United States Patent

[11] 3,559,629

[72] Inventor Henri Joseph Sauvignet
Paris, France

[21] Appl. No. 793,708
[22] Filed Jan. 24, 1969
[45] Patented Feb. 2, 1971
[73] Assignee Compagnie Des Compteurs
Paris, France
a company of France
[32] Priority Jan. 25, 1968, Nov. 21, 1968
[33] France
[31] 137,342 and 174,676

[54] **STATIC LEAD CORRECTION DEVICE FOR THE IGNITION OF AN INTERNAL COMBUSTION ENGINE**
8 Claims, 17 Drawing Figs.

[52] U.S. Cl. 123/148, 315/209
[51] Int. Cl. F02p 3/02
[50] Field of Search 123/148E, 149, 149A, 149D; 315/209

[56] **References Cited**

UNITED STATES PATENTS

3,202,146	8/1965	Short et al.	123/148
3,361,123	1/1968	Kasama et al.	123/148

Primary Examiner—Laurence M. Goodridge
Attorney—Pierce, Scheffler and Parker

ABSTRACT: The static correction device for advancing ignition controlled by an electromechanical or electronic detector incorporates a circuit for forming a signal received during the passage of a nonactive part of the cam and issuing a signal which partially charges a first condenser and discharges it during a time equal to the difference between the passage time of the nonactive part of the cam, and the charging time, a second charging condenser partially charging during a time inversely proportional to the speed during the passage of the nonactive part of the cam and completely discharging after that with a current proportional to the voltage at the terminals of the first condenser. The end of the discharge of the second condenser trips a temporization which is a function of the speed and interrupts the primary current of the ignition coil, by the intermediary of an amplifier circuit, so as to produce an induced current in the secondary of the ignition coil.

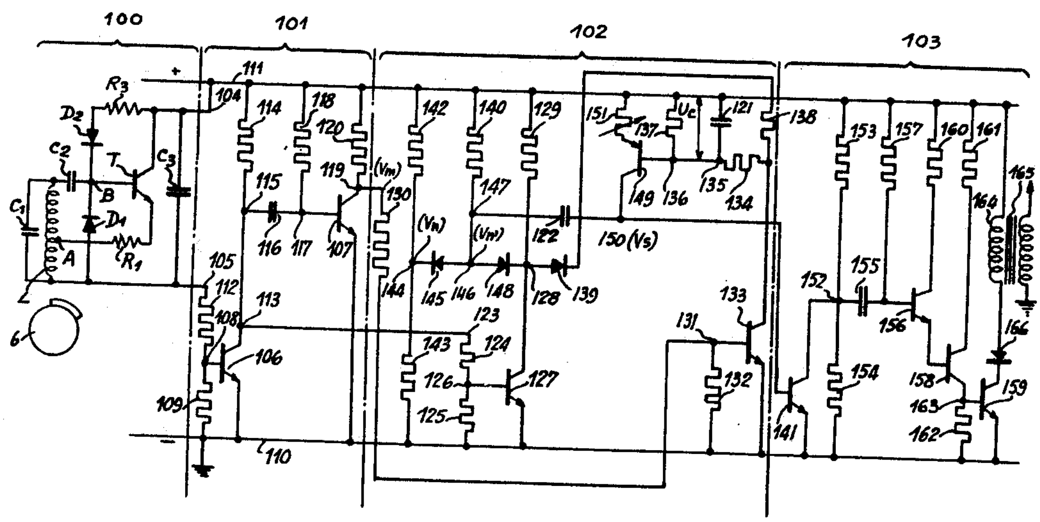


FIG.1

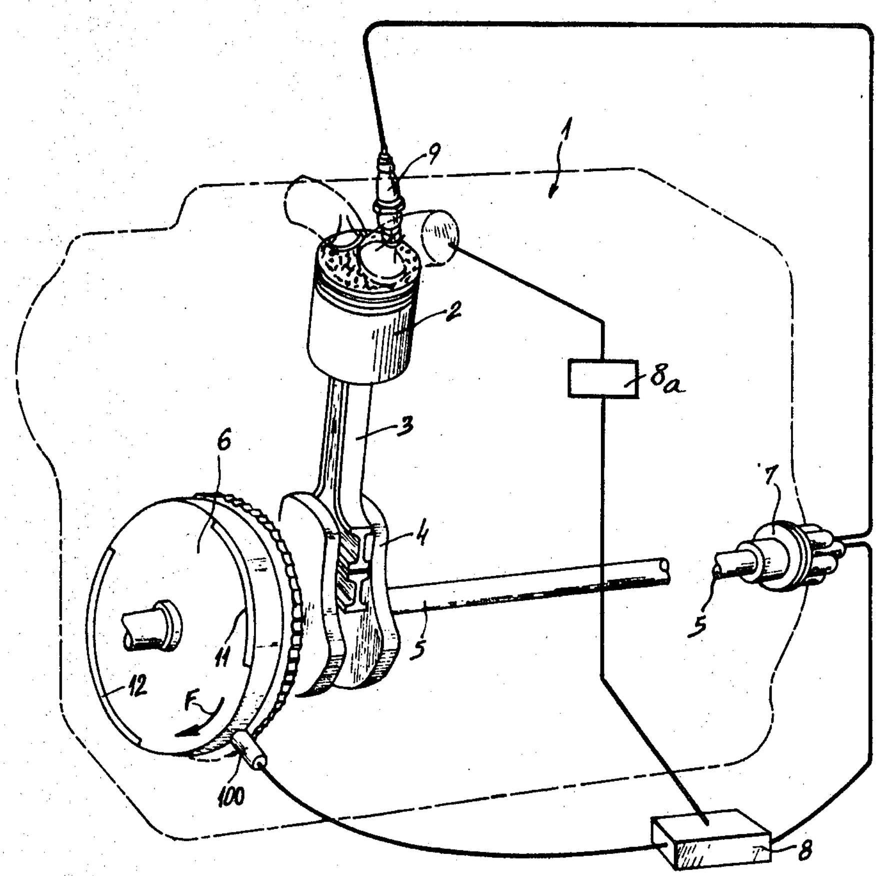
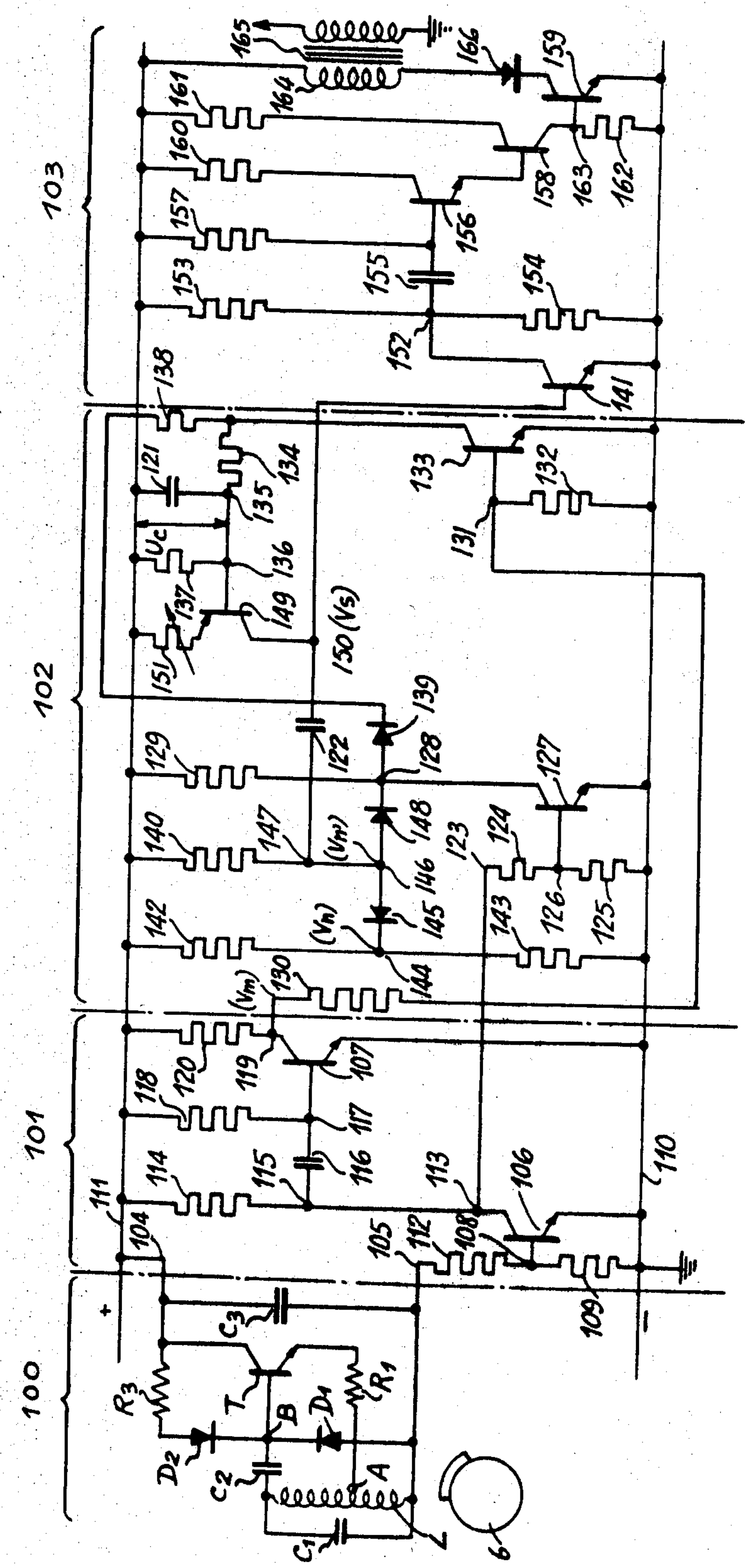


FIG.2.


100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150 (Vs)
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
(Vm)
(Vn)
(Vn')
Uc
+
−
T
B
A
L
6
R1
R3
D1
D2
C1
C2
C3

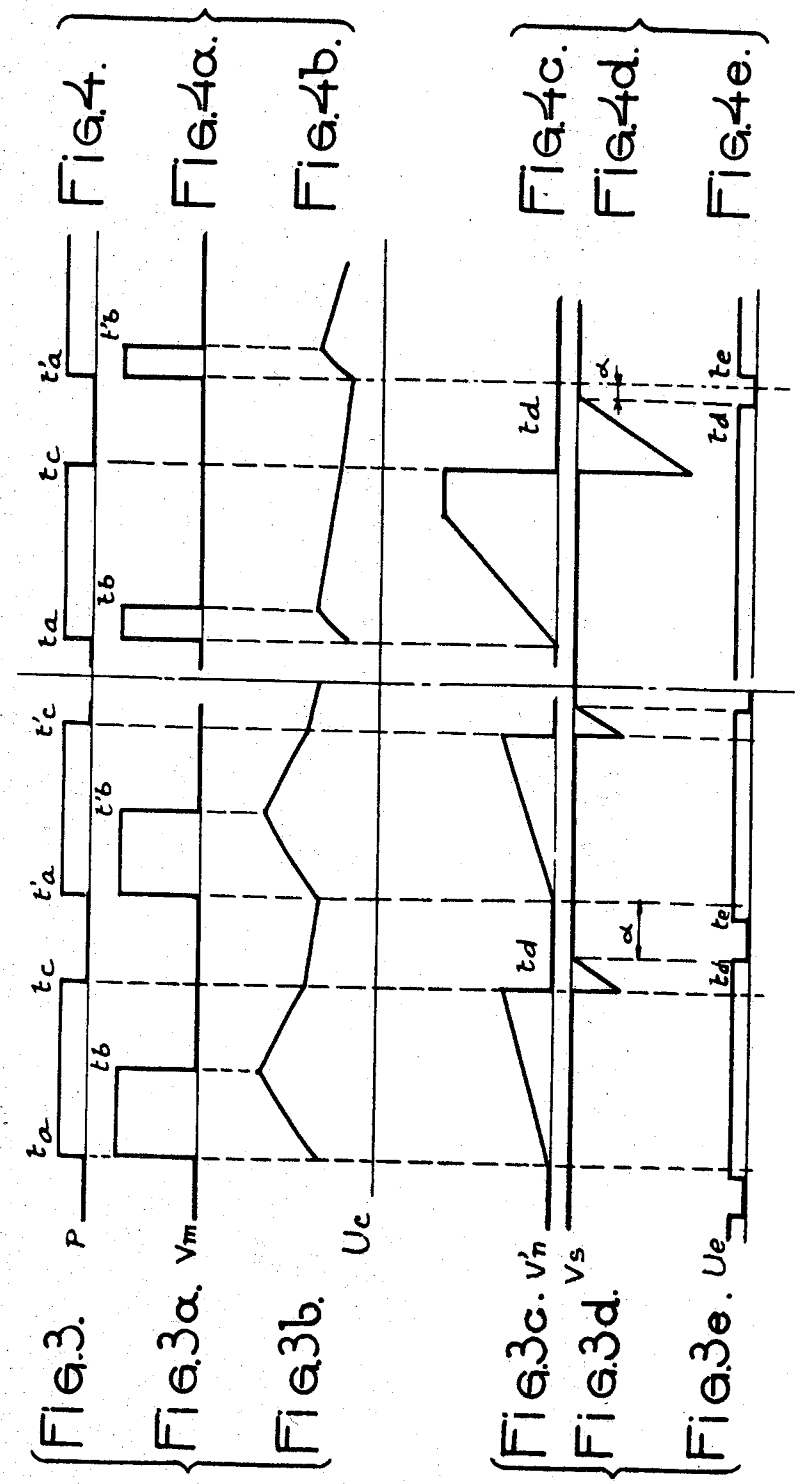


Fig.3.
Fig.3a.
Fig.3b.
Fig.3c.
Fig.3d.
Fig.3e.
Fig.4.
Fig.4a.
Fig.4b.
Fig.4c.
Fig.4d.
Fig.4e.
P
Vm
Uc
V'n
Vs
Ue
ta
tb
tc
t'a
t'b
t'c
td
te
α

PATENTED FEB 2 1971

3,559,629

SHEET 4 OF 4

Fig.5.

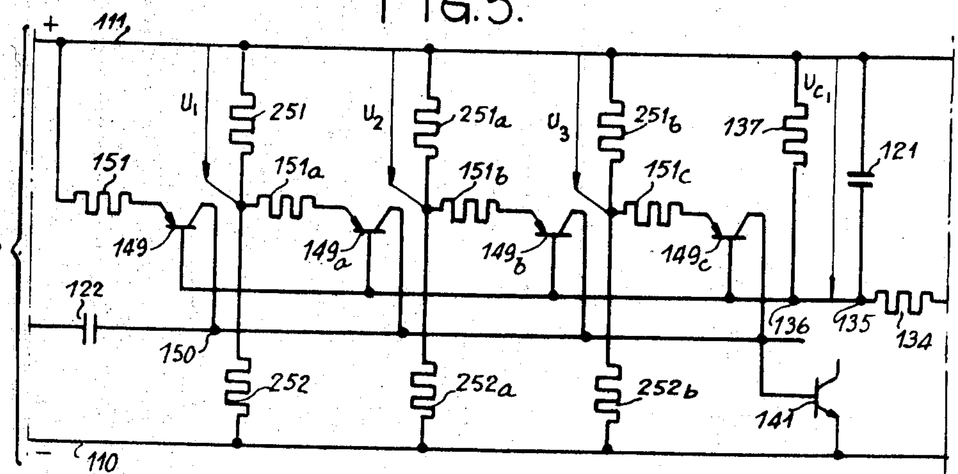


Fig.6.

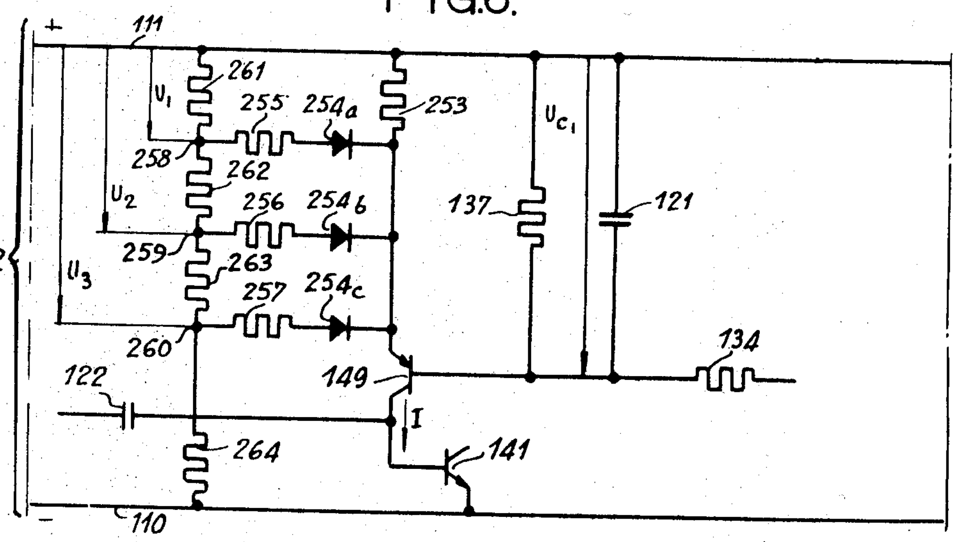
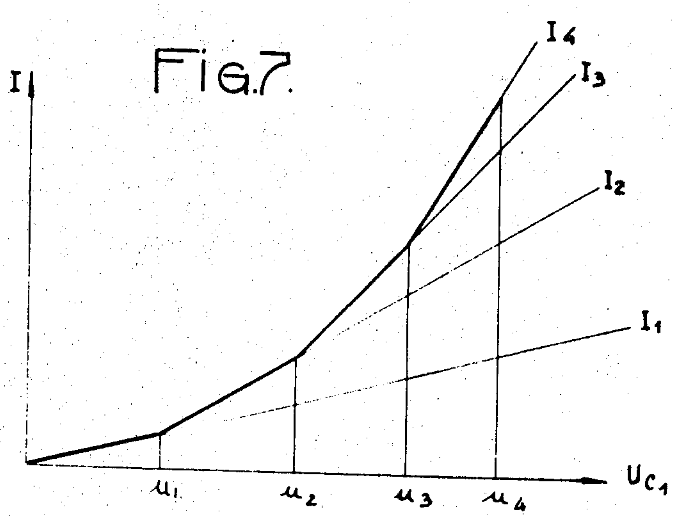


Fig.7.



STATIC LEAD CORRECTION DEVICE FOR THE IGNITION OF AN INTERNAL COMBUSTION ENGINE

The present invention relates to an electronic ignition device with lead controlled by a detector of an electromechanical or electronic type. A detector of this kind is described in a copending application Ser. No. 780,046 filed Nov. 29, 1968, in the name of Bernard Varaut and assigned to the same assignee as is the present application.

In accordance with the invention, the detector controls temporization members with several time constants for charging and discharging as a function of the speed of the engine. Specifically, an intercalated resistance is used in the emitter of a transistor biased by a condenser of a first temporization for supplying a collector current proportional to the voltage at the terminals of this condenser. Thus, it is possible to control the discharge current of a condenser of a second temporization. The resistance which can vary as a function of the air pressure depression (vacuum condition) in the intake piping defines the factor of proportionality.

The main object of the present invention is to effect an improved device directly usable on the voltage of the battery without amplifying the source by adjusting the discharge current of the second as a function of the speed of the engine.

The static lead correction device for advancing ignition controlled by an electromechanical or electronic detector incorporating, for instance, a cam driven by the crankshaft of the engine and comprising magnetic poles or conductors whose number depends on the number of engine cylinders comprises a circuit for forming the detector signal received during the passage of a nonactive part of the cam and issues a signal in phase opposition in relation to the detector signal and a fixed duration signal whose origin coincides with the appearance of the detector signal, the fixed duration signal partially charging a first condenser and discharging it during a time equal to the difference between the passage time of the nonactive part of the cam, and the charging time, the voltage at the terminals of the first condenser being an increasing function of the speed, a second charging condenser partially charging during a time inversely proportional to the speed during the passage of the nonactive part of the cam and completely discharging after the appearance of the active part of the cam with a current proportional to the voltage at the terminals of the first condenser, the discharge time of the second condenser being equal to the time passing between the appearances of the active part of the cam and the moment when the spark is started.

A voltage divider system is branched between the poles of the source and associated with switching means branched in parallel to various levels of the divider system for creating voltage thresholds on the emitter of at least one control transistor, so that the discharge current of the second condenser is a nonlinear function of the charge voltage of the first condenser.

In this manner, the end of the discharge of the second condenser trips a temporization which is a function of the speed and interrupts the primary current of the ignition coil, by the intermediary of an amplifier circuit, so as to produce an induced current in the secondary of the ignition coil.

According to another embodiment of the invention, the first condenser comprises a charge time constant and two discharge time constants.

According to another embodiment, the second condenser comprises a charge time constant, a charge limitation circuit and a discharge circuit for the imposed current.

According to one embodiment of the present invention, means of switching are made by transistors of the PNP type having their respective emitters branched in derivation through threshold resistances respectively connected at various levels of the voltage divider, the respective base of said transistors being in common connection to the first condenser and the collectors thereof being connected in common to the second condenser, one of the transistors having the function of controlling for a given voltage threshold.

According to another development of the invention, the switching means are formed by a set of diodes having their respective cathodes branched in derivation through threshold resistances connected to the various levels of the voltage divider, their anodes having a common connection to the emitter of the control transistor whose collector conducts the discharge current of the second condenser.

According to another development of the invention, the emitter of the control transistor has its base connected to the first condenser whose load voltage is a growing function of the speed, the collector of this transistor being connected to a second condenser whose charging time is inversely proportional to the speed, the increase of voltage of the charge of the first condenser releasing one of the switching means considered as a function of one of the voltage thresholds.

According to still another development of the invention, at least one resistance or the ratio of the resistances inserted in the emitter of the semiconductor charged by the capacity of the first temporization is variable as a function of the depression in the intake piping, so as to supply a collector current proportional to the voltage at the terminals of the first condenser.

Other characteristics of the invention are shown by the description which follows and attached drawings, given as examples of embodiment without limitative character.

FIG. 1 is a diagrammatic perspective of an internal combustion engine comprising the device of the invention.

FIG. 2 is a circuit diagram of the device according to the invention.

FIGS. 3, 3*a* and 3*b* are curves showing the shapes of signals at high rotation speeds and thus illustrating a method of operating the device of FIG. 2.

FIGS. 3*c* to 3*e* are curves showing the rate of lead signals at high speeds of the engine.

FIGS. 4, 4*a* and 4*b* are curves showing shapes of signals at low rotation speeds, thus illustrating another method of operating the device of FIG. 1.

FIGS. 4*c* to 4*e* are curves showing the rate of the lead signals at low speeds of the engine.

FIG. 5 shows an alternative of part of the diagram of FIG. 1.

FIG. 6 shows another alternative of the diagram of FIG. 2.

FIG. 7 shows the rate of curves as operating the alternatives of the diagram according to FIGS. 5 and 6.

In FIG. 1, there is a diagrammatical representation of a four-cylinder engine **1**, in each cylinder of which a piston **2** slides whose connecting-rod **3** is jointed at its foot on one of the crank-pins **4** of the crankshaft **5**, rigidly connected to a flywheel **6** and also a distributing device **7** which functions to direct, in a given order, current pulses produced from the device of the invention, designated as a whole by **8** to each ignition plug **9**. The device **8** comprises a depression plug **8***a* connected, for instance, to an intake collector of the engine.

The device **8** is also connected to a probe **100** forming part of it and which is intended to detect the successive passage of two members **11** and **12** carried by the flywheel **6**. In this manner, two current pulses are produced by setting up two sparks by two distinct spark plugs for each revolution of the crankshaft **5** as will be the case for a four-cylinder engine operating according to a four-stroke cycle.

In FIG. 2, the probe **100** is shown in one of its possible execution modes and comprises facing the flywheel **6** or a cam driven by this flywheel or another turning member of the engine, a coil L connected in parallel with a condenser C_1 to form an oscillating circuit whose resonance frequency has for value $\frac{1}{2\pi\sqrt{LC_1}}$.

C_2 is a connecting condenser which forms a counterreacting loop with a counterreaction resistance R_1 branched, on the one hand, on the point A of the coil L and on the other, on the emitter of a transistor T. A diode D_1 rectifies, at point B the alternating voltage coming from the oscillating circuit LC_1. A condenser C_3 filters the output current of the transistor T. A resistance R_3 and a diode D_2 form a biasing circuit of the base of the transistor T.

As shown in FIG. 2, this probe **100** is connected by the terminals **104, 105** to a circuit **101** enabling the shaping to be obtained of signals coming from this probe. The probe **100** supplied supplies a signal, all or nothing, according as to whether the members **11** or **12** forming the active parts of the flywheel **6** are passing, or not passing, in front of it.

The shaping circuit **101** comprises transistors **106** and **107**. The base of the transistor **106** is branched on to the junction point **108** of the common ends of two resistances in series **109, 112**. The voltage divider formed by the resistances **109, 112** is branched, on the one hand, to a negative potential line, **110**, and on the other, to the terminal **105** of the probe **100**. The negative voltage line is grounded.

The emitter of the transistor **106** is connected to the negative line **110** and its collector to a resistance **114** connected to the positive line **111**. The collector of the transistor **106** also comprises two derivations at two points **113** and **115**, the one effecting the junction with a complex circuit **102**, the other connected to a condenser **116** whose output at point **117** is common to a resistance **118** and the base of the transistor **107**.

The emitter of the transistor **107** is connected to the line **110**, whereas its collector is branched at **119** to the resistance **120** connected to the conductor **111**. The collector of the transistor **107** is also connected to the circuit **102** described hereafter by means of a resistance **130**.

The circuit **102** functions for drawing up the definition of a time basis $t=\frac{\beta-\alpha}{\omega}$ in which β is the angle corresponding to each active part **11** of **12** of the flywheel or cam **6**, α the angle of ignition advance and ω the speed. This time basis is obtained from variable temporization members specifically comprising the capacities **121** and **122**. The capacity **121** has a time charge constant and two time discharge constants; the capacity **122** has a charge time constant and a discharge time constant.

To this end, the derivation at point **113** is connected to point **123** of a voltage divider comprising resistances in series **124, 125**, the latter resistance being connected to the line **110**. The middle point **126** is connected to the base of a transistor **127** whose emitter is connected to the line **110**. The collector of the transistor **127** is connected to a point **128** and a resistance **129** whose other end ends at the line **111**.

Moreover, the collector **119** of the transistor **109** is connected by a resistance **130** to a point **131** common to a resistance **132** connected to the line **110**, and the base of a transistor **133** whose emitter is connected to the negative line **110**.

The collector of the transistor **133** is connected, on the one hand, to a resistance **134** branched in series to the common points **135, 136** with the condenser **121** and a resistance **137** connected in parallel with the condenser **121** on the line **110**, and on the other hand, to the resistance **138** in series with a diode **139** connected to point **128**.

A circuit for charging the condenser **122** comprises, from the line **111**: the resistance **140** and the base of a transistor **141** forming part of a following circuit **103**. A voltage reducer branched between the lines **110, 111** comprises resistances **142, 143** with an intermediate point **144** connected by a diode **145** to points **146, 147** common to the link with the resistance **140** and the condenser **122**; the charge of said condenser is limited by the voltage through the reducer described and the diode **145**.

A diode **148** prevents the charge of the condenser **122** through the resistance **129** and the circuit passing through points **146** and **147**.

A transistor **149** has its emitter fed from the line **111** through a resistance **151** and its collector connected to a point **150** on the liaison circuit between the condenser **122** and the base of the transistor **141**. The base of the transistor **149** is connected to common points **135, 136**. The value of the resistance **151** may vary, for instance, as a function of the depression in air pressure in the intake piping of the engine due to the action of the device **8***a* of FIG. **1**.

The circuit **103** is a voltage threshold device controlled by a signal coming from the condenser **122**, so as to obtain an output signal causing each spark of the spark plug **9**.

The circuit **103** comprises the transistor **141** mentioned above whose collector is connected at an intermediate point **152** of a voltage divider placed between the lines **110, 111** and formed by resistances **153, 154**. The intermediate point **152** is connected by means of a condenser **155** to the base of a transistor **156**, which base is subjected as well as the collector, to the voltage of the line **111** by means of resistances, respectively **157** and **160**. The condenser **155** and the resistance **157** form a time basis for the transistor **156**.

The emitter of the transistor **156** is connected to a power amplifier comprising transistors **158** and **159** mounted in cascade. The transistor **158** has its collector fed by the line **111** through the resistance **161** and its emitter comprises a ground connection at the point **163** by a resistance **162**. The transistor **159** has its collector fed by the line **111** through the primary winding **164** of the ignition coil **165** in series with a diode **166** and its emitter branched on to ground.

The diode **166** avoids the oscillating discharge effect that might occur through the primary winding **164** owing to an inverted voltage and entails destruction of the transistor **159**.

The operation of the circuits **100** to **103** described above is explained by FIGS. **3**, **3***a* to **3***e* as well as FIGS. **4**, **4***a* to **4***e*, respectively for high and low rotation speeds of the engine.

FIGS. **3** and **4** represent signals corresponding to the passage of the active part of the flywheel **6** in front of the detector **100** (FIG. **1**). Square waves of duration t_a t_c and t'_a t'_c show the oscillating state of the electronic detector for the inactive parts of the flywheel **6**; the space t_c t'_a between the squares shows the blocked state of the detector during the passage of the active part of the flywheel.

In FIGS. **3***a* and **4***a*, the squares at the moments t_a and t_b show the variations of the charge voltage V_m in the emitter-collector circuit of the transistor **107**, squares whose duration is a function of the first time base formed by the condenser **116** and the resistance **118**. The signal V_m is taken at the point **119** in the circuit **101**.

FIGS. **3***b* and **4***b* show the variations of the charge voltage U_c of the condenser **121**.

FIGS. **3***c* and **4***c* show the variations of the charge voltage V'_n of the condenser **122** at common points **146**, **147** and FIGS. **3***d*, and **4***d* show those of the output voltage V_s towards the transistor **141**.

The regulating of the angle β or advance ignition angle is comprised between a moment *td* and the moment t'_a which corresponds to the passage of the piston through dead center.

In FIGS. **3***e* and **4***e*, the tripping of the spark at the moment t_d and its duration until the moment t_e are defined by the level of the voltage U_e from the moment t_d corresponding to the origin of the advance angle.

At high speeds, the tripping of the spark at the moment t_d (FIG. **3***c*) is situated before the moments t_a or t'_a which mark the end of the passage of the active part of the flywheel (dead center). On the other hand, at low speeds, the tripping of the spark at the moment t_d (FIG. **4***e*) corresponds to the moment t_a or t'_a, i.e., when the angle α is slight or zero.

For facilitating the description, the working is described from the moment t_a which follows the passage of the piston **2** at dead center. In this case, the oscillations of the detector **100** saturate the transistor **106** which becomes passing whereas the transistors **107** and **127** are blocked, which has the effect of discharging the condenser **116** through the resistance **118** and the transistor **106**. Simultaneously, the transistor **107** is blocked and the transistor **133** can pass.

Up to that moment t_b, the condenser **121** partially charges from the voltage of the source (line **111**) through the resistance **134** and the transistor **133** which is saturated, which represents the time constant referred to in the foregoing.

Between the moments t_b t_c, the condenser **121** partially discharges in a first circuit passing through the resistance **137** in parallel and in a second circuit formed by the resistance **129**, the diode **139**, the resistances **138** and **124**, the transistors **127** and **133** being blocked. This partial discharge corresponds to the first time constant of discharge of said condenser **!21**.

The transistor **127** being blocked, the condenser **122** charges from the voltage of the source through the resistance **140** and by the base of the transistor **141** which is saturated, owing to this. The charge is limited to the level of the voltage defined by the resistance reducer **142, 143** and the diode **145**.

The discharge of the condenser **121** occurs during the moments t_c t'_a of the cycle following through the resistance **137**. There are thus two discharge time constants for the condenser **121**.

The moment t_c corresponds to the beginning of the active part **11** or **12** of the flywheel from which **100** is blocked.

It should be noticed that at all times the transistor **149** supplies a collector current proportional to the voltage at the terminals of the condenser **121** and that the proportionality factor is defined by the resistance **151** whose value is a function of the depression in the intake piping.

At the moment t_c, the voltage at the condenser terminals **121** is so much the higher as the of the engine is greater.

At low speeds, the charge voltage of the condenser **122** reaches the voltage V_n at point **144**, which is fixed by the resistances **142** and **143**, and for higher speeds the charge voltage decreases owing to the time constant defined by the resistance **140**.

It is advisable that the transistor **149** deliver to the condenser **122** when the potential V_s at point **150** is negative in relation the negative pole (line **110**) of the source. In these conditions, the voltage available for the amplification system (resistance **151** and transistor **149**) is always at least equal to the voltage of the source.

The time which elapses between the moment t_c and t_d corresponds to the discharge of the condenser **122** owing to the current of the collector of the transistor **149** passing through the common points **146, 147**, the diode **148** and the transistor **127**, the transistor **141** being blocked. During this time interval, there is the complete charge of the condenser **155** through the resistance **153** and the transistors **156, 158, 159** made passing.

At the moment t_d which corresponds to the end of the discharge of the condenser **122**, the transistor **141** becomes saturated which enables the discharge of the condenser **155** through the resistance **157** and the transistor **141** and which blocks the transistors **156, 158, 159**, cutting out the primary current of the coil.

By the effect of the extra breaking current, the spark appears at the secondary winding at the moment t_d. The duration of the spark between the moments t_d t_e corresponds to the discharging time of the condenser **155** and may decrease with the increasing of the engine speed.

The moment t'_a corresponds to the beginning of an inactive part of the flywheel **6** from which the detector **100** begins to oscillate. The working cycle described above from t_a begins again at the moment t'_a.

In FIGS. **5** and **6**, the members whose functions are identical to those of FIG. **1** have the same reference numerals. Thus, in the circuit **202** of FIG. **5** which shows an alternative of the circuit **102** of FIG. **2**, the lines **110** and **111**, the transistors **141** and **149**, the condensers **121** and **122**, the resistances **134, 137** and **151**, the common points **135, 136** and **150** have the same references as in said FIG. **2**.

One thus finds the emitter of the transistor **149** connected by a resistance **151** to the positive line **111**, the collector connected to point **150**, on the one hand, to the condenser **122**, and on the other, to the transistor **141**.

According to this arrangement, transistors **149a, 149b, 149c** have their emitters connected by resistances respectively **151a, 151b, 151c** to voltage dividers each comprising resistances such as **251, 252, 251a, 152a, 251b** and **252b**. For drawing up the formulas given in that which follows, the resistances **151, 151a, 151b** and **151c** correspond respectively to r_0, r_1, r_2 and r_3. Without changing anything in the character of the invention it is quite understood that the number of transistors can be different to that taken as an example in FIG. **5**.

The bases of transistors **149** to **149c** are connected together and to points **135, 136** common with the **137** and the condenser **121**. The collectors of these transistors are connected together as well as the condenser **122** by the point **150**, on the one hand, and the base of transistor **141** on the other. This latter connection conveys the discharge current of the second condenser **122**.

The working of the circuit **202** (FIG. **5**) is explained as follows in relation to FIG. **7**.

When the voltage Uc_1 at the terminals of condenser **121** is less than u_1 which is the voltage at the terminals of the resistances **251**, the transistor **149** only is passing, and the other transistors **149a** to **149c** are blocked. The discharge current of the second condenser **122** is expressed by:

$$I=\frac{Uc_1}{r_0} \tag{1}$$

r_0 being the resistance **151**.

If the voltage Uc_1 is comprised between u_1 and u_2, u_2 being the voltage at the terminals of the resistance **251a**, only transistors **149** and **149a** are passing and the other transistors are blocked. The discharge current of the condenser becomes:

$$I=\frac{Uc_1}{r_0}+\frac{Uc_1-u_1}{r_1} \tag{2}$$

r_1 being the resistance **151a**.

If the voltage Uc_1 is comprised between u_2 and u_3, u_3 being the voltage at the terminals of the resistance **251b**, the main current becomes:

$$I=\frac{Uc_1}{r_0}+\frac{Uc_1-u_1}{r_1}+\frac{Uc_1-u_2}{r_2} \tag{3}$$

r_2 being the resistance **151b**.

Thus, progressively as Uc_1 exceeds the reference thresholds u_1, u_2, u_3 defined by the voltage dividers through the resistances **151** to **151c**, the transistors such as **149, 149a, 149b**.....are successively released, which enables a nonlinear variation curve to be obtained of the discharge current I (FIG. **7**).

On this curve, one sees the variations I_1, I_2, I_3 of the discharge current as a function of the various levels of voltage u_1 to u_4 which corresponds to the increase of voltage of Uc_1.

FIG. **6** shows an alternative **302** of the circuit **202** of FIG. **5** and the members having the same function retain the same reference numerals.

In the circuit **302**, the emitter of transistor **149** is connected to the line **111** by a resistance **253** and a set of diodes replaces the resistances **151** to **151c** of FIG. **5**.

The set comprises diodes **254a, 254b** and **254c** whose cathodes are respectively fed by threshold resistances **255, 256, 257**, which are individually connected in this order to points **258, 259** and **260** of a voltage divider branched between the lines **110** and **111**. The divider comprises resistances **261, 262, 263** and **264**. The points **258, 259, 260** respectively determine the voltage levels u_1, u_2, u_3.

It is quite obvious that a different number of diodes could be used without changing the character of the invention.

The working of the circuit **302** of FIG. **6** is similar to that **202** of FIG. **5**.

Progressively, as the voltage Uc_1 exceeds the reference thresholds u_1, u_2 u_3 defined by the various points **258, 259, 260** of the voltage divider, as well as by the threshold resistances

255, 256, 257, the diodes 254*a*, 254*b*, 254*c* are successively released, enabling the same nonlinear variation curve to be found of the discharge circuit (FIG. 6) as a function of the voltage Uc_1.

For the two examples of circuits 202 (FIG. 5) and 302 (FIG. 6), when the voltage Uc_1 decreases, the discharge current backs gradually as a function of the threshold of the voltage u_3, u_2, u_1 which corresponds to the successive locking of the transistors such as 149 or diodes such as 254.

Without going outside the scope of the invention, we can vary, either emitter resistances such as 151 or 253, or the ratio of resistances such as 251, 252 or 261 to 264 as a function of the depression in air pressure in the intake piping by means of the device 8*a*.

I claim:

1. Static device for the ignition of internal combustion engines of the two-stroke or four-stroke type, in which the ignition moment depends at least on the rotation speed of the engine crankshaft, said device comprising a spark plug per cylinder of the engine, a distributor mechanism for directing current pulses respectively to each spark plug of each cylinder, a revolving member or cam driven by said crankshaft and comprising at least one active zone and one inactive zone, said cam being placed facing an electronic probe, said electronic probe comprising a bistable oscillator with a fixed frequency disposed facing said cam so that it produces pulses during the passage of the inactive part thereof and is blocked during the passage of the active part, said oscillator having a rectifying and filtering circuit so that it produces rectangular signals corresponding to the inactive parts of the cam and to both the duration and frequency of which image the rotation speed of the crankshaft, a pulse generating circuit having a fixed time constant smaller than the duration of the rectangular signals and being connected to the rectifying and filtering circuit of said electronic probe, so that rectangular pulses are produced by said pulse generating circuit with the same origin as said rectangular signals and a fixed duration, a first capacitor connected to said pulse generating circuit, so that said first capacitor is charged during a fixed duration corresponding to each one of said pulses, a resistive discharge circuit having at least two discharge resistors connected to said first capacitor so that said capacitor has two discharge time constants, a second capacitor connected to the first capacitor by one of said resistors of the discharge circuit thereof, a first electronic gate also connected to said second capacitor and to said rectifying and filtering circuit of said bistable oscillator, so that said first capacitor is progressively discharged through the two resistors of each discharge circuit from the end of each pulse of a fixed duration according to a first time constant and that the rectangular signals from said rectifying and filtering circuit keep closed said first electronic gate which is open as soon as said signals are interrupted whereby said first capacitor is brought to be discharged according to a second time constant in one only of the two resistances of its discharge circuit and said second capacitor also discharged in dependency of said second time constant of said first capacitor, a second electronic gate placed at the input of a voltage threshold circuit and connected to said second capacitor whereby said gate is closed during the duration of the discharge of said second capacitor function of said second time constant of said first capacitor, and open at the end of said discharge, said voltage threshold circuit comprising a capacitor connected to said second electronic gate and to an ignition circuit connected to said distributor mechanism so that the opening of said second electronic gate puts into action said ignition circuit at the end of discharge of said second capacitor to produce an ignition spark at a moment which is a function both of the duration of the discharge of the second capacitor and of the end of each rectangular signal.

2. Device according to claim 1, wherein said second capacitor is connected to said rectifying and filtering circuit by said first electronic gate so that the rectangular signals are applied to said second capacitor, thereby receiving a charge which is inversely proportional to the rotation speed of the crankshaft, said second capacitor being discharged at the end of each rectangular signal causing the closing of said first electronic gate.

3. Device according to claim 1, wherein further the discharge circuit of said first capacitor comprises a variable resistor the magnitude of which is a function of the vacuum in the engine so that the second time constant of said first capacitor is a function of said vacuum.

4. Device according to claim 1, wherein the first capacitor is connected to at least a source of constant voltage so that the charge voltage which is applied to it is at the most equal to said constant voltage and that the discharge voltage of said first capacitor controls the discharge voltage of the second capacitor and the control moment of said threshold circuit.

5. Device according to claim 4, comprising further voltage dividers parallely placed with a source of constant voltage, switching means connected to each voltage divider and respectively to sets of resistors constituting one of the resistors of the discharge circuit of said first capacitor, so that the discharge voltage of said capacitor is successively a function of said resistors and causes the discharge of said second capacitor in dependency thereof.

6. Device according to claim 5, in which the switching means are made by transistors PNP having their respective emitters branched in derivation through threshold resistances respectively connected to each voltage divider, their bases being connected in common to the first capacitor, their collectors being connected in common to the second capacitor, one of the transistors having the control function for a given voltage threshold.

7. Device according to claim 5, in which the switching means are formed by a scale of diodes having their respective cathodes branched in derivation through threshold resistances connected to the various levels of the voltage divider, their anodes being made in common with a transmitter of the semiconductor of control whose collector conveys the discharge current of the second capacitor.

8. Device according to claim 7, in which the control semiconductor has its base connected to the first capacitor whose charge voltage is an increasing function of the speed, the collector of this semiconductor being connected to a second capacitor whose charge time is inversely proportional to the speed, the increase of voltage of the charge of the first capacitor releasing one of the switching means considered as a function of the one of the voltage thresholds.