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# POWER SUPPLY UNIT WITH A HOUSING AND A RECHARGEABLE ELECTRICAL STORAGE DEVICE

The invention relates to a transportable power supply unit having at least one chargeable electrical store for storing electrical energy and a housing according to the preamble of claim 1.

## State of the art

Transportable power generators such as emergency power generators, etc. are already being used. They are usually provided for generating electrical energy and are used, for example, in the absence of a power grid or in the event of failure of a main power supplier, e.g., the public network. These transportable power generators are usually equipped with a diesel engine or gasoline engine which drive an electric generator. The generator then generates the AC voltage such as, for example, a mains voltage with 230 V, or a so-called “high current” with 380 V. There are corresponding sockets or outlets in the housing for the connection of one or more consumers.

The publication DE 82 23 987 U from the year 1982 relates to a transportable emergency power generator which has electrical accumulators charged by solar cells or PV modules.

Furthermore, other power supply units have been disclosed by CN 107 733 050 A and US 9,899,835 B2.

In the meantime, electrical devices are, among other things, also becoming increasingly prevalent in the construction industry or the like. For example, electrical rammers, rollers, chainsaws, scythes, etc. which are supplied or operated by electrical accumulators are used. For such large devices or larger consumers, a solar-operated power unit is not suitable for continuous use or for several hours, for example on a modern construction site.

## Object and advantages of the invention

In contrast, the object of the invention is to propose a transportable power supply unit which at least partially improves the disadvantages of the prior art and is especially suitable for continuous use by a consumer.

Proceeding from a transportable power supply unit of the type mentioned in the introduction, this object is achieved by the features of claim 1. Advantageous embodiments and developments of the invention are possible by the measures mentioned in the dependent claims.

Accordingly, a transportable power supply unit according to the invention is characterized in that at least one cooling unit is provided to cool the chargeable electrical store, and in that the cooling unit is designed simultaneously as an inverter cooling unit for cooling the inverter, wherein the cooling unit is designed simultaneously as a charging controller cooling unit for cooling the charging controller, wherein the cooling unit is arranged above the inverter, and the chargeable electrical storage unit is arranged above the cooling unit. In this way, an increase in efficiency and an increase in the service life of the store, and/or of the charging controller, and/or of the inverter can be realized. In addition, a double/multiple use of cooling can be realized for an economically and constructively particularly advantageous production and operation of the power supply unit according to the invention.

Also provided is at least one (toollessly) releasably connectible connection unit which is for the chargeable electrical store, wherein the connecting unit comprises at least one electrical contact device for the (toollessly) releasably connectible contact-connection of the chargeable electrical store, and at least one (toollessly) releasably connectible holding device for the (toollessly) releasably connectible holding of the chargeable electrical store in the housing.

With the aid of such a connection unit that can be toollessly releasably connected, the chargeable electrical store can now be replaced without great effort or without a tool. This opens up possibilities for advantageously operating the transportable power supply unit. A discharged or almost discharged first electrical store can therefore advantageously be replaced, wherein another or second charged electrical store is preferably installed without tools by means of

the connection unit according to the invention, or is connected in the power supply unit or connected thereto.

Electrical energy with advantageous alternating voltage is therefore again available for a consumer directly and very quickly, i.e., without longer charging times. This is particularly advantageous for comparatively long use in larger consumers such as, for example, vibrators, rammers, rollers etc. on a construction site or the like. For example, a nearly unlimited energy supply for construction devices or the like can be ensured with multiple, for example, approximately 5 or 10 rechargeable, replaceable, electrical stores. This opens up hitherto unrealizable possible applications in the construction industry for high-performance construction devices/machines.

An electrical charging device is advantageously provided for charging the chargeable electrical store, wherein the charging device comprises at least one electrical and/or electronic charging controller for controlling a charging process of the chargeable electrical store, wherein the charging controller is designed as an AC/DC converter for converting the first AC voltage to a DC voltage of the chargeable electrical store, wherein the connection unit is designed as an AC voltage input of the charging controller. In this way, the chargeable electrical store can not only be replaced quickly, but can also be charged in an advantageous manner if necessary when there is enough time, e. g., overnight or during lunch, etc. Accordingly, the storage or use of multiple chargeable electrical stores can be dispensed with. This saves, inter alia, investment/costs.

Preferably, the connection unit has at least one mains connection for the first alternating voltage designed as mains voltage, e.g., with approx. 115 V at 60 Hz, and/or single-phase mains voltage with approx. 230 V at 50 Hz, and/or so-called multi-phase "three-phase current" with approx. 400 V at 50 Hz, and in addition at least one low-voltage connection, e.g., 24 V or approx. 35 to 50 V such as in particular approx. 42 V/48 V at 200 Hz, for the second alternating voltage. Therefore, multiple or different consumers, especially of tools or the like used in the construction industry, can be advantageously operated simultaneously or alternately with the transportable power supply unit according to the invention or supplied with electrical energy/voltage.

Advantageously, the housing comprises at least one holding frame for holding the chargeable electrical store, especially in/within the housing. This enables a secure and tight integration of the store during operation.

Preferably, the electrical contact device comprises at least one (toolless) plug device for the (toolless) plugging and connecting of the chargeable electrical store. Therefore, for example, plugging/contacting can be realized at the same time as connecting the chargeable electrical store according to the invention. This improves design complexity and handiness.

In one particular development of the invention, the plug device comprises at least one store connection cable having a first connection plug, or having a first connection socket for a first accumulator socket or for a first store plug of the chargeable electrical store. In this way, plugging in/connecting the chargeable electrical store can be advantageously realized. For example, the chargeable electrical store can be connected to the cable manually so that the placement of the rechargeable, electrical storage device in the housing can be done without much effort.

Exemplary embodiment

An exemplary embodiment of the invention is illustrated in the drawing and is explained in more detail below with reference to the figures.

In the figures:

Figure 1 shows a schematic layout of a transportable power supply unit according to the invention in generator mode, and

Figure 2 shows a schematic layout of a transportable power supply unit according to Figure 1 in charging mode.

Figure 1 schematically illustrates a transportable power supply unit 1, wherein a chargeable battery 2 or chargeable electrical store 2 is arranged in a supporting frame 3 or support frame 3. In this case, the store 2 or chargeable battery 2 is held/fixed in a releasably connectible manner by means of a socket 11 or holder 11.

The chargeable battery 2 has, for example, a voltage of 48 Vdc, which is connected to an inverter 7 by means of a plug 4 via a flexible electrical cable 6 and a plug 5. In the generator mode according to Figure 1, the inverter 7 advantageously generates a mains voltage or AC voltage, for example 230 V at 50 Hz, which is applied to a plug socket 8 or a connection 8. A corresponding electrical consumer can be connected or plugged into the socket 8 or connection 8.

A fan 9 cools the chargeable battery 2 and also the inverter 7.

The chargeable battery 2 has a handle 10 so that it can be removed manually from the support frame 3 and replaced/exchanged with another, second chargeable battery 2. With the aid of the flexible, relatively long cable 6 and the plug 4, 5, the chargeable battery 2 can be releasably removed or installed easily without tools.

When the chargeable battery 2 is in charging mode according to Figure 2, the inverter 7 is designed as a charging device 7 so that a charging voltage of e.g., 48 Vdc can be generated by means of an input voltage or alternating voltage, for example 230 V at 50 Hz so that the chargeable battery 2 can be charged in an advantageous manner.

PATENTKRAV

1. En transportabel strømforsyningsenhed (1) med mindst én genopladelig elektrisk lagerenhed (2) til lagring af elektrisk energi og med ét hus (3), hvor der er mindst én inverter (7) til konvertering af en jævnspænding fra den genopladelige elektriske lagerenhed (2) til en første vekselspænding, navnlig til en første netspænding og/eller en første trefasestrøm, og/eller til en anden vekselspænding, idet mindst en tilslutningsenhed (8), navnlig mindst en stikkontakt og et stik, der er beregnet til den første vekselspænding og/eller til netspændingen, idet tilslutningsenheden (8) er udformet som en vekselspændingsudgang (8) fra inverteren (7) for den første vekselspænding, navnlig for netspændingen, og/eller for den anden vekselspænding, hvor der er mindst én aftagelig tilslutningsenhed (4, 5, 6) til den genopladelige elektriske lagerenhed (2), hvor tilslutningsenheden (4, 5, 6) mindst omfatter én elektrisk kontaktanordning (4, 5) til aftagelig tilslutning af den genopladelige elektriske lagerenhed (2) og mindst én aftagelig fastholdelsesanordning (11) til aftagelig fastholdelse af den genopladelige elektriske lagerenhed (2) i huset (3), **kendetegnet ved, at** der er mindst én køleenhed (9) til afkøling af den genopladelige elektriske lagerenhed (2), og at køleenheden (9) også er udformet som en inverterkøleenhed (9) til afkøling af inverteren (7), hvor køleenheden (9) er anbragt over inverteren (7) og den genopladelige elektriske lagerenhed (2) er anbragt over køleenheden (9).

2. En strømforsyningsenhed i henhold til krav 1, **kendetegnet ved, at** der er en elektrisk opladningsanordning (7) til opladning af den genopladelige elektriske lagerenhed (2), hvor opladningsanordningen (7) mindst omfatter en elektrisk og/eller elektronisk opladningsregulator (7) til styring af en opladningsproces af den genopladelige elektriske lagerenhed (2), idet opladningsregulatoren (7) er udformet som en AC/DC-konverter (7) til konvertering af den første vekselspænding til en jævnspænding for den genopladelige elektriske lagerenhed (2), og idet tilslutningsenheden (8) er udformet som en vekselspændingsindgang (8) til opladningsregulatoren (7).

3. En strømforsyningsenhed i henhold til et af de førnævnte krav, **kendetegnet ved, at** tilslutningsenheden (8) har mindst én nettilslutning (8) til den første vekselspænding, der er udformet som netspænding, og mindst én

lavspændingstilslutning til den anden vekselspænding, der er udformet som netspænding.

4. En strømforsyningsenhed i henhold til et af de førnævnte krav, **kendetegnet ved, at** køleenheden (9) også er udformet som en opladningsregulator-køleenhed (9) til køling af opladningsregulatoren (7).

5. En strømforsyningsenhed i henhold til et af de foregående krav, **kendetegnet ved, at** huset (3) omfatter mindst ét holdestativ (3) til at holde den genopladelige elektriske lagerenhed (2).

6. En strømforsyningsenhed i henhold til et af de foregående krav, **kendetegnet ved, at** den elektriske kontaktanordning (4, 5) mindst omfatter en stikanordning (4, 5) til tilslutning af den genopladelige elektriske lagerenhed (2).

7. En strømforsyningsenhed i henhold til et af de foregående krav, **kendetegnet ved, at** stikanordningen (4, 5) mindst omfatter ét hukommelsestilslutningskabel (6) med et første tilslutningsstik (4, 6) eller med en første tilslutningsstikkontakt (4, 5) til en første hukommelsesstikkontakt (4, 5) eller til et første hukommelsesstik (4, 5) til den genopladelige, elektriske lagerenhed (2).

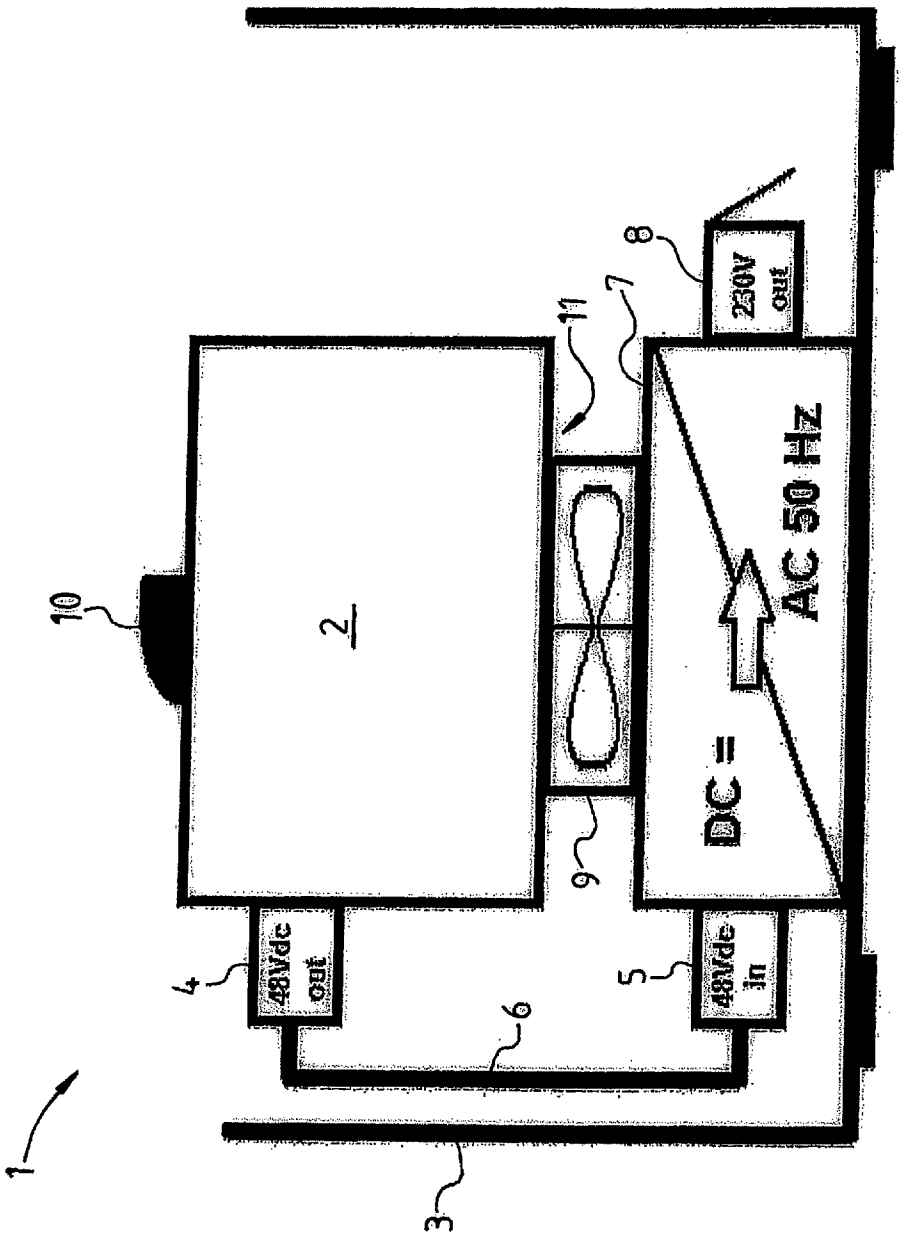



Fig. 1

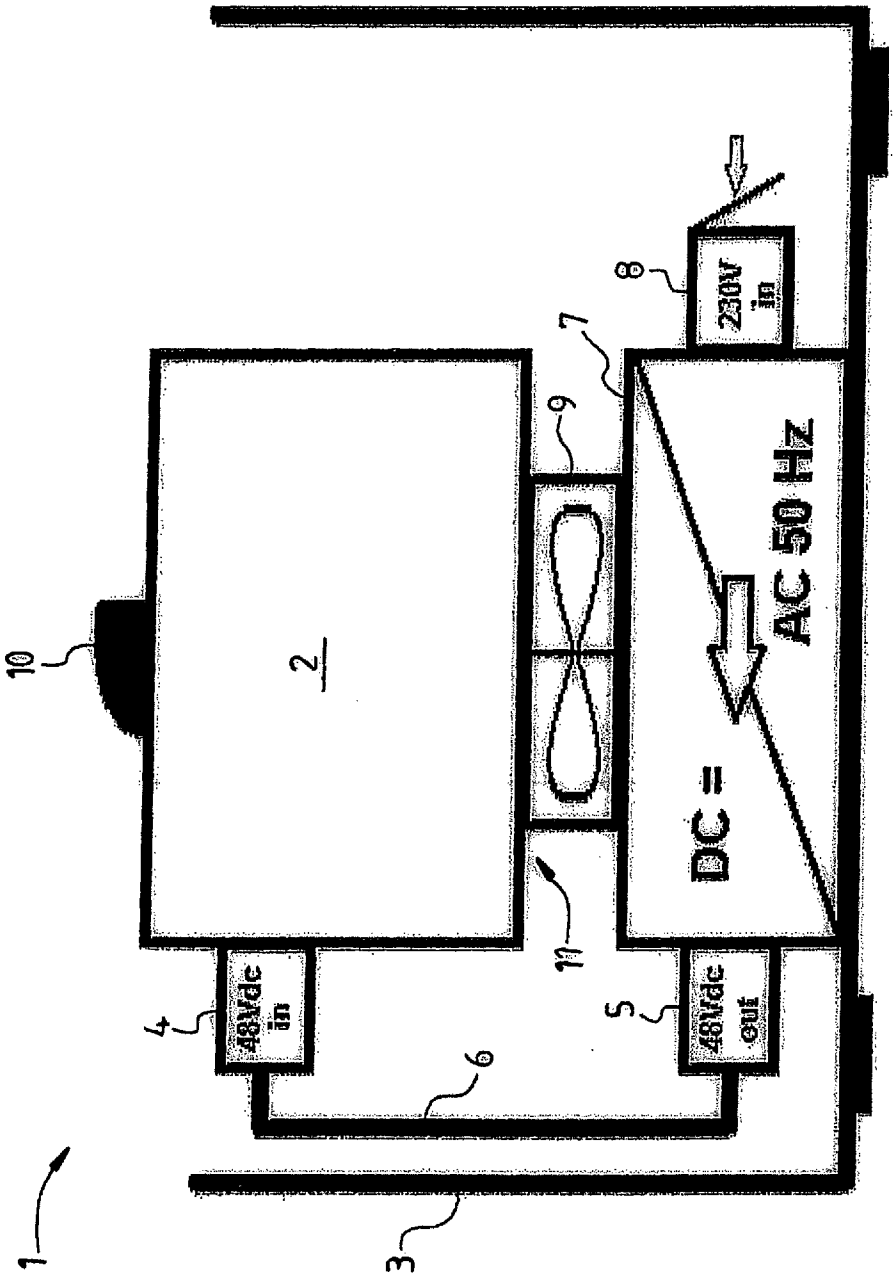



Fig. 2