

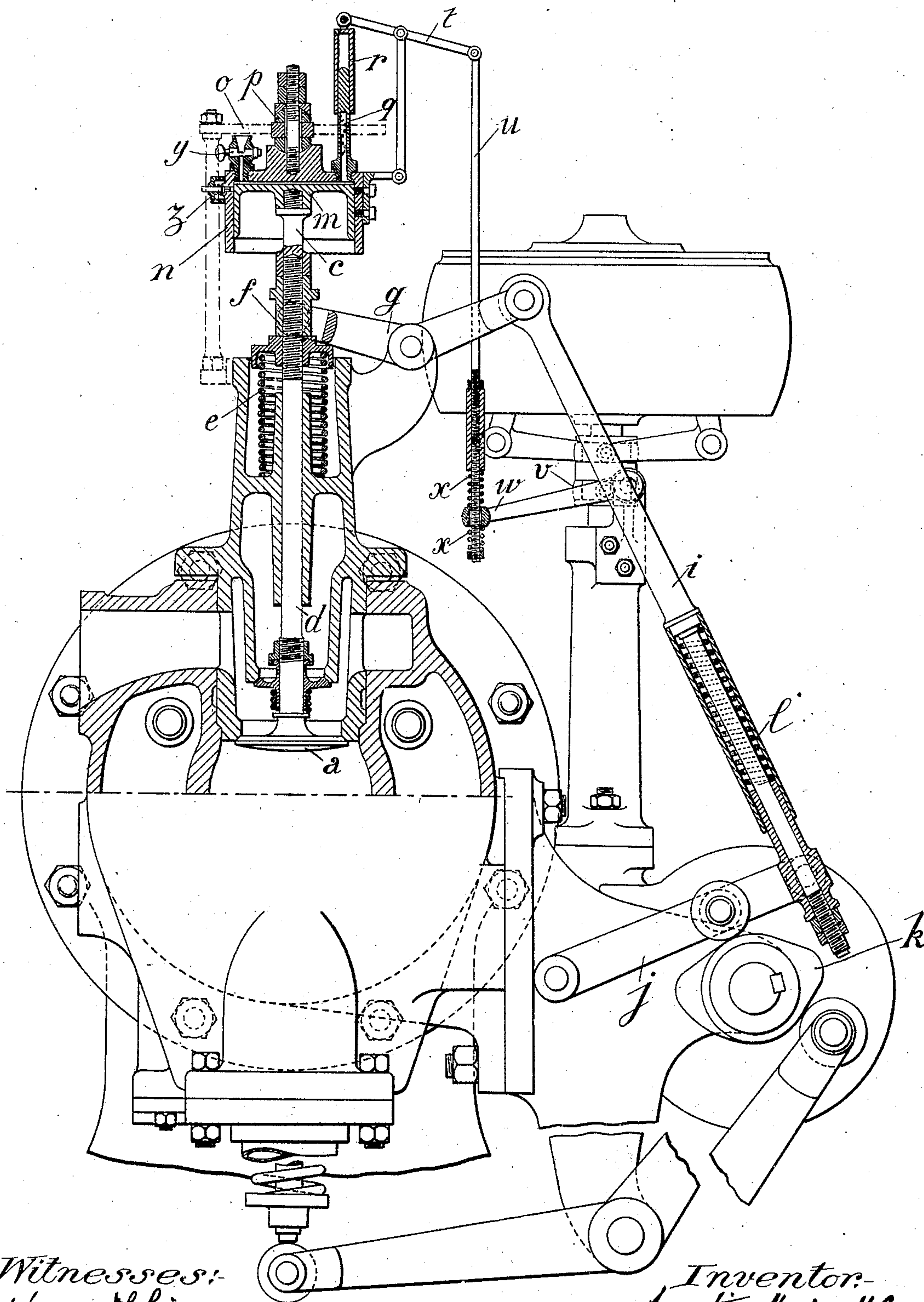
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A. M. MILSON.

SPEED REGULATOR FOR EXPLOSIVE ENGINES.

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Witnesses:
Henry Thiele.
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UNITED STATES PATENT OFFICE.

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SPEED-REGULATOR FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 785,428, dated March 21, 1905.

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To all whom it may concern:

Be it known that I, AUGUSTIN MAURICE MILSON, engineer, a citizen of the Republic of France, and a resident of 22 Rue Lafayette, Paris, in the Republic of France, have invented new and useful Improvements in Speed-Regulators for Explosive-Engines, of which the following is a specification.

This invention relates more especially to a means for regulating explosion-motors, in which the regulation of the speed is obtained by proportioned raising of the valve which admits the explosive mixture, whence results a greater or less compression, producing a power suited to the condition of running.

The valve *a*, which may be of any form, is carried by a long guided rod *d*. On the upper part of this rod is screwed a kind of head *c*. The lower part of this head serves as a collar or abutment for the spring *e*, which holds the valve closed, while the middle part, *f*, receives the fork of the lever *g*, which works the valve. The other arm of this lever is moved by the rod *i*, receiving its impulses from a lever *j*, provided with a roller on which the cam *k* acts. The rod *i* has to be elastic, as will hereinafter be seen, so that it comprises telescopic male and female parts, between which is interposed a spring *l* or other elastic medium.

On the upper part of the head *c* is screwed a piston *m*, which is one of the elements of the "system of regulation," properly so called, which we are now about to describe. The piston *m* moves in a cylinder *n*, fixed on a cross-head *o* of the motor-frame by a part *p*, held between collars forming a spherical joint, which allows, if required, of a slight rotation or shift of the whole in order to avoid any binding in case the guiding of the valve-rod should have a little play or get to one side.

On the cylinder-cover is fitted a hollow rod *q*, having a set of small holes along it. On this hollow rod slides another, *r*, which, as well as *q*, is closed at the top and which, according to its height, closes a less or greater number of the holes of *q*. For this purpose the hollow rod *r* is worked by the governor through

a lever *t* and rod *u*, the movements of the governor-collar *v* being transmitted to the rod *u* by the arm *w*, which by means of a ring acts on two springs *x*, placed on *u* on each side of the ring and insuring great gentleness of the movements. On the cylinder-cover is also mounted a grease-cock *y* for lubrication of the piston *m*, without, however, allowing passage of air to or from the interior of the cylinder.

On the side of cylinder some millimeters from its end is mounted a horizontal valve *z*, opening from within outward and pressed against its seat by a light spring.

The apparatus works as follows: When the engine is at rest, it may be readily understood that the hollow rod *r* is in its highest position and that consequently all the small holes are open, putting the interior of the cylinder in communication with the atmosphere. When the engine is going, so long as the governor has not attained the normal speed the relative position of the two rods *q* and *r* remains the same, and when the elastic rod *i* raises the valve it opens freely, as no vacuum can be formed behind the piston *m*, as air can enter by the rod *q*; but when the governor approaches its normal speed, and especially when, after attaining it, it tends to exceed it, the rod *r*, moved by the ascent of the governor-collar, slides along the rod *q* and successively closes the air-holes. It results from this that during the short time occupied by the raising of the admission-valve *a* the volume of air that can enter the cylinder becomes less and less, a vacuum is produced behind the piston, and this resisting the opening movement of the valve prevents its full opening and forces the elastic rod *i* to become contracted. Thus the amount of charge, and therefore the compression, is lessened step by step until the normal speed is attained or reestablished. The area of the piston is so calculated that when all the holes of *q* are closed by *r*, the valve *a* has an exceedingly-small lift, such as allows the engine to have a compression just enough to keep the motor going with no load on it.

The object of the valve *z* is to allow a rapid

closure of the admission-valve without noise. As I have said above, this valve opens from the interior outward. It therefore remains seated while the charge is drawn in by the pressure of its spring, as well as by the excess of the atmospheric pressure over the pressure within the cylinder; but when the valve *a* ascends the valve *z* is opened by the pressure of the air which has drawn in when the valve *a* descended and which has freer egress than by the holes of the rod *q*. The air escapes until the piston passes the opening to the valve *z* and then the piston *m*, which, in connection with the valve *a*, not yet completely closed, is received on the cushion of air remaining in the cylinder *n*, not yet having had time to escape by the holes of *q*. This prevents shocks to the valve, permitting it to close gently.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. In combination in a speed-regulator for explosive - engines: an admission - valve, a spring *e* for maintaining said valve normally on its seat, a rod for said valve, a piston fixed on the head of said rod, a vacuum-cylinder mounted on the engine and in which said piston works, a perforated tube attached to the head of said cylinder, and a progressive means for closing the perforations of said tube under the command of the governor.

2. In combination in a speed-regulator for explosive - engines: an admission - valve *a*, a spring for maintaining said valve normally on its seat, an abutment *f* at a certain point on the valve-rod, a lever *g* for operating the valve, a rod *i* in two telescoping pieces attached to said lever, a compressible extension-spring *l* tending to separate the two pieces of the rod *i*, a lever *j* pivoted to the engine and connected with the rod *i*, a cam *k* acting upon the lever *j*, a piston fixed upon the valve-stem, a vacuum-cylinder mounted upon the engine and within which this piston works, a perforated tube fixed in the head of said cylinder, and a progressive means for closing the perforations in said tube under the command of the governor.

3. In combination in a speed-regulator for explosive - engines: an admission - valve, a spring for maintaining said valve normally on its seat, a rod for said valve, a piston *m* fixed upon said rod, a vacuum-cylinder mounted upon the engine and in which said piston works, a perforated tube *q* fixed upon the head of said cylinder, an outer tube *r* fitting said tube *q*, a lever *t* operating said outer tube, a rod *u* connected with said lever, an arm *w* moved upward and downward by the governor and presenting at its extremity an eye through which said rod *u* passes, and two

springs *x* fixed upon the rod *u* one above and the other beneath the extremity of the arm *w*.

4. In combination in a speed-regulator for explosive - engines: an admission - valve, a spring for maintaining said valve normally upon its seat, a rod for said valve, a piston *m* fixed upon said rod, a vacuum-cylinder mounted upon the engine and in which said piston works, a perforated tube *q* attached to the head of said cylinder, an outer tube *r* fitting said tube *q*, a lever *t* operating said outer tube, a rod *u* articulated to said lever, a lever *w* moved upward and downward by the governor and presenting at its extremity an eye through which said rod *u* passes, two springs *x* fixed upon the rod *u* one above and the other beneath the extremity of the lever *w*, and a valve *z* in the cylinder near the head thereof and opening outward.

5. In combination in a speed-regulator for explosive - engines: an admission - valve, a spring for maintaining said valve normally upon its seat, a rod for said valve, a piston *m* fixed upon said rod, a vacuum-cylinder *n* in which this piston works, a spherical joint *p* attaching said cylinder to the engine, a perforated tube *q* fixed upon the head of said cylinder, an outer tube *r* fitting said tube *q*, a lever *t* operating said outer tube, a rod *u* connected with this lever, a lever *w* moved upward and downward by the governor and presenting at its extremity an eye through which said rod *u* passes, and two springs *x* fixed upon the rod *u* one above and the other beneath the extremity of the lever *w*.

6. In combination in a speed-regulator for explosive - engines: an admission - valve, a spring for maintaining said valve normally upon its seat, a rod for said valve, a piston *m* fixed upon said rod, a vacuum-cylinder *n* in which this piston works, a spherical joint *p* attaching this cylinder to the engine, a perforated tube *q* fixed on the head of said cylinder, an outer tube *r* fitting over the tube *q*, a lever *t* for operating said outer tube, a rod *u* connected with said lever, a lever *w* moved upward and downward by the governor and presenting at its extremity an eye through which the rod *u* passes, two springs *x* one above and the other below the extremity of the lever *w*, and a valve *z* in the cylinder *n* near the head thereof and opening outward.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 28th day of March, 1902.

AUGUSTIN MAURICE MILSON.

Witnesses:

EDWARD P. MACLEAN,
ALCIDE FABE.