(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 466 806 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.10.2004 Bulletin 2004/42

(51) Int Cl.[7]: **B61L 5/18**, G08G 1/0955

(21) Application number: **04425232.8**

(22) Date of filing: **31.03.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **08.04.2003 IT FI20030098**

(71) Applicant: **Elettromeccanica CM S.r.l.**
51034 Serravalle Pistoiese (PT) (IT)

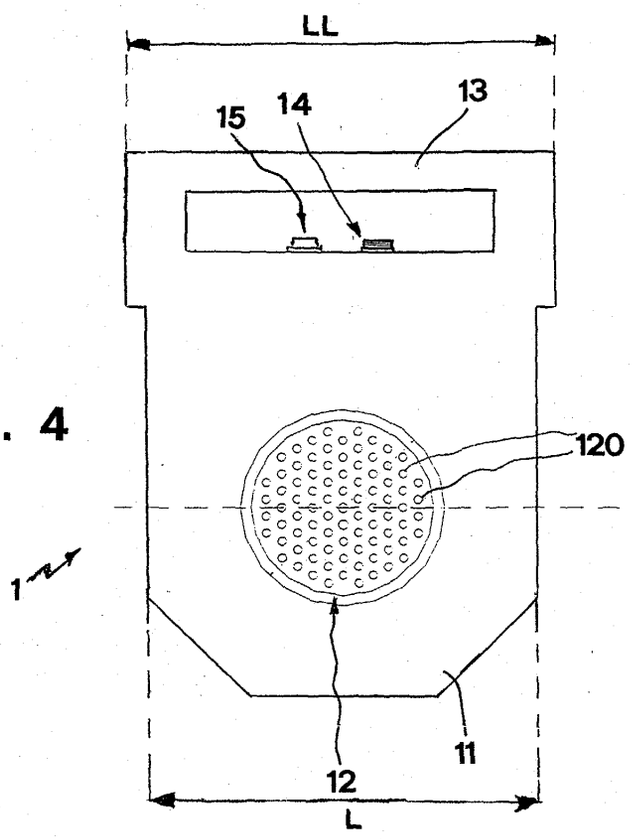
(72) Inventors:
- **Cappellini, Mario**
  51100 Pistoia (IT)
- **Cappellini, Roberto**
  51106 Montecatini Terme (Pistoia) (IT)

(74) Representative: **Martini, Lazzaro**
Studio Brevetti Ing. Dr. Lazzaro Martini s.r.l.
Via dei Rustici 5
50122 Firenze (IT)

(54) Portable signal device and corresponding support device

(57) The invention relates to a portable signalling apparatus to be used, in particular, for the temporary replacement of railways' high signal devices in order to provide a relevant light signal, characterized in that it comprises a containment body (11) able to be stably and removably associated to said signal device by relevant fixing means; provided inside said body (11) are battery supply means (16) and an optical group (12) for the emission of a relevant signal and consisting of at least a matrix of luminous elements or sectors electrically connected in parallel, each luminous sector comprising one or more light sources (120).

Fig. 4



EP 1 466 806 A1

Description

[0001] The present invention refers to a portable signalling apparatus and relevant kit for the use thereof. The signalling apparatus is intended, in particular, for temporarily replacing railways' signal devices, especially for signals of high type.

[0002] It is known that in case of failures of, or extra maintenance interventions on high signal devices, the engine-room personnel of the train has to consider the signal as one of red configuration, with relevant consequences on the subsequent service procedures.

[0003] The object of the present invention is to provide a signalling apparatus able to replace the high-signal devices in the above mentioned situations.

[0004] This result has been achieved, according to the invention, by adopting the idea of making an apparatus and a kit having the characteristics disclosed in the independent claims. Further characteristics being set forth in the dependent claims.

[0005] Among the advantages of the present inventions there is the fact that upon failures or maintenance interventions, it is possible to provide a signal of red colour (or a yellow signal in the particular case of protecting a crossroad in correspondence of a diverted direction) capable of ensuring anyway a signalling for the engine-motor personnel of a train, thereby improving the operation safety; that it has a battery power supply which allows it to be transported and used in any point of the railway system; that it provides, as a light source, a plurality of luminous elements subdivided into at least two groups or sectors connected in parallel to each other so as to give a high reliability; that it preferably utilizes, as luminous elements, LEDs able to ensure remarkably high efficiency and duration; that an apparatus according to the present invention is not subjected to the so-called "ghost effect" (that is, to that optical phenomenon by which the optical unit of a luminous signal, intended to project white light or other colour light, although switched off, is still able to generate a light beam after the incidence and subsequent reflection of foreign radiations such as those coming from artificial sources, like railway or road lamps, lights and luminous signs, or from natural sources like the sun rays); that an apparatus according to the present invention is relatively simple to make and to use and cost-effective when compared to its performance.

[0006] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 is an exploded perspective view of a possible embodiment of a support element for a portable signalling apparatus according to the invention, depicted in association with a screen to be assembled to a high signal device;
- Figs. 2 and 3 show the support element of Fig. 1 in side view and front view, respectively;
- Figs. 4 and 5 show, respectively in front view and side view, one embodiment of a portable signalling apparatus according to the invention;
- Figs. 6 and 7 show, respectively in front view and side view, one embodiment of a dimmer shield according to the invention;
- Fig. 8 is an electric block diagram of a possible embodiment of a kit for use with the portable signalling apparatus according to the present invention;
- Fig. 9 is an electric block diagram of a possible embodiment of a portable signalling apparatus according to the present invention;
- Fig. 10 is a schematic operation diagram relating to a matrix defining a possible optical group for the portable signalling apparatus according to the present invention, consisting of sectors connected in parallel and formed by in-series LEDs.

[0007] With reference to the accompanying drawings which, as indicated above, represent only possible non-limiting embodiments, a portable signalling apparatus 1 according to the invention comprises a containment body 11 provided with a handle 13 which allows it to be held by hand for the transportation and positioning thereof onto a relevant support element 5.

[0008] The support element 5 defines the means for a stable and removable association of the apparatus 1 with a railway signal device, in particular with a high signal device.

The support element 5 is made up of a hollow body exhibiting a through aperture 50 centrally disposed and having a circular profile. Provided on two opposite faces, around the aperture 50, are two sleeves 51 and 52 having cylindrical development. The sleeve 51 has a plurality of holes 510 which are used to secure the support element 5 to the fixed signal device to be equipped. The fixed signal device (not shown) is in fact provided with a circular collar with holes for the attachment of a screen 4 and/or other parts (not shown) such as a ground plate, for example.

[0009] When assembling the support 5 on the fixed signal device, the screen 4 is removed firstly from the latter, followed by the removal of any other part such as the ground plate. Afterwards, the sleeve 51 of support 5 is fixed on the collar of the signal device and, finally, by using suitable holes 520 provided on the sleeve 52, the screen 4 (being provided with corresponding holes 420) is mounted on the support 5 along with any other part previously removed from the fixed signal device.

It will be appreciated that the sleeves 51 and 52 can be shaped differently from the one illustrated in Figs. 1-3, so as to complementarily match both the screen and the other parts of the fixed signal device.

[0010] The support element, moreover, is provided with at least a side aperture 55 defining a seat for re-

ceiving the signalling apparatus 1 or a shield 2 to be described later on.

[0011] In the example, the seat 55 has a length designated by D and a width designated by H. On the support element two seats 55 may be provided which may in turn be provided with relevant closing caps to be used when the apparatus 1 (or the shield to be described later on) is not housed within the seats.

The apparatus 1 has, along the majority of its longitudinal development, a width L which is steady as far as region of the handle 13, wherein the width LL becomes larger. The thickness of the apparatus 1 has been indicated by Q in Fig. 5.

[0012] The kit for using the signalling apparatus 1 may comprise, among other parts, a shield 2 having dimensions similar to those of the same signalling apparatus 1. The shield 2 has a fully opaque body 2, and a handle 23. The shield 2, once positioned in front of a high-signal device, cannot be crossed by light radiations possibly emitted. The shield is possibly made from thermoplastic material and may exhibit an opaque black colour. The support element 5 and the signalling apparatus 1 may also be made from the said material.

The said cross-section dimensions L and Q of the apparatus 1, as well as of shield 2, allow the apparatus or the shield to be inserted into the seat 55 exhibited by the support element 5.

[0013] In practice, on railway signal devices equipped beforehand with the support element 5, it is possible to house stably and removably either the signalling apparatus 1 or the shield 2. In this way, in case of failures of high signal devices or extra maintenance interventions thereon - when a switch-off configuration of the signal takes place - it is possible to dispose the signalling apparatus 1 on the highest signal device and obscuring the signals below by means of corresponding shields 2.

[0014] Provided in the central region of the body 11 of apparatus 1, is an optical group 12 able to provide the relevant luminous signal.

The optical group 12 is made up of a matrix of electrically luminous elements or sectors connected in parallel to each other. Each luminous sector may consist of one or more light elements 120 connected in series to each other.

[0015] Advantageously, the said light elements 120 may be formed by LEDs. Shown in Fig. 10 is the electric diagram of a matrix 12 with m sectors in parallel, each of which is made up of n LEDs in series. Provided on each sector is a relevant limiting resistance (R1, ..., Rm) and a number n of LEDs 120 (D1, ..., Dn).

[0016] The optical group 12 is able to emit either a red or yellow light. In case of emission of red light, the signal is characterized by a minimum light intensity of 200 cd on its axis and of 100 cd at ±2°; in case of yellow light emission, the signal is characterized by a minimum light intensity of 500 cd on its axis and of 250 cd at ±2°. The said values are to be considered by way of a non-limiting exemplification.

[0017] With reference to Figs. 8 and 9 (wherein many components are indicated with their names), the signalling apparatus 1 is powered by a battery 16, preferably of Ni-Cd type, which can be recharged by connecting the apparatus, via a suitable connector 14, to a battery charger 10 schematically represented in Fig. 8. The signalling apparatus 1 is also provided with an on-off switch 15.

[0018] The battery charger 10 may be of box-like shape made from plastics material and provided with a suitable basket for receiving the units to be charged. In the example, the battery charger 10 is able to charge up to four signalling units 1 (channels 1 to 4 of Fig. 8) and is provided with pilot lights 7 for signalling the relevant state of charge; for the sake of clarity, the pilot lights have been shown only for the channel 1 to which the apparatus 1 is connected in the example of the figure; moreover, in correspondence of the channel 1, provision is also made for the discharge function, that is, the possibility of periodically controlling and restoring the efficiency of the batteries). The battery charger 10 can be powered with either 220 V or 150 V; in this view, provision is made for a plug for the 220V supply, and for terminals in case of 150V supply, along with a relevant voltage selector.

[0019] With reference to Fig. 9, two power supplies are shown for two sectors of matrix 12, connected in parallel to each other and represented by way of example by two LEDs 120; in a practical solution, it is obvious that the LEDs will be higher in number.

[0020] By using a matrix of LEDs or equivalent light sources as previously described, it is possible to avoid making use of optical components such as mirrors, prisms, colour filters and other that may alter the optical path and/or the colour of the luminous rays produced by external sources and reflected toward the observer ("ghost effect").

Claims

1. A portable signalling apparatus to be used, in particular, for the temporary replacement of railways' high signal devices in order to provide a relevant light signal, **characterized in that** it comprises a containment body (11) able to be stably and removably associated to said signal device by relevant fixing means; provided inside said body (11) are battery supply means (16) and an optical group (12) for the emission of a relevant signal and consisting of at least a matrix of luminous elements or sectors electrically connected in parallel, each luminous sector comprising one or more light sources (120).

2. A signalling apparatus according to claim 1, **characterized in that** each luminous sector comprises at least two light sources (120) connected in series.

3. A signalling apparatus according to claims 1 and/or 2, **characterized in that** each light source is made up of one LED.

4. A signalling apparatus according to claim 1, **characterized in that** the said fixing means comprise a support element (5) able to be secured to a fixed railway signal device and having a seat (55) for receiving said signalling apparatus (1).

5. A signalling apparatus according to claim 4, **characterized in that** the said support element (5) is made up of a hollow body having a through aperture (50) to be disposed in correspondence of the optical group of the fixed signal device to be equipped, two sleeves (51, 52) being provided for, respectively, allowing the interposition of said support element (5) between the optical group of the fixed signal device and a relevant screen (4) and/or other parts thereof.

6. A signalling apparatus according to any of the preceding claims, **characterized in that** the said luminous elements (120) emit light of red colour.

7. A signalling apparatus according to any of the preceding claims, **characterized in that** the said luminous elements (120) emit light of yellow colour.

8. Kit for using a portable signalling apparatus to be used, in particular, for the temporary replacement of railways' high signal devices in order to provide a relevant light signal, **characterized in that** it comprises a support element (5) made up of a hollow body having a through aperture (50) and being provided with a seat (55) for stably and removably receiving a portable signalling apparatus (1), provided with battery supply means (16) and an optical group (12) for the emission of a relevant signal, consisting of at least a matrix of luminous elements or sectors electrically connected in parallel, each luminous sector comprising one or more light sources (120).

9. Kit according to claim 8, **characterized in that** each luminous sector comprises at least two light sources (120) connected in series.

10. Kit according to claims 8 and/or 9, **characterized in that** each light source (120) is made up of one LED.

11. Kit according to claim 8, **characterized in that** it further comprises at least one shield (2) so shaped as to result insertable into said seat (55).

12. Kit according to claim 8, **characterized in that** it further comprises at least one shield (2) so shaped as to result insertable into said seat (55), a first apparatus (1) able to emit light of red colour and a second apparatus (1) able to emit light of yellow colour.

13. Kit according to claim 8, **characterized in that** it comprises a support element (5) consisting of a hollow body having a through aperture (50) and provided with two sleeves (51, 52) the first (51) of which can be used for securing said support element (5) to the body of said signal device in correspondence of the relevant optical group, and the second (52) of which can be used for securing a screen (4) and/or other elements provided on said signal device.

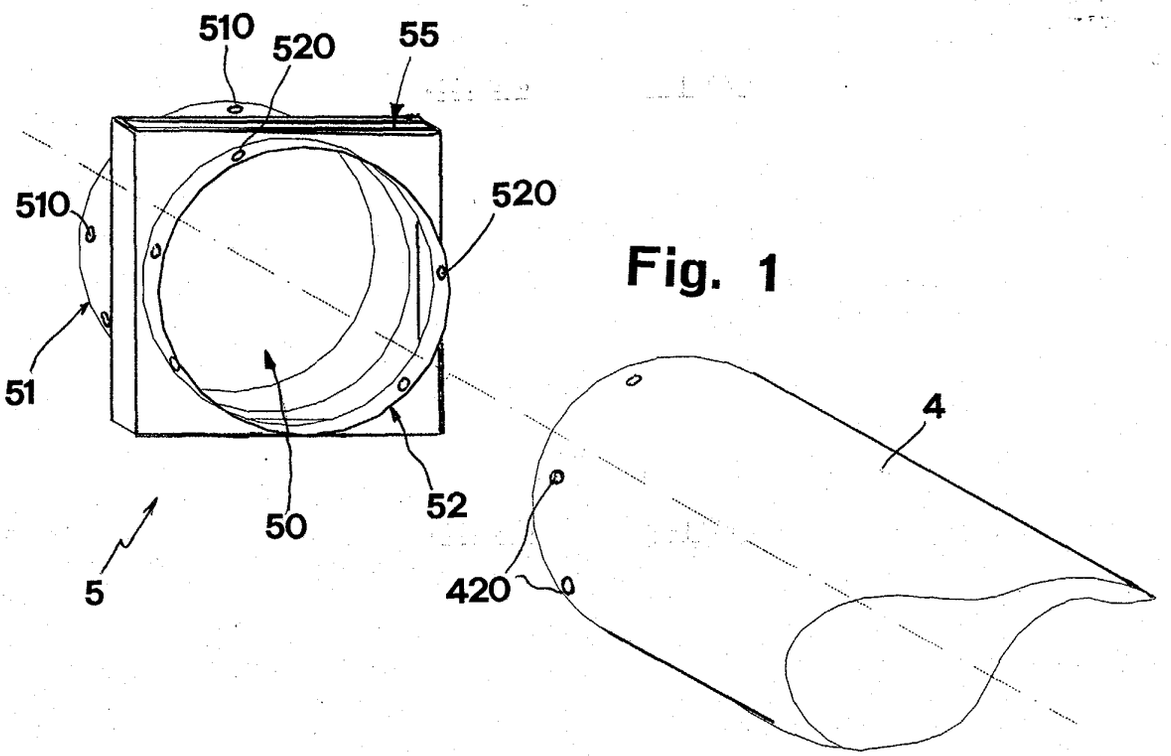


Fig. 1

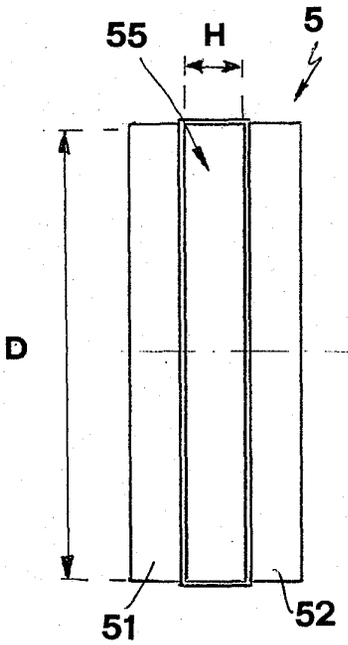


Fig. 2

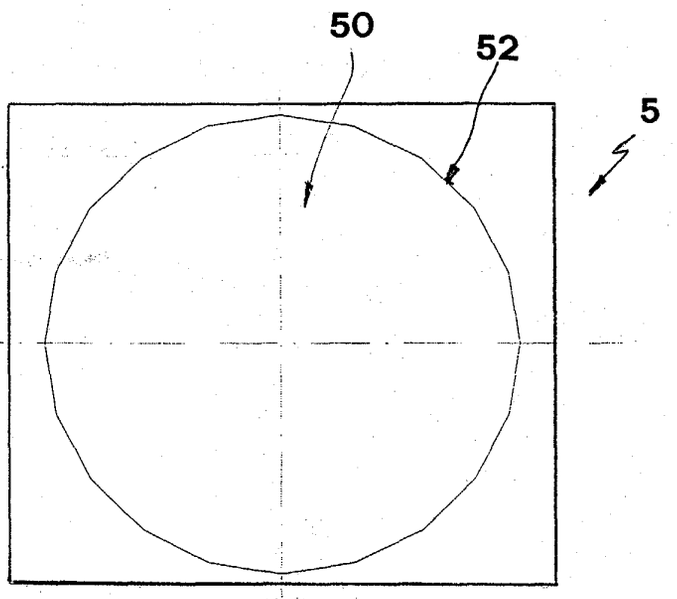


Fig. 3

Fig. 4

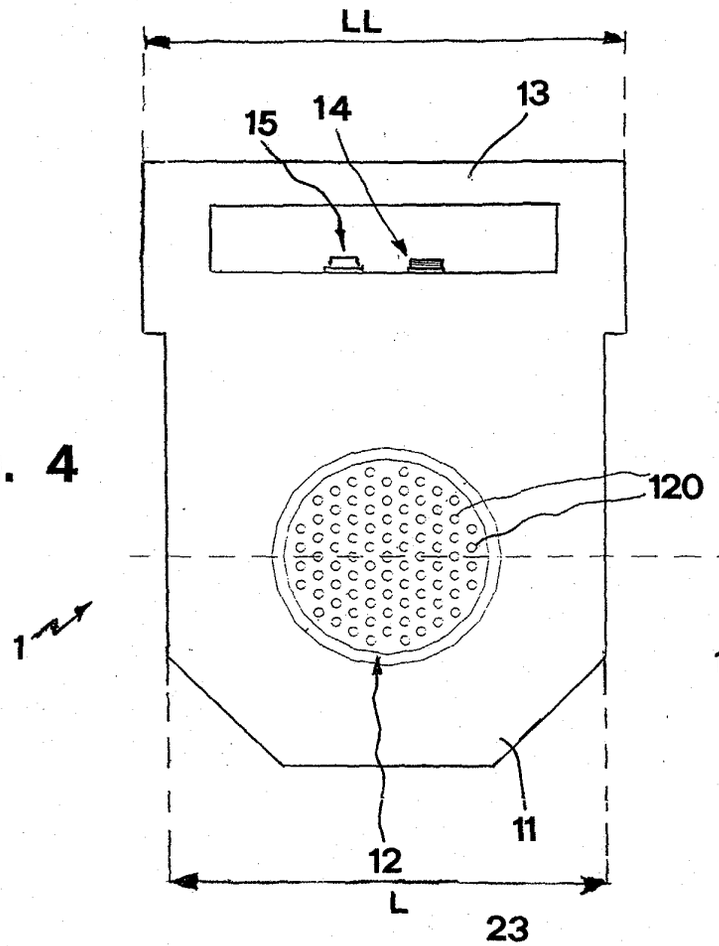


Fig. 5

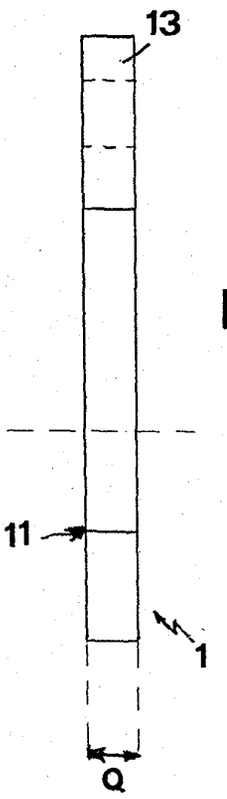


Fig. 6

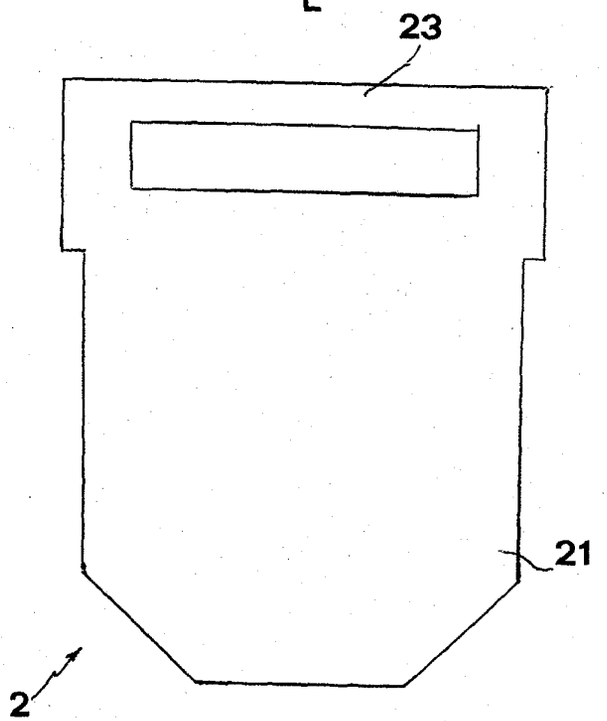
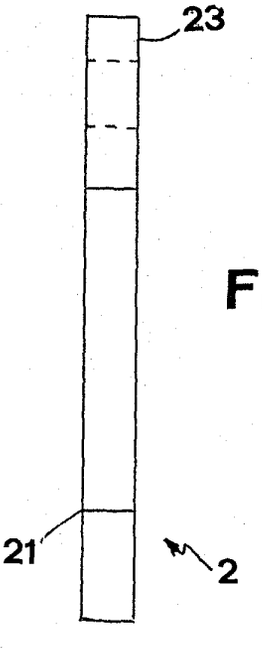


Fig. 7



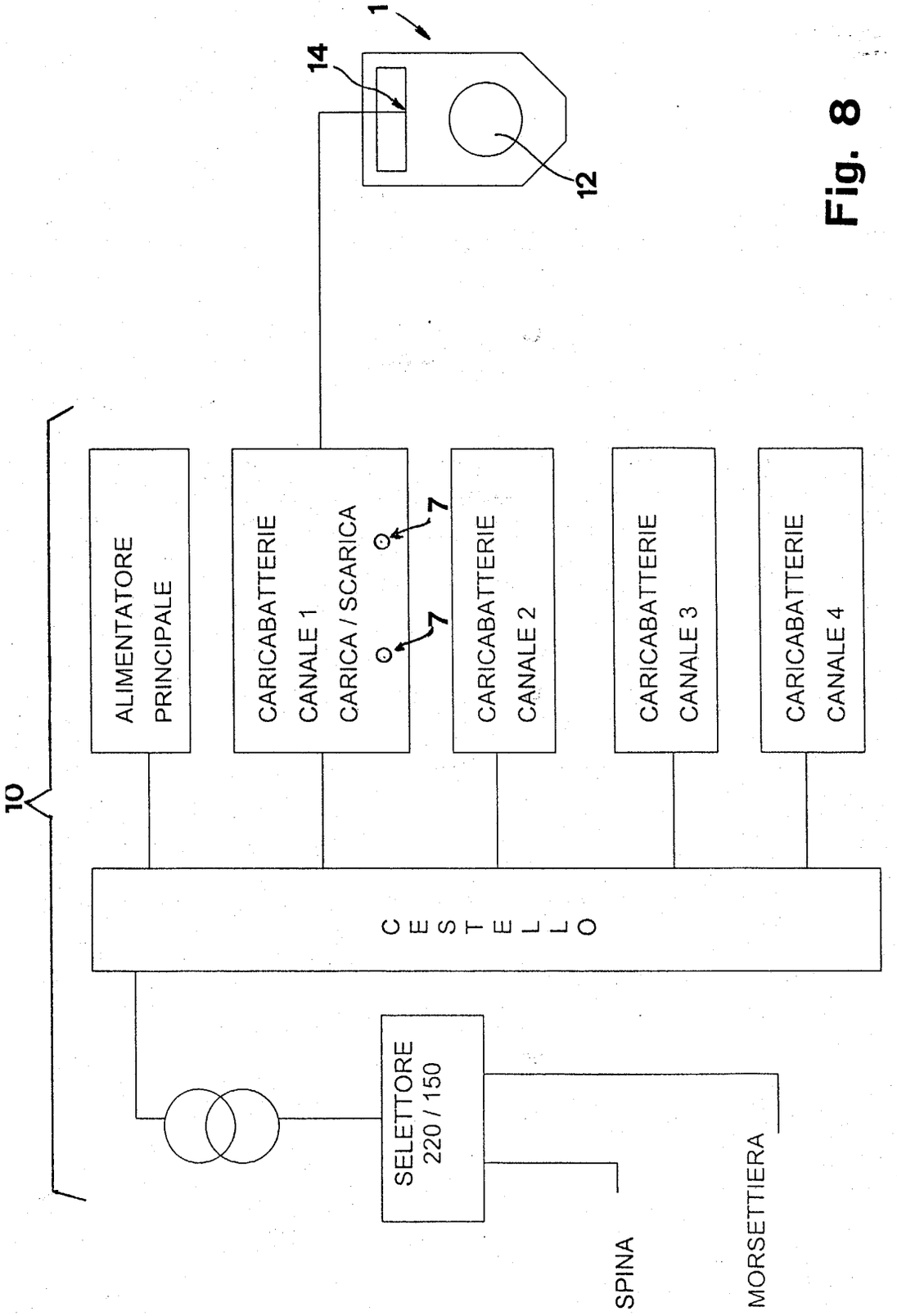

1
14
12
10
ALIMENTATORE PRINCIPALE
CARICABATTERIE CANALE 1 CARICA / SCARICA
7
7
CARICABATTERIE CANALE 2
CARICABATTERIE CANALE 3
CARICABATTERIE CANALE 4
CESTELLO
SELETTORE 220 / 150
SPINA
MORSETTIERA

Fig. 8

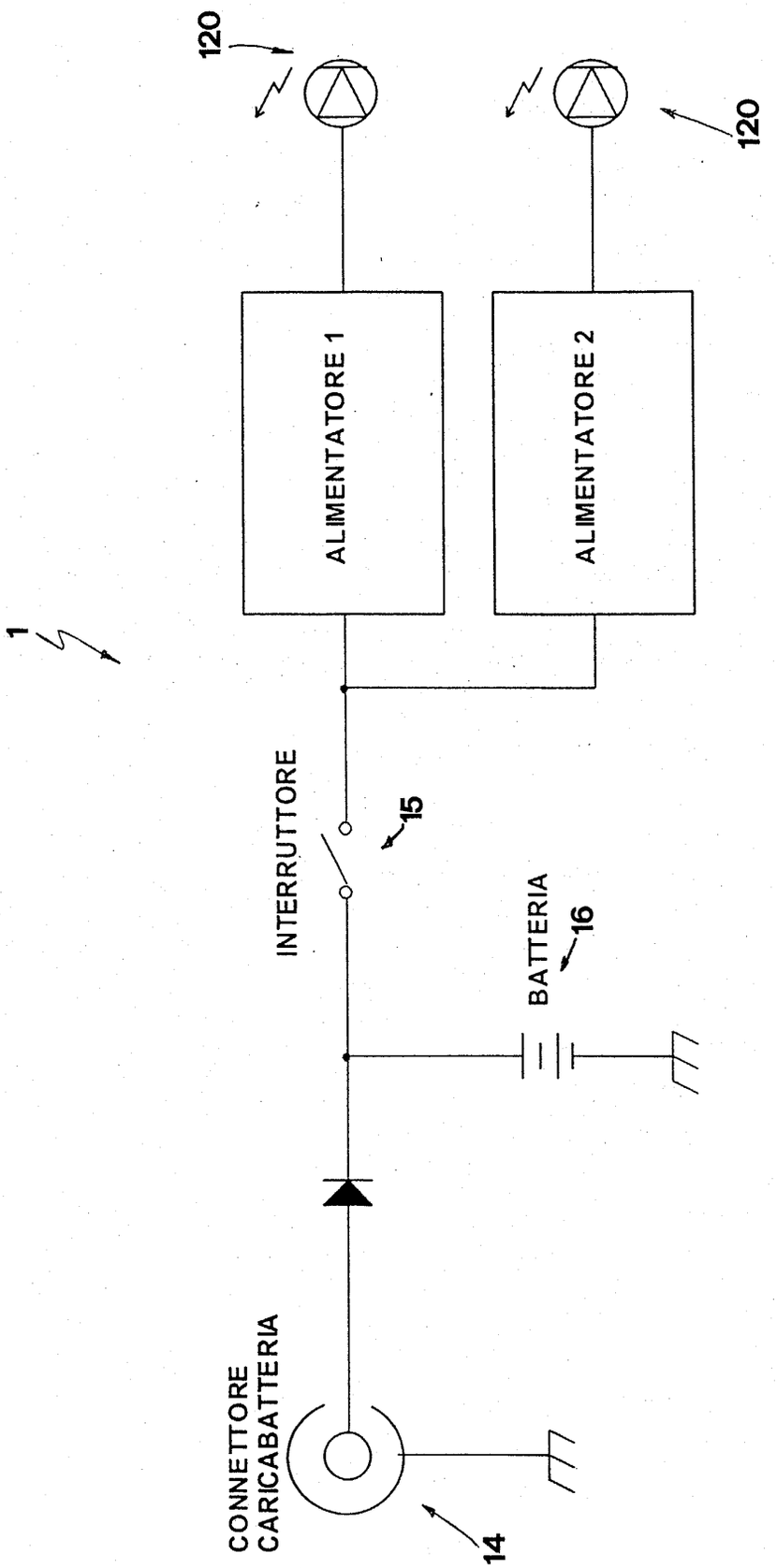

120
120
ALIMENTATORE 1
ALIMENTATORE 2
1
INTERRUTTORE
15
BATTERIA
16
CONNETTORE
CARICABATTERIA
14

Fig. 9

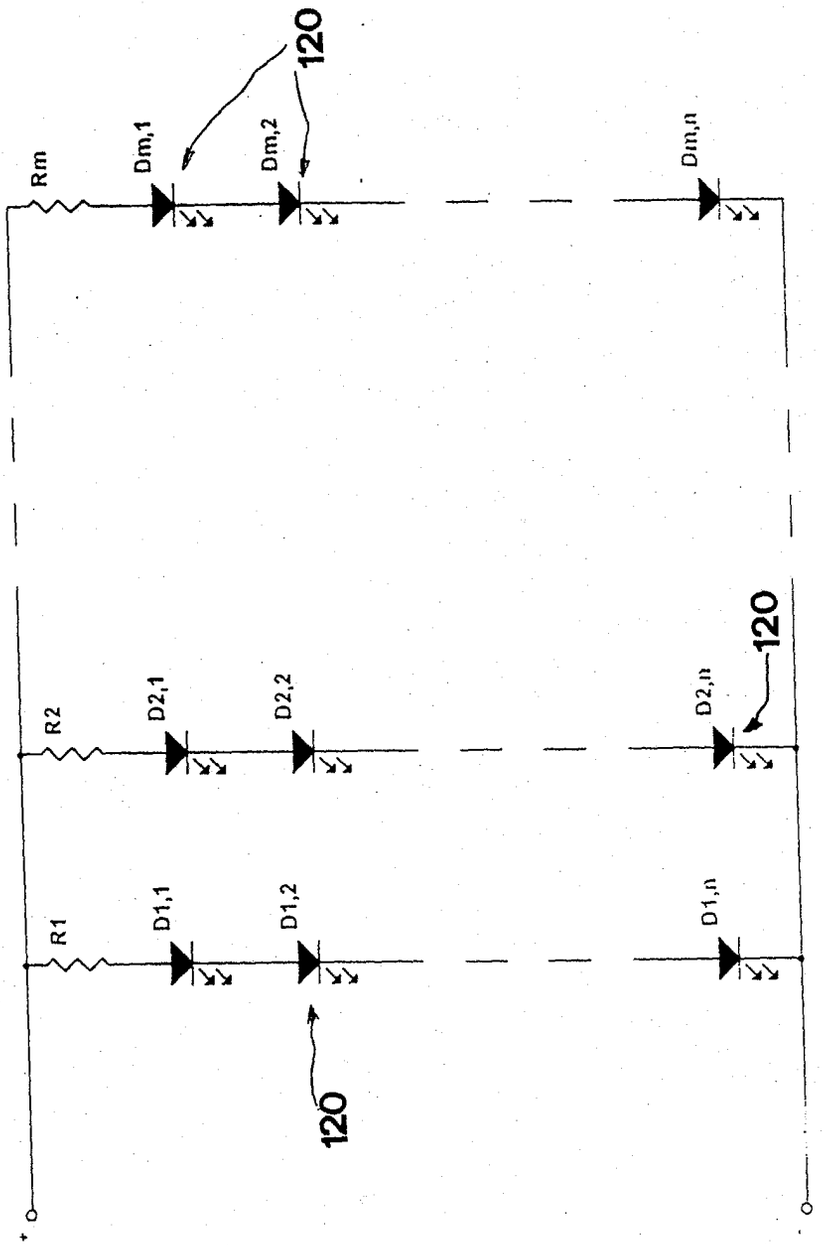


Fig. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5232

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 441 750 B1 (HUTCHISON MICHAEL C) 27 August 2002 (2002-08-27) * column 3, line 13 - column 7, line 28; figures 3-6 *	1,3-8, 10-13	B61L5/18 G08G1/0955
Y		2,9	

Y	GB 2 329 011 A (HOWELLS RAILWAY PRODUCTS LIMIT) 10 March 1999 (1999-03-10) * page 12, line 33 - page 14, line 1; figure 4 *	2,9	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B61L
G08G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 July 2004	Janhsen, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 42 5232

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-07-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6441750 B1	27-08-2002	AU 9126801 A	04-03-2002
		WO 0216823 A2	28-02-2002
GB 2329011 A	10-03-1999	AT 236821 T	15-04-2003
		AU 8876998 A	22-03-1999
		DE 69813255 D1	15-05-2003
		DE 69813255 T2	25-03-2004
		EP 1012023 A1	28-06-2000
		ES 2197498 T3	01-01-2004
		WO 9911498 A1	11-03-1999

EPO FORM P0459

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