No. 825,435. PATENTED JULY 10, 1906.

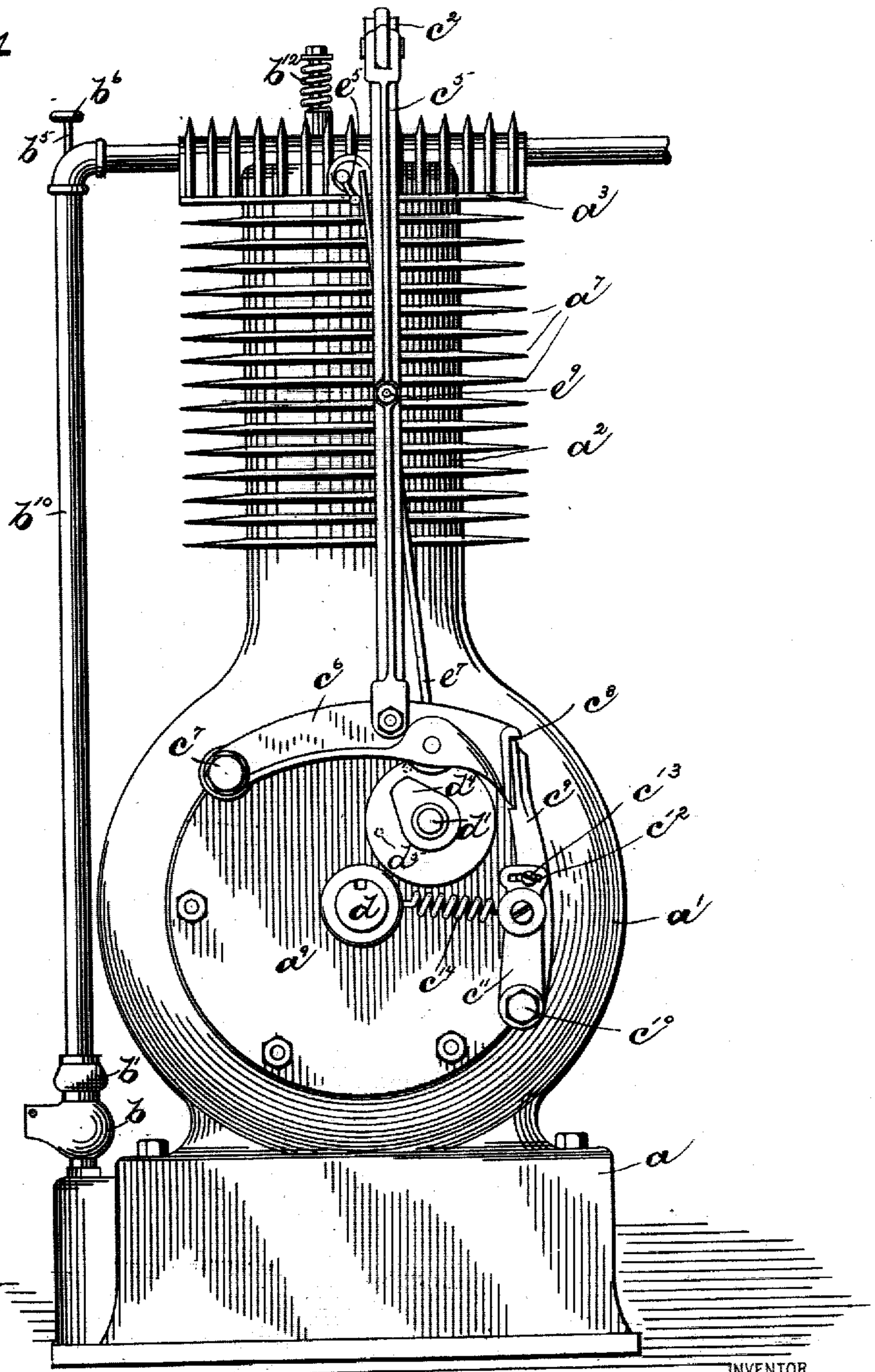
T. VAN TUYL.

SPEED AND SPARK REGULATING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAR. 30, 1903.

3 SHEETS—SHEET 1.

Fig 1



WITNESSES:

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3 SHEETS—SHEET 2.

Fig. 2.

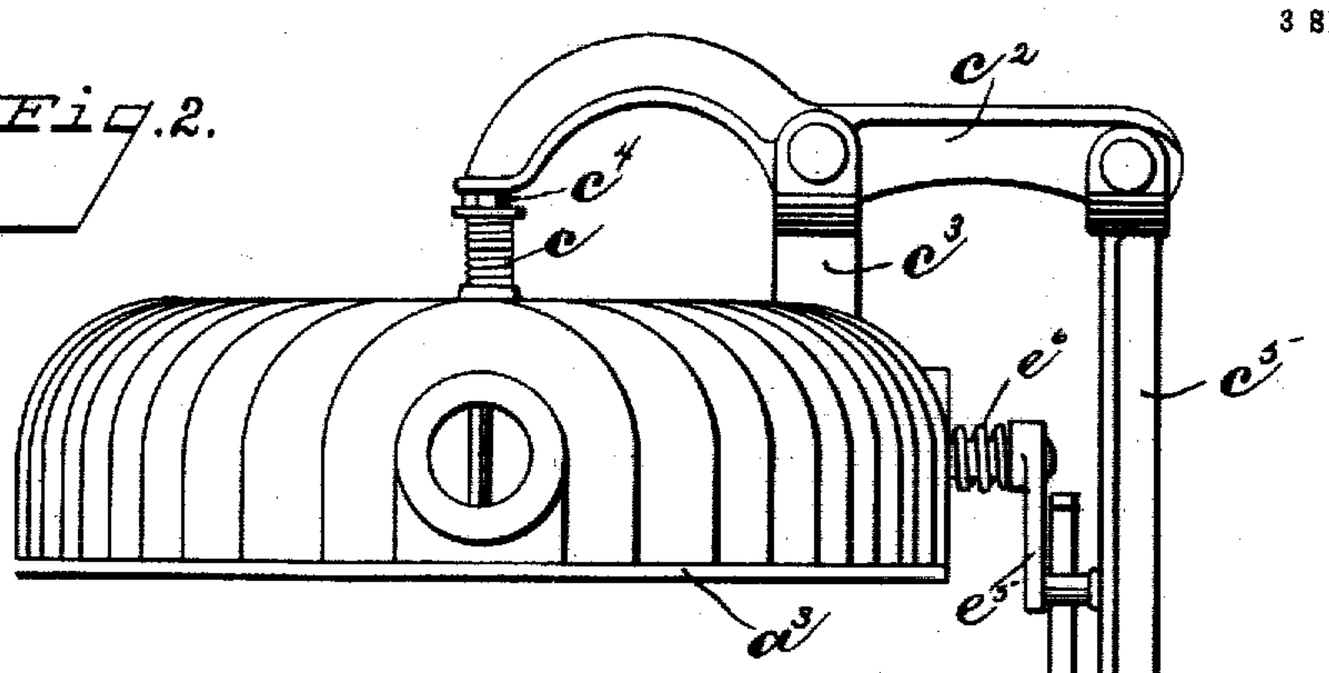
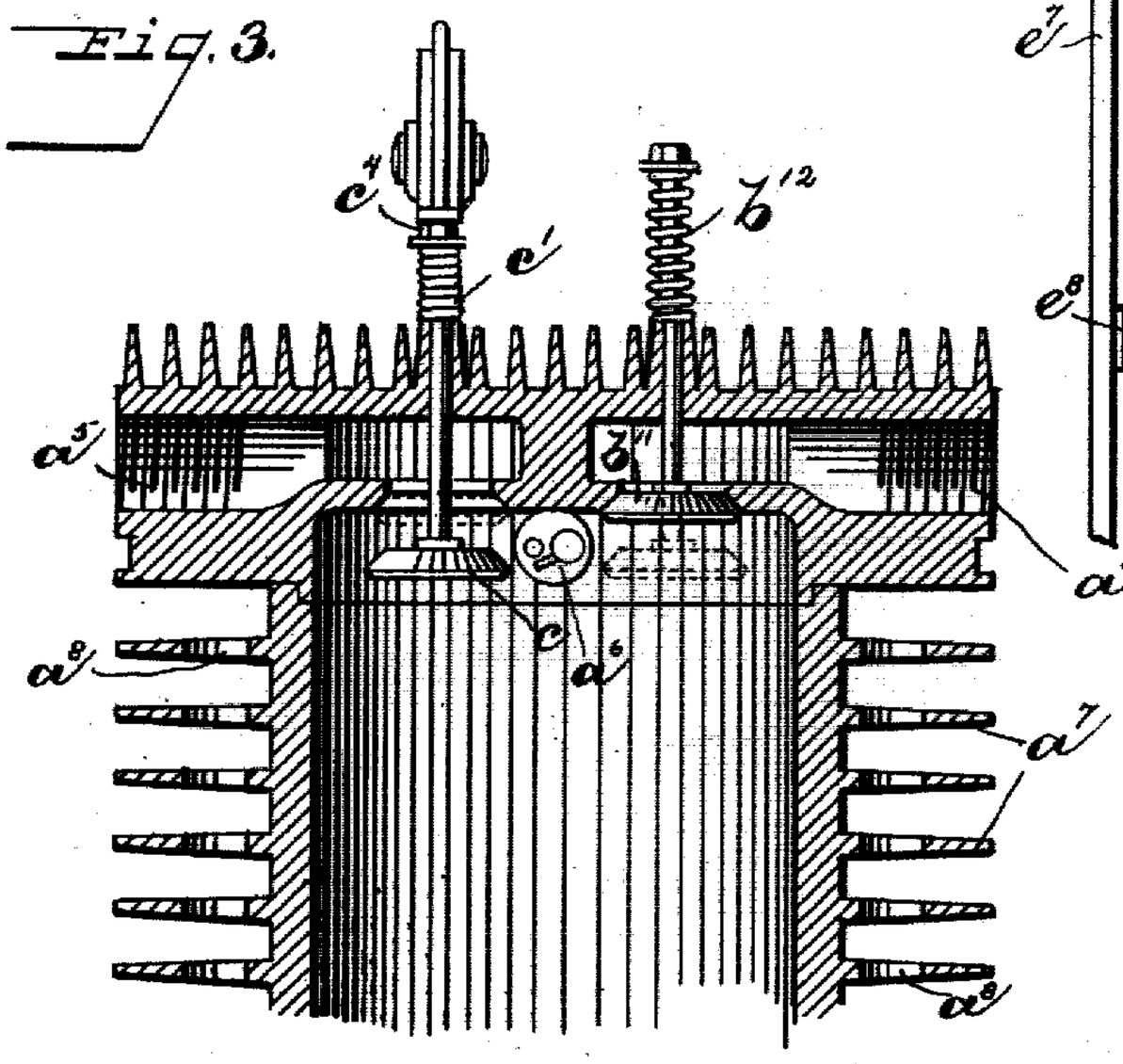


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 6.

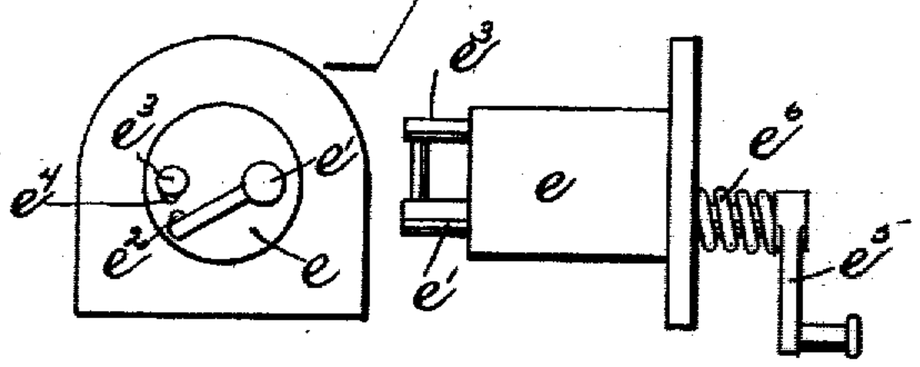


Fig. 4.

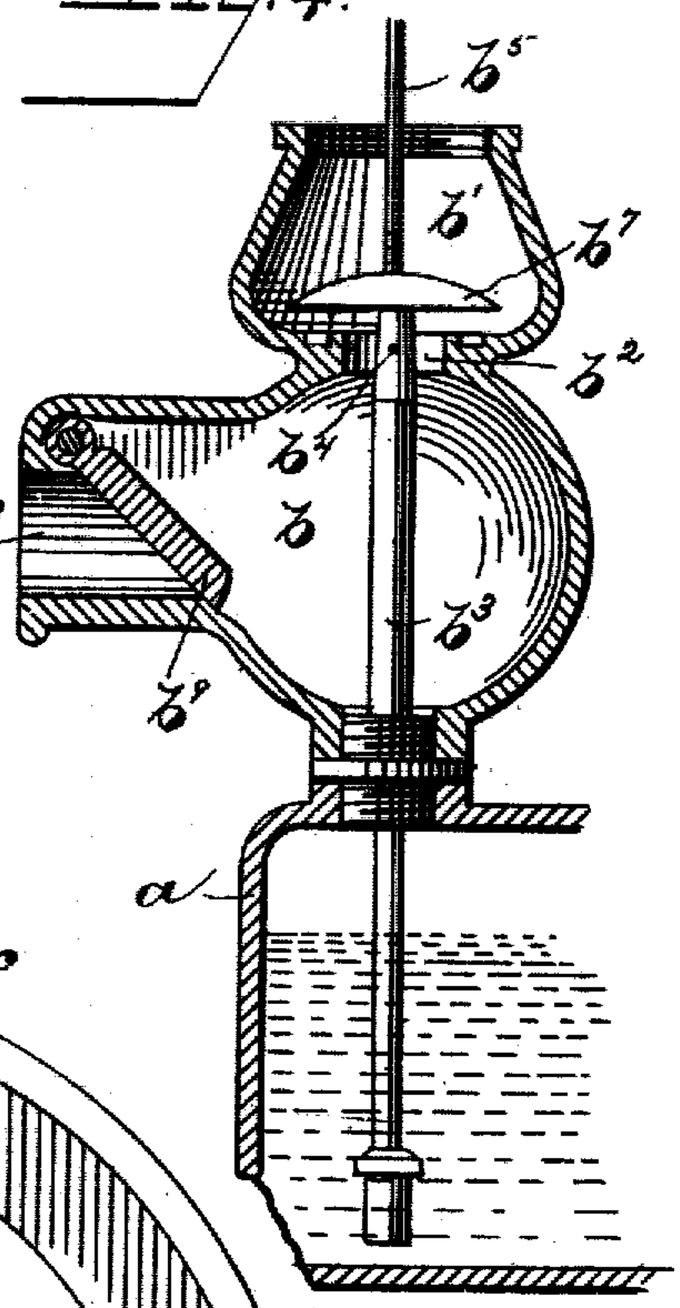


Fig. 7.

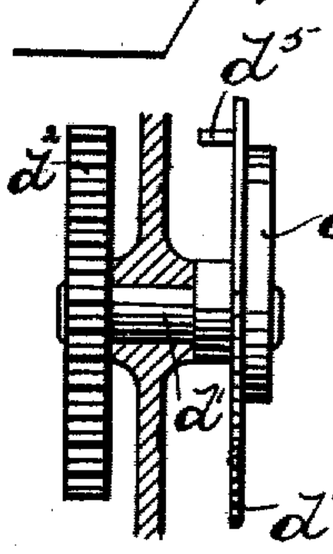


Fig. 8

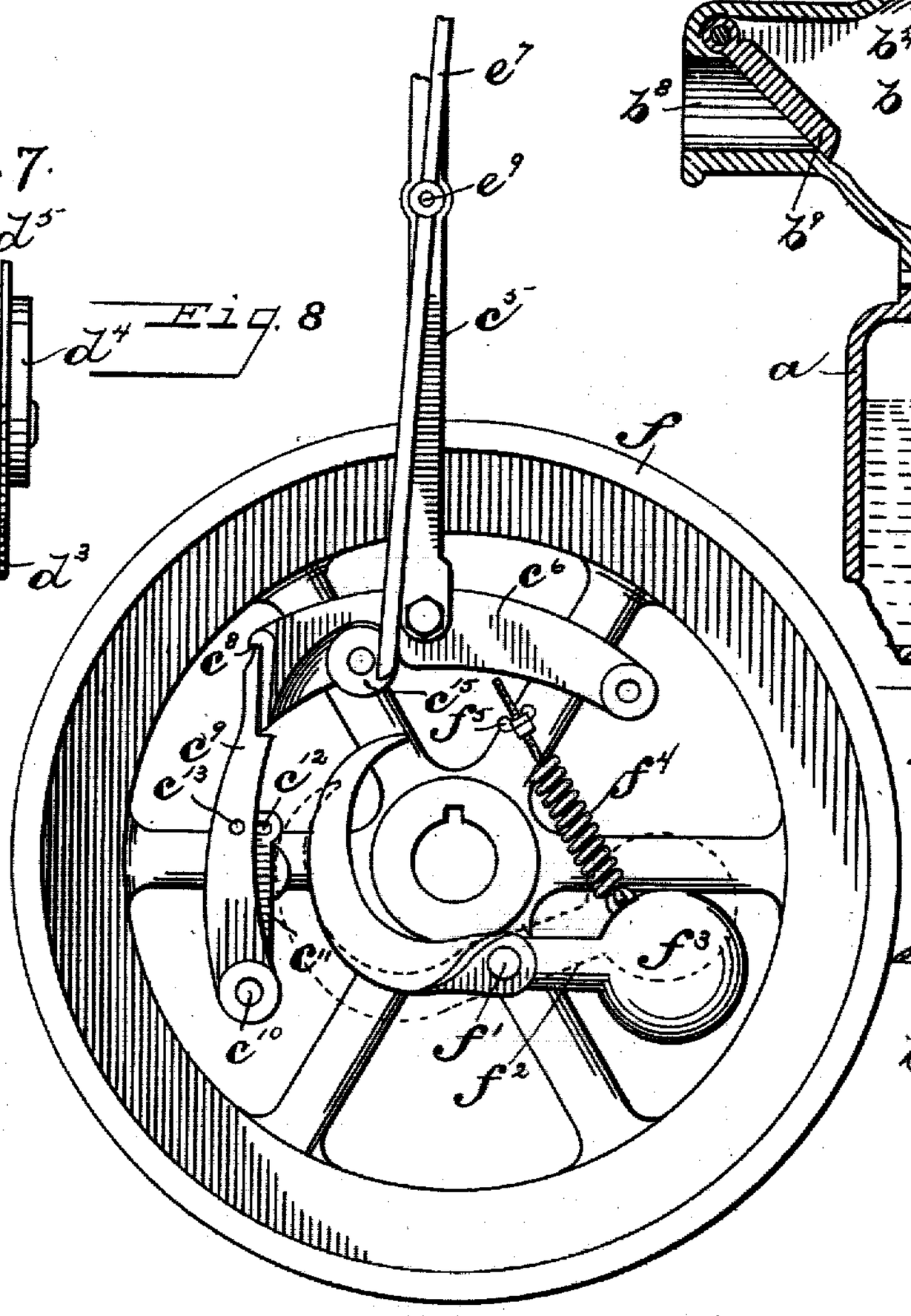
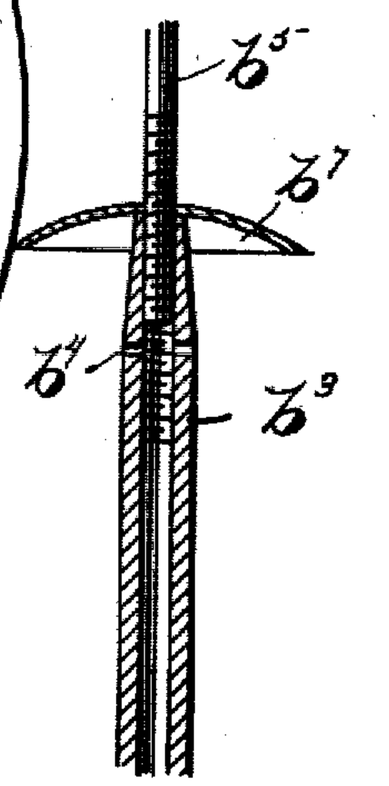


Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS VAN TUYL, OF IOWA CITY, IOWA, ASSIGNOR TO THE O. S. KELLY WESTERN MANUFACTURING COMPANY, OF IOWA CITY, IOWA, A CORPORATION OF IOWA.

SPEED AND SPARK REGULATING DEVICE FOR EXPLOSIVE-ENGINES.

No. 825,433. Specification of Letters Patent. Patented July 10, 1906.

Application filed March 30, 1903. Serial No. 150,148.

To all whom it may concern:

Be it known that I, THOMAS VAN TUYL, a citizen of the United States, residing at Iowa City, in the county of Johnson and State of Iowa, have invented certain new and useful Improvements in Speed and Spark Regulating Devices for Explosive-Engines, of which the following is a specification.

My invention relates to explosive-engines.

The object of my invention is to provide improved means for governing the exhaust-valve of the engine, and thereby controlling the supply-valve, and to provide in connection with said means improved devices for controlling and operating the igniter. I attain these objects by the constructions and combinations hereinafter described, and set forth in the claims.

In the drawings, Figure 1 represents an explosive-engine embodying my invention. Fig. 2 is a detail of the cylinder-head with connections to operate the exhaust-valve and igniter. Fig. 3 is a section of the upper portion of the cylinder, showing inlet and exhaust valves. Fig. 4 is a detail of the mixing-chamber, showing air-valve and gasolene-supply. Fig. 5 is a detail of the gasolene-supply pipe. Fig. 6 is a detail of the igniter. Fig. 7 is a detail of cam-disk and driving-gear therefor, and Fig. 8 shows operating devices for the exhaust-valve and igniter and means for permitting them to be held out of operative position.

Like parts are represented by similar letters of reference in the several views.

In the accompanying drawings, which form a part of this specification, a represents a base, to which the engine-frame a' is secured. The cylinder a^2 I preferably form integrally with the frame and cast the cylinder-head a^3 separate, with the inlet and exhaust conduits a^4 and a^5 therein, also a perforation a^6 for the igniter. This is an economical construction both in casting and assembling the parts, the head being secured to the cylinder in any suitable manner. For the purpose of obtaining the greatest radiation from the cylinder I provide its outer surface with ribs a^7, having perforations a^8, said perforations giving additional surface and permitting currents of air to pass through and carry off the heat.

Instead of feeding the gasolene-supply by gravity or lifting it from a lower level by a pump I provide improved means whereby the gasolene is drawn from a tank below mixed with air and introduced into the cylinder by the suction of the engine-piston alone without the aid of a pump, and I will now describe the devices employed for this purpose.

The gasolene tank or reservoir I preferably form within the engine-base a, as shown in Fig. 4, and to said base I attach a casing having a mixing-chamber therein, which I preferably provide with a web, forming the same into portions b and b', with an opening b^2 between them. A gasolene-supply pipe b^3 extends from a point near the bottom of the supply-tank through a perforation in the base a and said casing through the portion b and opening b^2 and terminates in the portion b' above said opening. Said pipe is preferably, although not necessarily, provided at its lower end with any suitable form of valve to retain the gasolene that has been drawn into the pipe. The opening b^2 is of greater diameter than the diameter of the pipe, and said pipe is provided with perforations b^4, preferably in that portion where it extends through the opening b^2, as shown.

Any suitable valve may be used to cut off the gasolene-supply; but I have shown a rod b^5, with a handle b^6 at its upper end and screw-threaded at its lower end and adapted to be screwed into the upper screw-threaded end of the pipe until it passes the perforations b^4, to cut off the gasolene-supply. I also preferably employ a disk b^7, screw-threaded on the screw-threaded end of the rod b^5, so as to be adjustable in its relation to the opening b^2 and the perforations b^4, said disk being preferably concave in form with the concave side facing said opening.

The air-supply is introduced through an inlet b^8 in an extension of the casing forming the chamber b. I provide a valve for this inlet, and any suitable valve may be employed that will resist the initial impulse of the piston-suction; but I have shown a hinged valve b^9 of sufficient weight, so that the first or initial impulse of the piston-suction will start and draw the gasolene through the perforations b^4, the lifting of the valve and admission of air immediately following. The current passes through the contracted

opening between the respective portions of said chamber, further lifting the gasolene and mixing with same, the disk spreading and aiding in thoroughly commingling the air and gasolene forming the explosive mixture, which is then drawn through a pipe b^{10}, leading to the inlet a^4 of the engine. A mixing-chamber without the central web and contracted opening will operate; but the construction shown is the preferred form.

A valve b^{11}, held in its closed position by a spring b^{12}, forms the inlet for the explosive mixture and is operated by piston-suction. A valve c, held in its closed position by a spring c', forms the exhaust-valve for the engine, and this valve is opened and controlled in the following manner: A lever c^2, pivoted intermediate of its ends to a post c^3, extending from the cylinder-head, contacts at one end with a head c^4 on the exhaust-valve spindle and at its other end is pivoted to the upper end of a lifting-bar c^5, the lower end of which is pivoted to an arm c^6 at a point intermediate of its ends. One end of said arm is pivoted at c^7 to the engine-frame, and the other or free end is formed witn a shoulder c^8, adapted to be engaged by a latch c^9, pivoted at c^{10} to the engine-frame. An arm c^{11}, also pivoted at c^{10}, has a transverse slot c^{12} in its upper end, through which a cap-screw c^{13} extends into the latch c^9 to adjust the relative positions of said arm and latch, and a spring c^{14} holds said latch in contact with said arm. The side plates a^9 are securely bolted to the engine-frame, and the crank-shaft d, which is driven in the usual manner, is journaled in the side plates. A short shaft d' is journaled in the side frames, as shown in Fig. 7, and at its inner end has a gear d^2 fixed thereon adapted to mesh with a pinion on the crank-shaft, said pinion not being shown, and the outer end of said shaft has a disk d^3 rigidly attached thereto, said disk having a cam d^4 on its outer side and a pin d^5 projecting from its inner side. Said gears are preferably of the proportion of two to one, so that the disk d^3 makes only one revolution to two revolutions of the crank-shaft. The cam d^4 is adapted to contact with and raise the arm c^6, and thereby lift the bar c^5 to open the exhaust-valve. The projection on the arm c^6, with which the cam contacts, is preferably in the form of a roller c^{15}, journaled on said arm.

Within a plug e, adapted to fit in the perforation a^6 of the cylinder-head and secured to said head, I journal a shaft e', having an arm with a contacting point e^2, and I also fix to said plug a stud e^3, having a contacting point e^4. A crank-lever e^5 is rigidly attached to the outer end of the shaft e', and said shaft is further provided with a spring e^6 to hold it from rocking. A rod e^7, spring-pressed by a spring e^8, is pivoted intermediate of its ends at e^9 to the lifting-bar c^5, one end of said rod engaging the crank-lever e^5 and the other end being in the path of the pin d^5 of the disk. When the cam d^4 operates to lift the bar c^5 to open the exhaust-valve, said bar carries the spring-pressed rod e^7 out of the path of the pin d^5, and when the bar c^5 drops the exhaust closes and the spring-rod is in the path of the pin d^5. The spring e^8 being stronger than the spring e^6, the contact-points of the igniter are held apart; but when the pin d^5 moves the spring-rod e^7 to release its pressure on the crank-lever e^5 the spring e^6 brings the contacting points together, and just as they contact the pin d^5 passes and releases the spring-rod, and the contacting points are quickly thrown apart. Any suitable wiring may be employed for the current to the igniter.

To an arm of the fly-wheel f I pivot at f', intermediate of its ends, an arm f^2, one end of which is hook-shaped and has a projection (not shown) to contact with the hub of the wheel to limit the movement of said arm in one direction. The other end of said arm is provided with a weight f^3 and a tension-spring f^4, having a screw-threaded connection with another arm of said fly-wheel, a thumb-nut f^5 being provided to adjust the tension of said spring. The adjustment is such that the hook-shaped end of the arm will normally engage and move the arm c^{11} against the tension of the spring c^{14}, and the latch c^9 being attached thereto will also move and release the arm c^6, which will drop and bring the operating connections to the exhaust-valve and igniter into operative position; but when the supply is greater than the work required the hook-shaped end of the arm will be thrown inward, so that it will not contact with the arm c^{11}, and the latch c^9 will hold the operating connections for the exhaust-valve and igniter out of operative position until their operation is again required. The arm c^{11} is preferably provided with a roller, with which the hook-shaped end of the arm f^2 contacts.

It will be seen that I control the operation of the supply-valve by providing means to control and regulate the exhaust-valve and that the valves and igniter remain in inoperative position until the demand upon the engine requires their operation, and I further provide means for lifting the gasolene-supply by the suction-stroke of the engine, and that I also provide an improved construction for assembling the parts and radiating the heat from the cylinder.

Having thus described my invention, I claim—

1. In an explosive-engine, the combination with a supply-valve adapted to be operated by the piston-suction, of an exhaust-valve spring-pressed in its closed position, and an igniter, the engine crank-shaft, a secondary shaft geared thereto, a disk on said secondary shaft having a cam on one side and a pin upon the other, a pivoted arm having con-

nections, including a lifting-bar, to said exhaust-valve, a rod pivoted intermediate of its ends on said bar, one end of which is adapted to engage and move said igniter and the other end extending in the path of said pin, a latch adapted to hold said arm out of the path of said cam, means adapted normally to release said latch and permit said arm to move into the path of said cam, said means being further adapted by the increased speed of the engine to pass free of said latch, substantially as specified.

2. In an explosive-engine, the combination with a supply-valve adapted to be operated by the piston-suction, of an exhaust-valve and an igniter, a pivoted arm having connections to said exhaust-valve and igniter, a disk having a cam to engage and move said arm to operate the exhaust-valve, and a pin to engage the connection to said igniter, a latch adapted to hold said arm out of the path of said cam and a fly-wheel having an arm pivoted thereto adapted normally to move said latch to permit said first-named arm and connections to move into the path of same cam and pin, said fly-wheel arm being further adapted by the increased speed of the engine to pass free of said latch, substantially as specified.

3. In an explosive-engine, an exhaust-valve, a bar connected to said valve, devices for operating said bar to open and close said valve, an electric igniter, the contacting points of which are adapted to be spring-pressed together, a spring-pressed rod pivotally connected to said exhaust-valve bar adapted normally to hold said contacting points apart, means for operating said igniter-rod independently of said exhaust-valve rod to permit said contacting points to come together to produce a spark, and means for holding said exhaust-valve bar, together with the connected igniter-rod, in inoperative position, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 23d day of March, A. D. 1903.

THOMAS VAN TUYL.

Witnesses:

JAMES H. MAGGARD,

CLEMENT P. GALLAGHER.