P. WOLF.

IGNITING DEVICE FOR MINERS' SAFETY LAMPS.

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1,052,783. Patented Feb. 11, 1913.

Fig. 3.

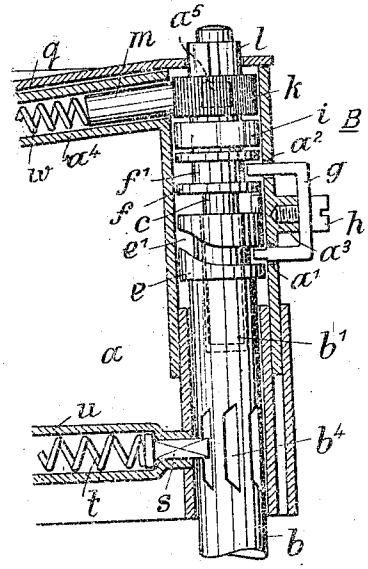


Fig. 4.

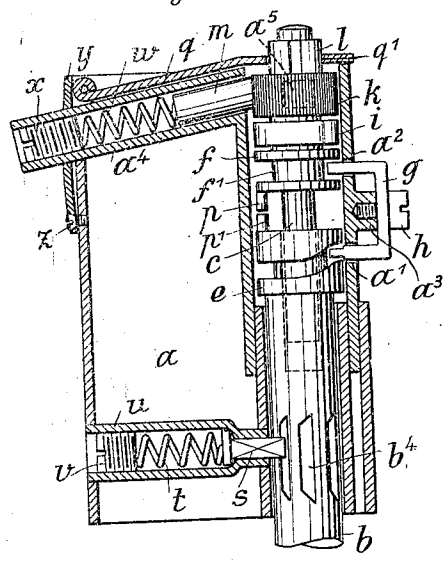


Fig. 1.

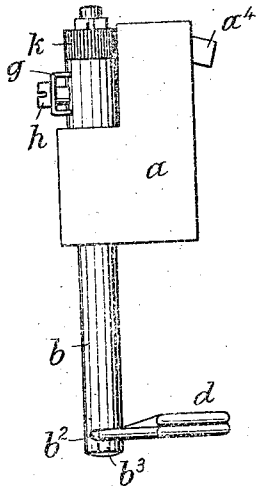


Fig. 5.

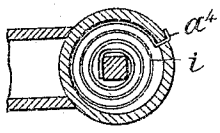
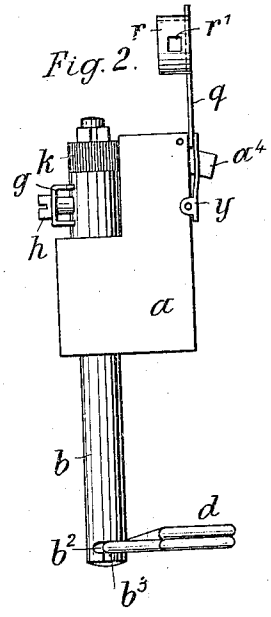


Fig. 2.



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IGNITING DEVICE FOR MINERS' SAFETY-LAMPS.

1,052,783. Specification of Letters Patent. Patented Feb. 11, 1913.

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To all whom it may concern:

Be it known that I, PAUL WOLF, a subject of the King of Saxony, residing at Zwickau, in the Kingdom of Saxony, Empire of Germany, have invented a new and useful Igniting Device for Miners' Safety-Lamps, of which the following is a specification.

The hitherto known devices for igniting miners' safety-lamps by means of sparks produced by striking or rubbing an igniting metal or composition present the great drawback, that by actuating the device particles are detached from the igniting metal or composition, of which particles very many in their unburnt state move about in the interior of the lamp and are apt to come in contact with the hot chimney made from wire gauze whereby they are ignited. As has been proved, explosions of the fulminating damps surrounding the safety-lamp can be thereby produced. For this reason all the known igniting devices of this kind have been in general pronounced to be unsafe.

My invention relates to improvements in such igniting devices, whereby the said drawback is avoided and the device is rendered quite safe and perfectly reliable. The new device is so constructed, that it can be easily withdrawn from the miner's safety-lamp and exchanged for another igniting device, that the several essential parts of the device when worn can be easily exchanged for new ones and that the essential parts are normally hidden by suitable means and thus protected from damages, which is of importance in mines.

In the accompanying drawing: Figure 1 is an elevation of an igniting device embodying my invention, Fig. 2 is a similar view of a modified igniting device, a protecting cover being turned upward, Fig. 3 is a vertical section on an enlarged scale through the greater upper part of a device similar to Fig. 1, when turned through an angle of 180° around the axis of the two coaxial spindles, which are here shown to be coupled together, Fig. 4 is a similar section, in which the lower spindle is disengaged from the upper spindle, and Fig. 5 is a horizontal section through the line A—B in Fig. 3.

Similar letters of reference refer to similar parts throughout the several views.

In a casing a of any suitable construction a lower spindle b is mounted to turn and to longitudinally move. It is made in one with a head e provided in its outer surface with a cam groove e^1, which is for the greater part in a plane at right angles to the axis, as is clearly shown. The spindle b has in its upper part a central bore b^1, in which the upper spindle c loosely engages. This spindle c is made in one with a grooved head f and carries above the head f a spiral spring i (Fig. 5) and a filing wheel k of hardened steel with fine teeth, which wheel is secured by means of a nut l or the like and is in any known manner prevented from turning. Both spindles b and c with the spiral spring i and the filing wheel k can be introduced from above through the casing a, so that the lower spindle b projects downward from the casing, as is shown at Fig. 1. The casing a has a slit a^4 (Fig. 5), in which the outer bent end of the spiral spring i can engage, this slit a^4 extending from the upper edge of the casing downward to a point where the spring i occupies its normal position shown. The casing a is provided with two slots a^1, a^2 and a lug a^3 between them, so that a bow g can be fastened on the lug a^3 by means of a screw h, while its two ends pass through the slots a^1 a^2 and engage in the slot a^1 of the lower head e and in the slot f^1 of the upper head f respectively. It is to be noted, that whereas the upper end of the bow g may be made broad, the lower end requires to be narrow, so as to be able to pass through the cam groove e^1. As the groove f^1 is entirely in a plane at right angles to the common axis of the two spindles b and c, it is evident that the upper spindle c is by the bow g prevented from longitudinal motion and can only turn. The lower spindle b, on the contrary, is by the bow g engaging in the cam groove e^1 of its head e compelled to once reciprocate during any complete revolution. The upper head f is provided with a clutch-pin p and the lower head e with another clutch pin p^1, which latter for the upper position of the lower spindle b shown in Fig. 3 can strike and take the pin p along with it on the spindle b being turned. For the lower position of the lower spindle b shown in Fig. 4, however, the two pins p and p^1 can not engage one another.

A springy handle d, that is a twice looped wire, is made to engage with its two bent

and oppositely pointed ends in corresponding recesses at the lower end of the spindle b and with its side parts adjoining the pointed ends in any of three furrows b^2 b^3 on either side of the spindle. Then it is possible to turn the handle d say from the position shown in Fig. 1 through an angle of 90° into the central plane of the spindle b or through an angle of 180° into the other extreme position on the left. When the handle d is in the central plane of the spindle b, the whole device can be comfortably inserted and carried in one's pocket.

In order to be able to wind up the spiral spring i and to prevent the spindle b from turning in the wrong direction, whereby the spring i might otherwise be damaged, I provide the spindle b on a suitable portion of its length with several longitudinal grooves or tooth spaces b^4, whereby this portion is turned into a ratchet wheel. A pawl s guided in the casing a at right angles to the spindle b is made to engage in any of the said tooth spaces b^4 under the pressure of a helical spring t guided in a suitable tube u forming part of the casing a. An adjusting screw v serves for regulating the pressure of the spring t.

An igniter m adapted to work with the filing wheel k is guided in a tube a^4 forming part of the casing a and consists of a bolt made from some known igniting metal or composition. The igniter m is pressed against the fine teeth of the filing wheel k by means of a helical spring w, the pressure of which can be regulated by means of a screw x so as to compensate for any wear of the igniter m. In Figs. 3 and 4 the casing a is at the top shown to be provided with a turnable cover q for protecting the filing wheel k from damage. A leaf spring y fastened on the casing a by means of a screw z serves for holding the cover q either in its closed state shown or in its open state. This spring y is provided with a hole through which the tube a^4 passes, so that the spring can freely exert its pressure. The cover q is provided with a hole q^1 through which the nut l can pass. The casing a may in this case be provided with a square aperture a^5 in front of the filing wheel k near the place where the igniter m comes in contact with the wheel k.

Where so preferred, the casing a may be cut out at the upper corner, so as to expose the filing wheel k (see Fig. 2), and the turnable cover q may be provided with a cap r for encircling the wheel k and the cap r may have an aperture r^1. Or the cover q with the cap r may be omitted altogether as is shown at Fig. 1.

The igniting device described operates as follows: Normally the lower spindle b occupies its upper position shown at Fig. 3 and the casing a of the device is inserted in a known manner in the miner's safety-lamp, so that the aperture a^5 or r^1 is near and opposite to the wick. Then the handle d is turned into a position at right angles to the spindle b, say as is shown at Fig. 1, after which it is turned in the direction of the hands of a watch, so that its pin p^1 engaging the pin p takes the same along with it and by the upper spindle c winds up the spiral spring i. When the lower end of the bow g engages in the curved portion of the cam groove e^1 and thereby shifts the spindle b outward (that is downward in the drawing), the pin p^1 of the lower head e will come out of engagement with the pin p of the upper head f, whereby the filing wheel k is released, so that under the action of the spiral spring i it will rapidly return to its initial position while rubbing off fine particles from the igniter m and producing numerous sparks which form together a single compact flame that passes through the aperture a^5 or r^1, strikes the wick of the lamp and ignites the benzin in the wick with an absolute certainty.

After the above explanations it is obvious, that after taking off the springy handle d from the lower spindle b, unscrewing the screw h and withdrawing the bow g from the casing a, unscrewing the two screws v, x and withdrawing the parts t, s, w, m and turning upward the cover q it is easy to push the lower spindle b upward for withdrawing the outwardly bent end of the spiral spring i from the slit a^4 in the casing a and finally both spindles b, c with all parts on them from the casing a.

It is possible to produce with this igniting device any number of consecutive igniting flames by merely turning around the handle d as many times as is required. It is a decided advantage of the new device, that the filing wheel k during its rapid return scrapes off the igniter m only slight chips, which are certain to completely burn in the compact flame produced. The igniter m is used very economically.

The igniting device can be varied in many respects without departing from the spirit of my invention.

I claim:

1. In an igniting device of the class described, the combination with a casing, of a spindle turnable in said casing and prevented from longitudinal motion, a filing wheel on said spindle, a spring-pressed igniter guided in said casing adapted to bear against said filing wheel, a driving spindle coaxial with said spindle turnable and longitudinally movable in said casing, a clutch one member of which is connected with said spindle and the other member with said driving spindle, means for holding the two members of said clutch in engagement during a part of any revolution and for detach-

ing them during the other part of the revolution, and a spring connecting said spindle with said casing and adapted to be wound up by turning said driving spindle in one direction and to recoil on said clutch being disengaged.

2. In an igniting device of the class described, the combination with a casing, of two spindles coaxially turnable in said casing and one having a groove and the other a cam groove, two lugs in said casing engaging in the grooves of said two spindles, whereby one of the spindles is prevented from longitudinal motion and the other is once reciprocated on every revolution, a filing wheel on the spindle prevented from longitudinal motion, a spring-pressed igniter guided in said casing adapted to bear against said filing wheel, two clutch-pins on said two spindles adapted to engage one another during a part of any revolution and to disengage from one another during the other part of the revolution, and a spring connecting the spindle carrying said filing wheel with said casing and adapted to be wound up by turning the longitudinally movable spindle in one direction and to recoil on said two clutch-pins being disengaged.

3. In an igniting device of the class described, the combination with a casing, of two spindles coaxially turnable in said casing and one having a groove and the other a cam groove, a detachable bow fastened on said casing and adapted to engage with its two ends through slots in said casing in the grooves of said two spindles, whereby one of the spindles is prevented from longitudinal motion and the other is once reciprocated on every revolution, a filing wheel on the spindle prevented from longitudinal motion, a spring-pressed igniter guided in said casing adapted to bear against said filing wheel, two clutch-pins on said two spindles adapted to engage one another during a part of any revolution and to disengage from one another during the other part of the revolution, and a spring connecting the spindle carrying said filing wheel with said casing and adapted to be wound up by turning the longitudinally movable spindle in one direction and to recoil on said two clutch-pins being disengaged.

4. In an igniting device of the class described, the combination with a casing, of a spindle turnable in said casing, a filing wheel on said spindle, a spring-pressed igniter guided in said casing adapted to bear against said filing wheel, and a spring-pressed cover turnable on said casing and provided with a cap adapted to encircle said filing wheel while leaving an aperture for the flame to be produced.

5. In an igniting device of the class described, the combination with a casing, of two spindles coaxially turnable in said casing and one having a groove and the other a cam groove, two lugs in said casing engaging in the grooves of said two spindles, whereby one of the spindles is prevented from longitudinal motion and the other is once reciprocated on every revolution, a filing wheel on the spindle prevented from longitudinal motion, a spring-pressed igniter guided in said casing adapted to bear against said filing wheel, two clutch-pins on said two spindles adapted to engage one another during a part of any revolution and to disengage from one another during the other part of the revolution, a spring connecting the spindle carrying said filing wheel with said casing and adapted to be wound up by turning the longitudinally movable spindle in one direction and to recoil on said two clutch pins being disengaged, and means for preventing the longitudinally movable spindle from turning in the opposite direction.

6. In an igniting device of the class described, the combination with a casing, of two spindles coaxially turnable in said casing and one having a groove and the other a cam groove, two lugs in said casings engaging in the grooves of said two spindles, whereby one of the spindles is prevented from longitudinal motion and the other is once reciprocated on every revolution, a filing wheel on the spindle prevented from longitudinal motion, a spring-pressed igniter guided in said casing adapted to bear against said filing wheel, two clutch-pins on said two spindles adapted to engage one another during a part of any revolution and to disengage from one another during the other part of the revolution, a spring connecting the spindle carrying said filing wheel with said casing and adapted to be wound up by turning the longitudinally movable spindle in one direction and to recoil on said two clutch-pins being disengaged, the reciprocating spindle having for a part of its length longitudinal grooves so as to form a ratchet wheel, and a spring-pressed pawl guided in said casing adapted to engage any of the longitudinal grooves of the reciprocating spindle for preventing this spindle from turning in the opposite direction.

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