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Description

The invention relates to a furniture drive having a control device and at least one electromotive adjustment drive as well as a manual operator control unit which is connected via a cable to the control device and has the purpose of actuating the at least one adjustment drive. The invention also relates to a piece of furniture having such a furniture drive.

Such furniture drives with manual control by means of a cable-bound manual operator control unit are commercially available in various forms since they can be manufactured in such a way that they can be operated reliably and are cost-effective. In particular, alternatively furniture drives which can be controlled in a wireless fashion by means of a specific manual operator control system or by means of a mobile device, e.g. a smartphone, are also commercially available, and compared with cable-bound manual control this is distinguished by a more conventional and flexible operator control capability. Voice-actuated controls are also known for furniture drives. Relevant examples from the prior art are DE 298 16 022 U1, JP H06 125942 A, US 2010/302044 A1 and US 2015/130595 A1.

An object of the present invention is to provide an easily retrofittable possible means of adding an operator control alternative to a piece of furniture or a furniture drive of the type specified at the beginning.

This object is achieved by means of a furniture drive and a piece of furniture having the features of the respective independent claim. Advantageous refinements and developments are the subject matter of the respective dependent claims.

A furniture drive according to the invention of the type specified at the beginning is distinguished by the fact that an adapter, by means of which a further transmission path for operator control commands is made available, is coupled to the control device. For example, the adapter can be coupled to the connection for the manual operator control unit on the control device.

The adapter can therefore access the furniture drive in a controlling fashion in such a way that it converts operator control commands, received by the other further transmission path, of a user into corresponding (switching) signals which, for the control device, appear to come from the manual operator control unit. The interface, already present, of the control device to the manual operator control unit is used. Therefore, for the control device, the addition of the operator control demands which are received via the further transmission path takes place in a transparent fashion. By means of the adapter it is therefore easily possible to retrofit a further transmission path for operator control commands and therefore further possible operator control means for already existing furniture drives, without having to modify the existing furniture drive.

According to the invention, the adapter is arranged electrically between the control device and the manual operator control unit. Signals or switching processes of the manual operator control unit can therefore be passed on to the control device by the adapter, with the result that this possible operator control means is still available.

According to the invention, the adapter has in this context a plug for connecting to the control device and a manual operator control connection for connecting to the manual operator control unit. The plug-type connection which is generally present between the manual control and the control device can then be disconnected by the user with little effort and without tools, in order to connect the adapter intermediately. The plug is preferably embodied integrally with the housing of the adapter, as a result of which the adapter is connected not only electrically but also mechanically to the control device.

According to the invention, the adapter has a receiver for waves or signals of the further transmission path. According to the invention, the receiver is a radio receiver, wherein the further transmission path comprises a wireless radio transmission of the operator control commands. In this way, a conveniently usable wireless remote operator control means can be retrofitted, for example with a specific remote-control system or a mobile device, e.g. a smartphone which functions as a remote control by means of a corresponding program

5 (“app”). The adapter can be configured for transmission according to the WLAN protocol, Bluetooth protocol or ZigBee protocol. In addition to such standardized protocols, proprietary radio protocols can also be used. Of course, in addition to the receiver it is also possible to provide a transmitter in the adapter, in order to permit the bidirectional transmission of signals and data. Owing to the protocol, this is generally also necessary when (useful) data is to be transmitted only to the adapter.

10 A piece of furniture according to the invention, in particular a bed, is distinguished by such a furniture drive having an adapter. The advantages specified in conjunction with the furniture drive are obtained.

15 The invention will be explained in more detail below on the basis of exemplary embodiments with the aid of figures, of which:

Figure 1 shows a schematic illustration of a bed having a furniture drive according to the prior art;

20 Figure 2 shows a schematic illustration of a bed having a furniture drive according to a first exemplary embodiment of the invention; and

Figure 3 shows a schematic illustration of a bed having a furniture drive according to a second exemplary embodiment of the invention.

25 Firstly, figure 1 shows a bed 1 as an example of a piece of furniture having an electromotive furniture drive according to the prior art, in a schematic view.

30 The bed 1 has at least one support element 2 for accommodating a mattress (not illustrated here). The bed 1 can be configured as a single bed for one person or else as a double bed for a plurality of persons. The support element 2 is formed from a plurality of panel-shaped parts or from a slatted frame, and is positioned or mounted on a base element (not illustrated here), e.g. a frame with feet.

In the illustrated example, the support element 2 has a back part 4 and a leg part 5 which are arranged so as to be mounted in a movable fashion relative to a fixed middle part 3 or relative to the base element. This movable arrangement is implemented, for example, by means of what is referred to here as a movement fitting. The movement is embodied to be slidable and/or pivotable.

The bed 1 which is shown in this example is equipped with an electromotive furniture drive. The movably mounted back part 4 and the leg part 5 are each coupled here via a mechanical connection 6, shown only schematically, to an electromotive adjustment drive 7, 8. The back part 4 is therefore coupled to the electromotive adjustment drive 7. The electromotive adjustment drive 8 is provided for moving or adjusting the leg part 5.

The electromotive adjustment drives 7, 8 are embodied here as linear drives. The linear drives have one electric motor or a number of electric motors, wherein a rotational speed reduction gear mechanism with at least one gear stage is generally connected downstream of each of the electric motors. A further gear mechanism, for example in the form of a threaded spindle gear mechanism, which generates a linear movement of an output element from the rotational movement of the motor, can be connected downstream of the rotational speed reduction gear mechanism. The last gear mechanism element or a further element connected thereto forms the output element. The output elements of the respective electromotive adjustment drive is connected to the respective furniture component (back part 4, leg part 5) or alternatively to a component which is connected to the base element, with the result that when the electric motor of the respective adjustment drive 7, 8 is operating, the respective furniture components 4, 5 are adjusted relative to one another and/or relative to the base element.

The electromotive adjustment drives 7, 8 are electrically connected, for their activation or actuation, to a control device 10. This connection can be embodied e.g. as a pluggable cable connection 9. The control device 10 has an electrical supply unit which makes available the electrical energy, e.g. from a power supply system, for the electromotive adjustment drives 7, 8. For this purpose, the control

device 10 in this example can be connected to a power system plug with a power system connection via a power system cable 11. The power system plug conducts the input-side power system voltage to the electrical supply unit of the control unit 10 via the power system cable 11, which supply unit outputs a low voltage in the form of a direct voltage on the secondary side.

As an alternative to this, an external power-system-dependent voltage supply with a power system input and with a secondary-side low voltage output is connected upstream of the control device 10 and feeds the low voltage in the form of a direct voltage via the line.

In an alternative refinement, the control device 10 is not arranged, or not completely arranged, in a separate housing, but instead entirely or partially integrated into one of the adjustment drives 7, 8. This adjustment drive then constitutes the main drive to which, if appropriate, further adjustment drives can be connected.

In the case of the furniture drive shown in figure 1, for the purpose of operating control an element cable-bound manual control 20 with a manual operator control unit 21 is present, which manual operator control unit 21 has operator control units, e.g. in the form of pushbutton keys. Activation of the operator control elements is transmitted via the illustrated cable 22 to the control device 10 which actuates the adjustment drives 7, 8 in accordance with the operated elements. This actuation can be subject to specific limitations, for example specific adjustment drives 7, 8 or specific adjustment ranges can be excluded from an adjustment or can be accessible only after enabling, e.g. via a key switch or a similar superordinate element. In addition, in each case one or more limit switches, which prevent movement beyond one or two defined end points, can be arranged in the adjustment drives 7, 8.

In order to connect the manual operator control unit 21 to the control device 10, a manual operator control connection 12, e.g. in the form of a belt-in socket, is arranged on the control device 10. The free end of the cable 22 is provided with a plug 23 which is plugged into the manual operator control connection 12.

Such furniture drives with manual control 20 by means of a cable-bound manual operator control unit 21 are available commercially in various forms, since they can be manufactured in such a way that they can be operated reliably and are cost-effective. There are variants available here in which a motor current of the adjustment drives 7, 8 is switched directly in the manual operator control unit 21, and variants in which control signals are transmitted from the manual operator control unit 21 via the cable 22, wherein the motor currents are connected by means of switching members (relays or semiconductor switches) in the control unit 10.

Figure 2 illustrates a first exemplary embodiment of a furniture drive according to the invention in the same way as in figure 1 and using the same bed 1 as an example of a piece of furniture.

The furniture drive according to figure 2 is formed by retrofitting the furniture drive according to figure 1 with an adapter 30. The design and the function of the adapter 30 are explained in more detail below. All the other components, in particular the control device 10 and the manual control 20 as well as the adjustment drives 7, 8 are the same in the two examples. Reference is made to the corresponding description relating to figure 1.

The adapter 30 is looped in between the control device 10 and the manual control 20 and for this purpose has itself a cable 32 and a plug 33 which is compatible with the plug 23 of the manual control 20 and is plugged into the manual operator control connection 12 of the control device 10. Furthermore, the adapter 30 has a manual operator control connection 34 which is embodied to be compatible with the manual operator control connection 12 of the control device 10. The plug 23 of the manual control 20 is plugged into said manual operator control connection 12.

The adapter 30 is configured here so as to feed all the relevant conductors or signals of the cable 22 or contacts of the plug 23 through to the manual operator

control connection 12 of the control device 10, with the result that the functionality of the manual control 20 is provided without modification.

5 Moreover, the adapter 30 has a receiver 31 which is suitable here for receiving radio signals 41 which are emitted by a mobile device 40 in the illustrated example. By means of the receiver 31, the adapter 30 makes available a further transmission path for operator control commands, in addition to the transmission path which is established via the manual control 20.

10 Radio signals 41 which are received from the receiver 31 are evaluated within the adapter 30 and implemented in such a way that at the plug 33 electrical signals are output or electrical connections are made available which correspond to the actuation of an operator control element of the manual operator control unit 21, and are therefore detected by the control device 10 as operator control
15 commands, for example for actuating the adjustment drives 7, 8.

A wireless operator control means can be easily added to an already existing furniture drive by means of the adapter 30, without the need for a modification at the control device 10 and without the possibility of performing operator control
20 via the manual control 20 being lost. Intermediate connection of the adapter 30 is transparent for the control device 10 insofar as from the side of the control device 10 it is not possible to detect whether an operator control command originates from the manual control 20 or the control by means of the mobile device 40.

25 If, in the case of the furniture drive, a direct switching operation of the motor currents of the adjustment drives 7, 8 takes place in the manual operator control unit 21, switching members, which are also able to switch the motor current directly, are correspondingly present in the adapter 30. If switching of the motor
30 currents is provided within the control device 10, corresponding signals – analog, digital and/or by means of a bus protocol – are generated in the adapter 30 and then bring about the switching of the motor currents via the switching members in the control device 10.

The operator control of the furniture drive by means of the manual control 20 or by means of the mobile device 40 can be treated equivalently by the adapter 30 here. However, it is also possible for the adapter 30 to perform prioritization of the signals to the effect that either the manual control 20 or the control by means
5 of the mobile device 40 is treated with priority. It is also conceivable that it is possible to make a setting by means of the mobile device 40 that only specific operator control commands of the manual operator control unit 21 are fed through, while other operator control commands are not fed through. In this way, when the furniture drive is used in a nursing bed or hospital bed, the use of
10 specific adjustment drives 7, 8 by the patient or the person in need of nursing can be prevented.

The mobile device 40 can be, in particular, a commercially available mobile telephone (“smartphone”) or a tablet computer. A piece of software (“app”) is
15 preferably installed for the function of the control of the furniture drive on the mobile device 40. Operator control commands to the adjustment drives 7, 8 are then transmitted to the control device 10 by means of the radio signals 41 via a further wireless transmission path from the mobile device 40 which is used as a manual operator control means to the control device 10. The further wireless
20 transmission path can be based, for example, on a standardized WLAN (Wireless Local Area Network) transmission path or Bluetooth transmission path or ZigBee transmission path. It is also alternatively possible to provide proprietary transmission paths or protocols for the radio signals 41. Of course, in addition to the receiver 31 it is also possible to provide a transmitter in the adapter, in order
25 to permit the bidirectional transmission of signals and/or data. This is generally also necessary, owing to of the protocol, if (useful) data are transmitted only from the mobile device 40 to the adapter 30.

Figure 3 illustrates a further exemplary embodiment of a furniture drive according
30 to the invention, in turn on the same bed 1 as in the preceding example and based on a comparable furniture drive.

The same reference symbols identify in this exemplary embodiment the same or identically acting elements to those in the preceding examples. With respect to

the basic design of the furniture drive, reference is made to the description of the preceding examples.

5 According to the invention, the difference from the exemplary embodiment in figure 2 is the connection between the adapter 30 and the control device 10. In the example in figure 3, the plug 33 with which the adapter 30 is plugged into the manual operator control connection 12 of the control device 10 is not connected to the adapter 30 via a cable but instead is embodied integrally on the housing thereof. In this way, the adapter 30 does not require any separate mechanical
10 fastening but instead is coupled electrically and mechanically to the control device 10 via the plug 33.

Not part of the invention and only for example, in contrast with the exemplary embodiment in figure 2, a microphone is provided as a receiver 31 in the case of
15 the adapter 30 in figure 3, which microphone is used to implement voice-activated control for the furniture drive. Spoken operator control commands of a user 50 are transmitted as sound waves 51 to the adapter 30, received there by the microphone and converted into electrical signals. These are evaluated in a speech analysis device and converted into control signals for the control device
20 and/or used directly to switch the motor currents by means of switching members.

In order to evaluate the electrical signals of the microphone, the adapter 30 has, for example, a microcontroller, a digital signal processor (DSP) as well as digital
25 and/or analog filters which are part of a local speech analysis device. It is therefore possible, for example, to detect spoken operator control commands such as "lower legs" or "raise head" and to convert them into a movement of the corresponding adjustment drive.

30 It can additionally be provided that safety-relevant speech information which brings about an emergency deactivation of the adjustment drives 7, 8 is detected. This emergency deactivation function can also come into play if an operator control command for activating one of the adjustment drives is output via the manual control 20.

For example, there can be provision that the local speech analysis device detects instructions such as "stop" and then conducts signals to the control device 10 which bring about immediate stopping (or even a brief reversal of the directional movement) of the currently moved adjustment drive, irrespective of whether the
5 movement has taken place on the basis of a speed command or the manual control 20.

In an alternative refinement of the adapter 30, there can be provision that
10 evaluation of the electrical signals of the microphone takes place partially in the adapter 30 itself and, if appropriate, additionally in an external speech analysis device, which is available e.g. as what is referred to as a cloud service.

In order to be able to use an external speech analysis device, the adapter 30 is
15 then connected to a network in a wire-bound fashion, e.g. via an ethernet cable, or else in a wireless fashion, which permits access to the Internet.

The analysis of the signals which are output by the microphone is then divided
20 into two branches, one of which comprises the local speech analysis device and the other the external speech analysis device.

During the operation of the adapter 30, electrical signals of the microphone are transmitted in digitized form to the external speech analysis device. The external
25 speech analysis device analyses the data and extracts a speech content. A detected speech content is also transmitted back in digital form, e.g. in the form of text. The text is then evaluated in the adapter 30 and operator control commands which are found are implemented. Through the high-power external speech analysis, an even more convenient possible way of controlling the adjustment drives 7, 8 and, if appropriate, components which are connected to
30 the control device 10 is made possible.

The convenient speech control is to be understood here as meaning that the speech control reacts in a flexible way to spoken words and can, if appropriate, be trained and/or expanded with respect to the usable vocabulary. This object

requires a high computing power and a complex speech analysis system. The adapter 30 advantageously uses for this purpose existing external speech analysis devices, with which contact can be made via the Internet. Such services are made available by various Internet providers as so-called cloud services. In this context, a standardized network interface technology in the form of an API (Application Programming Interface) or a standardized network enquiry, e.g. via the REST protocol, can generally be used.

Typical spoken commands can be in the form of “move backrest” or “lower leg support” or “assume reading position” or the like. Other commands in the form “store this position under the name ...” are conceivable when using a local speech analysis system. Furthermore, commands which are factory set such as “move in to the TV position” or “move to zero gravity” or “move into the lying position” can also be provided, which commands are linked to permanently preset adjustment positions for the head part and/or the foot part. The abovementioned commands are purely of an exemplary nature here and can be adapted as desired to the functional possibilities of the bed 1 or of the piece of furniture with the furniture drive.

If appropriate, provision is made to firstly use a preceding key word which is detected by the local speech analysis device in the adapter 30 and activates transfer of the recorded speech to the external speech analysis device, with the result that recorded signals are transmitted via the Internet only when they also relate to the furniture drive.

Even in the case of such a combination of local and external speech analysis there can be provision made that the local speech analysis device which is always available serves, in particular, for evaluating safety-relevant speech information.

The speech control is convenient by means of the external speech analysis, but it is nevertheless safe since the commands which are based on the external evaluation can be overwritten at any time by the emergency deactivation by means of the local speech analysis device.

The local speech analysis device can make use here of a microcontroller, of a DSP (Digital Signal Processor) and/or of an FPGA (Field Programmable Gate Array), wherein the specified components are, if appropriate, integrated in the form of an SOC (System On Chip). In this way, at least one analysis of speech inputs can occur in a way which is limited to a small number of keywords with relatively low expenditure on hardware. The specified keyword "stop", for example, can easily and safely be identified on the basis of the characteristic phonetics. In addition to explicit words, it is also possible to detect sounds which might be used in conjunction with dangerous situations and are interpreted as a sign to the adjustment drives 7, 8 to make them stop or make them run in reverse. A further increased safety level is therefore achieved.

In particular if only a few keywords have to be detected in the local speech analysis device, it is also advantageously possible to use a microphone into which the local speech analysis device is integrated. The expenditure on components for the adapter 30 can therefore be minimized.

In a further alternative refinement of figure 3, it is possible to provide evaluation not of language but instead of other sound events, e.g. of individual rattling events or of various rattling sequences which differ in their rhythm.

Not part of the invention and only for example, there may be an optical receiver 31 present in the adapter 30, with the result that a further transmission path which is based on optical signals is made available. It is therefore easily possible to retrofit e.g. a remote-control system operating with infrared light to control the furniture drive.

Only by way of example, it is also possible to retrofit a gesture control system by means of the adapter 30. In this case, the adapter 30 has one or more optical sensors, e.g. cameras, with which the movement of a body part can be detected with respect to speed and direction. Operator control commands for the furniture drive are derived from the sensed gestures.

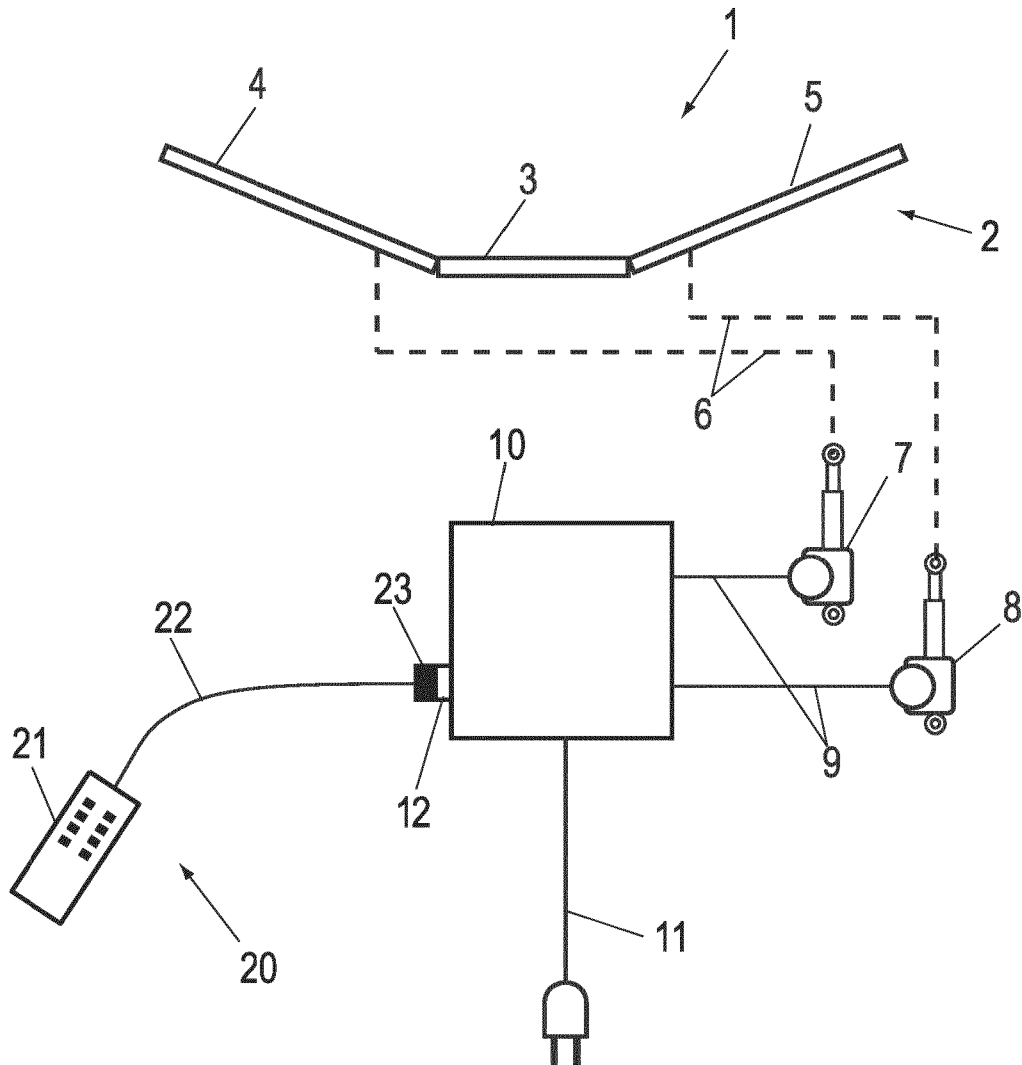
List of Reference Numbers

	1	Bed
	2	Support element
5	3	Middle part
	4	Back part
	5	Leg part
	6	Connection
	7, 8	Adjustment drive
10	9	Connecting cable
	10	Control device
	11	Power system cable
	12	Manual operator control connection
15		
	20	Manual control
	21	Manual operator control unit
	22	Cable
	23	Plug
20		
	30	Adapter
	31	Receiver
	32	Cable
	33	Plug
25	34	Manual operator control connection
	40	Mobile device
	41	Radio signals
30	50	Operator
	51	Sound waves

PATENTKRAV

1. Møbeldrev med en adapter (30), en styringsindretning (10) og mindst et elektromotorisk indstillingsdrev (7, 8), såvel som en manuel styring (20) med en
5 manuel betjeningsenhed (21), der via et kabel (22) er forbundet med styringsindretningen (10) med henblik på betjening af det mindst ene indstillingsdrev (7, 8) via en transmissionsvej for betjeningskommandoer, og hvorved adapteren (30) er tilsluttet til styringsindretningen (10), ved hjælp af hvilken en yderligere transmissionsvej for betjeningskommandoer tilvejebringes, og hvorved adapteren (30) er arrangeret mellem styringsindretningen (10)
10 og den manuelle betjeningsenhed (21), og hvorved adapteren (30) omfatter en modtager (31) for bølger, henholdsvis signaler i den yderligere transmissionsvej, og hvorved modtageren (31) er en radiomodtager, og den yderligere transmissionsvej omfatter en trådløs radiotransmission af betjeningskommandoer,
15 og hvorved adapteren (30) omfatter et stik (33) til forbindelse med styringsindretningen (10) samt en manuel-betjenings-tilslutning (34) for forbindelse med den manuelle betjeningsenhed (21).
2. Møbeldrev ifølge krav 1, i hvilket adapteren (30) er indrettet med henblik på
20 transmission ifølge WLAN-, Bluetooth- eller ZigBee-protokollen.
3. Møbeldrev ifølge krav 1 eller 2, hvorved stikket (33) er udformet integreret med et hus for adapteren (30).
- 25 4. Møbel, navnlig seng (1), omfattende et møbeldrev ifølge et af kravene 1 til 3.

Fig. 1



State of the art

Fig. 2

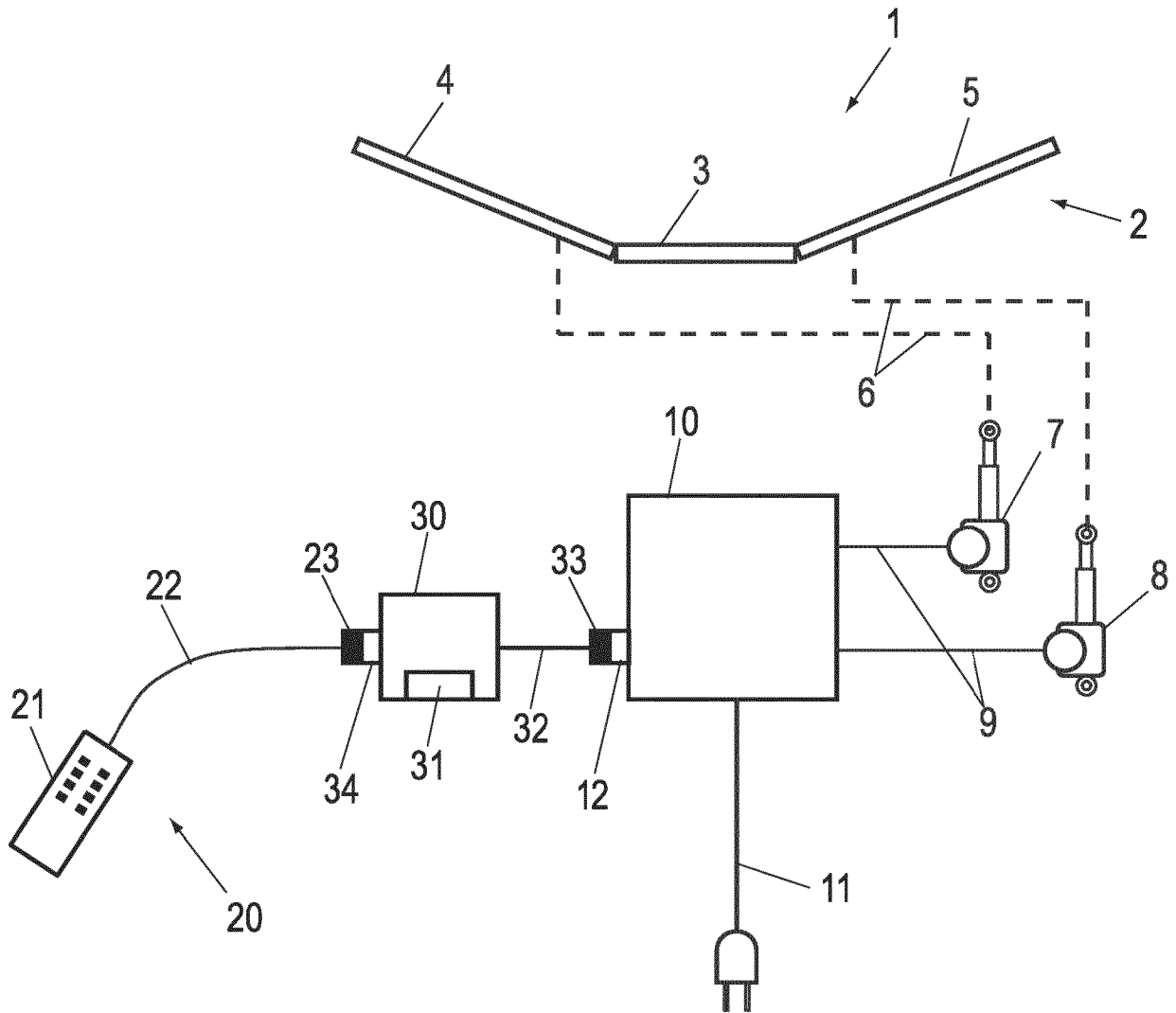


Fig. 3

