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(54) A CONNECTING DEVICE

(57) A connecting device (10) arranged for connecting a power supply device to a chargeable power storage unit of a machine. It comprises an elongated body (12) arranged to be electrically connected to said chargeable power storage and having a top part (14) extending above a housing (16) of said machine, wherein said elongated body (12) is arranged to be mechanically fixed in relation to said housing (16) and wherein said top part (14) is provided with at least one electrically conducting section (20), and an electrically non-conducting cover (18) arranged to alternatively cover said electrically conducting section (20) and to expose said electrically conducting section (20) of said top part (14) for receiving a connector that is electrically connected to said power supply.

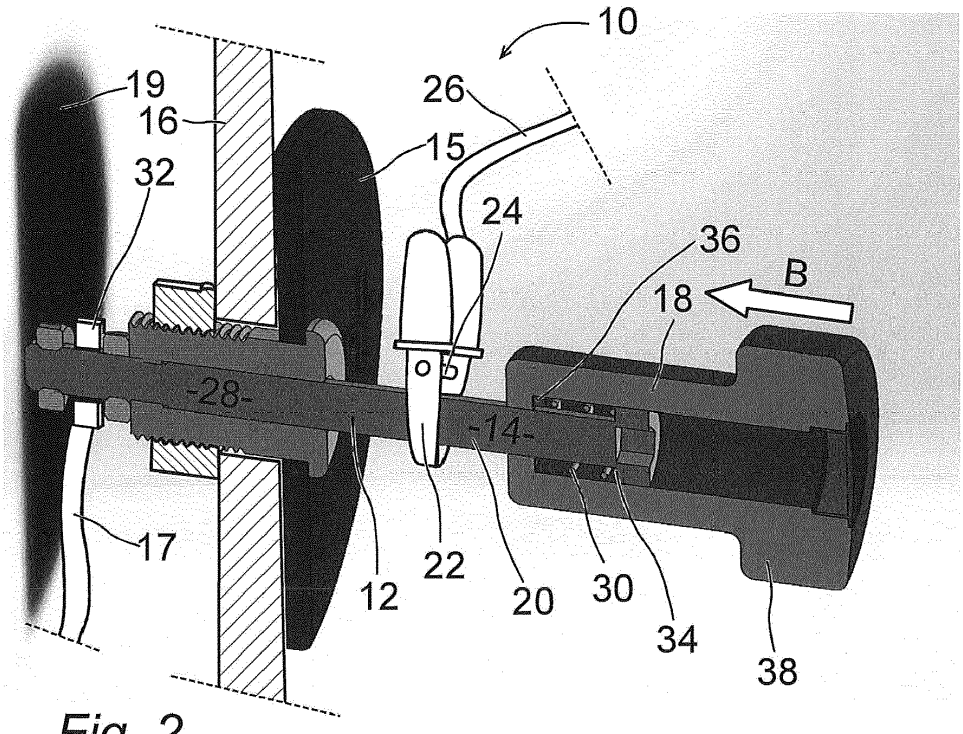

Fig. 2

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Description

TECHNICAL FIELD

[0001] The invention relates to a connecting device arranged for connecting a power supply device to a chargeable power storage unit of a machine.

BACKGROUND

[0002] Many machines and power tools in the construction industry and other industrial sectors has a battery or another chargeable power source. It is used for providing power to a motor for running the machine or to a starter when the machine is provided with a combustion engine. The battery or other chargeable power source normally can be charged when it is mounted to the machine.

SUMMARY OF THE INVENTION

[0003] In accordance with one aspect of the invention, a connecting device is arranged for connecting a power supply device to a chargeable power storage unit of a machine. It comprises an elongated body arranged to be electrically connected to said chargeable power storage and having a top part extending above a housing of said machine, wherein said elongated body is arranged to be mechanically fixed in relation to said housing and wherein said top part is provided with at least one electrically conducting section, and an electrically non-conducting cover arranged to alternatively cover said electrically conducting section, and to expose said electrically conducting section of said top part for receiving a connector that is electrically connected to said power supply.

[0004] It would be desirable to facilitate the charging of the machine by providing a connection point on the machine, wherein the connection point is electrically connected to the battery. Obviously, the connection point cannot be directly accessible because it is connected to one pole of the battery and could cause a short circuit, should any electrically conducting equipment engage it.

[0005] A prior art device is disclosed in EP2804262. It discloses a connection device with a contact element with an electrically conductive surface. A spring device is biased in such a way, that the contact element can be held in a protected position through the biased spring device. The contact element is surrounded by a protective housing in the protective position. An electrically insulated handle on the contact element is used to move the contact element against a bias of the spring device from a protected position to a connection position. In the connection position at least a portion of the contact element is arranged outside a protective housing.

[0006] A connecting device as disclosed herein comprises an elongated body with at least one electrically conducting section. The elongated body is arranged to connect the electrically conducting section to a pole of a battery and is mounted in a fixed relationship with a frame or housing of the machine. In various embodiments, the elongated body is formed by an electrically conducting material. When the connecting device is mounted on the housing or frame, the electrically conducting section extends from the housing. In a normal operating mode, the electrically conducting section is covered by a non-conducting cover. In this mode, the electrically conducting section is protected from an unintentional connection of any electrically conduction tool or device to the pole of the battery, and also from any contact by an operator of the machine. In a charging mode, the non-conducting cover is positioned so that the electrically conducting section is exposed and can receive a connector that can be electrically connected to a charger or a power supply.

[0007] Additional advantages will be set forth in part in the description which follows or may be learned by practice. The advantages will be realized and attained by means of the elements and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments and together with the description, serve to explain the principles of the methods and systems. In the drawings,

Fig. 1 is a schematic perspective cross section view of an embodiment of the disclosed connecting device in a normal operating mode, and

Fig. 2 is a schematic perspective cross section view of the connecting device of Fig. 1 in a charging mode.

DETAILED DESCRIPTION

[0009] In the embodiment shown in Fig. 1 a connecting device 10 is mounted in a housing 16 of a machine, such as a compactor or other building or construction machine. The connecting device 10 comprises an elongated body 12 with a top part 14 extending from the housing 16. The top part 14 is electrically connected to a battery (not shown) through an electrically conducting element and a battery cable 17. The top part 14 is formed with at least a section 20 that is electrically conducting. The elongated body 12 can comprise electrically conducting elements that connects the electrically conducting section 20 to the battery cable 17. In various embodiments, the elongated body 12 is formed by an electrically conducting material. The elongated body is fixedly mounted in relation to said housing 16 or to a frame 19 of the machine. In the embodiment shown in Fig. 1 and Fig. 2, the connecting device 10 comprises an externally threaded sleeve 11 mounted in a through hole in the housing 16 and fixed to the housing 16 by a nut 13. The sleeve 11 is attached to a plate 15 preferably made of electrically

non-conducting material.

[0010] In the position shown in Fig. 1, which can be referred to as a normal operating mode, the electrically conducting section 20 is covered by a non-conducting cover 18. As a result, any unintentional engaging of the electrically conducting section 20 is prevented. This is important because the electrically conducting section 20 is in fact electrically connected to a pole of the battery. The non-conducting cover 18 can be moved or displaced from the position shown in Fig. 1 to a position where the electrically conducting section 20 is exposed. This position can be referred to as a charging position and is shown in Fig. 2. The non-conducting cover 18 can be moved from the first position to the second position, for instance by providing a threaded section on the elongate body 12. In various embodiments, the non-conducting cover 18 comprises a foldable section that normally covers the electrically conducting section 20 and that can be folded to a position where the electrically conducting section 20 is uncovered.

[0011] In the embodiment shown in Fig. 1 and Fig. 2, the non-conducting cover 18 is supported by the elongated body 12 and is sliding on the elongated body 12 between the first position and the second position. In various embodiments, the non-conducting cover 18 is hollow and receives, in the first position, at least the electrically conducting section 20 of the elongated body 12. By pulling the non-conducting cover 18 from the position shown in Fig. 1 to the (charging) position shown in Fig. 2 as indicated by arrow A, the electrically conducting section 20 of the elongated body 12, or at least a part thereof, is uncovered. After charging the battery, the non-conducting cover 18 can be slid or pushed back to the first position in the direction indicated by arrow B, c.f. Fig. 2.

[0012] In the second position of the non-conducting cover 18 as shown in Fig. 2, a connector 22 is attached over the electrically conducting section 20, and is electrically connected thereto by a clamping mechanism 24. A connecting cable 26 is electrically connected to the connector 22 and to a charger or a power supply (not shown). The electrically conducting section 20 is electrically connected by the battery cable 17 to the battery (not shown) of the machine. In the embodiment shown in Fig. 1 and Fig. 2 the elongated body 12 is made of an electrically conducting material and the electrically conducting section 20 is provided at the top part 14. The battery cable 17 is connected to a bottom part 28 of the elongated body 12 below the housing 16.

[0013] In the embodiment shown in Fig. 1 and Fig. 2, the elongated body 12 including the bottom part 28 is fixed in relation to the housing 16 and other parts of the machine where it is used. The bottom part 28 is maintained in a fixed position below the housing 16 and the top part 14 is maintained in a fixed position above the housing 16 at all times. Thus, the electrical connection between the elongated body 12 and the battery, illustrated in the figures by the battery cable 17 and a cable connector, such as a cable lug 32, can be any type of fixed connection because there are no moving parts in any electrical components.

[0014] The non-conducting cover 18 is moved between the first position and the second position either manually in both directions or biased into one position, preferably the first position. In the embodiment shown in Fig. 1 and Fig. 2, the non-conducting cover 18 is spring biased to the position shown in Fig. 1. A spring 30 is provided in a hollow space inside the non-conducting cover 18. In various embodiments, the spring 30 is helical and extending around the elongated body 12. The spring 30 is biased between a head 34 at the end of the top part 14 and a shoulder 36 provided in the non-conducting cover 18. The non-conducting cover 18 is formed as a knob with a radially extending protrusion 38 that facilitates the pulling of the non-conducting cover 18 from the first position to the second position against the force of the spring 30. In the embodiment shown in Fig. 1 and Fig. 2, the spring 30 is completely enclosed by the non-conducting cover 18. As a result, no external objects could cause any jamming or failure of the operation of the spring 30.

[0015] It will be apparent to those skilled in the art that various modifications and variations can be made without departing from the inventive concept. Other embodiments will be apparent to those skilled in the art from consideration of the specification and practice disclosed herein. It is intended that the specification and examples be considered as exemplary only, and that the claims be construed as encompassing all equivalents of the present invention which are apparent to those skilled in the art to which the invention pertains.

Claims

1. A connecting device (10) arranged for connecting a power supply device to a chargeable power storage unit of a machine, **characterised by**
   an elongated body (12) arranged to be electrically connected to said chargeable power storage and having a top part (14) extending above a housing (16) of said machine, wherein said elongated body (12) is arranged to be mechanically fixed in relation to said housing (16) and wherein said top part (14) is provided with at least one electrically conducting section (20); and
   an electrically non-conducting cover (18) arranged to alternatively cover said electrically conducting section (20), and to expose said electrically conducting section (20) of said top part (14) for receiving a connector that is electrically connected to said power supply.

2. The connecting device (10) as claimed in claim 1, wherein
   the elongated body (12) is formed by an electrically conducting material.

3. The connecting device (10) as claimed in claim 1 or 2, wherein
the electrically non-conducting cover (18) is spring biased to a first position where said electrically conducting section (20) is covered.

4. The connecting device (10) as claimed in claim 3, wherein
a spring (30) is enclosed inside said electrically non-conducting cover (18).

5. The connecting device (10) as claimed in claim 4, wherein
the spring (30) engages at a first end a head (34) of said elongated body (12) and at an opposite second end a shoulder (36) of the electrically non-conducting cover (18).

6. The connecting device (10) as claimed in claim 1, wherein
a bottom part (28) of the elongated body (12) extending below said housing (16) is arranged to receive a cable connector (32) that is electrically connected to said chargeable power storage.

7. The connecting device (10) as claimed in claim 4, wherein
the elongated body (12) has a circular cross section and the spring (30) is helical and arranged around said elongated body (12).

8. The connecting device (10) as claimed in claim 1, wherein
the non-conducting cover (18) is supported by the elongated body (12) and sliding on the elongated body (12) between a first position where the non-conducting cover (18) covers said electrically conducting section (20) and a second position where the non-conducting cover (18) exposes said electrically conducting section (20).

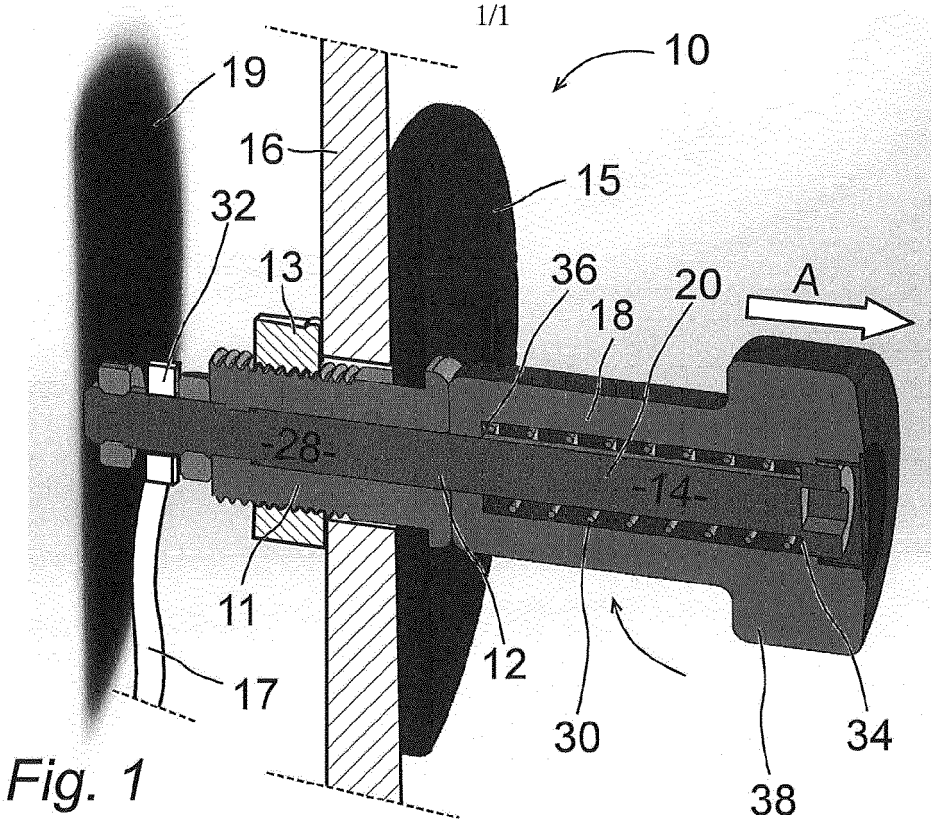
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Fig. 1

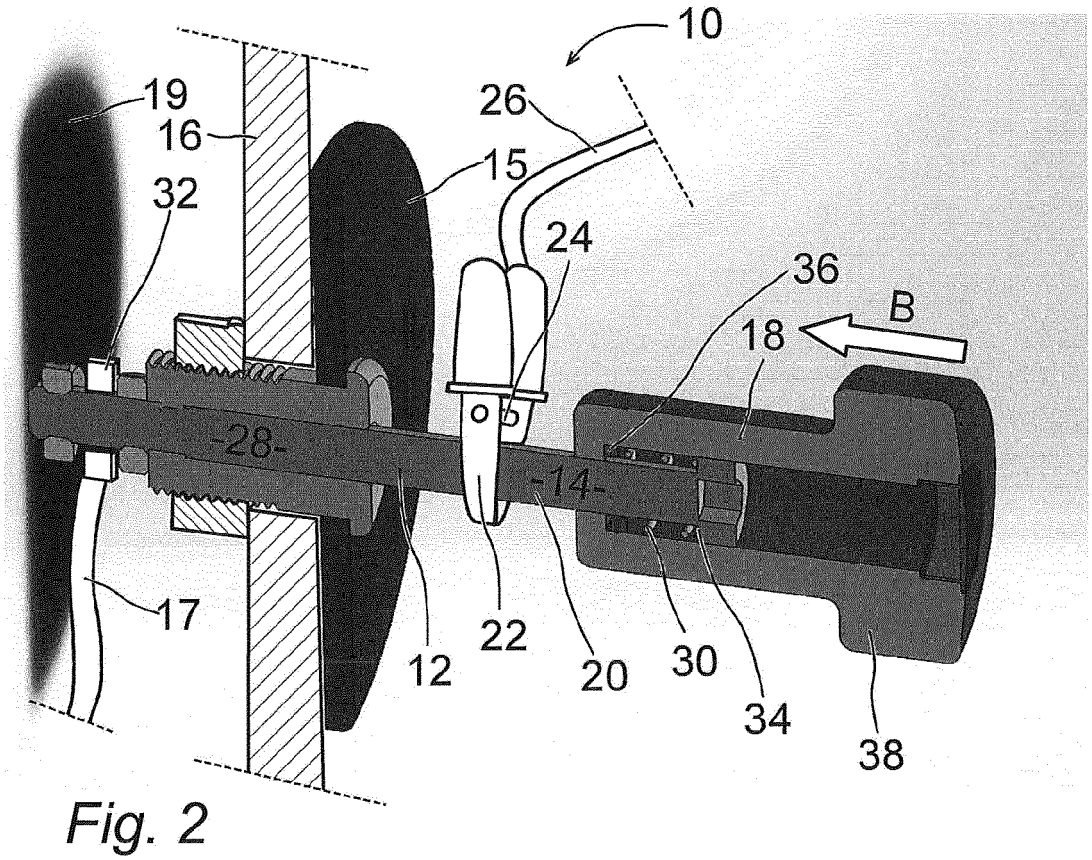
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Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 19 19 4382

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 405 536 A1 (INTERCABLE GMBH [DE]) 11 January 2012 (2012-01-11) * the whole document * -----	1-8	INV. H01R11/28 H01R13/447

TECHNICAL FIELDS SEARCHED (IPC)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 February 2020	Esmiol, Marc-Olivier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 19 4382

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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04-02-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2405536 A1	11-01-2012	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2804262 A **[0005]**