Oct. 7, 1930. C. DE FRANÇA E SILVA 1,777,656

MIXING DEVICE

Filed July 9, 1928

Fig. 1,

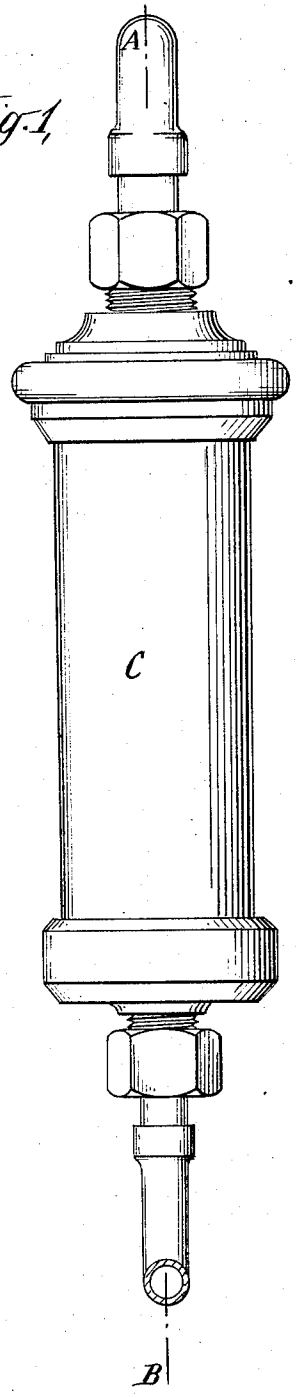


Fig. 2,

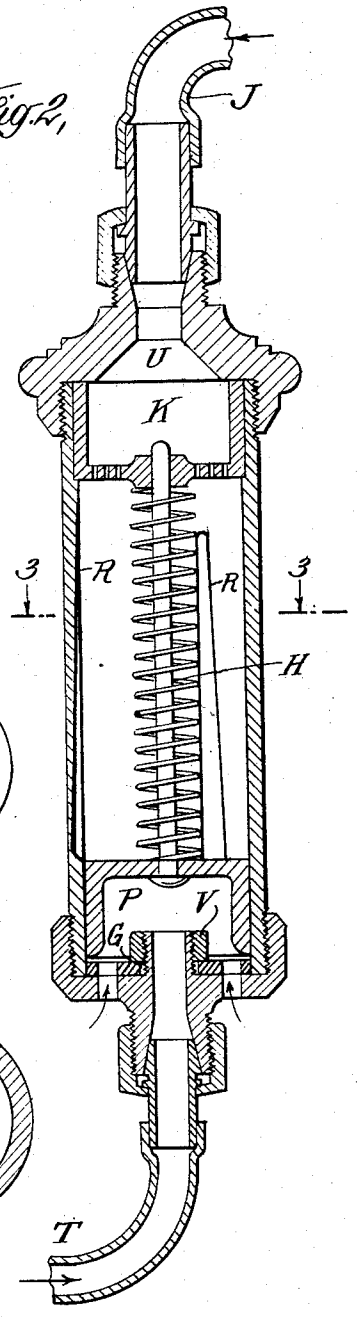


Fig. 4,

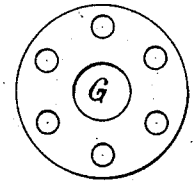
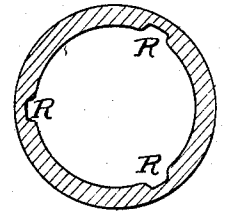


Fig. 3,



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UNITED STATES PATENT OFFICE

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MIXING DEVICE

Application filed July 9, 1928, Serial No. 291,235, and in Brazil September 10, 1927.

This invention relates to a gaseous fuel mixing device for internal combustion engines. More particularly it relates to various improvements in devices of this character and has for its object the provision of a suitable device for utilizing the waste gases from the crank case of internal combustion engines.

In the crank cases of practically all internal combustion engines there exist inflammable gases which arise in part through the leakage from the cylinders during the compression of the explosive mixture, and in part from the vaporization of the lubricating oils contained in the crank case, by the heat generated during the operation of the engine. Usually these gases are wasted and are not employed for any use or purpose such as in the operation of the engine itself.

It is the object of the present invention to provide a device whereby such gases may be utilized in the engine in the crank case of which they are found. More particularly the present invention concerns a device whereby these gases are drawn from the crank case of the engine and after mixing with a suitable quantity of air are supplied to the intake manifold of the engine, thereby aiding in the operation of the engine and effecting an economy in its fuel consumption.

In order that the invention may be better understood reference is made to the accompanying drawings wherein

Fig. 1 is a side view of a device in accordance with the invention.

Fig. 2 is a longitudinal section view on the line AB of Fig. 1.

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a plan view of a detail of the device.

Considering the drawings more in detail, the device comprises a cylindrical tube C connected at its lower end to a tube T, which may be attached in a suitable manner to an opening provided in the engine crank case. At its other end the cylinder C is connected to a tube or conduit J intended to be connected to the intake manifold of the engine. Within the tube C is arranged a piston P spring loaded at H and so mounted in a perforated closing member K as to permit it to move longitudinally in the cylinder under the intake suction of the engine.

In the wall of the cylinder C are provided a plurality of grooves R, which, as shown in Fig. 2, decrease in cross-sectional area from the inlet end to the outlet end of the cylinder. Accordingly when the engine to which the device is connected is started, the intake suction draws the piston P upwardly in the cylinder C, causing it to cover portions of the grooves of gradually decreasing cross-sectional area, with the result that the waste gases supplied through the tube T are supplied in gradually decreasing amounts to the tube J the further the piston P is moved upwardly in the cylinder C. Thus, in starting, the intake suction of the engine being at its highest value, the piston P is drawn almost to the upper limit of its stroke in which position it practically shuts off all passage of the gases into the tube J. During normal running, on the other hand, or operation at high speed, the intake suction is at a lower value, in which case the piston P drops down to some point below its extreme limit, and in so doing allows a portion of the gas to pass round it through the groves R. At all times, therefore, the amount of waste gas passed into the tube J through the grooves R is regulated or controlled by the position of the piston P which, in turn, is sensitive to the intake suction of the engine. A proper mixture of waste gas with the ordinary fuel supply of the engine is therefore assured by the device.

In addition to providing for a supply of waste gases from the crank case of the engine, the device may be provided with an air valve or perforated disc G to permit the mixture of a suitable quantity of air with the waste gases prior to the injection of the mixture into the intake manifold of the engine. To this end, the inlet end of the cylinder C may be provided with a plurality of perforations and equipped with a similarly perforated disc G which can be rotated or adjusted so as to bring a portion or all of its holes into coincidence with the holes, or perforations, in the end of the cylinder. After the disc G

has been adjusted to provide the proper amount of air it may be secured in position by means of a lock nut V.

Although the drawings illustrate but one form of the invention, it is to be understood that the device of the present invention may be varied in its structural details and size of parts, in order to be applicable to various types of engines, without departing from the spirit and scope of the invention as defined by the following claims.

I claim:—

1. A gaseous fuel mixing device for internal combustion engines, comprising a cylinder having an inlet conduit at one end for supplying gaseous fuel and an outlet conduit at the other end adapted to be connected to the intake manifold of an engine, said cylinder having a plurality of longitudinal grooves in the wall thereof varying in cross-sectional area from end to end, and a piston in said cylinder movable therein under the intake suction of said engine, whereby the quantity of gaseous fuel passed from said inlet end to said outlet end is controlled by the movement of said piston over said grooves.

2. A gaseous fuel mixing device according to claim 1, wherein the grooves in the cylinder wall progressively decrease in cross-sectional area from the inlet end to the outlet end.

3. A gaseous fuel mixing device according to claim 1, wherein the grooves are so disposed that the piston at each end of its stroke completely shut off all passage of the fuel mixture through the grooves.

In testimony whereof I affix my signature.

CESAR DE FRANÇA E SILVA.