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PATENT SPECIFICATION

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COMPLETE SPECIFICATION.



Pyrophoric Lighter.

We, DR. H. KELLERMANN G.M.B.H., a Company organised under the Laws of the Republic of Germany, of 6-8, Rusche-strasse, Lichtenberg, Berlin, Germany, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a pyrophoric lighter of the kind, in which the wheel file and the carrier of the wick-cap or the extinguisher are placed upon a common axis of rotation, both parts being so coupled with each other, that upon rotation of the carrier of the wick-cap during the opening movement the wheel file is rotated with it whereby the sparking particles are scraped from the pyrophoric mass pressed against the wheel file, and fly onto the end of the wick disposed beside said wheel file.

According to the present invention the extinguisher carrier is pivotally connected to a pressure lever, or to a pivoted arm, by means of a link or bridge-like part which is joined with the extinguisher carrier at a point, which, when the lighter is closed, is situated between two vertical transverse parallel planes passing through the axis of rotation of the carrier and the wick-tube, said link or bridge-like part being under the influence of a spring. Upon opening the carrier by the aid of the finger, the spring, after a dead point position has been overcome, suddenly throws back the extinguisher into the open position quite independent of the speed and intensity of the finger-pressure, thereby causing the wheel file to rapidly revolve. The dead point position previously referred to is caused at the point where the point of junction between the bridge-like part and the extinguisher crosses the transverse vertical plane passing through the axis of rotation of the said extinguisher carrier. The pressure spring here is arranged to act upon the extinguisher in a twofold way and direction, inasmuch, as it presses this cap into the closing position as long as the lighter is not in use, but rapidly forces it into the open posi-

tion, as soon as the opening movement has been introduced by hand and proceeded to a certain position. The intermediate position of the extinguisher which is passed under the action of the finger-pressure represents the dead point position in connection herewith.

The lighter may also be constructed, if desired, in such a manner that after the opening of it and the production of sparks has been effected, it will be automatically closed through the action of a second spring provided for that purpose, upon releasing the hold upon the pressure lever.

In the accompanying drawing constructional forms of the invention are represented by way of example.

Fig. 1 is a side view of an example of one embodiment of the lighter in the closed position,

Fig. 2 a view of the same lighter in the open position, part of the front-wall of the casing being broken away,

Fig. 3 represents a modified construction in side view in the closed position with part of the casing wall broken away.

Fig. 4 is a side view of a third, modified example of construction, showing the lighter in the closed position, partly in section,

Fig. 5 a side view of the same lighter in the open position, partly in section,

Figs. 6 and 7 show details of the construction in accordance with Figs. 4 and 5, in side elevation.

In the example of construction shown in Figs. 1 and 2, 1 is the casing of the lighter, 2 the end of the wick-tube, 4 the carrier of the wick-cap or the extinguisher and 3 the wick-cap or extinguisher proper. The axle of rotation 5 of the extinguisher carrier 4 is arranged in a support 7. This axle 5 may be made to consist of a screw or double screw capable of being easily removed. The axle 5 also carries the wheel file 6, against which the pyrophoric pin is pressed from below in the usual manner and which may be coupled in any desired known manner with the wick-cap carrier 4. For the sake of clearness this coupling has not been shown in the drawing. The coup-

{Price 1/-}

ling may, for instance, consist of a tooth or a toothed disk attached to the extinguisher carrier in the interior thereof, the teeth of said disk being directed inwardly. The toothed disk is made to engage in a corresponding lateral indentation of the wheel file 6 upon the carrier 4 being opened, so that the wheel file then is rotated, whilst it remains in a position of rest during the closing movement of the extinguisher, because in that case the tooth, or the teeth fixed to the carrier, resiliently glide over the lateral indentation of the wheel file.

At 9 an arcuate arm or bridge 8, extending rearwardly, is articulated to the extinguisher carrier 4. This arm or bridge 8 carries at its rearward end a cylindrical sleeve 13 which is attached thereto by means of a hinge at 14, the cylindrical sleeve 13 containing a pressure spring 15. The lower end of this pressure spring 15 rests upon a transverse pin 16, which penetrates into the open lower end of the sleeve 13 through a guide slot 17.

The transverse pin 16 is arranged within a cap-shaped double armed pressure lever 11, pivoted on a transverse pin 18 passing through the casing 1 of the lighter. This transverse pin 18 is embraced by the pressure lever 11 by means of a hook 19 in such a manner, that the lever may easily be released. The arcuate arm or bridge 8 is pivotally connected at 10, midway between its two ends, with the pressure lever 11. The pivot point 9 of this arm 8 on the wick-cap carrier 4 is so disposed, that the pivot point 9 itself, when the lighter is in the closed position (Fig. 1) will be at a place situated between the vertical transverse plane passing through the axle of rotation 5 and the parallel vertical plane passing through the axis of the wick-tube 2, whilst, when opening the lighter, this pivot point 9 travels through said first named vertical plane in a rearward direction, as may be gathered from Fig. 2.

The operation of this lighter is as follows:—

If the parts are in the closing position as seen from Fig. 1, the spring 13, resting upon the transverse pin 16, presses the rear end of the arcuate arm or bridge 8 upwards, correspondingly pressing the carrier 4 of the wick-cap downwards, i.e., against the wick-tube 2. If now pressure by a finger is exercised upon the rearward extension 12 of the pressure-lever 11, so that it begins to revolve round the axis 18 in a rearward direction the extinguisher carrier 4 will in the first instance be taken along against the action of the spring 13 by means of the bent arm or bridge 8 forming the connecting link, until the pivot 9 has crossed the vertical plane passing through the axis of rotation 5 and perpendicular to the plane of the drawing sheet. Hereafter owing to the changed position of the sleeve 13 and the spring 15 disposed within it, the spring no longer exercises a pressure in an upward direction, but in a rearward direction, and has for this reason, the tendency to open the carrier 4, in extending itself. This opening movement of the part 4 under the influence of the extending spring 15 and with it, and effected by it, the further rotation of the wheel file 6 takes place suddenly, after overcoming the dead point position for the pivot 9, quite independently of the speed of the movement of the finger or the intensity of the pressure of the finger, so that the wheel file 6 revolves with corresponding speed, thus producing sparks of considerable intensity by its contact with the pyrophoric mass. The closing of the lighter is effected in this example by turning the extinguisher carrier 4 by hand causing the parts 8 and 11 connected with the carrier 4 to be taken along and returned into the closing position (Fig. 1).

The form of construction shown in Fig. 3 is distinguished from that just described essentially only in that, for the purpose of simplifying the manufacture of the lighter, the pressure lever 11 has been omitted. In this case the opening of the lighter is effected by pressing the finger from below against a shoulder or handle 20 arranged on the extinguisher carrier 4, so that the carrier 4 is caused to turn round the axis 5. For the purpose of preventing the bent arm or bridge 8 in the said rotary motion being moved upwards instead of backwards, it is provided at 22 with a movable arm 21, the lower end 24 of which forms a hook embracing a transverse pin 23 passing through the casing 1 of the lighter. This transverse pin 23 replaces the transverse pin 16 provided in the pressure-lever 11 of the first described form of construction and thus also forms the abutment for the compression spring placed within the slotted sleeve 13. The operation for this construction essentially resembles that of the lighter shown in Figs. 1 and 2.

In the form of construction shown in Figs. 4 to 7, the disposition and construction of the extinguisher carrier or wick-cap carrier and of the wheel file is again the same as in the cases previously described. The pressure-lever 11, too, is essentially of the same construction and disposition as in the form shown in Figs.

1 and 2. An arm or bridge 25 extending in a rearward direction is pivoted to the extinguisher carrier 4 at a point 26, which is situated between the vertical transverse
 5 planes passing through the axis of rotation 5 and the wick-tube 2. The arm 25 here is provided at its rearward end with an oblong slit or a notch 27, in which a transverse pin 28, passing through the
 10 pressure lever 11, can be made to slide to and fro.

At 26, moreover, the upper end of a U-shaped arm 29 is pivotally attached, whose lower end is pivotally connected at
 15 30 with one part 31 of a cylindrical sleeve divided in longitudinal direction. This semi-cylindrical part 31 is connected with arm 29 by means of the rectangularly bent part 32. At the junction of the
 20 semi-cylindrical part 31 and the part 32 a shoulder or abutment 40 is formed. The lower end of the semi-cylindrical part 31 is formed by a cross piece or flange 37. The second half part 33 of the cylindrical
 25 sleeve is hinged to the pressure lever 11 at 34. At the upper end of the second semi-cylindrical part 33 also a shoulder or abutment 41 is arranged at a corresponding height to the shoulder 40 of
 30 part 31 (see Fig. 6). A compression spring 35 is secured within the semi-cylindrical part 33 at 36. The lower end of this spring engages with the cross piece 37 of part 31 when the two semi-cylindrical parts 31 and 33 are assembled (see
 35 Fig. 4), and therefore tends to press part 31 downwardly. Thus both parts 31 and 33 together form a sleeve or housing for spring 35, said divided sleeve replacing the sleeve 13 of the constructions described above.
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The divided spring sleeve 31, 33 is surrounded by a stronger helical spring 38, which rests in a well part 39 of the casing
 45 1. The lower end of the spring 38 presses against the bottom of the well part 39, whereas its upper end presses against the shoulders or abutments 40, 41 of the parts 31, 33.

The operation in the opening of the lighter corresponds exactly to that described above with respect to Figs. 1 and 2, in that spring 35 suddenly throws the extinguisher-carrier 4 in a rearward
 50 direction and thereby rapidly revolves the wheel file 6 after pivot point 26 has crossed the dead point position, i.e., the transverse vertical plane passing through the axis 5, as spring 35 presses the cross piece 37 of part 31 downwardly and this
 55 part is hinged at 26 to the extinguisher carrier 4 by means of the curved arm 29. The stronger spring 38 is further compressed during this action by the pressure
 60 of the finger on the rearward lug or

shoulder 12 acting by means of the shoulder 41 of part 33 connected therewith at 34, so that spring 38 will not come into action during the opening movement of
 70 the lighter. When, however, the pressure lever 11 is released, the closing of the lighter is performed automatically under the action of the spring 38 which has been previously compressed and which is
 75 stronger than spring 35, all parts thus returning from the position shown in Fig. 5 to that shown in Fig. 4.

It will be seen in this example, the arms 25 and 29 which form the bridge-like part are arranged side by side on the same
 80 pivot 26 on the extinguisher carrier. If desired one of them could be of trough section so that they could nest partly one within the other.

In all the constructional examples shown, the mechanical parts of the lighter, i.e., the extinguisher carrier together with the wheel file, the bent arm or bridge, the spring-sleeve and the
 85 spring and also, if desired, the pressure-lever, are arranged in such a manner that they may easily be removed and substituted, because, on the one hand, the axle 5 may be easily removed and, on the other hand, the pressure-lever 11 and the
 90 arm 21 (Fig. 3) are merely hooked to their axle.

Various modifications of the devices shown and described may be made within the scope of the invention.
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Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we
 105 claim is:—

1. A pyrophoric lighter of the kind described characterised in that the extinguisher carrier is hingedly connected to a pressure lever, or to a pivoted arm, by means of a link or bridge-like part,
 110 engaging the extinguisher carrier at a point which, when the lighter is closed, is situated between two vertical transverse parallel planes, one of which passes through the pivot axle of the carrier and the other through the wick tube, the said
 115 link or bridge being under the action of a spring which, upon opening the extinguisher by hand, suddenly throws back the extinguisher into the open position after the dead point position has been overcome, thereby rapidly revolving the wheel file independently of the speed and intensity of the pressure of the finger.
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2. A lighter in accordance with Claim 1, characterised in that the spring engages an extension of the link or bridge-like part beyond the connection of the latter to the lever or arm in such an angular position that the extinguisher is 130

thereby forced normally into the closing position.

3. A lighter in accordance with claim 1, characterised in that the pivot point for the pressure-lever, which is hinged to the bridge-like part, is situated below the cover-plate of the casing of the lighter.

4. A lighter in accordance with Claim 1, characterised in that the spring is arranged in a sleeve which is open at the lower end, the upper end of the sleeve being hingedly connected to the bridge-like part, whilst the lower end engages an abutment for the spring.

5. A lighter in accordance with claims 1 and 4, characterised in that a transverse pin provided on the lower part of the pressure-lever or on the casing of the lighter serves as the abutment for the spring, and that the lower end of the sleeve which encloses the spring is slotted for allowing the passage of the transverse pin.

6. A lighter in accordance with claim 1, characterised in that upon a rearwardly directed arcuate extension of the bridge-like part, a second, stronger spring is made to act in such a manner, that it tends always to force the extinguisher carrier into the closing position as long as the lighter is not operated, whilst it is thrown out of action by the finger pressure exerted upon the pressure lever during the operation of the lighter.

7. A lighter in accordance with Claims 1 and 6, characterised in that the weaker spring, effecting the rapid opening of the extinguisher carrier and the revolving of the wheel file is disposed in a divided sleeve, one part of which is hingedly connected to the pressure lever, whilst the other part is hingedly connected by the bridge-like part to the extinguisher carrier.

8. A lighter in accordance with claims 1, 6 and 7, characterised in that the closing stronger spring embraces the divided sleeve which houses the weaker opening spring, and presses from below against a stop on one of the parts of the divided sleeve, which thereby tends to press the extinguisher carrier into the closing position.

9. A lighter in accordance with Claims 1 and 6, characterised in that the bridge-like part consists of two arms, arranged side by side or one partly within the other, both arms engaging the extinguisher carrier at the same point, and one of them being provided with a connection to the divided sleeve, whilst the rearward end of the other arm engages the pressure lever.

Dated this 30th day of August, 1930.

For the Applicants,
BARKER, BRETTELL & DUNCAN.

[This Drawing is a reproduction of the Original on a reduced scale.]

