

1534524

- (21) Application No. 52070/75 (22) Filed 19 Dec. 1975 (19)
(31) Convention Application No. 2 461 342
(32) Filed 24 Dec. 1974 in
(33) Fed. Rep. of Germany (DE)
(44) Complete Specification published 6 Dec. 1978
(51) INT. CL.² G01D 21/00
(52) Index at acceptance

GIU 18

(72) Inventor CLEMENS HOPFNER



(54) BATTERY CHECKING MEANS

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to battery checking means.

Means of this kind are employed to check the state of batteries used to power drive units and/or electrical circuits incorporated in apparatus such as photographic cameras, tape recorders etc. Such checking means indicates to the operator that the battery is able to supply sufficient power to the apparatus with which it is being utilised. In this manner the risks of apparatus malfunction originating from a poor battery are minimised.

It is an object of the present invention to provide an improved battery checking means.

According to the present invention, there is provided a battery checking means comprising means for indicating the state of a battery when connected thereto, the indicating means being actuated only when the battery voltage exceeds a predetermined reference level, and a timer, arranged to commence operation upon initiation of a battery check and automatically to terminate the check after a predetermined time period.

The invention will now be described with reference to the drawing accompanying the specification which shows a circuit diagram of the battery checking means according to the invention.

As shown in the accompanying drawing, a battery checker includes a test switch 1, an automatic timer 15 and a battery checker circuit 16. The automatic timer 15 includes an R-C timing circuit having a timing capacitor 2 and a timing resistor 13, a voltage sensitive switch such as a Schmitt trigger 4,

and a transistor 5. The battery checking circuit includes first and second load simulating resistors 6 and 14, a reference voltage generating section comprising a resistor 9 and zener diode 10, a differential amplifier 11, and indicator means 12.

When test switch 1 is in its first position, as shown in the accompanying drawing, the battery 3 under test is disconnected from the battery checker circuit 16. Also, test switch 1, in this first position, short circuits and thus prohibits charging of capacitor 2. When test switch 1 is moved to its second position, connecting the battery 3 under test to the battery checker circuit 16, the short circuit across capacitor 2 is removed, whereupon the capacitor 2 begins to charge through resistor 13. During the charging period of capacitor 2 transistor 5 is held in its conductive state by means of the voltage supplied from the output of Schmitt trigger 4, thereby connecting first and second load simulating resistors 6 and 14 across the battery 3. The load simulating resistors 6 and 14 apply a load to the battery 3 comparable to that applied to the battery when it is supplying electrical power to the apparatus with which it is to be utilised. The voltage measured at junction 7 will be dependent upon the conditions of the battery 3.

The reference voltage, however, measured at junction 8, will be constant due to the voltage divider defined by resistor 9 and zener diode 10. If the measured voltage at junction 7 is higher than the reference voltage at junction 8, the differential amplifier 11 will cause indicator 12 to light up. This illumination of indicator 12 signifies that the electrical power stored in the battery 3 is sufficient to power the apparatus with which it is being utilised. If the measured voltage at junction 7 is lower than or equal to the reference voltage at junction 8, indicator 12 is not lit, thereby indicating that the electrical power stored in the battery 3 is no longer sufficient to operate the apparatus satisfactorily.

When the voltage across the capacitor 2

reaches the threshold value of the Schmitt trigger 4, the latter is switched. This causes the transistor 5 to return to its non-conductive state, whereupon the load applied to the battery 3 by load-simulating resistors 6 and 14 is discontinued, and the battery checking period is terminated, even if test switch 1 remains in its second position.

The duration of the checking period, which is independent of further actuation of switch 1, can be set by adjustment of the resistor 13 in the R-C timing circuit and normally, is chosen to be approximately one second, enabling a reliable indication of the battery condition to be made without excessive current drain on the battery.

The invention has been described with particular reference to a timer incorporating an R-C timing circuit but it will be understood that a mechanical timer may be substituted which co-operates in a suitable manner with the test switch 1 and operates a further switch arranged in the circuit, after a predetermined checking period has elapsed.

WHAT WE CLAIM IS:—

1. Battery checking means comprising means for indicating the state of a battery when connected thereto, the indicating means being actuated only when the battery voltage exceeds a predetermined reference level and a timer, arranged to commence operation upon initiation of a battery check

and automatically to terminate the check after a predetermined time period.

2. Battery checking means as claimed in claim 1 for use with apparatus providing an electrical load and further including means for simulating the load on a battery, and a test switch for connecting the load simulating means to the battery upon initiation of a battery check, the timer serving to disconnect the load simulating means from the battery.

3. Battery checking means as claimed in claim 1 or 2 wherein the timer is an electronic time switch.

4. Battery checking means as claimed in claim 3 wherein the timer comprises an R-C timing circuit controlling the operation of a voltage sensitive switching device.

5. Battery checking means as claimed in claim 1 or 2 wherein the timer is a mechanical time switch.

6. Battery checking means as claimed in claim 1 or 2 wherein the timer is a pneumatic time switch.

7. Battery checking means as claimed in claim 1 or 2 wherein the timer is a hydraulic time switch.

8. Battery checking means as claimed in any preceding claim wherein the predetermined time period is adjustable.

9. Battery checking means substantially as hereinbefore described with reference to the accompanying drawing.

L. A. TRANGMAR, B.Sc., C.P.A.,
Agent for the Applicants.

reaches the threshold value of the Schmitt trigger 4, the latter is switched. This causes the transistor 5 to return to its non-conductive state, whereupon the load applied to the battery 3 by load-simulating resistors 6 and 14 is discontinued, and the battery checking period is terminated, even if test switch 1 remains in its second position.

The duration of the checking period, which is independent of further actuation of switch 1, can be set by adjustment of the resistor 13 in the R-C timing circuit and normally, is chosen to be approximately one second, enabling a reliable indication of the battery condition to be made without excessive current drain on the battery.

The invention has been described with particular reference to a timer incorporating an R-C timing circuit but it will be understood that a mechanical timer may be substituted which co-operates in a suitable manner with the test switch 1 and operates a further switch arranged in the circuit, after a predetermined checking period has elapsed.

WHAT WE CLAIM IS:—

1. Battery checking means comprising means for indicating the state of a battery when connected thereto, the indicating means being actuated only when the battery voltage exceeds a predetermined reference level and a timer, arranged to commence operation upon initiation of a battery check

and automatically to terminate the check after a predetermined time period.

2. Battery checking means as claimed in claim 1 for use with apparatus providing an electrical load and further including means for simulating the load on a battery, and a test switch for connecting the load simulating means to the battery upon initiation of a battery check, the timer serving to disconnect the load simulating means from the battery.

3. Battery checking means as claimed in claim 1 or 2 wherein the timer is an electronic time switch.

4. Battery checking means as claimed in claim 3 wherein the timer comprises an R-C timing circuit controlling the operation of a voltage sensitive switching device.

5. Battery checking means as claimed in claim 1 or 2 wherein the timer is a mechanical time switch.

6. Battery checking means as claimed in claim 1 or 2 wherein the timer is a pneumatic time switch.

7. Battery checking means as claimed in claim 1 or 2 wherein the timer is a hydraulic time switch.

8. Battery checking means as claimed in any preceding claim wherein the predetermined time period is adjustable.

9. Battery checking means substantially as hereinbefore described with reference to the accompanying drawing.

L. A. TRANGMAR, B.Sc., C.P.A.,
Agent for the Applicants.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1978
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY
from which copies may be obtained.



* C L M S *