Jan. 3, 1950 R. T. FITZPATRICK 2,493,662

CIGARETTE LIGHTER

Filed May 1, 1947 2 Sheets-Sheet 1

Fig. 2.

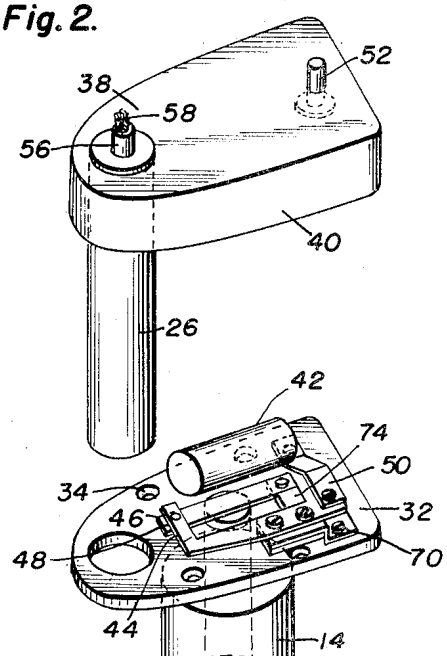


Fig. 3.

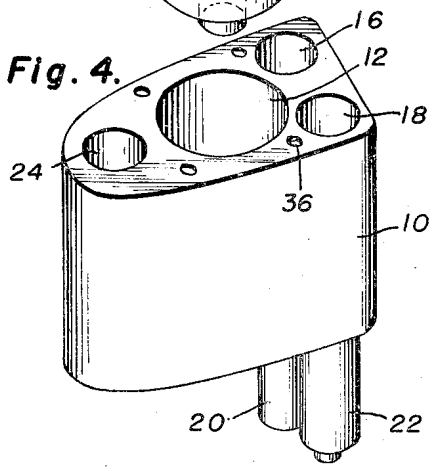


Fig. 4.

Fig. 5.

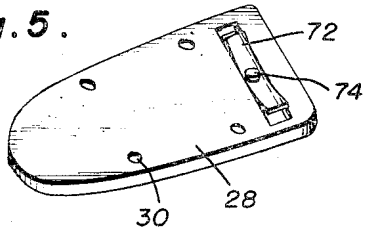


Fig. 6.

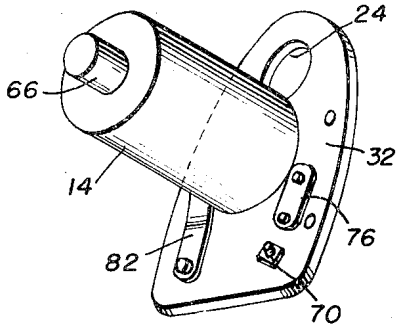
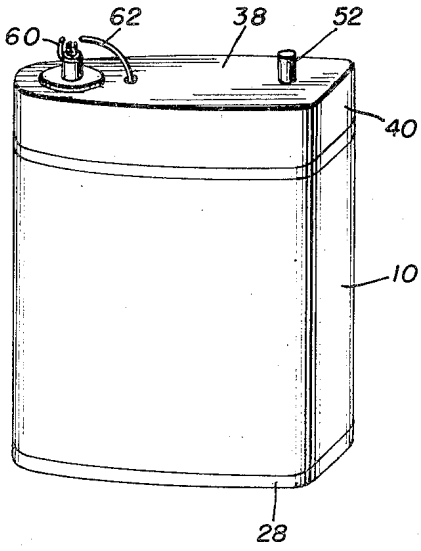


Fig. 1.



Inventor

Richard T. Fitzpatrick

By Clarence A. O'Brien and Harvey B. Jackson

Attorneys

Jan. 3, 1950 R. T. FITZPATRICK 2,493,662

CIGARETTE LIGHTER

Filed May 1, 1947 2 Sheets-Sheet 2

Fig. 7.

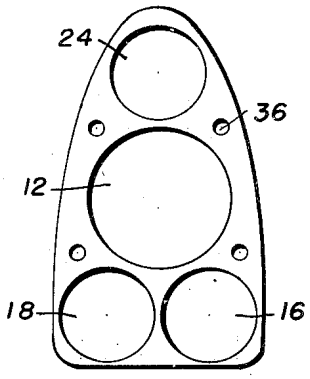


Fig. 8.

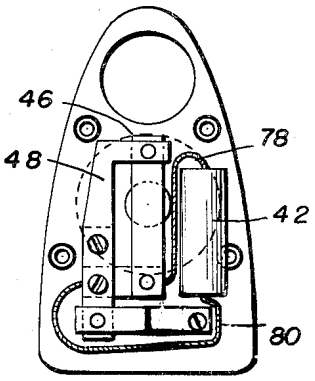


Fig. 9.

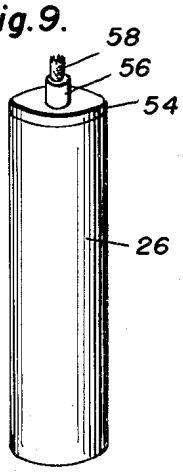


Fig. 10.

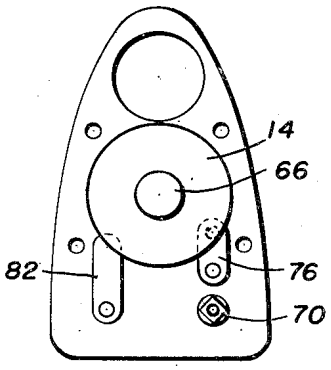


Fig. 11.

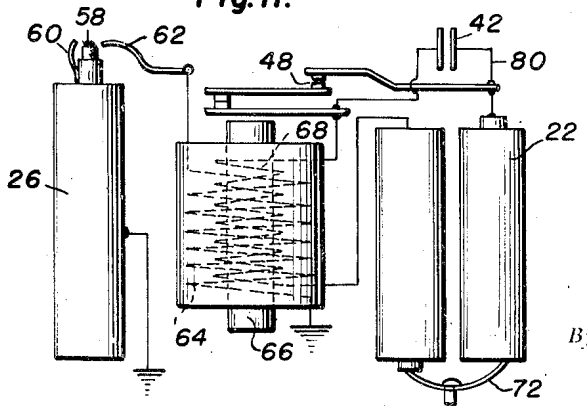


Fig. 12

Inventor

Richard T. Fitzpatrick

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Patented Jan. 3, 1950

2,493,662

UNITED STATES PATENT OFFICE

2,493,662

CIGARETTE LIGHTER

Richard T. Fitzpatrick, Marcellus, N. Y.

Application May 1, 1947, Serial No. 745,223

2 Claims. (Cl. 175—296)

1

This invention relates generally to cigarette lighters, and more particularly to a cigarette lighter characterized by having an induction coil with a condenser having a capacity of a predetermined value related to the value of the inductance of the coil primary and the natural mechanical frequency of the interrupter, the lighter being adapted for production as a table lighter or cigar lighter and being readily portable, with the source of electrical energy normally constituting dry cells contained within the casing of the lighter.

It is a primary object of this invention to provide a lighter in which the current drain is a minimum and in which satisfactory lighting is assured by the production of a very hot spark.

Another object of this invention is to provide a lighter in which no physical mechanical effort is required to operate the lighter, other than the closing of an electric switch.

Another object of this invention, ancillary to the penultimate object, is to provide for the enclosure of a satisfactory lighter within a small case of light weight, since the cell or battery of cells required for the operation of the lighter need not be large, inasmuch as the current drain is very small, that is, the net current drain is small.

Another object of this invention is to provide a lighter in a case having a removable cap, with the interrupter secured within this cap, to provide for easy access thereto for inspection and repair and adjustment.

A last object to be specifically mentioned is to provide a lighter of this character which is relatively inexpensive and completely practicable to manufacture, extremely convenient and simple to use, and which will give generally efficient and durable service.

With these and other objects definitely in view, this invention resides in certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings which form a material part of this application, and in which:

Figure 1 is a perspective view of the assembled lighter;

Figure 2 is a perspective view of the cap, switch and fuel tank, showing the position or relationship of these elements;

Figure 3 is a similar view of the coil, attachment plate, interrupter and condenser;

Figure 4 is a perspective view of the apertured

2

casing body member with a pair of dry cells partially inserted therein;

Figure 5 is a perspective view of the attachment plate, and it will be noted that the Figures 2, 3, 4 and 5 are arranged on the sheet in a manner constituting substantially an exploded view of the main elements of this invention;

Figure 6 is a perspective view of the structure shown in Figure 3 and viewed from another direction;

Figure 7 is a part plan view of the casing body portion;

Figure 8 is a top plan view of the structure shown in Figure 3;

Figure 9 is a perspective view of the fuel tank and the wick protruding therefrom;

Figure 10 is a lower plan view of the attachment plate;

Figure 11 is a schematic view illustrating the electrical circuit of the lighter; and

Figure 12 is a perspective view of the push button used in the controlling switch.

Similar characters of reference designate similar or identical parts and portions throughout the specification and throughout the several views of the drawings.

Referring now to the drawings in detail, which drawings represent one preferred embodiment of this invention, it will be noted that the body portion 10 of the casing is of generally rectangular shape in horizontal cross section, all the corners thereof being rounded or streamlined, and this body portion will be constructed of insulative material.

As best illustrated in Figure 4, this body portion 10 is provided with four cylindrical apertures, disposed in parallel relation and comprising a receptacle 12 for the coil 14, receptacles 16 and 18 for a pair of dry cells 20 and 22, and a receptacle 24 for the fuel tank 26. The casing also includes a bottom plate 28 which may be secured to the under side of the body portion 10 by screws inserted through screw holes 30, an attachment plate 32 of similar form and adapted to be secured to the top surface of the body portion 10 by screws inserted through the screw holes 34, into the holes 36 in the upper surface of the body portion 10, and the casing is provided with a cap 38 which has a peripheral depending flange 40 adapted to rest upon the body portion 10 and to space the top panel of the cap therefrom, in order to provide accommodation for the condenser 42, the interrupter comprised essentially of the fixed upper plate 44, the spring plate 46 and a set of contact points 48, and this cap also houses

the spring contact 50 which is insulatively secured to the attachment plate 32 and is positioned and adapted to be operated by the push button 52, a portion of which extends upwardly through the top panel of the cap 38. The fuel tank which is, of course, cylindrical to fit within the recess 24 is provided with a cap 54 which closes the top of the tank and is provided with a neck 56 for the wick 58, the cap, neck, and wick being shown as extending above the level of the top panel of the cap 38, in order to facilitate the replenishment of this tank with fuel. The simplified form of this invention, illustrated in the drawing, has a spark gap structure including a contact 60 electrically conductively secured on the metal tank 26 which is grounded, as hereinafter described, and a second contact 62 secured on the upper surface of the cap 38, and thus automatically insulated, this contact 62 being conductively secured to the end of the secondary coil winding 64, the other end of the coil winding 64 being grounded, to complete the secondary circuit, it being understood that the spark gap disposed adjacent the wick 58 exists between the contacts 60 and 62.

The coil 14 has a core 66 and another, or primary, winding 68 which is connected in series with the cells 20 and 22 and the interrupter, while a condenser 42 is connected across or parallel with the contact points 48.

To accomplish this connection, the top of the cell 22 may be grounded to the attachment plate 32 by a screw 70, the lower ends of the cells 20 and 22 being linked by a spring conductor 72 secured by a rivet 74, to the bottom plate 28, while the top of the cell 20 is in electrical connection with the spring contact plate 50, on the upper face of the attachment plate 32. An extending portion of the fixed contact plate 44 is contacted by this plate 50 when the push button 52 is depressed. This completes the circuit to the points of the interrupter and the vibrating plate 46 is electrically connected, through the plates 74 and 76, to one end of said primary winding 68, the other end of this winding being grounded to the attachment plate 32 to complete the primary circuit. The condenser 42 is connected in parallel with the interrupter points 48, by means of leads 78 and 80, as illustrated in Figure 8. It will, of course, be understood that the plate 32 is of metal, in order that it may constitute a proper ground or conductor as required to complete the circuits described above, and it should also be noted that the cell 20 is preferably grounded to the plate 32 by a spring contact 82, although the provision of this spring contact is not an essential feature of this invention.

This invention cannot be fully understood without a careful consideration being given to the manner in which the condenser 42 and the coil 14, that is, the primary winding 68 of the coil 14, are chosen with regard to the respective capacity and inductance thereof. In most applications of induction coils, the provision of sufficient primary current presents little difficulty, and the condenser is chosen with a view solely to a proper quenching of the spark, that is, the rapid demagnetization of the core as a result of the condenser action in absorbing the extra current at the time the circuit is broken and due to the self-inductance of the coil.

In this application of an inductance coil, it is of primary importance to minimize the current drain, since it is highly preferable to use

a very small cell or battery of cells. While this net current drain must be a minimum, it is also necessary to minimize the impedance to the current while the contacts are closed, so that a maximum variation in current in the primary is obtained, with consequent higher voltage current in the secondary and production of a hot spark. In this invention, maximum flow while the contacts are closed actually minimizes the net current drain on the battery over a lengthy period of use of the lighter because the hotter spark obtained lights the wick immediately and the control switch need be closed for a very short period each time the lighter is used.

Accordingly, it is a feature of this invention to match or tune the condenser and the coil with a view to securing maximum intermittent current flow from such a small source of electricity. Since the current through the coil is an interrupted direct current, the characteristics thereof may be considered somewhat similar to the characteristics of an alternating current, or similar to a degree allowing the application of the principle of a tuned circuit to the device. In the alternating type of current, the frequency equals the reciprocal of the square root of the product of the inductance in henrys multiplied by the capacitance in farads, times 6.28, and this formula has been used to calculate the proper sizes for these units. It will be understood that in the instant invention, the frequency is controlled, in large measure, by the mechanical characteristics of the vibrating portions. The length and strength of the spring, the mass of the spring and the contacts are of primary importance in determining the frequency at which the device will operate. When this natural frequency of the vibrating portions is known, the above formula is used to guide the choice of properly sized condensers and coils. In this tuned circuit, the net impedance is greatly reduced and satisfactory operation may be obtained by the use of a very small battery.

It should be noted that the proper quenching of the spark in order to speed the demagnetization of the core 66 is of importance in this device, as in other applications of induction coils, and that the condenser should have sufficient capacity to properly coact in this type of circuit. Ordinarily, the coil will, therefore, be chosen to provide for a tuned circuit with a condenser of a size chosen with a view to this other function.

Many and various useful modifications may be made in this invention, and though there has been shown a particular embodiment of this invention, this application is not limited to this particular embodiment, but it is desired to include in the scope of this invention the construction, combination and arrangement of parts and portions substantially as set forth in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A cigarette lighter case having a body portion with parallel cylindrical apertures, a fuel tank having a wick and an electrode projecting from one end thereof, an induction coil and a pair of dry cells, a removable base carrying a spring contact bar for connecting adjacent terminals of said dry cells, a removable plate having said induction coil mounted on the inner side thereof and a condenser on the outer side thereof, said plate having an aperture to receive an outer end portion of said fuel tank, said fuel tank, induction coil and dry cells being insertable

into said apertures in the body portion, and a cap carrying a switch controlling a circuit through said induction coil and condenser, said cap being also apertured to receive the end of said fuel tank carrying the wick and carrying a second electrode, said electrodes comprising a spark gap adjacent said wick.

2. A cigarette lighter comprising a case, and an attachment plate therein, a fuel tank with a wick extending outside said case, a source of direct current, an induction coil mounted on said attachment plate and having an interrupter including a vibrating spring element carrying a contact, a condenser on said plate tuned with said coil, said source being electrically connected with said coil, interrupter and condenser, the secondary of said induction coil having a spark gap adjacent said wick, and a switch to control the circuit through said source, said condenser

and coil having predetermined capacitance and inductance respectively for minimum net impedance at the natural vibration frequency of said spring element.

RICHARD T. FITZPATRICK.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,326,215	Sencenbaugh	Dec. 30, 1919
1,334,095	Hill	Mar. 16, 1920
1,445,967	Lehmann	Feb. 20, 1923
1,589,489	Snook	June 22, 1926
2,070,121	Gibson	Feb. 9, 1937
2,151,479	Ludovici	Mar. 21, 1939