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MINER'S LAMP STRUCTURE INCLUDING RACK AND PINION TYPE ADJUSTMENT MECHANISM

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FIG. 1

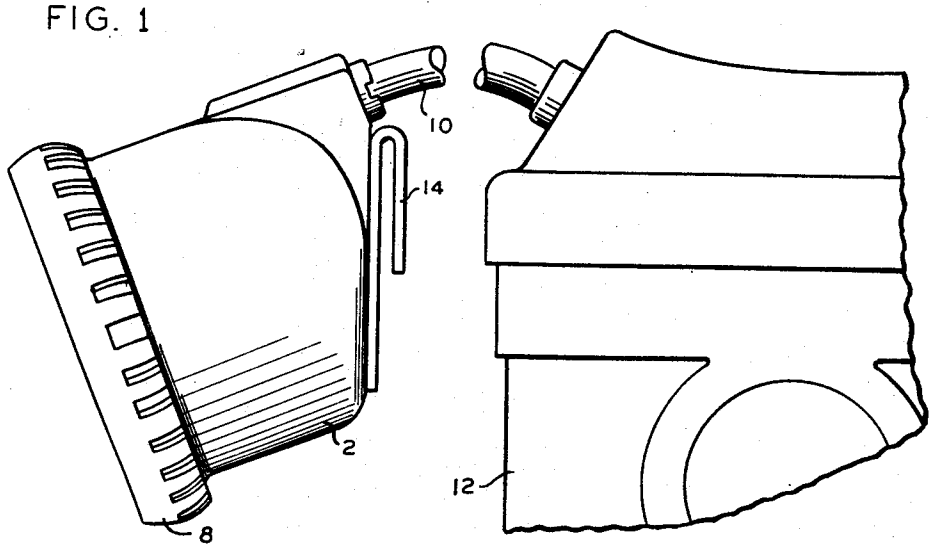
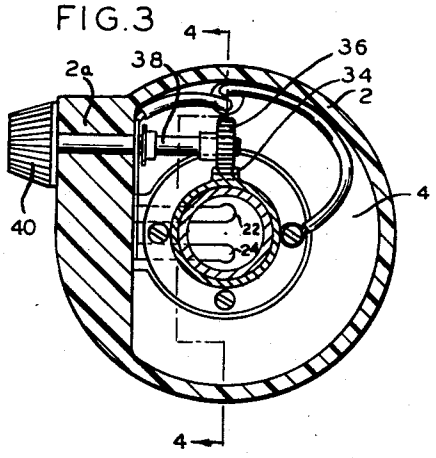


FIG. 3



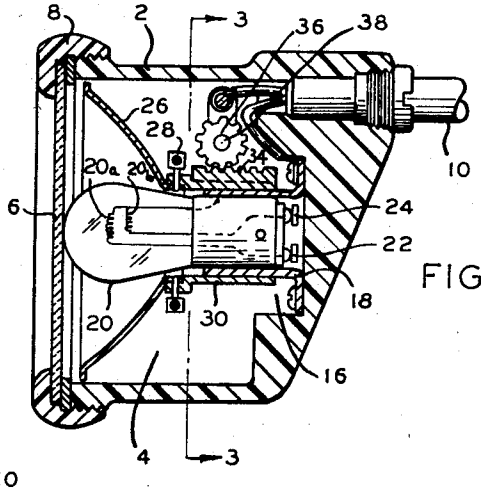


FIG. 2

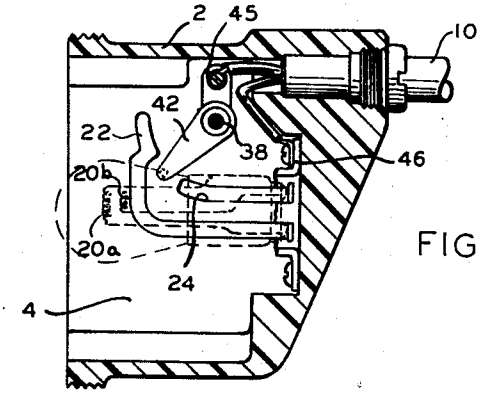


FIG. 4

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This invention relates to an adjustable electric lamp structure and, more particularly, to a miner's safety lamp of the type commonly referred to as a miner's cap lamp. In general, this form of lamp includes a headpiece in which an electric lamp is secured and means for supporting the headpiece on a cap, hat or other part of the clothing worn by a miner. An electric storage battery is supported by a suitable holding device around the waist of the miner and an electrical conductor extends from the battery upwardly to the headpiece.

Currently, miner's electric cap lamps are equipped with a reflector and two bulbs, or with a two-filament bulb. In the two-filament bulb, one filament is located at or near the focal point of the reflector and the other filament is located a short distance away from the focal point. Either filament provides a satisfactory light pattern when used with a matte-finished reflector, but only the filament most nearly in focus provides a satisfactory beam when used with a specular finished reflector of the class now employed most extensively in the art. More recent cap lamp models have included a focussing device to focus the more central filament, but the second filament remains out of focus. Thus, the tendency has been for the miner to use the same focussed filament every day and to reserve the second filament for temporary and generally unsatisfactory use in the event of "burn-out" of the correctly focussed filament.

The present invention is based on the novel concept of combining filament energization and beam focussing in one simplified turning adjustment. To accomplish this objective, I have devised a lamp and electrical switch arrangement wherein I provide means responsive to movement of the electrical switch for focussing a reflected beam of light from the lamp.

The combined switch and focussing arrangement of the invention, while adapted for use in focussing a light beam from either a single filament lamp or multiple filament lamp, is especially designed for use with a lamp having two filaments. The several components referred to are arranged in such relation to one another as to provide for selective operation of either filament of a two-filament lamp whereby each filament may be used interchangeably. Selective focussing of light from each filament may be accomplished by the same turning movement which closes an electrical circuit through one or the other of the filaments.

I have found that this concept of selective switching and simultaneous focussing may be practically embodied on one form in an adjusting lamp structure in which a unique rotor switch device is combined in interlocking relationship with a special reflector positioning apparatus. These units are so designed and organized as to provide for a tightly sealed bulb switch and reflector arrangement and, thus, a high standard of safety and durability is insured.

An important feature of the invention is the construction of a rotor type switch having a pair of electrical contact elements and a rotatable contact arm by means of

which either of two filament circuits may be energized and the same rotative movement is utilized to provide for two different focussing adjustments. The latter operation is accomplished in a preferred form of the invention, by a novel gear and rack mechanism which functions to focus one filament as it is energized by a clockwise rotation of the switch arm; and which focuses the second filament as it is energized by a counter clockwise rotation of the switch arm.

These and other objects and novel features will be more fully understood and appreciated from the following description of a preferred embodiment of the invention selected for purposes of illustration, and shown in the accompanying drawings, in which:

Fig. 1 is a composite view in side elevation illustrating a lamp enclosure body for use with a miner's cap or other supporting means, and further indicating a storage battery and an electrical conductor of the class commonly carried by a miner in conjunction with a miner's cap lamp;

Fig. 2 is a cross-sectional view taken centrally of the lamp enclosure body of Fig. 1;

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2; and

Fig. 4 is a cross-section taken on the line 4—4 of Fig. 3.

Referring more in detail to the structure shown in the drawings, numeral **2** denotes a cup shaped lamp enclosure body which may preferably consist of Bakelite or other rigid molded plastic. As shown in Fig. 2, the enclosure body is recessed at one side to define a chamber **4** which is normally closed by means of a glass lens **6** secured in place by means of a threaded bezel **8**.

An electrical conductor cord **10** is fastened through one side of the enclosure **2** and at its opposite end is connected to a storage battery **12** of the type normally used with electric cap lamps. At the outer rear wall portion of the enclosure **2** is a clip element **14** for use in attaching the lamp structure to a supporting part of a miner's cap or the like.

At its inner rear portion, the enclosure body is recessed to form a socket opening **16** in which is secured a lamp socket **18**. In this socket is detachably secured a lamp **20** which is retained in position by the lens **6** as suggested in Fig. 2. Also secured at one end of the socket **18** are electrical contact elements **22** and **24**. Located around the lamp **20** is a reflector element **26** which has a reduced central tubular section detachably fitted into the end of reflector sleeve **30** through which projects yieldable pins **28** engageable with the tubular section of reflector element **26**, as shown. Sleeve **30** is slidably received on the socket **18** and, when moved, is adapted to vary the position of adjustment of the reflector **26** to provide for selective focussing with respect to the lamp filaments **20***a* and **20***b*.

In accordance with the invention, I further provide on the sleeve **30** a rack portion **34** whose teeth, as shown in Fig. 2, are adapted to be engaged by a small gear **36**. The latter member is mounted on a shaft **38** which is received through one side of the enclosure body **2** in a bearing portion **2***a*. At its outer end, the shaft **38** is provided with a knurled knob **40** to facilitate turning the shaft by hand.

In accordance with a further aspect of the invention, I combine with the shaft **38** an electrical rotor arm contact **42** which may, for example, be secured to an intermediate portion of the shaft as illustrated in Fig. 4. The rotor arm contact **42** is chosen of a length such that it may swing through an arc which passes across the ends of two electrical contacts **22** and **24** whose extremities are fixed at the base of the lamp socket. These electrical contacts **22** and **24** are constructed with elongated contact surfaces as shown in Fig. 4, so that when arm **42** engages one or

the other of these contacts, an electrical circuit is closed through either one of the light filaments **20***a* and **20***b*, and there is a short time interval during which the shaft may be turned through a small arc of rotation. During this time interval the sleeve **30** may be advanced or retracted slightly to provide for correct focussing of the reflector in accordance with whichever filament is being energized at any given time.

Considering this switching device and its operation in greater detail, attention is directed to Fig. 4 wherein I have illustrated one of the leads from the conductor **10** connected to a terminal **45**, with the other lead being connected to a terminal **46**. The position of the rotary switch arm **42**, as shown in Fig. 4, is in an open circuit position, that is, neither filament is energized. However, by turning the knob **40** in a counter clockwise direction, the arm **42** is advanced into contact with the electrical contact **22** and immediately the filament **20***a* is energized with a circuit being closed through the contact **22**, then to the filament **20***a*, then to the lamp base and socket, and then through the terminal **46** through conductor **10** to the battery. In turning the knurled knob **40** in a counter clockwise direction, the gear **36** and rack **34** cooperate to move the sleeve **30** in a direction from right to left as viewed in Figs. 2 and 3, which movement provides a correct focussing of the reflector **26** for the filament **20***a*.

An alternate operation using the filament **20***b* may be carried out by moving the rotor switch arm **42** from the position shown in Fig. 4 in a clockwise direction in which event the arm **42** engages the electrical contact **24** and the filament **20***b* is then energized with a circuit being closed through this filament to the lamp base to socket. With this clockwise rotation of the knob, the gear **36** and rack **34** retract the sleeve **30** into a position where the reflector **26** is correctly focussed for the filament **20***b*.

Thus it will be seen that I have provided a simplified apparatus involving a simple turning operation which when considered in relation to a miner's cap enables a miner to very conveniently turn on a light beam and focus it with a single operation being carried out while the lamp is supported on the head. Such an operation may, in the event there is a sudden filament failure, be repeated to simultaneously renew the light and obtain proper focussing with little interruption or loss of time in the case of failure.

An important advantage of the invention is the broad focussing adjustments possible since each filament permits a miner, within limits, to obtain the sharpness or spread of light beam which he finds most convenient for his work. This may vary with the type of work which a miner may be doing. For example, a miner operating from the back of a long mining machine would want as sharp a beam as possible so that it would penetrate through dust and spray. On the other hand, a man repairing a motor or doing close work underground might require a broader light pattern to minimize sharp gradations from darkness to brightness.

Another advantage of the invention is compensation for variation in the filament location which commonly occurs in the manufacture of bulbs. All bulbs, as manufactured, are not exactly uniform in the location of filament, and the invention compensates this by providing for a focus in a range of positions which will take care of any variations with a minimum of difficulty.

Another advantage of the specific arrangement described is that instead of one filament being required to operate all of the time until failure, there may be an alternating type of operation since the rotor switch may energize either one of the filaments at will. The net result of this may well be to realize longer operating life from a lamp before a bulb replacement operation is required. It will further be appreciated that the desirable two filament operation described is accomplished with both safety and durability being maintained.

The invention has been described in one preferred form in which a two filament rotor switch is combined with focussing position apparatus. It should be understood that various changes and modifications may be resorted to in connection with this structural form of the invention and, similarly, I may desire to employ the combination rotor switch and focussing apparatus with various other filament arrangements, either of a single filament or a plurality of filaments in excess of the two illustrated.

The scope of the invention is to be understood as being defined by the appended claims.

This application is a continuation-in-part of application Serial No. 702,355, filed December 12, 1957.

Having thus described my invention, what I claim is:

1. In a miner's lamp, a lamp enclosure body, a lamp socket including a base portion fixed to the enclosure body and a tubular lamp receiving portion, a reflector positioned in said enclosure body including a cylindrical hub portion slidably mounted on the tubular portion of said socket, a rack extending longitudinally of said hub portion, a rotatable switch member mounted in the enclosure body having a gear engaging said rack for sliding said hub and reflector along the tubular portion of said socket, said lamp socket having a pair of electrical contact elements, a bulb member resiliently held in the socket and presenting a pair of filaments occurring in electrically connected relationship to the said electrical contact elements to constitute two independent sources through which said current may flow, a source of electrical current and electrical conductor means leading therefrom to said contact elements, said rotary switch device being adapted to close the circuit through said conductors to one of said filaments and simultaneously opening a circuit through the remaining filament, whereby said gear and rack mechanism actuates said reflector to position the latter in accordance with the filament illuminated to focus said reflector with respect to the filament energized.

2. A structure according to claim 1 in which the electrical switch means includes a pair of spaced apart electrical contacts having elongated contact tips, and a rotary arm movable into and out of engagement with the contact tips.

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