E. GOTTSCHALCK.

PORTABLE ELECTRIC LAMP.

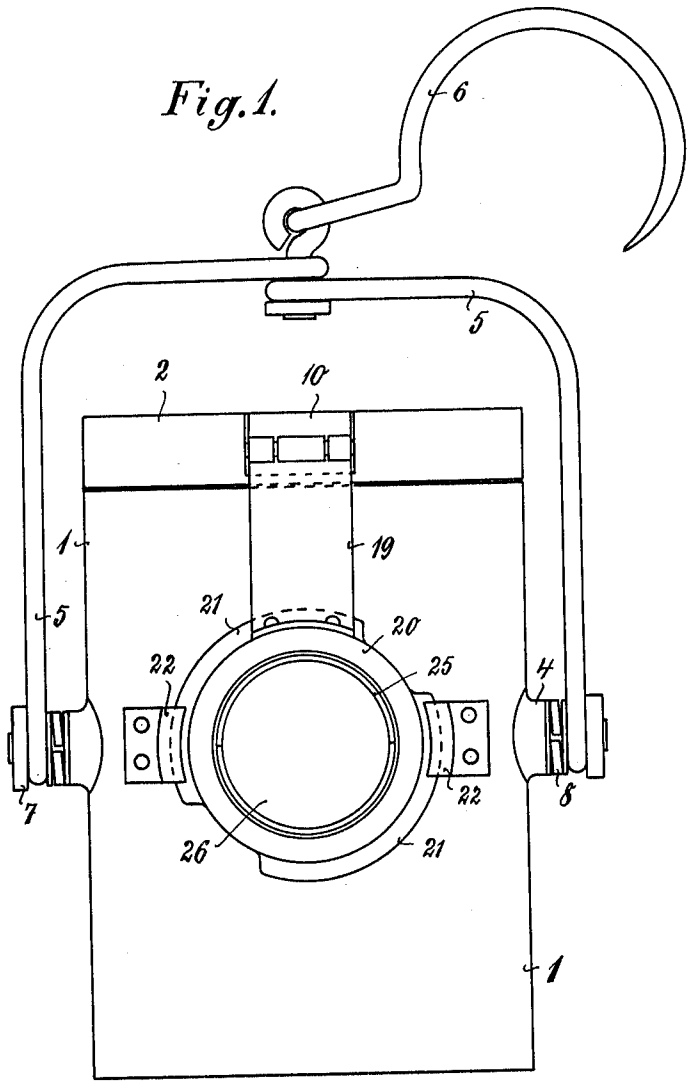
APPLICATION FILED DEC. 30, 1909.

1,022,072.

Patented Apr. 2, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



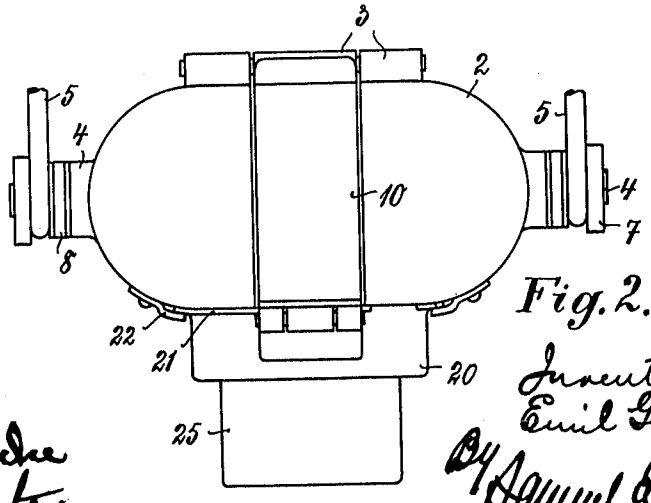


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

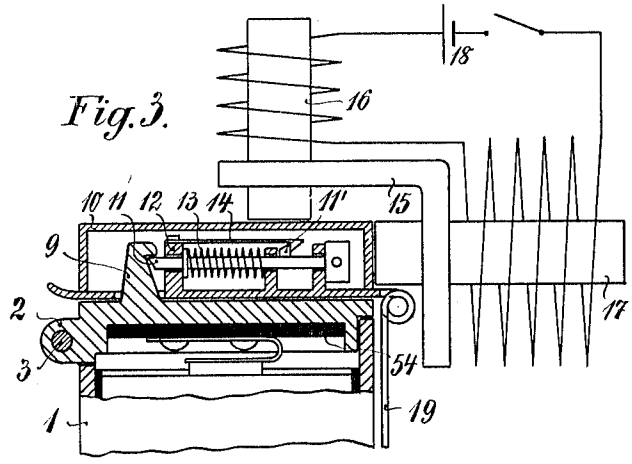


Fig. 4.

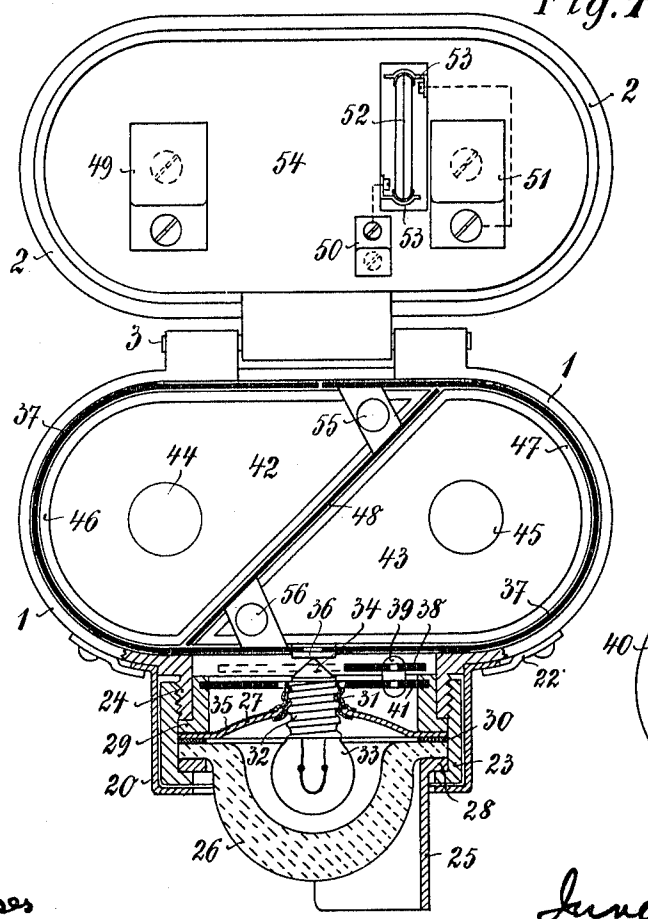
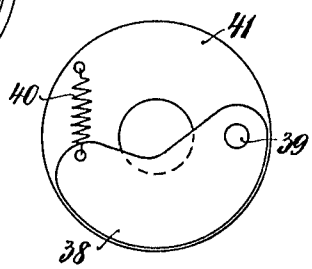


Fig. 5.



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PORTABLE ELECTRIC LAMP.

1,022,072. Specification of Letters Patent. Patented Apr. 2, 1912.

Application filed December 30, 1909. Serial No. 535,588.

To all whom it may concern:

Be it known that I, EMIL GOTTSCHALCK, engineer, a citizen of Germany, residing at Berlin, Germany, have invented new and useful Improvements in Portable Electric Lamps, of which the following is a specification.

This invention relates to improvements in the portable electric lamp according to my prior patent application Serial Number 528,246 of Nov. 15, 1909 which is particularly intended for use in coal mines.

The improvements consist in an increased protection of the glow lamp against ignition of combustible gases, in a magnetic lock of special construction; and in the connections to the circuits.

One form of construction of the new lamp is illustrated in the accompanying drawings. Figures 1 and 2 are respectively a front elevation and a plan; Fig. 3 is a section through the upper part of the lamp casing drawn to a larger scale and illustrates the opening of the magnetic lock; Fig. 4 shows the lamp in plan with its cover opened, partly in section, and also to a larger scale; Fig. 5 is a detail.

The casing 1 and the cover 2 of the lamp consist of light metal, for example aluminium, and are connected by a hinge 3. The casing has two lateral projections 4 to receive the loop 5 in which the usual hook 6 is movably arranged. The ends of the loop 5 are secured by nuts 7. Between the ends of the loop and the casing 1, split washers 8 are mounted on the projections 4, which washers tend to spread out and so hold the loop 5 in any desired angular position relative to the casing.

The cover 2 has a central groove to receive the magnetic lock (Fig. 3) and a hook 9 projects from its base. The magnetic lock itself consists of a flap 10 in which is mounted an iron bolt 11. This is guided in several lugs 12 in the interior of the flap 10 and its free end is pushed under the hook 9 by means of the spring 13, when the cover 2 and the flap 10 thereon have been brought to the locking position.

In order that the bolt 11 may not be disengaged through jolting it does not suffice to make the spring 13 stronger. If this is done the mass of iron in the bolt must be increased in order that it may be capable of being withdrawn against the force of the spring by a magnet. This evil is avoided in the new magnetic lock by securing the bolt against release through jolting by means of a resilient hook 14 which equally can only be released by means of a magnet applied externally. The hook 14 engages behind a projection 11′ on the bolt 11 which obviously can only be withdrawn when the hook 14 has been raised. For this purpose the two magnets 16, 17, mounted in a suitable frame 15 are employed; these may for example be electromagnets inserted in the circuit of the source of current 18. The poles applied to the magnetic lock must be of different polarity if they are to work in the proper manner. Obviously the separate magnets 16, 17 can be united into a single magnet with two relatively inclined poles. If the mine lamp with the new magnetic lock is held in front of the magnets 16, 17, the magnet 16 raises the hook 14 and the magnet 17 draws the bolt 11 from under the hook 9 so that the flap 10 and the cover 2 of the lamp casing can be opened. The flap 10 is linked to a metal strip 19 upon the other end of which is fastened a ring 20. This latter has two projecting flanges 21 which engage beneath lugs 22 on the casing 2 and extends over somewhat more than 90°. The ring 20, and therefore the flap 10, can only be removed from the casing when it is turned so far as to release the flanges 21 from the lugs 22. The sole purpose of the ring 20 which is shown in section in Fig. 4, is to prevent a second ring 23, which is mounted upon a boss 24 on the casing, from becoming unscrewed. The ring 23 secures the screen 25, the lens 26 and the reflector 27 in position. The screen 25 has an annular flange 28 which lies within the ring 23 and is freely revoluble. The screen is semi-cylindrical in form and directs the light so that it falls only upon the working place, and does not dazzle the user. The lens 26 may be of the usual or of any desired special form distributing and strengthening the light. The peripheral edge of the reflector 27 is gripped between a metal ring 29 and a yielding ring 30 of rubber or the like.

The middle hole of the reflector contains a screw casing 31 into which the socket 32 of the glow lamp 33 is screwed. The other terminal 34 of the glow lamp is placed as usual in the middle of the socket 32 and is formed as a cone. The reflector consists of

a very fragile but at the same time insulating material, for example glass or porcelain, and has on its rear surface a strip 35 of conducting matter, for example metal powder burned on it or a metallic deposit obtained by a galvanic process or the like. The strip 35 is conductively connected with the screw casing 31 and extends to the edge of the reflector so that it makes contact with the ring 29 when the reflector is in its proper position. The purpose of the reflector 27 and its strip are already explained in my prior application.

The conical middle terminal 34 of the glow lamp 33 makes contact with a metal button 36 which is mounted upon an insulating layer 37. This layer of which more is said hereafter therefore closes the opening in the front wall of the casing 1 surrounded by the screw flange 24 from the interior. Now a short circuit might be produced through negligence or evil intent if the lens 26 and the reflector 27 were destroyed so that the contact button 36 was left accessible. For example the carrying hook 6, a nail or any other piece of metal might be laid in contact on the one hand with the casing, and on the other hand with the contact button 36, so as to short circuit the source of current. This would not only severely damage the source of current but—what is more important—might produce sparks by which fire damp would be ignited. In order to avoid this evil an insulating plate 38 Figs. 4 and 5, is arranged in the flange 24 and is revoluble about the pin 39, being spring pressed by the spring 40. This latter is joined to a second insulating disk 41 in which also the pin 39 is set. The disk 41 is held against the front wall of the casing 1 by the ring 29 and has a central opening through which protrudes the inner flange of the reflector 27 or the socket 32 of the lamp 33. The form of the insulating plate 38 can be seen from Fig. 5. Normally under the action of the spring 40 it presses laterally against the middle contact 34. If, for example through a shock, the lens 26 and the reflector 27 are broken, the glow lamp 33 falls out, the spring 40 contracts and the insulating plate 38 is brought in front of the contact stud 36, so that this is inaccessible from outside. Since the middle contact 34 of the glow lamp 33 is formed as a cone the latter is forcibly thrown out by the pressure of the spring 40.

The interior of the casing 1 contains two cells 42, 43, for example dry cells or secondary cells. The drawing indicates dry cells (Fig. 4). One terminal is formed by a button 44, 45, which is connected with the carbon electrode, not shown. The other terminal is the metal container 46, 47 itself which serves this same purpose in many dry cells. The containers 46, 47 are separated from the casing 1 by the insulating layers 37 already referred to, which layers may suitably be made of sheet fiber or the like. A similar insulating sheet 48 is inserted between the two containers 46, 47. These are rounded on the outer side while the inner adjacent surfaces are inclined to the middle plane of the lamp. The purpose of this construction is that the one container extends over the part of the front wall of the casing where the glow lamp is arranged. Thus the metal button 36 already referred to can be immediately in contact with the casing 47.

The casing 2 has within it an insulating layer 54 suitably composed of sheet fiber and contains three contact springs 49, 50, 51 of which 49 is electrically connected with the cover itself, while 50, 51 are insulated therefrom but connected together through the resistance 52. This resistance, of which more is said hereinafter, is preferably formed as a cartridge, its holders 53 being insulated from the cover 2. The resistance 52 lies in the hollow space of the cover beside the flap 10 with the magnetic lock 53, and therefore between the insulating layer 54 and the metal cover 2. If the cover is shut down contact is established between 49 and 44, 50 and 55, and 51 and 45. The contact piece 55 bridges over the angle of the metal container 46 and is conductively connected therewith. A similar contact piece 56 is also provided on the metal container 47 which however, engages no other contact when the cover is shut down and is only present so that the two elements 42 and 43 may be completely similar and interchangeable. When the cover is shut down the following circuit is simultaneously closed; the cell container 47, metal button 36, middle contact 34, filament and socket 32 of the glow lamp 33, metal casing 31 and metal strip 35 of the reflector 27, casing 29, flange 24, casing 1, hinge 3, cover 2, contact spring 49, contacts 44 and 55 of the element 42, contact spring 50, resistance 52, contact spring 51 and contact 45 of the element 43. The circuit is therefore only closed when the cover 2 is shut down. Since the cover can not be opened by the user himself but only by means of the magnets illustrated in Fig. 3, the danger of contact breaking sparks in the mine due to opening of the cover is avoided. The two elements 42, 43 can however be connected in other ways, as already explained in my prior application.

The voltage of those sources of current which alone are available for portable electric lamps falls very considerably as is well known with continued discharge, so that the E. M. F. at the terminals of the lamp must be automatically kept constant by some auxiliary means, if the lamp is required to burn evenly for a long time. For this reason the

resistance 52 is made from a so-called conductor of the first class, *i. e.* from a metal wire or filament inclosed in an evacuated space. Such metal resistances are well known in themselves being used for example as regulating resistances in Nernst lamps. The voltage used in such cases is, however, comparatively high while in the present case it does not exceed 4, 4 volts. If the simple metal wire were used as a resistance, *i. e.*, one not inclosed in an evacuated space, the potential at the terminals of the lamp would vary a great deal with the temperature of the surrounding atmosphere. Automatic regulation of the voltage of the lamp is therefore only attained by making the metal wire independent of the temperature of the surroundings by inclosure in an evacuated space. So long as the cells are fresh they give a high E. M. F. which would therefore also produce a strong current but this is diminished by the greater loss of voltage in the resistance.

The dimensions, forms and details of the lamp can be altered without departing from the essence of the invention.

I claim:—

1. In a portable electric lamp, a casing, battery cells contained therein and having a circuit terminal, said casing having an opening through the side thereof for access to said circuit terminal, a removable lamp having a terminal coöperating with the battery circuit terminal through said opening, a closure plate for said opening and means acting on said plate normally tending to move the same into position to close said opening.

2. In a portable electric lamp, a casing, battery cells contained therein and having a circuit terminal, said casing having an opening through the side thereof for said circuit terminal, a removable lamp, a cone shaped terminal therefor, arranged to cooperate with the circuit terminal through said opening to complete the lamp circuit therethrough, and a movable spring pressed insulating cover plate for said opening, normally arranged to close said opening and to be displaced from its normal closing position by engagement therewith of the cone-shaped lamp terminal when the lamp is in position for use.

3. In a portable electric lamp, a casing, battery cells arranged therein, a lamp mounted on the casing and having one terminal thereof in electrical connection with one side of the battery cells, and the other terminal in electrical connection with the casing, a cover for the casing, contacts carried by the cover and arranged, when said cover is closed, to complete circuit connection from the casing to the other side of the battery, a locking bolt for locking the cover closed, a catch for retaining the bolt in locking position, said bolt and latch being of magnetic material and inclosed, whereby by applying magnets to release the latch and withdraw the bolt the cover may be opened and the lamp circuit broken.

4. In a portable electric lamp, a casing having an opening in the middle of its front wall, a cell contained in a metal cup located in the casing, a movable lamp having a terminal in direct contact through said opening with the metal cup of the cell, a closure plate for said opening and means acting on said plate normally tending to move the same into position to close said opening.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMIL GOTTSCHALCK.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.