No. 671,952. Patented Apr. 16, 1901.

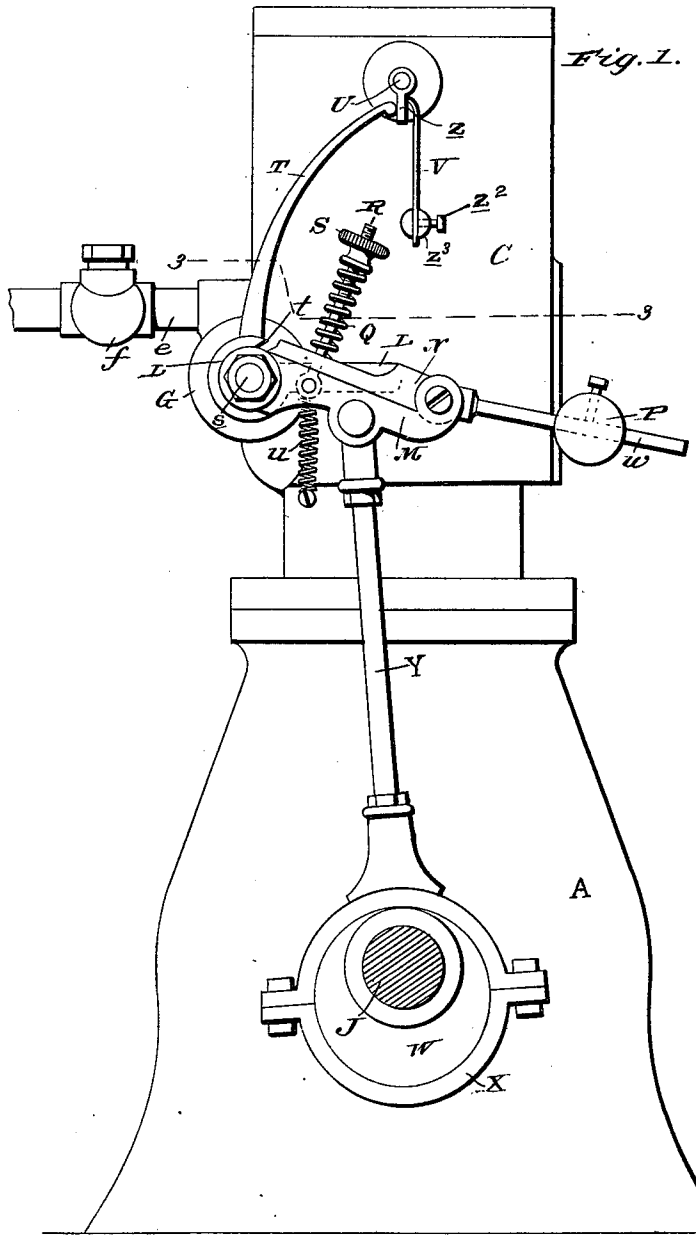
C. R. DAELLENBACH.

EXPLOSIVE ENGINE GOVERNOR.

(Application filed Feb. 23, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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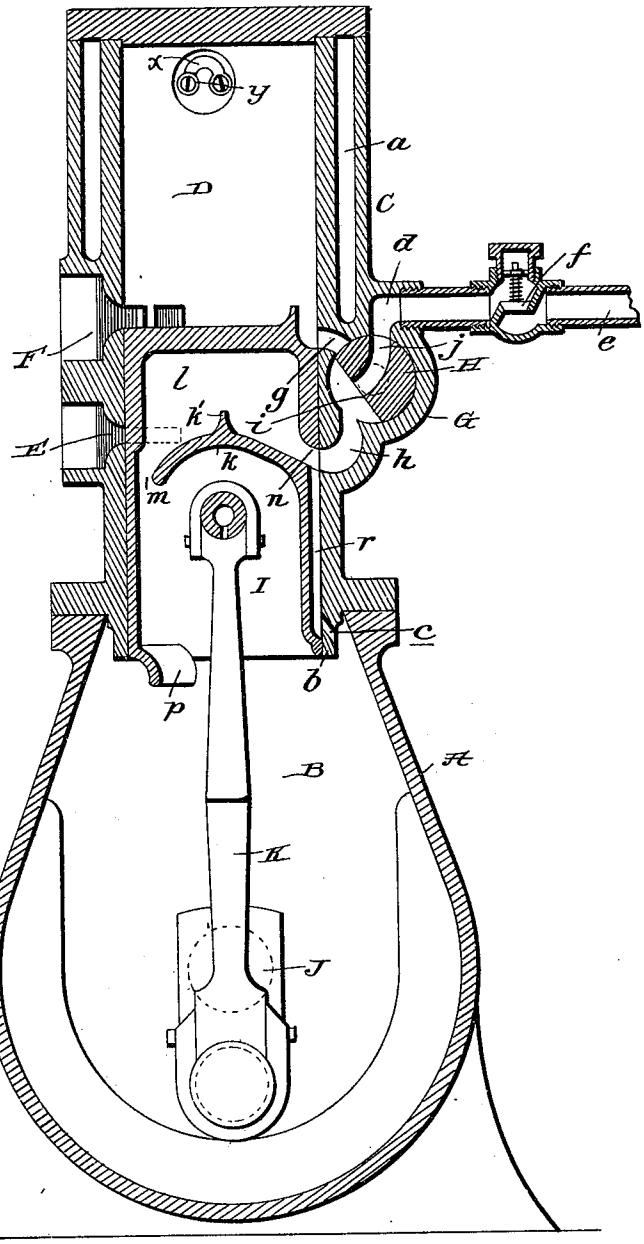
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(Application filed Feb. 23, 1900.)

(No Model.) 3 Sheets- Sheet 2.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 4.

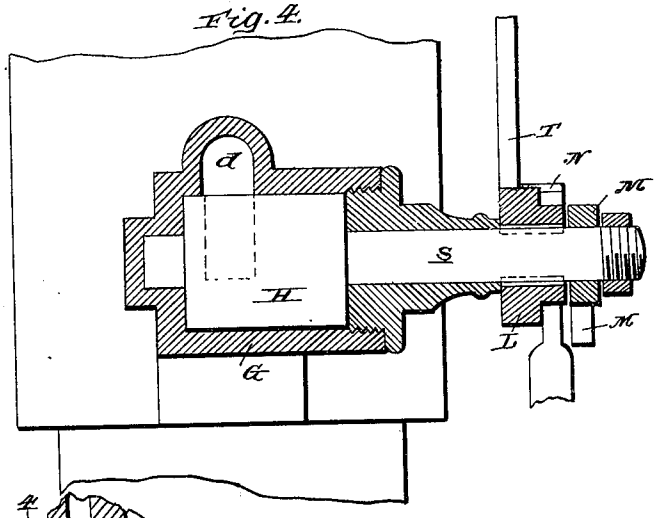


Fig. 3.

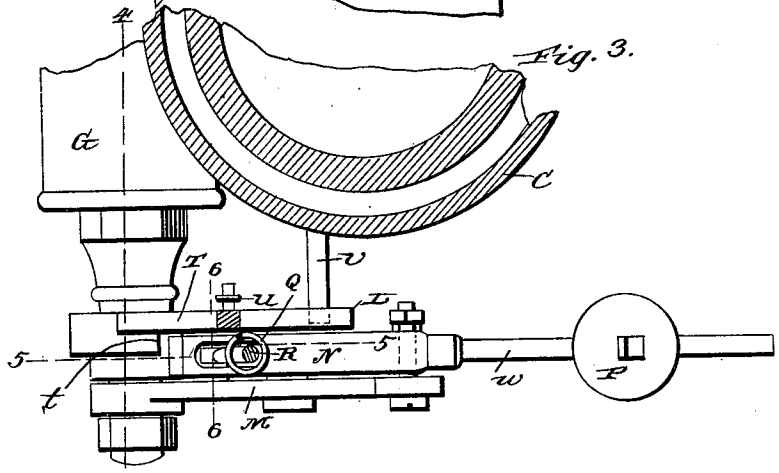


Fig. 5.

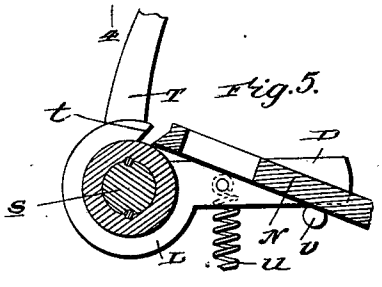
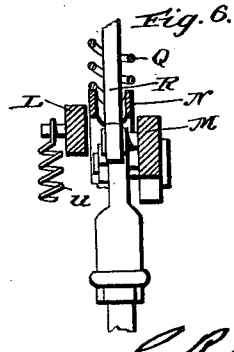


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES R. DAELLENBACH, OF PARKGATE, PENNSYLVANIA.

EXPLOSIVE-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 671,952, dated April 16, 1901.

Application filed February 23, 1900. Serial No. 6,277. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. DAELLENBACH, a citizen of the United States, residing at Parkgate, in the county of Beaver and State of Pennsylvania, have invented new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to improvements in explosive-engines, and more particularly to speed-governing mechanism therefor.

It has for its general object to provide a simple, strong, and durable speed-governing mechanism which is reliable in operation no matter what kind of hydrocarbon is used as a fuel.

With the foregoing in mind the invention will be fully understood from the following description and claims when taken in conjunction with the annexed drawings, in which—

Figure 1 is a side elevation of a two-cycle engine equipped with my improvements. Fig. 2 is a vertical central section illustrating the general structure of the engine. Fig. 3 is a detail section taken in the plane indicated by the broken line 3 3 of Fig. 1. Figs. 4, 5, and 6 are detail sections taken in the planes indicated by the broken lines 4 4, 5 5, and 6 6, respectively, of Fig. 3.

Referring by letter to the said drawings, A is the base or pedestal of my improved explosive-engine, in which is formed a crank-chamber B, and C is a cylinder mounted and suitably secured on the base and provided in its upper portion with an explosion or combustion chamber D, surrounded by the usual water-jacket *a*. The cylinder C extends down into the crank-chamber a slight distance, as indicated by *b*, and is provided in said extension with a port *c*. It is also provided at one side with an air-inlet port E and an exhaust-port F and at its opposite side has an offset forming a valve-casing G. This casing G has a port *d* for the connection of a fuel-supply pipe *e*, in which is a non-return valve *f*, and is connected with the interior of the cylinder by upper and lower ports or passages *g h*, the latter being curved, as shown, so as to form a pocket to catch gasolene or other fuel, as will hereinafter be pointed out.

H is a rocking valve arranged and adapted to turn in the casing G. This valve is of circular form in cross-section, with a segment removed, as indicated by *i*, and is provided with a port *j*. It is adapted in one position to establish communication between the fuel-inlet port *d* and the port *h* and close the port *g*, and in another position to close the port *d* and establish communication between the ports *h* and *g*.

I is the working piston of the engine. This piston is hollow and is peculiar in that it is provided with a partition *k* with a deflector *k'* thereon, a gas-chamber *l* above the same, and ports *m n*, communicating with the chamber. Said piston is also peculiar in that it has a depending deflector *p* at its lower end and is provided in its outer side with a longitudinal conduit *r*, which extends downwardly from the port *n* and is adapted when the piston is in the position shown in Fig. 2 to communicate with the port *c*.

J is a crank-shaft journaled in the side walls of the base or pedestal, and K is a rod interposed between and connected to the said shaft and the piston after the usual manner.

The parts of my improved engine thus far described are so arranged that when the piston moves inward it creates a partial vacuum in the crank-chamber and at the same time draws a charge of gas or gasolene through the valve-port *j*, the cylinder-port *h*, and the piston-ports *r n* into the gas-chamber *l*, where such gas is heated and expanded by the hot inner end wall of the piston. At the completion of the inward stroke of the piston the air-inlet port E is uncovered and air rushes in and occupies the crank-chamber, while upon the subsequent outward stroke of the piston such air is compressed and backed against the gas, whereby more gas is prevented from entering the gas-chamber. This continues until the piston-port *n* becomes coincident with cylinder-port *h*, and the valve H is moved to a position to establish communication between the cylinder-ports *h* and *g*, when the gas, followed by the air, will rush into the explosion-chamber D, wherein they will be commingled and from which they will expel the products of the previous explosion. In passing through the gas-chamber of the piston *en route* to the explosion-chamber the air will also be heated and expand, and hence enabled to commingle

more quickly and thoroughly with the previously-heated gas and form a highly-explosive mixture which conduces to the quick action and power of the engine. Incident to the subsequent inward stroke of the piston the explosive mixture is compressed in the explosion-chamber and the valve H is moved to the position shown in Fig. 2, so that a fresh charge of gas is drawn into chamber *l*, and at the completion of such inward movement the explosive in the explosion-chamber is ignited by means presently described, when the piston will be forced outwardly and the operation described will be repeated.

The pocket formed by the curved cylinder-port *h* serves to catch and hold gasolene; but in the event of any gasolene or gas entering the piston-port *r* it will when the piston reaches the position shown in Fig. 2 and the valve H connects the ports *h* and *g* be blown out of said port *r* and mixed with gas passing from chamber *l* by the compressed air in the crank-chamber, acting through the cylinder-port *c*.

The depending deflector *p* on the piston serves when the port E is uncovered to direct the entering air downwardly, so that the gas will be held in the gas-chamber, and when communication is established between the gas and explosion chambers the gas will enter the latter chamber in advance of the air, which is desirable, as it lessens the liability of a premature explosion.

In addition to forming a pocket adapted to catch and hold gasolene the curved port *h* serves, when communication is established between the gas and explosion chambers, to discharge the gas and air toward the latter.

By virtue of the construction described it will be observed that incident to the normal running of the engine a full charge of gas is drawn into the chamber *l* at each revolution of the shaft J. It will also be observed that the gas, which alone is non-explosive, is not commingled with the air necessary to support combustion until the explosion-chamber is reached, and consequently back explosions are effectually prevented.

The general structure of the engine thus far described forms the subject-matter of my contemporary divisional application filed May 8, 1900, Serial No. 15,896.

As best shown in Fig. 4 of the drawings, the stem *s* of the valve H is extended beyond one end of the casing G and is provided with a crank L, which is fixed thereto, and an arm M, which is loosely mounted thereon. The crank L is provided at its upper side with a shoulder or abutment *t* and is connected to one end of a coiled spring *u*, which is designed to return it to and normally hold it against a stop *v*, projecting laterally from cylinder C. The beveled shoulder or abutment *t* of the crank L is provided for the engagement of the beveled toe of a lever N, which is fulcrumed at an intermediate point of its length on the arm M and is provided on its outer portion *w* with an adjustable weight P. The inner portion of the said lever N is normally held down upon the arm M and in a position to engage the shoulder or abutment *t* of the crank by a coiled spring Q, which surrounds a rod R, pivotally connected to said arm M, and is interposed between the inner portion of lever N and an adjustable nut S on the rod, as shown.

T is an upwardly-extending arm fixed to and movable with the crank L, and U is a sparker-shaft journaled in, but insulated from, the cylinder. This shaft has a lateral contact *x* at its inner end, which is arranged in an electric circuit with and normally engages a fixed contact *y* in the explosion-chamber. Said shaft is also provided at its outer end with a lateral arm *z*, which is interposed between the end of arm L and a spring V, as shown. The spring V is held by a set-screw z^2 in a projection z^3 on the cylinder C.

W is an eccentric fixed on the shaft J, X a strap surrounding the eccentric, and Y a rod interposed between said strap and the arm M.

In the practical operation of the speed-governing mechanism the elements thereof occupy the positions shown in Fig. 1 when the valve H is in the position shown in Fig. 2. From this it follows that as the shaft J continues to revolve and the piston moves inwardly and outwardly the arm M and the lever N will be raised, and the latter acting against the abutment *t* of the crank L will through the medium of the same turn the valve H to the position opposite to that shown in Fig. 2 and at the same time move the arm T away from the outer arm of the sparker-shaft U, so as to enable the spring V to rock said shaft and carry the contact thereof against the fixed contact. It also follows from the foregoing that incident to the subsequent inward stroke of the piston the lever N, arm M, and the crank L will be returned to the position shown in Fig. 1 and the valve G will be caused to assume the position shown in Fig. 2, while the arm T will be carried into engagement with arm *z* of the shaft U, so as to rock said shaft against the action of the spring V, and thereby carry the contact *x* away from the contact *y* and cause an explosion of the mixture in the explosion-chamber.

The operation described is that which takes place when the engine is running at the normal rate of speed. In the event of the speed becoming excessive the outer arm of the lever N will be thrown downwardly by centrifugal force, and the inner arm of said lever will be thrown upwardly against the action of spring Q, and thereby caused to ride over the abutment *t* of the crank, with the result that the valve H will remain in the position shown in Fig. 2, and the engine will be prevented from taking a charge until the speed is reduced to the normal and the lever N returns to the position shown in Fig. 1 with reference to the arm M.

It will be readily observed from the fore-

going that the normal speed of the engine may be readily regulated by adjusting either the nut S or weight P, or both, as desired.

I have entered into a specific description of the construction and relative arrangement of the several parts of my improved engine in order to impart a full, clear, and exact understanding of the same. I do not desire, however, to be understood as confining myself to such specific construction and arrangement of parts, as such changes or modifications may be made in practice as fairly fall within the scope of my invention as claimed.

Having thus described my invention, what I claim is—

1. In an engine, the combination of a rocking valve, the crank L fixed on the stem of the valve and provided with a shoulder or abutment, a coiled spring connected to the crank L for returning the valve to its closed position, an arm M loosely mounted on the valve-stem, means connected with the arm M for operating said arm, and a lever fulcrumed at an intermediate point of its length on the arm M, and having its inner arm arranged to normally engage the abutment, and its outer arm provided with a weight, substantially as specified.

2. In an explosive-engine, the combination of a cylinder, an electrical contact therein, a rock-shaft journaled in the cylinder and carrying a contact adapted to engage the contact therein, a spring acting against the rock-shaft for holding the contacts in engagement, a rocking valve having an abutment on its stem, an arm fixed on the valve-stem and arranged to rock the shaft so as to separate the contacts, an arm loosely mounted on the valve-stem, a lever fulcrumed on said arm and having a weighted arm and adapted in its normal position to engage the abutment of the stem, a drive-shaft, and a driving connection between said shaft and the arm on the valve-stem, substantially as specified.

3. In an explosive-engine, the combination of a cylinder, an electrical contact therein, a rock-shaft journaled in the cylinder and carrying a contact arranged to engage the contact therein, a spring for normally holding the contacts in engagement, a rocking valve, coacting means on the stem of the valve and the rock-shaft, whereby the shaft is rocked with the valve and the contacts are separated, a crank fixed on the valve-stem and having a shoulder or abutment, a spring connected to said crank for returning the valve to its closed position, an arm loosely mounted on the valve-stem, a lever fulcrumed at an intermediate point of its length on said arm and having its inner arm arranged to normally engage the abutment of the crank, and its outer arm weighted, and means, connected to the loose arm, for operating said arm, substantially as specified.

4. In an engine, the combination of a rocking valve, a crank fixed on the stem of said valve and having a shoulder or abutment, an arm loosely mounted on the valve-stem, means connected to said arm for operating the same, a lever fulcrumed at an intermediate point of its length on the loose arm, and having its inner arm arranged to normally engage the abutment of the crank and provided with a slot, and its outer arm provided with a weight, a rod pivotally connected to the loose arm and extending through the slot in the lever, a coiled spring surrounding the rod above the lever, and means on the rod for regulating the tension of the spring, substantially as specified.

5. In an engine, the combination of a rocking valve having an abutment on its stem, an arm loosely mounted on the valve-stem, a lever fulcrumed at an intermediate point of its length on the loose arm and having its inner arm arranged to normally engage the abutment, and also having its outer arm weighted, a spring arranged to exert pressure against the inner arm of the lever and thereby normally hold the same in engagement with the abutment, and means, connected with the loose arm, for operating the said arm, substantially as specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES R. DAELLENBACH.

Witnesses:
S. C. VANGORDU,
WILLIAM BRAND.