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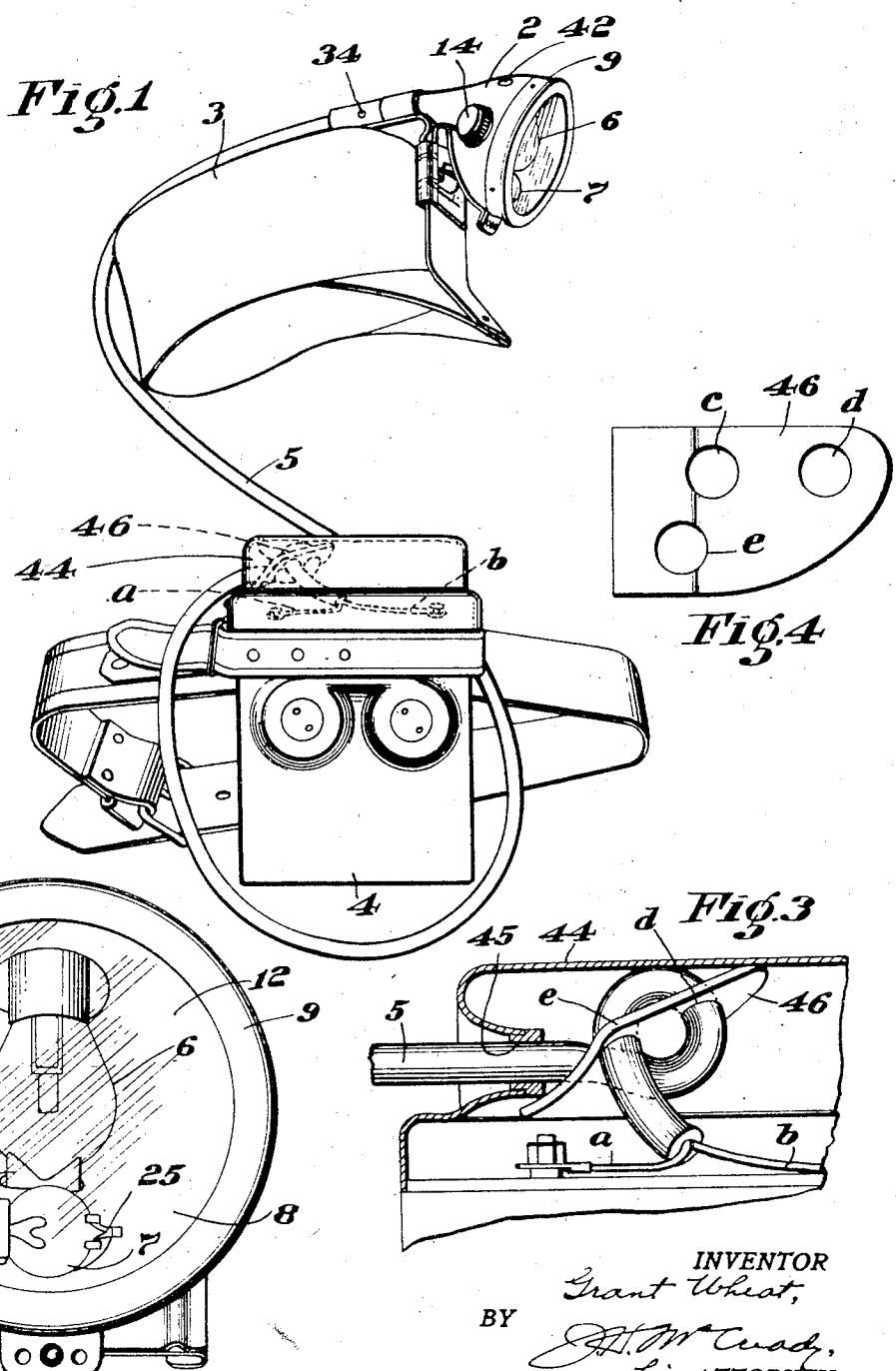
G. WHEAT

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MINER'S LAMP

Filed Jan. 23, 1929

2 Sheets-Sheet 1



BY

INVENTOR  
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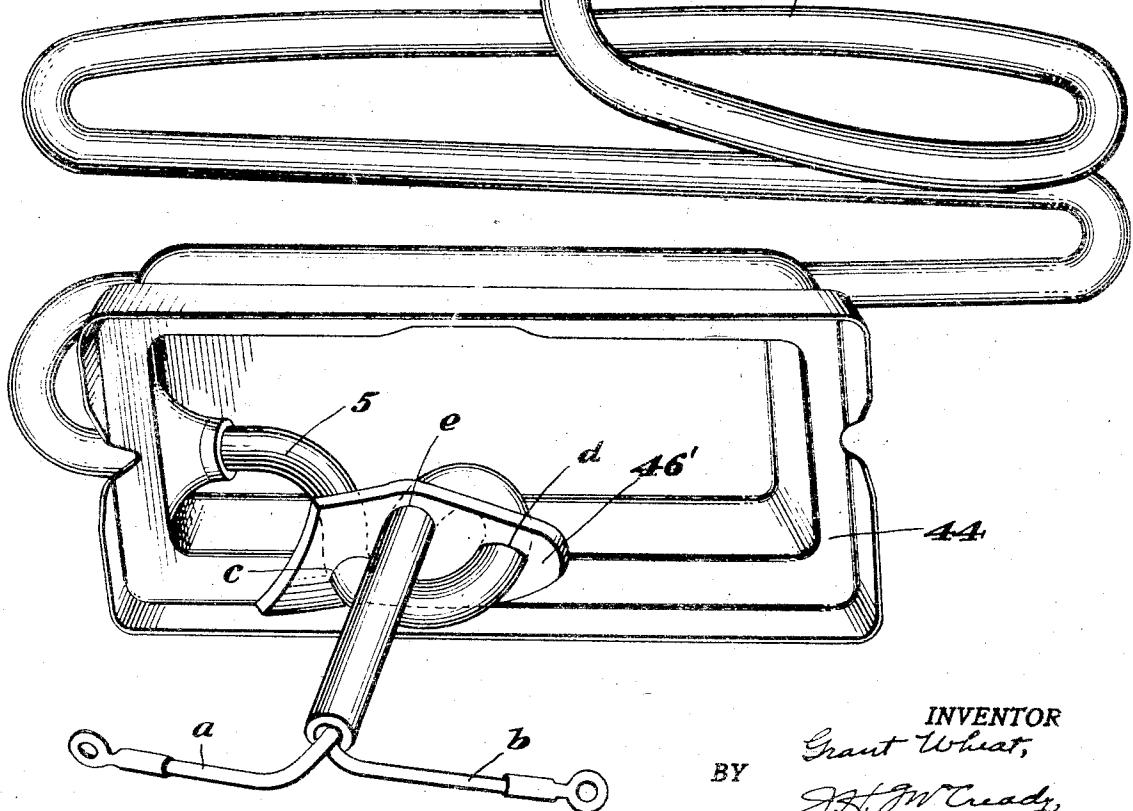
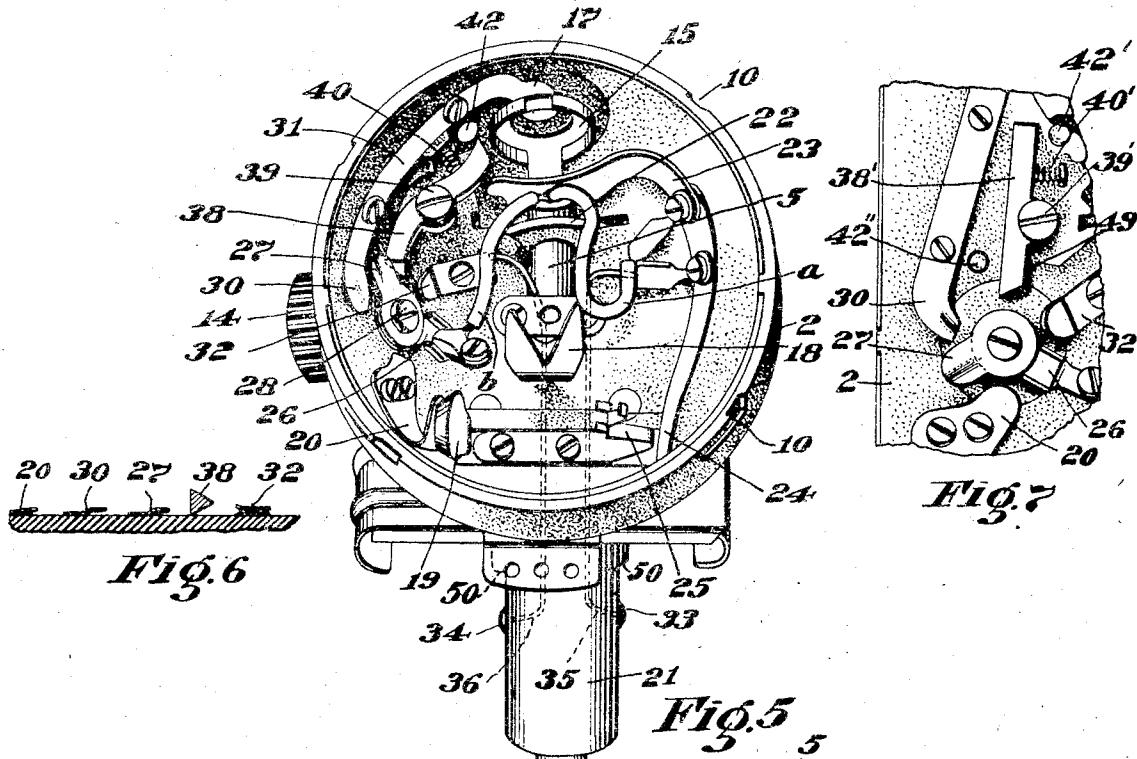
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

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## MINER'S LAMP

Application filed January 23, 1929. Serial No. 334,528.

This invention relates to miner's lamps and is a continuation, in part, of my pending application Serial No. 155,199, filed December 16, 1926.

Equipment of this character usually includes a head piece designed to be worn on the cap or other part of the clothing, a battery which is slung from the miner's belt, and a cord which connects the battery with the head piece and includes electrical conductors for supplying current from the battery to the lamp or lamps mounted in the head piece.

The present invention aims to improve apparatus of this character with a view to facilitating the handling and use of the apparatus by the miners and lamp house attendants, preventing injurious tampering with the device by the miners or other laborers, 20 making the apparatus more reliable, and reducing the expense of manufacture.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a perspective view of an apparatus constructed in accordance with this invention;

Fig. 2 is a front view of the head piece with parts broken away in order better to illustrate certain details of construction;

Fig. 3 is a cross-sectional view through a part of the battery casing illustrating a novel device for anchoring the cord to the battery;

Fig. 4 is a plan view of the anchoring plate shown in Fig. 3;

Fig. 5 is a perspective view of parts of the apparatus shown in Fig. 1, and shows the parts in the head piece immediately behind the reflector;

Fig. 6 is a developed cross-sectional view of the devices with which the switch engages as it moves backward and forward through its path; and

Fig. 7 illustrates a modified form of locking device for the switch.

Referring first to Fig. 1, the apparatus

there shown comprises a head piece 2 designed to be worn on a cap 3 or other part of the person, a battery 4, and a cord 5 through which the battery is electrically connected with the lamps in the head piece.

The head piece includes a casing preferably made of vulcanite, bakelite, or other insulating material. Two lamps 6 and 7 are shown mounted in the head piece, the arrangement preferably being like that disclosed in my pending application Serial No. 149,890, although other lamp arrangements obviously can be substituted for that shown. The lamps are protected by a glass plate 8 which closes the forward end of the opening in the head piece, this plate being held in place by a bezel 9 having pins to enter bayonet slots 10, Fig. 5, molded in the head piece 2. The bezel is sealed against removal.

In the construction shown the main lamp 6 is of relatively high power, usually from fifteen to twenty candle power, and is mounted immediately in front of and is centered with reference to a reflector 12. The smaller lamp 7 is simply an auxiliary or emergency lamp of say five or six candle power and is designed to be used only in case the main lamp fails. A switch which is arranged to be operated by the knob 14, Figs. 1 and 5, is provided in the head piece and enables the miner to bring one lamp or the other into operation, as desired.

Referring to Fig. 5 it will be seen that the contacts for the main lamp 6 include a cup-shaped resiliently supported socket 15 in which the base of the lamp is mounted, and a stationary contact 17 positioned to engage the end terminal of the lamp. A forked spring finger 18 which projects through the reflector engages the lower end of the bulb, as shown in Fig. 2, and holds it back against the reflector. The terminals for the emergency or auxiliary lamp 7 include a resiliently supported cup-shaped socket 19, and a contact 20 similarly arranged, respectively, to the members 15 and 17. A forked finger 25 engages the end of the lamp 7 and holds it in its socket. The cord 5 passes through the neck 21 of the head piece 2 and through a washer 22 which anchors it in the head piece, this

cord including two conductors *a* and *b*, respectively, and a heavy jacket of rubber to protect them. One of these conductors *a* runs directly to two metal strips 23 and 24, respectively, the former being connected with the socket 15 for the main lamp while the latter is connected to the metal piece on which the socket 19 for the auxiliary lamp is formed. Thus the conductor *a* is electrically connected at all times with the bases of the two lamps 6 and 7.

The other conductor *b* is connected directly to the metal base 26 on which the switch arm 27 is mounted, the switch arm bearing directly on the base and being secured by a screw 28 to the knob 14. Three contacts are mounted in cooperative relationship to the switch arm 27; namely, the upper end of the metal piece 20; a contact 30 on one end of the metal strip 31 which has the contact 17 at its opposite end, and another contact 32, the purpose of which will be described presently. It will be clear at this point, however, that if the switch arm 27 is moved into engagement with the contact 30 the main lamp 6 will be lighted, and if it is moved further to engage the contact 21 the main lamp 6 will be extinguished and the auxiliary lamp 7 will be lighted. Preferably the right-hand edge of the switch blade 27 is bent upward slightly so as to afford a firmer contact with the locking device 38, and the contact 30 is similarly shaped so that when the two contacts come into full engagement with each other there is a difference in the feel of the switch which indicates to the workman that the switch is properly positioned. This arrangement is such that the switch blade 27 passes under the contact 30 as it swings in a counter-clockwise direction, and passes over the latter contact when it is moved in the reverse direction.

The usual practice heretofore has been to mount the charging terminals for the battery on the battery casing and to control the electrical connection between the battery and these terminals by a switch mounted in the battery casing and usually arranged to be operated by a key or some other special tool of such a nature as to prevent the miner from tampering with the switch. I have found, however, that the construction of the apparatus can be substantially simplified and the use and handling of it facilitated by mounting the charging terminals on the head piece and placing the charging of the battery under the control of the same switch that controls the lamps. For this purpose two charging terminals 33 and 34, respectively, are mounted on opposite sides of the headpiece 60 preferably on the neck 21, the former of these terminals being connected by a wire 35 to the metal strip 24 which, in turn, is electrically connected with the conductor *a*, while the other charging terminal 34 is connected by a wire 36 to the stationary switch contact 32.

In charging the battery the neck 21 of the head piece can simply be forced in between two spring contacts to engage, respectively, with the charging terminals 33 and 34, the switch arm 27 being turned to engage the contact 32 and thus connect the terminal 34 with the conductor *b*. The other terminal 33 is always connected with the conductor *a*. Shoulders 50—50 on the neck 21 assist in positioning the device in a charging apparatus.

It is desirable to make one or both of the charging terminals 33 or 34 electrically dead when the lamp is being used by the miner, both in order to prevent accidental short circuiting of the battery with the resulting danger of creating a spark and possibly causing an explosion, and also for the purpose of preventing the miner or anyone else from tampering with the parts that carry current. This object is accomplished by providing a spring pressed dog 38 to lock the switch arm 27 against movement into engagement with the charging contact 32 of the switch. The dog is pivoted on a screw 39 and is pressed into its locking position by a coiled spring 40. It is bevelled on its lower side, as best shown in Fig. 6, so that the switch arm 27 can pass freely under it in swinging away from the contact 32, but when the arm has once passed the dog the latter then will effectually prevent the arm from swinging back in a reverse direction. The switch thus is locked out of its charging position but can still be moved into either of its working positions where it engages one or the other of the contacts 30 or 20, as desired.

This locking device is arranged to be released magnetically by a field of force applied at the outside of the head piece. Usually this is accomplished simply, by holding a magnet against the outer surface of the head piece opposite the rearward end of the locking member 38; and in order to transmit the lines of force more freely to the dog, a stud 42 of soft iron or other magnetic metal is set into the wall of the head piece, as shown in Fig. 2. This member both serves to designate the point at which the magnet should be applied to the head piece, and also to transmit the lines of force to a point inside the head piece closely adjacent to the tail of the locking member 38, thus acting to move this member about its pivot and against the action of the spring 40 into a position to release the switch arm 27 and permit this arm to be moved into engagement with the charging contact 32.

According to the usual practice, when the miners leave the mine at night they turn their lamps over to the lamp house attendant. He releases the lock 38 in the manner above described, turns the switch arm 27 into engagement with the contact 32 and thus electrically connects the charging terminal 34 with one terminal of the battery 4. The other terminal 33 is always electrically connected with

the opposite terminal of the battery. When this has been done the attendant simply pushes the head piece into a lamp rack provided with spring contacts which engage the terminals 34 and 33, respectively. A series of these lamps is mounted in each rack and all the lamps in a single rack are charged simultaneously. As the miners go to work the next morning each miner is handed his lamp by the attendant, the latter turning the switch to light the main lamp 6 before he delivers the apparatus to the miner. The movement of the switch necessary to light either lamp results automatically in locking the switch out of its charging position and disconnecting the charging terminal 34 electrically from any part of the apparatus which carries current. If the miner should take his lamp in the absence of the lamp house attendant he would be compelled to move the switch 27 in the manner just described in order to light either bulb, and thereafter it would be impossible for him to turn the switch back into engagement with the charging contact 32 of the switch.

The invention thus simplifies the handling and use of apparatus of this character, it reduces the work required of the lamp house attendant since it is not necessary for him to unlock the switch in delivering the lamps to the miners, and it guards the apparatus against either accidental or intentional short circuiting which would not only be an objectionable misuse of the apparatus, but might be positively dangerous to the workman himself because of the danger of creating an explosion. A further advantage of this arrangement of the charging terminals and the switch is that in the event of trouble which may naturally be supposed to arise from contacts in corroded or poor condition, it is not necessary to disturb the battery casing. The repair man knows that all of these contacts are in the head piece, and he therefore takes out the lamps and reflector at once and inspects the contacts in this part of the apparatus. In prior constructions having contacts in both the battery and the head piece there was no way of determining which set of contacts were in poor condition except from the general fact that the contacts in the battery casing were much more liable to corrode than those in the head piece. These former constructions, therefore, provided two possible sources of trouble, whereas the present construction eliminates one of these sources. Furthermore, the elimination of contacts from the battery casing definitely removes the most common cause of interruptions of service due to corrosion.

Fig. 7 shows a slightly different construction of locking device from that illustrated in Figs. 2 and 5. In the latter figures it will be observed that the locking dog 38 swings transversely to the plane of movement of the

switch arm. In the arrangement shown in Fig. 7 the locking dog swings in approximately the same plane as the switcharm but its swinging movement in a counter-clockwise direction about its pivot 39' is limited by an abutment 49 against which it is normally held by the spring 40', the abutment being formed in the wall of the head piece 2. In this construction, also, two studs 42'-42" of iron or other magnetic metal are set into the wall of the head piece at opposite sides of the pivot 39', and these studs preferably project entirely through the head piece. They are so spaced that the ends of a horse shoe magnet can be placed against the outer ends of the studs and they will thus transmit lines of force to points closely adjacent to the dog at opposite sides of its pivot and therefore exert a very strong action on the dog tending to swing it into its open or unlocked position.

The invention also includes a novel construction for anchoring the cord 5 in the battery casing. Referring to Figs. 1, 3 and 4, it will be observed that the battery casing includes a removable cover 44 provided at one end with a bushed aperture 45, Fig. 3, through which the cord 5 passes. Located in this cover is an anchoring plate 46 having three holes *c*, *d* and *e* punched therethrough. This plate may be made of metal, such as aluminum, or of some strong non-metallic sheet material, such as bakelite, vulcanite, or the like. The cord is passed through the holes *c*, *d* and *e* in succession, and its conductors *a* and *b* are separated and clamped or fused, respectively, to the two terminals of the battery.

The plate 46 holds the cord in the form of a loop, and even a very strong pull exerted lengthwise on the cord tending to draw it outwardly through the aperture 45 produces no slippage of the cord through the holes *d* or *e* but simply serves to increase the pressure of the plate against the inner walls of the casing 44. It therefore anchors the cord firmly in the casing. At the same time this construction does not bind the cord in the plate so tightly that it cannot be freed easily when necessary. Usually the plate is bent transversely, as best shown in Fig. 5, and its edges are shaped to conform more or less to the contour of those parts of the inner wall against which it will bear. The plate 46' shown in Fig. 5 is designed for a somewhat wider casing top or cover than that shown in Fig. 3. This arrangement for anchoring the cord in the battery casing thus is simple, extremely effective, can be manufactured economically, and it reduces the labor expense involved in fastening the cord in the battery or removing it therefrom.

The invention simplifies the construction of apparatus of this character since a single switch only is used to control both the lamps and also the charging circuit. The apparatus

also is made more reliable because of the fact that all movable or adjustable contacts are eliminated from the battery casing. A switch or contacts at this point are especially troublesome because of the corrosion produced by acid fumes from the battery.

While I have herein shown and described a preferred embodiment of my invention, it will be understood that the invention may be embodied in other forms without departing from the spirit or scope thereof.

As above stated this application is a continuation, in part, of my earlier application Serial No. 155,199. The broad claims covering subject matter common to the two applications are presented in the present case, and the claims in the earlier application are limited to features not disclosed in the present application.

Having this described my invention, what I desire to claim as new is:

1. In a miner's lamp, the combination of a head piece, an electric lamp in said head piece, a storage battery, a cord connecting said battery and head piece and including electrical conductors for supplying current from said battery to said lamp, charging terminals on said head piece, a switch in said head piece for electrically connecting one of said conductors with one of said terminals or disconnecting it therefrom, and means in said head piece for locking said switch in the position in which said terminal is disconnected from said conductor.

2. In a miner's lamp, the combination of a head piece, an electric lamp in said head piece, a storage battery, a cord connecting said battery and head piece and including electrical conductors for supplying current from said battery to said lamp, charging terminals on said head piece, a switch in said head piece movable to close or open a charging circuit through said conductors and said terminals, and means in said head piece operative automatically when said switch is moved out of its charging position to lock the switch out of said position.

3. In a miner's lamp, the combination of a head piece, an electric lamp in said head piece, a storage battery, a cord connecting said battery and head piece and including electrical conductors for supplying current from said battery to said lamp, charging terminals on said head piece, a switch in said head piece movable to close or open a charging circuit through said conductors and said terminals, and means in said head piece for locking said switch out of its charging position, said locking means being releasable magnetically by a field of force applied at the outside of said head piece.

4. In a miner's lamp, the combination of a head piece, an electric lamp in said head piece, a storage battery, a cord connecting said battery and head piece and including

electrical conductors for supplying current from said battery to said lamp, charging terminals on said head piece, a switch in said head piece movable to close or open a charging circuit through said conductors and said terminals, and a spring pressed dog in said head piece for locking said switch out of its charging position, said dog being arranged to be released magnetically by a field of force applied at the outside of said head piece.

5. In a miner's lamp, the combination of a head piece, two electric lamps mounted in said head piece, a storage battery, a cord connecting said battery with said head piece and including electrical conductors for supplying current from said battery to said lamps, charging terminals on said head piece, a switch in said head piece operable to connect either of said lamps in circuit with said battery or to close or open a charging circuit through said terminals, a switch in said head piece operable to connect said lamp in circuit with the battery and to close or open a charging circuit through said charging terminals, and means in said head piece for locking said switch out of the position in which it closes said charging circuit.

6. In a miner's lamp, the combination of a head piece, two electric lamps mounted in said head piece, a storage battery, a cord connecting said battery with said head piece and including electrical conductors for supplying current from said battery to said lamps, charging terminals on said head piece, a switch in said head piece operable to connect either of said lamps in circuit with said battery and to close or open a charging circuit through said terminals and means in said head piece for locking said switch out of its charging position but permitting the switch to be moved from its charging position to the position in which it closes the circuit through one of said lamps.

7. In a miner's lamp, the combination of a head piece, two electric lamps mounted in said head piece, a storage battery, a cord connecting said battery with said head piece and including electrical conductors for supplying current from said battery to said lamps, charging terminals on said head piece, an electric switch in said head piece movable into either a working position where it connects one of said lamps in circuit with the battery or to a charging position where it closes a charging circuit through said terminals, and a spring pressed dog in said head piece for locking said switch out of its charging position but permitting the switch to be moved from said charging position to said working position, said dog being arranged to be released magnetically by a field of force applied at the outside of said head piece.

8. In a miner's lamp, the combination of a head piece, two electric lamps mounted in said head piece, a storage battery, a cord con-

necting said battery with said head piece and including electrical conductors for supplying current from said battery to said lamps, charging terminals on said head piece, an electric switch in said head piece movable into either a working position where it connects one of said lamps in circuit with the battery or to a charging position where it closes a charging circuit through said terminals, a spring pressed dog in said head piece for locking said switch out of its charging position, and a piece of magnetic metal in the wall of the head piece positioned to transmit lines of force from outside the head piece to a point closely adjacent to said dog to release the dog.

9. In a miner's lamp, the combination of a head piece, two electric lamps mounted in said head piece, a storage battery, a cord connecting said battery with said head piece and including electrical conductors for supplying current from said battery to said lamps, charging terminals on said head piece, a switch in said head piece operable to connect either of said lamps in circuit with said battery or to close or open a charging circuit through said terminals, and means in said head piece for locking said switch against movement into charging position but permitting its movement from charging position to bring either lamp into operation.

10. In a miner's lamp, the combination of a head piece, two electric lamps mounted in said head piece, a storage battery, a cord connecting said battery with said head piece and including electrical conductors for supplying current from said battery to said lamps, charging terminals on said head piece, a switch in said head piece operable to connect either of said lamps in circuit with said battery or to close or open a charging circuit through said terminals, and a spring pressed dog in said head piece for locking said switch out of its charging position while permitting it to be moved from charging position to bring either of said lamps into operation, said dog being releasable magnetically by a field of force applied at the outside of said head piece.

11. In a miner's lamp, the combination of a head piece, an electric lamp mounted in said head piece, a cord connecting said head piece with said battery and including conductors for supplying current from said battery to said lamp, said battery including a casing having a hole through which said cord passes, and an anchoring plate in said casing having a plurality of holes through which the cord extends and through which the cord is firmly anchored in said casing.

12. In an apparatus of the character described, the combination of a battery including a casing, a cord containing a conductor electrically connected with said battery, said casing having an aperture through which said

cord passes, and a plate in said casing having a plurality of holes through which the cord extends and in which it is held in the form of a loop whereby said plate serves to anchor said cord in said casing.

13. In a miner's lamp, the combination of a head piece having a neck extending therefrom, an electric lamp in said head piece, a battery, a cord extending through said neck and connecting said battery with said head piece, said cord including electrical conductors for supplying current from said battery to said lamp, and charging terminals on the neck of said head piece.

14. In a miner's lamp, the combination of a head piece having a neck extending therefrom, an electric lamp in said head piece, a battery, a cord extending through said neck and connecting said battery with said head piece, said cord including electrical conductors for supplying current from said battery to said lamp, said neck having a reduced portion with shoulders at opposite sides thereof at one end of said portion, and charging terminals on said reduced portion of said neck.

15. A lamp apparatus designed to be carried on the person comprising, in combination, an electric lamp, a casing in which said lamp is mounted, a socket in said casing for operatively supporting said lamp, a storage battery including a casing therefor, said casings being separate from and independent of each other and adapted to be independently supported, a flexible cord connecting said casings and including conductors for supplying current from said battery to said lamp, and charging terminals in said lamp casing arranged to engage the charging terminals of a charging rack and to cooperate with the conductors in said cord to charge said battery through said conductors.

16. A lamp apparatus designed to be carried on the person comprising, in combination, an electric lamp, a casing in which said lamp is mounted, a socket in said casing for operatively supporting said lamp, a storage battery including a casing therefor, said casings being separate from and independent of each other and adapted to be independently supported, a flexible cord connecting said casings and including conductors for supplying current from said battery to said lamp, charging terminals located in exposed positions on said lamp casing and arranged to engage the charging terminals on a charging rack, and a switch in said lamp casing controlling the electrical connection between one of said charging terminals and one of the conductors in said cord.

17. A lamp apparatus designed to be carried on the person comprising, in combination, an electric lamp, a casing in which said lamp is mounted, a storage battery including a casing therefor, said casings being separate from and independent of each other and

adapted to be independently supported, a cord connecting said casings and including conductors for supplying current from said battery to said lamp, and charging terminals in said lamp casing accessible from outside the lamp casing without disturbing said lamp, said terminals being constructed and arranged to cooperate with the terminals of a charging rack and with the conductors in said cord to charge said battery through said conductors.

18. A lamp apparatus designed to be carried on the person comprising, in combination, an electric lamp, a casing in which said lamp is mounted, a storage battery including a casing therefor, said casings being separate from and independent of each other and adapted to be independently supported, a cord connecting said casings and including conductors for supplying current from said battery to said lamp, charging terminals in said lamp casing accessible from outside the lamp casing without disturbing said lamp, said terminals being constructed and arranged to cooperate with the terminals of a charging rack and with the conductors in said cord to charge said battery through said conductors, a switch in said lamp casing controlling the electrical connection between one of said charging terminals and said battery, and means in said lamp casing for locking said switch against operation.

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