

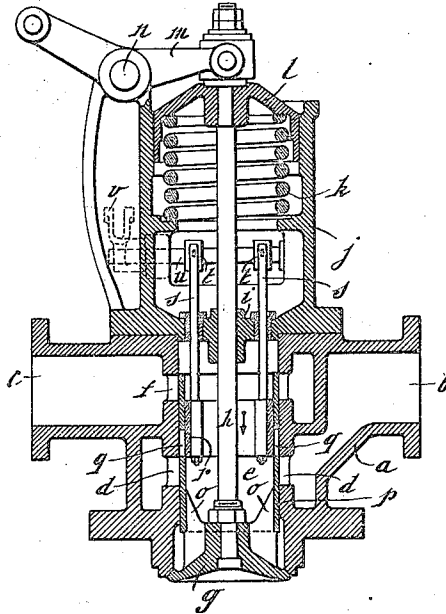
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APPARATUS FOR REGULATING THE SUPPLY OF EXPLOSIVE MIXTURE TO GAS ENGINES.

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To all whom it may concern:

Be it known that I, TOUSSAINT GENDARME, a subject of the King of Belgium, residing at Seraing, in the Kingdom of Belgium, have invented certain new and useful Improvements in Apparatus for Regulating the Supply of Explosive Mixture to Gas Engines, of which the following is a specification.

This invention relates to apparatus for regulating the supply of explosive mixture to gas engines, and which will serve for effecting a distribution with constant compression and with an admission of the mixture variable with the load of the engines.

The apparatus consists mainly in the combination with an admission valve for the mixture, of a cylindrical slide valve, actuated by the said admission valve, of a second cylindrical slide valve moving within the first under the action of the engine governor for regulating, as required, either the admission alone of the gas, or simultaneously the admission of the gas and the admission of the air through suitable ports provided in the first cylindrical slide valve.

To enable the invention to be fully understood, an example of the application is hereinafter described, for obtaining a constant compression.

The accompanying drawing is a vertical section through the distributing mechanism.

In the drawing *a* indicates the admission casing of the mixture with its two inlets for gas and air *b c*.

The gas inlet *b* communicates by means of ports *d* with a cylindrical chamber *e* forming the admission chamber of the mixture. The air inlet *c* communicates with the said chamber by means of ports *f*.

This chamber is closed at its lower end which opens into the engine cylinder through an inlet valve *g* for the mixture mounted upon a rod *h* which traverses, by a passage *i*, the lower wall of a casing *j* placed above the inlet casing of the mixture and which contains the retracting spring *k* of the inlet valve *g*.

This spring acts upon the operating rod *h* of the valve through the medium of a cap *l* guided in the casing *j*. The rod *h* of the valve is actuated above the cap *l* by a lever *m*, rocking upon a pivot *n* and receiving motion from suitable levers subjected to the action of the distributing cams of the engine, and not shown in the drawing.

According to the invention the inlet valve *g* for the mixture is, by means of ribs *o*, made integral with a cylindrical slide valve *p* moving in the chamber *e* and provided with ports *q*.

In the said cylindrical slide valve moves a second cylindrical slide valve *r* carried by rods *s*, subjected to the action of levers *t* mounted upon a shaft *u*, placed in the casing *j*. This shaft *u* extends outside the casing *j*, and is connected at *v* to a suitable drive placed under the control of the engine governor.

By reference to the drawing which shows the arrangement adopted for obtaining a distribution with constant compression and with admission of the mixture variable with the load of the engine, it will be understood that the valve *g* when it is moved from its seat under the action of the distribution control operating upon the rod *h* through the rocking lever *m* draws along with it the slide valve *p*.

This slide valve, as it moves, uncovers the ports *f* through which the air enters; at the same time the ports *q* of the cylindrical slide valve come opposite the ports *d* and therefore allow the gas to pass.

The air and gas ports being uncovered simultaneously the engine's cylinder becomes filled with the mixture. The admission of the gas is at the maximum and, in this case, the engine works with full load. On the other hand, the cylinder becomes filled with mixture and the compression is at the maximum.

The combination of the ports is suitably chosen according to the nature of the gas employed. The uncovered passages are always proportionate, so that an exact quantity of mixture is supplied resulting in perfect ignition.

The working of the engine with full load and with complete admission of the mixture is thus effected. With a light load, the mixture inlet valve in opening uncovers the ports *f* which allow the air to enter; the governor in assuming its position of equilibrium acts, through the drive *v*, shaft *u*, levers *t* and rods *s*, upon the cylindrical slide valve *r* and moves it in the direction of the arrow, that is to say, in the same direction as the lift of the mixture inlet valve.

The slide valve, in moving, closes the ports *q* of the cylindrical slide valve *p* during a certain portion of the stroke and the

admission of gas only takes place during the remainder of the stroke. This admission of gas varies with the displacements of the governor which correspond, as it is known, to the different loads of the engine. When the engine works with a reduced load the air admission, therefore, takes place during the whole of the stroke and the gas admission during a part of the stroke so that the volume of gas varies with the loads of the engine. The distribution therefore allows of admitting into the cylinder, when the load is reduced, at first a certain volume of air, then a volume of mixture of air and gas and finally a volume of air.

In this case, also the cylinder consequently becomes completely filled and the compression is constant and maximum.

The properly determined positioning of the sparking plugs insures a perfect ignition of the mixture, even though with small charges.

The passage left free by the cylindrical slide valve x being properly proportioned, the mixture, admitted is always homogeneous and the ignitions consequently, are perfectly effected and insure an effective explosion with the most reduced charges.

What I claim is:

1. The combination of a valve casing having therein a cylindrical admission chamber, with gas and air admission ports spaced endwise thereof, a valve controlling the passage of the mixture from the chamber to the cylinder, a pair of concentric cylindrical slide valves slidable within the chamber, one of

the slide valves having ports cooperative with the ports of the chamber to vary the admission of gas and air in a definite ratio and rigidly connected to the first mentioned valve for operation therewith, the other cylindrical valve being responsive to the engine governor to control the admission of gas through the gas inlet port proportionally to the speed of the engine and independently of the admission of air through the air intake port.

2. The combination with a valve casing having a cylindrical admission chamber formed therein and also having gas and air admission ports, a mixture inlet valve operating between the admission chamber of the casing and the cylinder of the engine, a cylindrical slide valve rigidly connected to the valve and movable in said chamber to cover and uncover the ports in a definite ratio, said cylindrical valve having ports spaced a distance apart equal to those of the chamber, a second cylindrical slide valve disposed within the first slide valve and operable by the governor of the engine to vary the effective gas admission openings between the first cylindrical valve and the chamber to extents proportional to the speed of the engine independently of the variation of the air admission control.

In testimony whereof I have affixed my signature in presence of two witnesses.

TOUSSAINT GENDARME.

Witnesses:

H. SAVAGE,
FRANK A. PHELAN.