

PATENT SPECIFICATION



Application Date : Feb. 12, 1926. No. 4085/26.

255,748

Complete Accepted : July 29, 1926.

COMPLETE SPECIFICATION.

Improvements in Ferro-cerium Lighters.

We, RAOUL MAGE, Engineer, residing at 198, rue Championnet, Paris, Seine, France, a citizen of the Republic of France, and EDMOND BLEUZE, Engineer, residing at 8, rue Lagille, Paris, Seine, France, a citizen of the Republic of France, 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 ferro-cerium lighters and is more especially concerned with certain improvements, the aim of which is to improve their operation and to render them more easily handled.

Lighters using ferro-cerium, whether in combination with petrol or a wick of amadou or tinder, usually comprise a tube containing the ferro-cerium and a disc or wheel against which the ferro-cerium is forced by a spring. Usually the wheel acts by friction upon the ferro-cerium by means of its periphery which, with this end in view, is provided with teeth or grooves, the wheel being actuated by pressure of the finger upon this edge, but the contact of the finger with the toothed portion of the wheel renders this latter greasy or damp, which prevents the proper formation of the spark. Furthermore owing to its friction against the ferro-cerium, the wheel becomes clogged and blackened so that the finger is soiled on contact therewith. In order to obviate this drawback it has been proposed to cause the wheel to act upon the ferro-cerium, not by its peripheral edge but by means of one of its faces, the peripheral edge however being provided with a fluted or milled portion which offers a larger engaging surface for the finger when it is desired to rotate the wheel. But this device is subject to the drawback that it is difficult for the sparks produced to move sufficiently away

from the wheel in order to reach the wick to be ignited, the result of which is frequent misfires. These misfires are also due to the fact that in the case of the lighters in which the wheel acts by one of its faces, the direction followed by the sparks coincides substantially with a tangent passing through the point of application of the ferro-cerium upon the circle of friction of this latter on the face of the wheel, and up to the present the axis of the wick to be lighted has generally been arranged in the same plane as the axis of the wheel and of the ferro-cerium, so that, only the sparks which form the boundaries of the stream are capable of reaching the wick, which reduces to a considerable extent the likelihood of ignition.

In one known apparatus, however, having a concave conical wheel the wick is arranged substantially on the tangent as defined above, but the wick is positioned directly underneath the face of the wheel, that is to say, at a distance from the axis of the wheel which is less than the radius of said wheel. The active face of the wheel is thus inevitably soiled by the soot from the flame and, moreover, access to the flame is difficult.

The improvements forming the subject of the present invention remedy these various drawbacks and they are furthermore intended to facilitate the assembling and the manipulation of this kind of lighters.

According to the invention, the working face of the wheel is of conical convex shape, and the end of the wick is located at a point substantially along a tangent to a circle concentric with the wheel, both tangent and circle passing through the point where the ferro-cerium makes contact with the said wheel.

It should be remarked that conical

convex wheels have already been used in connection with pyrophoric igniters or gas lighters producing sparks capable of igniting gas or other suitable media into which such sparks are projected; we therefore make no claim to the convex conical wheel per se.

According to another feature of the present invention, a portion of the working face of the wheel is provided with teeth the edges of which lie on tangents to a circle which is concentric with the wheel and the radius of which is approximately one tenth of that of the wheel.

The invention furthermore consists in arranging the wheel, the ferro-cerium, and the wick in such relative positions that their respective axes are parallel and constitute the edges of a triangular prism, the distance between the axis of the wick and the axis of the wheel being greater than the radius of said wheel. Preferably the distance which separates the axis of the wheel from the axis of the ferro-cerium is approximately half that which separates it from the axis of the wick, and the angles formed by the planes passing through these axes two by two are respectively 95° at the ferro-cerium and 30° at the wick.

According to a special form of execution of the invention a portion of the working face is formed with teeth having oblique symmetric faces and extending radially to the axis of the wheel.

According to another form of execution of the invention, two ferro-cerium tubes are used, mounted parallel to each other in the lighter, so that the points of contact of the ferro-cerium stones upon the working face of the wheel, are situated symmetrically relative to the plane containing the axis of the wheel and the axis of the wick, the wheel being constituted in this case either by an emery wheel, or a roughened plate of steel.

It has already been proposed in an igniting device for lighting gas or other combustible media, to arrange two ferro-cerium tubes diametrically one on each side of the axis of the conical wheel and we make no claim to this arrangement per se.

According to another method of execution of the invention, the working face of the wheel comprises two concentric portions having sets of teeth of opposite inclination and two tubes for the ferro-cerium which are mounted parallel to each other in the reservoir of the lighter. The points where their ferro-cerium stones bear against the working face of the wheel are situated

on either side of the plane containing the axis of this wheel and the axis of the wick and upon one or the other of the toothed portions respectively.

Various forms of execution of the invention are shown, but merely by way of example, in the accompanying drawing.

In this drawing, Fig. 1 shows a vertical section of a lighter constructed according to the present invention.

Fig. 2 is a corresponding plan view.

Fig. 3 shows a section to a larger scale of the wheel and the tube containing the ferro-cerium.

Fig. 4 is a partial view to a still larger scale of the lower working face of the wheel.

Fig. 5 shows a modification of the toothed portion of the wheel.

Fig. 6 shows a further modification.

Fig. 7 is a plan view of a portion of the lighter showing the relative positions of the wheel, the tube containing the ferro-cerium and the tube containing the wick.

The lighter according to the present invention comprises, in the usual way, a reservoir 1 which carries at its upper end a wheel 8, a tube 4 containing the ferro-cerium and a tube 16 containing the wick 2, which latter may be of cotton if the lighter is intended to use petrol, otherwise the wick should be made of amadou or of tinder. The tube 4 containing the ferro-cerium passes through the entire height of the reservoir 1 and at its lower portion is closed by a screw 7, its upper portion projecting sufficiently from the lighter to enable the piece of ferro-cerium 5 to be held constantly in contact with the wheel 8 by means of the spring 6. The wheel 8 is mounted upon a boss 15 of the lighter by means of a screw 9 which allows it to turn freely under the action of the finger. The tube 16 containing the wick 2 projects from a boss 17 on the lighter, this boss serving as a support for a hood 11 which is designed so as to cover up the free end of the wick 2 in order to protect it. The hood 11 is carried by an arm 12 pivoted at 18 and having at its pivot, two flats 19 and 20 upon which a spring plunger 13, mounted in a tube 14 can act, according as the arm 12 is in the inoperative position (raised) as shown in full lines in Fig. 1, or in its working position (swung down) shown in dotted lines in the same figure.

A screwed plug 3 is provided for the purpose of refilling the reservoir 1.

In order to obtain the maximum number of utilisable sparks with a ferro-cerium lighter of the class just described,

70

75

80

85

90

95

100

105

110

115

120

125

130

it is necessary to arrange the various parts of the lighter (wheel, ferro-cerium, wick) in such a manner that each of them gives the maximum efficiency. For example, it is indispensable that the working face of the wheel shall be formed, as has already been stated, so as to allow the sparks to issue freely, and that the wick shall be located, relative to the point of the wheel where the spark is produced, substantially in the direction followed by the axis of the stream of sparks.

Arrangements which render it possible to obtain these results have been provided in the lighter which has just been described and these arrangements form a portion of the present invention.

The working face of the wheel is given a slightly conical convex form, the result of which is to enable the upper sparks of the stream produced to issue freely. This form of wheel has already been used in gas lighters having no wick, and, therefore, not for the same purpose. It has been found in practice that the angle at the top of the cone formed by the working face of the wheel should be about 160° in order to enable the entire stream of sparks to be released. An arrangement of this kind is shown in Fig. 3 which shows the inclination given to the toothed portion 10 of the wheel 8.

Furthermore, in order to be able to obtain the highest possible efficiency of the action of the teeth of the wheel upon the ferro-cerium, the teeth should only act obliquely upon this latter during the rotation of the wheel in one direction and in these circumstances it appears advantageous to cut these teeth not radially to the axis of the wheel but obliquely to a radius as can be seen at 31, Fig. 4. This obliquity may furthermore be relatively slight and it will be sufficient in the majority of cases for the edges of the teeth to be on tangents to a circle which is concentric to the wheel and whose radius is about one-tenth of that of the wheel.

It is known that the direction of rotation of the wheel is not without effect upon the production of sparks. In order to avoid any hesitation in the manipulation of the lighter, it is preferable to be able to turn the wheel in one direction or the other without fear of misfires. According to the invention this aim is attained by the arrangement, in the lighter, of two ferro-cerium tubes 21 and 22 (Fig. 5) placed parallel to each other on either side of the plane passing through the axes of the wheel and of the wick. In order to ensure that the wheel bites upon both ferro-cerium stones

whatever may be its direction of rotation, this wheel could be constituted by an emery wheel or a steel plate having asperities, or again the toothed portion could be given a special form such as shown in Fig. 5. In this example the two faces of the tooth are symmetrical and of the same inclination and the teeth are cut radially relative to the axis of the wheel as shown at 32.

It would also be possible, as shown in Fig. 6, with the same end in view, to form two toothed portions 23 and 24 upon the working face of the wheel, these toothed portions being arranged concentrically and their teeth being made inversely oblique relative to radii of the wheel and directed respectively in opposite directions. By means of this double toothed portion, when the wheel is caused to turn in the direction of the arrow 25, only the toothed portion 23 will act upon the ferro-cerium 21, the other ferro-cerium 22 not producing any sparks, while the reverse is the case when the wheel is turned in the direction of the arrow 26.

It has also been found out by experience that the relative position of the axis of rotation of the wheel and the axes of the tubes containing the ferro-cerium and the wick, are not without effect upon the obtainment of a maximum of sparks in a lighter of this kind. In order to obtain the maximum useful effect of the stream of sparks, the wheel, the wick, and the ferro-cerium are arranged upon the lighter, according to this invention, in such a manner that their axes are parallel and constitute the edges of a triangular prism the distance between the axis of the wick and the axis of the wheel being greater than the radius of said wheel as can be seen in Fig. 7. In this fig. the axis of the wheel 8 is located at 27 while the axes of the ferro-cerium stone 5 and the wick 2 are respectively at 28 and 29.

It will be understood that if the wheel 8 rotates in the direction of the arrow 30, the stream of sparks produced at 28 will tend to move away along a tangent to the circle passing through this point and having its center at 27, that is to say, substantially along the straight line 28—29. Experience has shown that the best results are obtained when, on the one hand, the distance from the axis 28 of the ferro-cerium to the axis 27 of the wheel is approximately half that which separates this axis 27 from the axis 29 of the wick, and when on the other hand, the angles formed by the straight lines cutting these axes are respectively 55° at 27, 95° at 28 and 30° at 29.

70

75

80

85

90

95

100

105

110

115

120

125

130

Various modifications in detail could be made in the arrangements which have just been described, for example the peripheral edge of the wheel could be made to extend slightly beyond the body of the lighter so as to enable this latter to be rotated by friction against any hard body such as the sole of a boot, a wooden panel, and the like (see Fig. 7). When the invention is applied to a lighter having a tinder or like wick, such wick takes the place of the wick 2.

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 claim is:—

1. A ferro-cerium lighter of the kind comprising a wheel acting by one of its side faces upon ferro-cerium, and a wick impregnated with liquid fuel or made of tinder or the like characterised by the fact that the working face of the wheel is, in a manner known per se, of a conical convex shape, and that the end of the wick is located at a point substantially along a tangent to a circle concentric with the wheel, both tangent and circle passing through the point where the ferro-cerium makes contact with the said wheel.

2. A lighter according to Claim 1 characterised by the fact that a portion of the working face of the wheel is provided with teeth, the edges of which lie on tangents to a circle, which is concentric with the wheel and the radius of which is approximately one-tenth of that of the wheel.

3. Lighter according to Claim 1, characterised by the fact that the wheel, the ferro-cerium and the wick occupy relative positions such that their respective axes are parallel and constitute the edges of a triangular prism, the distance between the axis of the wick and the axis of the wheel being greater than the radius of said wheel.

4. Lighter according to Claim 3, char-

acterised by the fact that the distance which separates the axis of the wheel from the axis of the ferro-cerium is approximately half that which separates it from the axis of the wick, and that the angles formed by the planes passing through these axes two by two are respectively 95° at the ferro-cerium and 30° at the wick.

5. Lighter according to Claim 1, characterised by the fact that a portion of the working face is formed of teeth having oblique symmetric faces and extending radially to the axis of the wheel.

6. Lighter according to Claim 1, and comprising, in a manner known "per se" two ferro-cerium tubes arranged on either side of the axis of a convex conical wheel, said lighter being characterised by the fact that the points of contact of the ferro-cerium stones upon the working face of the wheel, are situated symmetrically relative to the plane containing the axis of the wheel and the axis of the wick, the wheel being constituted in this case either by an emery wheel, or a roughened plate of steel.

7. Lighter according to Claim 1, characterised by the fact that the working face of the wheel comprises two concentric toothed portions having the teeth inclined in opposite directions, and two ferro-cerium tubes which are mounted parallel to each other in the reservoir of the lighter and in such a manner that the points of contact of their ferro-cerium stones with the respective working portions of the wheel are situated on either side of a plane containing the axis of the wheel and the axis of the wick.

8. Lighter substantially as described and shown in the accompanying drawing.

Dated this 12th day of February, 1926.

For the Applicants,

LLOYD WISE & Co.,
10, New Court, Lincoln's Inn, London,
W.C. 2,
Chartered Patent Agents.

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

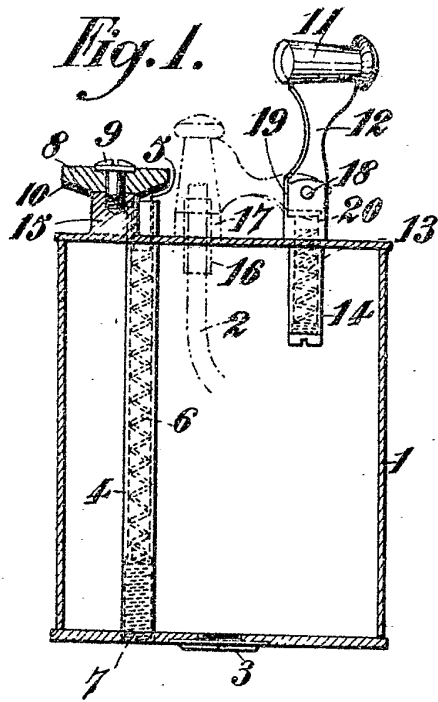


Fig. 2.

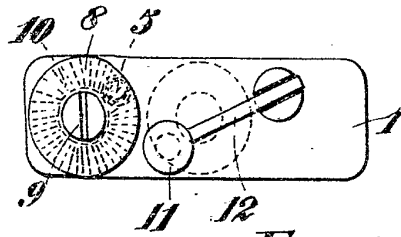


Fig. 3.

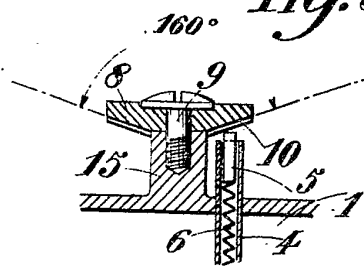


Fig. 4.

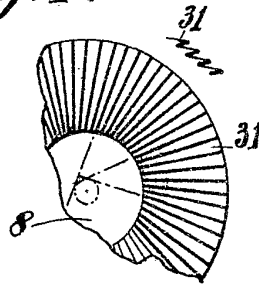


Fig. 5.

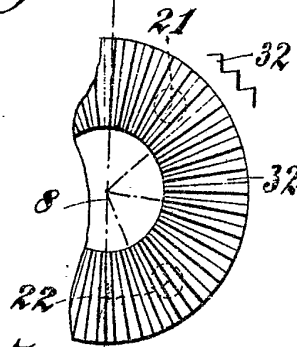


Fig. 6.

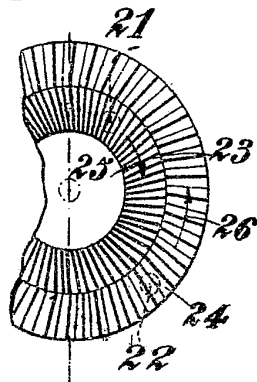


Fig. 7.

