This invention relates to an improved device for automatically igniting and dispensing cigarettes. The device includes a chamber for containing a quantity of cigarettes and discharging one at a time, an ignition means for lighting a cigarette, a transport means for conveying the cigarette through the device and an electric motor drive unit for automatically and sequentially actuating the components.

Prior art lighter dispensers have never been fully satisfactory because of a tendency for the mechanism to jam. Jamming occurs in some devices due to unreliable mechanical and, in others due to inadequate design compensation for defective cigarettes. Since cigarettes are fragile and are generally subject to rough handling, it is almost a certainty that some cigarettes, ultimately placed into a dispenser chamber, will have been partially bent, torn, or otherwise deformed. Such cigarettes fail to move through the mechanism freely or else burn improperly so that the apparatus operation becomes interrupted or completely arrested.

Another undesirable feature in prior art devices is having the ignition means deeply enclosed within the dispenser casing. Malfunction often results in this internal area for the following reasons: burning characteristics of cigarette tobacco produce a tendency for the lit end of the cigarette to adhere to the ignition element during the ignition phase; ashes and tobacco particles accumulate in and near the element and interfere with proper ignition. Due to the inaccessibility of this area, corrective action and normal cleaning are unfeasible. It was logical for earlier designers to isolate this combustion phase from danger to the smoker or interference by him; however, the result was unreliable overall operation. Two impressive but also unreliable sub-assemblies of some prior art devices are (a) a hopper floor comprising sliding, tilting plates for metered release of cigarettes to the ignition means and (b) a transversely moving carriage whereby a cigarette is grasped by jaws, carried to the ignition means, and subsequently ejected. The structure and drive means for these sub-assemblies have the disadvantage of being unnecessarily complex and expensive. Also such mechanisms have a tendency to jam when defective cigarettes occur.

In the present invention are numerous structural innovations and functional improvements over related devices in the prior art. Broadly stated my invention is a device for igniting and dispensing cigarettes automatically and sequentially. The device includes a chassis, a hopper mounted on the chassis and having a storage chamber for cigarettes, and an electric ignition means for igniting one end of a cigarette. Means are provided for transporting one cigarette at a time from the hopper to the ignition means and thereafter to be discharged from the dispenser. Also mounted on the chassis is a drive unit comprising an electric motor which drives a cam shaft having thereon first cam means for actuating the transport means and second cam means for actuating the ignition means. An electric circuit is provided for energizing the motor and ignition from a source of power; the circuit includes a first switch for starting the motor and a second switch for the ignition means. Once the first switch is closed, the motor is started, driving the cam means which automatically and sequentially actuate the transport means, the ignition means, and the circuits, until a lit cigarette is dispensed from the dispenser.

In one embodiment, a gravity feed system is used whereby each cigarette falls downward during the series of phases beginning with a drop through the hopper throat to its base. A pusher bar gently pushes this cigarette from the base to the ignition position where holding elements catch and support it. Following ignition, these elements release the lit cigarette to fall further to a dispensing area. When more than one cigarette falls to the throat or discharge opening of the hopper, a spring-loaded gate gently pushes excess cigarettes back into the chamber without damage to a cigarette or disruption of the passage of the proper cigarette.

Simplicity is the basis of this new device which is completely reliable, yet simple and inexpensive. The total number of components has been reduced to a minimum; the manner of operation is automatic while remaining uncomplicated. This gravity feed system combined with the transport and ignition mechanism efficiently conveys each cigarette, while eliminating typical force-feed systems, clamping elements, and other internal units where jamming of defective cigarettes occurs. Holding elements maintain the cigarette in an inclined position which aids in ignition and in disengagement of cigarettes from the ignition element at the time of final delivery of the lit cigarette.

In the accompanying drawings a preferred embodiment of this invention is shown.

FIGURE 1 is an exploded perspective view of the automatic cigarette lighter-dispenser;

FIGURE 2 is an exploded perspective view of the means for transporting a cigarette through the device;

FIGURE 3 is an exploded perspective view of the details of the transport means of FIGURE 2;

FIGURE 4 is a side sectional view showing movement of a cigarette through the hopper;

FIGURE 5 is a view like FIGURE 4, showing transport of a cigarette from the hopper to the ignition means;

FIGURE 6 is a view like FIGURE 4, showing movement of a cigarette from ignition to dispensing means;

FIGURE 7 is a front elevation partially broken away showing a cigarette in ignition position; and

FIGURE 8 is an electrical circuit diagram for the device.

The automatic cigarette lighter dispenser as shown in FIGURE 1 comprises the principal mechanism 1 on a chassis 2, with hopper 3, into which a load of cigarettes is placed, a platform 4 onto which one cigarette is released from the hopper, and a cam driven bar 5 which pushes the released cigarette off the platform to an ignition position where pins 6 and 6' support the cigarette with one end thereof in contact with ignition element 7 for a period of time. This element 7 is energized to ignite the cigarette and subsequently, the pins are retracted such that the lit cigarette continues to fall into delivery tray 8 where it can be removed by the smoker. Below the hopper is an electric motor drive unit 9 engaged to cams which automatically and sequentially cause a cigarette to be conveyed through the various stages described above.

In this embodiment a boon 10 is provided which encloses assembly 1 and also has rail mounts 11 for guiding attachment to another structure such as an automobile dashboard. At the front of the housing, slightly above the delivery tray is a strike bar 12, which when struck or pressed momentarily, closes an electrical circuit whereby the automatic cigarette lighting and dispensing cycle is begun. The hopper as shown in FIGURE 2 comprises side walls 21, an inclined floor 22, a front gate 23, pivotable on hinge 24, a flange plate 25, pivotable on the same
hinge, baffle lever 26, which pivots and engages its finger portion 27 against baffle plate extension 28 causing the baffle to periodically pivot. Spring 39 urges gate 23 to remain closed or return to a closed position when forced open.

At the bottom of the hopper is the throat or exit outlet 30 having dimensions large enough for only one cigarette at a time to be released.

In FIGURES 4, 5 and 6, the hopper is shown in cross-section and the steps are indicated whereby a cigarette is released from the hopper and conveyed through the mechanism during the automatic ignition and dispensing sequence. In FIGURE 4, it can be seen that a layer of cigarettes forms naturally on the floor 22 with the remaining cigarettes forming a pile above the first layer.

The position of baffle 25 with its edge extending into the chamber prevents cigarettes other than those on the bottom layer from moving toward the throat area 30. Throat 30 is wide enough so that only a single cigarette may be released to fall onto platform 4 where lip 31 restrains the cigarette from falling further until the proper time. Post-bar 5 is so aligned with cigarettes on the platform and ready to push just lip 31 to fall down to the ignition position. In contact with bar 5 is rod 33 driven by transport cam 34 with spring 35 urging rod 33 to remain in contact with the cam at all times. In FIGURE 5, it can be seen that cam 34 rotates counterclockwise urging rod 33 and bar 5 to move slowly, laterally to the left and, consequently, to push cigarette 30 from the platform. Bar 5 passes below cigarette B thus preventing B or other cigarettes from falling at this time and simultaneously bar 5 engages baffle lever 26. The lever pivots about portion 27, contacting baffle plate 25 at 28 and urging it to pivot upward against cigarette C. Movement of the baffle joggles the pile of cigarettes and minimizes the possibility of a "lump jam.

As seen in FIGURES 5 and 7 when cigarette A is pushed from platform 4 it falls and lands on ignition holding elements or pins 5 and 6A with the lower end of the cigarette in contact with ignition element 7 for a predetermined time period. Electric resistance coils of the element are energized and become heated so that ignition of one end of the cigarette occurs. It can be seen in FIGURES 5 and 6 that pin elements 5 and 6A are the ends of a continuous wire having a body portion 26 with a portion thereof formed into a cam follower 37. FIGURE 6 shows continued rotation of cam 34 in a counter-clockwise direction. Cam driving surface 36 urge wire 36 and the end pins 5 and 6A to move laterally to the right and thereby to retract the platform 4 at 28. Consequently, with support pins removed following ignition, the lit cigarette A falls downward, landing on the delivery tray 3 at the upper part 40, and rolls to lip 41 where the cigarette remains until retrieved by a smoker. To insure disengagement of the cigarette from element 7 after ignition, a jiggling effect is provided; the end of pin 5A (shown) or pin 6A may be bent upward or otherwise modified to deflect the cigarette during withdrawal of the pins.

Referring again to the hopper of FIGURE 4, gate 23 is urged by spring 29 (see FIGURE 2) to remain in a closed and vertical position such that throat 30 retains its narrow dimensions. In the event that more than one cigarette falls to or toward platform 4, the spring-biased gate 23 will urge the excess cigarettes backward into the main chamber thus preventing an actual double drop of cigarettes and possibility of jamming. It should be noted that the incline of hopper floor 22 is such that a gravity force gently urges the cigarettes to roll to the throat of the hopper. The combination of this mild incline, the slow moving push bar, the jiggling action of the baffle plate, and the spring force of the pivotable front gate permit a controlled movement of cigarettes without the possibility of jamming an irregular or deformed cigarette as often occurs with the usual back forking operation in most prior art devices. In FIGURE 5, it can also be seen that gate 23 has an extending portion 23A. Cigarette A, while being vertically supported by pins 5 and 6A, is temporarily biased in part by wall 33 so that the cigarette cannot move forward and fall off the pins unless and until the pins are retracted by the mechanism.

The drive unit as a separate assembly is seen in an exploded view in FIGURES 2 and 3. The heart of the unit is a permanent-magnet direct current motor 40 mounted by clip 41 and bracket 43 which are attached to chassis 2. The output torque of the motor shaft is converted through two gear reduction units 43 and 44 to drive cam shaft 45. On this shaft are mounted cams having driving surfaces for the push bar of the transport means, the holding pins of the ignition means, and timing cams 46 and 47 which alternate switches 48 and 49 of the electric circuit of the mechanism. It should be noted that cam 44 has driving surface 33 which alternately drives two separate and independent followers, namely rod 33 and wire 37. This is one more example of the achievement of simplicity and compactness which makes this invention novel and highly reliable.

The electric circuit X of the device is shown in FIGURE 8 with switches 48 and 49, also clearly seen in FIGURE 2. Circuit X includes the motor 60 and two contact points of switch 48 actuated by lower portion 50 of cam 46. One complete revolution of the camshaft 45 and cams therein corresponds to one complete cycle of cigarette transport, ignition, and dispensing components. As seen, cam 46 has a high portion 51 which causes switch 48 to include the ignition element in a circuit parallel to the motor during the ignition period. Thus, the motor and cam shaft contact 45 distributes functioning as a timing mechanism during ignition while the cigarette is held at rest. A secondary circuit Y includes resistance R and switch 49 actuated by cam 47. By this circuit the resistance is inserted in series with the motor to thereby reduce the voltage across the motor and consequently reduce motor speed; cam 47 is oriented with respect to switching cam 46, to time this speed reduction to occur during the period of cigarette ignition. A particular benefit resulting from the insertion of resistance R is that when the electricity source is weak the reduced motor speed provides an extended ignition period. Thus, lower voltage across the ignition element is compensated by longer ignition time and a properly lit cigarette still results. On cam 46 is V groove 52; when this cam rotates such that the V groove is directly adjacent switch 48, the contact elements separate, opening the circuit and stopping the operation of the mechanism. A second auxiliary circuit Z includes the same motor 60 and a push button or other momentary contact switch. In this preferred embodiment the push button switch is actuated by a strike bar 12, seen in FIGURE 1, and momentary pressure or force against the strike bar closes the circuit to start the motor running. After running for a few moments the motor has caused cam 46 to rotate enough to close the primary circuit X such that release of the strike bar and push button opening that secondary circuit will have no effect on continued operation of the motor which is now controlled by circuit Y. Also for convenience and attractiveness a light may be included in the primary circuit, the light being lit during operation of the motor and illuminating a window in the front of the housing. The absence of illumination would be a signal to the operator that a malfunction has occurred. Below the chassis a connection may be made into which the various circuit wires converge and are connected. When the assembled mechanism is slidingly installed into an automobile dashboard or otherwise no additional wiring or connections are necessary because a mating connector may be installed in the supporting structure of the ignition element may be a self heat resistant plate member having resistance wire wound around its forming a grill for contact with a cigarette. Preferably the major structural components are formed of a rigid metallic.
material, the hopper of a lightweight plastic and the cams of electrically non-conductive material so they do not interfere with electric circuit during engagement with the switch contacts.

I claim:

1. An automatic cigarette dispenser and igniter comprising in combination:
   (a) a chassis,
   (b) a cigarette storage hopper mounted on said chassis including a chamber for containing cigarettes,
   (c) an electric ignition means mounted on said chassis for igniting one end of a cigarette,
   (d) means for transporting a cigarette from said hopper to said ignition means and thereafter to be discharged from said dispenser,
   (e) a drive unit mounted on said chassis for operating said dispenser comprising:
      (1) an electric drive motor,
      (2) a cam shaft driven by said motor and having first and second cam means thereon,
      (f) electric circuit means for energizing said motor and said ignition means from a source of power, said circuit means comprising a first switch in circuit with said motor for starting the latter, a second switch in circuit with said ignition means, said first cam means operatively connected to said transport means to actuate the latter, and said second cam means operatively connected to said second switch means for energizing said ignition means.

2. A cigarette dispenser and igniter according to claim 1 wherein said chamber includes a lower portion defining a throat through which a cigarette may fall due to gravity, and a base below said throat for receiving and supporting said cigarette, and said transport means includes a laterally moving element which pushes said cigarette off said base to move to said ignition means.

3. A cigarette dispenser and igniter according to claim 1 wherein said chamber includes a downward sloping lower plate to induce gravity feed of cigarettes to said transport means.

4. An automatic device for ignition and dispensing of cigarettes comprising:
   (a) a chassis,
   (b) a hopper which is mounted on said chassis and includes
      (1) a chamber for containing cigarettes,
      (2) a throat in the bottom portion of said chamber through which a cigarette is dispensed by a gravity feed, and
      (3) a base below said throat upon which a dispensed cigarette rests after falling from said throat,
   (c) a transport means mounted on said chassis and comprising:
      (1) a cam-driven push-bar which cyclically moves laterally across said base and pushes said cigarette to an ignition means, and
      (2) a holding element for releasably maintaining said cigarette with one end thereof in contact with said ignition means,
   (d) an ignition means mounted on said chassis and comprising an electric resistance element which is cyclically energized to ignite a cigarette,
   (e) a drive unit mounted on said chassis comprising an electric motor and a cam shaft driven by said motor and having thereon:
      (1) transport cam means for actuating said push-bar and said holding element, and
      (2) timing cam means for actuating said ignition means, and
   (f) an electric circuit means for energizing said motor and said ignition element from a source of power, said circuit means comprising a first switch in cir-