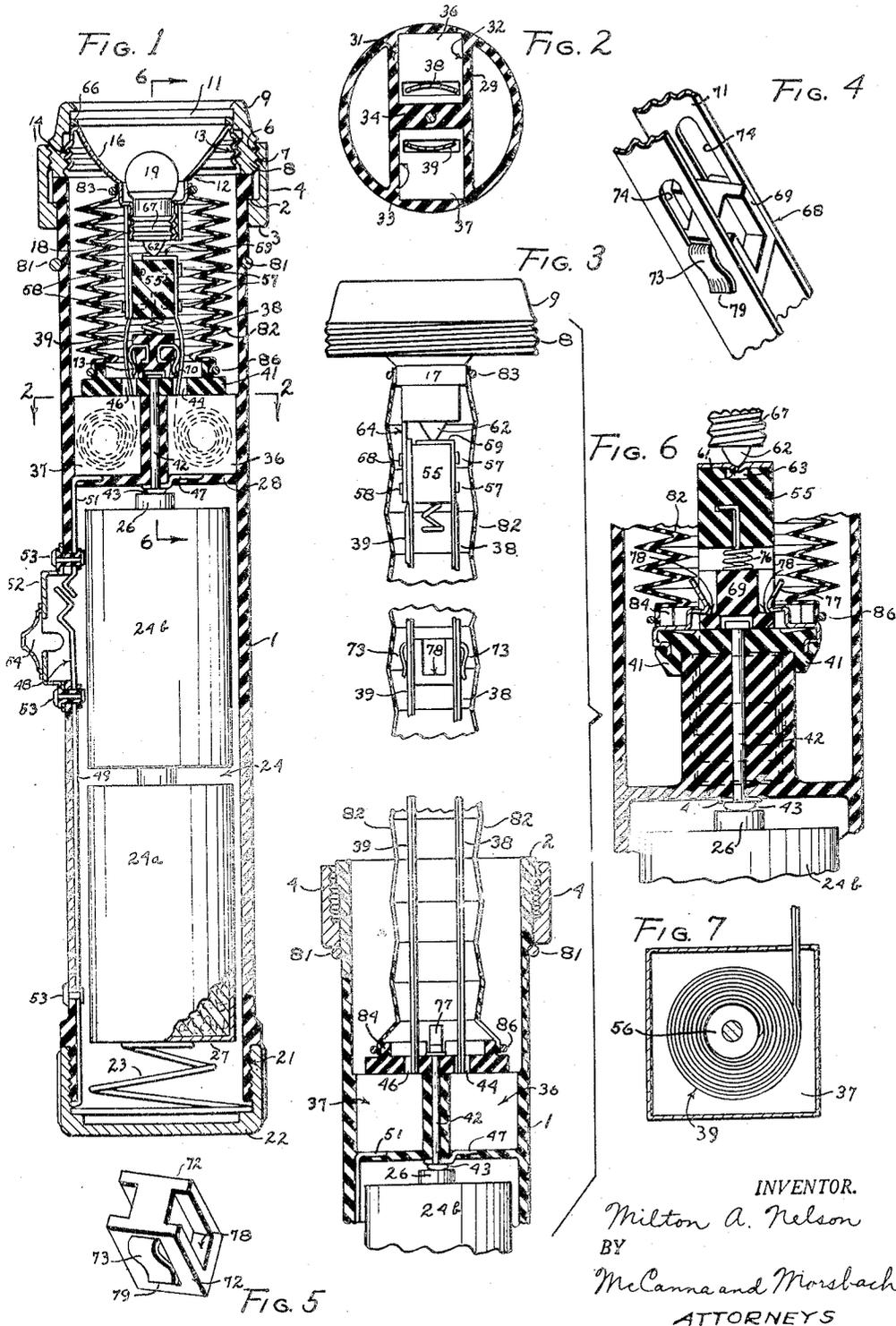


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EXTENSIBLE FLASHLIGHT

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## EXTENSIBLE FLASHLIGHT

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This invention relates to an extensible flashlight in which the light or bulb-carrying head is extensible from the main body of the flashlight and is usable in either retracted or extended positions.

An object of this invention is to provide a flashlight having substantially the same shape and size as conventional flashlights yet which may be extended a substantial length, even several feet where desired, for uses where a temporarily longer flashlight is needed to concentrate the light beam in an otherwise inaccessible location. An extensible flashlight of this kind is usable to advantage in inspecting certain types of equipment, as for example the extreme inner end portions of cylinder bores or inner portions of engine crankcases where the light must be placed in close proximity to the portion being inspected in order to avoid confusing reflection and glare from other parts. Such a flashlight can also be advantageously employed for signal transmitting, as in military service, where it is necessary to transmit messages with the sender remaining in a protected position, such as in a trench, or behind a wall or the like. And properly insulated and waterproofed, such a device may also be used as an underwater light, aiding in the recovery of lost articles; or for the purpose of studying marine life at night, as in fish hatcheries. (This would involve the addition of a waterproofing gasket around the bulb end contact (62), and the elimination of the supporting block, with its attendant springs and tape slots.)

Other objects and advantages will become apparent from the following description in connection with the figures, in which

Figure 1 is a longitudinal cross-sectional view of a flashlight made in accordance with the present invention shown in the fully retracted position;

Fig. 2 is a transverse sectional view of Figure 1 taken along the line 2—2;

Fig. 3 is a partial view of the forward portion of the flashlight shown in Figure 1 with the parts in extended position;

Fig. 4 is a fragmentary perspective view of one form of auxiliary spacing means which may be employed at an intermediate position on the tapes to provide additional stability or rigidity where required;

Fig. 5 is a perspective view of the insulating block partially shown in Fig. 4;

Fig. 6 is a fragmentary longitudinal sectional view of Figure 1 taken along the line 6—6 showing the spring members for locking the auxiliary

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spacing block in place when the parts are fully retracted, and

Fig. 7 is a sectional view through one of the tape cases.

Referring to the drawings, the particular modification shown has a tubular casing 1 of suitable insulating material. It will be obvious, however, as the description proceeds that a metal casing may be employed where desired with the provision of suitable insulating liners where it is necessary to insulate certain parts of the mechanism from the casing. The front end portion is formed with an enlarged shoulder 2 engageable with the shoulder 3 on coupling 4, the latter being threaded internally at 5 for engagement with the threads 7 on the outside of the reflector retaining ring 8. This retaining ring is formed with an inward forward shoulder 9 for the usual glass lens 11. The reflector generally designated 12 is formed with a peripheral threaded portion 13 engaging the internal ring threads 14, the reflector surface 16, and a cup-shaped extension 17 terminating in a formed threaded portion 18 with which the bulb 19 is engaged.

At the rear end of the casing are formed threads 21 with which is engaged the conventional threaded cap or closure 22 which holds the rear contact spring 23 and battery 24 (comprising cells 24a and 24b) in place. One terminal of the battery 24 in this case is the center electrode 26 of cell 24b; the other terminal being the outer metallic shell 27 of cell 24a against which the rear contact spring 23 is pressed.

Referring now more particularly to the elements representing one form of the present invention, namely, the extension means and the parts coating therewith, the casing 1 is formed with an internal dividing wall or diaphragm 28 having two spaced forwardly extending walls 29 and 31 separated into two compartments 32 and 33 by the forwardly extending centrally located wall 34. The compartments 32 and 33 are formed to receive cases 36 and 37 for elastic concavo-convex tapes 38 and 39 which will usually be formed of spring steel. These tapes are of the general type used in extension measuring devices and have the characteristic of being extensible into straight rigid shapes and of being coiled within their cases into very compact space. It is believed their construction and operation are generally well understood but for further details concerning extensible tapes of this type reference may be had to Patents 1,964,280 and 1,987,652.

As shown in Figure 1, it will be preferable to

mount the tapes in an oppositely wound manner so their concave surfaces will be positioned inwardly, facing one another (as shown in Fig. 2); or so their convex surfaces will be facing (not shown). This will provide the maximum rigidity in the extended condition combined with minimum space requirement in the retracted or fully wound condition.

Atop the walls 29, 31 and 34 a cover 41 of suitable insulating material is mounted by means of rivet 42, the head 43 of which is engaged by the forward battery terminal 25. The cover plate 41 serves to hold the tape cases 36 and 37 in place. Apertures 44 and 46 are formed therein to permit the passage of the tapes. Beneath the rigid head 43 is a formed bus bar 47 which is grounded on the bottom of tape case 36. Likewise, the two-piece bus bar generally designated 48, and comprising elements 49 and 51, is grounded at one end on the bottom of tape case 37 and at the other end against the rear contact spring 23 which engages the battery terminal 27. The bus bar elements 49 and 51, together with the switch 52 are mounted in the present instance on the casing 1 by rivets 53, the intermediate end portions of these bus bar elements forming part of the switch. Thus, by moving switch button 54 forward the elements 49 and 51 will be engaged to complete a circuit connecting tape case 37 with the rear battery terminal 27. As shown in Fig. 7, the inner end of each tape is attached to a stationary metallic post 56 which is mounted on the tape case so that with the above described construction tape 38 is electrically connected with the forward battery terminal 26 and the tape 39 is connected with the rear battery terminal 27, this being true whether the flashlight is in a fully retracted, fully extended, or intermediate condition.

The ends of the tapes are spaced apart and insulated from one another at their end portions by a block 55 of insulating material, the tapes being mounted thereon by rivets 57 and 58, each of which extends part way into the block. The end portion 59 of tape 38 is folded over the block and dimpled at 61 (see Fig. 6) for reception of the bulb end contact 62. The forward end of the block 55 is recessed at 63 to receive the dimple 61. The reflector 12 is grounded to the tape 39 by means of the formed sheet metal part 64 which is attached at the one end to that tape and to block 55 by the above-mentioned rivets 58 and at the other end to the rear end portion of the reflector as by welding or soldering. The member 64 also serves to carry the entire head assembly (comprising the reflector 12, gasket 66, lens 11, and retaining ring 8).

Thus, it will be apparent that when the switch means 52 is closed the bulb 19 will be lighted by an electrical circuit which may be traced as follows: forward battery terminal 26—rivet head 43—bus bar 47—tape case 36—tape 38—bulb contact 62—bulb contact 67—tape 39—tape case 37—bus bar elements 51 and 49—rear contact spring 23—battery terminal 27. The bulb may be lighted in this manner in either the retracted or extended position.

Auxiliary spacing means generally designated 68 may be employed as desired as where the tapes are very long and may need some intermediate means for maintaining them in rigid condition when extended. In the present instance, the auxiliary spacing block 69 (Figs. 4 and 5) is formed of suitable synthetic resinous insulating material and is positioned between the tapes and slidably

with respect to the leading portion 71 of the latter. In each side 72 of the block 69 is molded a rearwardly extending spring finger 73 adapted to engage the tapes within apertures 74 which are provided at intermediate portions thereof. When the head portion of the flashlight is retracted from the Fig. 3 position the auxiliary block 69 will be carried with it until it is stopped by abutment with the top of cover 41. Further retracting movement will cause the tapes to slide past the spring fingers 73 as the apertures 74 are moved backward with respect to the block and will cause disengagement thereof so that the tapes may be moved beyond the block to fully retracted position, the spring fingers 73 being depressed into recesses 70 formed in the sides of the auxiliary spacing block 69. A cushion spring 76 is mounted on the rear surface of the insulating block 55, as by being molded integrally therewith and engages the auxiliary block 69 when in the fully retracted position to urge the block backwards for positive abutment with the cover 41. This cushion spring 76 is provided so as to assure that the block 69 will be positively engaged by the spring fingers 77 when in the fully retracted position. The spring fingers 77 are in the present instance molded integrally with the cover 41 and are formed to engage the shoulders 78 of the block 69 so as to prevent the auxiliary block 69 from moving forward until the spring fingers 73 are engaged within the aperture 74. When the tape is moved forward from the fully retracted (Figure 1) to the fully extended (Fig. 3) position the forward portions 71 of the tapes will slide past the auxiliary block 69 without effecting forward movement thereof due to the above-mentioned grip of spring member 77 on that block. When the intermediate portion containing the apertures 74 reaches the block 69 the outwardly turned leading end portions 79 of the spring fingers 73 will engage the outer surfaces of the tapes and further forcible outward movement of the tapes will then move the spring members 77 aside to permit the auxiliary block 69 to be carried outward with the continued extension of the tapes. As mentioned above, the auxiliary spacing block 69 need not be employed in every case and, therefore, the spring members 77 and the cushion spring 76 need not be employed either, but it will usually be preferable to provide some auxiliary spacing and stiffening means when the tapes are thin and very long.

The flashlight may be locked in fully retracted position by engagement of the coupling ring 4 with the retaining ring 8. When the coupling 4 is in loose condition, as shown in Fig. 3, to permit the extension of the flashlight head, it will usually be preferable to provide some means for restraining the coupling from sliding back and forth along the outside of the casing. A simple means for effecting this restraint is illustrated in the form of snap ring 81 which is seated in a peripheral groove on the outside of the casing just behind the coupling.

For many purposes the flashlight may be used without providing means for electrically insulating the tapes 38 and 39 from objects which they may come in contact with. However, in certain cases, as where the light is to be used at least partly underwater or in restricted locations where it is likely to be shorted by simultaneously engaging the two tapes with a metallic or other conductive element, this may be desirable and may be effected in a number of ways. For example, a suitable extensible insulating

shroud may be provided around one or both of the tapes. Such insulating means as shown in the drawing comprises a conventional accordion-type rubber bellows 82 fastened to the reflector extension 17 by snap ring 83 and to the cylindrical extension 84 of the cover 41 by snap ring 86. It will be obvious that with this construction, the entire extended portion of the light may be immersed or laid across a conductor without short-circuiting the tape conducting members 38 and 39. Such short-circuiting may also be avoided where desired by making only one or neither of the tapes an electrical conductor, in which case the current can be supplied to the bulb by any suitable extensible insulated flexible cable means or the equivalent.

In the particular embodiment shown, a pair of tapes have been illustrated. However, it will be obvious that a single tape may be employed in certain cases, as in very small flashlight structures, in which case an additional wire or flexible conductor may be employed to complete the circuit back to the battery. And furthermore, it is contemplated that in certain cases two pairs of diametrically opposed tapes may be employed, as where maximum extensibility and rigidity is desired. In the latter modification, where four tapes are employed, each spaced 90° away from one another, the auxiliary spacing block 69 may conveniently be dispensed with.

While a particular form of the present invention has been shown, it will be apparent that minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described the invention, what is claimed as new is:

I claim:

1. A flashlight comprising a casing shaped to receive a battery, a light assembly including a bulb movable between a position in which the assembly is adjacent the casing and a position in which the assembly is disposed in spaced relation to the casing, a pair of extensible metal tapes mounted on said casing and having an end mounted in the casing and an end attached to said light assembly, said tapes being movable between a retracted position and an extended position in which the ends of the tapes attached to the assembly are disposed in spaced relation to the casing, said tapes being formed from relatively thin flexible material and having an arcuate shaped cross section and positioned so that corresponding surfaces on the tapes face each other to impart rigidity to the tapes when the latter are in an extended position for supporting the light assembly in spaced relation to the casing, and means for electrically connecting said bulb to said battery.

2. The combination recited in claim 1 in which the tapes are utilized as part of a circuit for electrically connecting the battery with the bulb.

3. A flashlight comprising a casing shaped to receive a battery, said casing having a pair of chambers formed at one end and spaced apertures extending axially of said end of the casing and in communication respectively with said chambers, a light assembly including a bulb mounted on the casing adjacent said end of the casing and movable between a position in which the assembly is disposed in a contiguous relation with the casing and a position in which the light assembly is disposed in spaced relation to the casing, a metal tape disposed in each of said

chambers and extending through the corresponding aperture to be connected to said light assembly, said tapes being movable between a position in which they are coiled in said chambers and a position in which they extend outwardly from the casing to support the light assembly in its outer position, said tapes being formed from relatively thin flexible material having a concavo-convex cross section and positioned so that corresponding surfaces on the tapes face each other to provide rigidity to the tape for supporting the light assembly, and means for electrically connecting said bulb with said battery.

4. A flashlight comprising a casing, a light assembly mounted on said casing for movement between a position in which the assembly is adjacent the casing and a position in which the assembly is in spaced relation to the casing, a pair of extensible tapes mounted on said casing, said tapes each having a connection with the casing and a connection with said light assembly, said tapes being movable between a position in which the tapes are coiled in the casing and a position in which the tapes extend outwardly from the casing in substantially parallel relation, each of said tapes having a concavo-convex cross section, one of said tapes having an aperture formed at a portion intermediate its ends, a separator block releasably retained by the casing and disposed between said tapes, said block having a clip shaped to be disposed in said aperture on the intermediate portion of the tape and engageable therewith when the latter is moved to its extended position and disengageable from the tape to remove the block therefrom when the tape is moved to its retracted position.

5. A flashlight comprising a casing, a light assembly, a pair of extensible flexible tapes having a concavo-convex cross section mounted on said casing and having a connection with said light assembly and a connection with said casing, said tapes being movable between a position in which the tapes are coiled in the casing and a position in which the tapes extend outwardly from the casing in substantially parallel relation to support the light assembly in spaced relation to the casing, one of said tapes having an aperture formed thereon, an abutment disposed between said tapes, a first spring clip mounted adjacent the sides of said abutment, and a spacing block normally retained against said abutment by said spring clip and having a second clip disposed thereon shaped to be received in said aperture when the tape is extended a preselected distance to secure the block to the tape for separating the tapes and shaped to facilitate the removal of the block from the tape when the block engages the abutment as the tapes are being retracted.

6. The combination of claim 5 with means carried by said tapes for urging said spacer block to a position in which it is secured against the abutment by the first spring clip when the tapes are moved to their coiled positions.

7. The combination recited in claim 1 in which the light assembly, the tapes and the battery are disposed in substantial axial alinement in the casing.

8. A flashlight comprising a casing shaped to receive a battery, a light assembly including a bulb movable between a position in which the assembly is adjacent the casing and a position in which the assembly is disposed in spaced relation to the casing, a pair of extensible flexible

thin metal tapes mounted on said casing and having an end mounted in the casing and an end attached to said light assembly, said tapes being movable between a retracted position and an extended position in which the ends of the tapes attached to the assembly are disposed in spaced relation to the casing, said tapes having an arcuate shaped cross section and positioned so that corresponding surfaces on the tape face each other to impart rigidity to the tapes when the latter are in said extended position for supporting the light assembly in spaced relation to the casing, means including said tapes for electrically connecting said bulb to said battery, and means associated with the tapes to form a protective covering therefor for all positions of the tapes between their retracted and extended positions.

9. A flashlight comprising a casing shaped to receive a battery, a light assembly including a bulb movable between a position in which the assembly is adjacent the casing and a position in which the assembly is disposed in spaced relation to the casing, a pair of extensible flexible metal tapes mounted on said casing and having an end mounted in the casing and an end attached to said light assembly, said tapes being movable between a retracted position and an extended position in which the ends of the tapes attached to the assembly are disposed in spaced relation to the casing, said tapes having an arcuate shaped cross section and positioned so that corresponding surfaces on the tape face each other to impart rigidity to the tapes when the latter are in said extended position for supporting the light assembly in spaced relation to the casing, means including said tapes for elec-

trically connecting said bulb to said battery, and means for maintaining the intermediate portions of said tapes in spaced relation when the latter are in their extended position, said means being engageable with at least one of said tapes in response to movement thereof to its extended position and disengageable therefrom in response to movement of said one tape to its retracted position.

10. The combination recited in claim 9 in which the last mentioned means comprises flexible bellows embracing said tapes and having a connection with said light assembly and said casing and being movable in unison with the light assembly as it moves between its retracted and extended positions, said bellows being movable from a compressed position in which the bellows is disposed in the casing and an extended position to provide an insulated enclosure for said tapes for all positions thereof.

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