

[54] **BATTERY HOUSING**

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[51] Int. Cl. **H01m 1/04**

[58] Field of Search 136/173, 166, 169, 171;
339/152

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ABSTRACT

A self locking battery housing includes a body portion and a door having a living hinge and contacts mounted near the hinge for making electrical contact between the body portion and the door. Terminals are provided on the body portion for mounting the housing and electrically contacting the battery, and provisions are made to contact the battery for charging purposes through the door.

10 Claims, 8 Drawing Figures

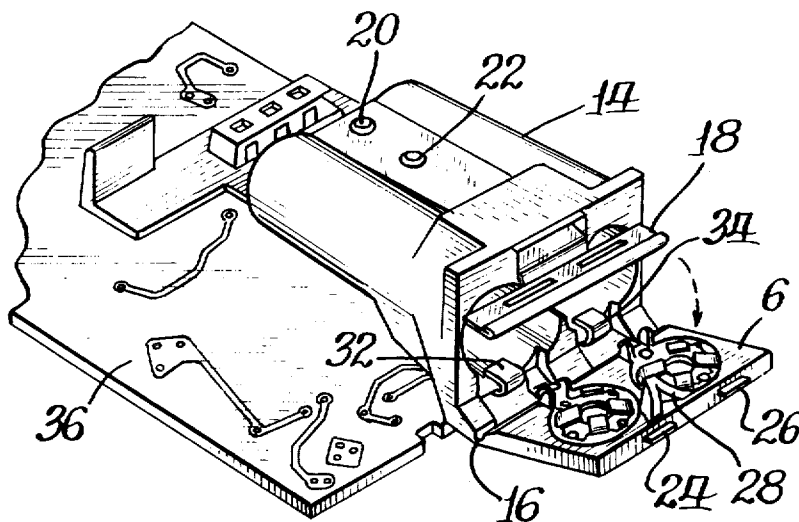


Fig. 1.

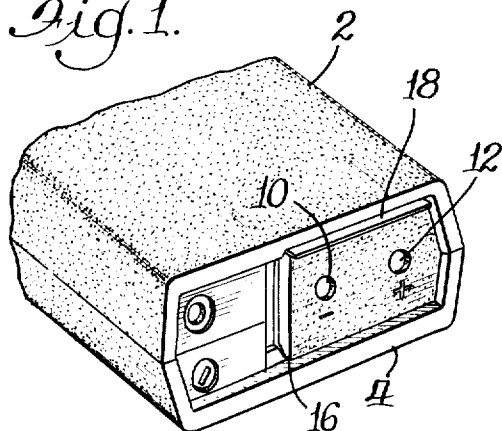


Fig. 2.

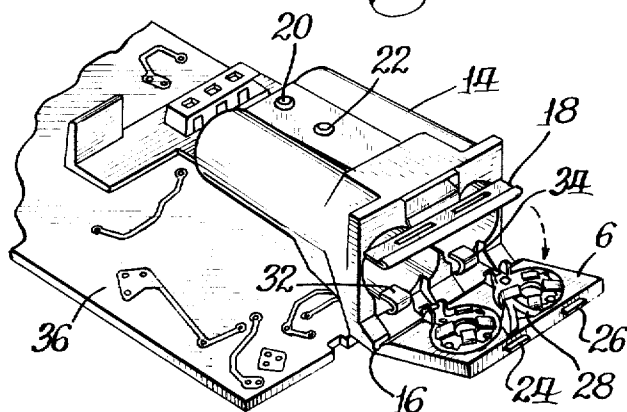


Fig. 4.

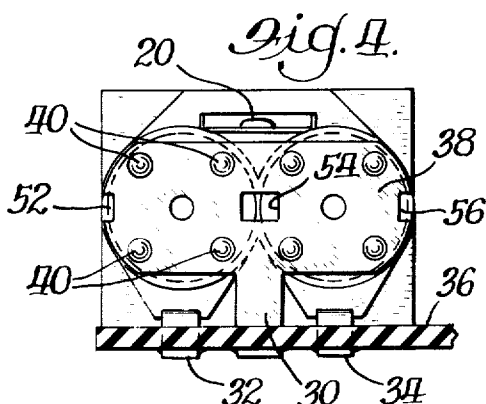


Fig. 3.

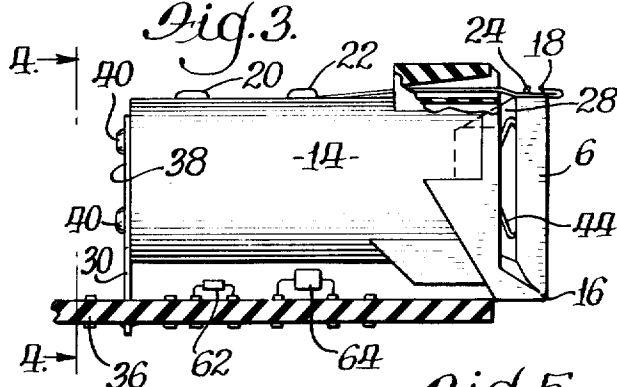


Fig. 6.

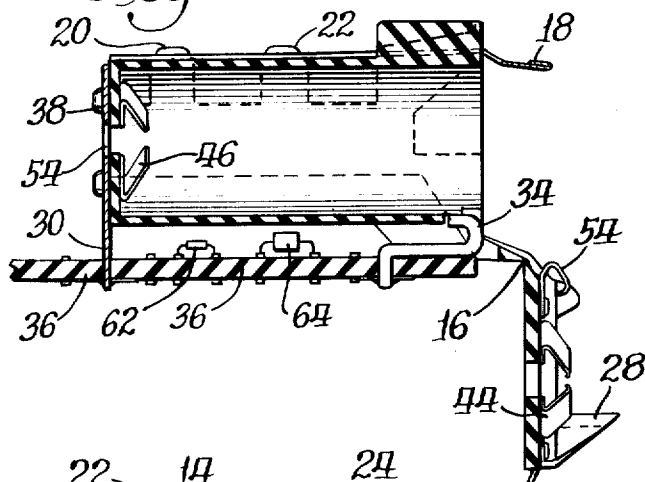


Fig. 5.

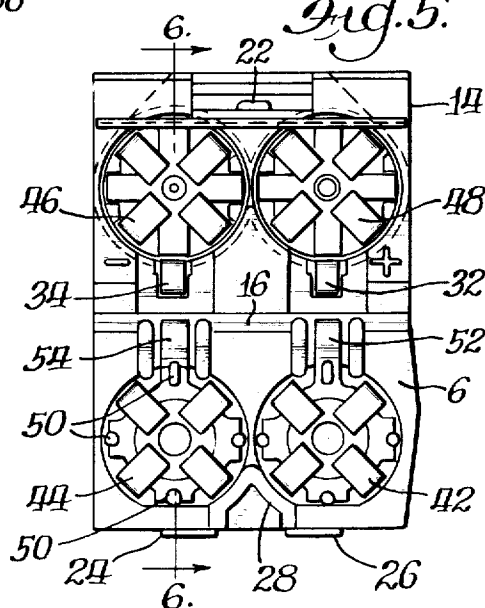


Fig. 7.

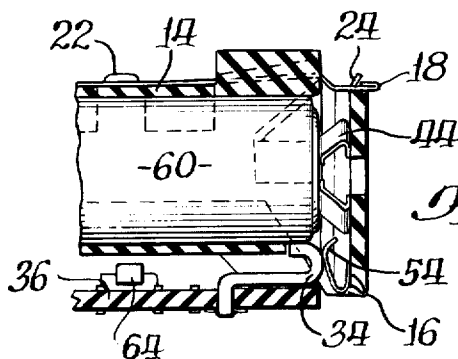


Fig. 8.



BATTERY HOUSING

BACKGROUND

1. Field of the Invention

This invention relates generally to battery holders, and more particularly to printed circuit board mounted battery holders for portable electronic equipment.

In the manufacture of portable electronic equipment, it is necessary to provide mounting means for the batteries necessary to power the equipment. The mounting means should securely hold the batteries, provide ready access to the batteries, and in the case of miniature equipment should occupy minimal volume. Furthermore, when rechargeable batteries are used, means must be provided for conveniently charging the batteries.

2. Prior Art

Several techniques for mounting batteries in miniature electronic equipment are known. Such techniques include spring loaded holders and various battery boxes, both uncovered and hinged and unhinged covered type. Whereas these systems provide a means for mounting batteries in electronic equipment, the open types do not provide a secure battery mounting, while the closed types occupy substantial volume and do not provide ready access to the batteries for charging and replacement purposes.

SUMMARY

It is an object of the present invention to provide an improved battery compartment for miniature electronic equipment.

It is another object of this invention to provide an improved battery compartment that provides ready access to the batteries for charging and replacement purposes.

It is still another object of this invention to provide an improved battery compartment that provides minimal interference with the components of the equipment in which it is mounted.

Yet another object of this invention is to provide a simplified battery holder that is easily and inexpensively fabricated.

In accordance with a preferred embodiment of the invention, a battery compartment having a body portion and a door portion is molded as a single unit from plastic or other flexible insulating material. A living hinge is employed to flexibly secure the door to the body portion. Contacts are mounted on the body portion and on the door in close proximity to the hinge to provide contact between battery contacts on the door and power output terminals mounted on the body when the door is closed. The power output terminals are used to mount the housing to a suitable mounting surface, such as, for example, a printed circuit board. Spacers are provided to support the body a predetermined distance from the mounting board to allow electrical components to be placed between the body and the board. Holes are provided in the door to allow contact to the battery for charging purposes, and a self locking clasp is provided to hold the door closed.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a portion of a housing for portable electronic equipment showing the door portion of the battery housing according to the invention and the access holes provided in the door of the housing;

FIG. 2 is a perspective view of the battery housing according to the invention showing the housing mounted to a printed circuit board;

FIG. 3 is a side elevation of the battery housing showing a portion of the printed circuit board in cross section and the clearance provided between the body of the housing and the printed circuit board;

FIG. 4 is a rear end view of the housing according to the invention taken along line 4—4 of FIG. 3;

FIG. 5 is a front end view of the door end of the battery housing showing the door in an open position and the contacts mounted to the door and body portions;

FIG. 6 is a side view of the housing according to the invention taken in cross section along line 6—6 of FIG. 5;

FIG. 7 is a cross sectional side view of the housing showing the door in a closed position retaining a battery within the housing; and

FIG. 8 is a perspective view of one of the support members mounted in the body portion which makes contact with the contacts in the door.

DETAILED DESCRIPTION

Referring to FIG. 1, there is shown a partial drawing of a piece of electronic equipment showing the location of the battery housing according to the invention therein. The housing comprises a pair of molded plastic shells 2 and 4 which enclose the equipment. The battery housing is mounted between the shells, the door portion 6 of the housing extending through an opening in the shells. The housing is mounted such that the end walls of the shells 2 and 4 are flush with the door 6. A resilient door retaining member 18 protrudes beyond the door 6 and is accessible to a user of the equipment to allow the user to release the door to gain access to the batteries contained in the housing. A pair of access holes 10 and 12 are provided in the door 6 to allow electrical contact to be made to the batteries within the housing for charging or testing purposes.

Referring to FIG. 2, the battery housing according to the invention is molded from a single piece of plastic material, such as, for example, polypropylene. The battery housing comprises a body portion 14 integrally molded with the door 6 for housing the batteries. The door 6 and the body portion 14 are molded in one piece, and a living hinge 16 is provided by reducing the thickness of the material in the area where the door 6 joins the body portion 14. The reduced thickness allows the door to flex and eliminates the need for a separate mechanical hinge.

The door retaining member 18 made of resilient material, such as, for example, spring steel is mounted to the housing 14 by means of a pair of posts 20 and 22 which are molded integrally with the body portion 14 and extend through the door retaining member 18. The door retaining member 18 has openings defined therein for receiving a pair of metal protrusions 24 and 26 which have been molded into the door portion 6. The retaining member 18 is biased to engage the protrusions 24 and 26 to retain the door in a closed position.

A wedge shaped deflecting member **28** is molded integrally with the door for deflecting the member **18** when the door is being closed to deflect the member **18** to a position for engaging the protrusions **24** and **26**.

Referring to FIGS. **3**, **4** and **6**, the housing is mounted to a printed circuit board **36** by means of metal supports **30**, **32** and **34** which also provide an electrical contact to the batteries contained in the housing. The support member **30** extends from an interconnecting plate **38** which is secured to the end of the body portion **14** by means of a plurality of protrusions **40** molded to the body portion and extending through the interconnecting plate **38**. The support members **32** and **34** are not molded into the body portion in this embodiment, but engage the body portion in close proximity to the hinge **16**. The members **32** and **34** may be retained by the closed door **6** until they are mounted to the board **36**, whereupon they retain the housing in place.

Referring to FIG. **5**, electrical contact is made to the battery by means of battery contacts **42** and **44** attached to the inner surface of the door portion **6** and contacts **46** and **48** mounted to the inner surface of the end wall of the body portion **14**. The contacts can be made of any suitable resilient contact material, such as, for example, phosphor bronze.

The battery contact **42** and **44** are secured to the door **6** by means of a plurality of mounting posts or protrusions **50** which are molded as part of the door and extend through openings in the battery contacts. The contacts **46** and **48** are secured by means of tabs extending therefrom through the openings **52**, **54** and **56** shown in FIG. **4**. The openings **52**, **54** and **56** extend through the end wall of the body portion **14** and the interconnecting plate **38**. Electrical contact is provided between the contacts **46** and **48** by means of the aforementioned tabs which extend through the openings **52**, **54** and **56** and are soldered or otherwise attached to the interconnecting plate **38**.

Electrical contact between the battery contacts **42** and **44** and the support members **32** and **34** is provided by a pair of extensions **52** and **54** of the contacts **42** and **44**, respectively. The contacts **52** and **54** are positioned near hinge **16** in alignment with the member **32** and **34** to provide electrical contact between the members and contacts **32**, **52** and **34**, **54**, respectively, when the door is in the closed position as shown in FIG. **7**. The contact **44** simultaneously makes contact with a battery **60** located in the housing **14** to provide electrical contact between the battery **60** and the terminal **34**. Similarly, the contact **42** provides contact to another battery (not shown) in the housing. The aforementioned system eliminates wire breakage problems associated with systems that use wires to make connection to the door contacts.

The support member **30** is elongated, and the portion of the body portion **14** located near the door **6** is enlarged to provide clearance between the rear portion of the body portion **14** and the printed circuit board **36** to allow the mounting of components, such as, for example, components **62** and **64** to the board in the area between the housing **14** and the board **36**, thereby allowing the portion of the board **36** underneath the body portion **14** to be used both for the mounting of the housing and the mounting of the other components.

Although a particular embodiment of the housing according to the invention has been shown, it should be noted that any housing using the concepts described in

the disclosure falls within the scope and spirit of the invention.

I claim:

1. A housing for a battery having first and second terminals, said housing comprising:
 - a body portion having an opening defined therein for receiving the battery;
 - a door having an open and a closed position attached to said body portion by means of a hinge, said door being positioned for covering said opening for retaining the battery within said body portion placed in the closed position, and for allowing removal of the battery when placed in the open position;
 - first and second contacts, said first contact being mounted to said door and said second contact being mounted to said body portion and positioned to make an electrical contact with said first contact when the door is in the closed position;
 - first battery contact means for making electrical contact to the first terminal of the battery attached to said door and electrically connected to said first contact, said first battery contact means being positioned to make electrical contact to said battery when said door is closed;
 - second battery contact means mounted within said body portion for making electrical contact to the second terminal of said battery when the battery is received in said opening; and
 - first and second output terminals mounted to said body portion in parallel spaced outwardly projecting relationship and forming mounting means for securing said housing to a mounting board, said first output terminal being electrically connected to said second contact and said second output terminal being electrically connected to said second battery contact means, said first and second output terminals thereby providing electrical contact to said first and second battery terminals when said door is in the closed position.
2. A battery housing as recited in claim 1 wherein said door has an opening defined therein for providing access to said first terminal of said battery, the size of the opening defined in said door being smaller than the opening defined in said body portion for preventing the passage of said battery therethrough.
3. A battery housing as recited in claim 1 wherein said output terminals are further constructed to maintain at least a portion of said body portion in spaced relationship to said mounting board.
4. A battery housing as recited in claim 1 wherein said door is integrally formed with said body portion and is attached to said body portion by means of a living hinge.
5. A battery housing as recited in claim 4 wherein said body portion and said door are fabricated from plastic.
6. A battery housing as recited in claim 5 wherein said contacts and said battery contact means are fabricated from resilient metal, said first and second contacts being biased to resiliently engage each other, and said battery contact means are biased to resiliently engage said battery when said door is in the closed position.
7. A battery housing as recited in claim 6 wherein at least a portion of said body portion has an elongated cylindrical shape for receiving a cylindrically shaped

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battery therein, and wherein said door is attached to one end of said cylindrically shaped portion.

8. A battery housing as recited in claim 7 wherein said body portion comprises two elongated cylindrically shaped portions for receiving two cylindrical batteries, said door and said each body portion having battery contact means for making electrical contacts to both batteries, and means for electrically interconnecting said batteries.

9. A battery housing as recited in claim 4 wherein

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said body portion has means for securing said door in a closed position attached thereto, said securing means including a resilient metal strip biased to engage and retain said door upon said door being moved to said closed position.

10. A battery housing as recited in claim 9 wherein said door has a deflecting member attached thereto for deflecting said resilient metal strip to a predetermined position for engagement with said door.

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