

No. 661,439.

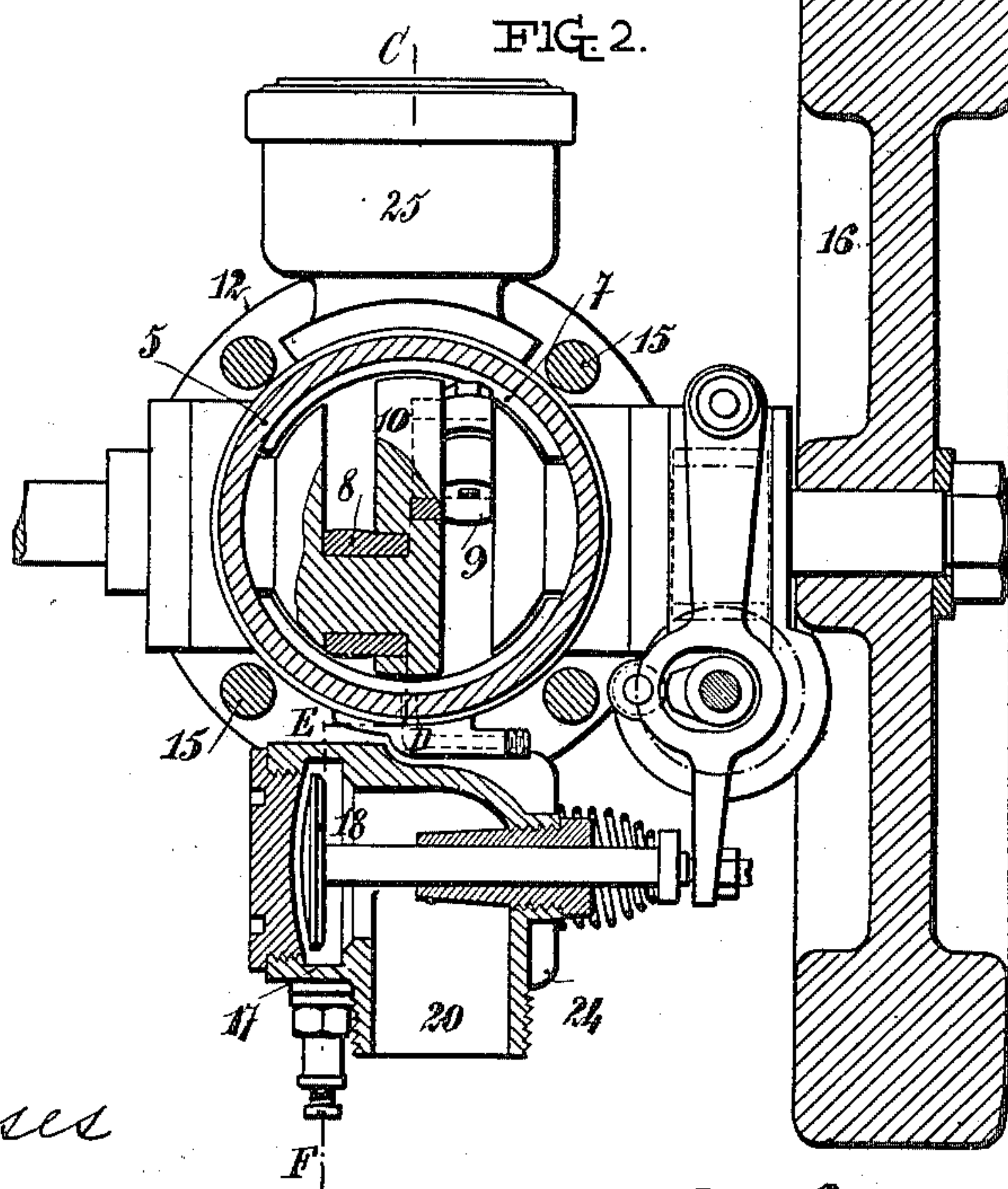
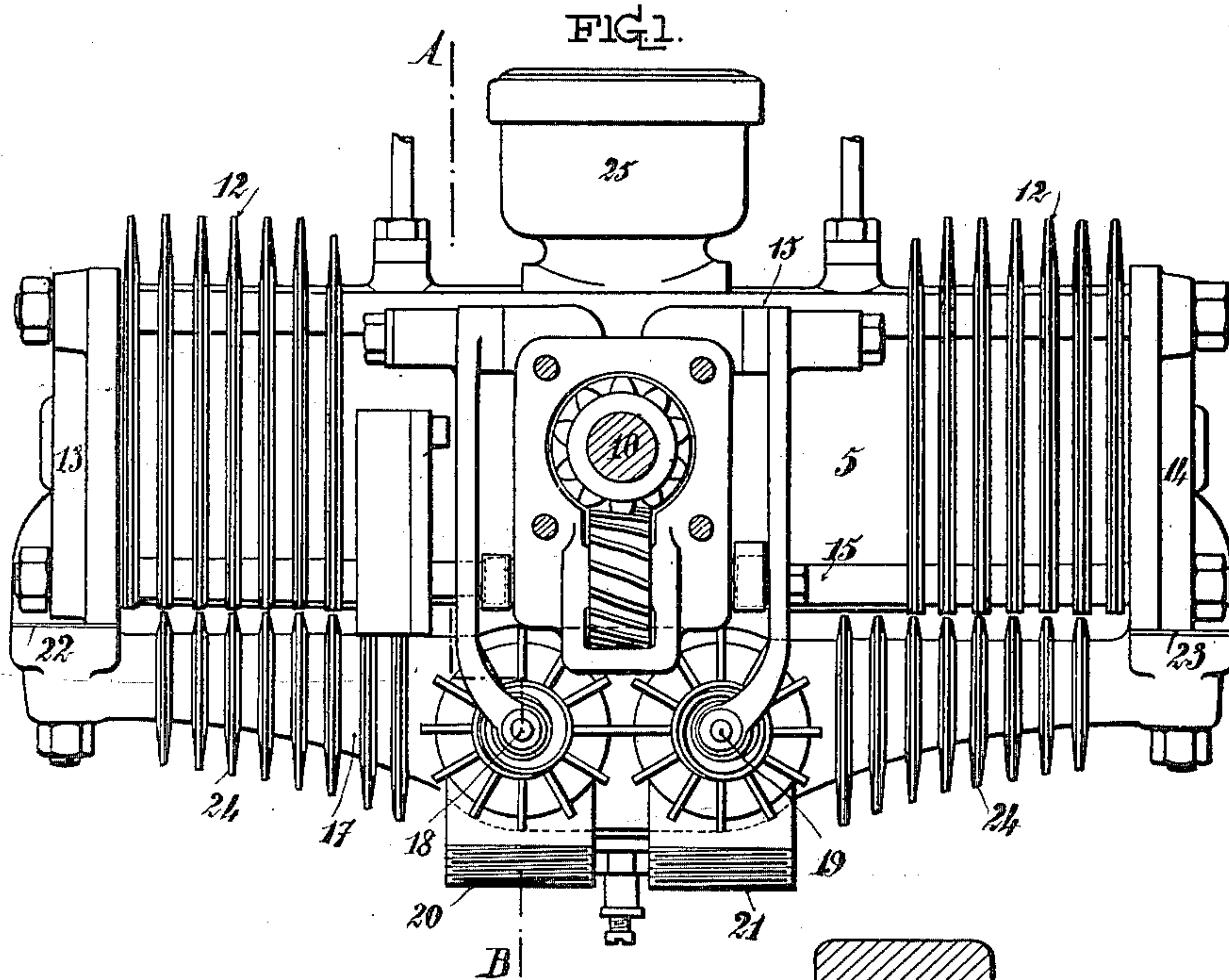
Patented Nov. 6, 1900.

A. & E. BOULIER.
EXPLOSION ENGINE.

(Application filed July 14, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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[Signature]

Inventors

Alfred Boulter

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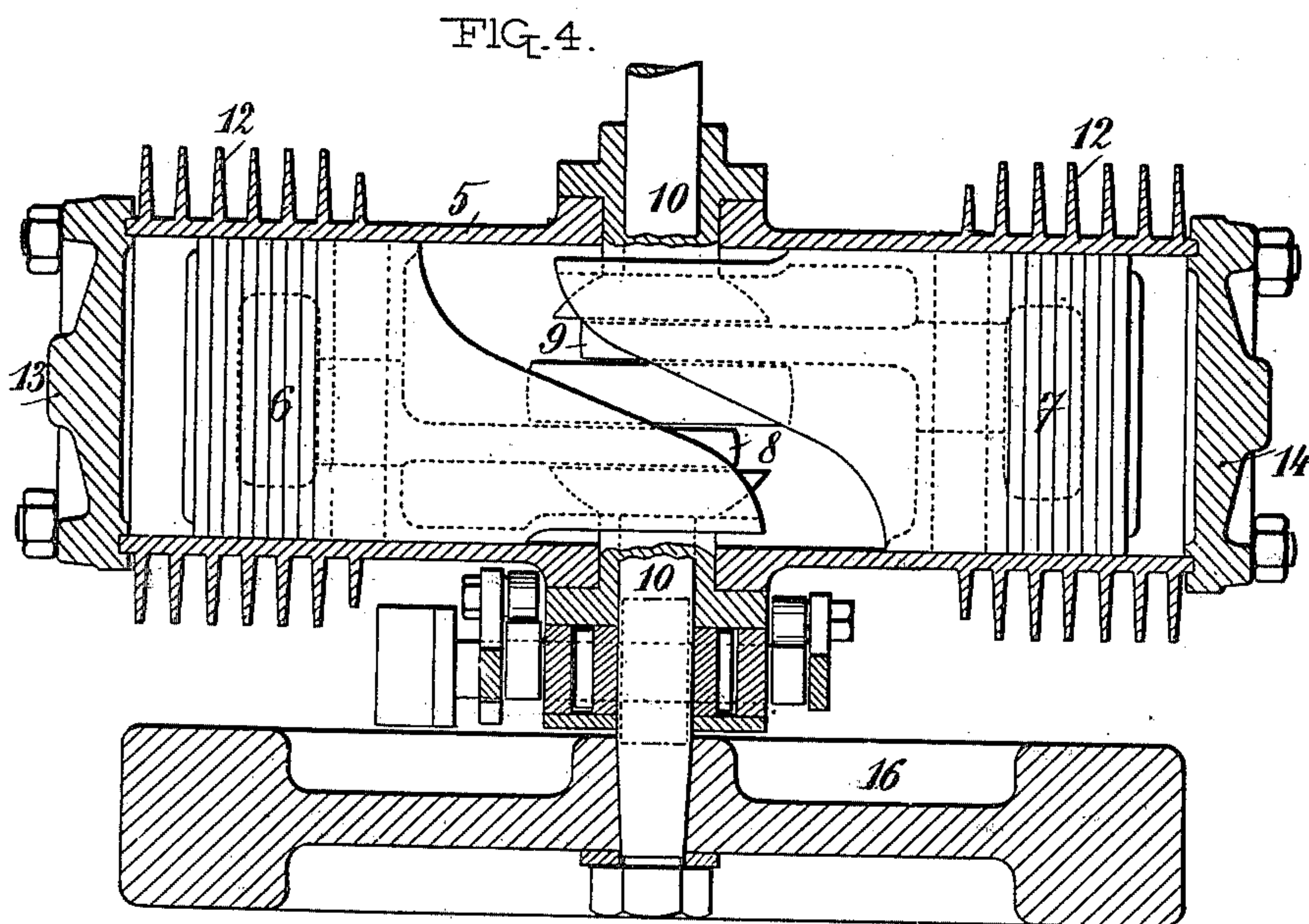
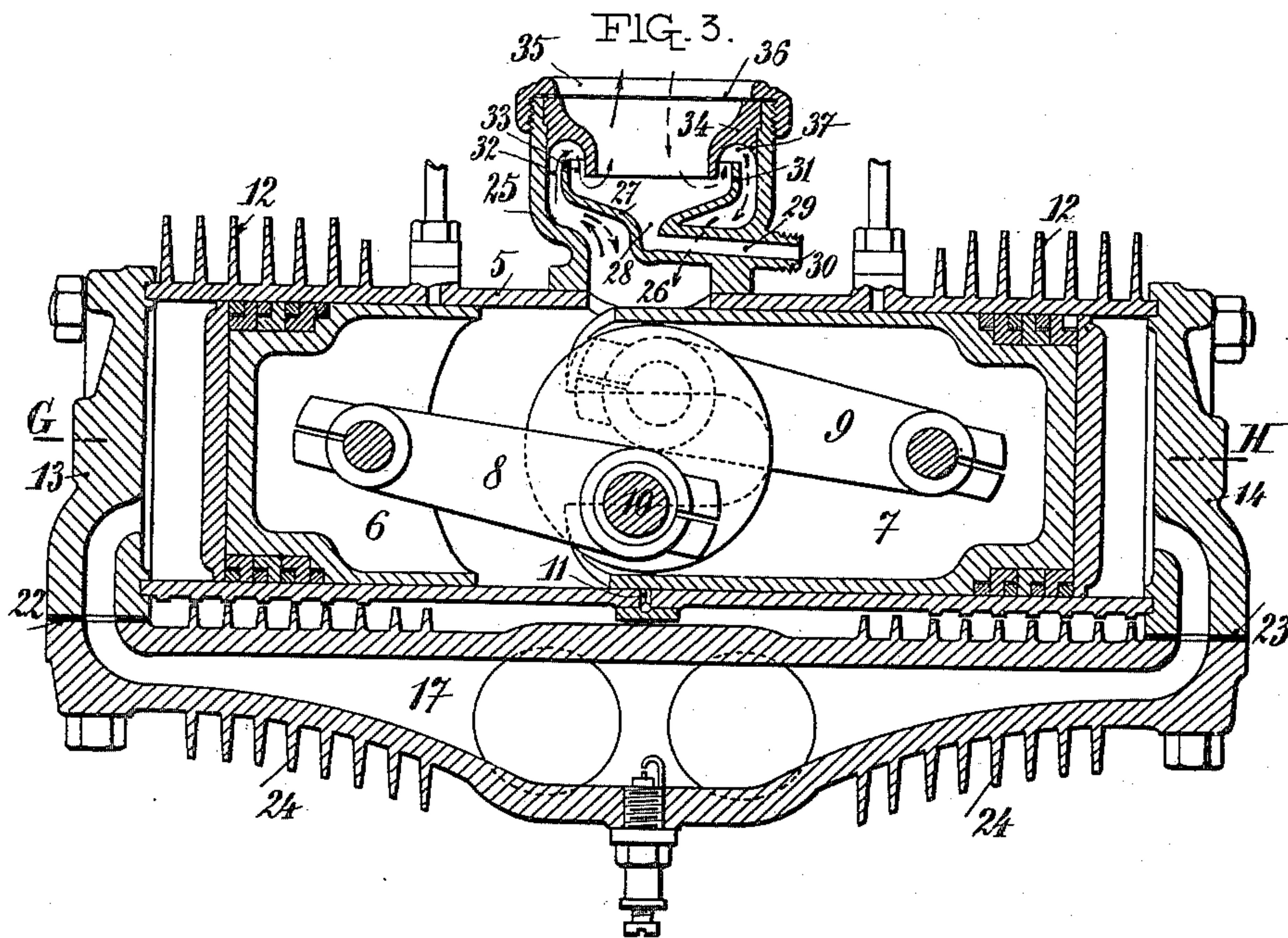
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UNITED STATES PATENT OFFICE.

ALFRED BOULIER AND EUGÈNE BOULIER, OF NEUILLY, FRANCE.

EXPLOSION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 661,439, dated November 6, 1900.

Application filed July 14, 1900. Serial No. 23,554. (No model.)

To all whom it may concern:

Be it known that we, ALFRED BOULIER and EUGÈNE BOULIER, citizens of the Republic of France, residing at Neuilly-sur-Seine, near Paris, France, have invented certain new and useful Improvements in or Relating to Explosion-Engines, (for which we have applied for Letters Patent in Great Britain under No. 11,690, dated the 27th day of June, 1900, and in France, No. 295,719, dated December 29, 1899,) of which the following is a specification.

The present invention relates to a motor working on the Otto cycle and driven by any suitable explosive medium, such as petroleum, spirit, gas, or the like. The motor consists of a single cylindrical structure in which operate two pistons having a rectilineal conjugated reciprocating movement in opposite directions to each other, the explosive force acting at the opposite ends of the cylinder. The explosions are effected in a special explosion-chamber so arranged as to be quite separated from the motor-cylinder, being connected with the latter only at the respective ends through heat-insulating connections between the explosion-chamber and the ends of the cylinder. The distributing-valve and the exhaust-valve, as well as the ignition device, are carried by the explosion-chamber and arranged in the middle portion thereof. The opening of the valves is effected from the operative parts of the engine, while their closing is automatically effected by a spring of suitable power and tension, so as to insure regularity of action. The cylinder, in the middle part of which is arranged the crank-shaft suitably connected with the pistons by means of connecting-rods, is provided on the outside with a kind of receiver or vessel, with which it communicates, the object of which is to aid in cooling the motor-cylinder by the driving out of the hot air compressed between the two pistons in the cylinder whenever they travel toward each other and supplying fresh air to the same part when the pistons are traveling outward, the expulsion of the hot air being effected in consequence of the compression produced through the pistons being driven toward each other by the explosions, such escape of air being free from any oil, which otherwise would be driven out with it, the air being caught and intercepted owing to the special construction

of this part of the apparatus, which will be explained hereinafter, while the admission of fresh air is effected in consequence of the suction produced by the pistons traveling in opposite directions—i. e., traveling away from each other.

The motor is represented in the accompanying drawings, in which—

Figure 1 is a longitudinal or side elevation; Fig. 2, a cross-section on the line A B of Fig. 1; Fig. 3, a longitudinal section on the lines C D and E F of Fig. 2, and Fig. 4 a horizontal section on the line G H of Fig. 3.

The cylinder 5 is provided with two pistons 6 and 7, one at each end and working in directions contrary to each other, said pistons being connected by suitable rods 8 and 9 with the crank-shaft 10, arranged transversely—i. e., at right angles—to the longitudinal axis of the cylinder 5 and placed in the central portion of the latter. The cylinder 5 is preferably made, for the purpose of conveniently arranging and mounting the different parts, of two parts bolted together or otherwise suitably connected. The ends of the component parts forming the two cylinders are provided with cooling-ribs 12 on those portions most exposed to the heat of the gases. The ends of the cylinder are closed by face-plates 13 14, applied and held by means of longitudinal bolts 15, which firmly hold together all the parts constituting the cylinder 5.

The crank-shaft 10 is sufficiently prolonged beyond each side of the cylinder 5 to carry on one side the parts for transmitting the movement and on the other the actuating devices for the admission and exhaust valves, the ignition device, and the fly-wheels 16.

The explosion-chamber which is quite separate from the cylinder 5, is constituted by an elongated box 17, in the enlarged central portion of which are arranged the admission-valve 18 and exhaust-valve 19, controlling the inlet port or pipe 20 for admitting the explosive mixture and the exhaust-pipe 21 for carrying off the gases of combustion. The ends of the said box 17 are connected, by means of heat-insulated connections 22 and 23, to the corresponding ends of the cylinder 5 in such a manner that a communication between the explosive-chamber, consisting of the box 17, is established with each end of

the cylinder at each explosion. The box 17 is provided on the outside at suitable points with ribs 24 to assist the cooling of the said box.

5 On the central portion of the cylinder 5 is arranged a collector or intercepting vessel 25, through which the hot air compressed between the two cylinders as they travel toward each other is expelled without, however,
10 any lubricating-oil being driven out at the same time, the hot air being replaced by fresh air entering through the collector during the time the pistons are traveling from each other. The open bottom of the said vessel 25 can be
15 fixed on the cylinder 5 so as to correspond exactly with an opening 26, provided for that purpose in the wall of the cylinder in such a manner that the interior of that part of the cylinder in which the crank-shaft works can
20 communicate with the interior of the vessel 25, in the center of which is provided a cup or inverted cone 27, the bottom of which is provided with an orifice 28, communicating with a tube or passage 29, extending through
25 the side of the vessel 25 and terminating outside in a pipe 30.

The cup 27 is provided with an upright rim 31, over which is arranged a ring 34 or part with an inwardly-depending flange in such a
30 manner as to surround the top of the rim and at the same time leave sufficient space to form the annular passages 32 33 between the top of the rim and the ring or recessed part, while a ring 34 is screwed onto the upper edge of
35 the vessel 25, the upper end 35 of which is covered by a metallic tissue or sieve 36, so as to prevent the entry of impurities with the air.

In consequence of this arrangement the motor-pistons when traveling toward each
40 other under the effect of an explosion compress the air between them in the cylinder 5 and drive it out through the opening 26 of the vessel 25, the air being obliged, owing to the obstacles or baffles it meets with in the cup
45 27 and the ring 34 in its passage through the vessel, to follow the path indicated by the arrows drawn in full lines, escaping finally through the central opening 35. When, however, the pistons are traveling in the opposite
50 direction—i. e., traveling away from each other—they produce through the opening 26 a very strong suction in the vessel 25, drawing in the air from the outside through the openings 35, (indicated by the arrows drawn
55 in dotted lines,) which air, thus passing in a direction contrary to that taken by the hot air which had been expelled, enters the vessel 25 and through the orifice 26, the said cylinder 5 thereby greatly assisting in cooling
60 ing the latter.

The object of the baffles arranged within the vessel 25 is to prevent any lubricating-oil from being carried outside with the hot air

driven out. A large quantity of such oil has to be provided in the central portion of the
65 cylinder 5, where the crank-shaft works, and would be liable to be carried away by the hot air driven out by the pistons; but any oil taken up by the hot air strikes first against
70 the lower surface of the cup 27 and then the wall of the recess 37 of the ring 34, where it is deposited and from whence it runs down and falls into the cup 27, passing out through
75 the orifice 28, provided for that purpose, into the passage 29, and outside pipe 30, by which the collected oil may be led to any place where it is required. Thus the expulsion of the air is effected without any loss of lubricants.

What we claim as our invention, and desire
80 to secure by Letters Patent, is—

1. An explosion-motor comprising a cylinder, two pistons in said cylinder working simultaneously in opposite directions, an explosion-chamber separated from said cylinder
85 and containing the devices for the admission and escape of the gases and an ignition device and connections between said explosion-chamber and the ends of the cylinder, and an air inlet and outlet vessel on said cylinder
90 and communicating with the interior thereof between the pistons, and oil-intercepting devices in said vessel substantially as described.

2. An explosion-motor comprising a substantially-closed cylinder, two pistons in said
95 cylinder, working simultaneously in opposite directions, an air inlet and outlet vessel on said cylinder and communicating with the interior thereof between the pistons, an oil-intercepting cup in said vessel and a baffle arranged above and about the rim of said cup
100 substantially as described.

3. An explosion-motor comprising a substantially-closed cylinder, two pistons in said
105 cylinder working simultaneously in opposite directions, an explosion-chamber separated from said cylinder and extending longitudinally thereof, gas inlet and outlet ports therein and connections between the ends of the
110 explosion-chamber and the ends of the cylinder for the inlet and outlet of gases and an air inlet and outlet vessel on the cylinder and communicating with the interior thereof above the crank-shaft and an oil-intercepting
115 device in said vessel substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALFRED BOULIER.
EUGÈNE BOULIER.

Witnesses:

LOUIS SULLIGER,
EDWARD P. MACLEAN.