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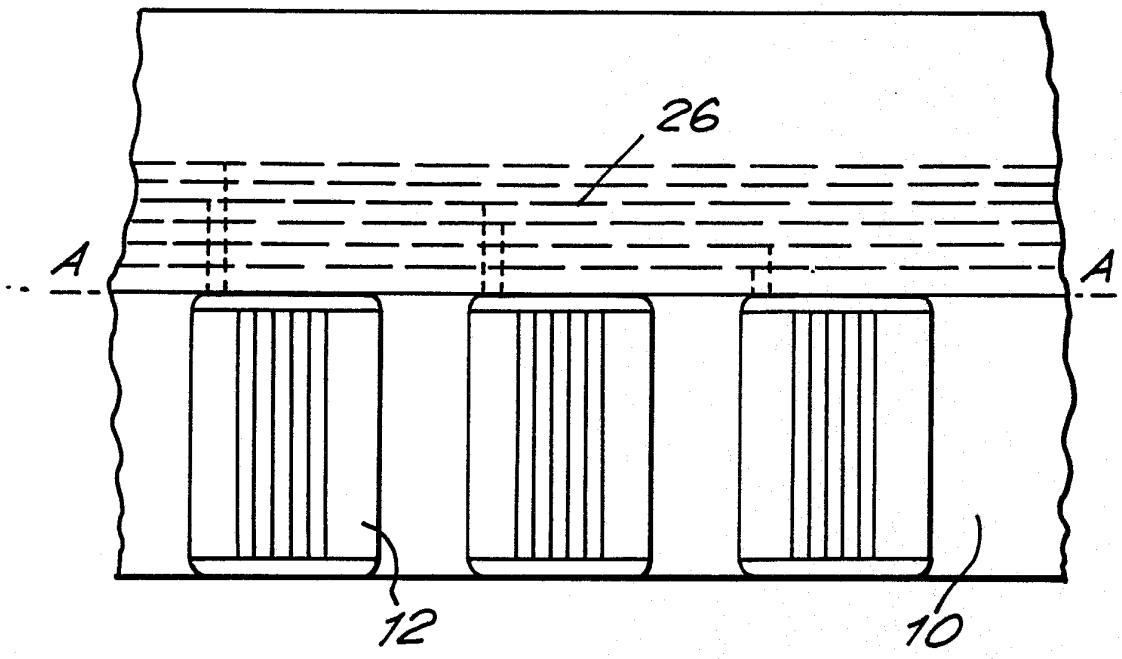
(54) Title: PORTABLE POWER SUPPLIES



(57) Abstract

A portable power supply comprises a belt (10) and a series of battery holders (12) detachably carried on said belt. One battery holder (12) carries two rechargeable batteries in combination with a battery charge management system and a battery condition display unit both in circuit with said battery. Each battery holder (12) is fabricated from an extrusion (14).

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PORTABLE POWER SUPPLIES.

This invention relates to a portable power supply for use particularly, but not exclusively, in operating (1) a video camera, or (2) a combined video camera and tape recorder, or (3) a light unit for use with either (1) or (2).

A belt portable power supply or a clip-on portable power supply to secure to (1) or (2) above for roving reporter use have been proposed heretofore but they suffer from the disadvantage that there is no precise method of estimating or indicating the power remaining in the supply at any one time. The absence of this facility means that, for time-of-run assurance, a reporter usually carries a spare supply which, when on the move, is extra weight and represents yet another piece of apparatus which is susceptible to loss or theft. In the case of belts, a further disadvantage is that existing battery holders are not well enough protected from impact damage by the canvas or leather pouches provided in the belt and in which batteries are housed.

According to the present invention, there is provided a portable power supply comprising at least one battery holder to carry at least one rechargable battery in combination with a battery charge management system

and a battery condition display unit both in circuit with said battery.

Preferably, the supply comprises a belt and a series of battery holders detachably carried on said belt.

Preferably also, the battery holders are each fabricated from an extrusion, preferably of metal, for example aluminium.

Preferably also, the belt serves to concealingly carry a connecting cable harness for the batteries, the battery charge management system and the battery condition display unit.

In design, one of the battery holders can desirably be employed to house the battery condition display unit and either it, or another holder, can be used to house a battery charge management system. Alternatively, a battery charge management system may be provided in a stand alone unit. The system preferably automatically controls a charging regime for the supply depending upon the voltage profile of the batteries at the time of charging. In certain conditions, the supply can be topped-up with a charge whilst at other voltage profiles, the entire supply can be discharged and re-charged to suit the characteristics of the cells employed in the batteries.

Alternatively, the supply comprises a clip-on

battery holder which also houses the display unit and the charge management system and circuitry therefor. Further the supply may comprise a clip-on battery holder housing the display unit with the charge management system provided in a separate stand alone unit.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figs. 1A and 1B are respectively a plan view and a front view of a battery holder according to the present invention;

Fig. 2 is a plan view of the holder with a closure plate removed;

Fig. 3 is a front view of a part of belt showing three holders and with the belt opened-out;

Fig. 4A is a rear view of a part of a belt opened-out showing a cable harness and sewn-in loop channels which are used to secure the holders in place on the belt;

Fig. 4B is a plan view of a detail of Fig. 2 illustrating the method of fixing a holder to the belt; and

Fig. 5 is a block diagram of circuits which constitute a display unit and a charge management system.

Referring to the drawings, the portable power supply comprises a belt 10 having a series of battery

holders 12 (or pods) carried thereon.

The belt 10 is of leather or other suitable material and has fastening means of known type provided at opposite ends for securing same around a user's waist.

Each battery holder 12 (or pod) has a body 14 formed from an extrusion, preferably of metal such as aluminium, which can be coloured by anodizing and dyeing, and which can be enclosed by the use of top and bottom closure plates or lids 16, 18 which are held in place, after battery loading, by means of fixing screws 20. For the purpose of rigidity and lightness, and secondary as decoration, the extrusion carries a series of ribs 22, or other strenthening configurations.

The holders 12 carry rechargeable batteries in the two internal housings 24, and each housing 24 carries two cells of nominal 1.2 volts each. Within the limitations of belt length, any number of holders 12 can be located thereon and in whatever spaced apart relationship is desired.

The belt 10 along its length, or at least that part of its length which is intended to carry holders 12, is formed of double-width material which is folded along centre line A-A as shown in Figs. 3 and 4A, the material being sewn lengthwise along its outer edges. One longitudinal half of the folded belt carries

internally the cable harness 26, and the other half has externally a series of sewn loop channels 28, two for each holder 12. Each channel 28 fits into a shaped recess 30 of a holder 12 (two on each holder 12 as shown in Fig. 2) and are fixed in position by the use of a rod 32 which slips into the void space of channel 28 and is held in position by the top and bottom lids 16, 18. This method of fixing is illustrated in detail in Fig. 4B.

There are various types of circuitry using microprocessor technology which are suitable for use in a battery charge management system and a battery condition display unit for monitoring and indicating the charge storage state of the cells of the batteries. The microprocessor technology involves a programmed chip. The batteries are in circuit with the battery charge management system and a battery condition display unit, and a block diagram of the type intended for use in this described embodiment is illustrated in Fig. 5 comprising the battery power supply, a battery monitor including a software control system, the battery condition display unit, a control panel, and a battery charger unit with a charger timer unit including a cut-off facility. All components, in this embodiment, are housed in one or more holders 12 fixed to the belt 10 by the method above-described. The software control system monitors the load being discharged from from the batteries and computes the time of use for the remaining charge in the

batteries and provides a percentage of power available for use using as a datum the load discharge curve in respect of the batteries in use.

Various methods are available for leading the connecting cable into, and out of, the holders 12 in order to convert the series of cells into a power supply, and in the embodiment shown in Fig. 4A, the entry for each holder is directly through the body 14 at recess 30 in a middle position 34 as shown.

The holder 12, carrying the control circuits, contains two connectors with one of these connectors constituting the power output for (1), (2), or (3) above and the other connector constituting the input for the controlled battery charger unit. The top 16 of this holder 12 will house the battery condition display unit, which is an optoelectronic display for indicating "percent of life left", "time left to run" and other such indications, as required, such as "pod condition" including "faulty cell detection".

The charger is normally separate from the belt 10 and is of a conventional "Smart" type which functions as an intelligent battery charge management system which decides, when presented with a partly-used supply whether or not it should be topped-up (say 5% to 10%) or else fully discharged and then charged again so as to prevent the formation and build-up of such as inactive

dendritic crystals in the batteries' chemical system.

The above described invention is advantageous and is mechanically robust and electronically self-indicating in the sense that it monitors and displays the state of power storage in the unit's rechargeable cells.

In an alternative embodiment (not shown) the portable power supply is a clip-on battery holder for direct attachment to (1) or (2) above. The holder is an enlarged version of a holder 12 of the above embodiment without recesses 30 but with clip-on means to complementarily engage receiving means on (1) or (2) above. The battery condition display unit and the battery charge management system are incorporated into said enlarged holder. In a modification, the battery charge management system may be provided in a separate stand alone unit.

Variations and modifications can be made without departing from the scope of the invention above-described.

CLAIMS:

1. A portable power supply comprising at least one battery holder to carry at least one rechargable battery in combination with a battery charge management system and a battery condition display unit both in circuit with said battery.

2. A portable power supply as claimed in Claim 1, wherein the supply comprises a belt and a series of battery holders detachably carried on said belt.

3. A portable power supply as claimed in Claim 1 or 2, wherein the battery holders are each fabricated from an extrusion.

4. A portable power supply as claimed in Claim 2 or 3, wherein the belt serves to concealingly carry a connecting cable harness for the batteries, the battery charge management system and the battery condition display unit.

5. A portable power supply as claimed in 2, 3 or 4, wherein one of the battery holders is employed to house the battery condition display unit and a battery charge

management system.

6. A portable power supply as claimed in Claim 2, 3 or 4, wherein one of the battery holders is employed to house the battery condition display unit and another is used to house a battery charge management system.

7. A portable power supply as claimed in Claim 2, 3 or 4, wherein one of the battery holders is employed to house the battery condition display unit and a battery charge management system is provided in a separate stand alone unit.

8. A portable power supply as claimed in any one of the preceding Claims, wherein the system automatically controls a charging regime for the supply depending upon the voltage profile of the batteries at the time of charging.

9. A portable power supply as claimed in Claim 8, wherein the supply can be topped-up with a charge whilst, at other voltage profiles, the entire supply can be discharged and re-charged to suit the characteristics of the cells employed in the batteries.

10. A portable power supply as claimed in Claim 8,

wherein the supply comprises a clip-on battery holder which also houses the display unit and the charge management system and circuitry therefor.

11. A portable power supply as claimed in Claim 8, wherein the supply comprises a clip-on battery holder housing the display unit with the charge management system provided in a separate stand alone unit.

12. A portable power supply substantially as hereinbefore described with reference to the accompanying drawings.

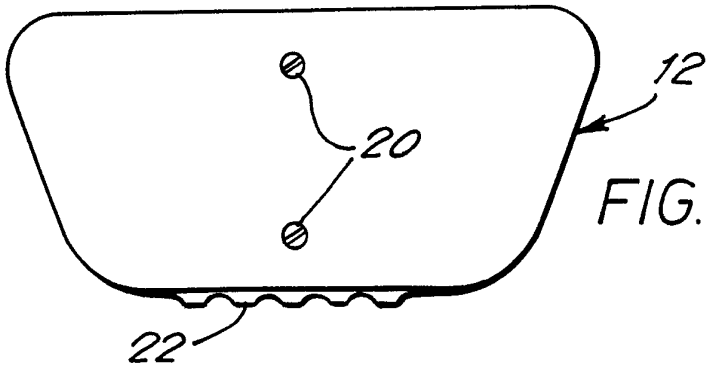


FIG.1A.

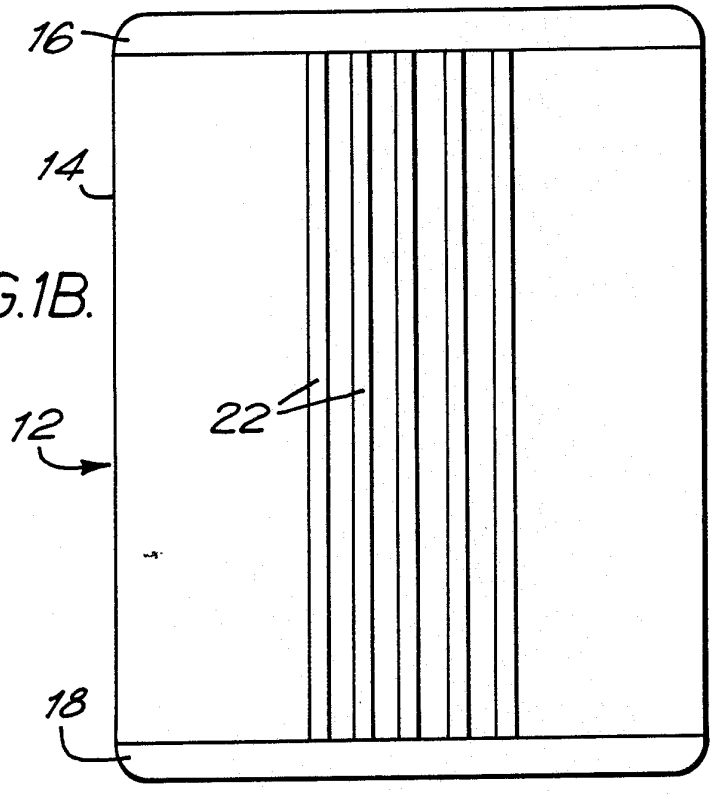


FIG.1B.

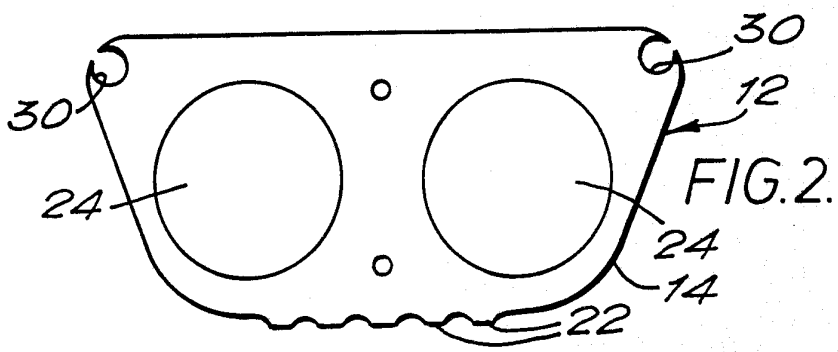


FIG.2.

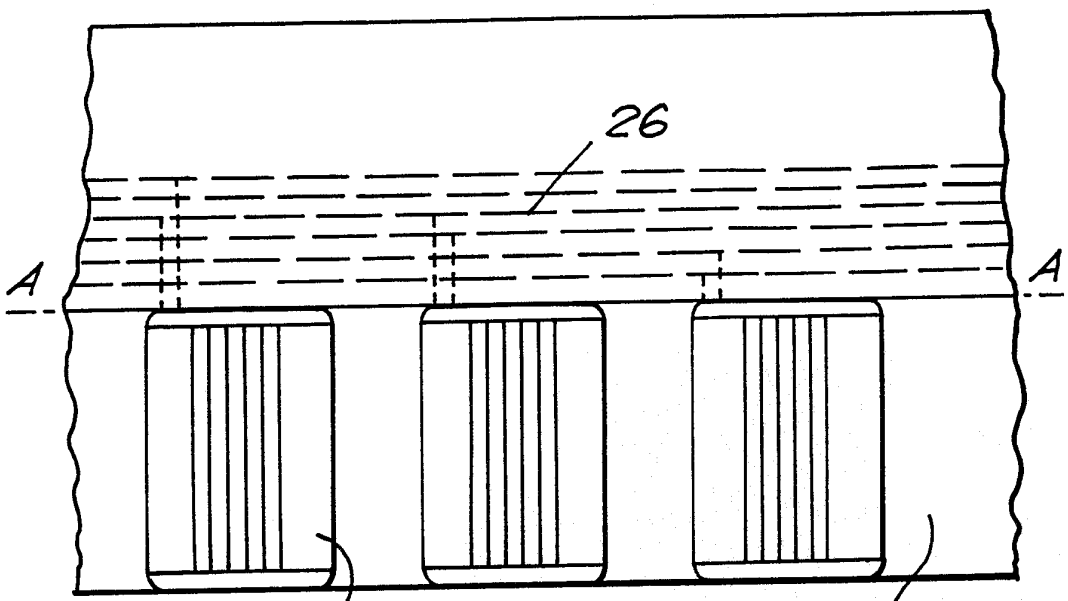


FIG.3.v

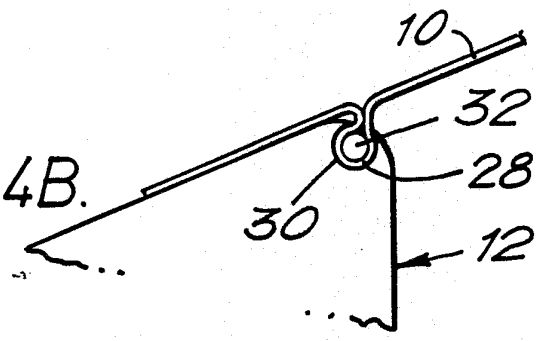
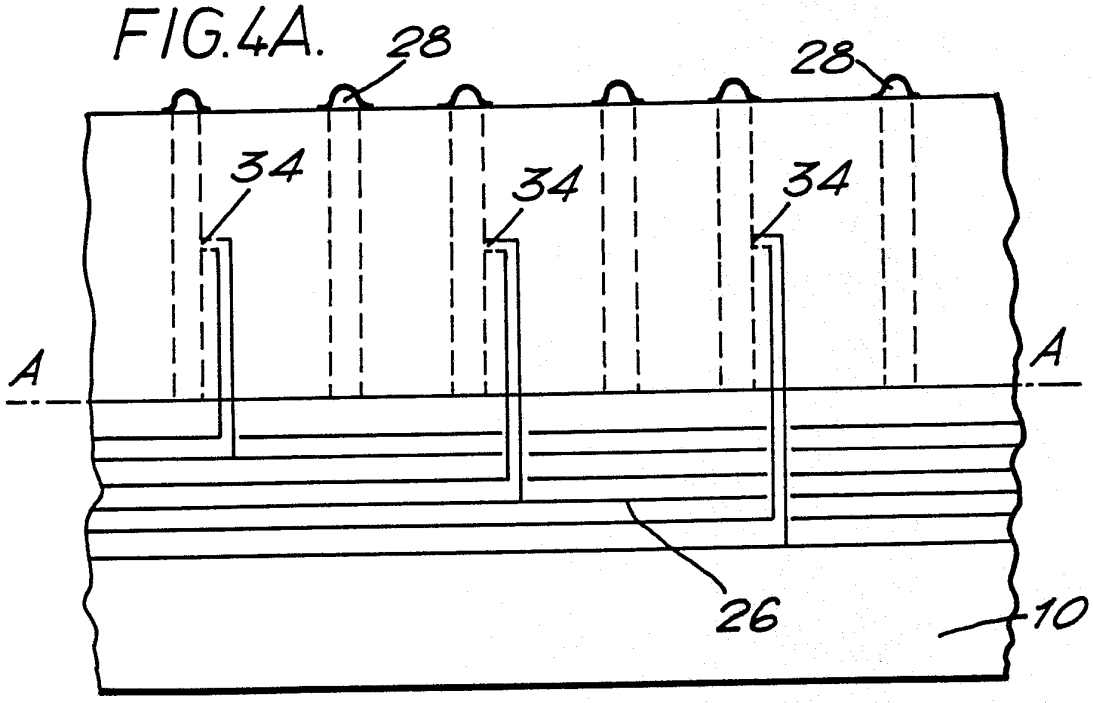


FIG.4B.

FIG.4A.



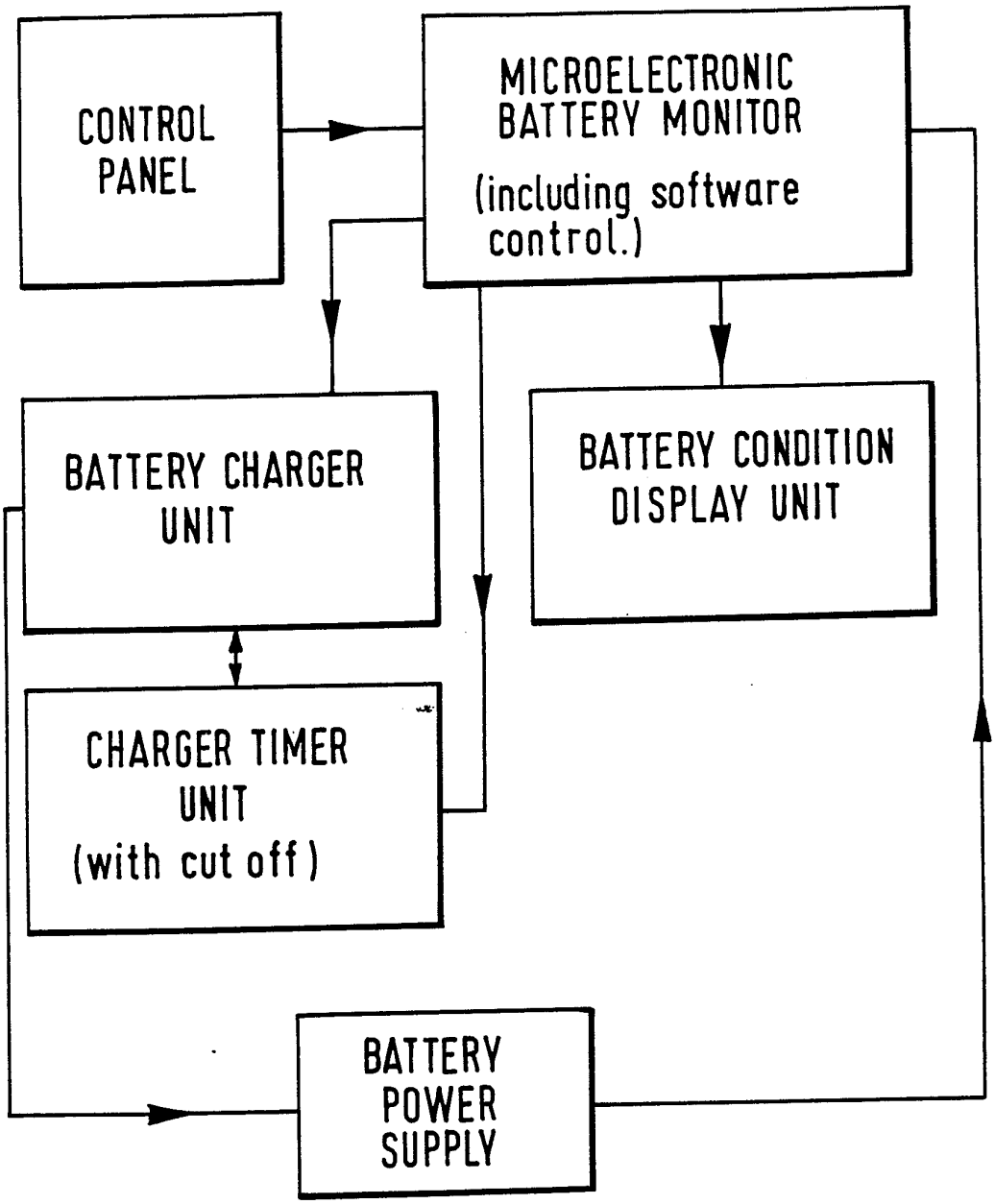

CONTROL PANEL
MICROELECTRONIC BATTERY MONITOR
(including software control.)
BATTERY CHARGER UNIT
BATTERY CONDITION DISPLAY UNIT
CHARGER TIMER UNIT
(with cut off)
BATTERY POWER SUPPLY

FIG.5.

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 90/01563

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: H 01 M 2/10, H 01 M 10/46, H 02 J 7/00, A 45 F 5/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	H 01 M 2/10, H 01 M 10/46, H 02 J 7/00, F 21 L 11/00

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	EP, A, 0291131 (EMERSON ELECTRIC CO.) 17 November 1988 see abstract; column 4, lines 16-38; column 5, line 24 - column 6, line 24 ---	1,3,8,9,12
Y	GB, A, 2192102 (CHINAHONG INDUSTRY DEVELOPMENT LTD.) 31 December 1987 see the whole document ---	1,9,12
Y	US, A, 4748344 (PETER SING) 31 May 1988 see the whole document ---	1-9,12
X	DE, A, 3421832 (HIMMELREICH KLAUS) 19 December 1985 see the whole document --- ./.	1-3

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
30th January 1991	14. 02. 91
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	miss T. MORTENSEN

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	Patent Abstracts of Japan, volume 9, no. 118 (E-316)(1841), 23 May 1985 & JP, A, 607074 (MATSUSHITA DENKI SANGYO K.K.), 14 January 1985 see the whole abstract	1
X	DE, U, 8623223 (DENZ PETER) 12 February 1987 see the whole document	1-3
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A	DE, U, 8814849 (BRUNKE DIRK) 9 March 1989 see claims; page 4, last paragraph - page 7	1,11
A	EP, A, 0310717 (BLACK & DECKER INC.) 12 April 1989 see abstract; column 3, line 8 - column 5, line 37	1,3
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A	FR, A, 1031260 (SOCIÉTÉ ELAU) 22 June 1955 see the whole document	1,2,4,6
A	US, A, 3919615 (RONALD NIEKE) 11 November 1975 see the whole document	1-8

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9001563

SA 41294

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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		JP-A-	1039240	09-02-89
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