Feb. 13, 1951 J. SIMON ET AL 2,541,111

CIGARETTE LIGHTER

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Fig. 1.

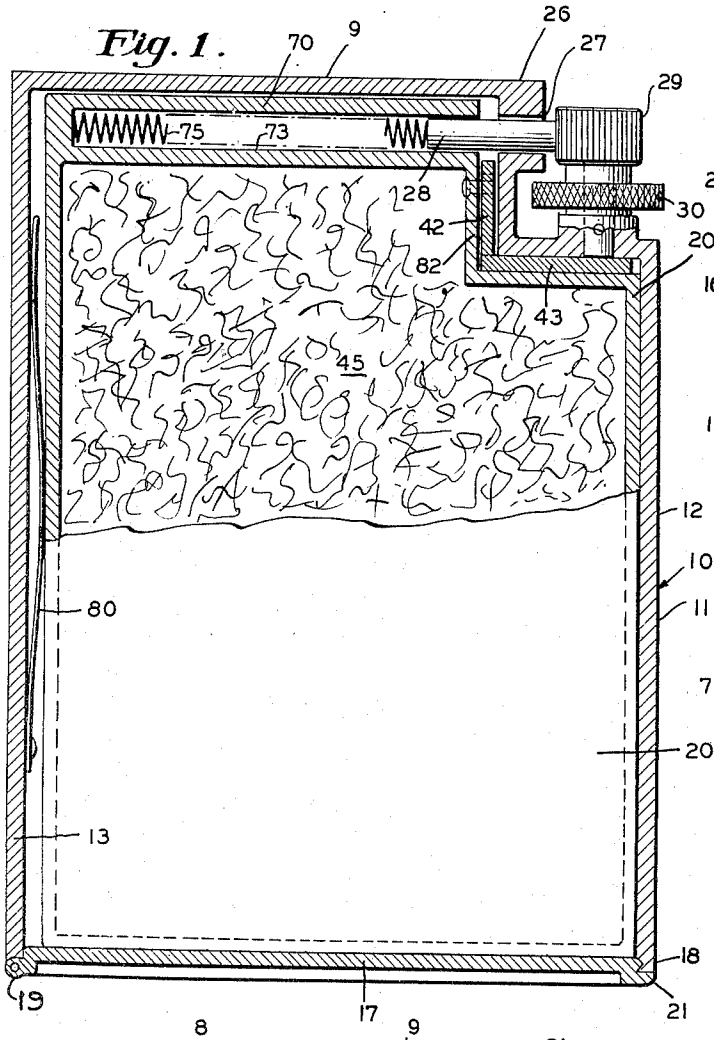


Fig. 2.

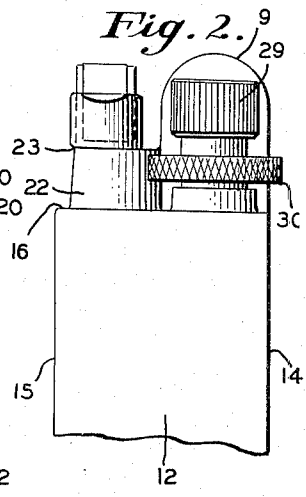


Fig. 3.

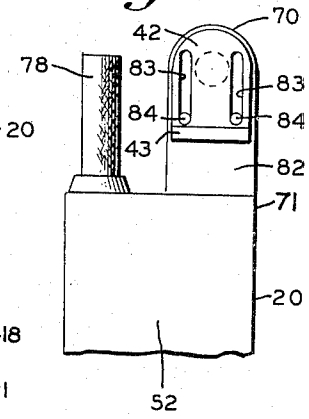
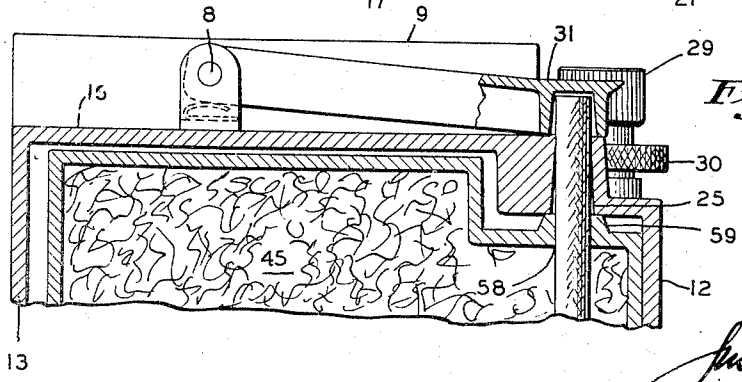


Fig. 4.



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CIGARETTE LIGHTER

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Fig. 5.

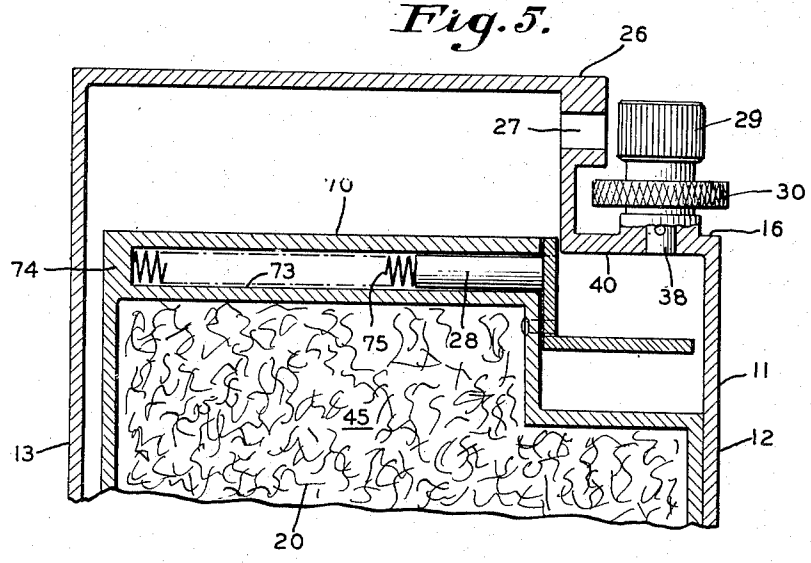


Fig. 6.

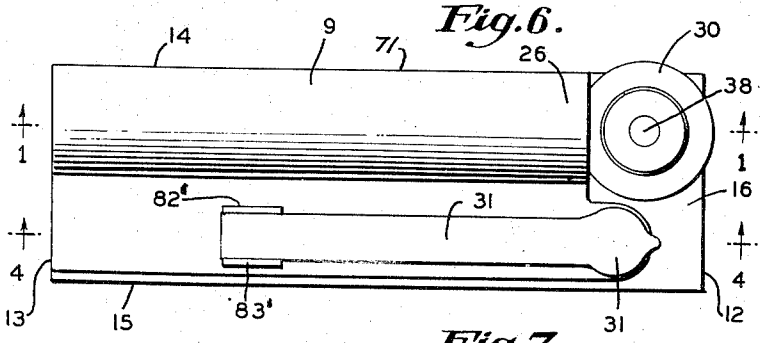
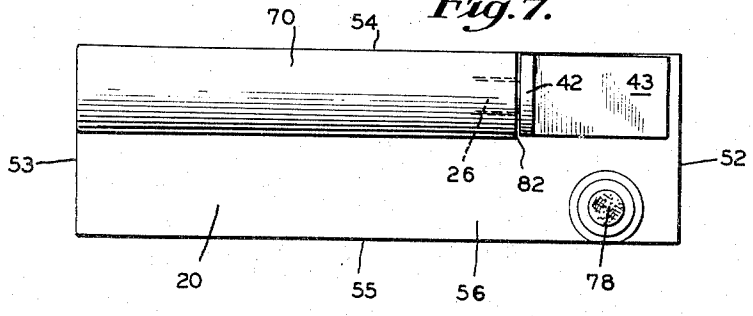


Fig. 7.



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CIGARETTE LIGHTER

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Fig. 8.

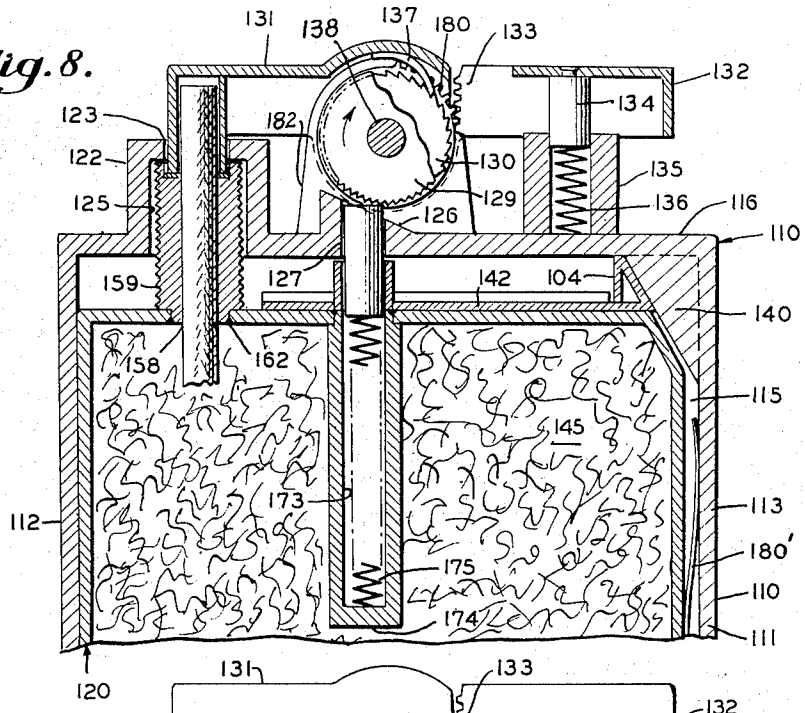

Fig. 9.

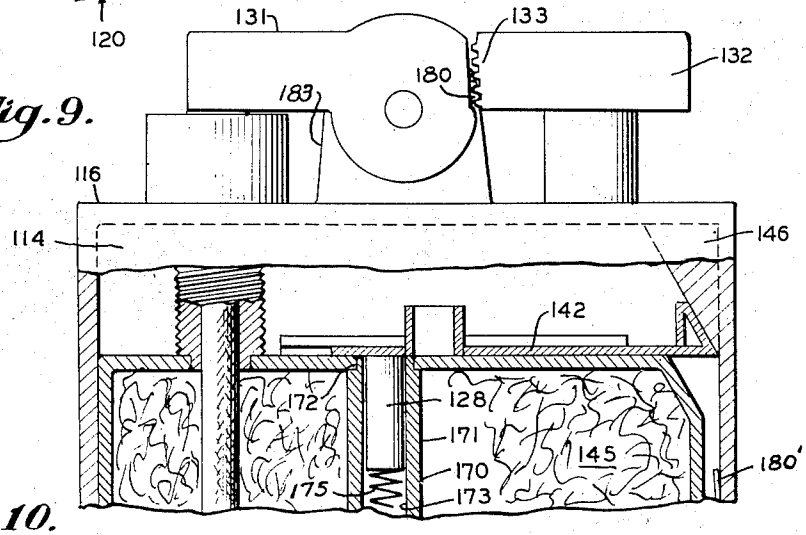

Fig. 10.

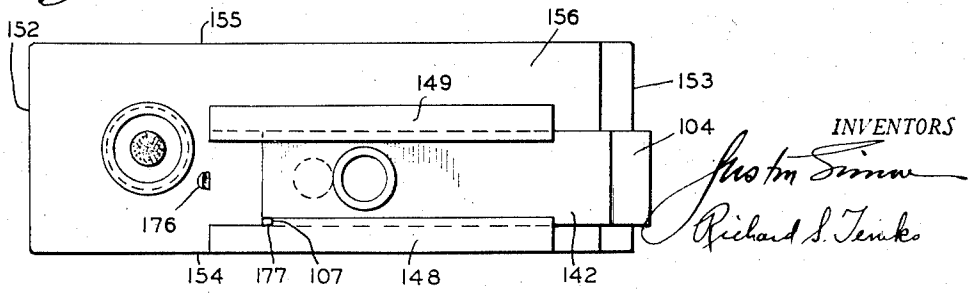

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Fig. 11.

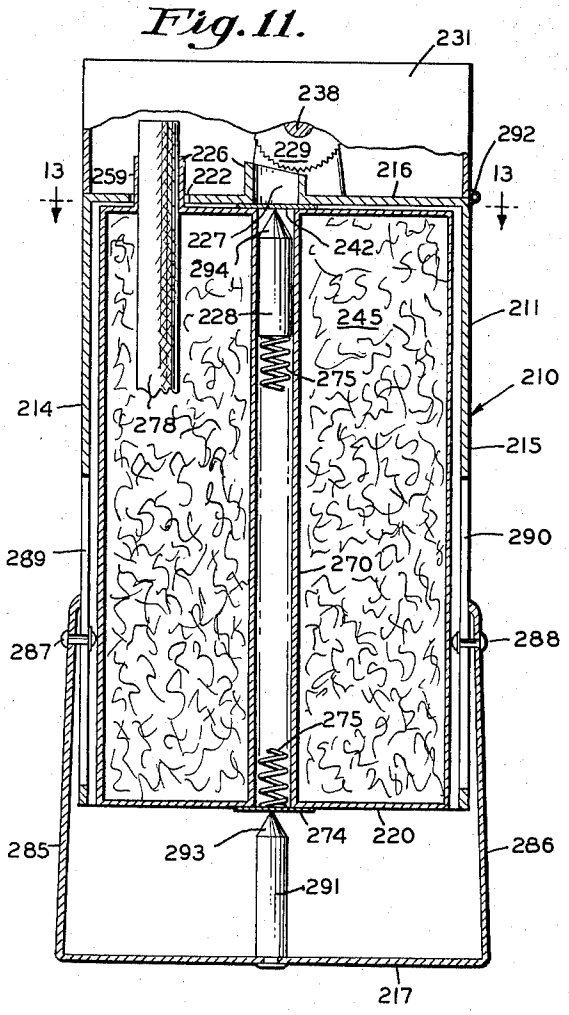

Fig. 12.

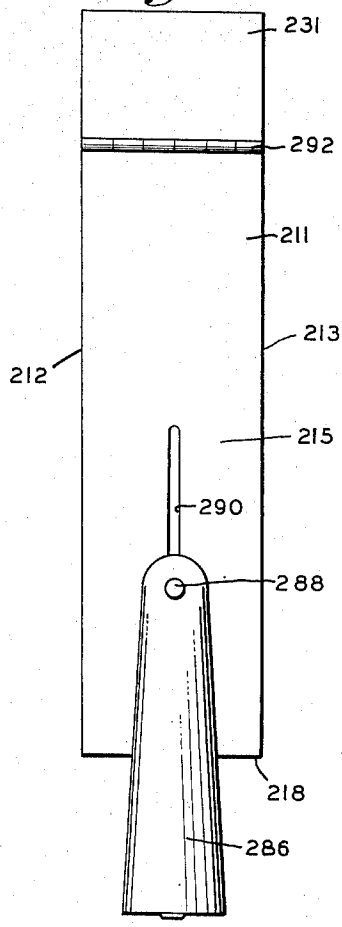

Fig. 13.

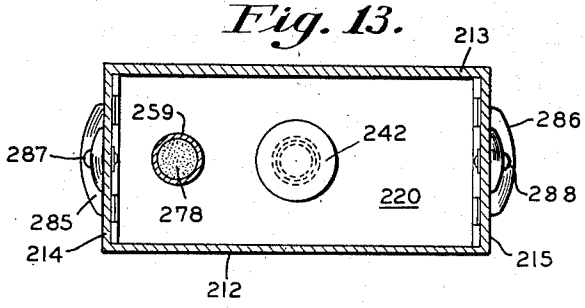

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Fig. 14.

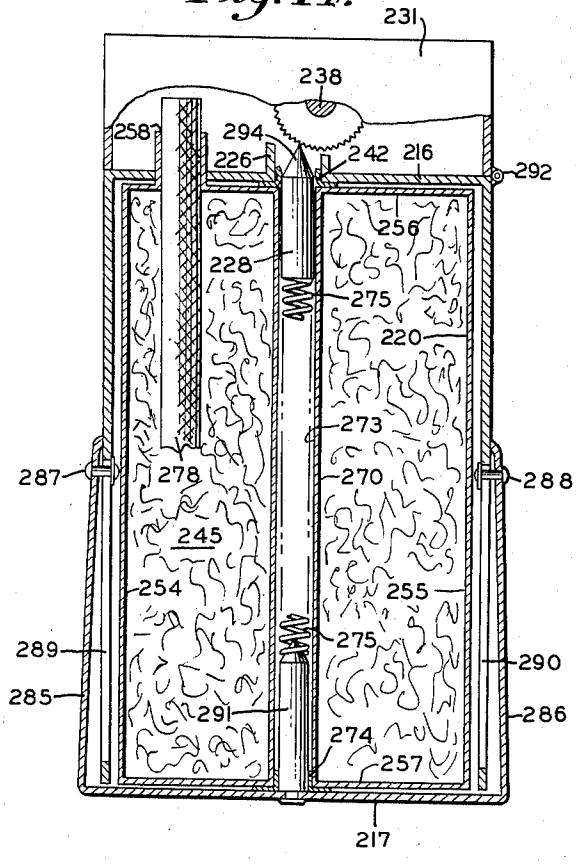
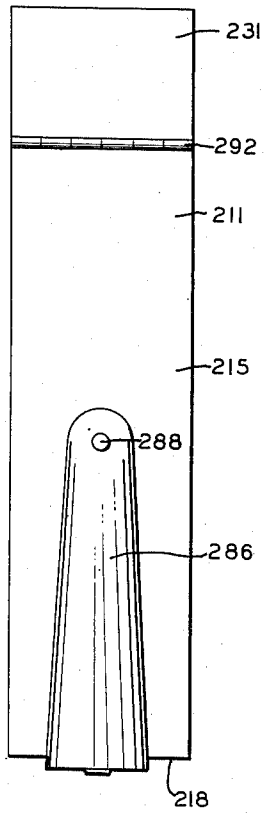


Fig. 15.



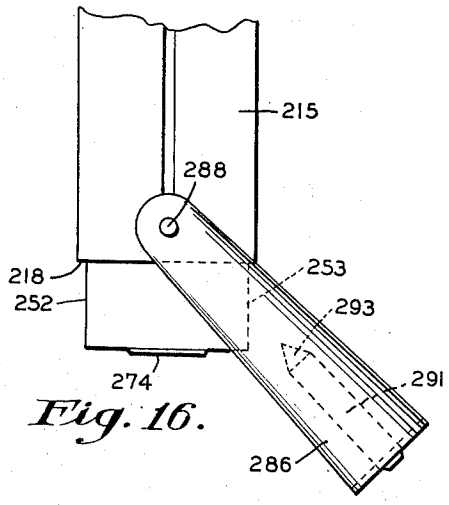


Fig. 16.

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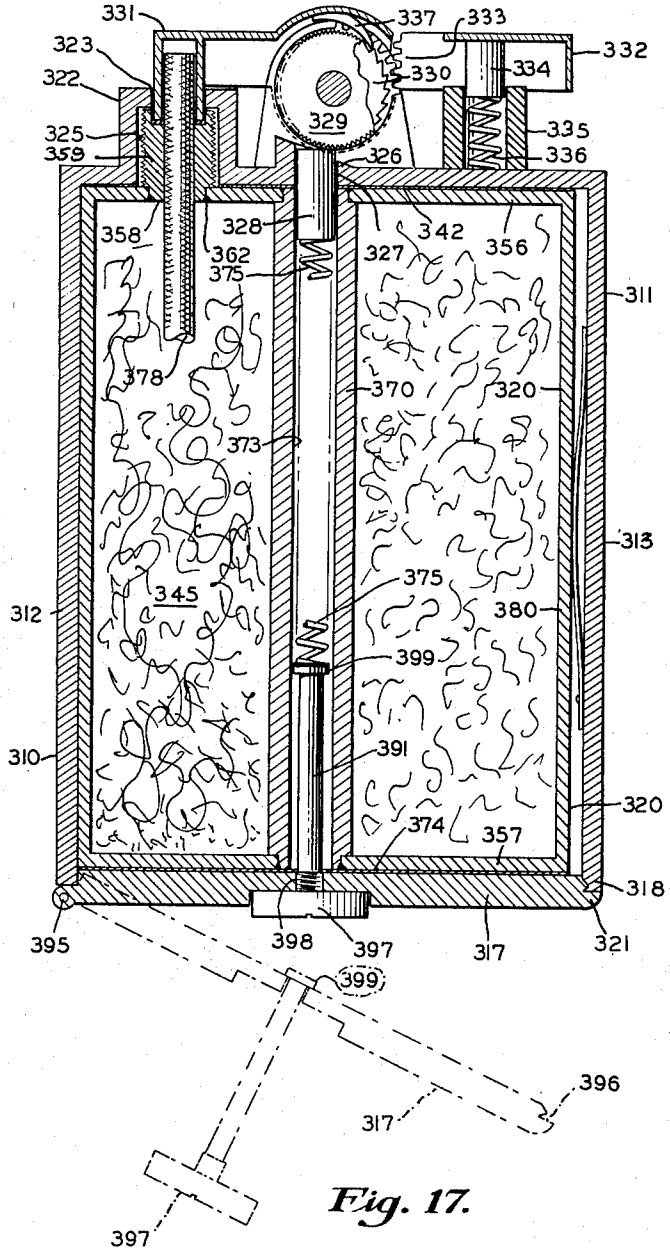

Fig. 17.

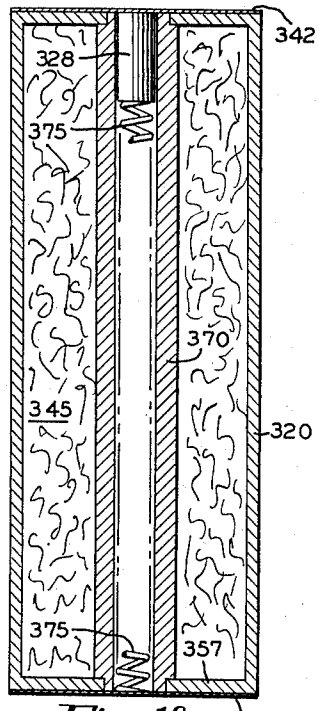

Fig. 18.

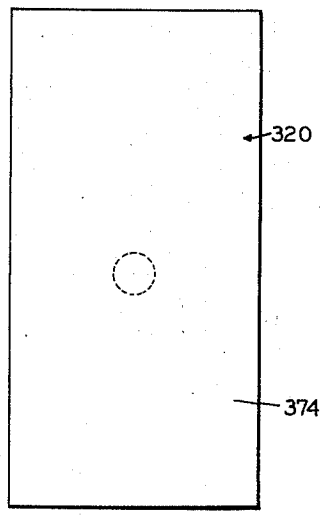

Fig. 19.

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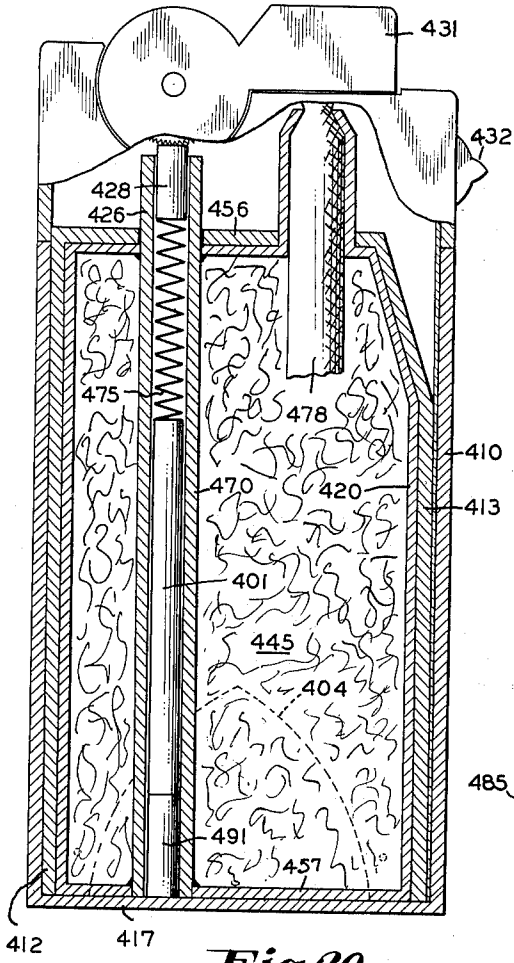

Fig. 20.

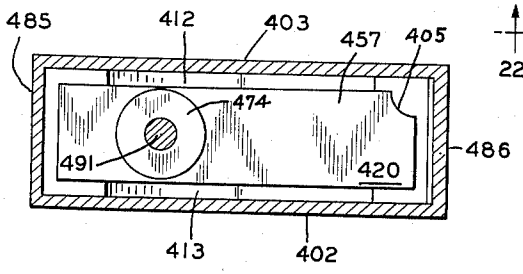

Fig. 22.

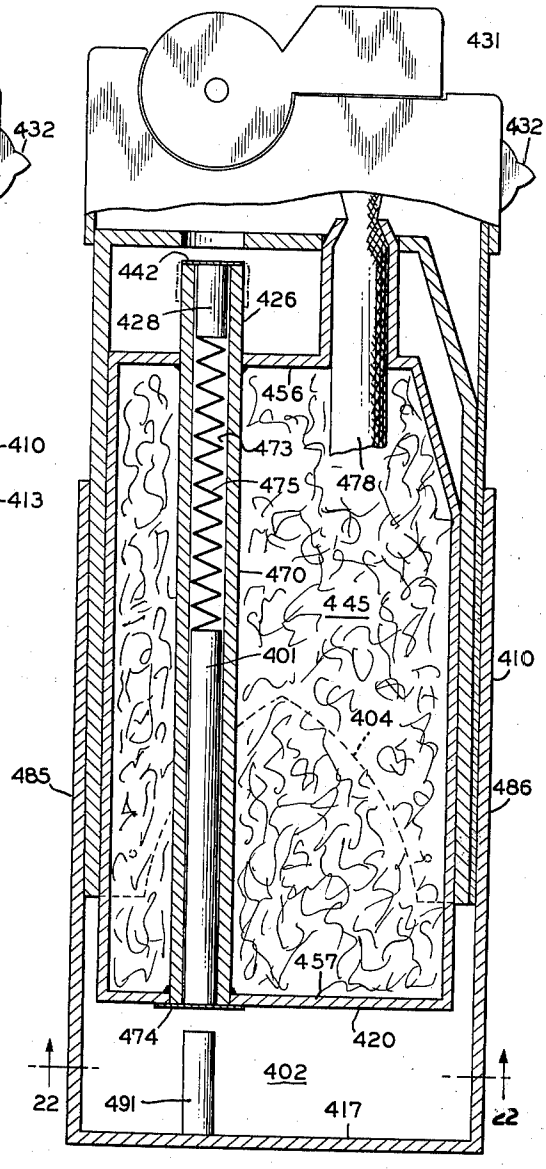

Fig. 21.

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UNITED STATES PATENT OFFICE

2,541,111

CIGARETTE LIGHTER

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Application August 2, 1946, Serial No. 688,068

3 Claims. (Cl. 67—7.1)

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This invention relates generally to cigarette lighters and more particularly to a cigarette lighter in which the fuel, flint, and wick are replaced as a unit in the form of a disposable cartridge when these consumable elements have been used up.

In view of prior improvements in the art to which the present invention relates, lighters have become relatively foolproof in operation but are open to the disadvantage that any one of the consumable elements therein, namely, the wick, flint, and fuel may give out at a time when least expected. In accordance with the present invention the consumable elements are correlated so that the fuel becomes entirely consumed at substantially the same time or slightly before the flint is consumed. The wick is so set that the exposed portion thereof is adequate for the entire burning period permitted by the quantity of fuel in the cartridge.

It is, therefore, among the principal objects of the present invention to provide a novel and useful cigarette lighter construction in which when the fuel, flint or wick has been consumed, it is a relatively simple operation to remove a cartridge containing all three of these elements, to discard the same and to replace a new cartridge instead of the old one.

Another object herein lies in the provision of the device of the class described, which is substantially leakproof both while being stored prior to use and during use.

Another object herein lies in the provision of a cartridge and cigarette lighter casing construction in which the consumed cartridge may be quickly and conveniently replaced with a new one by a user having no special skill and having no special tools.

These objects and other incidental ends and advantages will more fully appear in the progress of this disclosure.

In the drawings in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a fragmentary longitudinal vertical sectional view of a first embodiment of the invention as seen from the plane 1—1 on Figure 6.

Figure 2 is a fragmentary end elevational view as seen from the right of Figure 1.

Figure 3 is a fragmentary end elevational view of the cartridge preparatory to insertion within the lighter casing.

Figure 4 is a fragmentary longitudinal vertical sectional view as seen from the plane 4—4 on Figure 6.

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Figure 5 is a fragmentary, vertical sectional view corresponding to Figure 1, but showing the cartridge in a partially inserted position within the lighter casing.

Figure 6 is a top plan view of the embodiment shown in Figure 2.

Figure 7 is a top plan view of the cartridge.

Figure 8 is an enlarged longitudinal central vertical sectional view partly in elevation and with some of the parts fragmented, of a second embodiment of the invention. In this view the flint gate is open and the lighter is ready for operation.

Figure 9 is a fragmentary sectional view partly in elevation corresponding generally to Figure 8 but showing the cartridge in the course of being inserted into the lighter casing.

Figure 10 is a plan view of the cartridge as removed from the lighter casing, the cartridge being shown in a relatively closed position.

Figure 11 is a longitudinal vertical sectional view, partly in elevation, showing a third embodiment of the invention. In this view, the cartridge has been inserted in the lighter casing but the cover for the cartridge entrance has not been fully closed.

Figure 12 is an end elevational view as seen from the light of Figure 11.

Figure 13 is a horizontal sectional view as seen from the plane 13—13 on Figure 11.

Figure 14 is a longitudinal vertical sectional view, partly in elevation, corresponding generally to Figure 11, but showing the cover for the cartridge entrance in a fully closed position.

Figure 15 is an end elevational view as seen from the right of Figure 14.

Figure 16 is a fragmentary side elevational view corresponding generally to Figure 15 but showing the cartridge partly inserted within a lighter casing and with the cover for the cartridge entrance open and swung to one side.

Figure 17 is a longitudinal vertical sectional view showing a fourth embodiment of the invention.

Figure 18 is a longitudinal vertical section of the cartridge of the fourth embodiment.

Figure 19 is a bottom plan view of the cartridge of Figure 18.

Figure 20 is a longitudinal vertical sectional view, partly in elevation of a fifth embodiment of the invention.

Figure 21 is a longitudinal vertical sectional view partly in elevation, corresponding generally to Figure 20 showing the cartridge as partly inserted and the bottom cover as partly in place.

Figure 22 is a horizontal sectional view as seen from the plane 22—22 on Figure 21.

In accordance with the invention, the cigarette lighter generally indicated by reference character 10, includes a casing 11, having a front wall 12, a rear wall 13, side walls 14 and 15, a top wall 16 and a bottom wall 17. The bottom wall 17 is movably associated with the lower peripheral edge 18 of the body of the casing 11 in any suitable manner, as for example by the hinge structure 19. We have shown the bottom wall 17 as having a snap action 21 to secure the same in a closed position. Obviously other locking means may be used which will permit the detachable connection of at least a portion of the bottom wall for the purpose indicated. Thus the wall 17 forms a movable closure for an entrance in the bottom of the casing 11. This entrance is of such size and configuration as to permit the insertion therethrough of the cartridge generally indicated by reference character 20. While we have shown the bottom wall 17 as being hingedly connected to the body of the casing, where desired other closure means may be used.

The top wall 16 is provided with a receptacle 22 which may have any desired external configuration to conform aesthetically to the external appearance of the lighter casing 11 and has a snuffer element receiving surface 23. The internal configuration of the receptacle 22 is preferably such as to correspond to the wick 78 of the cartridge 20, as will more fully appear. Thus the receptacle 22 provides the upwardly extending well formed by its internal surfaces. The well is indicated by numeral 25.

The top wall 16 is further provided with a flint support 26 which has a bore 27, the cross-sectional configuration of which conforms to the cross-sectional size of the flint element 28.

Disposed upon and associated with the top wall 16 are a flint wheel 29, knurled wheel 30, and snuffer element 31.

As best seen in Figures 5 and 6, the top wall 16 is provided with a housing 9 which forms an upwardly extending recess in the inner surface thereof, which is adapted to receive the flint carrier 70. By virtue of the fact that the remainder of the top wall 16 is positioned at a level below the effective level of the housing 9, the forward portion, that is, nearest the front wall 12 of said top wall 16, forms a flint gate operating member 40.

The flint wheel 29 and the knurled wheel 30 are connected to each other and rotatably mounted as a unit on the axle 38. The lower end of axle 38 is preferably secured in a boss on the top wall 16.

The snuffer element 31 may be of a well known construction pivotally mounted on axle 8, journalled in a pair of ears 82', 83'. A spring between the ears 82' and 83' may co-act with a flattened portion on the pivoted end of the snuffer element 31 to maintain the said element in an open or closed position thereof, in a well known manner.

The cartridge 20 is preferably composed of a low cost material, which is impervious to the fuel 45. The cartridge may, therefore, be constructed similarly to the well known "tin can." Thus, it may have a front wall 52, a rear wall 53, side walls 54 and 55, a top wall 56 and a bottom wall 57. The front, rear and side walls 52–55 inclusive, may be composed of a single blank 46, cut from a sheet of thin steel and may be vertically seamed in a well known manner (not shown)

such as is used on "tin cans." The sole fluid exit from the cartridge 20 is through the bore 58 in the neck 59, which extends upwardly from the top wall 56.

The flint carrier 70 is disposed upon the top wall 56 of the cartridge 20 and is preferably provided with a longitudinally extending bore 73, the cross-sectional shape and size of which correspond to the cross-sectional size and shape of the flint element 28. The flint carrier 70, which may take the shape of an outwardly opening cup, forms the upper part of a housing 71. The housing 71 has a closed end wall 74 which serves as a support for the outer end of an expansive spring 75 which forces the flint element 28 longitudinally thereof, that is to say, laterally with respect to the cartridge 20, toward the flint gate 42.

The flint gate 42 is slidably disposed for vertical reciprocal movement outwardly of the exit of the bore 73 and is shown in the closed position thereof in Figure 5 and in the open position thereof in Figure 2. The inner surface of the flint gate 42 slidably contacts the outer surface 82 of the housing 71. As seen in Figure 3, the flint gate 42 may be adapted for reciprocal movement on the surface 82 by means of the slots 83 in said gate, which engage the outwardly projecting pins 84. Movement of the gate 42 upwardly is limited by the pins 84 meeting the lower ends of the slots 83 and downward movement of said gate is limited by the laterally extending projection 43 abutting against the top wall 56 of the cartridge 20.

The cartridge may be loaded in any suitable manner with fuel and the fuel may have absorbent cotton or similar material therein, as is well known in the art and the wick 78 is inserted into the neck 59. The cotton may be placed within the cartridge 20 either through a closable opening not shown or by the securing of one of the walls of the cartridge in place after the cotton has been loaded. Suitable means may be provided for enclosing the projecting portion of the wick 78, such as that shown in our co-pending application Serial No. 536,916, filed May 23, 1944, now issued as Patent No. 2,415,515, prior to the uncapping thereof and the insertion of the cartridge 20 into the casing 11. The spring 75 and the flint 28 are loaded into the carrier 70 with the cap 42 in an open position thereof and when the gate is moved into the closed position thereof, it is frictionally retained thereat by the pressure of the outer end of the flint against the inner surface of said gate. In order to load the lighter 10, the casing is opened by swinging the bottom wall 17 and assuming the upper end of the wick 78 to be uncovered, the cartridge 20 is pushed into the casing 11. As the cartridge is pushed into the casing the flint gate operating member 40 contacts the lateral extending projection 43 and forces the same downwardly until the gate 42 is in the open position thereof. Upon the opening of the gate the spring 75 forces the flint element 28 outwardly through the bore 27 of the flint support 26 in the casing 11. The position and arrangement of the parts is such that the release of the flint element by the flint gate occurs at a time when the mouth of the bore 73 is substantially positioned opposite the bore 27. As the cartridge 20 is inserted into the casing 11, the exposed portion of the wick 78 enters the well 25 to emerge through the outer end thereof and to lie within the snuffer element 31, opposite the outer end of the flint element 28. The posi-

tion of the neck 59 may be gauged from the outer surface of the front wall 52 and in order that the parts may properly align themselves, the inner surface of the rear wall 13 may be provided with a spring 80 adapted to force the front wall 52 into contact with the inner surface of the front wall 12. Where desired, to provide for variations in the effective length of the cartridge 20, the upper surface of the bottom wall 17 may be provided with resilient means not shown, corresponding to the spring 80, adapted to urge the uppermost surfaces of the cartridge 20 against the lower surfaces of the top wall 16. With the bottom wall closed and the parts in the position shown in Figure 1, the flint element will have shifted outwardly to meet the serrated surfaces of the flint wheel 29. Rotation of the knurled wheel 30 in the usual manner, counterclockwise as viewed in Figure 6, will cause sparks to be emitted toward the wick 78 and to ignite the fuel therein, it being understood that the snuffer element has been lifted out of the way during the lighting process. The flame may be extinguished in the usual manner by the return of the snuffer element to its closed position. After the flint, wick or fuel have been consumed, the entire cartridge may be discarded and a new one replaced in an easy and convenient manner. If the flint has not been consumed entirely a sharp downward snap of the wrist while holding the casing with the bottom wall 17 in the open position thereof, would serve to break the flint sufficiently to allow the cartridge to drop out.

Turning now to the second embodiment of the invention illustrated in Figures 8 to 10 inclusive, certain parts corresponding to those in the first embodiment are given the same reference character with the addition of the numeral 1 as a prefix. This is for the purpose of avoiding unnecessary repetition.

It will be noted that in contrast with the first embodiment in which the movement of the flint is at an angle with respect to the movement of the cartridge as it is placed into the casing, in the second embodiment the movement of the flint is substantially parallel or co-axial with the movement of the cartridge as it is placed within the casing.

The cigarette lighter generally indicated by reference character 110, includes a casing 111, having a front wall 112, a rear wall 113, side walls 114 and 115, a top wall 116 and a bottom wall (not shown) corresponding to the bottom wall 17.

The top wall 116 is provided with a receptacle 122 which may have any desired external configuration to conform aesthetically to the external appearance of the lighter casing 111 and has a snuffer element receiving orifice 123. The internal configuration of the receptacle 122 is preferably such as to correspond to the neck 159 of the cartridge 120, as will more fully appear. Thus the receptacle 122 provides the upwardly extending well formed by its internal surfaces. The well is indicated by numeral 125.

The top wall 116 is further provided with a flint support 126 which has a bore 127, the cross-sectional configuration of which conforms to the cross-sectional size of the flint element 128.

Disposed upon and associated with the top wall 116 are a flint wheel 129, ratchet wheel 130, snuffer element 131, operating handle 132 and rack members 133. The handle 132 has a slide member 134 which is adapted for vertical reciprocation in the cylinder 135. The cylinder 135 is affixed to the top wall 116 in any suitable manner. Disposed within the cylinder 135 is an expansive coil spring 136 which urges the handle 132 to its upper position. Suitable detent means are provided to limit the upward movement of the handle 132, as for example the engagement of a portion of the rack member 133 with the teeth on the gears 180 which are keyed to the shaft 138 upon which the snuffer element 131 is fixedly mounted. The snuffer element 131 is urged in a downward direction, that is to say, in the direction of counterclockwise rotation as viewed in Figures 8 and 9, by the upward movement of the racks 133.

The rearmost portion of the gears 180 are provided with teeth adapted to engage with the racks 133. The last mentioned gears are fixed on the axle 138 inwardly of the uprights 182 and 183. Secured to the undersurface of the rear upper portion of the snuffer element 131 is a spring ratchet pawl 137 which is adapted to engage the ratchet wheel 130. The operation of this structure is that when the handle 132 in pushed downwardly, it elevates the snuffer element and rotates the flint wheel 129 through the action of the ratchet pawl 137 and the ratchet wheel 130. Release of manual pressure on the handle 132, allows the spring 136 to return the snuffer to its original position, but allows the flint wheel to remain stationary ready for the next movement thereof.

In other words, downward movement of the handle 132 rotates the flint wheel 129 in a clockwise direction as viewed in Figures 8 and 9. The movement of the flint wheel and the ratchet wheel is intermittent and uni-directional, and this movement takes place with each downward movement of the handle 132. Downward movement on the handle 132 simultaneoustly elevates the snuffer element 131, that is, it rotates the snuffer element in a clockwise direction as viewed in Figures 8 and 9. Release of manual pressure upon the handle 132 permits the spring 36 to return the snuffer element 131 to its normal or closed position.

Preferably at the juncture of the rear wall 113 and the top wall 116 there is a cam 140. This cam may extend completely between the side walls 114 and 115 or it may be in the form of a fin or rib positioned so as to engage the flint gate 142 on the cartridge, as will more fully appear below.

The cartridge 120 is preferably composed of a low cost material, which is impervious to the fuel 145. The cartridge may, therefore, be constructed similarly to the well known "tin can." Thus, it may have a front wall 152, a rear wall 153, side walls 154 and 155, and a top wall 156 and a bottom wall not shown. The front, rear and side walls 152–155 inclusive, may be composed of a single blank 146, cut from a sheet of thin steel and may be vertically seamed in a well known manner (not shown) such as is used on "tin cans."

The top wall is provided with a pair of oppositely disposed guides 148 and 149. The sole fluid exit from the cartridge 120 is through the bore 158 in the neck 159, which extends upwardly from the top wall 156. The neck 159 is provided with a central co-axially arranged annular depression, which is adapted to receive and retain a ring gasket, preferably composed of synthetic rubber, leather or other material, which under compression prevents the passage of fuel. The neck 159 may be a separate die casting or screw machine turning which is suitably integrated with the edge of a corresponding orifice 162 in the top wall 156.

One suitable method of integration is the connection of the lower portion of the neck 159 to the edge of the orifice 162 by soldering. Other methods as welding or swaging may be used. Where the top wall 156 is made of suitable material, the neck 159 may be formed by a deforming or extrusion process directly from the material of which the top wall 156 is composed.

As best seen in Figure 8, the outer vertical surface of the neck 159 is provided with means such as threads for the detachable engagement therewith of a cap, not shown. In the use of the cartridge, as will appear hereinbelow, the lower edge of the snuffer element 131 is adapted to resiliently engage the resilient gasket.

Suspended from the top wall 156 and opening upwardly therethrough, is a flint carrier 170. The carrier 170 is preferably in the form of a housing 171 which may take the shape of an upwardly opening cup. The housing 171 at the upper free edge thereof, is connected to a corresponding opening 172 in the top wall 156. The parts may be integrated thereat in any well known manner, as for example by soldering, welding or swaging. It is important that this juncture be hermetic in order to avoid leakage of contents or vapors from the inside of the cartridge 120. The housing 171 is preferably provided with a longitudinally extending bore 173, the cross-sectional shape and size of which, correspond to the cross-sectional size and shape of the flint element 128. The housing 171 has a closed bottom wall 174 which serves as a support for the lower end of an expansive spring 175 which forces the flint element 128 upwardly.

The flint gate 142 previously mentioned, is slidably disposed above the exit of the bore 173 and is shown in the closed position thereof in Figure 9 and the open position thereof in Figure 8. The undersurface of the flint gate 142 slidably contacts the upper surface of the top wall 156 and at the edges thereof is disposed between the guides 148 and 149. Movement of the gate 142 to the left, as viewed in Figures 8 to 10, is limited by the detent 176 and movement thereof to the right, as viewed in said figures, is limited by the upwardly bent tab which forms the projection 177 abutting against the shoulder 107 formed by the cut back in the guide 148 (see Figure 10).

The flint gate 142 is provided with an orifice 106 surrounded by a lower flint support 105, and further at the outer end thereof the flint gate has a follower 104. The follower 104 is adapted to co-act with the cam 140 which serves as a flint gate operating member.

In the assembly of the cartridge 120 fuel is loaded into the same and as is known, may have absorbent cotton or similar material therein. The cartridge may be previously fabricated with the cotton inside and then the fuel may be injected through the neck 159 followed by an insertion of the wick. Otherwise there may be another opening in the cartridge through which the fuel cotton and/or wick may be loaded and this opening may be subsequently concealed. The fuel and cotton may be loaded through the opening 162 following which the neck 159 may be put in place. The flint element 128 may be inserted into the carrier 170 through the upper entrance thereto by placing the same on top of the previously inserted spring 175. The flint is next pushed down in the carrier until its upper end is flush with the surface of the top wall 156. Following this the gate 142 is inserted into the right ends of the guides 148 and 149 and moved over to the closed position thereof shown in Figure 10, whereupon the projection 177 is raised to prevent accidental withdrawal of the gate 142 to the right as viewed in Figures 8–10. The gate is frictionally maintained in position by the pressure of the top of the flint against the under surface thereof.

In order to load the lighter 110, the cartridge 120, with the wick uncapped is pushed into the casing 111 until the follower engages the cam 140. Continued pressure moves the flint gate to the left until the lower flint support 105 surrounds the opening in the carrier 170, whereupon the spring 175 urges the flint up through the lower flint support 105 into the flint support 126 and into contact with the flint wheel 129. The gate thus moves at an obtuse angle with respect to the casing. While this is going on, the neck 159 is becoming seated within the well 125 and the cover or movable bottom wall (not shown) of the casing 111 is closed so as to maintain the cartridge in the position shown in Figure 8. In the embodiment shown in Figures 8 to 10 inclusive, the position of the neck 159 and the exit from the bore 173 are gauged in position from the outer surface of the front wall 152 and in order that the parts may properly align themselves, the inner surface of the rear wall 113 of the casing may be provided with a spring 180 adapted to force the front wall 152 into contact with the inner surface of the front wall 12. Similar means may be provided on the inner surface of the bottom wall (not shown) of the casing, corresponding to the spring 180 to maintain the cartridge in proper operative position and particularly with respect to the neck 159 and its seating within the receptacle 122.

While we have shown the outer end of the flint gate 142 as extending in the form of the follower 104 outwardly beyond the external surface of the wall 153, the extremity of the follower 104 may be flush with the outer surface of the wall 153 where desired for packaging purposes, without materially changing the operation thereof with respect to the cam 140.

Thus the replacement of a used cartridge in the casing is a simple matter. Opening the bottom wall of the casing permits the cartridge to be withdrawn and a new one inserted and as the complete new cartridge is inserted, during a portion of its travel, the flint gate is opened to permit the flint to enter the appropriate portions of the lighter casing for immediate operation.

In accordance with the third embodiment of the invention, as shown in Figures 11 to 16 inclusive, the cigarette lighter generally indicated by reference character 210, includes a casing 211 having a front wall 212, a rear wall 213, side walls 214 and 215, a top wall 216 and a bottom wall 217. The bottom wall 217 is movably associated with the lower peripheral edge 218 of the body of the casing 211. The bottom wall 217 has a pair of upstanding arms 285 and 286, the relatively free terminals of which are pivotally and slidably connected to the side walls 214 and 215 in a suitable manner as by the pins 287 and 288 which penetrate the elongated slots 289 and 290. The bottom wall 217 has affixed thereto and projecting from the normally upper wall thereof a pusher element 291. The pins 287 and 288 are sufficiently short so that the inner surfaces of the arms 285 and 286 are in frictional engagement with the outer surfaces of the walls 214 and 215. Thus, the wall 217 forms a mov-

able closure for a cartridge entrance in the bottom of the casing 211. This entrance is of such size and configuration as to permit the insertion therethrough of the cartridge generally indicated by reference character 220.

The top wall 216 is provided with an orifice 222 which is of sufficient size to permit the upward penetration therethrough of the wick 278 and the wick tube 259 of the cartridge 220 as will more fully appear.

The top wall 216 is further provided with a flint support 226 which has a bore 227, the cross-sectional configuration of which conforms to the cross-sectional size of the flint element 228.

Disposed upon and associated with the top wall 216, are a flint wheel 229 and a movable snuffer element 231 which forms a cover for the top of the lighter casing to enclose the wick and striking mechanism as well as the flint support. The snuffer element 231 may be hingedly connected to the casing at 292.

The flint wheel 229 is mounted upon an axle 238 so that it may be rotated against the flint in a well known manner.

The cartridge 220 is preferably composed of a low cost material which is impervious to the fuel 245. The cartridge may, therefore, be constructed similarly to the well known tin can or may be a casting of a synthetic resin which is not deleteriously affected by the fuel. The cartridge 220 may have a front wall 252, a rear wall 253, side walls 254 and 255, a top wall 256 and a bottom wall 257. The sole fluid exit from the cartridge 220 is through the bore 258 in the neck 259 which extends upwardly from the top wall 256. The flint carrier 270 is in the form of an elongated tube which is connected to the top wall 256 and the bottom wall 257 in a liquid-tight manner so that said tube opens upon the outer surfaces of said top and bottom walls. The bore 273 of the carrier 270 is of a cross-sectional shape corresponding generally to the cross-sectional shape of the flint element 228. The cross-sectional size of the bore 273 is preferably greater than the cross-sectional size of the flint element 228 and it is closed at the top and bottom by frangible closures 242 and 274, respectively. The bore 273, below the flint element 228 contains an expansive spring 275. The total length of the flint element 228 and the coil spring 275 in a relaxed condition of the latter is preferably substantially equal to the length of the bore 273.

The cartridge 220 may be loaded in any suitable manner with fuel 245 and the fuel may have absorbent cotton or similar material therein, as is well known in the art, and the wick 278 is inserted in the neck 259. The cotton may be placed within the cartridge 220 either through a closable opening not shown or by the securing of one of the walls of the cartridge in place after the cotton has been loaded therein. Suitable means may be provided in enclosing the projecting portion of the wick 278 such as that shown in our co-pending application, Serial No. 536,916, filed May 23, 1944, prior to the uncapping thereof and the insertion of the cartridge 220 into the casing 211. The spring 275 and the flint 228 are loaded into the carrier 270 and are maintained therein by the frangible upper and lower closures 242 and 274. These closures may be in the form of paper, thin metal foil, thin plastic sheeting composed of synthetic resins or other membranous material secured in place upon the ends of the carrier 270 and/or the top and bottom walls 256 and 257 in any suitable manner as by the use of an adhesive (not shown). To facilitate the rupture of the closure members 242 and 274, the same may be scored or partially cut, said scoring and cutting not being shown in the drawing.

In order to load the lighter 210, the casing is opened by pulling the bottom wall 217 down until the pins 287 and 288 contact the lower ends of the slots 289 and 290 whereupon the bottom wall may be rotated about the pins 287 and 288 to take the position shown in Figure 16. Assuming the lighter to be empty and the upper end of the wick 278 to be uncovered, the cartridge 220 is fed upwardly into the casing 211. When the cartridge is fully seated, that is to say, when the upper surface of the top wall 256 or the closure member 242 contacts the end surface of the top wall 216, the bottom wall of the lighter casing 217 is swung about so that the arms 285 and 286 align with the slots 289 and 290. Following this, the bottom wall 217 is pressed upwardly and the pusher 291 breaks the bottom closure member 274 which compresses the spring 275 and this, in turn, forces the flint element 228 upwardly to puncture and penetrate the upper closure member 242 so that the flint element 228 comes in contact with the flint wheel 229. This position of the parts is shown in Figure 14 where portions of the bottom closure member 274 have been forced into the carrier 270 bordering the pusher 291 and portions of the top closure member 242 lie between the flint 228 and the surface of the bar 227. As shown, the pusher 291 may have a pointed end 293 and the flint may have a pointed end 294. These pointed ends are for the purpose of more easily breaking the closures.

When the fuel 245 has been consumed, it becomes a simple matter to reverse the foregoing procedure for withdrawing the exhausted cartridge.

By the use of the spring 275 in a fully relaxed condition there is substantially no danger of the flint 228 being accidentally discharged from the cartridge when it is not located within the lighter casing.

Turning now to the fourth embodiment of the invention illustrated in Figures 17 to 19, inclusive, for the purpose of avoiding needless repetition, certain of the parts corresponding to the third embodiment are given the same reference characters with the substitution of the prefix 3 instead of 2.

The fourth embodiment differs from the third embodiment principally in altered structure of the bottom wall 317, the pusher element 391, the closure members 342 and 374 and the shape of the flint.

The bottom wall 317 is hingedly mounted upon the lower edge of the side wall 314 by the pin 395 and is adapted to be detachably retained in a closed position thereof by the means 396 which may include a projection on the bottom cover 317 which detachably engages a corresponding depression on the inner surfaces of the wall 315. The pusher element 391 may include an enlarged handle 397, a threaded shank 398 and a head 399. The handle 397 is adapted to seat within a corresponding depression in the lower surface of the bottom cover 317 while the threaded shank 398 may threadedly engage the corresponding opening in said cover 317. The head 399 is of greater diameter than the threaded opening in the cover 317 so that in its fully retracted posi-

tion the pusher 391 may not be removed from the cover 317. The head 399, furthermore, has a punching action in severing the portion of the bottom closure member 374 so that the piece punched may lie between the head 399 and the lower end of the spring 375.

The flint 328 may have a similar punching action to cut a disc from the upper closure member 342. This disc is readily cast off upon the first rotation of the flint wheel 329.

The closure members 374 and 342 may extend over a relatively large area of the top and bottom walls 356 and 357 and since they are of low cost material such as paper or foil, they may carry instructions for use of the article and/or other advertising material.

In operation the cartridge 320 as shown in Figure 18 is placed within a lighter casing 311, the cap from the wick having been previously removed and the bottom cover 317 having been previously opened. With the pusher element 391 in a position with respect to the cover 317 as indicated in the dot-dash lines on Figure 17, the cover 17 is moved to its closed position. Following this, the pusher element 391 is forced upwardly causing the rupture of the bottom closure member 374, the compression of the spring 375 and following this the rupture of the top closure member 342, whereupon the flint element 328 rises to meet the flint wheel 329. The pusher element 391 is retained in the uppermost position thereof by engaging the threaded shank with the threaded orifice in the cover 317.

To remove a consumed cartridge, the above operation is reversed. By virtue of the fact that the pusher element 391 extends a distance suitable within the bore 373, it is necessary to withdraw the pusher element 391 before shifting the cover 317.

Turning now to the fifth embodiment of the invention illustrated in Figures 20 to 22 inclusive, here again for the purpose of avoiding unnecessary repetition, certain of the parts corresponding to the third embodiment are given the same reference characters with the substitution of the prefix 4 instead of 2.

The fifth embodiment differs from the third and fourth embodiments principally in the carrier 470, the upper closure member, the introduction of a spacer element and a change in the bottom cover.

As seen in Figures 20 and 22, the carrier 470 extends upwardly beyond the upper surface of the top wall 456 so that the flint support 426 is united therewith. The advantage of this construction is that it assures the simultaneous removal of the unused piece of flint with the cartridge when the fuel in the cartridge has been consumed.

The upper closure member 442 may engage only the upper end of the flint support 426 or as indicated by the dot-dash lines on Figure 21, may be extended down along the vertical walls thereof.

The spacer element 491 permits the use of a smaller spring 475. The spacer 491 is of substantically the same cross-sectional shape as the flint element 428.

The bottom cover 417 includes side walls 485 and 486, a rear wall 402 and a front wall 403. The walls 485, 486, 402 and 403 functionally engage the outer surfaces of the corresponding walls of the lighter casing to have a telescopic action therewith. The pusher element 491, as the cover 417 is pushed upwardly, breaks the bottom closure member 474, elevates the spacer 491 which compresses the spring 475 to break the upper closure member 442. Depending upon the nature of the adhesive used the flint element may actually remove the entire closure member 442. The front and rear walls 412 and 413 are provided with indentations 404 for grasping the cartridge 420 for inserting and removing the same from the lighter. As indicated by reference character 405 on Figure 22, there is a projection on the casing of the lighter and a corresponding depression on the cartridge which assures there will be a proper interengagement of these elements.

It may thus be seen that we have provided a novel and useful cigarette lighter construction which is extremely convenient in use and efficient and foolproof in operation. The cartridge may be replaced with a single quick operation which is as convenient as replacing the dry cells in an ordinary flashlight, and it contains fuel, flint, a spring for the flint and frangible cover means.

We wish it to be understood that we do not desire to be limited to the exact details of constructions shown and described, for obvious modifications will occur to a person skilled in the art.

We claim:

1. Cigarette lighter construction comprising: a casing; a cartridge, said cartridge having a flint carrier associated therewith; a flint disposed within said carrier; said cartridge being insertable within said casing in a predetermined direction with respect to said casing; a gate movably mounted on said cartridge for movement in substantially the opposite direction as said predetermined direction to the open position thereof and adapted in the open position thereof, to allow the flint to move outwardly of said carrier and in the closed position thereof, to obstruct movement of the flint outwardly of the carrier and means lying in the path of travel of the cartridge as it is inserted into the casing while moving in said predetermined direction and positioned to actuate said gate, before the cartridge is fully seated in the casing.

2. Cigarette lighter construction comprising: a casing; a cartridge, said cartridge having a flint carrier associated therewith; a flint disposed within said carrier; resilient means to urge the flint out of said carrier; said cartridge being insertable within said casing in a predetermined direction with respect to said casing; a gate movably mounted on said cartridge for movement in substantially the opposite direction as said predetermined direction and adapted in the open position thereof, to allow the flint to move outwardly of said carrier and in the closed position thereof, to obstruct movement of the flint outwardly of the carrier by contacting said flint; and means lying in the path of travel of the cartridge as it is inserted into the casing while moving in said predetermined direction and positioned to actuate said gate, before the cartridge is fully seated in the casing.

3. Cigarette lighter construction comprising: a casing having a flint support opening and flint striking mechanism; a cartridge, said cartridge having a flint carrier associated therewith, said carrier having an exit positioned opposite to the flint support opening in the casing; a flint disposed within said carrier; said cartridge being insertable within said casing in a predetermined direction with respect to said casing; a gate mov-

ably mounted on said cartridge for movement in substantially the opposite direction as said predetermined direction and adapted in the open position thereof, to allow the flint to move outwardly of said carrier and in the closed position thereof, to obstruct movement of the flint outwardly of the carrier and means lying in the path of travel of the cartridge as it is inserted into the casing while moving in said predetermined direction and positioned to actuate said gate automatically before the cartridge is fully seated in the casing whereby when said gate is shifted to the open position thereof, said flint may enter the flint support opening in the casing to be acted upon by the flint striking mechanism.

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