

(No Model.)

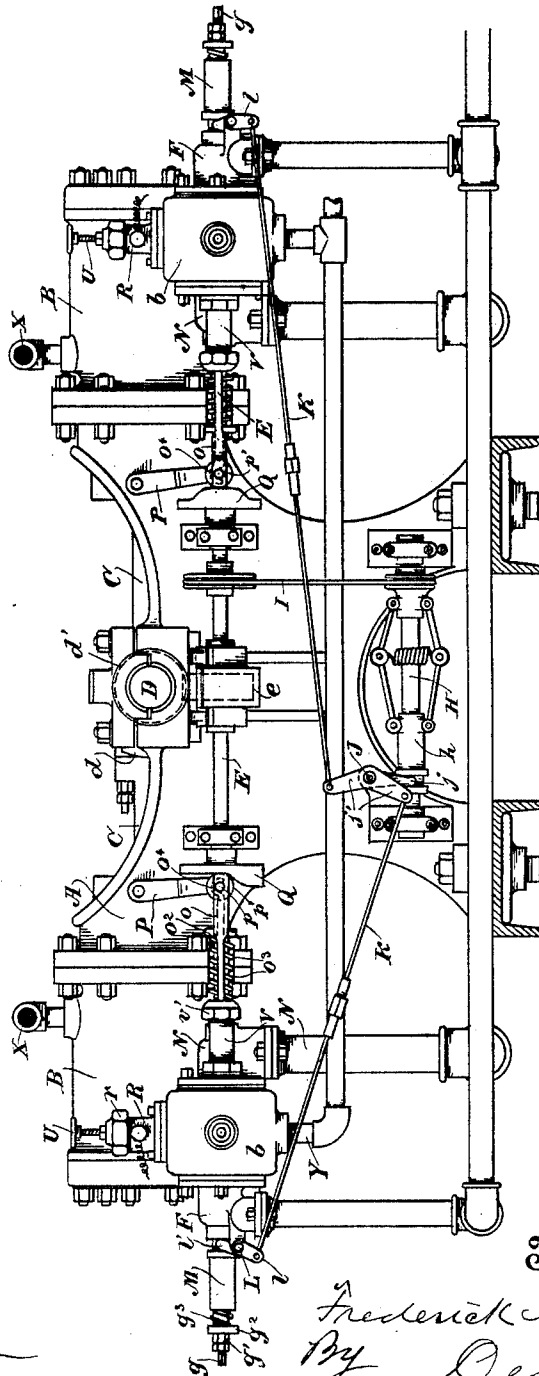
2 Sheets—Sheet 1.

F. A. REDMON.
EXPLOSIVE ENGINE.

No. 586,826.

Patented July 20, 1897.

Fig. 1.



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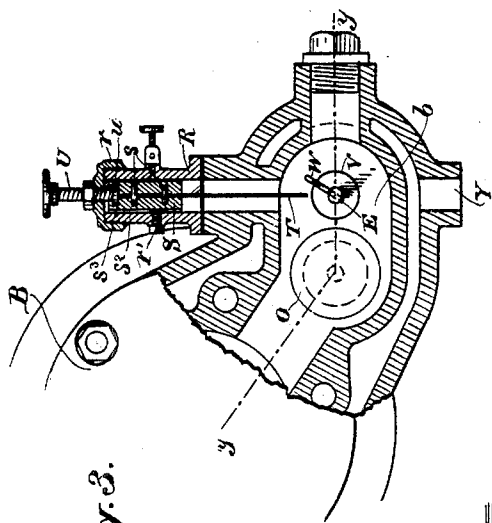


Fig. 3.

Fig. 4.

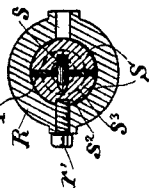


Fig. 2.

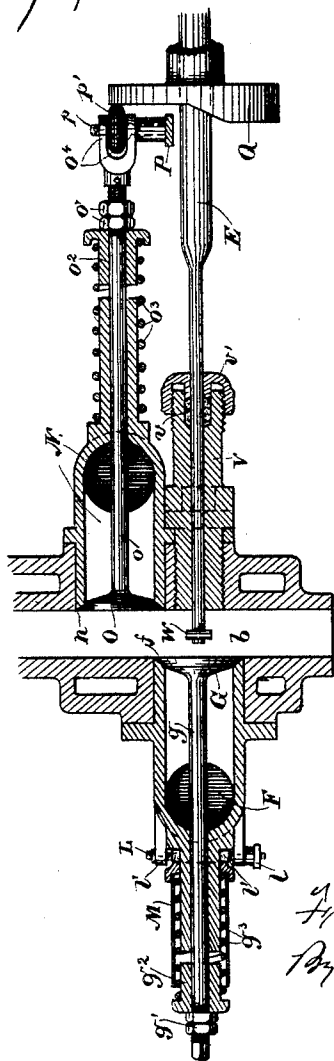
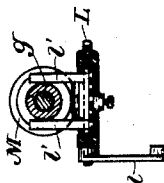


Fig. 5.



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UNITED STATES PATENT OFFICE.

FREDERICK A. REDMON, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO
BAINBRIDGE L. RYDER, OF SAME PLACE.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 586,826, dated July 20, 1897.

Application filed October 9, 1896. Serial No. 608,345. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. REDMON, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Explosive-Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to explosive-engines; and it consists in the parts and the constructions and combinations of parts hereinafter described and claimed.

The object of my invention is to provide a simple, effective, and accurate explosive-engine.

Referring to the accompanying drawings, Figure 1 is a side elevation of my engine. Fig. 2 is a sectional view of the inlet and exhaust valves. Fig. 3 is a sectional view of the sparking device. Fig. 4 is a horizontal section of the means for clamping the electrode T of Fig. 3. Fig. 5 is a detail of the connection for governing the inlet-valve.

A is the frame-casting of the engine. To this are bolted the cylinders B. There are two of these cylinders, and they are here shown as being oppositely located, though this is not essential, but is the best arrangement. The piston-rods C of these duplicate cylinders are connected to opposite cranks *d* of a shaft D, which is therefore common to both cylinders. This shaft D has a spiral gear or worm *d'*, which operates with a two-to-one motion upon a spiral worm or gear *e* on a shaft E, which shaft is the means for operating the exhaust-valves and the sparking devices of both cylinders.

Each cylinder has an explosion-chamber *b*, in which the valves, both the suction and exhaust, and the sparking electrodes are located.

F is the inlet-passage for the explosive mixture, said passage having at its inner end the seat *f* for the inlet-valve G, which operates by suction. The stem *g* of this valve extends outwardly through the back of the passage and has upon its outer extremity stop-nuts *g'*, against which bears a sleeve *g²*, controlled by a spring *g³*, which by the contact of the sleeve *g²* with the stop-nuts *g'* holds the valve G

closed and returns it again to its seat after opening under suction.

The valve G is regulated as to the amount of its movement in order to control the speed of the engine by admitting more or less of the explosive mixture, according to the needs of the engine, by means of a governor, which is represented generally by H. This governor may be of any suitable type affected by varying speeds, in order to move a sliding part *h*, from which the power is transmitted. This governor is driven by a belt I from the shaft E above. The sliding part *h* of the governor acts upon a crank-arm *j* upon a short shaft J, which has oppositely-extending arms *j'*, from which the connecting-rods K extend in opposite directions. The outer end of each rod is connected with a crank-arm *l* on a rock-shaft L, having a forked arm *l'*, which bears against a sliding sleeve M, said sleeve having its outer end in proximity to the sleeve *g²*, which the spring *g³* controls. Thus by the varying speeds of the governor motion will be transmitted to move the sliding sleeve M, so that its end will be thrown closer to or farther from the sliding sleeve *g²*, thereby providing for varying movement of said sleeve *g²* before contact with said end whereby the amount of inward movement of the suction-valve is regulated.

N is the exhaust-passage having the seat *n* for the exhaust-valve O, the stem *o* of which extends outwardly through the back of the exhaust-passage and has stop-nuts *o'* upon it, against which bears a sliding sleeve *o²*, controlled by a spring *o³*, whereby the exhaust-valve is controlled. The extremity of the stem *o* of the exhaust-valve is provided with a hook *o⁴*, which freely engages a cross-pin *p* on the lower end of a pivoted hanger or link P, and said pin also carries a contact-roller *p'*, against which a cam Q on the shaft E impinges. The rotation of this shaft, therefore, communicates movement through the impingement of the cam on the roller to the stem *o* of the exhaust-valve and positively opens said valve and permits it to close again under the power of its spring *o³*.

The pivoted hanger or link P serves as a guide and support for the outer end of the

valve-stem, whereby its movement is true and accurate.

It will be understood that the cams Q on the shaft E are relatively located and formed as to effect the timely movements of the exhaust-valves on each side.

The sparking device is as follows: Upon the top of each explosion-chamber is secured a casing R, which, through the intervention of suitable non-conducting washers, is completely insulated from the explosion-chamber. On the top of this casing is screwed a cap r, and within it is fitted a sliding clamp S, made in opposing sections provided with transverse dowel-pins s, which are adapted to engage holes in the contact-spring or electrode T, which is seated and confined between the sections of the clamp S. The clamp is held from rotating by means of a screw r' in the casing R, entering a groove s² in the side of the clamp, and said clamp is moved up and down by means of a screw U, which passes down through the cap r of the casing and has a head u fitted freely in a groove s³ in the clamp. This construction is for the purpose of enabling the electrode or contact-spring T to be moved or adjusted properly with respect to the other electrode while the engine is in operation and also to provide a means for firmly and accurately holding the electrode T, so that it will not be likely to be crystallized or otherwise injured.

The extremities of the shaft E enter the explosion-chambers through stuffing-boxes consisting of pieces V, chambered out to receive packing at v and fitted with compression-glands v' to tighten the stuffing. This construction avoids any leakage from the explosion-chambers. The extremities of the shaft E within the explosion-chambers are provided with the contact-points or electrodes W, which are adapted by the revolution of said shaft to make and break electrical connection with the contact-springs or electrodes T and thus produce the spark, and it will be understood that the relative location of these electrodes W is such as to produce the timely explosion in each chamber. The cylinders and explosion-chambers are water-jacketed, as usual, the water entering at X and issuing at Y.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an explosive-engine, the combination of duplicate cylinders, the pistons of which are connected with a crank-shaft common to both, a driven shaft operated from said crank-shaft, having its extremities projecting directly into the explosion-chambers, electrodes in the explosion-chambers of the cylinders, and electrodes on the extremities of said driven shaft operating in connection with the first-named electrodes for producing the spark in each explosion-chamber at timely periods.

2. In an explosive-engine, the combination of duplicate cylinders, the pistons of which

are connected with a crank-shaft common to both, a driven shaft operated from said crank-shaft, having its extremities projecting directly into the explosion-chambers, electrodes in the explosion-chambers of the cylinders, electrodes on the extremities of the driven shaft, for operating in connection with said first-named electrodes for producing the spark at proper times in each explosion-chamber, exhaust-valves in said explosion-chambers and connections whereby the exhaust-valve of each chamber is operated from the driven shaft.

3. In an explosive-engine, the combination of duplicate cylinders, the pistons of which are connected with a crank-shaft common to both, a driven shaft operated from the crank-shaft, spring-controlled exhaust-valves in the explosion-chambers of the cylinders, cams on the single shaft for operating the exhaust-valve of each chamber at proper times, and the hangers or links for supporting the outer extremities of the exhaust-valve stems and having the contacts against which the cams on the driven shaft operate.

4. In an explosion-engine, the combination of duplicate cylinders, the pistons of which are connected with a crank-shaft common to both, the driven shaft operated from said crank-shaft, electrodes in the explosion-chambers of the cylinders, stuffing-boxes in said chambers through which the extremities of the driven shaft enter, and electrodes on said extremities within the chambers for operating in connection with the first-named electrodes to produce the spark in each chamber at proper times.

5. In an explosive-engine, a movable electrode within the explosion-chamber thereof, in combination with an opposing electrode therein, and the means for holding and adjusting said opposing electrode, consisting of the casing insulated from the explosion-chamber, the slidable clamp within said casing and adapted to receive and hold the electrode, and the exterior screw engaging said clamp for moving it to adjust the electrode.

6. In an explosive-engine, a movable electrode within the explosion-chamber thereof, in combination with an opposing electrode therein, and the means for holding and adjusting said opposing electrode, consisting of the casing insulated from the explosion-chamber, the slidable two-part clamp within said casing and having pins adapted to receive and hold the electrode, the exterior screw engaging said clamp for moving it to adjust the electrode, and the screw passing through the casing and engaging a groove in the clamp to prevent its turning while being moved linearly.

7. In an explosive-engine, the suction-valve in the explosion-chamber having an outwardly-projecting stem with stop-nuts, a sliding sleeve on said stem controlled by a spring for impinging against said nuts to return the valve, in combination with the means for con-

trolling the movement of said valve, consisting of a governor driven by the engine, power-transmitting connections from said governor, and a sliding sleeve operated by said connections to come into more or less proximity with the sleeve of the valve-stem to limit the movement of the latter.

8. In an explosive-engine, an inlet or suction valve having a spring-controlled stem, in combination with a sliding sleeve in the path of movement of said stem and adapted by its position to limit, at various points, the movement of said stem, and a governor driven by the engine and having connections to operate the sliding sleeve.

9. In an explosive-engine, the combination of duplicate cylinders, the pistons of which are connected with opposite cranks of a crank-shaft common to both cylinders, a driven shaft operated from the crank-shaft, spring-controlled inlet or suction valves in the explosion-chambers in said cylinders, a governor operated by the driven shaft, a sliding sleeve, one for each suction-valve and in the path of movement thereof, adapted by its position to limit, at various points, the movement of

the suction-valve stems, and connections between the governor and said sliding sleeves for operating the latter.

10. In an explosive-engine, the combination of duplicate cylinders, the pistons of which are connected with a crank-shaft common to both, a driven shaft operated from said crank-shaft, exhaust-valves and connections from said driven shaft for operating said valves, an electrode in the explosion-chamber of the cylinders, and electrodes on the driven shaft operating in connection with said first-named electrodes, inlet or suction valves to the explosion-chambers having spring-controlled stems, a sliding sleeve adapted by its position to limit at various points the movement of said inlet-valve stems, a governor operated by the driven shaft and connections from said governor to operate the sliding sleeve.

In witness whereof I have hereunto set my hand.

FREDERICK A. REDMON.

Witnesses:

HENRY M. MCGILL,
S. H. NOURSE.