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The invention relates, according to claim 1, to a maneuvering drive for a trailer, in particular a mobile home.

Trailers are usually towed by towing vehicles. For example, it is known for a passenger car to tow a mobile home. When the trailer is removed from the towing
5 vehicle, it is usually pushed to the final parked position by hand. However, trailers are nowadays being increasingly used in caravanning that, by reason of their size and weight, can be pushed by hand only with great difficulty.

Auxiliary drives have thus been developed that make it possible to push or turn a trailer with motorised assistance even without a towing vehicle. Such maneuvering
10 drives can also be retrofitted after the trailer has been produced.

The components of such a maneuvering drive are typically powered by a 12 volt battery in order to be able to use the drive independently of an external power network. For example, it is known to attach the maneuvering system to a 12 volt battery already generally provided in the trailer. The required energy can be transferred via suitable
15 cables from the 12 volt battery to the components of the maneuvering drive.

However, owing to the low nominal voltage of the 12 volt battery and the high level of power required for the maneuvering drive, cables with large cross-sections are required that are mostly heavy and expensive. The thick cable harnesses, that also need to be long for connection to the 12 volt battery, lead to a high level of power loss within
20 the energy supply system. In addition, installation of such a maneuvering drive with connection to the battery provided in the trailer is time-consuming and requires bores to be produced through the outer skin of the trailer.

In EP 1 894 822 A1 a device for moving a trailer is disclosed. The device has at least one drive unit, a fastening device for the drive unit and an actuator device that is
25 associated with the or each drive unit. The drive unit, or each of them, has a roller for frictionally engaged pressing against a wheel of a trailer. Furthermore, the or each drive device has a motor to drive the roller. The fastening device of the drive unit makes it possible to fasten the drive unit in a movable manner. The or each actuator device is coupled to the fastening device and can move the roller relative to the fastening device
30 along a translation axis and thus move the drive roller between a pressed position, in which the roller is pressed against the wheel of the trailer, and a released position in which the roller is not pressed against the wheel. Furthermore, transmission devices are provided to transfer a rotational movement of the actuator device to the drive roller.

In EP 2 138 387 A1 an auxiliary drive for externally moved vehicles, in particular
35 trailers is disclosed. The auxiliary drive consists of at least one drive unit that is mounted on the vehicle, is adapted to be advanced towards a vehicle wheel and has a motor-

driven drive element. The drive unit comprises a plurality of motors drivingly acting on the drive element. Two or more motors can be arranged in parallel. The drive unit can comprise a wireless communication device for mutual communication between a plurality of drive units. The auxiliary drive can be designed as a maneuvering drive and
5 comprise at least one drive unit on both vehicle sides, wherein the speed of the drive units can be controlled and the vehicle is adapted to be steered during the maneuvering travel by a speed control of the two drive units.

EP 1 225 090 A2 discloses a device for moving a trailer, that comprises two drive units. The drive units are arranged or are adapted to be arranged on the trailer and
10 comprise drive motors with drive rollers that are adapted to be moved into or out of a drive position with a respective wheel. The device comprises a control device for step-wise driving of the drive devices.

EP 2 138 386 A1 discloses a holding device for a maneuvering device for a trailer, that comprises a carrier device to which the maneuvering device is fastened. The carrier
15 device for its part is fastened to a base frame of the trailer and is supported with the aid of a support device on a vehicle axle of the trailer. Forces arising during operation, in particular twisting forces and moments, can be supported by the stable vehicle axle without the base frame of the trailer being twisted.

In WO 2009/015413 A1 a self-driven device of a controllable supporting wheel for a
20 trailer or a vehicle is disclosed. The device comprises a fastening device for fastening to the trailer or vehicle, a stanchion that can be adapted in length and is connected to the fastening device, and at least one wheel on a lower end of the length-adaptable stanchion to support a mass of the trailer or vehicle on the ground.

In FR 1 153 691 A a motorised carriage for pedestrians is disclosed for use in moving
25 sports equipment.

In WO 00/59440 A1 a drive for a wheelchair is disclosed that makes it possible to select between manual drive and motorised drive. The device comprises a transmission unit for driving the wheelchair, a clamp device for fastening the transmission unit to the wheelchair and a switching device for selecting the type of drive. The transmission
30 device comprises drive rollers on both sides, that are connected to motorised accelerating and braking devices, in order to drive both wheels of the wheelchair. Furthermore, control devices and a battery are provided.

In EP 1 700 766 A2 an electromotive drive unit for a container, in particular for golf bags, is disclosed. The drive apparatus comprises an electric motor that is powered by
35 a battery and, via a transmission, drives a running wheel, the electric motor and the

battery being integrated into a module for which a stowing space is provided in the container.

In US 6 390 216 B1 a motorised tricycle is disclosed. In one embodiment, at least one of the drive motors is arranged in at least one wheel of the motorised tricycle. In a
5 further embodiment, the drive motor is arranged in one of the wheels and batteries in another of the wheels of the motorised tricycle.

In WO 2005/039961 A1 a motorised vehicle with a base frame, at least one motor, at least two wheels and a control device is disclosed. Furthermore, a fastening device for fastening an object to be towed is disclosed. Furthermore, a handle for an operator
10 to pull the towing vehicle is disclosed.

The object of the invention is to provide a maneuvering drive for a trailer in which it is rendered possible to supply energy in an economical and simple manner.

This object is achieved by a maneuvering drive for a trailer as claimed in claim 1. Further developments of the invention are to be found in the dependent claims.

15 A maneuvering drive for a trailer comprises a drive device having a drive motor and a transmission device coupled to the drive motor for transmitting a torque of the drive motor to a wheel of the trailer. Furthermore, the maneuvering drive comprises a fastening device for fastening the drive device to the trailer. In addition, an electrical energy storage device for supplying the drive motor with electrical energy is provided
20 that is adapted to be arranged on the outside of the trailer and, for example, is also adapted to be coupled to the drive device outside the trailer.

The trailer can be a vehicle that is typically towed by a towing vehicle such as a motor vehicle and thus does not have an independent main drive. The maneuvering drive makes it possible to be able to move and maneuver the trailer with ease even
25 when it has been removed from the towing vehicle. The trailer can be, for example, a mobile home, a caravan, a transport trailer, a goods trailer or a purpose-specific trailer such as e.g. a boat trailer.

The drive motor arranged in the drive device can be designed, for example, as an electric motor of a suitable construction type and power level. In addition to the drive
30 motor, the drive device can comprise further components such as, for example, power electronics for driving the drive motor or a transmission for the drive motor.

The transmission device coupled to the drive motor can also comprise, for example, a drive roller that is adapted to be driven in a rotary manner by the drive motor and that can be moved, for example, between a rest position, in which the drive roller is spaced
35 apart from the wheel of the trailer, and a drive position, in which the drive roller is pressed

against the wheel of the trailer. An example of a maneuvering drive of this type with a drive roller is described in EP 1 836 085 A1 or EP 1 714 858 A1 .

By means of the fastening device the drive device can be fastened to the trailer in such a way that the drive device can be suitably positioned with respect to the trailer and, for example, the drive roller of the transmission device can be moved into the rest position or into the drive position. Since the drive roller must be pressed firmly against the wheel of the trailer in order to transmit the torque of the drive motor, the fastening device is adapted, for example, to be fastened to a base frame (chassis frame) of the trailer and/or to be supported on a vehicle axle of the trailer.

10 An accumulator or a battery of a suitable power class such as, for example a Li-ion battery, can be used as an electrical energy storage device. By means of the battery all electrical components of the maneuvering drive can be powered, for example, even the drive motor and the power electronics for motor control.

15 The electrical energy storage device is arranged on the outside of the trailer, namely on or inside the connecting crossbeam. Thus, for fastening purposes, there needs to be no incursion into the outer skin of the trailer. It is thus possible to avoid making bores in an outer skin of the trailer with such an arrangement.

20 With the electrical energy storage device arranged on the outside of the trailer, this trailer is also coupled outside the trailer to the components to be supplied, for example, the drive device. All electrical couplings that are provided for supply of the components or also to charge the electrical energy storage device, such as, for example, cables and connectors, can thus likewise be arranged on the outside of the trailer and, for example, mounted or fastened on the base frame or running gear and be connected to the electrical energy storage device and to the components to be supplied. In other words, 25 cabling of the maneuvering drive can be effected entirely outside the outer skin of the trailer.

The arrangement of the electrical energy storage device on the outside of the trailer and coupling thereof, likewise provided outside the trailer, to the components of the maneuvering drive to be supplied make possible simple and inexpensive mounting of 30 the maneuvering drive, that can take place without incursion into the trailer and in particular without bores being made into the outer skin of the trailer. Furthermore, with this design, the electrical energy storage device can be designed specifically with respect to the energy requirement of the maneuvering drive.

35 The fastening device and the drive device are arranged outside the trailer and the electrical energy storage device is arranged on or inside the fastening device and/or the drive device. The electrical energy storage device is arranged on the outside of the

fastening device or the drive device and, for example, can be fixedly connected thereto. For this purpose, for example, a housing can be provided and fastened to the fastening device or the drive device. Furthermore, the electrical energy storage device can also be disposed on the inside of the fastening device or the drive device, for example, in a
5 recess provided for this purpose or a housing arranged inside the fastening device and/or drive device.

The arrangement of the electrical energy storage device on or inside the fastening device and/or the drive device, that for their part are arranged outside the trailer, makes it possible to provide the maneuvering drive as an integrated system such as, for
10 example, a retrofit system. During installation of such an integrated maneuvering drive, no additional cabling has to be carried out between the maneuvering drive and the trailer, that additionally shortens the mounting time.

Furthermore, in the case of such an arrangement, the electrical energy storage device is placed close to the components to be supplied. An electrical connection of the
15 components to the electrical energy storage device can consequently be achieved by short sections of cable that, depending on the arrangement of the energy storage device in the maneuvering system are, for example, not longer than 30 cm to 1 m. In this manner, power losses within the energy supply system can be avoided and the weight and the costs of the maneuvering drive can be reduced. In addition, by means of the
20 integral arrangement of the electrical energy storage device and of the components to be supplied, the electrical connections can be protected against environmental influences so that the maneuvering drive is less failure-prone and is therefore more robust and inexpensive to operate.

In one embodiment, the maneuvering drive comprises a further drive device (second
25 drive device) that is adapted to be arranged by the fastening device outside the trailer and has a further drive motor and a further transmission device, that is coupled to the further drive motor, for transmission of a torque of the further drive motor to a further wheel of the trailer. The further drive device can essentially be designed like the already described drive device but can be adapted to the properties of the respective installation
30 location. For example, the further drive device can be disposed in an opposite arrangement on the further wheel on the same wheel axle. This is a case where there is a maneuvering drive on both sides, having a respective left-side and right-side drive device.

The fastening device comprises a connecting crossbeam between the two drive
35 devices. The connecting crossbeam can comprise, for example, a connecting, middle or transverse rod that can have a suitable cross-section and a suitable torsional

stiffness. It can thus improve, for example, transmission of the torque of the drive motors to the wheels of the trailer.

Furthermore, a coupling device is provided inside the connecting crossbeam, that can extend, for example, in a cavity inside the connecting crossbeam between the drive
5 devices and can couple these to one another. By means of the coupling device the drive devices can, for example, be electrically coupled and/or can be connected to the electrical energy storage device. Additionally or alternatively, the coupling device can comprise a communication connection for the electronic exchange of data, such as, for example, via a bus system (data bus).

10 By means of the coupling device arranged inside the connecting crossbeam, the electrical and/or electronic coupling of the two drive devices can be effected entirely inside the maneuvering drive. Thus, the maneuvering drive can be presented, sold and mounted as an integral system. A connection of the components to the trailer, for example, an electrical connection is not required. The integrally encapsulated
15 arrangement of the electrical/electronic connections between the individual components further simplifies mounting and increases robustness in operation.

In one embodiment, the electrical energy storage device can be arranged inside the fastening device or the connecting crossbeam and can be electrically coupled to the drive device and/or to the further drive device by the coupling device.

20 In the case of this arrangement, only short sections of cable with a length of, for example, less than 1.20 m are required for electrical coupling of the electrical energy storage device to the drive devices so that the system involves only low production costs during production and only slight power losses in operation. Furthermore, in the case of an arrangement of this type, all electrical connections from the electrical energy storage
25 device to the components to be supplied can be disposed inside the fastening device or the connecting crossbeam so that these are largely protected against environmental influences and damage. In addition, an arrangement such as this of the electrical energy storage device permits favourable weight distribution of the trailer with a maneuvering drive when the electrical energy storage device is disposed in a centred manner, for
30 example, in the proximity of the wheel axle.

In a further embodiment, the electrical energy storage device can be disposed in the drive device and a further (second) electrical energy storage device can be disposed in the further (second) drive device. Furthermore, a charging current can be transmitted to the electrical energy storage devices, for example, through the coupling device.

35 In this embodiment, the electrical energy storage devices can be arranged close to the components to be powered in the drive devices. They can thus be coupled by short

sections of cable of, for example, less than 30 cm or even directly to the components of the drive device that are to be powered, whereby largely loss-free powering of the drive devices can be achieved and cabling costs can be saved.

Coupling of the electrical energy storage devices, for example, for common
5 connection to a charging source can be achieved by the coupling device. If the voltage to be supplied for charging purposes can be high and, for example, can be 230 V, only a thin charging cable (230 V conduction) is required as the coupling device. In this way, for example, it becomes possible to charge the electrical energy storage devices by one-sided plugging-on of a charging plug for supply of energy from an external energy source
10 on any side of the maneuvering drive provided with a suitable plug connection. This permits easy charging of the electrical energy storage devices at an external energy source, for example at a socket of a national power grid, irrespective of a parking position of the trailer.

In a further embodiment, a control device for driving the drive motor and/or the further
15 drive motor is provided, wherein the control device can be arranged in the fastening device, the connecting crossbeam and/or the drive device and can be supplied with energy by the electrical energy storage device. For example, the control device can be arranged adjacent to the electrical energy storage device in the drive device, the fastening device or the connecting crossbeam and can thus be powered via only a short
20 cable connection by the electrical energy storage device.

In this embodiment, control information can be exchanged between the control device, the drive device and/or the further drive device, for example, through the coupling device or via a communication connection (data bus) provided inside the coupling device. The control device can additionally obtain control commands of an
25 operator of the maneuvering drive through a wireless communication to a remote control unit and can convert these into control commands for the power electronics for control of the drive motors.

In one arrangement of the control device in the fastening device or the connecting crossbeam and in the case of a transfer of the control information from the control device
30 to the drive motors by the coupling device likewise arranged in the fastening device or in the connecting crossbeam, it is possible to ensure that all the electronics for data transmission (data bus and associated plug connections) are disposed inside the fastening device or the connecting crossbeam and are thus protected against environmental influences and damage. In this way, the robustness of the maneuvering
35 drive can be increased further.

In one variation of this embodiment, the control device can be arranged inside the drive device and a further control device can be arranged inside the further drive device. In this embodiment, control information can be transmitted between the control devices in a secure and protected manner, for example through the coupling device.

5 Alternatively or additionally, it is possible to provide a bidirectional wireless communication between the control device, the further control device and the remote control unit.

On the one hand, by means of the bidirectional wireless communication, control information can be transmitted between the remote control unit and a respective one or
10 both of the control devices. On the other hand, control information can also be transferable from one of the control devices to the remote control unit and from the remote control unit to the further control device. In the case of such a design of the bidirectional wireless communication between the control devices and the remote control unit, the communication connection inside the coupling device can be omitted
15 and the coupling device can be used merely for supplying energy to the functional units. This makes possible a further saving on cable connections and therefore an inexpensive design for the maneuvering drive.

In a further embodiment, a charging device for charging the electrical energy storage device is provided, wherein the charging device is adapted to be coupled to the electrical
20 energy storage device and/or to an external energy supply device provided, for example, on the trailer. The charging device can be adapted to be connected to the electrical energy storage device and/or to the external energy supply device of the trailer by a charging cable that is adapted to be plugged on outside the trailer or arranged inside the trailer.

25 The external energy supply device can, for example, comprise an access, provided on the trailer, to a socket of a national power grid or a drawbar socket for the supply of electrical energy from the towing vehicle.

In the variation in which the charging cable is adapted to be plugged on outside the trailer, it is possible to ensure that all components of the maneuvering drive can be
30 arranged or mounted outside the trailer. This makes possible easy mounting or retrofitting of the maneuvering drive. In this case, in order to charge the electrical energy storage device, the user of the maneuvering drive can, when necessary, plug in the charging cable on the outside of the trailer or the maneuvering drive and thereby initiate charging of the electrical energy storage device.

35 In the variation in which the charging cable is laid inside the trailer, automatic charging of the electrical energy storage device, for example, upon connection of the

external energy supply device to a socket of a national power grid or to an energy supply of the towing vehicle can be ensured.

In a further variation of this embodiment, the charging device can be arranged inside the drive device, the fastening device and/or the connecting crossbeam and can be adapted to be connected to the external energy supply device by the charging cable.

In this variation, it is possible to ensure that all the components of the maneuvering drive are able to be arranged outside the trailer and, for example, presented in an integrated manner as a retrofit system. Only during charging of the electrical energy storage device is manual connection of the charging cable to an external energy supply device necessary. The mounting or retrofitting of such a system requires no incursion into a structure of the trailer, for example, no bores whatsoever in the outer skin of the trailer, and can thus be carried out easily and inexpensively.

In a further variation, the charging device can be adapted to be coupled to the external energy supply device of the trailer and adapted to be connected to the electrical energy storage device by the charging cable. For example, in the case of this variation, it is also possible to use a charging device provided in the trailer to charge the electrical energy storage device.

In a further variation, the charging device can be arranged inside the trailer, for example, inside the body of the trailer, for example on or in the cabin of the trailer. If, in this variation, in addition, the charging cable is laid inside the trailer, automatic charging of the electrical energy storage device, for example, upon connection of the external energy supply device to a socket of a national power grid or to an energy supply of the towing vehicle can be ensured without further manual intervention by the user.

In a further embodiment, it is possible not to arrange the charging device in a stationary manner on the maneuvering drive or on the trailer but to present it separately as a mobile apparatus or accessory, for example, together with the charging cable, and to provide a plug connection for connection to the maneuvering drive, in particular with the electrical energy storage device, for example, on both sides on both drive devices. Likewise in the case of this embodiment, in order to mount or retrofit the maneuvering drive on the trailer, no incursion into the trailer is necessary.

In a further embodiment, the external energy supply device is adapted to be inductively charged by an inductive charging device. For this embodiment, a cable connection between the external energy supply device and the charging device is not necessary. In the case of this embodiment, the charging device can be designed, for example, as a separate accessory part that is also external.

In one variation, the coupling device can be adapted to be coupled to the electrical energy storage device, the controller and/or the charging device by a plug connection arranged inside the connecting crossbeam.

The plug connection can be effected, for example, by a plug of the appropriate protective class with respect to the voltage applied. For example, when using an electrical energy storage device with a higher nominal voltage, owing to the lower current strength, the use of a standard plug or a standard plug connection is possible. The arrangement of the plug connection inside the connecting crossbeam, for example, in the connection pipe, can protect the plug connection against environmental influences and vibration during travel and thus make possible a robust design for the maneuvering drive.

In further embodiments, the electrical energy storage device and/or the further electrical energy storage device can comprise a nominal voltage of 12 volts or more. For example, the electrical energy storage device and/or the further electrical energy storage device can be tailored to any nominal voltages greater than or equal to 12 volts, for example, to 14.8 volts, 18.5 volts, 22.2 volts or 25.9 volts. Nominal voltages of 24, 32 or 48 volts are also possible.

Owing to the nominal voltage of, for example, 24, 32 or 48 volts, that is higher than a conventional 12 volt voltage, lower current strengths are required in these embodiments for energy supply than in the case of an energy supply via a battery with a 12 volt nominal voltage. Consequently, cables with thinner cross-sections of, for example, 1.5 to 2.5 mm² can be used, whereby weight and production costs for the maneuvering drive are reduced. Furthermore, the higher nominal voltage means that comparatively lower power losses occur. Owing to the lower current strength, standard cable plugs can be used and connection of special plugs is not necessary. This can also further reduce the production costs of the maneuvering drive.

In a further embodiment, the electrical energy storage device comprises a Li-ion battery (lithium-ion battery). Owing to the high specific capacitance of Li-ion batteries, in this embodiment, in spite of the use of a battery of the corresponding power class, a lower overall weight of the maneuvering drive can be achieved. Owing to the quick charging and discharging cycles, the robustness and operational readiness of the maneuvering drive are also improved.

These and further features of the invention will be explained in more detail herein under with the aid of examples and with reference to the accompanying figure, in which:

figure 1 shows a schematic view of a trailer with a maneuvering drive in which a battery and a controller are arranged in a transverse member or connecting crossbeam of the maneuvering system,

figure 2 shows the trailer with the maneuvering drive of figure 1, in which in each case a controller is disposed in one of the motor-transmission units,

figure 3 shows the trailer with the maneuvering drive of figure 2, in which in each case a controller and a battery is arranged in one of the motor-transmission units; this embodiment does not form part of the invention owing to the arrangement of the energy storage device (the battery),

figure 4 shows the trailer with the maneuvering drive of figure 3, in which a charging device is arranged in the connecting crossbeam of the maneuvering drive; this embodiment does not form part of the invention owing to the arrangement of the energy storage device, and

figure 5 shows the trailer with the maneuvering drive of figure 4, in which the charging device is arranged inside the trailer; this embodiment also does not form part of the invention owing to the arrangement of the energy storage device.

Figure 1 shows a trailer 1 having a base frame 2 (chassis frame), on which a trailer body 3 is arranged, and on which wheels 4 are attached, for example, in an opposing arrangement on a common wheel axle. The trailer 1 comprises a maneuvering drive 5 with which the trailer 1 is adapted also to be moved when it is uncoupled from a towing vehicle.

The maneuvering drive 5 comprises a motor-transmission unit 6 in which an electric motor (E) of a suitable power class is provided as the drive motor along with the power electronics required to control the motor. Furthermore, a drive roller 7 is provided that is adapted to be arranged remote from the wheel 4 when in a rest position and can be pressed against the wheel 4 when in a drive position. By means of the driver roller located in the drive position, a torque of the drive motor can be transmitted to the wheel and the trailer 1 can thereby be moved by the maneuvering drive 5. This is disclosed in a detailed manner, for example, in EP 1 836 085 A1 and EP 1 714 858 A1 .

In order to ensure driving on both sides and therefore comprehensive maneuverability of the trailer 1, in figure 1 a further motor-transmission unit 6' with a further drive roller 7' is arranged on a further wheel 4' arranged in an opposing manner on the same wheel axle as the wheel 4. The mode of operation of these components corresponds to that of the components 6 and 7 arranged on the wheel 4 and is thus not described separately.

In order to ensure suitable fastening of the maneuvering drive 5 to the trailer 1, a fastening device for fastening the maneuvering drive 5, for example, to the base frame 2 or to a wheel axle can be provided. In order to couple the maneuvering drive, on both sides, shown in figure 1, the fastening device can comprise a connecting crossbeam 8
5 (also designated as a transverse member in this case) (shown in a dotted line) that can be mounted, for example, in the proximity of the wheel axle and parallel thereto.

In the illustrated example, the transverse member 8 comprises an electrical energy storage device 9 that can be designed, as shown, as a battery, for example, as a 48 volt battery. As shown, the electrical energy storage device 9 can be arranged inside the
10 transverse member. For example, the transverse member 8 can comprise a hollow steel pipe in which the electrical energy storage device is arranged or inserted. In the case of this arrangement, the electrical energy storage device is protected in the steel pipe against environmental influences that may prevail at the wheel axle under rough driving operation.

15 The electrical energy storage device 9 can be connected via a connecting cable 10 to the components of the maneuvering drive 5 that are to be powered. In the illustrated example, the electrical energy storage device 9 is connected via the connecting cables 10 to the electric motors, that are arranged in the motor-transmission units 6, 6', and the associated power electronics. The connecting cables 10 and the connections thereof
20 to the components to be powered are thus arranged completely inside the transverse member 8. For example, the connecting cables 10 can be passed through the steel pipe. In this way, connecting cables 10 and the connections thereof to the components to be powered can likewise be protected against damaging environmental influences.

By using, for example, a 48 volt supply voltage, the cables can be selected to be
25 comparatively thin with a small cross-section of, for example, 1.5 to 2.5 mm². Standard plug connectors can be used for connection to the components to be supplied. This makes possible an inexpensive design for the efficient maneuvering drive while at the same time saving weight.

Furthermore, in the illustrated example, the electrical energy storage device 9
30 supplies a controller 11 that is connected to the motor-transmission units 6, 6' by a communication connection 12, for example, a data bus. The controller 11 is also connected by a bidirectional wireless communication (roughly illustrated in a broken line) to a remote controller 13 by which an operator can transfer control information to the controller and can thereby control maneuvering operation of the maneuvering drive
35 5. Furthermore, the controller can also emit operationally-relevant information to the user via the bidirectional wireless communication, for example, information relating to a

charge condition of the electrical energy storage device 9 or relating to the output signals of the drive motors.

In the illustrated example, the electrical energy storage device 9, the connecting cables 10 and the communication connection 12 are contained, with the associated plug
5 connections, completely inside the transverse member 8 and thus are protected against damaging environmental influences and vibration. This makes possible a robust design for the maneuvering drive 5 in spite of the harsh environmental conditions at the mounting location in the proximity of the wheel axle of the trailer 1.

In order to charge the electrical energy storage device 9, a charging device 14 is
10 connected via a charging cable 15 to the maneuvering drive 5, by which a charging current can be supplied to the electrical energy storage device 9. In the illustrated example, the charging device is arranged on an external energy supply device of the trailer 1 such as, for example, a connector to a socket of a national power grid. Alternatively or additionally, the maneuvering drive 5 or the charging device 14 can also
15 be coupled to an energy supply of a towing vehicle via cabling with a drawbar socket of the trailer 1.

In the example, the charging cable 15 runs outside the trailer 1 and can be laterally connected to the cable guide of the maneuvering drive 5 through a socket provided, for example, on both sides of the maneuvering drive. If a cable 16 of a national power grid
20 is connected to the external energy supply device and/or the charging device 14, the electrical energy storage device 9 can be charged.

In the illustrated example, the installation of the maneuvering drive 5 takes place completely outside the trailer 1, i.e. on the outside of the trailer 1, for example, by fastening to an undercarriage or base frame 2 of the trailer 1, and without penetrating
25 the trailer body 3 or making bores in the outer skin of the trailer body 3. Wiring in the interior of the trailer 1 with the laying of cables in or on the floor and with corresponding bores is not required. This simplifies installation of the maneuvering drive 5 and protects the structure of the trailer 1. In addition, no stowing space is required in the trailer 1. The weight distribution in the trailer 1 is hardly influenced by the high-capacity - and therefore
30 generally heavy - energy storage device 9 because this device is located centrally on the wheel axle. In addition, a Li-ion accumulator with a high specific capacity and thus lower weight can be used for the same power class. In the illustrated arrangement, short sections of cable with a length of, for example, less than 1.20 m, that owing to the high supply voltage have only a comparatively small cross-section, will suffice as the
35 connecting cable 10. In this way, savings can be made on production costs and overall weight. Power losses in the electrical supply system are reduced to a minimum by the

higher supply voltage and the short cable runs. By reason of the higher supply voltage and the currents that are therefore lower, it is possible to use standard cable plugs, which further reduces production costs on the one hand and wiring time on the other. By means of the illustrated arrangement of the components in the transverse member 8, the connecting cables 10 can likewise be laid in the transverse member 8, whereby damage to the cables is prevented and robust operation of the maneuvering drive 5 can be ensured.

Figure 2 shows a trailer 1, largely corresponding to the illustration of figure 1, having a maneuvering drive 5 in which the controller 11 is arranged non-centrally in the transverse member (connecting crossbeam 8) but in which a controller 11, 11' is arranged in each one of the motor-transmission units 6, 6' (E/S). The controllers 11, 11' can be coupled, for example, directly to the power electronics of the drive motor and control operation of the drive motors. In the illustrated example, each of the controllers 11, 11' communicates via a bidirectional wireless communication (roughly illustrated in a broken line) with the remote controller 13, from which, for example, commands of the operator for control of maneuvering operation of the maneuvering drive 5 can be received. Furthermore, by means of the bidirectional wireless communication, control information from one of the controllers 11, 11' can be transmitted to the other of the controllers 11', 11 so that the operation of the drive motors can be synchronized. Thus, in the illustrated example, a communication connection 12 inside the transverse member is not required, whereby the production costs can be reduced further.

Figure 3 illustrates a trailer 1, largely corresponding to the illustration of figure 2, having a maneuvering drive 5 that, however, does not form part of the invention and in which, however, instead of the electrical energy storage device 9 arranged centrally in the transverse member 8, in each of the motor-transmission units 6, 6' a respective dedicated electrical energy storage device 9, 9' is arranged (E/S + Batt). In this variation, the electrical energy storage devices 9, 9' can be connected directly to the respective controller 11, 11', power electronics and the respective drive motor and can supply them with electrical energy. It is thereby no longer necessary to lay supply cables inside the transverse member 8, so that outlay for cabling and production costs can be reduced. In the example, the connecting cable 10 inside the transverse member 8 only needs to be a cable for transmission of charging currents to or between the electrical energy storage devices 9, 9' in order to ensure a two-sided connection option for the charging cable 15 depending on the arrangement of the charging device 14 or of a socket of a national power grid in the vicinity of the trailer 1.

The trailer 1 shown in figure 4, having the maneuvering drive 5, largely corresponds to that shown in figure 3; however, this embodiment also does not form part of the invention. In this case, the charging device 14 is arranged in the fastening device of the maneuvering drive 5, namely in the transverse member 8, so that it can be permanently
5 coupled to the electrical energy storage devices 9, 9' arranged in the motor-transmission units 6, 6'. In this variation, a coupling between the charging device 14 and an external energy source, is to be additionally provided, for example, on the trailer 1, which coupling is effected, in the example, by a charging cable laid inside the trailer 1, for example, by
10 a 230 volt line. In this variation, the charging of the electrical energy storage device 9, 9' can take place automatically when the external energy supply device of the trailer 1 is connected to an external energy source, for example, a socket of a national power grid or an energy supply of the towing vehicle. Charging can thus take place automatically without separate intervention of the operator.

In the trailer 1 illustrated in figure 5, having a maneuvering drive 5 that largely
15 corresponds to that illustrated in figure 4 and likewise does not form part of the invention, the charging device 14 is arranged inside the trailer, i.e. inside the trailer body 3. In this exemplified embodiment, the charging device 14 is coupled to the external energy source by a charging cable laid inside the trailer 1, that can be embodied, for example, by a 230 volt line. In this variation, the charging of the electrical energy storage devices
20 9, 9' can take place automatically when the external energy supply device of the trailer 1 is connected to an external energy source, for example, a socket of a national power grid or an energy supply of the towing vehicle. In this exemplified embodiment, charging can thus also take place automatically without separate intervention of the operator. Furthermore, in this exemplified embodiment, it is possible to use a charging device
25 provided in the trailer, for example, jointly with other components.

PATENTKRAV

1. Rangeringsdrev (5) til en trailer (1), med
- en udenfor opbygningen af traileren (1) anbringelig drivindretning (6, 6') med en drivmotor og en med drivmotoren forbundet transmissionsindretning med en drivrulle (7, 7') til overføring af et drejningsmoment fra drivmotoren til et på en 5 hjulaksel på traileren anbragt hjul (4, 4') på traileren, hvor drivrullen kan bevæges imellem en hvileposition, i hvilken drivrullen er adskilt fra hjulet, og en drivposition, i hvilken drivrullen er trykket imod hjulet på traileren;
 - en udenfor opbygningen anbragt fastgørelsesindretning (8) til fastgørelse af 10 drivindretningen (6, 6') på traileren (1), og
 - et elektrisk energilager (9) til at forsyne drivmotoren med elektrisk energi; hvor
 - det elektriske energilager (9) kan anbringes udenfor opbygningen på traileren (1) og kan forbindes med drivindretningen (6, 6'), og hvor
 - det elektriske energilager (9) er anbragt på eller i fastgørelsesindretningen (8); 15 hvor
 - en ved hjælp af fastgørelsesindretningen (8) udenfor traileren (1) fastgørbar yderligere drivindretning (6') med en yderligere drivmotor og en med den yderligere drivmotor forbundet yderligere transmissionsindretning (7') til overføring af et drejningsmoment fra den yderligere drivmotor til et yderligere på hjulakslen anbragt hjul 20 (4') på traileren (1); hvor;
 - fastgørelsesindretningen omfatter en forbindelsestravers (8) imellem drivindretningen (6) og den yderligere drivindretning (6'), og
 - en elektrisk koblingsindretning (10, 12) imellem drivindretningen (6) og den yderligere drivindretning (6') strækker sig i forbindelsestraversen (8); hvor
 - det elektrisk energilager (9) er anbragt på eller i forbindelsestraversen (8) og er, 25 ved hjælp af den elektriske koblingsindretning (10, 12), forbundet elektrisk med i det mindste én af drivindretningen (6) og den yderligere drivindretning (6').
2. Rangeringsdrev (5) ifølge krav 1, med
- en ved hjælp af det elektriske energilager (9) med energi forsynet styreindretning 30 (11) til at styre i det mindste én af drivmotoren og den yderligere drivmotor, hvor styreindretningen (11) er anbragt i i det mindste én af komponenterne i gruppen omfattende fastgørelsesindretningen, forbindelsestraversen (8) og drivindretningen (6), hvor

- styreinFORMATION imellem styreindretningen (11), drivindretningen (6) og/eller den yderligere drivindretning (6') kan transmitteres via den elektriske koblingsindretning (12).

- 5 3. Rangeringsdrev (5) ifølge krav 2, hvor
- styreindretningen (11) er anbragt i drivindretningen (6) og en yderligere styreindretning (11') er anbragt i den yderligere drivindretning (6'), og
 - styreinFORMATION imellem styreindretningen (11) og den yderligere styreindretning (11') kan transmitteres via den elektriske koblingsindretning (12) og/eller via
- 10 en tovejs radioforbindelse imellem styreindretningen (11), den yderligere styreindretning (11') og en fjernbetjeningsenhed (13).
4. Rangeringsdrev (5) ifølge ethvert af de foregående krav, med
- en med det elektriske energilager (9) og med en ekstern energiforsyningsindretning forbindelig ladeindretning (14) til at oplade det elektriske energilager (9),
- 15 hvor
- ladeindretningen (14) kan forbindes, via et uden på anhængerens (1) påstikkelig eller via et i traileren (1) anbragt ladekabel (15), med det elektriske energilager (9) og/eller med den eksterne energiforsyningsindretning.
- 20
5. Rangeringsdrev (5) ifølge krav 4, hvor
- ladeindretningen (14) er anbragt i drivindretningen (6'), fastgørelsesindretningen og/eller forbindelsestraversen (8) og kan forbindes med den eksterne energiforsyningsindretning via ladekablet (15).
- 25
6. Rangeringsdrev (5) ifølge krav 4 eller 5, hvor
- ladeindretningen (14) kan forbindes med den eksterne energiforsyningsindretning og via ladekablet (15) med det elektriske energilager (9).
- 30
7. Rangeringsdrev (5) ifølge ethvert af kravene 4 til 6, hvor
- ladeindretningen er anbragt i traileren.
8. Rangeringsdrev (5) ifølge ethvert af de foregående krav, hvor
- det elektriske energilager (9) kan oplades induktivt via en induktiv ladeindretning.
- 35
9. Rangeringsdrev (5) ifølge ethvert af de foregående krav, hvor

- den elektriske koblingsindretning (10, 12) kan forbindes med det elektriske energilager (9), styringen (11) og/eller ladeindretningen (14) via en i forbindelses-traversen (8) anbragt stikforbindelse.

- 5 10. Rangeringsdrev (5) ifølge ethvert af de foregående krav, hvor
- det elektriske energilager (9) og/eller det yderligere elektriske energilager (9') har en nominel spænding, som er større end eller lig med 12 volt.

- 10 11. Rangeringsdrev (5) ifølge ethvert af de foregående krav, hvor
- det elektriske energilager (9) og/eller det yderligere elektriske energilager (9') omfatter et Li-ion batteri.

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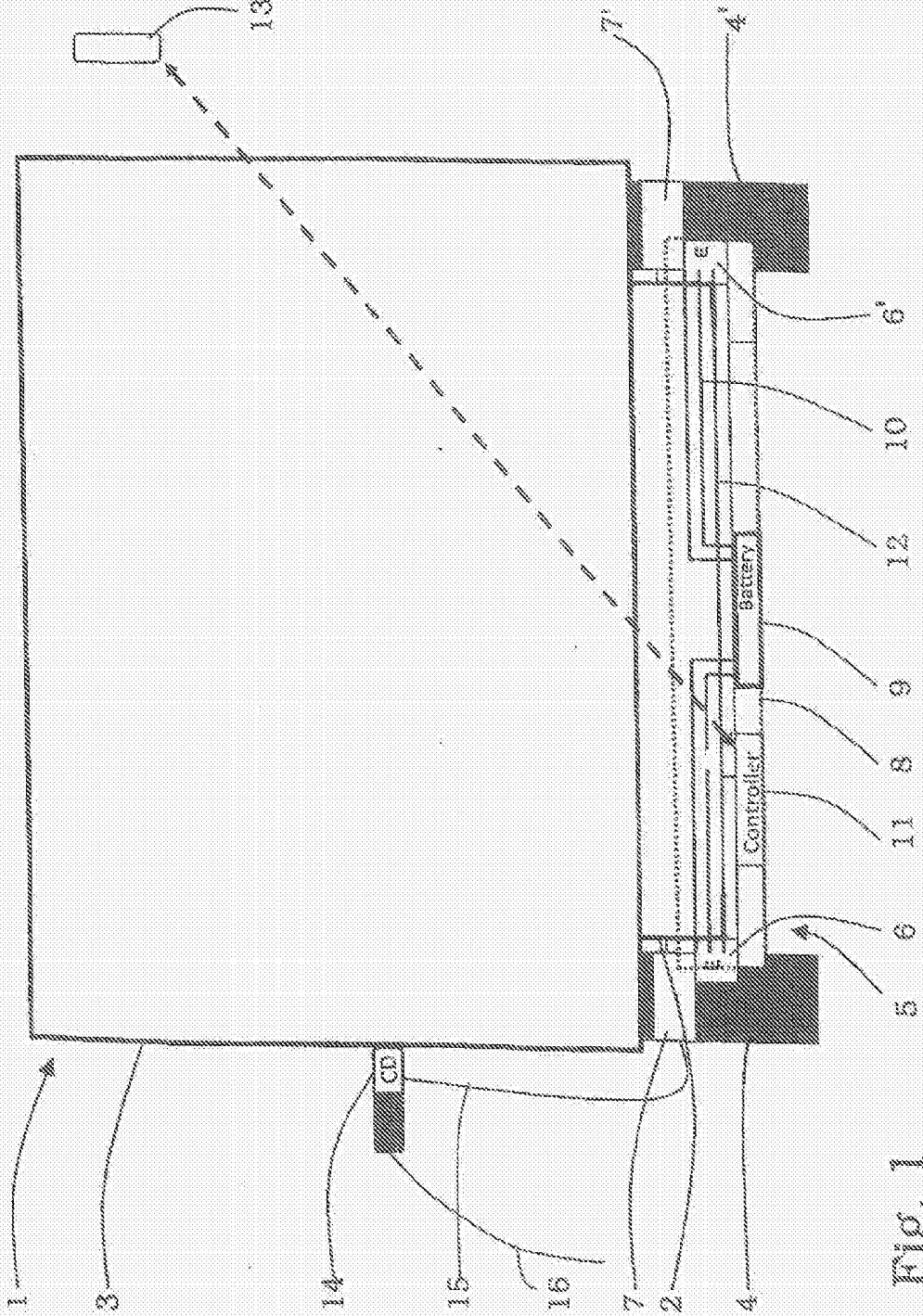


Fig. 1

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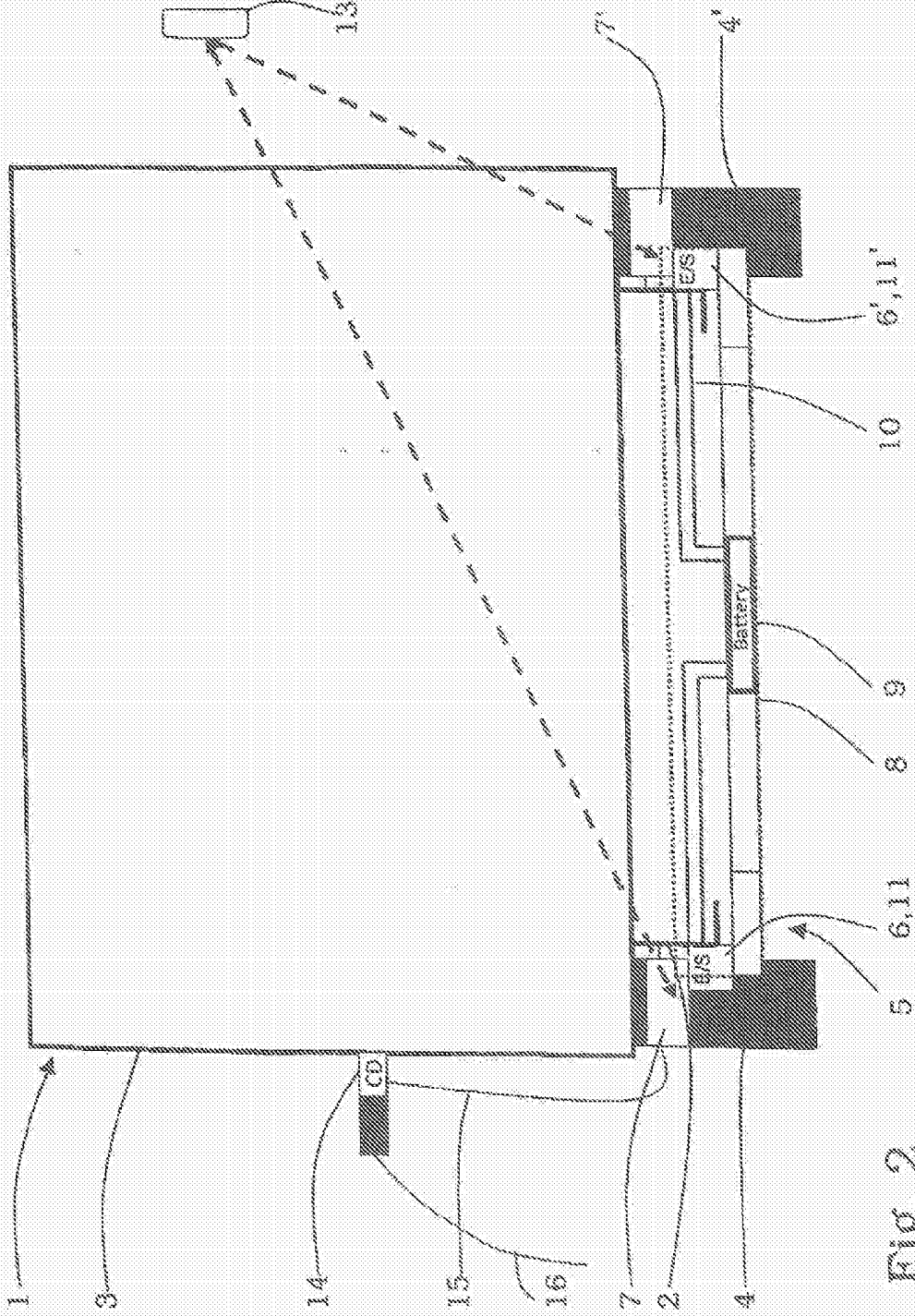


Fig. 2

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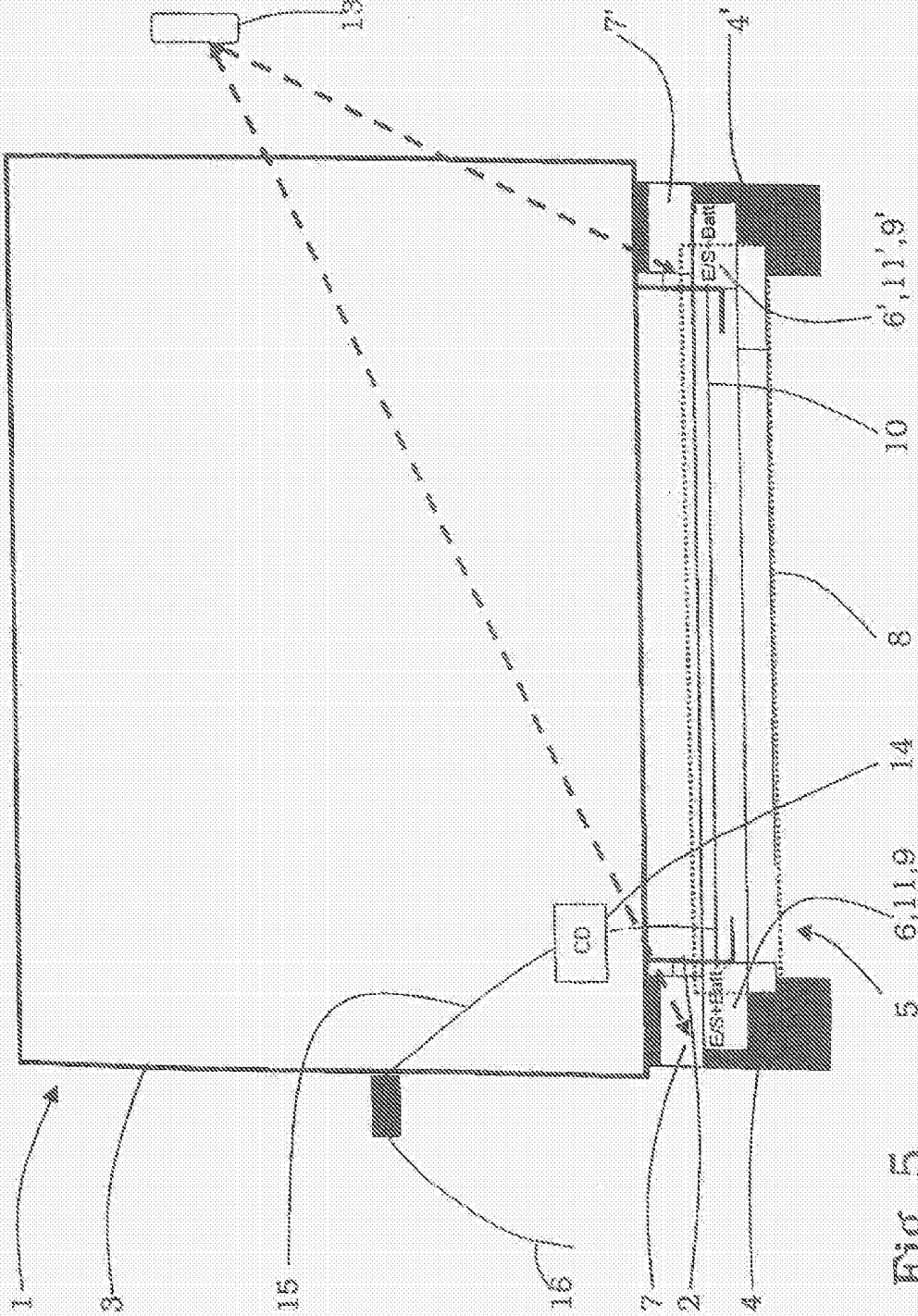


Fig. 5