Jan. 7, 1958 M. MORRIS 2,818,716

CIGARETTE LIGHTER AND FUELING DEVICE THEREFOR

Filed Nov. 9, 1956

Fig-1

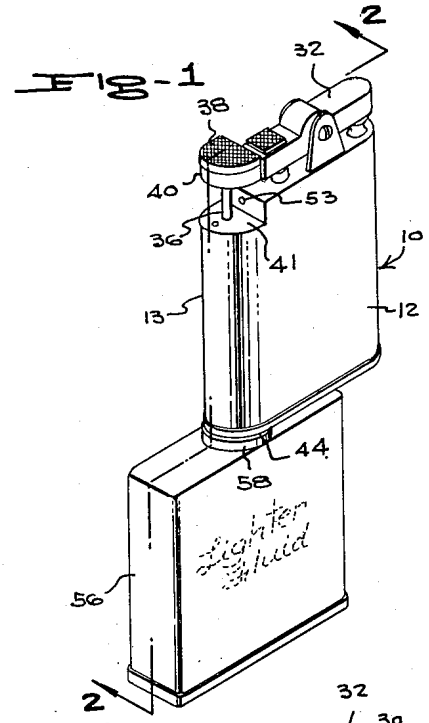


Fig-4

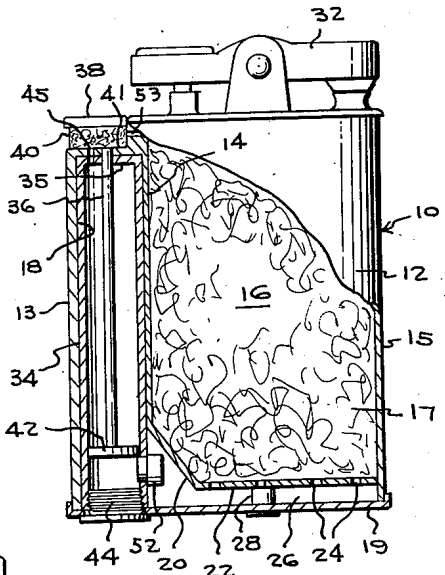


Fig-2

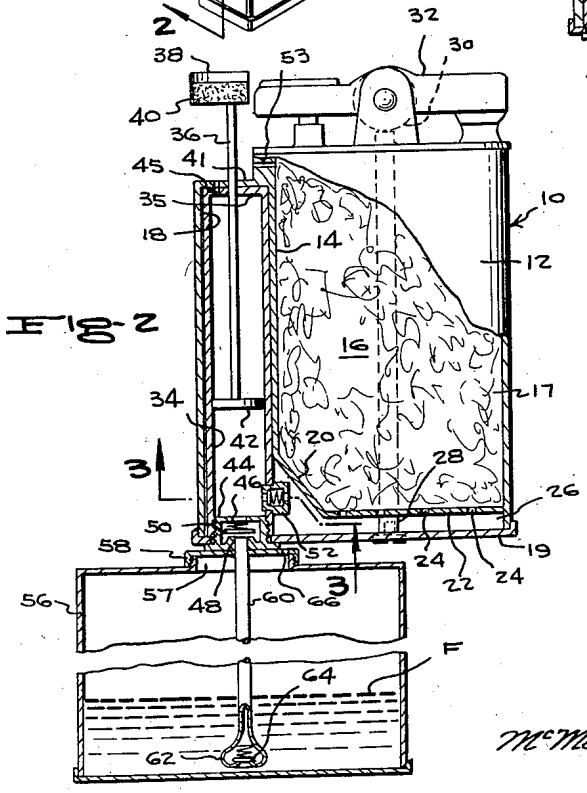
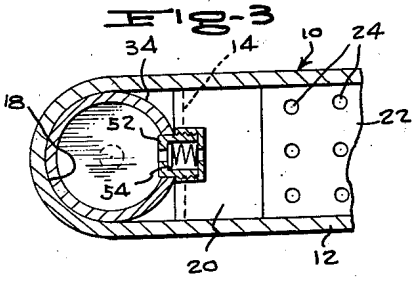


Fig-3



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CIGARETTE LIGHTER AND FUELING DEVICE THEREFOR

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9 Claims. (Cl. 67—7.1)

This invention relates in general to cigarette lighters and to means for refueling the same. More particularly, the invention is a cigarette lighter having a built-in refueling pump, adapted to pump fuel from an associated fuel container into the wadding-filled wick chamber of the lighter.

The refueling of a cigarette lighter is accompanied by some difficulty and inconvenience. A cap is usually provided, providing access to the wick chamber, and this cap must be removed, after which the nozzle of the fuel container is inserted and a quantity of fuel ejected through the nozzle.

This is, at best, a haphazard manner of refueling a cigarette lighter, and often the wadding is not uniformly saturated, or alternatively, is either inadequately or excessively saturated.

In addition, it often happens that the user is unable to direct all the fuel accurately into the wick chamber, as a result of which fuel may be spilled onto the sides of the lighter or onto the floor surface.

In view of the above, the object of the present invention is to provide a generally improved cigarette lighter and refueling means therefor, adapted to permit the efficient refueling of the lighter.

Among various specific objects of the invention are the following:

To provide a pump means built into the lighter, designed to effect the extraction of a measured amount of fuel from the container and the direction of said amount into the wick chamber, by operation of the pump handle through a single stroke or, perhaps, through a predetermined number of strokes found to be proper for charging the lighter with the desired, measured quantity of fuel;

To so design the pump means as to cause the same, when being operated, to expose vents that will permit the displacement of air from the wick chamber by the fuel entering the same, and that will also permit venting of the pump chamber to atmosphere, with the pump being so designed as to automatically close the vents when the pump is not in use;

To facilitate the direct connection of the fuel container to the pump chamber, when the lighter is to be refueled;

To accomplish the above stated purposes without increasing the size of the lighter any more than a relatively inconsequential amount;

To incorporate the features of the invention in a lighter having a conventional flint striker and wick mechanism, without requiring modification of these particular mechanisms;

To so charge the lighter as to cause the fuel to be distributed uniformly over the full transverse dimension of the wick chamber, thus to assure uniform saturation of the wadding; and

To accomplish the various desirable results stated above without increasing the overall cost of the lighter and fuel container any more than a relatively inconsequential amount, considering the benefits to be obtained from the invention.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a perspective view of the lighter and associated fuel container, with the pump in operating position;

Figure 2 is an enlarged longitudinal sectional view substantially on line 2—2 of Figure 1, a portion of the fuel container being broken away;

Figure 3 is a detail sectional view, still further enlarged, on line 3—3 of Figure 2; and

Figure 4 is a view of the lighter on the same cutting plane and on the same scale as Figure 2, with the pump in its normal, inoperative position.

Designated generally at **10** is a cigarette lighter according to the present invention. In respect to the striking and wick mechanism, the lighter is of conventional design, and any of various well known mechanisms may be employed for this purpose. In the illustrated example, the lighter includes a casing **12**, and extending transversely of the casing at a location spaced a short distance from the back wall **13** thereof is a transverse partition **14**. Defined between the partition **14** and the front wall **15** of the casing is a wick chamber **16** containing a quantity of wadding **17**.

Defined between the partition **14** and the back wall **13** is a piston chamber **18**. In this connection, as will be noted from Figures 2 and 4, the partition **14** terminates at its lower end in spaced relation to the bottom plate **19** of the lighter casing, the partition merging at its lower end into an inclined connecting wall **20** merging in turn into a bottom wall **22** of the wick chamber having a plurality of perforations **24** spaced uniformly over the length and width of the bottom wall as shown in Figure 3.

The bottom wall **22** of the wick chamber is spaced upwardly a short distance from the bottom plate **19** of the casing **12**, thus defining a fuel distribution chamber **26** extending over the full bottom area of the wick chamber and communicating at one end with the piston chamber **18**. As a result, fuel forced into the distribution compartment or chamber **26** will distribute itself over the full area of the bottom of the wick chamber, and passing through the perforations **24** will saturate the wadding **17** uniformly, as distinguished from conventional refueling devices, which force all the fuel into a particular area of the wadding, thus tending to prevent uniform saturation of the wadding.

The lighter in the illustrated example has the usual flint tube **28**, flint wheel **30**, and flint wheel rotating lever **32**. This is a typical flint and striker mechanism, and does not per se constitute part of the present invention. As will be presently made apparent, the lighter can have any type of striker mechanism, and can be of the type, for example, wherein the flint wheel is rotated manually.

The lighter can, in fact, be any type that involves the use of a liquid fuel.

In any event, mounted within the pump chamber **18** is a piston cylinder **34** extending substantially the full height of the lighter, and having a circular cross section in the illustrated example as shown in Figure 3, although said piston chamber could have other cross sectional configurations if desired. The piston cylinder **34** is formed open at its lower end, and is permanently closed at its upper end by an upper end wall **35**.

Extending axially within the piston cylinder **34** is a stem **36**, which is reciprocable within the piston cylinder and projects upwardly out of the chamber **18**, the upper, projecting end of the stem being provided with a head **38** providing a handle. Cemented or otherwise secured to

the underside of the head **38** is a resiliently compressible pad or gasket **40**. This, as shown in Figure 4, is adapted to seat, together with the handle **38**, in an angular recess **41** formed in the top wall of casing **12**, so that the handle will be flush with the top wall of the casing when the device is not in use, as best shown in Figure 4.

On the inner end of the stem **36** there is mounted a piston **42**.

At its lower end, the piston cylinder **34** is internally threaded, to receive a closure cap **44**. At its upper end, the piston cylinder is formed with a relief vent opening **45** registering with an opening formed in the bottom wall of the recess **41** to vent the upper portion of the piston cylinder **34** to atmosphere during the pumping operation. This is necessary in view of the fact that when piston cylinder **42** moves upwardly within the piston cylinder (see Figure 2) it is necessary to relieve the portion of the cylinder between piston **42** and end wall **35** of air that might otherwise be trapped therein, it being further necessary to permit the free flow of air during the downstroke of the piston to prevent the tendency toward formation of a vacuum between the piston and the upper end wall **35**.

Formed in the cap **44**, at the inner end thereof, is a small opening **46**. The cap **44**, as shown in Figure 2, is of hollow formation, and in the outer end wall thereof there is formed a flared opening **48** in registration with the opening **46**. Between the outer and inner walls of the cap **44** a spring-loaded check valve **50** is mounted, said valve being loaded to normally seat upon the edge of the opening **48**, the valve being adapted to permit the flow of fuel through the cap into the piston cylinder, while preventing the return flow of fuel from the piston cylinder outwardly through the cap **44**.

In the side wall of the piston cylinder **34**, in closely spaced relation to cap **44**, there is mounted a spring-loaded check valve **52**, controlling communication between the piston cylinder **34** and the fuel distribution chamber **26**. Valve **52** operates in a direction to permit the flow of fuel from the piston cylinder into the distribution chamber **26**, while preventing return flow of the fuel from the distribution chamber back into the cylinder.

It will be understood that when the pumping action occurs, causing fuel to be pumped into the distribution chamber **26** and forced upwardly through the perforations **24**, it is necessary to permit air within the wick chamber to be displaced by the fuel. To relieve the wick chamber of air that might otherwise be trapped therein, there is provided a relief vent **53**, formed in the side wall of the recess **41** and fully exposed during the pumping operation.

When the lighter is to be refueled, there is utilized a fuel container **56**. Container **56**, at its upper end, has an upwardly projecting, externally threaded, low neck **57**, and threaded on said neck is a cap **58**, centrally apertured to receive the upper end portion of a tubular stem **60** extending downwardly within the container **56** and terminating at its lower end in closely spaced relation to the bottom of the container **56**. At its lower end, stem **60** is formed with a flared portion **62**, having an inlet opening at its larger end, and mounted within the flared portion of the stem is a check valve **64** spring-loaded to normally close the opening of the flared portion. Valve **64** opens in a direction to permit fuel to flow from within the container upwardly within the stem **60**, while preventing return flow from the stem into the container proper.

At its upper end, the stem **60** projects beyond the cap **58**, so as to extend into the intake opening **48** of the cap **44** as shown in Figure 2.

As shown in Figure 2, in cap **58** there is formed a relief vent **66**, venting the interior of the container to atmosphere during the pumping operation.

It will be understood in this regard, that at times when the lighter is not being refueled, there would be applied, over the projecting portion of the stem **60**, another small

cap, not shown, which could have a friction fit with the upper end of the stem **60** to close the same. Such a cap would be provided with a flared portion or circumferential lip that would at the same time close the air vent **66**, thus to seal the container **56** when it is not in use to prevent evaporation of the fuel F.

In use of the device, the lighter would ordinarily remain sealed against the evaporation of the fuel saturating the wadding, due to the fact that the valves **52**, **50** are normally tightly closed by reason of the springs thereof. At the same time, the piston stem is in the Figure 4 position thereof, with the gasket **40** engaging in the recess **41** in position to close off and tightly seal, simultaneously, the piston chamber vent **45** and the wick chamber vent **53**. This is an important feature of the invention, in that the handle of the piston stem, as will be appreciated, automatically opens these vents when the pump is in operating position, with said handle also automatically closing the vents whenever the handle is in its normal, inoperative position recessed in the top wall of the lighter casing.

Assuming that it is desired to recharge the lighter with fuel, one merely seats the lighter upon the upper end of container **56**, in the positions shown in Figures 1 and 2. The upwardly projecting end of stem **60** engages in opening **48**, and one now elevates the pump stem **36** to or beyond the Figure 2 position.

When the stem **36** is shifted upwardly in the direction of the arrow shown in Figure 2, it will tend to cause a vacuum between cap **44** and piston **42**. As a result, valve **50** is unseated, and the fuel F will be drawn upwardly through the stem **60** into the piston cylinder, valve **64** also being unseated as the stem is raised.

This charges the piston cylinder with a predetermined or measured quantity of fuel, and thereafter, one merely depresses the stem **36**, so that the piston **42** forces the fuel through the check valve **52**, which will now be unseated while valve **50** is closed. The fuel thus is forced into the distribution chamber **26**, and upwardly through the perforations **24** to uniformly saturate the wadding **17**.

The number of strokes of the piston required to saturate the wadding with a predetermined quantity of fuel will, of course, depend upon the size of the lighter and other factors, and can be readily determined. A single stroke of the piston, for example, may be sufficient in some embodiments for charging the wadding with the exact amount of fuel found proper to fully saturate the same while not causing over or inadequate saturation.

When the lighter has been refueled, the piston will merely be disposed in its depressed, normal position shown in Figure 4, with the valves automatically moving to closed position and the vents **45**, **53** being closed by the gasket **40**.

If desired, the valve **52** could be flush with the inner surface of the piston cylinder **34**, rather than project inwardly beyond said inner surface in the manner shown in Figure 3. In these circumstances, the piston **42** might be thicker, and as a result, with the handle **38** in its fully depressed position shown in Figure 4, the piston **42** may be proportioned and located to sealably engage in position to close the opening **46** as well as the opening of the valve **52**, thus to even further insure against the leakage of fumes or evaporation of fuel.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A lighter and fuel injecting device therefor comprising a lighter casing including communicating wick and pump chambers; a fuel container engageable with the casing in communication with the pump chamber; a pair of check valves, one arranged for flow of fuel from the fuel container to the pump chamber and the other for flow of fuel from the pump chamber to the wick chamber; and pump means in the pump chamber operative to pump fuel through the valves, thus to effect transfer of fuel from the fuel container to the wick chamber.

2. A lighter and fuel injecting device therefor comprising a lighter casing including communicating wick and pump chambers; a fuel container engageable with the casing in communication with the pump chamber; a pair of check valves, one arranged for flow of fuel from the fuel container to the pump chamber and the other for flow of fuel from the pump chamber to the wick chamber; and pump means in the pump chamber operative to pump fuel through the valves, thus to effect transfer of fuel from the fuel container to the wick chamber, the wick chamber having a bottom wall perforated over substantially the full area of the bottom of the wick chamber to provide the communication between the wick chamber and the pump chamber, whereby to uniformly distribute fuel over substantially the full area of the bottom of the wick chamber.

3. A lighter and fuel injecting device therefor comprising a lighter casing including communicating wick and pump chambers; a fuel container engageable with the casing in communication with the pump chamber; a pair of check valves, one arranged for flow of fuel from the fuel container to the pump chamber and the other for flow of fuel from the pump chamber to the wick chamber; and pump means in the pump chamber operative to pump fuel through the valves, thus to effect transfer of fuel from the fuel container to the wick chamber, comprising a piston stem working in the pump chamber, said stem having an outer end projecting out of the pump chamber, a handle on the projecting end of the stem, and a piston on the inner end of the stem.

4. A lighter and fuel injecting device therefor comprising a lighter casing including communication wick and pump chambers; a fuel container engageable with the casing in communication with the pump chamber; a pair of check valves, one arranged for flow of fuel from the fuel container to the pump chamber and the other for flow of fuel from the pump chamber to the wick chamber; and pump means in the pump chamber operative to pump fuel through the valves, thus to effect transfer of fuel from the fuel container to the wick chamber, comprising a piston stem working in the pump chamber, said stem having an outer end projecting out of the pump chamber, a handle on the projecting end of the stem, and a piston on the inner end of the stem, said casing having a recess receiving the handle in the fully depressed position of the handle.

5. A lighter and fuel injecting device therefor comprising a lighter casing including communicating wick and pump chambers; a fuel container engageable with the casing in communication with the pump chamber; a pair of check valves, one arranged for flow of fuel from the fuel container to the pump chamber and the other for flow of fuel from the pump chamber to the wick chamber; and pump means in the pump chamber operative to pump fuel through the valves, thus to effect transfer of fuel from the fuel container to the wick chamber, comprising a piston stem working in the pump chamber, said stem having an outer end projecting out of the pump chamber, a handle on the projecting end of the stem, and a piston on the inner end of the stem, said casing having a recess receiving the handle in the fully depressed position of the handle, the recess having vent openings in its walls communicating one with the pump chamber and one with the wick chamber to relieve said chambers of air during operation of the pump means, the handle having a gasket sealing said vent openings in the fully depressed position of the handle.

6. A lighter and fuel injecting device therefor comprising: a lighter casing including a partition dividing the casing into communicating wick and pump chambers, the partition merging into a wall perforated substantially over its full area, said wall providing a bottom for the wick chamber and being spaced from the bottom of the casing to define below the wick chamber a fuel distribution chamber opening into the pump chamber; a piston cylinder within the pump chamber; a fuel container engageable with the casing in communication with the piston cylinder; a pair of check valves in the piston cylinder one arranged for flow of fuel from the fuel container to the piston cylinder and the other for flow of fuel from the piston cylinder to the distribution chamber; and pump means in the piston cylinder operative to pump fuel through the valves, thus to effect the transfer of fuel from the fuel container to the wick chamber.

7. A lighter and fuel injecting device therefor comprising: a lighter casing including a partition dividing the casing into communicating wick and pump chambers, the partition merging into a wall perforated substantially over its full area, said wall providing a bottom for the wick chamber and being spaced from the bottom of the casing to define below the wick chamber a fuel distribution chamber opening into the pump chamber; a piston cylinder within the pump chamber; a fuel container engageable with the casing in communication with the piston cylinder; a pair of check valves in the piston cylinder one arranged for flow of fuel from the fuel container to the piston cylinder and the other for flow of fuel from the piston cylinder to the distribution chamber; pump means in the piston cylinder operative to pump fuel through the valves, thus to effect the transfer of fuel from the fuel container to the wick chamber; and a cap closing one end of the piston cylinder, said cap being hollowly formed and being apertured at opposite ends thereof, said one check valve being mounted within the cap, said fuel container being engageable against the cap in communication with one of the openings of the cap to provide the communication between the fuel container and piston cylinder.

8. A lighter and fuel injecting device therefor comprising: a lighter casing including a partition dividing the casing into communicating wick and pump chambers, the partition merging into a wall perforated substantially over its full area, said wall providing a bottom for the wick chamber and being spaced from the bottom of the casing to define below the wick chamber a fuel distribution chamber opening into the pump chamber; a piston cylinder within the pump chamber; a fuel container engageable with the casing in communication with the piston cylinder; a pair of check valves in the piston cylinder one arranged for flow of fuel from the fuel container to the piston cylinder and the other for flow of fuel from the piston cylinder to the distribution chamber; pump means in the piston cylinder operative to pump fuel through the valves, thus to effect the transfer of fuel from the fuel container to the wick chamber; and a cap closing one end of the piston cylinder, said cap being hollowly formed and being apertured at opposite ends thereof, said one check valve being mounted within the cap, said fuel container being engageable against the cap in communication with one of the openings of the cap to provide the communication between the fuel container and piston cylinder, the fuel container including a hollow, check-valved outlet stem projecting into said one opening of the cap in the casing-engaging position of the fuel container.

9. A lighter and fuel injection device therefor comprising a lighter casing including communicating wick and pump chambers; a fuel container engageable with the

casing in communication with the pump chamber; a pair of check valves, one arranged for flow of fuel from the fuel container to the pump chamber and the other for flow of fuel from the pump chamber to the wick chamber; and pump means in the pump chamber operative to pump fuel through the valves, thus to effect transfer of fuel from the fuel container to the wick chamber, comprising a piston stem working in the pump chamber, said stem having an outer end projecting out of the pump chamber, a handle on the projecting end of the stem, and a piston on the inner end of the stem, said casing having a recess receiving the handle in the fully depressed position of the handle, the recess having vent openings in its walls communicating one with the pump chamber and one with the wick chamber to relieve said chambers of air during operation of the pump means, the handle having a gasket sealing said vent openings in the fully depressed position of the handle, the walls of the recess being at right angles to each other with one wall

of the recess lying in a plane perpendicular to the path in which the piston stem works, the other wall of the recess lying in a plane normal to the plane of the first named wall, one vent opening being formed in the first and the other vent opening being formed in the second wall, said gasket having perpendicularly related bottom and side faces disposed in face-to-face contact with the respective walls of the recess, in said fully depressed position of the handle.

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