

G. E. HOGLUND.
EXPLOSIVE ENGINE.
APPLICATION FILED AUG. 18, 1911.

1,062,099.

Patented May 20, 1913.

3 SHEETS—SHEET 1.

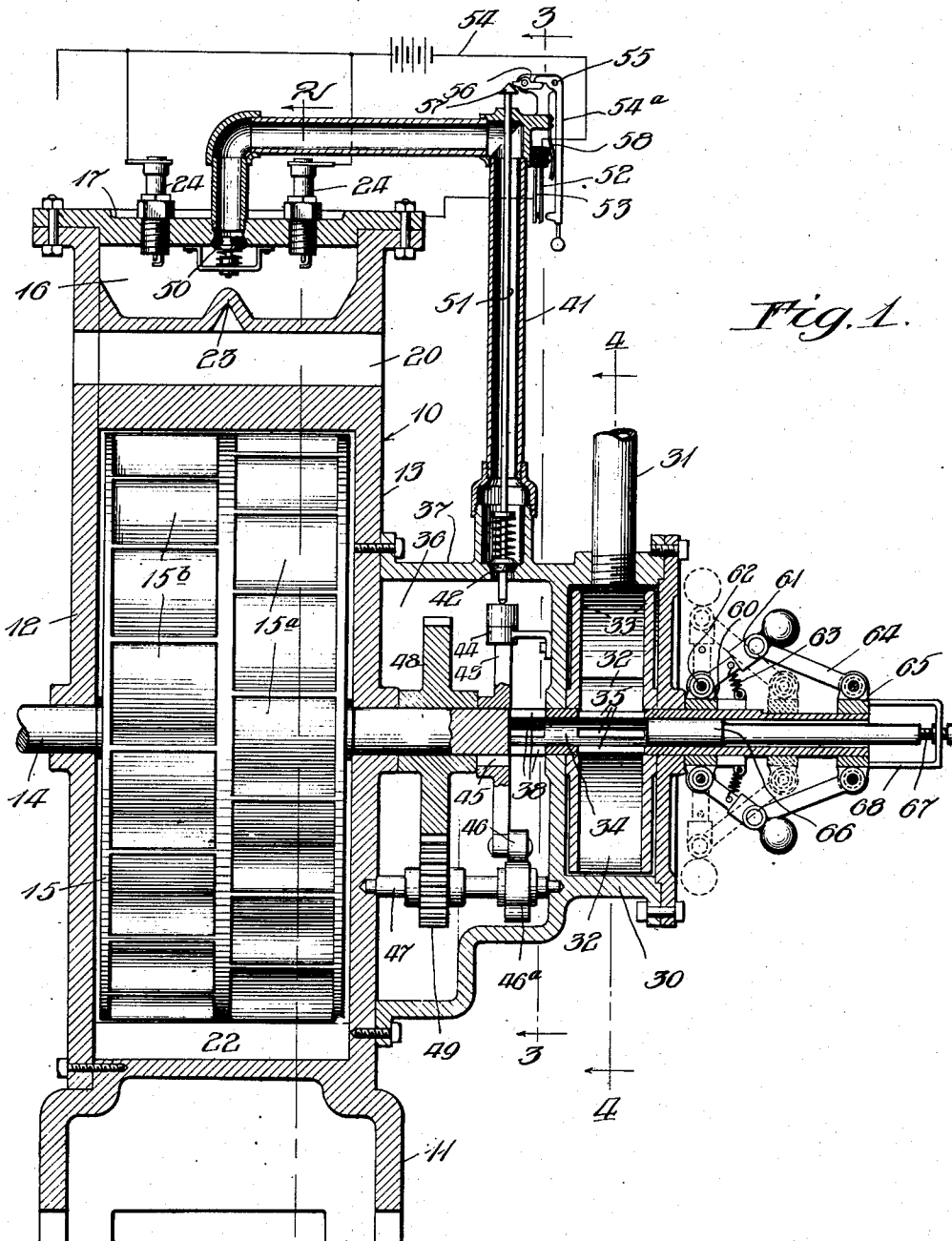


Fig. 1.

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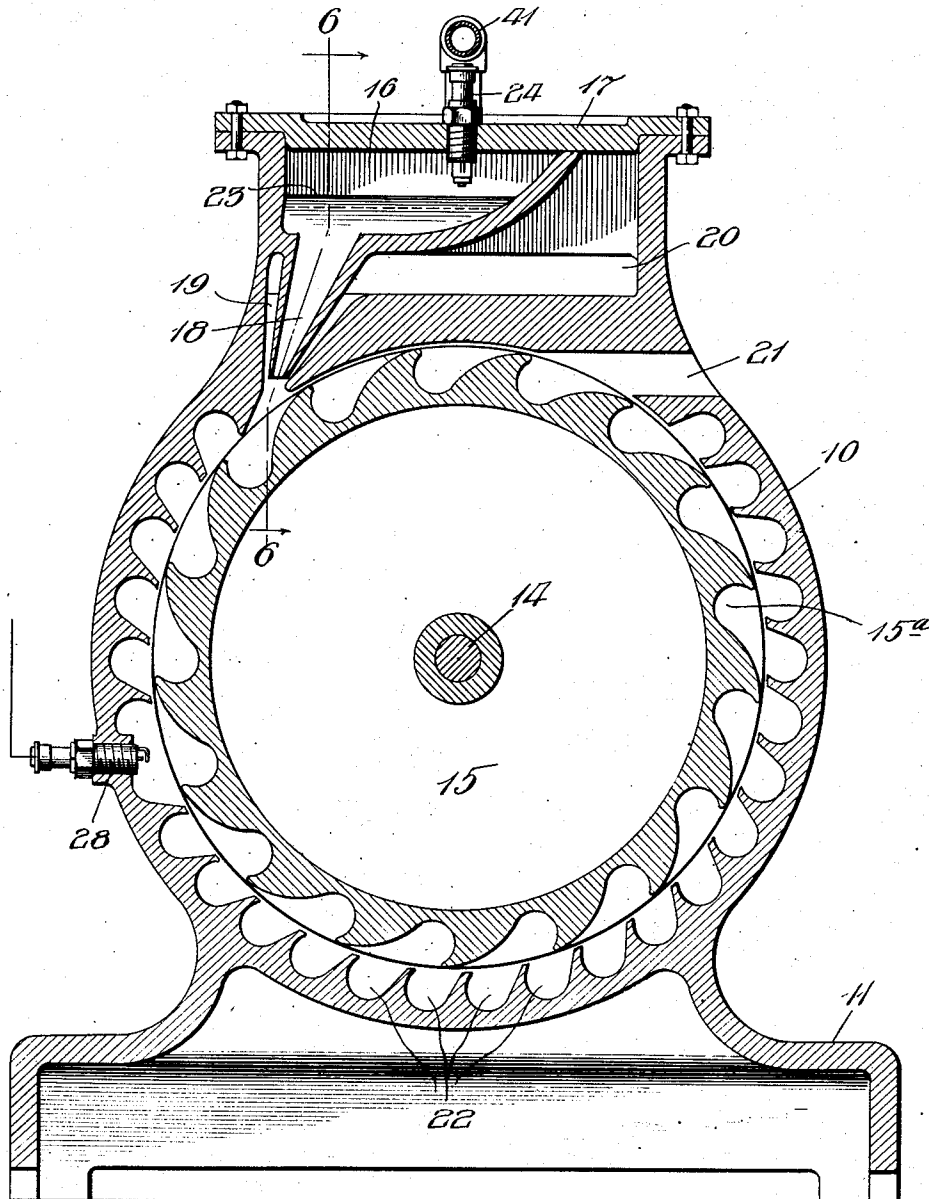
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3 SHEETS—SHEET 2.

Fig. 2V.



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3 SHEETS—SHEET 3.

Fig. 4.

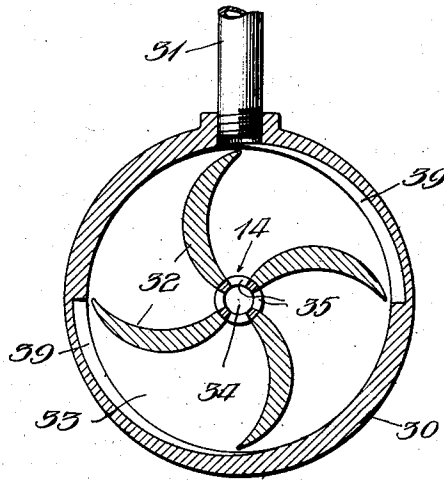


Fig. 3.

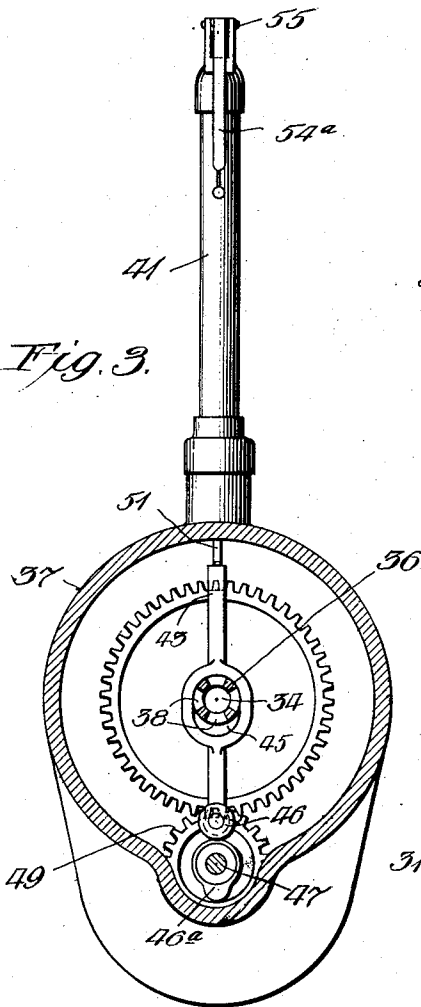


Fig. 5.

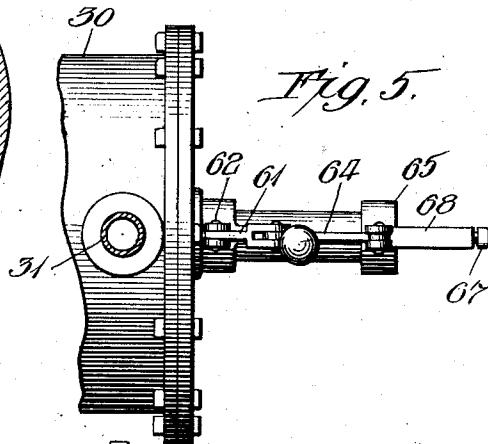
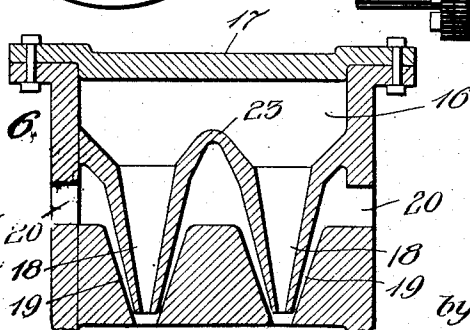


Fig. 6.



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UNITED STATES PATENT OFFICE

GUSTAVE E. HOGLUND, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO OLIVER C. DENNIS, OF CHICAGO, ILLINOIS.

EXPLOSIVE-ENGINE.

1,062,099.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed August 18, 1911. Serial No. 644,820.

To all whom it may concern:

Be it known that I, GUSTAVE E. HOGLUND, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain
5 new and useful Improvements in Explosive-Engines, of which the following is a full, clear, and exact description.

The invention relates to explosive engines; and more particularly to the type
10 known as rotary impact engines, in which the explosive agent is impacted against and drives a turbine or wheel.

One object of the invention is to provide an explosive engine with a rotary pump
15 for compressing the combustible mixture and forcing it to the combustion-chamber, and thus dispensing with the necessity of providing a reciprocating pump or compression-means for that purpose.

A further object of the invention is to provide an improved explosive engine in
20 which provision is made for expansion of the gases in the pockets or buckets of the impact wheel.

A further object of the invention is to provide an auxiliary ignition-device for ex-
25 ploding any unconsumed gases in the rotating impact-wheel.

The invention also designs to provide a
30 rotary impact explosive engine of improved construction.

In the drawings; Figure 1 is a central vertical transverse section of an explosive engine embodying the invention. Fig. 2 is
35 a section taken on line 2—2 of Fig. 1. Fig. 3 is a section taken on line 3—3 of Fig. 1. Fig. 4 is a section taken on line 4—4 of Fig. 1. Fig. 5 is a plan of the centrifugal pump and governor. Fig. 6 is a section
40 taken on line 6—6 of Fig. 2.

The engine comprises a casing 10 and a base 11, a side-plate 12 and a side-wall 13 integrally formed with the casing. Engine-
45 shaft 14 is journaled in sides 12 and 13 and a turbine or impact wheel 15 is secured to said shaft, so that the latter will be driven by rotation of said wheel. Wheel 15 is provided with two annular series with im-
50 pact-ribs or buckets 15^a and 15^b relatively offset to one another. Casing 10 is extended upwardly to form a combustion-chamber 16, which is closed by a top-plate 17. Tapered jet 18 extends downwardly from the combustion-chamber to direct the exploding
55 gases into the pockets of and to impact

against the turbine wheel 15. These jets extend through ducts 19 in the casing 10 and these ducts communicate with a cross-channel 20 in the casing, which opens to the atmosphere so that the supply of air for
60 combustion and expansion will be drawn into the buckets of the impact-wheel by the blast forced through jets 18. An exhaust-port 21 is formed in the shell. A series of pockets 22 are formed in the casing, to com-
65 municate with the pockets in the turbine-wheel, and the walls between the pockets 22 form abutments for the fluid in pockets, so that the fluid may expand and aid in driving the turbine-wheel.

A V-shaped wall 23 extends across the combustion-chamber and a spark-plug 24 is provided at each side of said chamber. It will be understood that these spark-plugs
70 will be operated to successively ignite the fluid in the combustion-chamber. In practice it occurs that some of the vapor or combustion fluid fails to ignite in the combustion-chamber, so that its propelling force
75 is lost, and to overcome this loss, a supplemental spark-plug 28 is mounted in casing 10 at a point where it will ignite unconsumed vapor or fluid in the buckets of the turbine, some distance from the point where
80 the jets 18 impact the fluid against the turbine-wheel. It will be understood that this spark-plug will be suitably connected to the ignition circuit.

The operation of the engine thus far described will be as follows: Compressed air
85 and gas or vapor forced into the combustion-chamber 16, will be ignited therein by the operation of spark-plugs 24 and the exploding gases will escape through jets 18 and be successively impacted against, or
90 into pockets of, the turbine wheel 15, and thus drive said wheel. In rotation, the fluid in the pockets will have opportunity to expand into pockets 22 in the casing and the unconsumed vapor or fluid will be ignited
95 as it passes spark-plug 28, thus utilizing the unconsumed fluid. The products of combustion will escape through exhaust ports 21.

Rotary compression-means is provided for forcing combustible fluid under pres-
100 sure, to the combustion-chamber and consists of a centripetal pump casing or shell 30 to which a pipe 31 is connected, which may be connected to any suitable source of supply of vapor, such as a carbureter, as
110

well understood in the art. Turbine shaft 1' extends through casing 30 and rotating pistons or vanes 32 are secured to rotate with said shaft, being formed in piece with sides 33 which are secured to and rotate with said shaft. These pistons are curved as illustrated in Fig. 4 and the chambers therebetween communicate with a duct 34 formed in shaft 14, and said duct communicates with said chambers by means of openings 35 in said shaft and with a fluid chamber 36 formed in a shell 37 secured to the side wall 13 of the engine, by means of openings 38 formed in said shaft, so that the fluid will be forced by pistons 32 through openings 35, duct 34 and openings 38, into said fluid chamber. Channels 39 of gradually increasing depth are formed in pump-casing 30, so that the fluid will not be pocketed between the pistons and will not pass around with the blades or pistons of the rotary pump.

Combustible fluid from chamber 36 is conducted to the chamber 16, by a pipe 41 and the flow is controlled by a valve 42 which is intermittently operated by valve-operating mechanism, comprising a rod or plunger 43 which is slidably held in a guide 44 and is provided with an elongated slot 45 through which shaft 14 extends, a roller 46 mounted on the lower end of said rod, a cam 46^a on a shaft 47 which is driven at the desired speed by a pinion 48 secured to and rotating with the shaft 14 and which meshes with a gear 49 on the cam-shaft 47. Resultantly charges of compressed fuel will be conducted through pipe 41 into the combustion-chamber 16 under control of valve 42. A check-valve 50 is provided in the combustion-chamber 16 to cut off communication between the pipe 41 and said chamber 16, during combustion and to prevent back-firing in pipe 41.

The operation of the fluid-supplying mechanism will be as follows: The combustible vapor or fluid entering through pipe 31 will be compressed by the constantly rotating centripetal pump, the blades of which will force the fluid through openings 35, duct 34 and openings 38 into chamber 36, from which the fluid will pass under control of valve 42 to the combustion-chamber. The stem 51 of valve 42 is extended upwardly through pipe 41 to operate the ignition-controlling mechanism, which comprises a switch composed of contact terminals or members 52 and 53 which are normally separated and are included in an electric circuit 54 in which a source of potential and the spark-plugs 24 and 28 are included, it being understood that the engine-frame serves as a conductor, as well understood in the art. A lever 54^a is pivotally sustained as at 55, and is disposed to press switch-member 52 into contact with switch-

member 53 to close the ignition-circuits. Lever 54 is operated by a trip-lever 56 which in turn is operated by an abutment 57 on stem 51. During the opening movement of valve 42, abutment 57 will pass over the trip-lever 56, the latter being free to swing for that purpose. During the closing stroke of valve 42, abutment 57 will engage trip-lever 56 which in turn will operate lever 54 to spring the switch-members into contact. As abutment 57 rides off of or beneath trip-lever 56, lever 54 will be restored to its normal position by a spring 58. Such closing and opening of the circuit will render the spark-plugs operative to ignite the combustible fluid in the chambers in which they are located.

Governor mechanism is provided for automatically controlling the admission of compressed fluid to the chamber 36 and comprises a collar 60 secured to and rotating with turbine-shaft 14, weighted arms 61 pivoted to said collar, as at 62, and connected to collar 60 by spring 63 against which the said centrifugal force acts, links 64 connecting arms 61 and a collar 65 which is slidably connected to shaft 14 and is operated inwardly by the weighted arms, under the influence of the centrifugal force upon said arms. A plunger 66 is fitted in the bore of shaft 14 and is adjustably connected by a screw 67 to a yoke 68 which is secured to collar 65. Resultantly, as the speed of the engine increases the weighted arms 61 will swing outwardly by reason of centrifugal force, and such movement of the weighted arms will cause the plunger 66 to move inwardly and cut off the passage of fluid through openings 35 in shaft 14, in degree corresponding to the movement of the weighted arms and speed of the engine.

The invention is not to be understood as restricted to the details set forth since these may be modified by the skilled mechanic within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. In an explosive engine, the combination of a casing, an impact-wheel in the casing, a combustion chamber, ignition-means, a centripetal pump driven by the engine for compressing the fluid, a pump-shaft having a passage therein for the compressed fluid, and means for conducting the compressed fluid from said passage to the combustion-chamber.

2. In an explosive engine, the combination of a casing, an impact-wheel in the casing, a shaft to which the wheel is secured having a passage therein, a combustion-chamber, ignition means, a rotary pump comprising a piston secured to said shaft and

forcing fluid into said passage, a valve operating in said passage for controlling supply of compressed fluid to the combustion-chamber, and valve operating mechanism operated by said shaft.

3. In an explosive engine, the combination of a casing, an impact-wheel, a combustion-chamber, a pump driven by the engine, for compressing the fluid supplied to the combustion-chamber, a jet in the casing for directing the motive agent from the combustion-chamber against the impact-wheel, and an air-duct around said jet and opening into the combustion chamber, for supplying air to the agent impacted against the wheel.

4. In an explosive engine, the combination of a casing, an impact-wheel, a combustion-chamber, a rotary pump driven by the engine, for compressing the fluid supplied to the combustion-chamber, a jet in the casing for directing the motive agent from the combustion-chamber against the impact-wheel, and an air-duct around said jet, for supplying air to the agent impacted against the wheel.

5. In an explosive engine, the combination of a casing, having explosion-pockets therein, an impact-wheel, a combustion-chamber, a pump driven by the engine, for compressing the fluid supplied to the combustion-chamber, a jet in the casing for directing the motive agent from the combustion-chamber against the impact-wheel, and an air-duct around said jet, for supplying air to the agent impacted against the wheel.

6. In an explosive engine, the combination

of a casing, an impact wheel, a combustion-chamber, an ignition-device for the combustion-chamber, means for directing the combustible agent against the impact wheel, and an auxiliary device for igniting the fluid in the impact-wheel.

7. In an explosive engine, the combination of a casing, an impact wheel, a combustion-chamber, an ignition-device for the combustion-chamber, means for directing the combustible agent against the impact-wheel, an air-inlet around said means, and an auxiliary device for igniting the fluid in the impact-wheel.

8. In an explosive engine, the combination of a casing, an impact wheel, a combustion-chamber, an ignition-device for the combustion-chamber, means for directing the combustible agent against the impact-wheel, an air-inlet around said means, said casing having expansion-pockets therein, and an auxiliary device for igniting the fluid in the impact-wheel.

9. In an explosive engine, the combination of a casing, a rotary impact wheel, a combustion chamber, a jet for directing fluid from the combustion chamber against the impact-wheel, an ignition device, and compression means, said casing having expansion-pockets therein for the fluid in the impact-wheel.

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