handheld cutting tool of FIG. **1**.
[0023] FIGS. **5** and **6** are detail views of the flat spring and of the hood of the handheld cutting tool of FIG. **1**, with the hood in different rotational positions, respectively. The position of FIG. **5** can be

an end position.
[0024] FIG. **7** a perspective, partly cutout view, of a second embodiment of a handheld cutting tool.
[0025] FIG. **8** is a detail view of the flat spring of the handheld cutting tool of FIG. **7**.
[0026] FIG. **9** is a detail view of the hood and of the flat spring of the handheld cutting tool of FIG. **7**.

DETAILED DESCRIPTION

[0027] FIGS. **1** to **6** illustrate a first embodiment of a handheld cutting tool **101** for driving a disc blade **109**. The tool **101** comprises a housing **110**, which houses a motor for rotationally actuating the disc blade **109**, and preferably a control unit for said motor. The housing **110** comprises a gear housing with bearing flange **115**, on which the disc blade **109** is rotatably mounted. The tool **101** furthermore comprises an arcuate handhold **105** that is attached to the housing **110**.
[0028] The tool **101** furthermore comprises a protective hood **120** for, circumferentially, covering the disc blade **109**. Said hood **120** is, rotatably, mounted on the housing **110**, in particular on the gear housing with bearing flange **115** thereof. A handle knob **121** is attached to the hood **120**, for manually rotating the hood **120**.
[0029] The tool **101** furthermore comprises a holding fixture, which is able to, releasably, arrest the above-mentioned rotation of the hood **120** with respect to the housing **110**, in particular at discrete locking positions. The holding fixture comprises a toothing **125** that is arranged on the hood **120**, in particular on a face of the hood **120**. In the present embodiment, the toothing **125** and the hood **120** are monolithic, but this is an example only. The holding fixture furthermore comprises a spring-loaded pawl **132**, arranged on the housing **110**, for engaging the toothing **125**, so as to arrest the above-mentioned rotation of the hood **120**. The pawl **132** is spring-loaded, wherein this spring-loading forces the pawl **132** into the toothing **125** (radially with respect to the axis of rotation). A push pad **131** is connected to the pawl **132** for manually withdrawing the pawl **132** from the toothing **125** so as to release the rotational arrest of the holding fixture.
[0030] The toothing **125** is an inclined toothing, so that the pawl **132** and the toothing **125** form a ratchet mechanism, which allows rotation in a first direction, and arrests rotation in a second opposite direction. In the present embodiment, said allowed first direction would be the clockwise direction in the view of FIGS. **5** and **6**, and said arrested second direction would be the counterclockwise direction in the view of FIGS. **5** and **6**. In other words, said allowed first direction would be one that moves the handle knob **121** away from the handhold **105** (see FIG. **1**).
[0031] The tool **101**, namely the holding fixture thereof, comprises a flat spring **130**, wherein the pawl **132** is formed by the flat spring **130**. More particularly, the flat spring **130** comprises a V-shaped section comprising a first leg **151** and a second leg **152**, and a straight bend connecting the first leg **151** and the second leg **152** with one another. This V-shaped section of the flat spring **130** forms the pawl **132**.
[0032] The flat spring **130** furthermore comprises a L-shaped section, comprising a first leg **141** and a second leg **142**, and a straight bend connecting the first leg **141** and the second leg **142** with one another. The push pad **131** is provided on the first leg **141** of the L-shaped section, and the second leg **142** of the L-shaped section is the first leg **151** of the V-shaped section.
[0033] The flat spring comprises a generally flat connector tab **139**, which connects the flat spring to the housing **110**. In the present embodiment, the flat spring **130** is connected to the housing **110**, in particular to the gear housing with bearing flange **115** thereof, by means of two screw fasteners **119**″ and **119**″ (see FIG. **4**), which extend through the flat spring **130**, in particular through the connector tab **139** thereof.
[0034] The flat spring **130** comprises a generally flat intermediate tab **138** (see FIG. **2**), which is arranged adjacent to the connector tab **139**, and which is connected to the connector tab **139** via a straight bend of the flat spring **130**. The flat spring **130** comprises a spring leg **137**, which is arranged adjacent to the intermediate tab **138**, and which is connected to the intermediate tab **138** via a straight bend of the flat spring **130**. The second leg **152** of the V-shaped section of flat spring

130 is arranged adjacent to the spring leg **137** and is connected to the spring leg **137** via a straight bend of the flat spring **130**.
[0035] At least one of the second leg **152** of the V-shaped section, the first leg **151** of the V-shaped section, the first leg **141** of the L-shaped section, the second leg **142** of the L-shaped section, and/or push pad **131** are generally flat. In the shown embodiment, all of said elements are generally flat.
[0036] A stop **116** (see FIG. **4**) is arranged on the housing **110**, in particular on the gear hosing with bearing flange **115**. The stop **116** provides an abutment for the flat spring **130**, so as to delimit the path of pawl **132** away from the toothing **125**.
[0037] FIGS. **7** to **9** show second embodiment of a handheld cutting tool **201** for driving a disc blade **209**. The first and the second embodiments share a common basic concept. Thus, unless indicated otherwise, the description of the first embodiment applies mutatis mutandis to the second embodiment, and vice versa, unless indicated otherwise.
[0038] The tool **201** of the second embodiment comprises a housing **210**, which houses a not shown motor for rotationally actuating the disc blade **209** and preferably a not shown control unit for said motor. The housing **210** comprises a gear housing with bearing flange **215**, on which the disc blade **209** is rotatably mounted. The tool **201** furthermore comprises an arcuate handhold **205** that is attached to the housing **210**.
[0039] The tool **201** furthermore comprises a protective hood **220** for, circumferentially, covering the disc blade **209**. Said hood **220** is, rotatably, mounted on the housing **210**, in particular on the gear housing with bearing flange **215** thereof. A handle knob **221** is attached to the hood **220**, for manually rotating the hood **220**.
[0040] The tool **201** furthermore comprises a holding fixture, which is able to, releasably, arrest the above-mentioned rotation of the hood **220** with respect to the housing **210**, in particular at discrete locking positions. The holding fixture comprises a toothing **225** that is arranged on the hood **220**, in particular on a face of the hood **220**. In the present embodiment, the toothing **225** and the hood **220** are monolithic, but this is an example only. The holding fixture furthermore comprises a spring-loaded pawl **232**, arranged on the housing **210**, for engaging the toothing **225**, so as to arrest the above-mentioned rotation of the hood **220**. The pawl **232** is spring-loaded, wherein this spring-loading forces the pawl **232** into the toothing **225** (axially with respect to the axis of rotation). A push pad **231** is connected to the pawl **232** for manually withdrawing the pawl **232** from the toothing **225** so as to release the rotational arrest of the holding fixture.
[0041] The toothing **225** is an inclined toothing, so that the pawl **232** and the toothing **225** form a ratchet mechanism, which allows rotation in a first direction, and arrests rotation in a second opposite direction. In the present embodiment, said allowed first direction would be the clockwise direction in the view of FIGS. **7** and **9**, and said arrested second direction would be the counterclockwise direction) in the view of FIGS. **7** and **9**. In other words, said allowed first direction would be one that moves the handle knob **221** away from the handhold **205**.
[0042] The tool **201**, namely the holding fixture thereof, comprises a flat spring **230**, wherein the pawl **232** is formed by the flat spring **230**. More particularly, the flat spring **230** comprises a V-shaped section comprising a first leg **251** and a second leg **252**, and a straight bend connecting the first leg **251** and the second leg **252** with one another. This V-shaped section of the flat spring **230** forms the pawl **232**.
[0043] The flat spring **230** comprises a Y-shaped section, comprising a first leg **261**, a second leg **262**, and a third leg **263**, wherein the pawl **232** is provided on the first leg **261** of the Y-shaped section, and wherein the push pad **231** is provided on the second leg **262** of the Y-shaped section, and wherein the flat spring **230** is mounted on the housing **210** on the third leg **263** of the Y-shaped section. The first leg **261** of the Y-shaped section forms the second leg **252** of the V-shaped section.
[0044] The flat spring comprises a generally flat connector tab **239**, which connects the flat spring to the housing **210**. In the present embodiment, the flat spring **230** is connected to the housing **210**, in particular to the gear housing with bearing flange **215** thereof, by means of two not shown screw

fasteners, which extend through the flat spring **230**, in particular through the connector tab **239** thereof.
[0045] The flat spring **230** comprises a generally flat intermediate tab **238**, which is arranged adjacent to the connector tab **239**, and which is connected to the connector tab **239** via a straight bend of the flat spring **230**. The Y-shaped section is arranged adjacent to the intermediate tab **238** and is connected to the intermediate tab **238** via a straight bend of the flat spring **230**.

Claims

1. A handheld cutting tool for driving a disc blade, the tool comprising a housing; a hood for covering the disc blade, the hood being rotatably mounted on the housing; a holding fixture for arresting rotation of the hood on the housing, the holding fixture including a toothing arranged on the hood and a flat spring, the flat spring having a spring-loaded pawl for engaging the toothing, the pawl being arranged on the housing.
2. The tool as recited in claim 1 wherein the flat spring includes a push pad for manually withdrawing the pawl from the toothing, and the flat spring includes a V-shaped section forming the pawl.
3. The tool as recited in claim 2 wherein the flat spring includes a L-shaped section including a first leg and a second leg, the push pad being provided on the first leg of the L-shaped section, and the second leg of the L-shaped section is a first V leg of the V-shaped section.
4. The tool as recited in claim 2 wherein the flat spring includes a Y-shaped section including a first leg, a second leg, and a third leg, the pawl being provided on the first leg of the Y-shaped section, and the push pad being provided on the second leg of the Y-shaped section, the flat spring being mounted on the housing on the third leg of the Y-shaped section.
5. The tool as recited in claim 4 wherein the first leg of the Y-shaped section forms a second V leg of the V-shaped section.
6. The tool as recited in claim 1 wherein the flat spring is mounted on the housing via at least one screw fastener.
7. The tool as recited in claim 6 wherein the flat spring is positioned in a slit in the housing.
8. The tool as recited in claim 1 wherein the flat spring is positioned in a slit in the housing.
9. The tool as recited in claim 1 wherein the toothing is an inclined toothing, so that the pawl and the toothing form a ratchet mechanism.