May 26, 1931. P. WOLF 1,806,869

ELECTRIC LAMP CHARGED FROM ACCUMULATORS

Filed April 28, 1930 2 Sheets-Sheet 1

Fig. 1

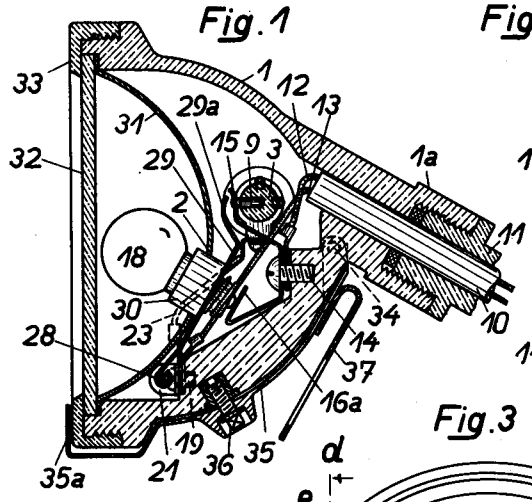


Fig. 2

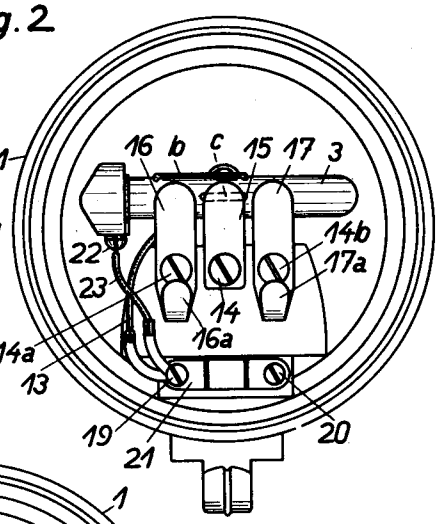


Fig. 3

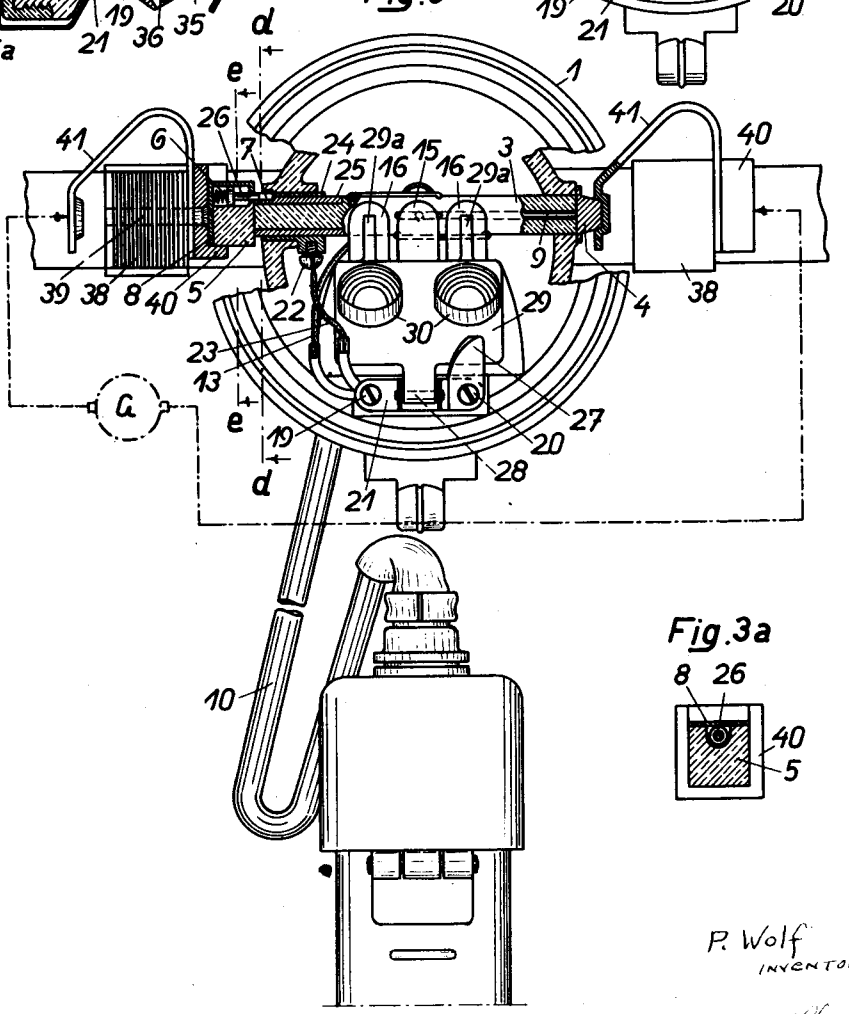


Fig. 3a

P. Wolf
INVENTOR

By Marks & Clerk
Attys

May 26, 1931. P. WOLF 1,806,869

ELECTRIC LAMP CHARGED FROM ACCUMULATORS

Filed April 28, 1930 2 Sheets-Sheet 2

Fig.4

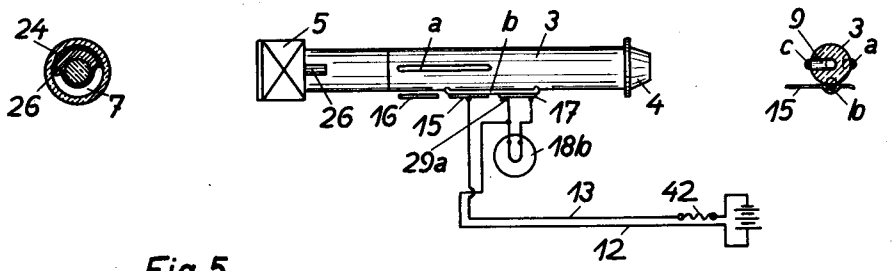


Fig.5

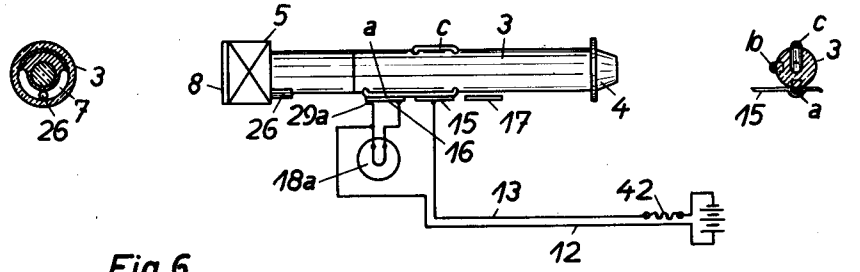


Fig.6

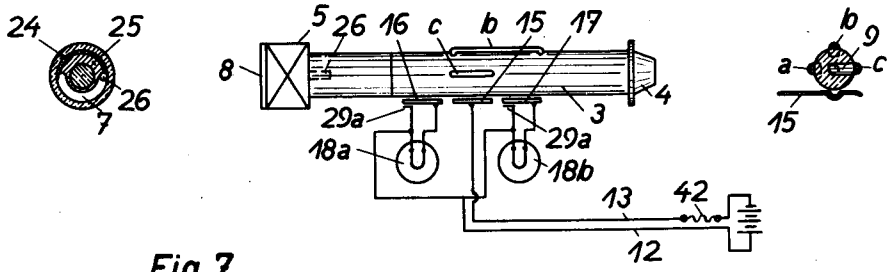
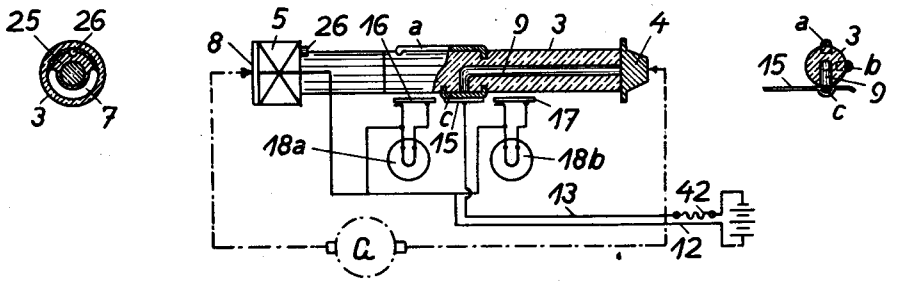


Fig.7



P. Wolf
INVENTOR

By: Marks & Clerk
Attys.

Patented May 26, 1931 1,806,869

UNITED STATES PATENT OFFICE

PAUL WOLF, OF ZWICKAU, GERMANY

ELECTRIC LAMP CHARGED FROM ACCUMULATORS

Application filed April 28, 1930. Serial No. 448,062.

My invention relates to electric lamps operated from accumulators, and more particularly to a head lamp for miners, which consists of the lamp itself, to be carried on the miner's head gear, and of the accumulator, to be carried on the back or on a belt, connected with the lamp itself by means of a cable. My invention relates more particularly to a device which enables the accumulator to be charged through the lamp, for the purpose of obviating the necessity for releasing a connecting cable from the accumulator and opening the accumulator casing. The present invention provides a solution of this problem which may be utilized instead of the solution described in my co-pending patent application, and it presupposes the switching arrangement described in my said co-pending application. This switching arrangement is so constructed, according to the present invention, that the switch spindle, with its conducting projections in a certain angular position, connects, with the current supply conductors to the lamp, two poles projecting out of the casing, to which poles the poles of the charging circuit can be supplied.

Care must be of course taken that the poles projecting from the casing cannot be used by the miner for the purpose of taking current from the accumulator. By such use the danger of igniting fire damp would be produced. I therefore provide a lock which prevents the switch spindle from being rotated into the charging position, and which in its turn is secured by means of a magnet lock. The latter can only be released by means of a powerful magnet provided at the charging station above ground. The charging device for this purpose will be hereinafter described for the sake of completeness although it forms no part of the present invention.

The invention is illustrated by way of example in the accompanying drawings, in which

Figure 1 is a side elevation of the lamp in section,

Figure 2 is a plan of the lamp, with the frame ring and its glass, and also the stop member and the carrying plate removed.

Figure 3 is a plan of the lamp, partially in section, with the frame ring and its glass removed. In this figure, are also shown the magnets of the charging apparatus, and also the accumulator belonging to the lamp.

Figure 3*a* is a section on the line *e*—*e* in Figure 3, looking in the direction of the arrows.

Figures 4, 5, 6 and 7 show the switch spindle in different positions, and include circuit diagrams to explain the various switching positions.

The lamp casing 1 is formed by a hemispherical hollow body of insulating material, on the back of which a screw-threaded tubular coupling member 1*a* is provided. In the lamp casing is rotatably mounted the switch spindle 3. Upon the latter are provided conducting projections *a*, *b* and *c*. The projection *c* is conductively connected by a metal pin 9 with a conical metal hood 4 on one end of the switch spindle 3, of insulating material, as shown in Figure 7. A bush 24 is vulcanized firmly into the lamp casing 1. The bush is provided with an arcuate slot or groove 7 as shown in Figures 4, 5, 6 and 7. The switch spindle, as shown in Figure 2, has at the left hand end a metallic ring 25, which gives contact with the bush 24. In the square head 5 of the switch spindle 3 is provided a bolt 26, which, under the pressure of a spring 6, engages in the arcuate slot 7. The outer coating 8 of the head 5 of the switch spindle likewise consists of conducting material. On the bush 24 is provided a projection into which a screw 22 is screwed, as shown in Figure 2. Through the tubular projection 1*a* on the lamp casing, the cable 10, with the conductors 12 and 13, is intro-

duced into the interior of the lamp and secured with a member 11.

The conductor 12 leads to the screw 14, to which a spring 15 is secured. By means of a screw 14*a*, springs 16 and 16*a* are secured to the lamp casing. These springs may alternatively be in one piece, as may also the springs 17 and 17*a*, which are secured to the lamp casing by means of the screw 14*b*. The springs 16*a* and 17*a* bear against the terminal poles of the lamps 18 and exert a pressure thereon.

The conductor 13 leads to the screw 19, to which also a conducting member 23 leading to the screw 22 is secured. Screws 19 and 20 at the same time secure the member 21 to the lower and inner portion of the lamp casing. The screw 20 at the same time holds fast the stop member 27. To the member 21 is fitted a pivot 28, about which a plate 29, with frame rings 30 is rotatable. The plate 29 has two finger-like projections 29*a*, which, when the springs 16*a* and 17*a* exert a pressure upon the lamp 18, are located a very short distance above the springs 16 and 17. On the front aperture of the lamp casing 1 is mounted a reflector 31 and a lamp glass 32. These two are held fast by screwing on the frame ring 33. The reflector 31 has two round apertures 2, by which it engages over lamp holders 30, and it can be taken out when the lamps 18 are unscrewed. To the back of the lamp casing a flap 35 is rotatably secured on a pin 34. This flap engages by a finger 36*a* over the frame ring 33, and can be so secured to the lamp casing, by means of a screw 36 which is only releasable by means of a special key, that it is impossible for the frame ring 33 to be unscrewed by the miner. On the closure flap 35 is also mounted a hook 37 for suspending the lamp from the miner's head gear.

If a powerful shock acts upon the lamps 18, by which the protecting glass or the glow lamps might be in danger of breaking, or might be in fact broken, the springs 16*a* and 17*a* will yield. The plate 29 swings about the pivot 28, and the finger-like projections 29*a* of the plate 29 touch the springs 16 and 17. This provides a short circuit, if one of the two lamps is switched on, as will be seen from the diagram in Figure 7, thereby causing a fuse 42, lodged in the lamp or in the battery, to melt. The ignition of mine gases in the event of the lamp being smashed is thus made impossible.

Figures 4, 5, 6 and 7 show the various angular positions of the switch spindle 3, and for the better understanding thereof, sections are shown on the right hand side from which the positions of the contact pieces *a*, *b* and *c* can be seen. On the left hand side are shown sections on the line *d*—*d* in Figure 3, for the purpose of explaining the corresponding positions of the bolt 26.

In Figure 4 the conducting projection *b* of the switch spindle connects the spring 15 with the spring 17. The lamp 18*b* is therefore alight. In Figure 5 the projection *a* connects the spring 15 with the spring 16, so the lamp 18*a* is now alight. Upon a further quarter revolution of the switch spindle a position is reached at which none of the projections come into contact with the springs. In Figure 6, therefore, everything is switched off. Now when it is desired to charge the battery belonging to the lamp, which is situated at the other end of the cable, it is first necessary to hold a powerful magnet to the head 5 of the switch spindle, in order that the bolt 26 may be drawn out of the arcuate slot 7. After a further quarter revolution (see Figure 7), the contact piece *c* comes into contact with the spring 15. The conductor 13, that is to say, one pole of the battery, is in conductive connection through the conducting piece 23 with the conducting coating of the head 5 at the left hand end of the switch spindle. In the switching position indicated in Figure 7, the conductor 12, that is to say, the other pole of the battery, is connected through the spring 15, the contact piece *c* and the pin 9 with the cap 4, which is located at the right hand end of the switch spindle. Hence according to Figure 7, by holding the charging poles to the two ends of the switch spindle, the accumulator or battery belonging to the lamp can be charged. This is preferably done in such a way that the magnet 38 to be held to the switch spindle head 5 has a core 39 with a key-shaped projection 40 into which the head 5 is introduced from above. On the other end of the switch spindle a spring 41 is pressed. After drawing the bolt 26 out of the arcuate slot the lamp body is rotated relatively to the spindle through the aforementioned quarter revolution. The magnet 38 and the spring 41 are assembled in the manner indicated in Figure 3 and secured in a row to a frame, so that between a magnet 38 and a spring 41 a lamp is always suspended, and a whole row of lamps can be fitted to this frame. Each key head 40, and a spring 41 located opposite thereto, thus form, in relation to the lamp, a connecting point for the charging current. By the arrangement of the bolt 26 in the arcuate slot 7, unauthorized rotating of the switch spindle into the charging position, in which the two poles of the battery belonging to the lamp project at the ends of the switch spindle, is prevented.

What I claim is:—

1. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a lamp bulb mounted in the lamp casing, conductors for conveying current to the lamp bulb from an accumulator outside the lamp casing, a switch spindle rotatably mounted in the lamp cas-

ing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting an electric circuit through the lamp bulb, the conductors and the accumulator by rotating the switch spindle, and terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulb and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator.

2. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a plurality of lamp bulbs mounted in the casing, conductors for conveying current to the lamp bulbs from an accumulator outside the casing, a switch spindle rotatably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting electric circuits through the lamp bulbs, the conductors and the accumulator by rotating the switch spindle, and terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulbs and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator.

3. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a lamp bulb mounted in the lamp casing, conductors for conveying current to the lamp bulb from an accumulator outside the lamp casing, a switch spindle rotatably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting an electric circuit through the lamp bulb, the conductors and the accumulator by rotating the switch spindle, and terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the said terminals being mounted directly upon the switch spindle itself, and the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulb and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator.

4. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a plurality of lamp bulbs mounted in the casing, conductors for conveying current to the lamp bulbs from an accumulator outside the casing, a switch spindle rotatably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting electric circuits through the lamp bulbs, the conductors and the accumulator by rotating the switch spindle, and terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the said terminals being conducting portions of the switch spindle itself, and the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulbs and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator.

5. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a lamp bulb mounted in the lamp casing, conductors for conveying current to the lamp bulb from an accumulator outside the lamp casing, a switch spindle rotatably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting an electric circuit through the lamp bulb, the conductors and the accumulator by rotating the switch spindle, terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulb and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator, and means for normally preventing the switch spindle from being rotated into the position in which the outside terminals are connected with the accumulator.

6. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a lamp bulb mounted in the lamp casing, conductors for conveying current to the lamp bulb from an accumulator outside the lamp casing, a switch spindle rotably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting an electric circuit through the lamp bulb, the conductors and the accumulator by rotating the switch spindle, terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp

bulb and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator, and magnetic locking means, only releasable by a powerful magnet, for normally preventing the switch spindle from being rotated into the position in which the outside terminals are connected with the accumulator.

7. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a lamp bulb mounted in the lamp casing, conductors for conveying current to the lamp bulb from an accumulator outside the lamp casing, a switch spindle rotatably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting an electric circuit through the lamp bulb, the conductors and the accumulator by rotating the switch spindle, terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulb and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator, and magnetic locking means, only releasable by a powerful magnet, for normally preventing the switch spindle from being rotated into the position in which the outside terminals are connected with the accumulator, the said locking means consisting of a pin of magnetizable material, inaccessible from outside the casing, mounted in the switch spindle and slidable in the axial direction thereof, the lamp casing being formed with an arcuate slot in which the pin normally engages.

8. An electric lamp, such as a miner's head lamp, adapted to be energized by an accumulator, comprising a lamp casing, a plurality of lamp bulbs mounted in the casing, conductors for conveying current to the lamp bulbs from an accumulator outside the casing, a switch spindle rotatably mounted in the lamp casing, means such as a handle for rotating the switch spindle from outside the lamp casing, means co-operating with the switch spindle for establishing and interrupting electric circuits through the lamp bulbs, the conductors and the accumulator by rotating the switch spindle, terminals projecting to the outside of the lamp casing and adapted to be coupled to a source of charging current, the conductors, the switch spindle and the means co-operating therewith being adapted to cut off the current from the lamp bulbs and to establish a connection in one position of the switch spindle between the outside terminals and the accumulator, and magnetic locking means, only releasable by a powerful magnet, for normally preventing the switch spindle from being rotated into the position in which the outside terminals are connected with the accumulator, the said locking means consisting of a pin of magnetizable material, inaccessible from outside the casing, mounted in the switch spindle and slidable in the axial direction thereof, the lamp casing being formed with an arcuate slot in which the pin normally engages.

In testimony whereof I have signed my name to this specification.

PAUL WOLF.