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J. GROUVELLE & H. ARQUEMBOURG.

REGULATOR FOR CARBURETERS FOR EXPLOSIVE ENGINES.

APPLICATION FILED JULY 3, 1903.

NO MODEL.

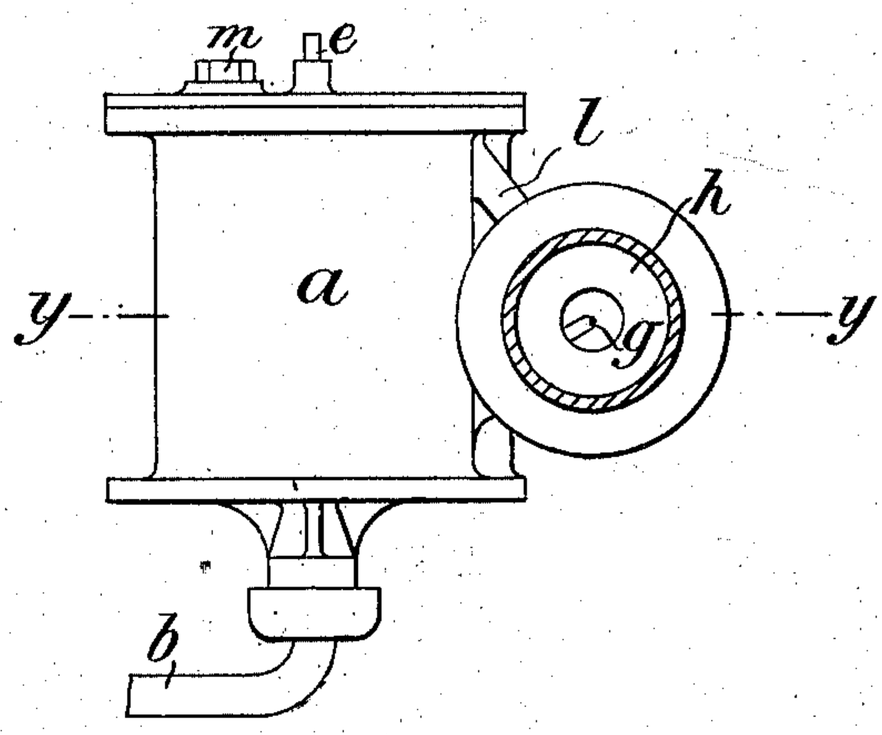

Fig. 1.

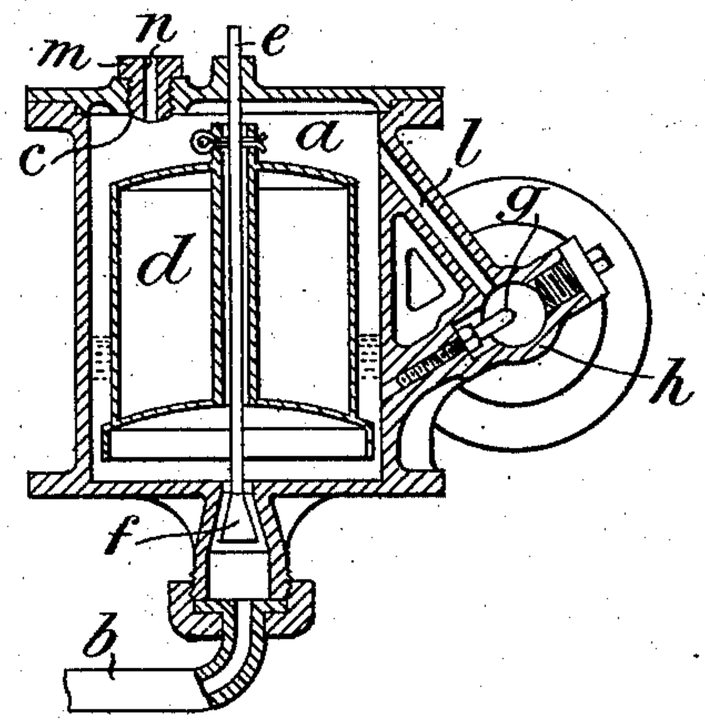

Fig. 3.

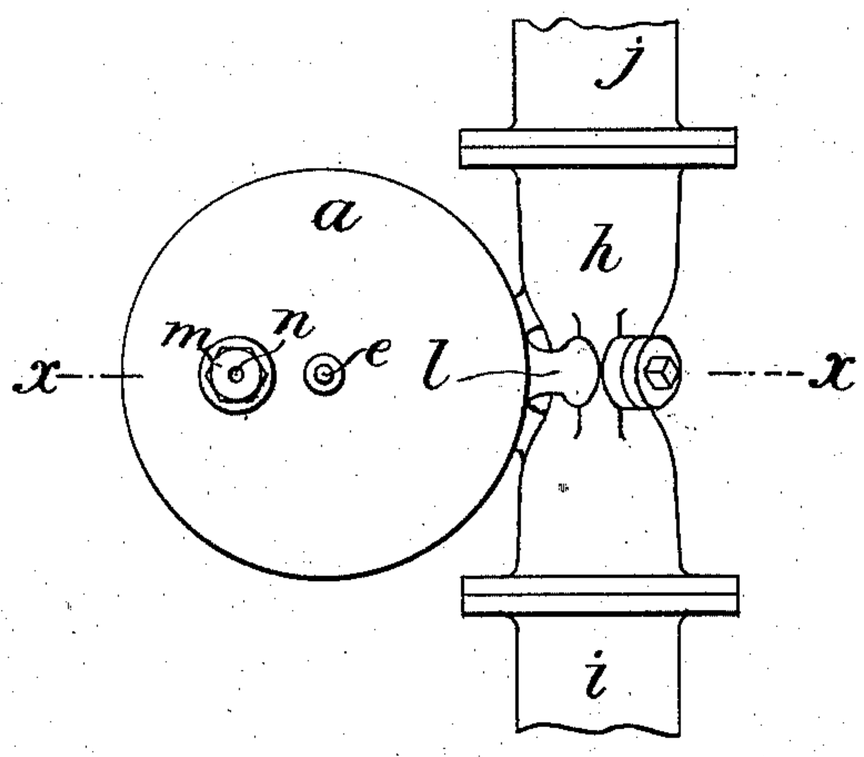

Fig. 2.

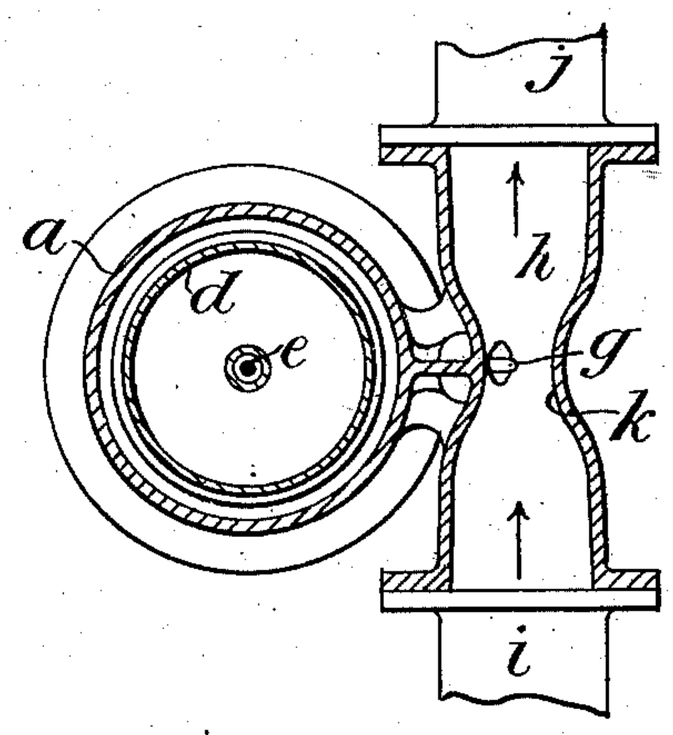

Fig. 4.

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UNITED STATES PATENT OFFICE.

JULES GROUVELLE AND HENRI ARQUEMBOURG, OF PARIS, FRANCE.

REGULATOR FOR CARBURETERS FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 741,962, dated October 20, 1903.

Application filed July 3, 1903. Serial No. 164,126. (No model.)

To all whom it may concern:

Be it known that we, JULES GROUVELLE and HENRI ARQUEMBOURG, manufacturers, trading as La Société Jules Grouvelle et H. Arquembourg, citizens of the French Republic, residing at 71 Rue du Monlin-Vert, Paris, in the French Republic, have invented new and useful Improvements in Regulators for Carbureters for Explosive-Engines, of which the following is a specification.

This invention relates to means for automatically regulating the carbureting action in carbureters of the constant-level and atomizing type.

In the accompanying drawings, which illustrate a carbureter embodying our improvements, Figure 1 is an elevation, and Fig. 2 a plan view, while Figs. 3 and 4 are respectively sections on the lines *x x* of Fig. 2 and *y y* of Fig. 1.

The carbureter may comprise a cylindrical vessel *a*, to which spirit or other inflammable liquid is supplied through a pipe *b*, connected with the bottom end thereof, an opening *c* being provided at the top end for communicating with the atmosphere. Within the vessel *a* is a float *d*, secured to a central spindle *e* and adapted to control a valve *f*, whereby the admission of the liquid to the vessel is regulated. A suitable nozzle *g* conducts a jet of the inflammable liquid from the vessel *a* to an atomizer *h*, the latter being furnished with a pipe *i* for supplying fresh air and a pipe *j* for carrying off the air when carbureted.

We will now describe our method of automatically regulating the carbureting action—that is to say, of automatically maintaining constant the proportion of the air and spirit or other inflammable liquid constituting the explosive mixture—whatever may be the variations in the speed of the motor. In the usual manner the air and liquid are drawn into the atomizer *h* by a reduction of pressure created by the suction of the motor in a narrow portion *k*, generally formed in the passage of the atomizer *h*, this inflow being more or less accentuated according to the increase or decrease in the speed of the motor. As in theory the formula $V = \sqrt{2gH}$ gives the speed of the flow of fluids under pressure and applies to gases as well as liquids it would appear that the constancy of the composition of the explosive mixture should be obtained by that formula alone; but in practice it is found that this is not so, as the free end of the nozzle *g* being a little above the level of the liquid a change of level is occasioned, and as the said end of the said nozzle is provided with a hole of small diameter capillary action also occurs. These defects may, however, be considerably modified by a suitable formation of the nozzle; but the most objectionable feature is the influence exerted by the inertia of the liquid set in motion, which has the effect of increasing the proportion of liquid in the explosive mixture exactly when the speed of the motor tends to become too high. The depression in the atomizer *h* varies with the speed of the motor-piston, being least at the ends of the stroke and reaching the maximum at about the middle of the stroke. By reason, however, of its inertia the liquid having been set in motion flows to the nozzle *g* during a very appreciable time after the pressure has reached the minimum, and a fairly simple calculation shows that at a given moment the excess of inflammable liquid is proportionate to the depression in the atomizer at the same moment. It therefore follows that in order to obviate the excess of liquid it is sufficient to diminish the pressure, causing it to flow by an amount proportionate to variations of the depression in the atomizer, and this is what we accomplish by putting the atomizer *h* by means of a lateral conduit *l* into communication with the upper part of the vessel *a* holding the liquid and by placing in the orifice *c* communicating with the atmosphere at the top end of the said vessel a removable plug *m*, having a reduced aperture *n* suited to the purpose. To this end it is only necessary to provide a number of interchangeable plugs having apertures of different dimensions. If desired, the lateral conduit *l* between the atomizer *h* and the vessel *a* may also be provided with a removable plug (not shown in the drawings) having a reduced orifice, in which case the regulation is effected by the differential action of the two plugs. The proper size of the plug-aperture is determined permanently by experiment and once for all in every case. As a result of the vessel *a* containing the liquid being put into

communication with the atomizer *h* and with the atmosphere under the conditions above pointed out a depression is created in the said vessel proportionate at each moment to that which exists in the atomizer. Consequently the pressure which causes the flow of liquid to the atomizer is regulated and the said depression can be to any desired extent less than that in the atomizer, since the size of the holes in the plugs can be varied within wide limits.

By practical experience it has been proved that the apparatus actually operates in the manner described and that a counter depression is obtained in the vessel *a*, which increases or decreases with the speed of the motor and which obviates the excessive supply of liquid to the atomizer in the most effective manner. It follows that by allowing the admission of air to the vessel containing the liquid to become such that the carbureting action gradually becomes weaker the point can easily be found for a practical arrangement which admits of limiting the maximum speed of internal-combustion motors in general, but is particularly applicable to the motors of automobile vehicles. At the same time the necessity of providing for the admission of supplementary air (as is the case in carbureters of usual construction) is dispensed with. In carbureters in general use the supplementary admission of air is effectually obtained as gradually as possible, but always imperfectly, either by hand or automatically, and in the latter case by means of mechanical contrivances of delicate construction which are liable to frequent derangement.

The removable plugs with reduced orifices before referred to can be replaced by any suitable equivalent contrivance and the apparatus may be varied in many other respects without affecting the principle which underlies our invention.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a constant-level and atomizing carbureter, a vessel to which spirit or other inflammable liquid is supplied, a nozzle for conducting the liquid to an atomizer, a passage connecting the atomizer with the upper part of the vessel, and a vent-hole, in the top end of the vessel, provided with an apertured removable plug.

2. In a constant-level and atomizing carbureter, a vessel to which spirit or other inflammable liquid is supplied, a nozzle for conducting the liquid to an atomizer, a passage connecting the atomizer with the upper part of the vessel, an apertured removable plug, in the said passage, and a vent-hole, in the top end of the vessel, also provided with an apertured removable plug.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JULES GROUVELLE. [L. S.]
HENRI ARQUEMBOURG. [L. S.]

Witnesses:
EDOUARD CARÉNOU,
GABRIEL MARCEAU.