

Nov. 11, 1952

M. M. LEVENE

2,617,285

PYROPHORIC LIGHTER

Filed March 13, 1948

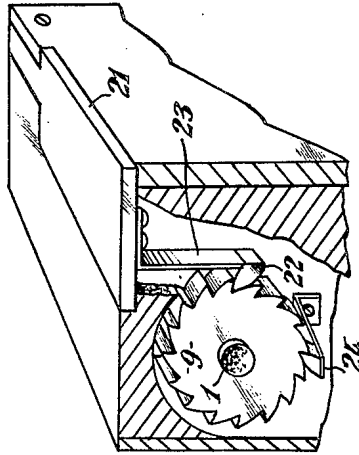
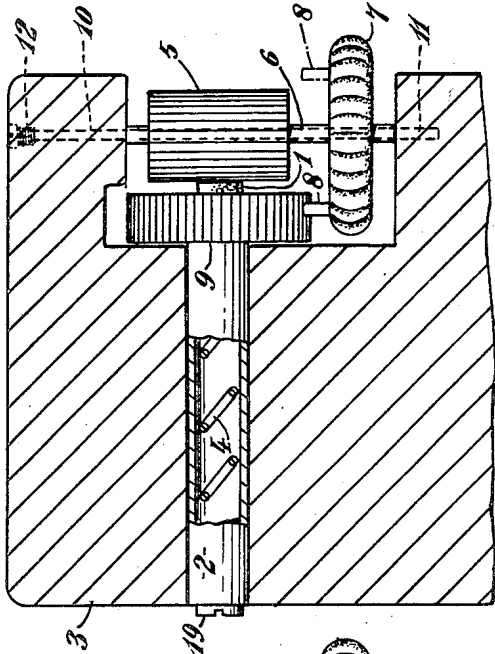


Fig. 1.

Fig. 2.

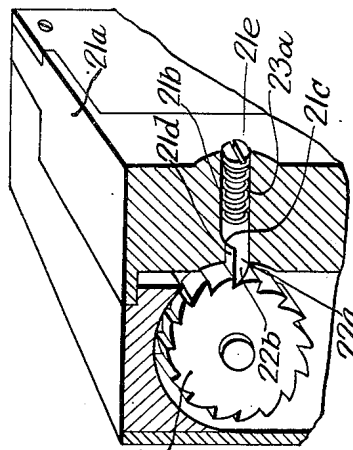
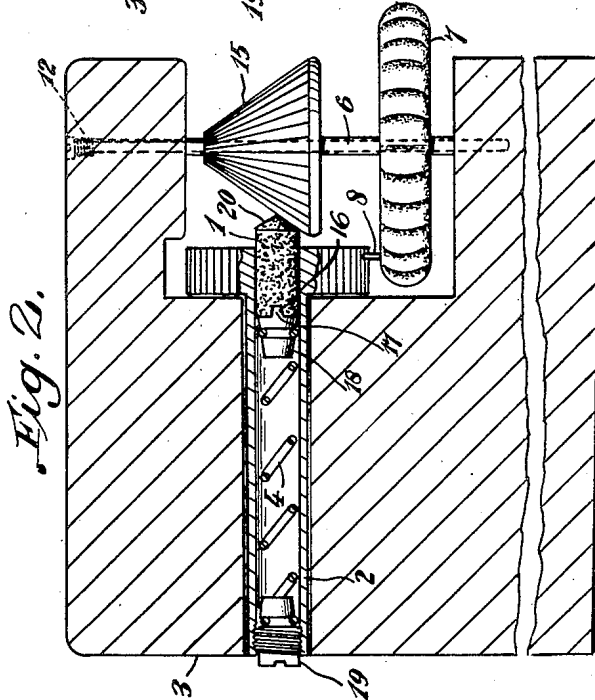


Fig. 3.

Fig. 4.

Meyer Maximilian Levene
By Fraser, Mijcro & Manley, Attys.

UNITED STATES PATENT OFFICE

2,617,285

PYROPHORIC LIGHTER

Meyer Maximilian Levene, Uplowman, near
Tiverton, England

Application March 13, 1948, Serial No. 14,698
In Great Britain July 16, 1947

11 Claims. (Cl. 67—7.1)

1

This invention relates to pyrophoric lighters. In pyrophoric lighters one of the usual ways of obtaining a spark is to have an abrasive steel cutting wheel which strikes on a flint. Each time the cutting wheel is operated, usually by the thumb or by the action of opening the lid, the wheel contacts the end surface of the flint forming a spark. The flint is usually pressed towards the periphery of the wheel by a spring to keep it in close contact with the wheel surface but after a certain amount of use a groove is formed in the top of the flint which in the end becomes so deep that the flint is useless. The object of this invention is to overcome this disadvantage.

According to this invention the flint is caused to rotate through an angle each time the lighter is operated so that on each occasion a fresh radial surface on the flint is presented to the wheel. The rotation is caused either when the cutting wheel is operated or by the movement of the lid.

The invention is illustrated in the accompanying drawings wherein:

Fig. 1 is a sectional side elevation of the upper portion of one form of lighter made in accordance with this invention to an enlarged scale.

Fig. 2 is a sectional side elevation of a modified form of lighter.

Fig. 3 is a perspective view of another modification.

Fig. 4 is a perspective view of still another modification.

Referring to Fig. 1 of the drawings a flint 1 is mounted in a holder 2 in the casing 3 of the lighter and adapted to be pressed outwardly by a light coil spring 4. The cutting wheel 5 is arranged adjacent to the flint so as to strike thereon. The cutting wheel 5 is rigidly mounted on a vertical rod or tube 6 towards the lower end of which is provided a thumb wheel 7 adapted to operate the cutting wheel 5. Alternatively the thumb wheel can be arranged above the cutting wheel. One or more striker pins 8 project upwardly from the thumb wheel 7 and are adapted to engage a drive portion in the form of a toothed wheel 9 provided at the end of the flint holder 2. The cutting wheel 5, tube 6, thumb wheel 7 and striker pin 8 provide a single unit which is located in the casing by means of a central rod 10 which provides a bearing for rotation. The lower end of the rod 10 is located in a recess 11 provided in the casing the upper end being secured by means of a countersunk nut 12. Instead of the striker pin or pins 8 projecting upwardly from the thumb wheel 7 it may project horizon-

2

tally from the tube 6 between the wheels 5 and 7.

In order to prevent relative rotational movement between the flint and flint holder, means are provided, substantially similar to means illustrated in Fig. 2 wherein the inner end of the flint 1 is provided with a radial or other groove 16 which is engaged by a corresponding projection 17 provided on a member 18 at the forward end of the spring 4. A grub screw 19 is adapted to adjust the flint relatively to the cutting wheel 5 as the face of the flint is worn down. Obviously, the described tongue 17 and groove 16 arrangement constitutes only one of many possible arrangements for assuring that the flint 1 will turn with the member 18 which is constrained, through the medium of the spring 4, to turn with the flint holder 2. It should be apparent that with the flint 1 and the member 18 held in end to end contact by the force of the spring 4, the flint and the member 18 will turn together if their contacting ends have surfaces which are irregular rather than smooth plane surfaces. Thus, the inner end of the flint need not necessarily have the groove 16 but can merely have a rough inner end surface as is true of most flints made for this purpose. In the latter arrangement the projection 17 could advantageously be sharper than illustrated to more effectively engage the rough inner end of the flint and thereby constrain the latter to turn with the flint holder 2.

The construction shown in Fig. 2 is the same as that shown in Fig. 1 except that the cutting wheel 15 is conical instead of being cylindrical. In this case the end of the flint 1 is also conical as shown at 20. The advantage of this arrangement is that there is a larger striking area and the upward pressure of the cutting wheel tends to hold the flint in contact with the holder 2.

In the modification shown in Fig. 3, the flint and flint holder assembly may be substantially as in Figs. 1 and 2, but instead of the said assembly being rotated by the described striker pin arrangement, the said assembly, including the flint, is rotated by means of a spring-pawl 22 on a pivotal cap 21. The pawl 22 may be tensioned or spring-loaded by being attached to the underside of the lid or cap 21 through a resilient vertical member 23, the pawl 22 engaging the drive portion or ratchet wheel 9 which is provided at the end of the flint holder 2 in the same arrangement as described with reference to Figs. 1 and 2. On each occasion that the lid 21 is pivotally raised to operate the device, the pawl 22 causes a rotational movement of the ratchet

3

9, moving with it the flint so that a fresh surface of the latter is presented to the cutting wheel every time the lid is raised. In order to prevent the ratchet from moving when the lid is pivotally lowered to close it, a fixed spring-loaded pawl 24 may be provided. In this construction the striker pins 8 are dispensed with.

The principle of operation of the modification shown in Fig. 4 is the same as that already described with reference to Fig. 3; the only material difference in structure residing in the pawl for rotating the flint-holder assembly. In the structure of Fig. 4, a pivotal cap 21a is provided with a horizontal bore 21b, preferably of circular cross section, which terminates at an inner shoulder 21c from which a semi-circular bore 21d is formed as a continuation of the bore 21b and opens at the inner face of the cap.

A pawl 22a, complementally shaped in cross section to the bore 21d and the adjacent portion of the bore 21b, is yieldably held in place in said bores by a coil spring 23a in the bore 21b, which spring is compressed therein by a screw plug 21e, threaded into the outer end of the latter bore. The pawl 22a has a protruding finger portion 22b which engages the teeth of the ratchet wheel 9. The pawl 22a functions similarly to the pawl 22 to rotate the flint-holder assembly and the flint, when the cover or cap 21a is raised to operate the device.

When the ratchet type flint holder is used as shown in Figs. 3 and 4 it is possible to provide for rotation of the flint holder in a clockwise direction by inverting the pawl and reversely cutting the ratchet teeth on the flint holder. Under this arrangement the rotation of the flint will take place when the cap 21 or 21a is pivotally lowered to the closed position. In such an arrangement the spring loaded pawl 24 may be dispensed with.

The flint and flint holder may take various forms. The flint may be square in cross-section and adapted to engage a square bore in the flint holder or it may be cylindrical and have a flat to constrain it to turn with the holder, or it may be hexagonal or any other polygonal shape.

When using the lighter, shown in Figs. 1 and 2, the cap of the lighter is opened and thumb wheel 7 is rotated whereby the cutting wheel 5 forms a spark with the flint 1. At the same time one of the striker pins 8 engages the toothed wheel 9 which together with the flint holder and flint rotates through an angle of about 45 degrees so that on each occasion the spark is formed a fresh surface on the flint is presented to the cutting wheel. In the lighter described with reference to Figs. 3 and 4, on each occasion the lid is opened the flint is rotated through an angle so that a different surface is presented to the cutting wheel. In the last-described arrangement, the flint is stationary when the spark is formed.

It may be observed that a feature common to all disclosed embodiments is that manually operable means are provided for substantially rotating the flint holder, and a flint carried thereby, each time the lighter is operated; although the arrangement, within the invention may cause such rotation every second or third time. In either situation, the rotation achieves the object of preventing the formation of a groove in a flint so that the sparking face of the latter remains flat and continuously maintains a very narrow, line contact with the abrasive cutting wheel to produce a rich spark. Such flint holder rotating means are illustrated as the thumb wheel 7 with striker pins 8 in Figs. 1 and 2 and the lids

4

or caps 21, 21a in Figs. 3 and 4 respectively, with their related pawls 22, 22a; and, for convenience, such flint holder rotating means are referred to in the accompanying claims as a "flint holder rotating member."

With such an arrangement a longer flint can be used and a lighter spring than normally employed and there is more certainty of obtaining a fat spark.

What I claim and desire to secure by Letters Patent is:

1. In a pyrophoric lighter, the combination comprising a casing, a tubular flint holder having a toothed circumferential portion and being carried by the casing for rotation about the holder's central longitudinal axis, means associated with the flint holder for constraining a flint held by the latter to rotate coaxially therewith and for urging such a flint forwardly in an axial direction relatively to said flint holder, the said flint holder being free to so rotate irrespective of such forward movement of the flint, means for restraining the flint holder against material movement other than said rotational movement, an abrasive wheel carried by the casing in position for its periphery to sparkingly engage an adjacent end of a flint thus held by the flint holder, a flint holder rotating member which is necessarily movable manually as a part of complete operation of the lighter and is carried by the casing and has a projection thereon adapted, upon movement of said member, to engage said toothed circumferential portion of the flint holder to thus rotate the latter and a flint held thereby to present different lines of contact of the flint, at its said end, with the periphery of the abrasive wheel, in successive operations of the lighter.

2. In a pyrophoric lighter, the combination according to claim 1 wherein the said constraining means comprises a follower member, within said flint holder, having one end portion of non-planar contour adapted for non-rotative engagement with an adjacent irregular end face of a flint in said holder, and means constraining the follower member to turn with the flint holder.

3. In a pyrophoric lighter, the combination according to claim 1, wherein the said projection is in substantially fixed relation to said abrasive wheel for coacting with the teeth of said toothed circumferential portion to rotate the flint holder.

4. In a pyrophoric lighter, the combination according to claim 1, the said flint holder rotating member comprising a pivotal cover which must be pivotally moved between opened and closed positions as a part of the operation of the lighter, and the said projection being on said cover and adapted to engage and rotate said toothed circumferential portion during the cover's said pivotal movement.

5. In a pyrophoric lighter, the combination according to claim 4, further including a restraining member, carried by said casing, and coacting with said toothed circumferential portion to limit the flint holder to material rotational movement in only one direction.

6. In a pyrophoric lighter, the combination according to claim 4, wherein the said projection is a pawl, and a spring arm is fixed to said cover and to said pawl and constitutes a yieldable mounting for the latter.

7. In a pyrophoric lighter, the combination according to claim 4, wherein a finger is slidably carried within a bore in said cover with an end portion of said finger, constituting said projec-

5

tion, protruding from one side of said cover into engagement with the toothed circumferential portion of the flint holder, and a spring is associated with said cover and coacts with said finger to urge the latter toward said toothed portion.

8. In a pyrophoric lighter, the combination comprising a casing, a tubular flint holder having a toothed circumferential end portion and being carried by the casing for rotation about the holder's central longitudinal axis, means associated with the flint holder for constraining a flint held by the latter to rotate coaxially therewith and for urging such a flint forwardly in an axial direction relatively to said flint holder, the said flint holder being free to so rotate irrespective of such forward movement of the flint and said toothed end portion constituting means for restraining the flint holder against material movement other than said rotational movement, an abrasive wheel carried by the casing in position for its periphery to sparkingly engage an adjacent end of a flint thus held by the flint holder, a flint holder rotating member which is necessarily movable manually as a part of complete operation of the lighter and is carried by the casing and has a projection fixed thereon adapted, upon movement of said member, to engage said toothed circumferential portion of the flint holder to thus rotate the latter and a flint held thereby to present different lines of contact of the flint, at its said end, with the periphery of the abrasive wheel, in successive operations of the lighter.

9. In a pyrophoric lighter, the combination comprising a casing and a flint holder carried by said casing for movement which is solely rotational movement relatively to the casing, the said flint holder having a toothed portion in coaxial relationship to said flint holder's axis of such rotation, means for carrying a flint in a position coaxial to said axis of rotation and means for constraining a flint thus carried to rotate with the flint holder and for urging such a flint forwardly in an axial direction relatively to said flint holder, the said flint holder being free to so rotate irrespective of such forward movement of the flint; the combination further comprising an abrasive wheel carried by the casing in position for its periphery to sparkingly engage an adjacent end of a flint thus carried, and a flint holder rotating member which is necessarily movable manually as a part of complete operation of the lighter and is carried by the casing and has a projection thereon adapted, upon movement of said member, to engage said toothed portion of the flint holder to thus rotate the latter and a flint carried thereby to present different lines of contact of the flint, at its said end, with the periphery of the abrasive wheel, in successive operations of the lighter.

10. In a pyrophoric lighter, the combination comprising a casing, a tubular flint holder carried by the casing for rotation about the holder's central longitudinal axis, and having a generally cylindrical circumferential drive portion for receiving driving movement for imparting such rotation to the flint holder, means associated with the flint holder for constraining a flint held by

6

the latter to rotate coaxially therewith and for urging such a flint forwardly in an axial direction relatively to said flint holder, the said flint holder being free to so rotate irrespective of such forward movement of the flint, an abrasive wheel carried by the casing in position for its periphery to sparkingly engage an adjacent end of a flint thus held by the flint holder, and a flint holder rotating member which is necessarily movable manually as a part of complete operation of the lighter and is carried by the casing and coacts with said drive portion, upon movement of said member, to rotate the flint holder and a flint held thereby to present different lines of contact of the flint at its said end, with the periphery of the abrasive wheel, in successive operations of the lighter.

11. In a pyrophoric lighter, the combination comprising a casing and a flint holder carried by the casing for rotation relatively to said casing and having an irregular, circumferential drive surface, coaxial to said flint holder's axis of rotation, for receiving driving movement for imparting such rotation to the flint holder, means for carrying a flint in a position coaxial to said axis of rotation and means for constraining a flint thus carried to rotate with the flint holder and for urging such a flint forwardly in an axial direction relatively to said flint holder, the said flint holder being free to so rotate irrespective of such forward movement of the flint; the combination further comprising an abrasive wheel carried by the casing in position for its periphery to sparkingly engage an adjacent end of a flint thus carried, and a flint holder rotating member which is necessarily movable manually as a part of complete operation of the lighter and is carried by the casing and coacts with said drive portion, upon movement of said member, to rotate the flint holder and a flint held thereby to present different lines of contact of the flint at its said end with the periphery of the abrasive wheel, in successive operations of the lighter; the said casing and flint holder having interengaging shoulder portions for restraining the said flint holder against material movement longitudinally of its said axis of rotation in a direction away from said abrasive wheel.

MEYER MAXIMILIAN LEVENE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,464,203	Hutchinson	Aug. 7, 1923
1,612,595	Mace et al.	Dec. 18, 1926
1,726,237	Patnaude	Aug. 27, 1929
1,762,281	Stecker	June 10, 1930
1,906,217	Scully	Apr. 25, 1933
2,529,326	Borthayre	Nov. 7, 1950

FOREIGN PATENTS

Number	Country	Date
297,188	Great Britain	Sept. 20, 1928
787,706	France	July 8, 1935
917,306	France	Sept. 9, 1946