Nov. 10, 1970 W. H. DORING 3,539,800

FLASHLIGHT WITH MAGNETIC SUPPORT

Filed Jan. 12, 1968 3 Sheets-Sheet 1

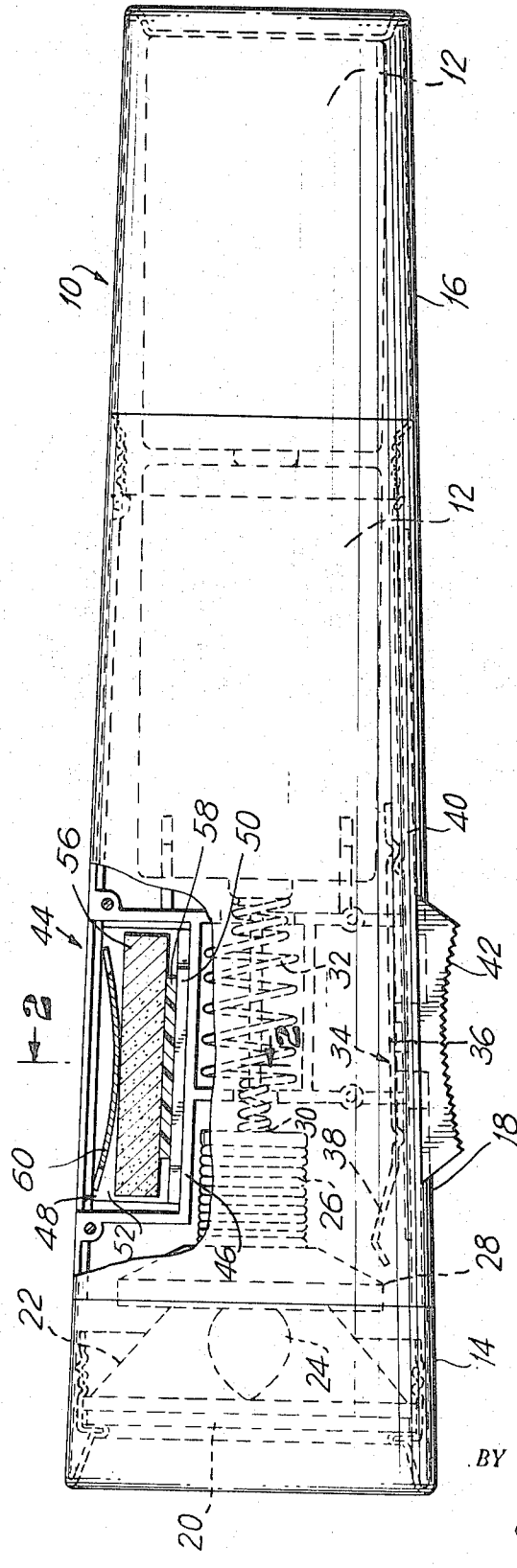


FIG. 1

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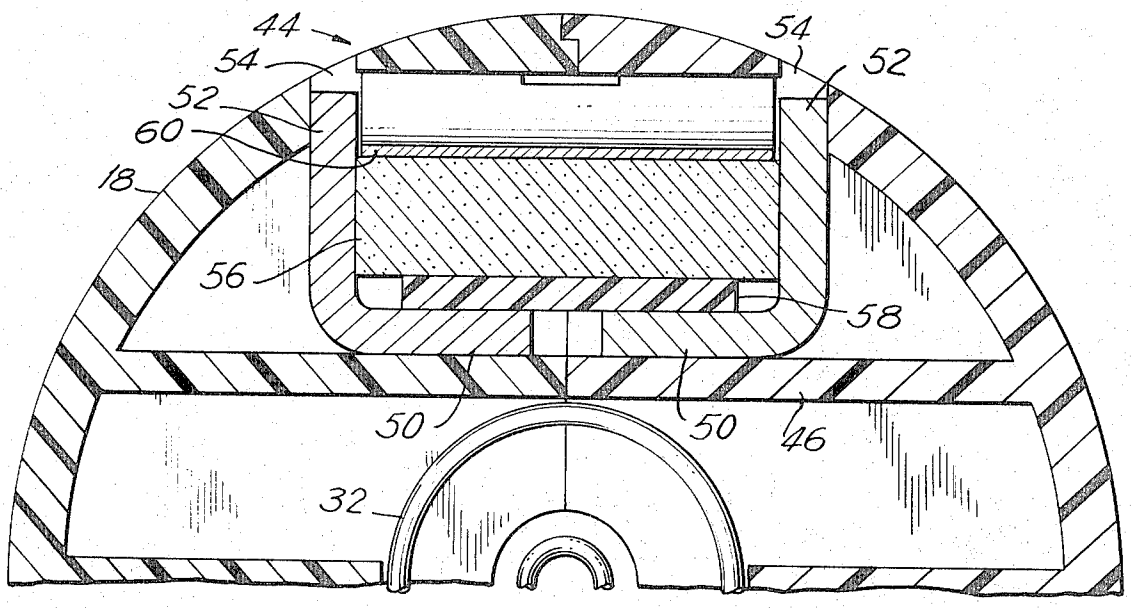


FIG. 2

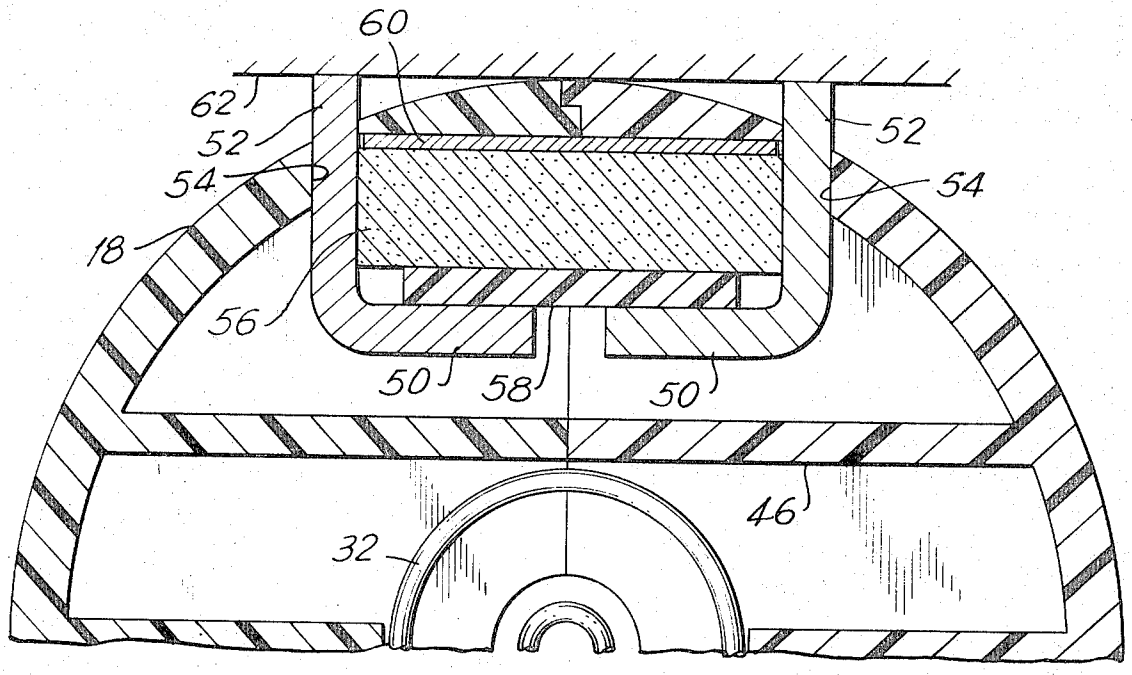


FIG. 3

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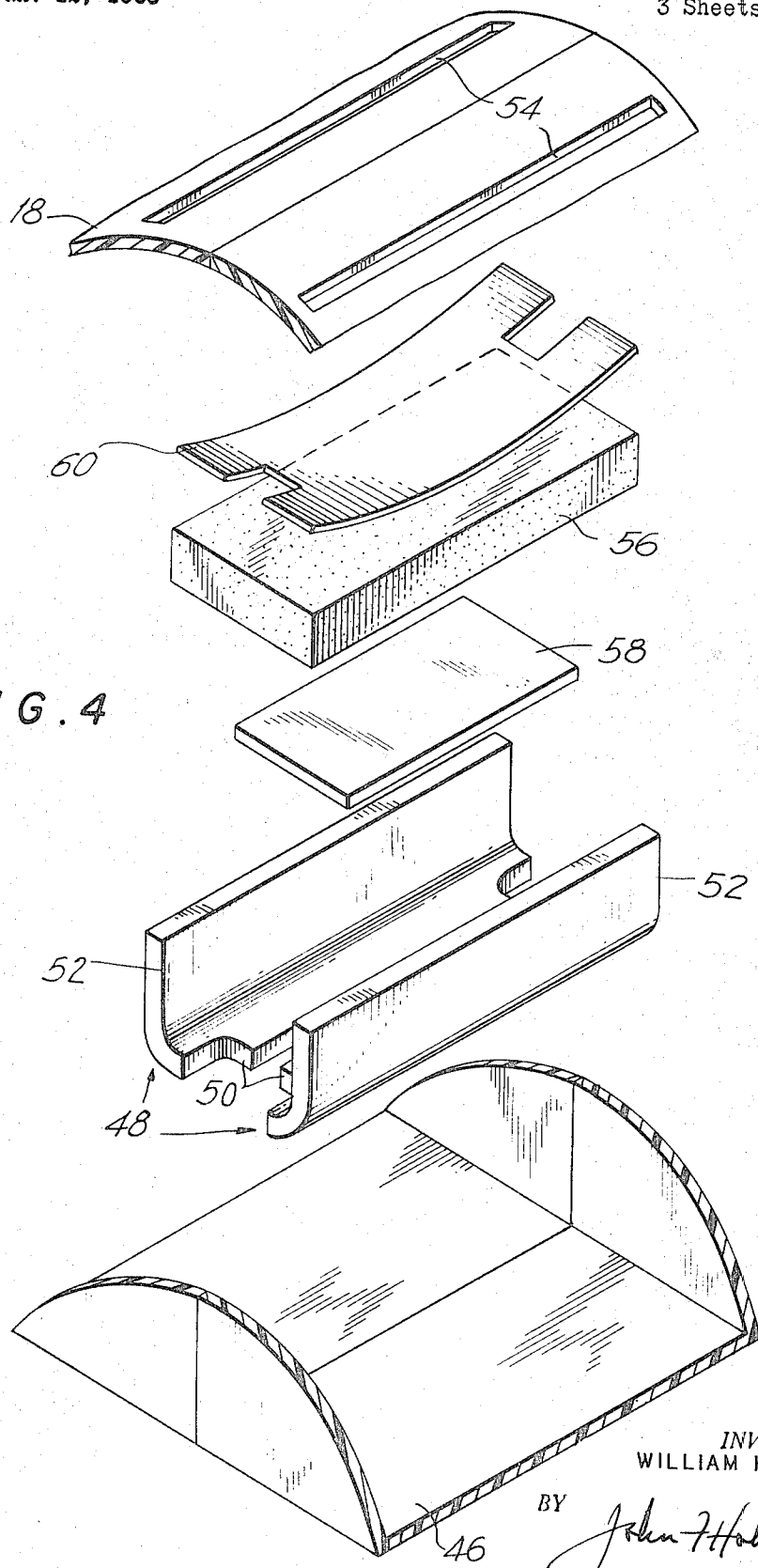


FIG. 4

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FLASHLIGHT WITH MAGNETIC SUPPORT

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U.S. Cl. 240—52.15 10 Claims

ABSTRACT OF THE DISCLOSURE

A magnet assembly for detachably attaching a flashlight to a magnet attracting surface. The assembly comprises a magnet positioned within the flashlight, a collector associated with the magnet, and a spring maintaining the magnet and collector away from the outer wall of the flashlight. The magnet assembly is substantially hidden when not in use but partially protrudes from the flashlight when the flashlight is positioned near to a magnet attracting surface and magnetically attaches the flashlight to the surface.

This invention relates to magnet devices.

It has heretofore been known to secure a magnet to an article, for example a flashlight, to enable the article to be removably attached to a magnet attracting surface. Magnets are commonly riveted to the article or enclosed in a housing which is riveted to the article.

These magnets have traditionally been bulky and have detracted from the general appearance of the article. In many instances the magnets, thus attached, have also interfered with the utility of the article. For example, when attached to a flashlight, they have prevented easy insertion and removal of the flashlight from one's pocket or, when attached to the switch of a flashlight, they have greatly increased the chances of accidentally turning on the flashlight while slipping it into one's pocket.

It is an important object of the present invention to provide a magnet attachment device which does not detract from the appearance or operation of the article to which it is attached.

It is another object to provide a magnet attachment device which is substantially hidden from view when not in use.

These and other objects are accomplished by a magnet assembly for detachably attaching an article to a magnet attracting surface which assembly is movable from a position substantially hidden within said article to a position at least partially protruding therefrom, when said article is positioned proximate to a magnet attracting surface, to magnetically engage said surface and attach the article thereto until magnetic contact between the magnet and the surface is broken.

The invention will be more particularly described with reference to the accompanying drawings in which:

FIG. 1 is an elevational view partly in section of a flashlight incorporating the device of the present invention;

FIG. 2 is an enlarged sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 2 but showing the magnet assembly in its raised operative position; and

FIG. 4 is an exploded view of the parts of the magnet assembly shown in FIGS. 2 and 3.

Referring in detail to the drawings, there is shown a flashlight **10** adapted to receive therein conventionl batteries **12**. The flashlight is constructed in three sections, a head assembly **14**, a bottom cap **16** and an intermediate case **18**. The bottom cap **16** is made of thin gage metal such as chrome plated steel, aluminum, brass or copper coated steel or other conductive material, preferably a

metal capable of being finished to a highly polished state. The intermediate case **18** is preferably molded from a suitable plastic material, and the head assembly **14** is preferably a thin gage metal or a molded plastic.

The head assembly **14** contains the usual lens, reflector, bulb and bulb holder parts **20**, **22**, **24** and **26**. A bulb holder flange **28** is secured to the reflector **22** and electrically contacts one terminal of the bulb filament. The other terminal of the bulb filament, that is, the end portion of the bulb base makes contact with a terminal **30** of the bulb holder **26**. The terminal **30** is maintained in electrical contact with the batteries **12** by a coil spring **32** which bridges a void between the batteries **12** and the terminal **30**. The positioning of the coil spring **32** between the batteries **12** and the terminal **30** permits the batteries **12** to be inserted in the flashlight with both positive terminals facing either the front or rear of the flashlight, a desirable feature which is not found in the usual flashlight construction where the spring is placed at the rear of the flashlight.

The batteries **12** are in electrical contact with the bottom cap **16** of the flashlight **10** and the electrical circuit between the filament of the bulb **24**, the bottom cap **16** and the batteries **12** is completed by means of the usual switch assembly **34**. The switch assembly **34** comprises an elongated rectangular contactor strip **36** made of a thin gage electrically conductive material such as bronze or brass coated steel and has an elongated flexibly resilient extension section **38**. The contactor strip **36** is disposed inside the intermediate case **18** with the extension section **38** projecting toward the head assembly **14**. The contactor strip **36** extends, at the end opposite the resilient extension section **38**, in a direction toward the bottom cap **16** and slidingly contacts a wear plate **40** of a conductive metal which is in contact with the bottom cap **16**.

Actuation of the contactor strip **36** into engagement with the bulb holder flange **28** is performed by manipulating a switch slide **42** disposed outside and adjacent the intermediate case **18**. The switch slide **42** is made from a non-conductive material, for example, polypropylene, and operatively engages the contactor strip **36** through an aperture in the intermediate case **18**. In this manner the switch slide **42** together with the contactor strip **36** may be reciprocatingly slidingly moved as a unit, relative to the intermediate case **18**, a distance sufficient to complete and break the electrical circuit.

The magnet assembly **44**, which embodies the present invention, is positioned inside the intermediate case **18**, opposite the switch assembly **34**, in the void between the head assembly **14** and the batteries **12**. The magnet assembly **44** is enclosed within a rectangular box-like housing **46** disposed within and adjacent the wall of the intermediate case **18**. The housing **46** is made from the same non-conductive material as the intermediate case **18** and is preferably molded as an integral part thereof. Positioned in the housing **46** are a pair of opposed elongated collector bars or angles **48** made of non-magnetic, but magnet conductive material, for example, steel. Each collector **48** consists of a relatively short leg **50** which, in assembly with the other collector, is disposed in spaced planar relation thereto and forms a short gap therebetween, and a relatively longer leg **52** adapted to fit into a corresponding slot **54** in the intermediate case **18**. Seated within the housing **46** and in nested engagement with the angled collector bars **48** is a permanent magnet **56**, preferably made of Alnico metal. The collector bars **48** and the magnet **56** are held together by magnetic attraction and are kept in alignment by an elongated insulating member or spacer **58** disposed between the magnet **56** and the collector bars **48**.

The housing **46** is sufficiently deep to permit the magnet **56**, the spacer **58** and the collector bars **48**, which

make up the magnet assembly 44, to nest at the bottom thereof in a manner such that the longer legs 52 of the collector bars 48 are aligned with slots 54 but are not protruding therefrom (FIG. 2). An elongated leaf spring 60 is disposed between the magnet 56 and the intermediate case 18 and is arcuately bowed with its medial portion in resilient engagement with the topside of the magnet 56 and its ends in resilient contact with the underside of intermediate case 18. The spring 60 is made from a non-magnetic material such as brass and is of a length which will permit it to lie flat within the housing 46. The spring 60 is resilient enough to maintain the magnet assembly 44 against the innermost wall of housing 46 but is flexible enough to allow the magnet assembly 44 to rise to the underside of the intermediate case 18 upon magnetic attraction of the legs 52 to an external magnet attracting surface 62. The legs 52 serve to conduct the magnetism beyond the housing 46 through slots 54 in order that the magnet strength may be strongly applied to the magnet attracting surface 62 without significant loss or attenuation of the magnet strength by the intermediate case 18.

The operation of the magnet assembly can best be described as a hidden magnet which automatically pops up when needed to magnetically attach the flashlight to a magnet attracting surface. The magnet assembly is retained in a hidden position within the flashlight by the spring until the flashlight is positioned proximate to a magnet attracting surface whereupon the attractive force of the magnet, directed through the collector legs, overcomes the resiliency of the spring and allows the magnet assembly to pop up. The legs thereupon protrude from the flashlight through the slots, engage the attracting surface and magnetically hold the flashlight against the surface (FIG. 3).

To disengage the flashlight from the attracting surface it is merely necessary to pull the flashlight in a direction away from the attracting surface with sufficient force to overcome the magnetic attraction. Once the flashlight is free of the attracting surface the spring is unopposed by magnetic attraction and retracts the magnet assembly to its initial position.

While a leaf spring is preferred, it is to be understood that a helical or coil spring or any other resilient and deformable member can be used. Also while it is preferred to construct the magnet and a pair of collectors as separate parts, it is also possible to form the collectors as parts of the magnet itself or to use a single collector or more than two collectors with a corresponding number of slots being provided.

The invention has been particularly described with reference to use in a flashlight, but it is to be understood that the magnet assembly of the present invention has use in articles other than flashlights. Any article which it is desired to detachably attach to a magnet attracting surface can be used in combination with the present invention.

Likewise, it will be understood that while this invention has been described with reference to many specific details thereof, it is apparent that the invention is not limited to such details.

What is claimed is:

1. In a flashlight having a casing, bulb filament and battery parts, the improvement which comprises a magnet assembly for detachably attaching the flashlight to a magnet attracting surface, such assembly comprising a spring, a magnet, and a collector means associated with said magnet, said magnet and said collector means being substantially wholly positioned within said casing and

being resiliently held away from the outer wall thereof by said spring, said outer wall having at least one aperture therein aligned with said collector means, and said magnet being of sufficient force to overcome the resiliency of said spring thereby allowing said magnet to approach said outer wall and said collector means to partially protrude through said aperture when said magnet assembly is positioned proximate to a magnet attracting surface.

2. A flashlight in accordance with claim 1 wherein said collector means is a pair of oppositely disposed angled collector bars straddling said magnet.

3. A flashlight in accordance with claim 1 wherein the resiliency of said spring is sufficient to retract said collector means and said magnet to their initial substantially hidden position upon removal of said flashlight from the immediate vacinity of said magnet attracting surface.

4. A flashlight in accordance with claim 1 wherein said spring is a coil spring.

5. A flashlight in accordance with claim 1 wherein said magnet is Alnico metal.

6. A flashlight in accordance with claim 1 wherein said magnet assembly is positioned between the battery and the bulb filament parts of said flashlight.

7. In a flashlight which is an elongated casing having a lens housing at one end thereof, a battery compartment at the opposite end thereof, a metallic spring within said casing contacting said lens housing and said battery compartment and a switch means on said casing for completing and interrupting the electrical circuit between said battery compartment and said lens housing, the improvement which comprises a magnet assembly disposed substantially wholly within said casing between said battery compartment and said lens housing, such assembly comprising a spring, a magnet, and a collector means associated with said magnet, said magnet and said collector means being positioned within said casing and being resiliently held away from the outer wall thereof by said spring, said outer wall having at least one aperture therein aligned with said collector means, and said magnet being of sufficient force to overcome the resiliency of said spring thereby allowing said magnet to approach said outer wall and said collector means to partially protrude through said aperature when said magnet assembly is positioned proximate to a magnet attracting surface.

8. A flashlight in accordance with claim 7 wherein said collector means is a pair of oppositely disposed angled collector bars straddling said magnet.

9. A flashlight in accordance with claim 7 wherein the resiliency of said spring is sufficient to retract said collector means and said magnet to their initial substantially hidden position upon removal of said article from the immediate vicinity of said magnet attracting surface.

10. A flashlight in accordance with claim 7 wherein said spring is a coil spring and said magnet is Alnico metal.

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240—52.5; 248—206