

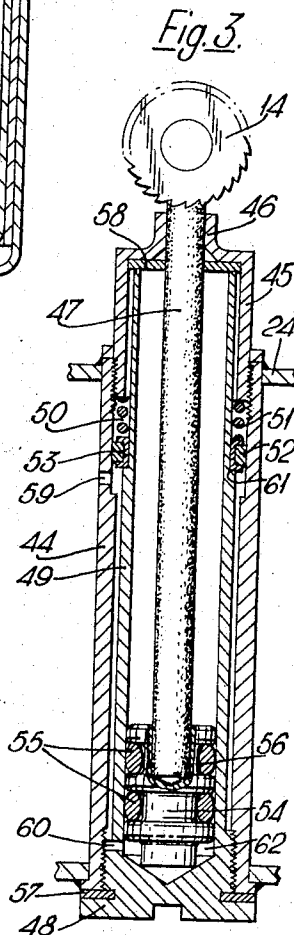
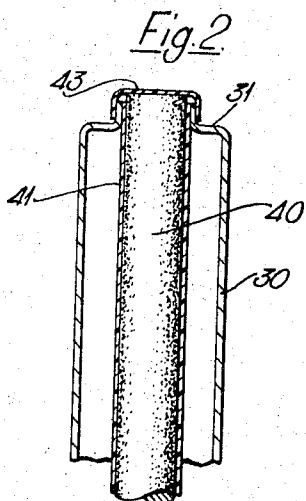
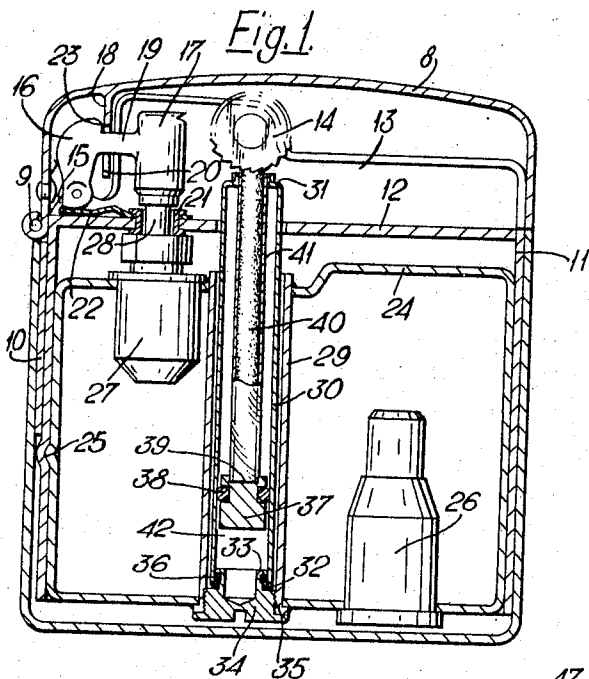
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CIGARETTE LIGHTERS

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**CIGARETTE LIGHTERS**

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Smoker's lighters usually have a fuel reservoir and a flint guide which extends through or beside the reservoir and which has a spring for urging a flint along the guide into engagement with an abrasive element, such as a flint wheel, for igniting fuel at a burner. The provision of a spring has conventionally been accepted as a necessary part of a lighter.

It has previously been proposed in connection with a gas burning smoker's lighter that, instead of using a spring, the lighter is arranged so that in use the pressure of the liquefied fuel gas contained in the fuel reservoir provides the force which urges the flint along the guide into engagement with the abrasive element. With this arrangement there is no restriction on the length of the flint other than the overall size of the lighter, and since the compressed gas is partly in the liquid phase, the force with which the flint is pressed against the abrasive element does not decrease as the flint is used up but depends only on the vapour pressure of the liquefied gas and this depends on the temperature. In the previous proposal the gas pressure was converted to a force to urge the flint along the guide by means of a piston which slides in the cylindrical flint guide behind the flint and seals a space in the end of the guide remote from the abrasive element in communication with the interior of the fuel reservoir.

This construction is not suitable for petrol burning lighters where there is no gaseous fuel and does in any case involve difficulties in servicing, sealing and recharging the flint feed mechanism.

In accordance with the present invention, in a smoker's lighter of the kind which has an igniting mechanism consisting of a guide along which the flint is urged into engagement with the abrasive element, the flint guide comprises an outer tube which extends towards the abrasive element and an inner sleeve which is arranged to support a flint within the outer tube and forms the cylinder of a piston and cylinder arrangement that uses the pressure of a compressed gas contained in the lighter to urge the flint out of the inner sleeve and outer tube into engagement with the abrasive element, the inner sleeve being removable through an end of the outer tube to enable the guide to be recharged with a new flint.

With this arrangement the outer tube may be fixed in position and take the place of the conventional flint guide and may extend between and through and seal the upper and lower walls of the fuel tank of the lighter whereupon the guide can be recharged with a new flint simply by removing the inner sleeve from the outer tube without disturbing the seal. One advantage of this construction is that the inner sleeve can be made as a disposable element which, when the flint is used up, is thrown away and replaced by a new sleeve containing a new flint and its own charge of compressed gas, such as Freon.

A further advantage is that if the inner sleeve is removable through the end of the outer tube remote from the abrasive element no separation of the outer tube, and the parts to which it is attached, from the abrasive element, which usually overlies the end of the flint guide, is necessary.

When the lighter is gas burning, the compressed gas which provides the force for urging the flint along the

flint guide may again be the liquefied gaseous fuel from the fuel reservoir of the lighter. This has the advantages that only one supply of gas is necessary on the lighter and, since the fuel reservoir normally contains some gas in the liquid phase, the gas will be at its vapour pressure which will always be above atmospheric pressure and will only vary with temperature. We find that liquefied gaseous butane fuels commonly used in gas burning lighters are perfectly capable of providing sufficient force to operate the flint feed mechanism and if, for example, the gas is applied to a piston having a diameter of between 0.2 and 0.25 in. the lighter functions very satisfactorily at temperatures between 35° F. and 90° F. In addition, if there is a slight leak in the cylinder used for converting the compressed gas pressure into a force, the supply of compressed gas will be continually replenished from the fuel reservoir. Care must however be taken to preclude escape of the fuel in the reservoir into the atmosphere during a flint recharging operation when the inner sleeve is removed from the outer tube. For this purpose a sealing device may be provided which is movable relatively to the outer tube between first and second positions in which it opens and closes respectively a gas inlet passage through which the inner sleeve is supplied with gas from the fuel reservoir. The sealing device may be provided by at least one annular sealing ring occupying together with a helically coiled compression spring an annular space between the inner sleeve and outer tube, the arrangement being such that when the inner sleeve is assembled in the outer tube the sealing ring is held against the action of the spring away from the port or ports forming part of the gas inlet passage in the wall of the outer tube but when the sleeve is removed from the outer tube during a flint recharging operation the spring urges the sealing ring along the tube until it seals the exit from the port or ports. In this sealed position, a single sealing ring may actually cover the ports but alternatively a pair of sealing rings may straddle the ports.

Minor advantages do exist in using the pressure of the liquefied fuel gas for urging the flint along the guide into engagement with the abrasive element and indeed no liquefied gas fuel exists if the lighter is of the petrol burning type. Thus, gases such as butane and propane which are commonly used as a fuel in gas burning smoker's lighters are naturally very inflammable and do not have a vapour pressure at normal atmospheric pressures quite as large as would be desirable in conjunction with a small piston for producing the necessary force in spite of the fact that the use of higher pressure makes sealing more difficult. There are therefore certain advantages in using a separate source of compressed gas such as liquefied Freon, which is non-flammable and non-toxic. Irrespective of whether the lighter is petrol or gas burning, the use of a separate source of compressed gas in the inner sleeve make it possible to construct the inner sleeve as a separate disposable element in which, prior to use, a flint is retained against the pressure of a charge of compressed gas behind the piston by means of a cap which is fitted over the open end of the sleeve and is arranged to be removed to expose the flint when the element is fitted to a lighter. The cap may be a thin film of material the film being arranged to be torn to expose the flint upon operation of the abrasive element.

The flint may be arranged to project through an opening of reduced diameter in the end of the inner sleeve or outer tube adjacent to the abrasive element. The flint will then in use be located within the inner sleeve with an appreciable annular clearance between the outer surface of the flint and the inner surface of the sleeve and in order to hold the pieces of the flint together in the event of the flint being accidentally broken within the sleeve,

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the flint may be sheathed in a thin skin which is arranged to be rubbed away as the abrasive element rubs against the flint in use. If the sheath is smooth and made for example of polytetrafluoroethylene, it may serve the dual purpose of providing a good seal with surrounding O-sealing rings when the construction of the flint guide is such that the flint itself forms the piston which rubs through one or more O-sealing rings mounted in the inner walls of the inner sleeve.

Some examples of cigarette lighters constructed in accordance with the present invention are illustrated in the accompanying drawings, in which:

FIGURE 1 is a central vertical section through one lighter;

FIGURE 2 is an enlarged detail of part of the flint guide of the lighter shown in FIGURE 1; and,

FIGURE 3 shows the flint guide of a modification of the lighter illustrated in FIGURE 1.

The cigarette lighter illustrated in FIGURES 1 and 2 has an outer casing fitted with a lid which is hinged at 9 to a plate 10 fixed within one side wall of the outer casing. Slidable into the outer casing 1 through its open upper end when the lid 2 is open is an inner casing 11 having an open bottom and a closed top formed by a bridge 12. Extending upwards from the side walls of the inner casing 11 above the level of the bridge 12 are a pair of plates 13 between which is freely rotatably mounted a serrated flint thumb wheel 14. Pivotaly mounted between a pair of lugs 15 formed integrally with the plates 13 is a lever 16 to which is fitted a snuffer cap 17. When the lid 8 is closed the link 16 is located within a cup formed behind a downwardly extending partition 18 within the lid and an arm 19 interconnecting the link 16 and snuffer cap 17 extends through a slot 20 in the partition 18. Secured to the bridge 12 by a hollow rivet 21 is a leaf spring 22 which bears against the bottom of the link 16 and urges it to rotate so that its nose 23 engages the partition 18 above the slot 20 and holds the link closed. When the lid is open the link 16 swings with it about its pivot and passes through a dead centre position with respect to the spring 22 and the back of the link 16 then engages the back of the cup to hold the lid open. When the lid is open, the nose 23 is clear of the partition 18 and the snuffer cap 17 can be swung with the link 16 down to the closed position illustrated in FIGURE 1 without disturbing the open lid.

A fuel tank 24 for liquefied gaseous butane fuel is retained firmly within the inner casing 11 by means of a co-operating dimple and recess 25 in their adjacent end walls. The tank 24 is fitted with a gas inlet valve 26 and a burner valve 27 carrying a burner 28 which, in the assembled position, extends through the hollow rivet 21. In its closed position the snuffer cap 17 overlies the burner 28 and closes the burner valve 27 but when it is rocked with the lid 8 as the lid opens, the burner 28 is exposed and gas from the tank issues through the burner valve 27 and out through the burner 28.

Extending through and between and sealed to the top and bottom walls of the tank 24 is an open ended cylindrical outer tube 29 of a flint guide. Loosely contained within the outer tube 29 is an inner sleeve 30 one end 31 of which is spun over to form an opening of reduced diameter immediately beneath the flint wheel 14 and the other end 32 of which is upset into a groove in a spigot 33 projecting from an externally screw threaded plug 34 which screws into the lower end 35 of the outer tube 29. An O-sealing ring 36 is interposed between the lower end 32 of the sleeve 30 and the spigot 33 to seal the lower end of the sleeve 30. Slidable within the sleeve 30 is a piston 37 which is sealed to the sleeve by an O-sealing ring 38 located in an annular groove in the piston. The top of the piston is formed with a recess 39 which receives the lower end of a flint 40 the upper end of which in use extends through the opening in the end 31 of the sleeve. The flint 40 is sheathed in a thin skin 41 of polytetra-

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fluoroethylene which assists in holding together any pieces into which the flint 40 might accidentally become broken within the sleeve 30.

A space 42 in the bottom of the sleeve 30 contains a charge of compressed liquefied Freon gas which continually urges the piston 37 and flint 40 upwards along the cylinder formed by the sleeve 30 so that the upper end of the flint 40 is urged into engagement with the flint wheel 14.

In use the lid 8 is opened so that gas flows out through the burner 28 and the flint wheel 14 is manually operated by a user's thumb to eject a stream of sparks from the flint 40 to ignite the gas. The sheath 41 does not impede the production of the sparks and is continually rubbed away by the flint wheel 14 as the flint is used up.

When the flint has been used up, the lid is opened and the link 16 and snuffer cap 17 are rocked back to their closed position to stop the gas issuing through the burner 28. The inner casing 11 and tank 24 are then pulled upwards out of the outer casing 7 to expose the plug 34. The tank 24 is however so firmly retained by the co-operating dimple and recess 25 within the inner casing 11 that it is not readily possible for the user to remove the tank 24 from the inner casing. In an emergency however this can be done by the manufacturer or his agents. The plug 34 is then unscrewed from the tube 29 and is withdrawn together with the sleeve 30 from the tube 29. This component which is removed is thrown away and is replaced by a new component in which as shown in FIGURE 2 the flint 40 is retained by a thin synthetic plastic skin 43 forming a cap which covers the opening in the end 31 of the new sleeve 30. When the plug 34 of the new element has been screwed into the tube 29 operation of the flint wheel 14 tears the cap 43 and enables the new charge of Freon behind the piston in the new component to urge the new flint into engagement with the flint wheel so that sparks can be produced again. The inner casing 11 and tank 24 are reinserted into the outer casing 7 and the lighter is ready for use again. The gas tank 24 is refuelled with gas by removing the inner casing 11 and tank 24 from the outer casing 7 again and applying the nozzle of a refilling container to the inlet valve 26 in the conventional manner.

The flint feed arrangement of outer tube 29 and throw away component is equally applicable to a petrol burning cigarette lighter in which case the fuel tank 24 is padded with cotton wool, the inlet valve 26 is replaced by a conventional petrol inlet and the burner valve 27 and burner 28 are replaced by the conventional wick.

In the modification illustrated in FIGURE 3, the outer tube 29 is replaced by an outer tube 44 which extends through and between and is sealed to the upper and lower walls of the fuel tank 24 for liquefied gaseous fuel. Screwed into the upper end of the outer tube 44 is a flint guide 45 having an end portion 46 defining an opening of reduced diameter for guiding a flint 47 into engagement with the abrasive element 40. A plug 48 screws into the lower end of the outer tube 44 and is formed integrally with a cylindrical tube 49 which is a loose fit within the tube 44. The inner surface of the tube 44 and the outer surface of the sleeve 49 are relieved to provide between them and beneath the bottom of the cap 45 an annular space 50 which contains a helically coiled compression spring 51 and a sealing ring 52 mounted in a carrier ring 53 of outwardly facing channel section.

Within the cylindrical sleeve 49 there slides a piston 54 carrying in two annular grooves oval section O-sealing rings 55 which rub over the inner wall of the sleeve 49 and seal the piston to the sleeve. A recess 56 is formed in the top of the piston to locate the bottom of the flint 47.

The plug 48 is sealed to the bottom of the outer tube 44 by a sealing washer 57 to seal the bottom of the annular space between the sleeve 49 and outer tube 44 and the top of this space is sealed by a further sealing wash-

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er 58 trapped between the top of the sleeve 49 and the shoulder inside the cap 45. A port 59 is formed in the wall of the outer tube 44 through its relieved portion and a further port 60 is formed through the wall of the sleeve 49 adjacent to the plug 48. When the sleeve 49 is assembled within the outer tube 44 with the plug 48 screwed in position as shown in FIGURE 3, the carrier ring 53 is held upwards against the action of the spring 51 by a shoulder 61 at the bottom of the relieved portion of the sleeve 49 so that the sealing ring 52 is clear of the port 59. Liquefied gaseous fuel under pressure in the tank 24 is therefore able to percolate through the port 59, down through the annular space between the sleeve 49 and outer tube 44, through the port 60 into a space 62 within the sleeve beneath the piston 54. The piston 54 and flint 47 receive from the gas in the space 62 a force which urges the flint and piston upwards in the sleeve 49 so that the top of the flint 47 is urged into engagement with the flint wheel 14.

When the flint 47 has been used up, the inner casing 11 and gas tank 24 are removed from the outer casing 7 as before, the plug 48 is unscrewed from the bottom of the outer tube 44 and the plug and sleeve 49 are withdrawn out through the bottom of the outer tube 44. As the sleeve 49 is lowered within the tube, the carrier ring 53 is urged downwards by the spring 51 until the sealing ring 52 covers and closes the port 59 to prevent leakage of gas from the tank 24. At the same time the space 62 is vented to atmosphere through the port 60 so that the stub of the old flint 47 can be shaken out of the sleeve 49 and a new one inserted. Since the space 62 is vented no resistance is felt while the piston 54 is pushed back along the sleeve 49. When the sleeve 49 with its new flint is reinserted into the outer tube 44 and the plug 48 is screwed into position, the shoulder 61 once again moves the carrier ring 53 against the action of the spring 51 so that the sealing ring 52 exposes the port 59 once more and the space 62 is put into communication with the interior of the tank 24.

We claim:

1. In a smoker's lighter comprising a fuel tank, a burner mounted on said fuel tank, an abrasive element, a flint guide, and means urging a flint along said guide into engagement with said abrasive element whereby operation of said abrasive element produces sparks to ignite fuel at said burner; the improved flint guide and urging means which comprises an open ended outer tube extending towards said abrasive element, an inner sleeve positioned within said outer tube and having a closed end remote from and an open end adjacent to said abrasive element, piston means slidable longitudinally within said inner sleeve, means sealing said piston means to said inner sleeve, a source of compressed gas communicating with the space within said sleeve between said closed end and said piston means and adapted to urge said piston means along said inner sleeve and said flint into engagement with said abrasive element, and means releasably securing said inner sleeve within said outer tube whereby said inner sleeve is removable through said open end of said outer tube remote from said abrasive element for recharging said guide with a new flint.

2. A gas burning smoker's lighter according to claim 1 wherein said fuel tank is a reservoir tank for liquified gaseous fuel, and means are provided in connecting said reservoir and said space within said inner sleeve between said closed end and said piston means whereby said piston means is urged along said inner sleeve by a force derived from the pressure of said gaseous fuel.

3. A smoker's lighter according to claim 1, wherein said inner sleeve is a disposable element containing a charge of compressed gas sealed in said space between said closed end and said piston means, and there is further provided cap means fitted over said open end of sleeve for retaining a flint within said inner sleeve against the pressure of said gas charge prior to use, said cap

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means being adapted to be removed to expose said flint when said inner sleeve is fitted to the lighter.

4. A smoker's lighter according to claim 3, wherein said cap means is a thin film of material, said film being adapted to be torn to expose said flint upon operation of said abrasive element.

5. A smoker's lighter according to claim 1, wherein said open end of said inner sleeve includes means defining a central opening of reduced diameter through which said flint projects into engagement with said abrasive element, and said flint is sheathed in a thin skin which is adapted to be rubbed away as said abrasive element rubs against said flint in use.

6. In a smoker's lighter comprising a fuel tank, a burner mounted on said fuel tank, an abrasive element, a flint guide, and means urging a flint along said flint guide into engagement with said abrasive element, whereby operation of said abrasive element produces sparks to ignite fuel at said burner; the improved flint guide and urging means which comprises an outer tube extending towards said abrasive element and having an open end nearest said abrasive element, an inner sleeve positioned within said outer tube and having a closed end remote from an open end adjacent to said abrasive element, a flint located within said inner sleeve and adapted to be guided through said open end of said inner sleeve into engagement with said abrasive element, a source of compressed gas sealed within said inner sleeve interposed between said closed end and said flint and adapted to urge said flint out through said open end of said inner sleeve, removable cap means for closing said open end of said inner sleeve and adapted to hold said flint within said sleeve against the pressure of said gas prior to use, and means releasably securing said inner sleeve within said outer tube whereby said inner sleeve and its contents constitute a disposable element which is removable from said outer tube for replacement by a new element.

7. The smoker's lighter according to claim 6, further comprising piston means slidable within said inner sleeve between said source of gas and said flint and means for sealing said piston means to said inner sleeve.

8. The smoker's lighter according to claim 6, wherein said cap means is a thin film of material adapted to be ruptured to expose said flint upon operation of said abrasive element.

9. In a smoker's lighter comprising a reservoir for liquid gaseous fuel, a burner mounted on said reservoir, an abrasive element, a flint guide, and means urging a flint along said guide into engagement with said abrasive element whereby operation of said abrasive element produces sparks to ignite fuel at said burner; the improved flint guide and urging means which comprises an open ended outer tube extending towards said abrasive element, an inner sleeve positioned within said outer tube and having a closed end remote from and an open end adjacent to said abrasive element, piston means slidable longitudinally within said inner sleeve, means sealing said piston means to said inner sleeve, a source of compressed gas communicating with the space within said sleeve between said closed end and said piston means and adapted to urge said piston means along said inner sleeve and said flint into engagement with said abrasive element, means releasably securing said inner sleeve within said outer tube whereby said inner sleeve is removable through said open end of said outer tube remote from said abrasive element for recharging said guide with a new flint, a gas inlet passage connecting said gas reservoir with said space within said inner sleeve between said closed end and said piston means, and a sealing device movable between first and second positions in which it opens and closes said gas inlet passage when said inner sleeve is secured within said outer tube and closes said passage when said inner sleeve is removed from said outer tube whereby said gaseous fuel in said reservoir cannot escape into the atmosphere during a flint recharging operation.

10. In a smoker's lighter comprising a reservoir for liquid gaseous fuel, a burner mounted on said reservoir, an abrasive element, a flint guide, and means urging a flint along said guide into engagement with said abrasive element whereby operation of said abrasive element produces sparks to ignite fuel at said burner; the improved flint guide and urging means which comprises an open ended outer tube extending towards said abrasive element, an inner sleeve positioned within said outer tube and having a closed end remote from and an open end adjacent to said abrasive element, piston means slidable longitudinally within said inner sleeve, means sealing said piston means to said inner sleeve, a source of compressed gas communicating with the space within said sleeve between said closed end and said piston means and adapted to urge said piston means along said inner sleeve and said flint into engagement with said abrasive element, means releasably securing said inner sleeve within said outer tube whereby said inner sleeve is removable through said open end of said outer tube remote from said abrasive element for recharging said guide with a new flint, a gas inlet duct connecting said reservoir with said space within said inner sleeve between said closed end and said piston means, at least one port through said outer tube forming a part of said gas inlet duct, annular sealing ring means mounted for axial movement between said inner sleeve and said outer tube and rubbing over the inner surface of said outer tube, a helically coiled compression spring mounted between said inner sleeve and said outer tube and adapted to urge said sealing ring means to a position in which said sealing ring means seals the exit from said port to close said gas inlet duct, and means

carried by said inner sleeve and adapted upon insertion of said inner sleeve within said outer tube to engage said sealing ring and move said sealing ring against the action of said spring to uncover said port.

11. The improved removable flint guide and urging means unit for use in a smoker's lighter provided with a fuel tank, an abrasive element, and an outer tube extending through said fuel tank to a point adjacent said abrasive element, said unit comprising an inner sleeve having an open end and a closed end, said sleeve being adapted to be positioned within said tube with said open end adjacent said abrasive element, a flint slidably positioned within said sleeve, a sealed source of compressed gas within said inner sleeve interposed between said closed end and said flint and adapted to urge said flint out through said open end of said inner sleeve, removable cap means for closing said open end of said inner sleeve and adapted to hold said flint within said sleeve against the pressure of said gas prior to use, and means releasably securing said inner sleeve within said outer tube whereby said inner sleeve and its contents constitute a disposable element which is removable from said outer tube for replacement by a new element.

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