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SELF IGNITING EXPLOSION MOTOR

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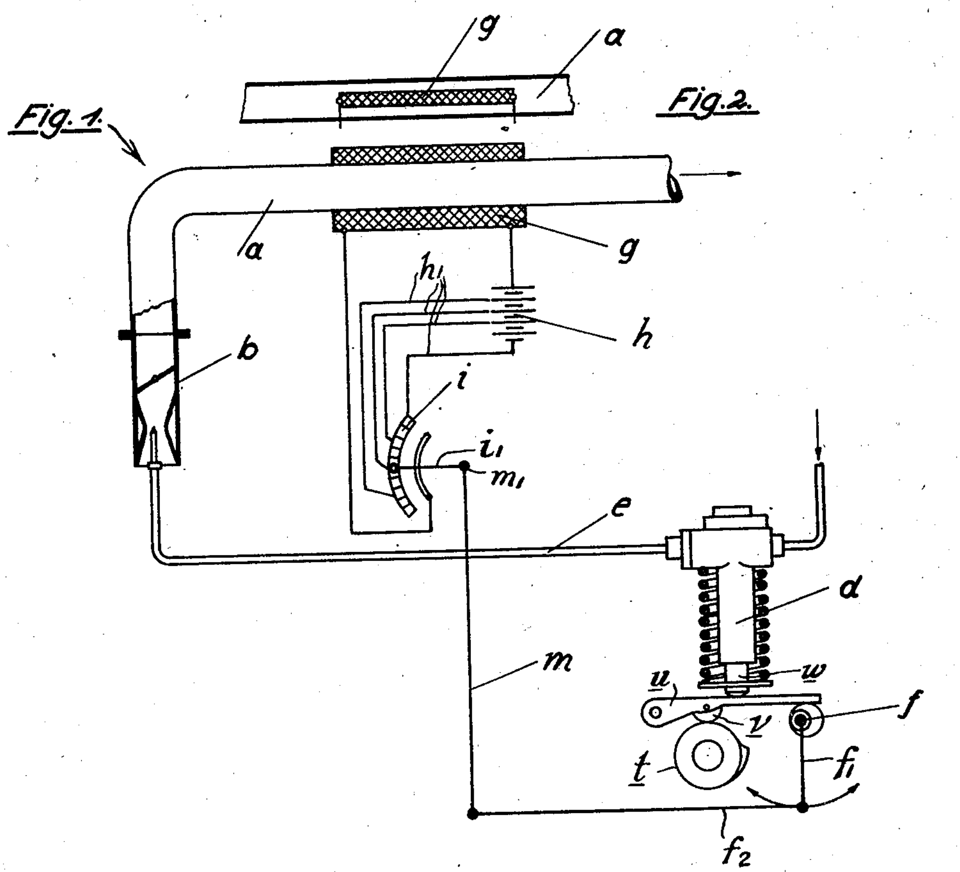

Inventor:
Jordan Bauer
By: Marks & Clerk
Attys.

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UNITED STATES PATENT OFFICE

JORDAN BAUER, OF STUTTGART-UNTERTURKHEIM, GERMANY, ASSIGNOR TO DAIMLER-BENZ AKTIENGESELLSCHAFT, OF STUTTGART-UNTERTURKHEIM, GERMANY, A CORPORATION OF GERMANY

SELF-IGNITING EXPLOSION MOTOR

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This invention relates to a method of regulating the ignition point in mixture-compressing combustion engines with self-ignition (self-igniting explosion motors), in which the output is regulated by this, that only the amount of the fuel—introduced before the end of the suction stroke—is varied.

The difficulty arises in this case that the specific heat of the mixture varies with the content of fuel. The specific heat of a rich mixture is greater than that of a poorer mixture and consequently, with otherwise equal ratios, self-ignition through heat of compression cannot occur at the same position of the crank. Thus if a machine is so dimensioned that the mixture, with a small load and a normal initial temperature, is self-ignited at a definite position of the crank, then with a greater load, self-ignition cannot take place at the same position of the crank, for in this case with a given weight of charge, more fuel is led in, i. e., a mixture richer in fuel is used, that is to say a mixture of higher specific heat.

The proportion of the specific heats for various compositions of the mixture will now be more fully referred to by way of an example. If a quantity of gas consists of parts of weights g_1, g_2 with the respective specific heats c_1, c_2 the specific heat of the mixture is given by the formula

$$c=(g_1c_1+g_2c_2)/(g_1+g_2).$$

For a mixture of 15 parts of air, (specific heat $c_1=0.1684$) and one part of petrol or petroleum (specific heat $c_2=0.5$), the specific heat is

$$c=\frac{1}{16}(15\times0.1684+1\times0.5)$$

$$c=0.1895.$$

For 15 parts of air and ½ part of petrol or petroleum,

$$c=\frac{1}{15.5}(15\times0.1684+0.5\times0.5)$$

$$c=0.1785$$

With a greater load and mixture richer in fuel more units of heat must be supplied to ignite the mixture.

According to the invention the increase in the specific heat of the mixture in the case of an increased content of fuel is compensated by preheating. In this way it is attained that for all loads the charge is ignited by heat of compression at the same position of the crank.

In practice, the specific heats for the different fuels and for the ratios of the mixture which come into question are first ascertained by calculation, and in each case the amount of heat to be added to the mixture from without, and the extent to which the end compression has to be varied are determined therefrom. By these means also the differences in the specific heats of different fuels can be compensated.

Fig. 1 shows an arrangement for varying the initial temperature of fuel and air, comprising an electric heating device,

Fig. 2 shows a modified form of heating device.

Referring to Fig. 1, the carburetter b is connected up to the suction pipe a of the engine. The fuel nozzle of the carburetter is connected up to the delivery pipe e of the fuel pump d, the stroke of the plunger w of the fuel pump being determined by the cam disc f. The plunger w is operated by means of a rocker lever u having a roller v thereon which rests on the cam t fixed on the cam-shaft of the engine. The cam disc f is rotatable and is rigidly connected to a lever f_1 which is connected up by a link f_2 to a lever m fixed on a shaft m_1. On the shaft m_1 is fixed the control lever i_1 of the switch i of the battery h which is in the circuit of the heating device g surrounding the suction pipe a. The switch has a plurality of contacts connected up by leads h_1 to different cells of the battery h in well-known manner, only a few of the leads being shown in order to avoid confusing the drawings. In the arrangement shown, when the lever i_1 is in its highest position, all the cells of the battery are in circuit with the heating device g, while when the lever is in the lowermost position the circuit is broken and the heating device is currentless.

The free end of the rocker lever u rests on the cam disc f and if the latter is turned anti-clockwise it will raise the rocker lever and the pump plunger, so that the pump will deliver less fuel owing to the reduction of stroke effected by raising the plunger. At the same time, the lever f_1 rigidly connected to the cam disc f will turn in unison therewith and, through the intermediary of the link f_2, will rock the lever m on the shaft m_1 of the control lever i_1 of the battery switch i, thereby turning the control lever downwardly to reduce the heating action of the heating device g.

In Figure 2, the heating device g is arranged inside the suction pipe a instead of outside it as shown in Figure 1.

What I claim is:

A method of regulating the ignition point in mixture-compressing combustion engines with self-ignition, in which the output is regulated by the amount of fuel being varied, and by the air-charge being kept substantially constant, the initial temperature of the mixture of fuel and air being varied to correspond to the specific heat of the mixture as it varies with the content of fuel, whereby the mixture is ignited at the same position of the crank for all loads.

In testimony whereof I affix my signature.

JORDAN BAUER.