

E. L. THOMAS.
EXPLOSION ENGINE.
APPLICATION FILED OCT. 20, 1909.

991,670.

Patented May 9, 1911.

4 SHEETS—SHEET 1.

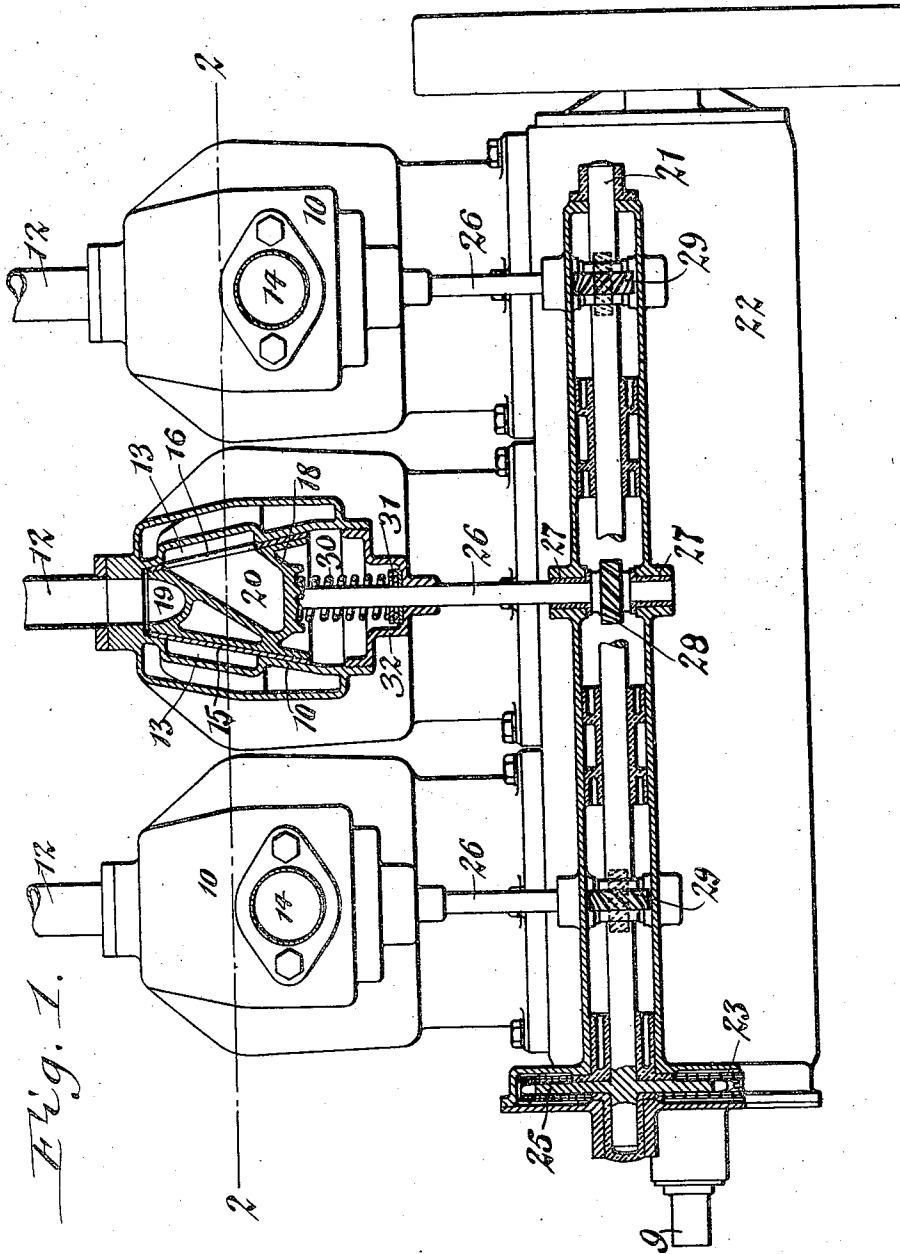


Fig. 1.

WITNESSES:

Richard Sommer
John H. Shoemaker

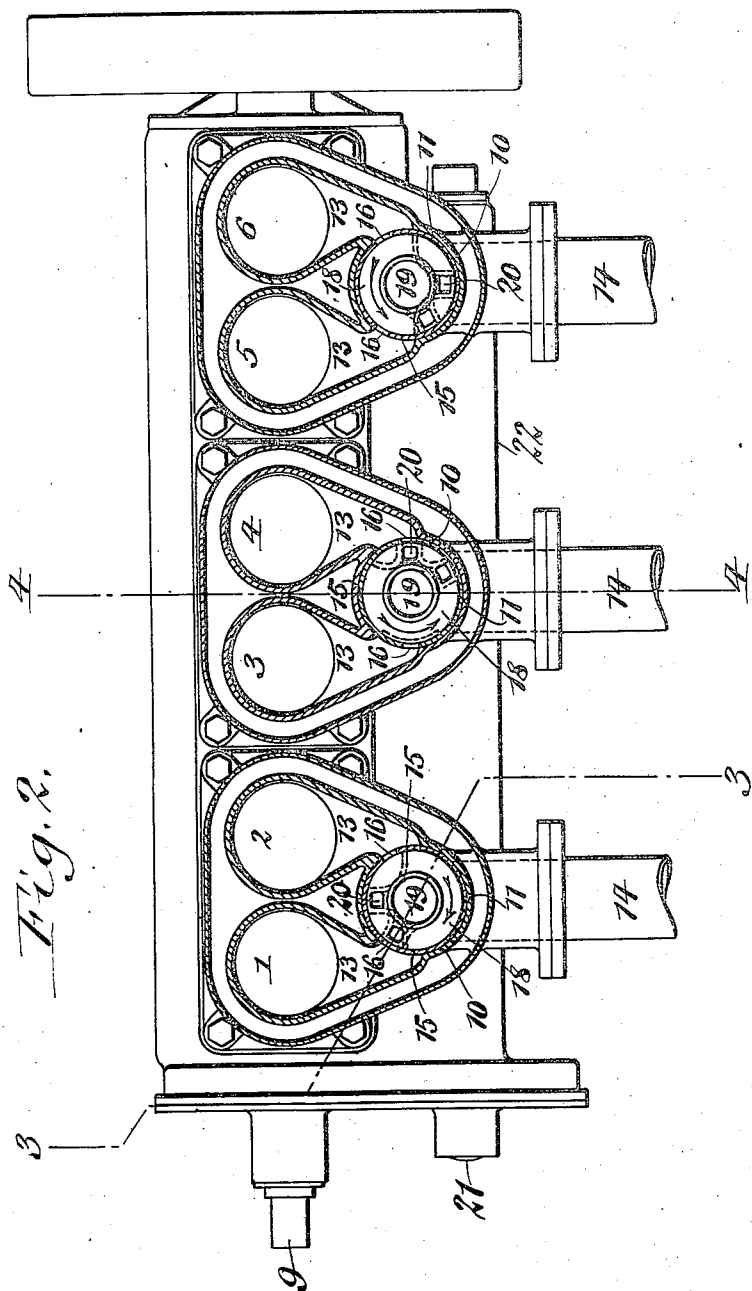
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4 SHEETS--SHEET 2.



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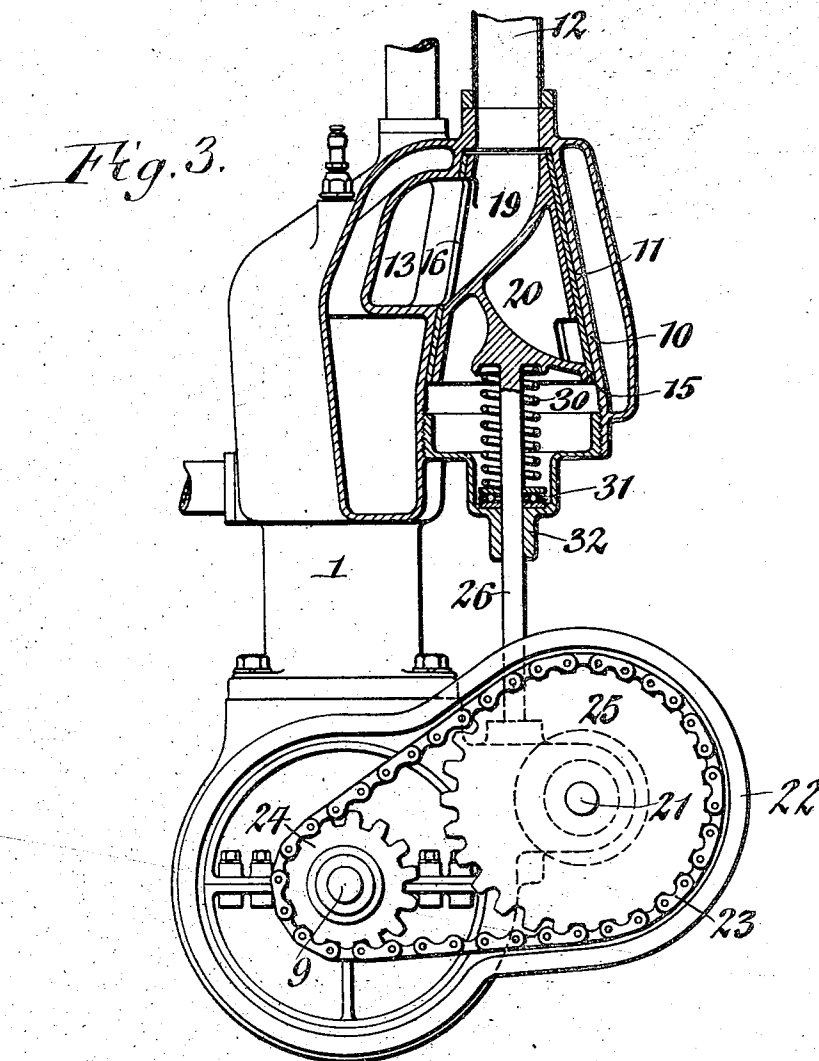
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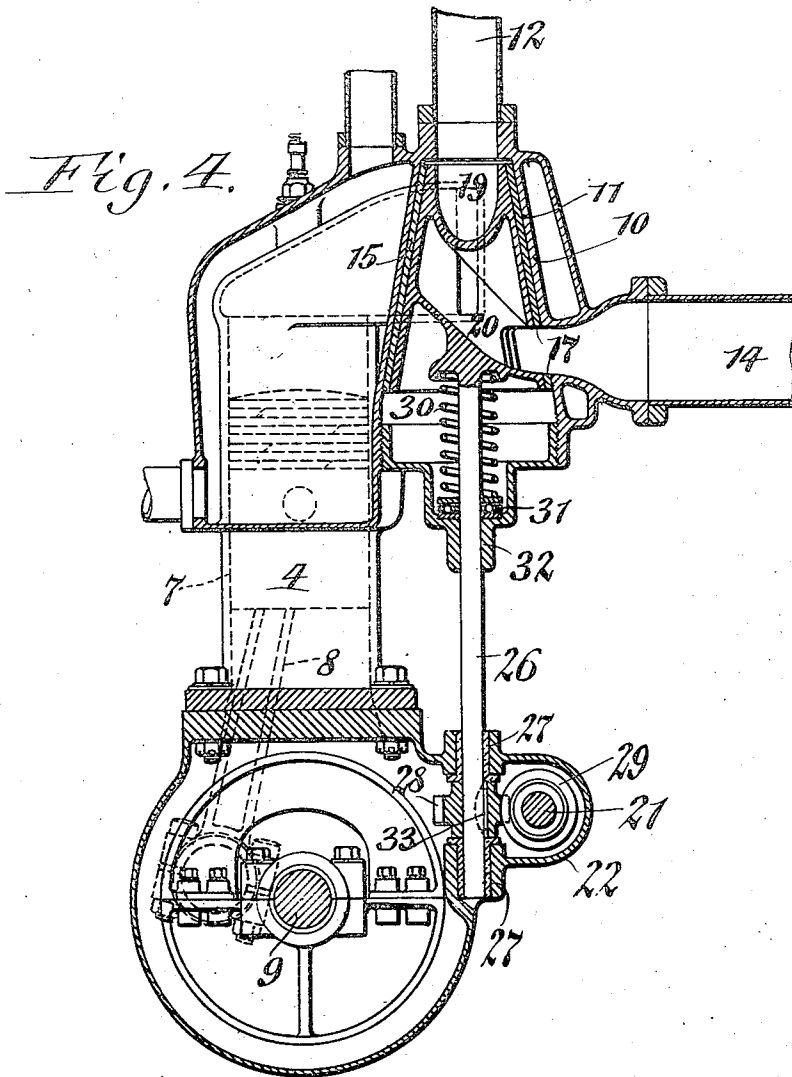
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

EDWIN L. THOMAS, OF BUFFALO, NEW YORK.

EXPLOSION-ENGINE.

991,670.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed October 20, 1909. Serial No. 523,648.

To all whom it may concern:

Be it known that I, EDWIN L. THOMAS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Explosion-Engines, of which the following is a specification.

This invention relates generally to a gas engine provided with a plurality of working cylinders and pistons, and more particularly to a gas engine having more than two pairs of such cylinders.

This invention has for its object to provide an improved valve mechanism for engines of this character whereby one movable valve-member operates to connect the firing ends of two working cylinders in the proper sequence with the fuel supply and with the exhaust, and also to permit of the proper timing of such valve-members when installed in an engine containing more than two pairs of cylinders, so as to insure proper sequence of supplying fuel to and exhausting the products of combustion from the several cylinders and still permit of constructing the main parts of the several pairs of cylinders alike and casting such several pairs of cylinders from the same pattern.

In the accompanying drawings consisting of 4 sheets: Figure 1 is a side elevation of a gas engine, partly in section, embodying my invention and showing the same applied to an engine having three pairs of cylinders. Fig. 2 is a horizontal section thereof in line 2-2, Fig. 1. Figs. 3 and 4 are vertical transverse sections taken in the correspondingly numbered lines in Fig. 2.

Similar letters of reference indicate corresponding parts throughout the several views.

In its general organization, this gas engine comprises a plurality of pairs of working or power cylinders 1, 2, 3, 4, 5, 6, each cylinder containing a reciprocating working piston 7 which is connected by a pitman 8 with a crank on a crank shaft 9 in a well known manner. The cylinders are preferably cast in pairs and three of such pairs are preferably employed, as shown in the drawings, although this number may be varied to suit the amount of power which it is desired the engine should develop.

Between the upper or outer parts of the working cylinders of each pair is arranged a stationary valve case 10 for that portion of the valve mechanism which controls the

fuel supply and exhaust of these particular cylinders. This valve-case is preferably cast integrally with the respective pair of working cylinders and has an internal conical bore, face or seat 11 the axis of which is preferably arranged parallel with those of the working cylinders and on one side thereof. The small end of this conical seat is arranged at the top or outer end of the casing and at this place this seat communicates with an inlet pipe or conduit 12 whereby the fuel, such as gasolene, gas or other explosive agent is admitted to the respective end of the chamber within the casing. On its side and near its small end the conical bore of the valve casing is connected at different parts of its periphery, preferably on diametrically opposite sides, with the explosion ends, respectively, of the companion pair of working cylinders by means of main passages or conduits 13, 13. Between these main conduits or passages and preferably on the outer side of the conical bore of the valve casing near its large end, this bore is connected with an exhaust conduit or passage 14 extending laterally outward therefrom.

Engaging with the bore of the valve-casing is a conical valve sleeve, bushing or lining 15 which engages with the bore of the valve-casing and the interior of which forms the valve-seat proper. This valve sleeve or lining opens at its upper end into the small end of the valve casing which communicates with the fuel inlet, its large lower end is in communication with the lower end of the valve casing, its side adjacent to the small end is provided at different parts of its circumference with two axially-elongated main ports 16, by which the interior of the sleeve is placed in communication respectively with the main conduits or passages leading to the firing or explosion ends of the working cylinders, and adjacent to its large end and at a point about midway between the main ports 16, and on the outer side of the sleeve the same is provided with a circumferentially-elongated exhaust port or outlet slot 17, whereby the interior of the sleeve or lining of the valve-case communicates with the exhaust-conduit 14.

Within the lining or sleeve of the valve-case is arranged the rotatable plug or movable member 18 of the valve which serves to connect the respective ends of two working cylinders in proper sequence with the fuel

cost the several rotatable plugs of the engine, in the case of one having three pairs of cylinders and three rotatable plugs, is organized so that two of these plugs turn in the same direction while the other turns in the opposite direction, as indicated by the arrows in Fig. 2. Furthermore, all of the main ports or passages of the several cylinders are made wider than necessary in a direction circumferentially of the rotatable valve plugs. The valve lining, bushing or sleeve of each plug is, however, constructed to suit the requirements of that particular pair of cylinders and the plug cooperating therewith in order to produce the proper timing of the fuel admission and exhaust outlet of this particular pair of cylinders relative to the other pair of cylinders. As will be seen in Fig. 2, the main ports of the valve sleeves of the two pairs of engine cylinders at opposite ends of the engine, as a whole, are spaced apart 120° and the valve plug cooperating with the left hand pair of cylinders turns in the direction of the hands of a clock while the valve plug of the right-hand pair of cylinders turns in a direction opposite to the hand of a clock. The valve sleeve of the intermediate or central pair of cylinders has its main ports arranged on diametrically opposite sides, or in other words, spaced apart 180° , and the valve plug rotates in the same direction as that associated with the pair of cylinders at the right end of Fig. 2. It will be observed, however, that although the main ports of the several valve sleeves are arranged in different positions relative to their valve plugs, the main ports of these sleeves in all cases open into the outer ends of the main passages leading to the exploding ends of the cylinders. This is accomplished by making the outer ends of these main passages sufficiently wide to effect communication with the main ports of the valve-sleeves regardless of the position which the same must assume in order to produce harmony of action between the several valve plugs. By thus constructing the main passages of the cylinders, all of the pairs of cylinders can be produced by casting from the same pattern and any difference as to the exact location and extent of the outer ends of the main passages is taken care of by the valve bushing or sleeves which, although requiring individual care, can nevertheless be produced at considerably lower cost than if the exact location of the outer end of the main passages was effected in the castings of the engine cylinders.

In the positions of the valve plugs shown in Fig. 2, the fuel inlet for the first cylinder, counting from left to right, is wide open and the piston in the respective cylinder is

making a suction stroke, exhausting of the products of combustion is about to begin in the second cylinder, compression of the fresh fuel has been nearly completed in the third cylinder, the exhaust of the fourth cylinder is open its maximum area, compression of a new charge of fuel is just beginning in the fifth cylinder and an explosion has just occurred in the sixth cylinder, and the piston therein is being propelled forwardly with a working stroke.

My improved valve mechanism for gas engines renders it possible to materially reduce the cost of the same, increase its efficiency and reliability and avoid the wear and undue noise of the valve mechanism as heretofore constructed.

I claim as my invention:

1. An explosion engine comprising two working cylinders, pistons arranged in said cylinders, and a valve mechanism having a conical casing which is provided at its end with a fuel inlet port and on different parts of its side with an exhaust port and with two main ports connected respectively with said cylinders, a conical valve plug rotatable in said casing and having two passages one of which extends from its end to its side and is adapted to connect said fuel inlet port successively with said main ports and the other of which is arranged at its side and is adapted to connect said exhaust port successively with said main ports, and a spring operating to press said valve with its small end toward the small end of the casing, substantially as set forth.

2. An explosion engine comprising a plurality of pairs of working cylinders, pistons arranged in said cylinders, and a valve mechanism for each pair of cylinders comprising a casing having a fuel inlet port, an exhaust port and two main ports connecting respectively with the cylinders of a pair, a valve plug rotatable in said casing and having two passages one of which is adapted to connect said fuel inlet port successively with said main ports and the other of which is adapted to connect said exhaust port successively with said main ports, and a bushing arranged between each valve plug and its case and provided with a port registering with said main ports and said bushings being rotatably adjustable for varying the relative position of the ports of the several bushings, substantially as set forth.

Witness my hand this 1st day of October, 1909.

EDWIN L. THOMAS.

Witnesses:

THEO. L. POPP,
ANNA HEIGIS.