Aug. 16, 1955 R. L. BURCHETT 2,715,329

PYROPHORIC LIGHTER

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Fig. 1.

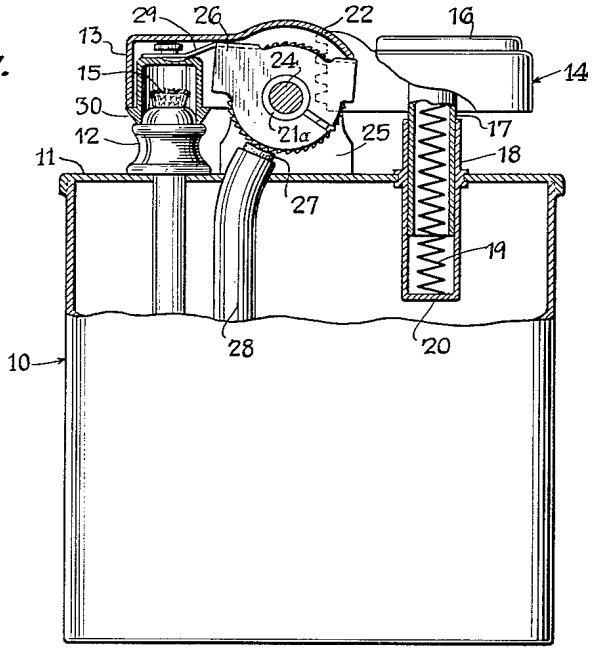


Fig. 2.

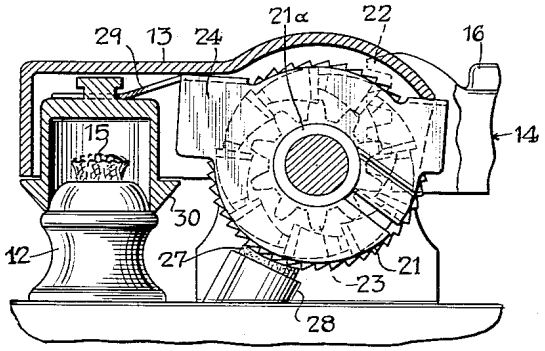
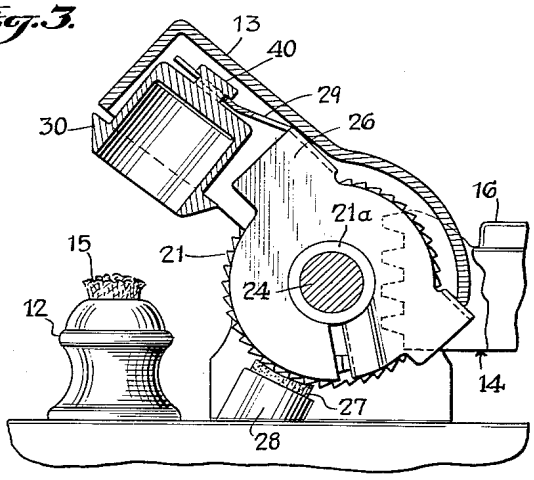


Fig. 3.



INVENTOR.
RAY L. BURCHETT.
BY Ward, Crosby & Neal
ATTORNEYS.

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Fig. 4.

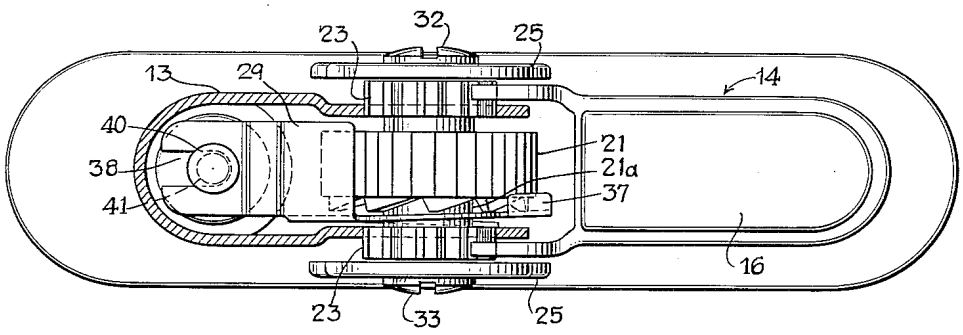


Fig. 5.

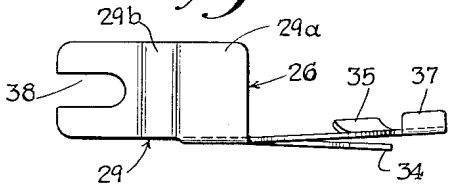


Fig. 6.

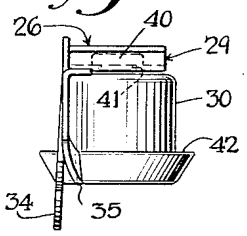
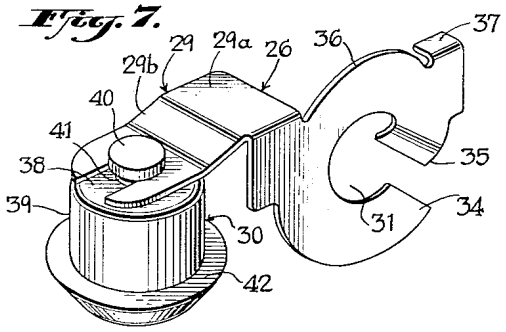


Fig. 7.



INVENTOR.
RAY L. BURCHETT.
BY Ward, Crosby & Neal
ATTORNEYS.

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PYROPHORIC LIGHTER

Ray L. Burchett, East Orange, N. J., assignor to Ronson Corporation, Newark, N. J., a corporation of New Jersey

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6 Claims. (Cl. 67—7.1)

This invention relates to pyrophoric lighters of the type wherein the burner thereof is covered with a cap when the lighter is not in use and relates particularly to an improved mounting arrangement for such a cap.

Pyrophoric lighters have been constructed with a rigid closure lever which is driven manually or by a spring. The lever is used not only to cover the burner and other parts of the lighter mechanism so as to protect them from damage and so as to prevent them from coming in contact with clothing, etc., but also it is used to drive the sparking wheel through some form of clutch mechanism. It is usual to mount a closure cap on such a lever, which cap engages and encloses the burner. If the burner is of the wick tube type, the cap acts as a snuffer and prevents evaporation of fuel from the wick, or if the burner is a nozzle of a gaseous fuel type of lighter, the cap prevents damage to the nozzle and prevents clogging of the nozzle by dirt.

It is important in lighters of the type mentioned above that a relatively tight seal be obtained between the closure cap and the burner. However, if the cap is rigidly secured to the closure lever, manufacturing tolerances make it difficult to obtain the desired seal without individual adjustment of each cap. In overcoming the misalignment of the cap with respect to the burner, it usually must be moved both toward and away from the burner and angularly with respect thereto. Thus, a mounting for the cap which merely permits tilting of the cap is not always adequate to permit alignment of the cap and the burner, and this is particularly true when the burner is provided with a resilient sealing ring over which the cap slides.

It is an object of my invention to provide a mounting arrangement for a closure cap of a lighter which has several directions of freedom so that it will align itself with the burner of the lighter in which it is installed, even though from lighter to lighter the variations of spacing and orientation of the burner with respect to the closure lever or its pivot point may be relatively large.

It is a further object of my invention to provide a mounting arrangement for a closure cap of a lighter which is simple and economical to manufacture and which simplifies the lighter assembly.

Further objects and advantages of the invention will be in part obvious and in part specifically referred to in the description hereinafter set forth which, taken in conjunction with the accompanying drawings, discloses a preferred form and a modified form of a lighter which is constructed in accordance with the invention. The disclosure, however, should be considered as merely illustrative of the principles of the invention.

Referring to the drawings:

Fig. 1 is a side elevation view, partly in cross section, of a pyrophoric lighter including the improved closure cap mounting arrangement of my invention;

Figs. 2 and 3 are enlarged, fragmentary, side elevation views, partly in cross section, of the embodiment

shown in Fig. 1 and illustrate respectively the parts of the lighter in idle and in active positions;

Fig. 4 is an enlarged plan view, partly in cross section, of the embodiment shown in Fig. 1;

Fig. 5 is a plan view of the closure cap mounting device of my invention;

Fig. 6 is an end view of the closure cap mounting device shown in Fig. 5 with a closure cap mounted thereon; and

Fig. 7 is an enlarged perspective view of the closure cap and mounting device shown in Fig. 6.

Referring to Figs. 1–4 which show a pyrophoric lighter including the closure cap mounting arrangement of my invention, the lighter comprises a casing **10** having mounted on the top wall **11** thereof a burner **12**, a closure lever **13** and a manually operable member **14**. In the drawings the burner **12** has the form of a wick tube enclosing a wick **15** but, if desired, the burner **12** may be a nozzle in the event that gaseous fuel, such as butane or propane, is employed. The fuel for the burner **12** is contained within the casing **10** and is conducted to the burner by conventional means.

The manually operable member **14** comprises a fingerpiece **16** and a hollow tube **17** secured thereto. The tube **17** slidably engages the inner wall of the tube **18** mounted on the wall **11** of the casing **10** and the member **14** is urged into its idle position, as shown in Fig. 1, by a spring **19** acting between the member **14** and the end wall **20** of the tube **18**.

The closure lever **13**, a sparking wheel **21** and a pair of pinions **23** are rotatably mounted on a shaft **24** which is supported on a pair of ears **25** mounted on the top wall **11**. The shaft **24** may consist of an internally threaded tube having a slotted head **32** and an interengaging externally threaded screw having a slotted head **33** so as to permit ready removal of the rotatable parts of the lighter. The side walls of the closure lever **13** are cut out to conform to the teeth of the pinions **23** and the pinions **23** extend through these cut-out portions of the side walls so that the closure lever **13** rotates with the pinions **23**.

A clutch member **26** which loosely supports a closure cap **30** preferably is mounted on a hub **21***a* extending from the side of sparking wheel **21** and between one of the pinions **23** and a side of the sparking wheel **21**, but the hub **21***a* may be omitted and the members **26** may be mounted directly on the shaft **24**. The clutch member **26** has, as described hereinafter in greater detail, a pawl portion which engages teeth on the side of the sparking wheel **21** and causes the sparking wheel **21** to rotate when the clutch member **26** is rotated in one direction. The clutch member **26** is engaged by the under side of the top wall of the closure lever **13** and, therefore, is driven thereby.

The manually operable member **14** is preferably drivingly interconnected with the closure lever **13** by means of a rack **22** which may be formed integrally with the member **14** and which meshes with the pinions **23**. Thus, as the manually operable member **14** is depressed, the pinions **23** are rotated, causing rotation of the closure lever **13** into the position shown in Fig. 3. Rotation of the closure lever **13** in turn causes rotation of the clutch member **26** and the sparking wheel **21**. A pyrophoric material, such as the spring-pressed flint rod **27** extending from the flint tube **28**, presses against the serrated face of the sparking wheel **21** and produces a shower of sparks at the burner **12** when the sparking wheel **21** is rotated.

Although, as indicated above, the manually operable member **14** preferably is drivingly interconnected with the closure lever **13**, it is to be understood that the driving mechanism shown is only one form of known types of driving mechanisms which may be employed in

connection with my invention and, also, my invention may be employed in arrangements in which the lever **13** is moved from its idle position by other known types of driving means rather than by the member **14**.

Referring to Figs. 5–7, it will be seen that the clutch member **26** has a main body portion **36** in the form of a plate. The entire member **26** preferably is made from a thin sheet of resilient metal, such as spring steel, which is formed by cutting and bending it into the shape shown in these figures. The main body or plate portion **36** has an aperture **31** therein which permits the clutch member **26** to pass over the hub **21***a*. The plate portion **36** also is slit and bent so as to form a positioning tongue **34** which extends in a direction perpendicular to the plane of the plate **36** and a pawl tongue **35** which also extends in a direction perpendicular to the plane of the plate portion **36**.

The size of the aperture **31** in the clutch member **26** is such that the clutch member **26** has a running fit with the hub **21***a*. The positioning tongue **34** presses against the inner wall of the closure lever **13**, as best indicated in Fig. 4, and resiliently holds the clutch member **26** in its proper position. Also, the positioning tongue **34** assists in permitting the pawl tongue **35** to ride over the teeth on the side of the sparking wheel **21** when the closure lever **13** is returned from its active position to its idle position.

A tab **37** extending in a plane perpendicular to the plane of the plate portion **36** is formed on one side of the center of the aperture **31** and engages the under side of the top wall of the closure lever **13**. An arm **29** is formed on the opposite side of the center of the aperture **31** and also has a portion **29***a* which engages the under side of the top wall of the closure lever **13**. The arm **29** of the clutch member **26** lies generally in a plane which is perpendicular to the plane of the plate portion **36** but is bent downwardly at **29***b* so as to provide a resilient mounting for the closure cap **30**. The end of the arm **29** remote from the center of the aperture **31** extends over the burner **12** and is bifurcated so as to provide an aperture **38** between the ends thereof for loosely receiving the closure cap **30**.

The closure cap **30** has a main body portion **39** which is of a diameter larger than the width of the aperture **38**, a securing portion or head **40** which also has a diameter larger than the width of the aperture **38** and an intermediate cylindrical portion **41** between the securing portion **40** and the main body portion **39**. The diameter of the intermediate cylindrical portion **41** is less than the width of the aperture **38** and preferably the length of the portion **41** is greater than the thickness of the arm **29** where it surrounds the aperture **38** so that the cap **30** is loosely supported by the clutch member **26** and may not only be tilted slightly with respect to the arm **29**, but may also be moved lengthwise of the aperture **38** and hence may be moved toward and away from the burner **12**.

The closure cap **30** is also provided with an annular shoulder **42** which, if the force applied by the spring **19** is sufficient, is engaged by the lower rim of the closure lever **13**, aiding in the engagement of the closure cap **30** with the burner **12**. Also, the closure lever **13** preferably has a U-shaped cross section and a closed end not only to provide strength, but also to retain the closure cap **30** in the aperture **38**.

From the above it will be seen that the mounting for the closure cap **30** permits the cap to be tilted and moved toward and away from the burner **12**. Also, the mounting is resilient and permits the cap to adjust itself to burners of different heights. Accordingly, the cap **30** has several directions of freedom, and relatively large variations from lighter to lighter of the spacing and orientation of the burner **12** with respect to the shaft **24** will not require individual adjustment of the closure cap in order to obtain a tight seal between the cap and the burner.

In addition, the mounting arrangement of my invention is simple and economical to manufacture and permits rapid assembly of the cap with the remainder of the lighter parts without the use of screws, rivets or solder.

Having thus described my invention with particularity, with reference to the preferred embodiments of the same, and having referred to certain modifications thereof, it will be obvious to those skilled in the art, after understanding my invention, that other changes and modifications may be made therein without departing from the spirit or scope of my invention, and it is intended in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. In a pyrophoric lighter having a casing, a burner, a sparking wheel mounted on said casing and having ratchet teeth thereon and a closure cap adapted to cover said burner, means for mounting said closure cap comprising: a clutch member mounted adjacent said wheel, said member having flexible pawl means integral therewith and engageable with said teeth for rotating said wheel and having a flexible arm integral therewith extending over said burner and adapted to support said cap, said arm being flexible toward and away from said burner and having an aperture therein adapted to receive a portion of said cap and said aperture being larger than said portion of said cap, whereby said cap may be moved with respect to said arm.

2. A pyrophoric lighter comprising: a casing; a rotatable sparking wheel mounted on said casing; a pyrophoric material mounted on said casing in contact with said wheel; a burner mounted on said casing and adjacent said wheel; a closure lever pivotally mounted on said casing, said lever overlying said burner in an idle position and being movable to an active position in which it is remote from said burner; a closure cap mounted under said lever and adapted in its idle position to cover said burner; and driving means for driving said lever and said cap to move said lever from idle to active positions and to move said cap away from said burner, said driving means including a unitary clutch member having a flexible pawl engageable with said wheel and having a flexible arm extending over said burner said cap being loosely secured to said arm and being free to move with respect to both said arm and said lever.

3. A pyrophoric lighter comprising: a casing; a rotatable sparking wheel mounted on said casing; a pyrophoric material mounted on said casing in contact with said wheel; a burner mounted on said casing and adjacent said wheel; a reciprocable fingerpiece mounted on said casing and adjacent said wheel; a closure lever pivotally mounted on said casing, said lever overlying said burner in an idle position and being movable to an active position in which it is remote from said burner; driving means interconnecting said fingerpiece and said lever to move said lever from idle to active positions on movement of said fingerpiece from idle to active positions; clutch means interconnecting said lever and said wheel to move said wheel on movement of said lever from idle to active positions, said clutch means comprising a plate having a pawl engageable with said wheel and having a flexible arm extending over said burner and flexible toward and away from said burner, said plate also having portions thereof engageable with said lever for movement therewith; and a closure cap mounted under said lever and adapted in the idle position of said lever to overlie and engage said burner, said cap being loosely secured to and supported by said arm and being free to move with respect to said arm in two mutually transverse directions.

4. A pyrophoric lighter comprising: a casing, a shaft mounted on said casing; a rotatable sparking wheel mounted on said shaft; a pyrophoric material mounted on said casing in contact with said wheel; a burner mounted on said casing and adjacent said wheel; a re-

ciprocable fingerpiece mounted on said casing and adjacent said wheel; a closure lever pivotally mounted on said shaft, said lever overlying said burner in an idle position and being movable to an active position in which it is remote from said burner; driving means interconnecting said fingerpiece and said lever to move said lever from idle to active positions on movement of said fingerpiece from idle to active positions; clutch means interconnecting said lever and said wheel to move said wheel on movement of said lever from idle to active positions, said clutch means comprising a plate having an aperture therein and having a pawl engageable with said wheel, said plate being mounted on said shaft with said shaft extending through said aperture, said plate also having a tab thereon at one side of the center of said aperture and an arm at the opposite side of said center and extending over said burner, said tab and said arm being engageable with said lever and said arm having an aperture therein remote from said center and overlying said burner; and a closure cap loosely mounted under said lever and adapted in the idle position of said lever to overlie and engage said burner, said cap being loosely secured to said arm with a portion thereof extending through said aperture in said arm.

5. A pyrophoric lighter comprising: a casing; a shaft mounted on said casing; a rotatable sparking wheel mounted on said shaft; a pyrophoric material mounted on said casing in contact with said wheel; a burner mounted on said casing and at one side of said wheel; a reciprocable fingerpiece mounted on said casing and at the opposite side of said wheel; a closure lever pivotally mounted on said shaft and having a U-shaped cross section and a closed end, said lever overlying said burner in an idle position with its open side and said closed end adjacent said burner and being movable to an active position in which it is remote from said burner; gear means interconnecting said fingerpiece and said lever to move said lever from idle to active positions on movement of said fingerpiece from idle to active positions; clutch means interconnecting said lever and said wheel to move said wheel on movement of said lever from idle to active positions, said clutch means comprising a relatively thin disc of resilient metal having an aperture therein and

having a pawl tongue, said disc being mounted on said shaft with said shaft extending through said aperture, and said pawl tongue being engageable with said wheel, said disc also having a lever engaging portion thereon at one side of the center of said disc and an arm at the opposite side of said center and extending over said burner, said lever engaging portion and said arm being engageable with the inner wall of said lever and said arm having a slot therein remote from said center and overlying said burner, said slot lying in a plane perpendicular to the plane of said disc and having its length extending parallel to the plane of said disc; and a closure cap loosely mounted within said lever adjacent said closed end and adapted in the idle position of said lever to overlie and engage said burner, said cap having a diameter which is greater than the width of said slot and having a cylindrical portion intermediate the ends thereof the diameter of which is less than the width of said slot and said cap being mounted with said second portion within said slot.

6. In a pyrophoric lighter having a casing, a burner and a sparking wheel mounted on said casing and a closure cap adapted to cover said burner, means for mounting said closure cap comprising: a unitary clutch member mounted adjacent said wheel, said member having means integral therewith engageable with said wheel for moving said wheel and having a flexible arm integral therewith and extending adjacent said burner, said cap being loosely secured to said arm and being free to move with respect to said arm in two mutually transverse directions.

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