L. H. L. BELLEM & G. JEAN-BAPTISTE BRÉGERAS.

PUMP FEEDING MECHANISM FOR INTERNAL COMBUSTION ENGINES.

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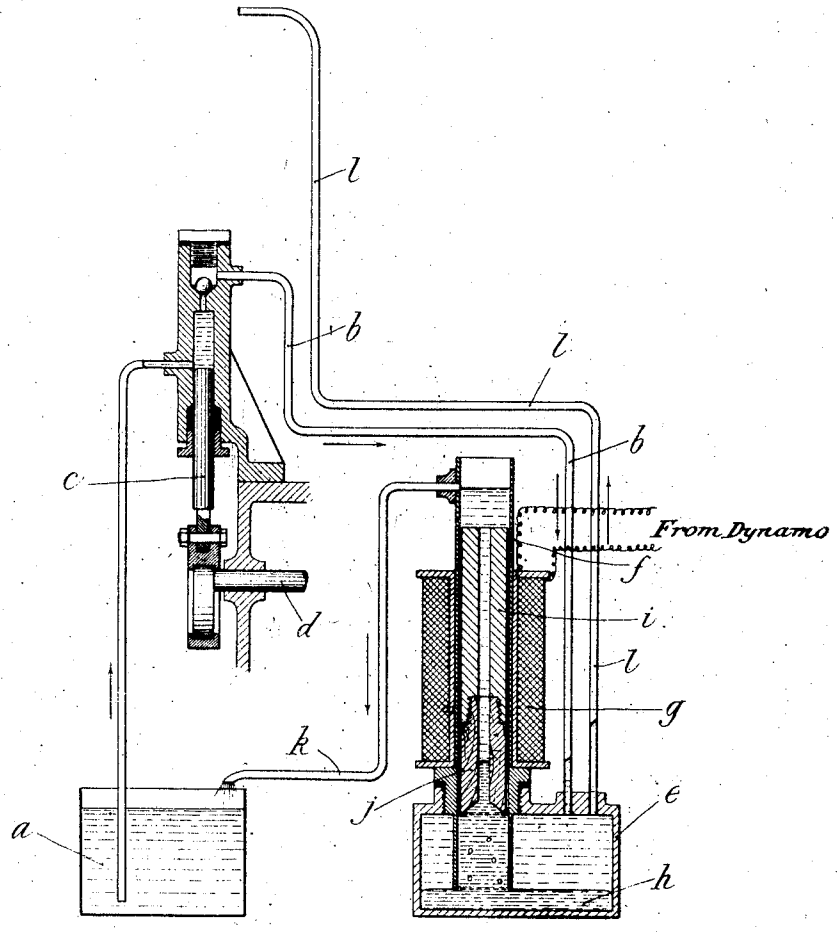


Witnesses:-
Henry C. Thieme.
F. George Barry.

Inventors:-
Louis Henri Gilbert Bellem
Gaston Jean-Baptiste Brégéras
by their attorneys
Brown & Durand

# UNITED STATES PATENT OFFICE.

LOUIS HENRI LIBERT BELLEM AND GASTON JEAN-BAPTISTE BRÉGÉRAS, OF NEUILLY-SUR-SEINE, FRANCE.

## PUMP FEEDING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,036,424. Specification of Letters Patent. Patented Aug. 20, 1912.

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*To all whom it may concern:*

Be it known that we, LOUIS HENRI LIBERT BELLEM and GASTON JEAN-BAPTISTE BRÉGÉRAS, citizens of the Republic of France, and residents of 60 Boulevard d'Asnières, Neuilly-sur-Seine, Seine, in the said Republic, engineers, have invented a new and useful Pump Feeding Mechanism for Internal-Combustion Engines, of which the following is a specification.

The governing of internal combustion engines which can operate with a liquid combustible has generally been effected hitherto by centrifugal force governing. Such governors, however, are subject solely to the action of the speed and not to that of the power developed or used; this latter factor however is alone essential, particularly when the engines are used for driving machinery or groups of electric generators.

The present invention relates to a governing device which adjusts with the greatest precision the admission of the liquid combustible into such engines in accordance with the demand made upon them for power, more particularly when the engine is driving an electric motor. For this purpose the admission of the liquid fuel into the engine is controlled by a pump which forces the liquid under pressure into a closed receiver containing mercury; the level of the latter, under the action of a solid body floating therein and suitably displaced, rises or falls and thus regulates the pressure of the liquid combustible, such as petrol, supplied to the engine. The movement of the solid body may be effected by hand or may be produced by a solenoid surrounding it and supplied with electric current; in the latter case the body is made of soft iron and constitutes the core of the solenoid.

The accompanying drawing shows in vertical section a governor constructed according to the present invention and the petrol pump, the adjustment being produced in this case by the electric current.

The petrol or other liquid combustible is contained in a reservoir *a* from whence it is sucked by a pump of any suitable kind which delivers it into a duct *b*. In the example shown the pump consists of a plunger piston *c* driven in suitable manner from the engine. For example the shaft *d* that drives the pump may be an extension of the distributing shaft of the engine. The pipe *b* delivers into a closed receiver *e* into which is screwed a tube *f* extending into the vessel and around which is a solenoid *g* supplied with current from the generator or from a dynamo driven by the motor or in any other suitable manner. In the receiver *e* there is a layer of mercury *h* which, owing to the pressure of the petrol, rises in the tube *f*. Into the mercury there extends within the tube *f* a core *i* of the solenoid *g*; this core is hollow and is terminated at its base by a screw threaded portion *j* of wood and similarly hollow. Between the core and the tube *f* there is sufficient space for passage of the petrol so that the excess of the latter may be returned by way of pipe *k* to the reservoir *a*. The petrol forced by the pressure from the receiver *e* passes to the engine through a tube *l*.

The operation of the arrangement is as follows:—The petrol supplied by pump *c* travels through tube *b* into the receiver *e*. Here it is subjected to the pressure of a column of mercury which rises in the tube *f* and within the hollow core *i*, *j*, the height of the column being proportional to the intensity of the current traveling through the solenoid *g*, that is to say to the power developed by the internal combustion engine, so that the petrol is always supplied to the latter through pipe *l* to a degree proportional to the power demanded of the engine. It will be seen that the variation of the current in the solenoid causes the hollow core *i*, *j* to rise or descend and accordingly to displace the column of mercury in the tube and within the core, causing its level to rise or fall. When the output of power by the engine, that is to say the intensity of the current, increases, the solenoid *g* attracts its core *i* more or less which therefore descends and increases the pressure of the petrol supplied to the motor. If the pressure exerted by the mercury becomes too great, the excess of petrol which cannot be delivered through the tube *l* rises in the form of bubbles through the mercury as indicated in the drawing and passes above the core *i* whence it can return through tube *k* to the supply reservoir *a*. The arrangement is adjusted in such a manner that the total pressure (columns of mercury and petrol) is sufficient for feeding the engine when this is running light.

Instead of using a core, such as *i*, operated by a solenoid, it is evident that there may be substituted a solid body extending into the mercury *h*, the movements of which may be controlled either directly by hand or through intermediary of a mechanical or electrical device of any suitable kind set in action by the engine.

Having thus described our invention and the best means we know of carrying the same into practical effect, we claim:—

1. A device for regulating the pressure of liquid combustible admitted into an internal combustion engine, which device comprises a closed receiver containing liquid combustible and mercury, devices for forcing liquid combustible into the said receiver, a solid body extending into the said mercury, means for causing the said solid body to rise or fall so as to vary the height of the column of mercury and a pipe for delivering the liquid combustible under pressure.

2. A device for regulating the pressure of combustible admitted into an internal combustion engine, which device comprises a supply reservoir containing combustible liquid, a closed receiver containing combustible liquid and mercury, devices for forcing the liquid combustible from the supply reservoir into the closed receiver, a solid body extending into the said mercury, means for causing the said solid body to rise or fall so as to vary the height of the column of mercury, a pipe for delivering liquid combustible under pressure and a pipe for conducting back to the supply reservoir excess of liquid combustible from the closed receiver.

3. A device for regulating the pressure of liquid combustible admitted into an internal combustion engine, which device comprises a closed receiver containing liquid combustible and mercury, devices for forcing the liquid combustible into the said receiver, a metallic body extending into the mercury, a solenoid for causing the said solid body to rise or fall and a pipe for delivering the liquid combustible under pressure.

4. A device for regulating the pressure of combustible liquid admitted into an internal combustion engine, which device comprises a closed receiver containing liquid combustible and mercury, devices for forcing the liquid combustible into the said receiver, a tube extending into the said receiver, a bored metallic body arranged in the said tube, a bored mass of wood fixed to the base of the said metallic body, a solenoid surrounding the said tube and a pipe for delivering the liquid combustible under pressure.

In testimony, that we claim the foregoing as our invention, we have signed our names in presence of two witnesses, this seventh day of November 1911.

LOUIS HENRI LIBERT BELLEM.
GASTON JEAN-BAPTISTE BRÉGÉRAS.

Witnesses:
H. C. COXE,
ALCIDE FABE.