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**Villamos működtetőszerkezet-rendszer**

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(54) **ELECTRICAL ACTUATOR SYSTEM**

ELEKTRISCHES AKTORSYSTEM

SYSTÈME D'ACTIONNEUR ÉLECTRIQUE

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**EP 2 087 497 B1**

## Description

**[0001]** The present invention relates to an electrical actuator system especially for adjustable articles of furniture and comprising at least one electric actuator for bring about the adjustment, a mains based power supply and possibly also rechargeable batteries, a control unit and a hand control with at least one key of a transparent material and/or an area surrounding the key is of a transparent material, and a light source located inside the hand control in conjunction with the transparent material.

**[0002]** By electrically adjustable articles of furniture there is a particular complex of problems, when it comes to hand controls with background lighting, as it often occurs that the article of furniture is not constantly connected to mains. Intensified by a price, incentive, the background lighting has, for that reason, typically been left out.

**[0003]** Hand controls with lighting for background lighting of the keys are known cf. for instance DE 195 01 976 A1 Di-etmar Koch (OKIN). Unlike hand controls with constant background lighting of the keys, this publication DE 195 01 976 A1 discloses a hand control where the light is normally off and is not switched on until the moment when the hand control is being used. The light can be switched on as a result of the operation of a key, alternatively by touch, as it is equipped with a touch sensor and finally alternatively, when the hand control is moved, as a movement sensor is built hereinto.

**[0004]** DE 93 18 083 U1 to Dewert shows an electromotive drive for furniture comprising a hand control having a plurality of keys and at least one light source for illuminating the keys. The light sources may either be switched on permanently, or they may be switched on by activation of a key.

**[0005]** Hand controls with constant lighting are easier to locate in the dark; on the other hand the light may also appear annoying. The hand control also requires a constant energy supply of a certain size in order to light up the keys. The other type of hand controls where the light is not switched on until the hand control is activated, has the disadvantage of being difficult to locate in the dark.

**[0006]** The object of the invention is to provide a hand control with improved user properties and which is not so energy demanding.

**[0007]** This is achieved according to the invention with a hand control as stated in claim 1. The hand control thus has a subdued basic lighting, so that it is easy to locate in the dark without otherwise seeming annoying. Further, a subdued basic lighting is not very energy demanding. When activating the hand control, the control unit ensures that the light changes to the stronger operating lighting, where the keys are actually lit up. For activating the operating lighting, activation of a separate key or an operating key can be used, but some form of touch or movement sensors is preferred, so that the light is switches to operating lighting by the mere touch or movement of the hand control. The control unit is moreover embodied so that the operating lighting is on in a certain period of time,

before falling back to the reduced basic lighting. The background lighting requires constant connection to a power source, but it does not necessarily have to be the mains based main power supply, thus it is here possible to use rechargeable batteries or capacitors as power source for the background lighting.

**[0008]** Expediently, the basic lighting and the operating lighting is constituted by a common light source, which by the basic lighting is powered with a lower voltage and/or current corresponding to lower energy than by the operating lighting. Hereby a set of light sources is saved and thus simplifying the construction. The light source is preferably constituted by one or more light emitting diodes, which are not very energy demanding, while they takes up but little space and have small dimensions.

**[0009]** Expediently, the actuator comprises a first constant current generator for the basic lighting and a second constant current generator for the operating lighting, which is simple and sturdy. They could be made so that they operate the basic and operating lighting respectively, but by the operating lighting, the light source is expediently powered both by the first and the second constant current generator.

**[0010]** In the period of time when the hand control is being operated, it is expedient that it emits the operating lighting constantly and in order to attain this, the actuator system comprises a timer for belated switching off the operating lighting, so that it will not go out every time an operating key is released. The timer can be realized in various ways, but is expediently constituted by an analogous circuit.

**[0011]** An embodiment for the invention will be described in the following with reference to the accompanying drawing, in which:

Fig. 1, shows a stylized view of an adjustable bed equipped with an actuator system according to the invention,

Fig. 2, shows an exploded view of a hand control, and

Fig. 3 shows a diagram of the background lighting.

**[0012]** The bed shown in Fig. 1 comprises a lower frame 1, with drive wheels and equipped with a telescopic column 2,3 at each end driven by a built-in linear actuator. The columns carry an upper frame, not shown, wherein is mounted a support surface for a mattress. The support surface is constituted by a back rest section 4, a fixed middle section 5 and an articulated leg rest section 6. The back and leg rest section 4,6 may be adjusted with a linear actuator 7,8 each. The actuators are connected to a control box 9 comprising a mains based power supply, a rechargeable battery package and a control unit. To the control box is connected one or more hand controls 10 via a distribution box 11, just as fixed operating panels 12 can be located at the foot of the bed.

**[0013]** The hand control shown in Fig. 1 comprises a

plastic shell 13, wherein a printed circuit board 14 with switches 15 is inserted for activation of the actuators. Above is a plate 16 of transparent plastic with key bricks 17, which with a stem is resiliently connected to the plate so that they can be pressed inwards for activation of the switch 15 below. Above the transparent plate 16 is placed a cover foil 18 with indications 19, indicating the key bricks 17. The indications are constructed transparently, while the rest of the foil is constructed light impervious. The keys can be locked in pairs with a particular locking arrangement 20. On the printed circuit board 2, in connection with the indications 19 for the keys, are light emitting diodes D051, D052, D042, D041 indicated in the diagram in Fig. 2 for lighting of the keys when emitting light through the indications 19 with a basic lighting and with an operating lighting.

**[0014]** With a first constant current generator based on Q303, the constant basic lighting is emitted. When activating one of the switches 15 on the hand control, another constant current generator, based on the transistor couple Q301, 302, is activated for emitting the operating lighting. The operating lighting is left on for a short period of time after the switch has been released with a timer based on the capacitor C501.

**[0015]** In greater detail, the circuit functions as follows: The transistor Q503 will, with the basis voltage from VCC via the resistance R511, be switched on, for which reason, the collector can be considered connected to ground GND.

**[0016]** The hand control is connected to the circuit by "Power request". When "Power request" is activated "active low", it means that a current runs from "permanent" via the resistance R506 and the light emitting diode D501 through the transistors Q501. By that means basis is driven low on the transistor Q501-B and, with a cascade connection to Q501-A, a current amplification is obtained, which momentarily connects the capacitor C501 with V-permanent in one end to V-permanent minus two times the diode transition in the transistor Q501, which all together constitutes about 1 volt in the other end.

**[0017]** As long as "Power request" is held low, the base voltage on the transistor Q502-A is kept close to V-permanent. This means that a current can run through the resistance R504 and on through the emitter for basis on the transistor Q502-B and for ground GND via the resistance R509. This will mean that a greater current runs through the resistance R504 and on through the emitter for the collector on the transistor Q502-B. This will power the network consisting on the resistances R510, R507 and the Zener diode Z501. The emitter resistance R301 (R302) will, with the Zener diode, cause the transistors Q301 and Q302 to function as constant current generators. The current in the individual transistor will be  $((V_{zener} - V_{be})/R_e)$  which in this case is 3,3 mA and, as we are dealing with two parallel steps, it is 6,6 mA, while the transistor Q303 also functions as constant current generator and provides a contribution of about 1 mA. This contribution is always there when VCC is present and

makes the light emitting diodes send out a feeble light at all times.

**[0018]** When "Power request" again is switch off, the transistor couple Q501A, Q501B will close. At the same time, the capacitor C501 will, with its voltage of about one volt, be preserved. When the capacitor C501 subsequently is charged through the resistance R501, the voltage over the resistance R503 will increase and at some point activate the transistor Q502-A, which will start to increase the voltage on basis of the transistor Q502-B, whereupon this will close. This will mean that the transistors Q301 and Q302 will cut off the current for the light emitting diodes, which will then only have the contribution from the transistor Q303.

**[0019]** Lastly, it is noted that the actuator system is controlled with a bus system as described in WO 2007/057014 A1 Linak A/S, which in the diagram is indicate with OPENBUS I/F.

## Claims

1. Electrical actuator system, especially for adjustable articles of furniture, and comprising at least one electric actuator (7, 8) for bringing about the adjustment, a mains based power supply and possibly also rechargeable batteries, a control unit and a hand control (10) with at least one key (17) of a transparent material and/or an area surrounding the at least one key (17) is of a transparent material, and inside the hand control a light source (D041, D042, D051, D052) located in connection with the transparent material, **characterized in that** it comprises a control of the light source (D041, D042, D051, D052) being furnished so that the light source always emits a subdued basic lighting and by touch, movement of the hand control or activation of a key (17), the light source is brought to emit an actual operating lighting of the keys.
2. Electrical actuator system according to claim 1, **characterized** in that the basic lighting and the operating lighting is constituted by a common light source (D041, D042, D051, D052), which by the basic lighting is powered with a lower energy (voltage, ampere) than by the operating lighting.
3. Electrical actuator system according to claim 1 or 2, **characterized in that** the light source (D041, D042, D051, D052) is constituted by one or more light-emitting diodes.
4. Electrical actuator system according to any one of claims 1 to 3, **characterized in that** it comprises a first constant current generator for the basic lighting.
5. Electrical actuator system according to claim 4, **characterized** in that it comprises another constant cur-

rent generator for the operating lighting.

6. Electrical actuator system according to claim 5, **characterized** in that by operating lighting the light source (D041, D042, D051, D052) is powered by both the first and the second constant current generator.
7. Electrical actuator system according to any one of claims 1 to 6, **characterized in that** it comprises a timer for delayed switching off the operating lighting.
8. Electrical actuator system according to claim 7, **characterized** in that the timer is constituted by an analogous circuit.

#### Patentansprüche

1. Elektrisches Stellantriebssystem, insbesondere für verstellbare Möbelstücke, mit mindestens einem elektrischen Stellantrieb (7, 8) zum Bewirken der Verstellung, einer netzbasierten Stromversorgung und ggfs. auch wiederaufladbaren Batterien, einer Steuereinheit und einer Handsteuerung (10) mit mindestens einer Taste (17) aus einem transparenten Material und/oder ein Bereich, der die mindestens eine Taste (17) umgibt, ist aus einem transparenten Material, und innerhalb der Handsteuerung eine Lichtquelle (D041, D042, D051, D052), die in Verbindung mit dem transparenten Material angeordnet ist, **dadurch gekennzeichnet, dass** es eine Steuerung der Lichtquelle (D041, D042, D051, D052) aufweist, die so eingerichtet ist, dass die Lichtquelle immer eine gedämpfte Grundbeleuchtung und durch Berührung, Bewegung der Handsteuerung, oder Aktivierung einer Taste (17), die Lichtquelle dazu gebracht wird, eine tatsächliche Betriebsbeleuchtung der Taste zu emittieren.
2. Elektrisches Stellantriebssystem nach Anspruch 1, **dadurch gekennzeichnet, dass** die Grundbeleuchtung und die Betriebsbeleuchtung durch eine gemeinsame Lichtquelle (D041, D042, D051, D052) gebildet ist, die bei der Grundbeleuchtung mit einer niedrigeren Energie (Spannung, Ampere) als bei der Betriebsbeleuchtung versorgt wird.
3. Elektrisches Stellantriebssystem nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Lichtquelle (D041, D042, D051, D052) gebildet ist durch eine oder mehrere Leuchtdioden.
4. Elektrisches Stellantriebssystem nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** sie einen ersten Konstantstromgenerator für die Grundbeleuchtung aufweist.

5. Elektrisches Stellantriebssystem nach Anspruch 4, **dadurch gekennzeichnet, dass** sie einen weiteren Konstantstromgenerator für die Betriebsbeleuchtung aufweist.

6. Elektrisches Stellantriebssystem nach Anspruch 5, **dadurch gekennzeichnet, dass** bei der Betriebsbeleuchtung die Lichtquelle (D041, D042, D051, D052) sowohl von dem ersten als auch von dem zweiten Konstantstromgenerator gespeist wird.

7. Elektrisches Stellantriebssystem nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** es einen Zeitgeber für verzögertes Ausschalten der Betriebsbeleuchtung aufweist.

8. Elektrisches Stellantriebssystem nach Anspruch 7, **dadurch gekennzeichnet, dass** der Zeitgeber durch eine analoge Schaltung gebildet ist.

#### Revendications

1. Système d'actionneur électrique, particulièrement pour des meubles réglables, et comprenant au moins un actionneur électrique (7, 8) pour provoquer le réglage, une alimentation sur secteur et éventuellement également des batteries rechargeables, une unité de commande et une commande manuelle (10) avec au moins une touche (17) en un matériau transparent et/ou une zone entourant l'au moins une touche (17) est en matériau transparent, et à l'intérieur de la commande manuelle une source de lumière (D041, D042, D051, D052) située en lien avec le matériau transparent, **caractérisé en ce qu'il** comprend une commande de la source de lumière (D041, D042, D051, D052) étant fournie de sorte que la source de lumière émette toujours un éclairage de base tamisé et par un effleurement, un mouvement de la commande manuelle ou une activation d'une touche (17), la source de lumière soit amenée à émettre une lumière de fonctionnement réelle des touches.
2. Système d'actionneur électrique selon la revendication 1, **caractérisé en ce que** l'éclairage de base et l'éclairage de fonctionnement sont constitués d'une source de lumière commune (D041, D042, D051, D052), qui par l'éclairage de base est alimentée par une énergie plus basse (tension, ampère) que par l'éclairage de fonctionnement.
3. Système d'actionneur électrique selon la revendication 1 ou 2, **caractérisé en ce que** la source de lumière (D041, D042, D051, D052) est constituée d'une ou de plusieurs diodes électroluminescentes.
4. Système d'actionneur électrique selon l'une quel-

conque des revendications 1 à 3, **caractérisé en ce qu'il** comprend un premier générateur de courant constant pour l'éclairage de base.

5. Système d'actionneur électrique selon la revendication 4, **caractérisé en ce qu'il** comprend un autre générateur de courant constant pour l'éclairage de fonctionnement. 5
6. Système d'actionneur électrique selon la revendication 5, **caractérisé en ce que**, par l'éclairage de fonctionnement, la source de lumière (D041, D042, D051, D052) est alimentée à la fois par le premier et le second générateur de courant constant. 10
7. Système d'actionneur électrique selon l'une quelconque des revendications 1 à 6, **caractérisé en ce qu'il** comprend un minuteur pour l'arrêt retardé de l'éclairage de fonctionnement. 15
8. Système d'actionneur électrique selon la revendication 7, **caractérisé en ce que** le minuteur est constitué d'un circuit analogue. 20

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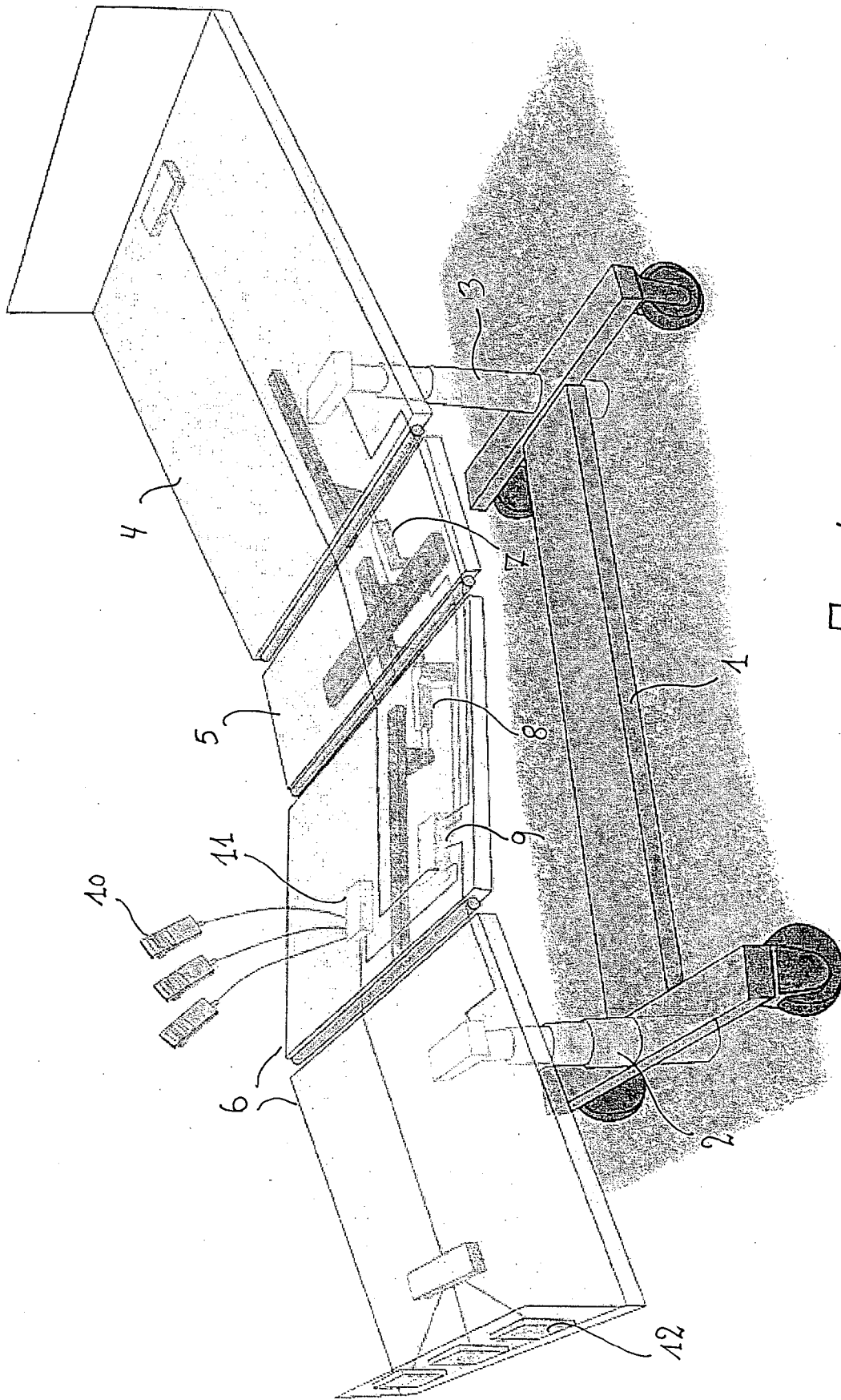
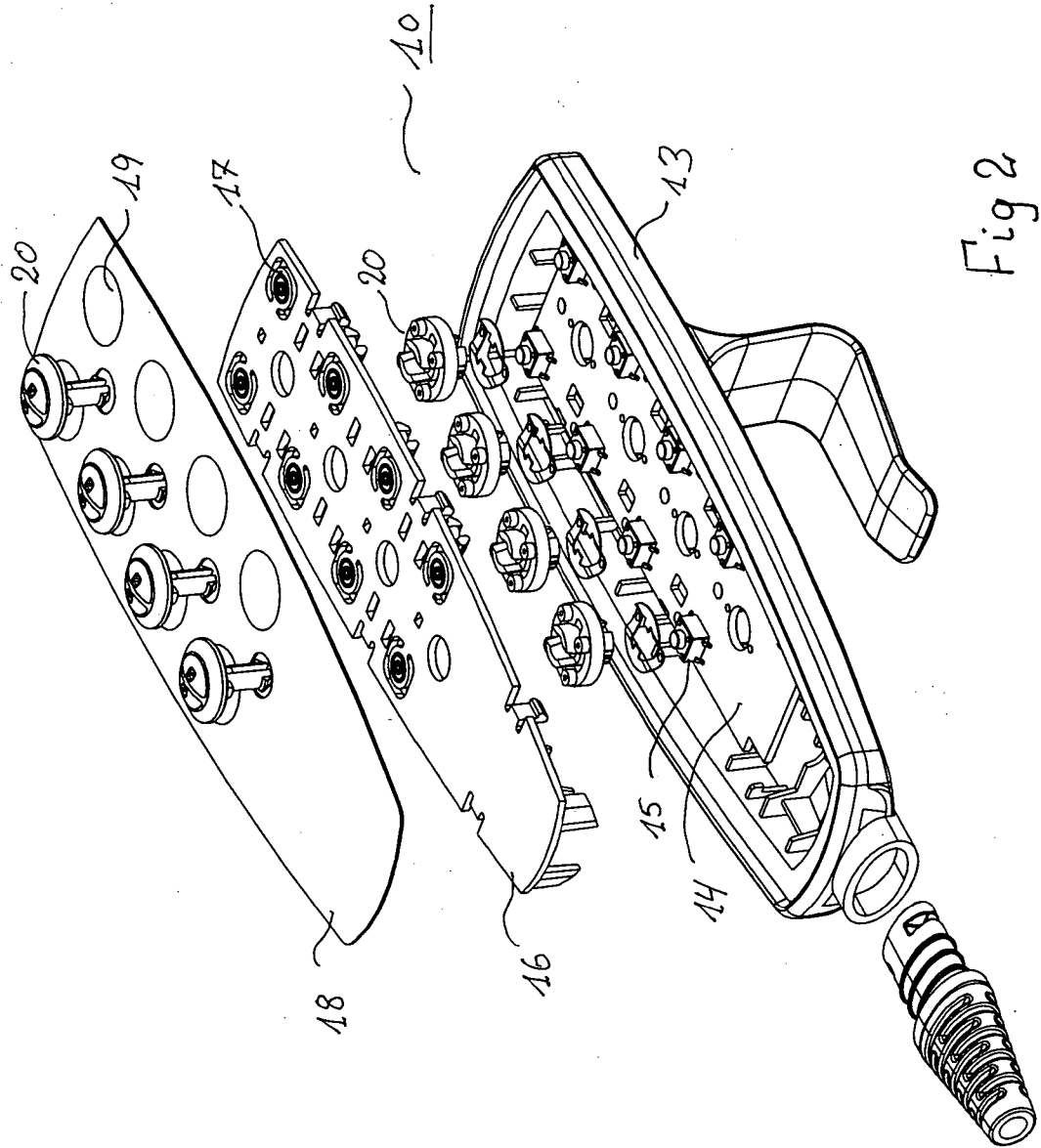
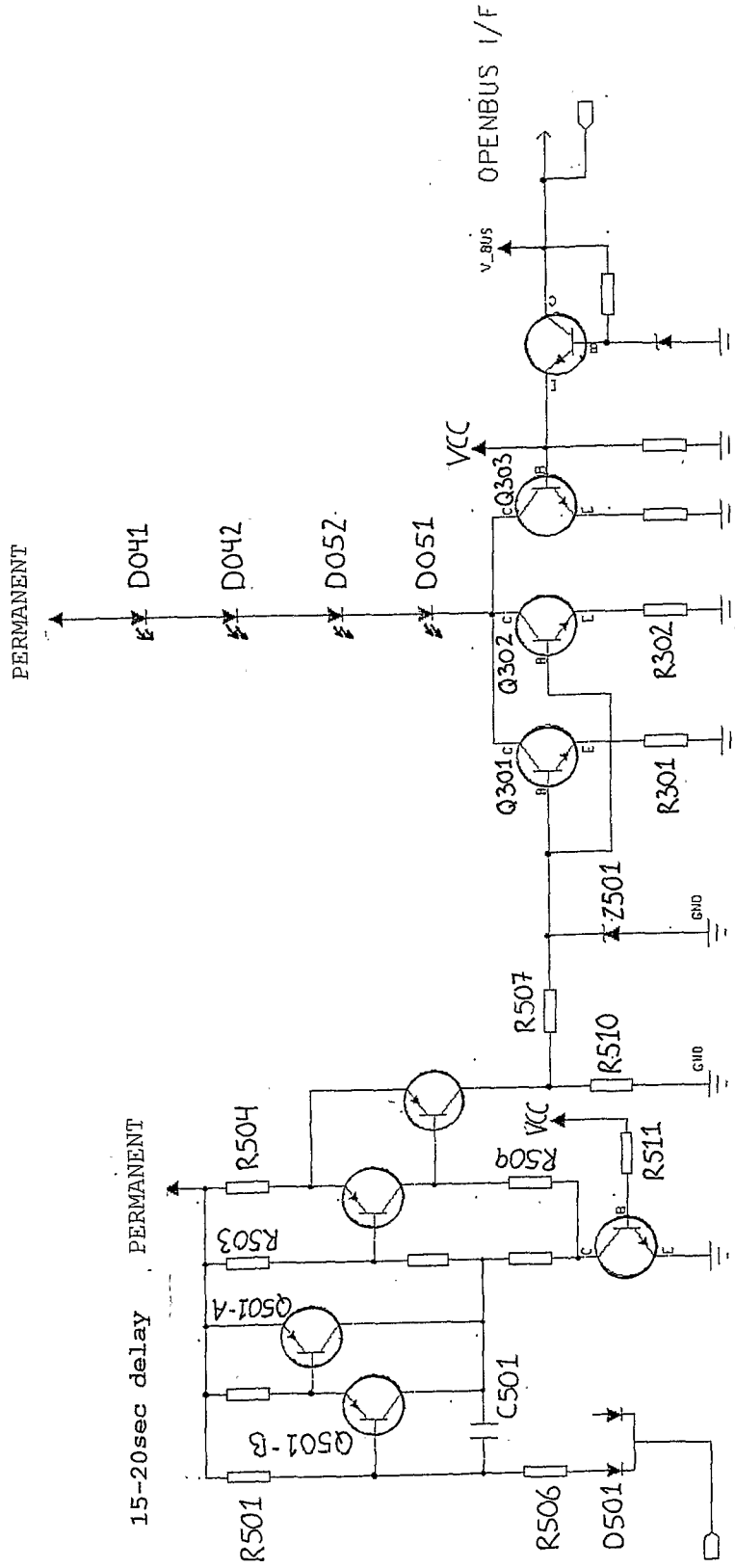


Fig. 1





"Power\_request" is on when button is pushed

Fig. 3

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- DE 19501976 A1 [0003]
- DE 9318083 U1, Dewert [0004]
- WO 2007057014 A1 [0019]

## VILLAMOS MŰKÖDTETŐSZERKEZET-RENDSZER

*Szabadalmi igénypontok*

- 5 1. Villamos működtetőszervezet-rendszer, különösen állítható bútorcsoportokhoz, amely tartalmaz a beállítás előidézéséhez legalább egy villamos működtetőszervezetet (7, 8), hálózatról üzemelő tápegységet és adott esetben tölthető telepeket, vezérlőegységet és kézi vezérlőt (10) legalább egy nyomógombbal (17), amely átlátszó anyagból van és/vagy a legalább egy nyomógombot (17) körülvevő tartomány átlátszó anyagból van, valamint a kézi vezérlő belsejében az átlátszó anyaggal együttműködően elhelyezett fényforrás (D041, D042, 10 D051, D052) van, azzal jellemezve, hogy a fényforráshoz (D041, D042, D051, D052) vezérlőegységet tartalmaz, amely úgy van kiképezve, hogy a fényforrás mindig tompított alap világítást bocsát ki és érintés, a kézi vezérlő mozgatása vagy egy nyomógomb (17) aktiválása esetén a fényforrás a nyomógombok tényleges üzemi világítását bocsátja ki.
2. Az 1. igénypont szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, hogy az alap 15 világítást és az üzemi világítást egy közös fényforrás (D041, D042, D051, D052) biztosítja, amely az alap világítás esetén alacsonyabb energiájú (feszültségű, áramerősségű) tápellátást kap, mint üzemi világítás esetén.
3. Az 1. vagy a 2. igénypont szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, hogy a fényforrást (D041, D042, D051, D052) egy vagy több fénykibocsátó dióda képezi.
4. Az 1-3. igénypontok bármelyike szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, 20 hogy az alap világításhoz első állandó áramú generátort tartalmaz.
5. A 4. igénypont szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, hogy az üzemi világításhoz egy további állandó áramú generátort tartalmaz.
6. Az 5. igénypont szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, hogy üzemi 25 világítás esetén a fényforrás (D041, D042, D051, D052) számára az első és a második állandó áramú generátor is tápellátást biztosít.
7. Az 1-6. igénypontok bármelyike szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, hogy az üzemi világítás késleltetett kikapcsolásához időzítőt tartalmaz.
8. A 7. igénypont szerinti villamos működtetőszervezet-rendszer, azzal jellemezve, hogy az időzítő: analóg áramkör képezi.

