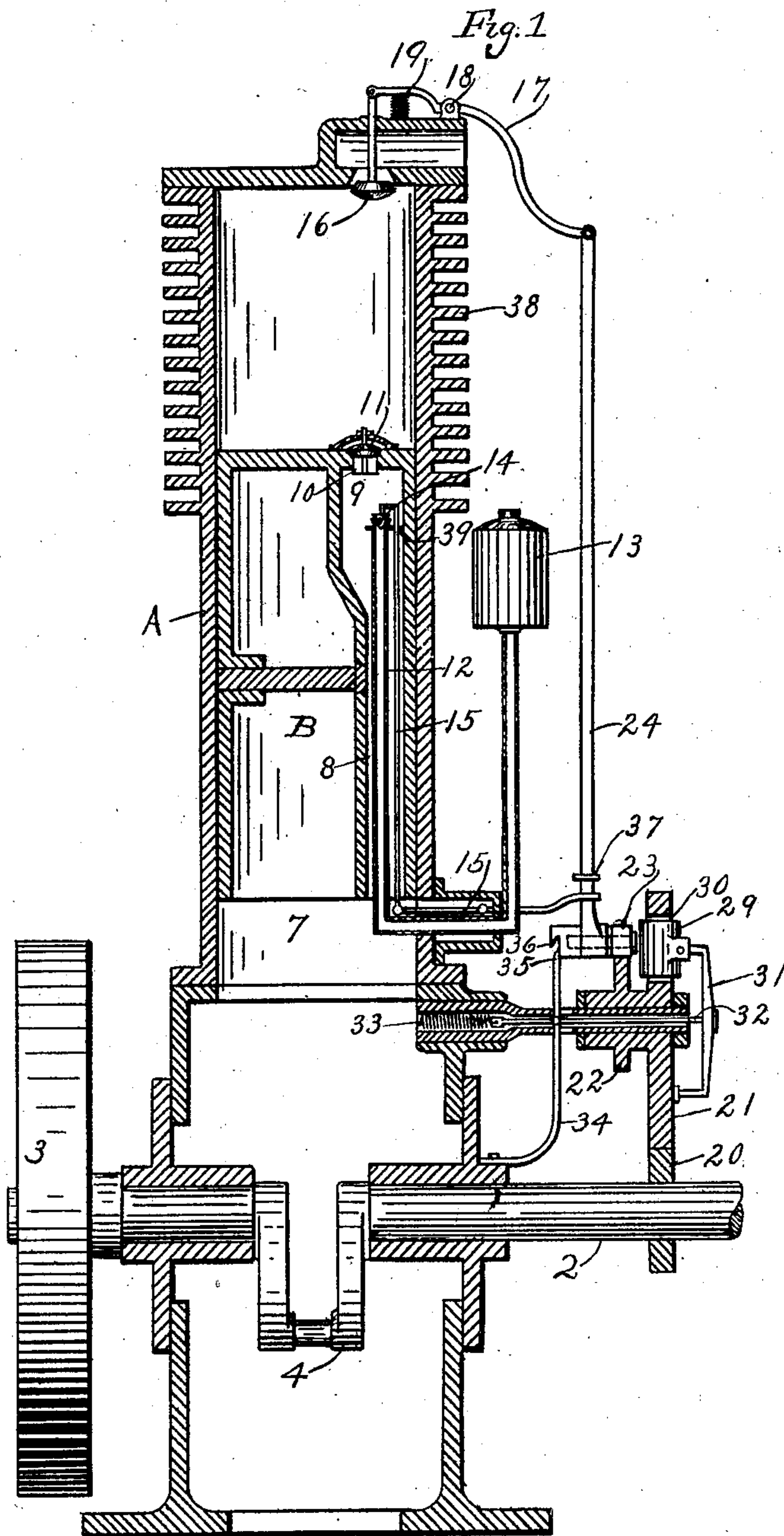


V. ST. JOHN.  
EXPLOSIVE GAS ENGINE.

(Application filed May 8, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

Willis L. Riley.  
H. L. Thawald.

Inventor:

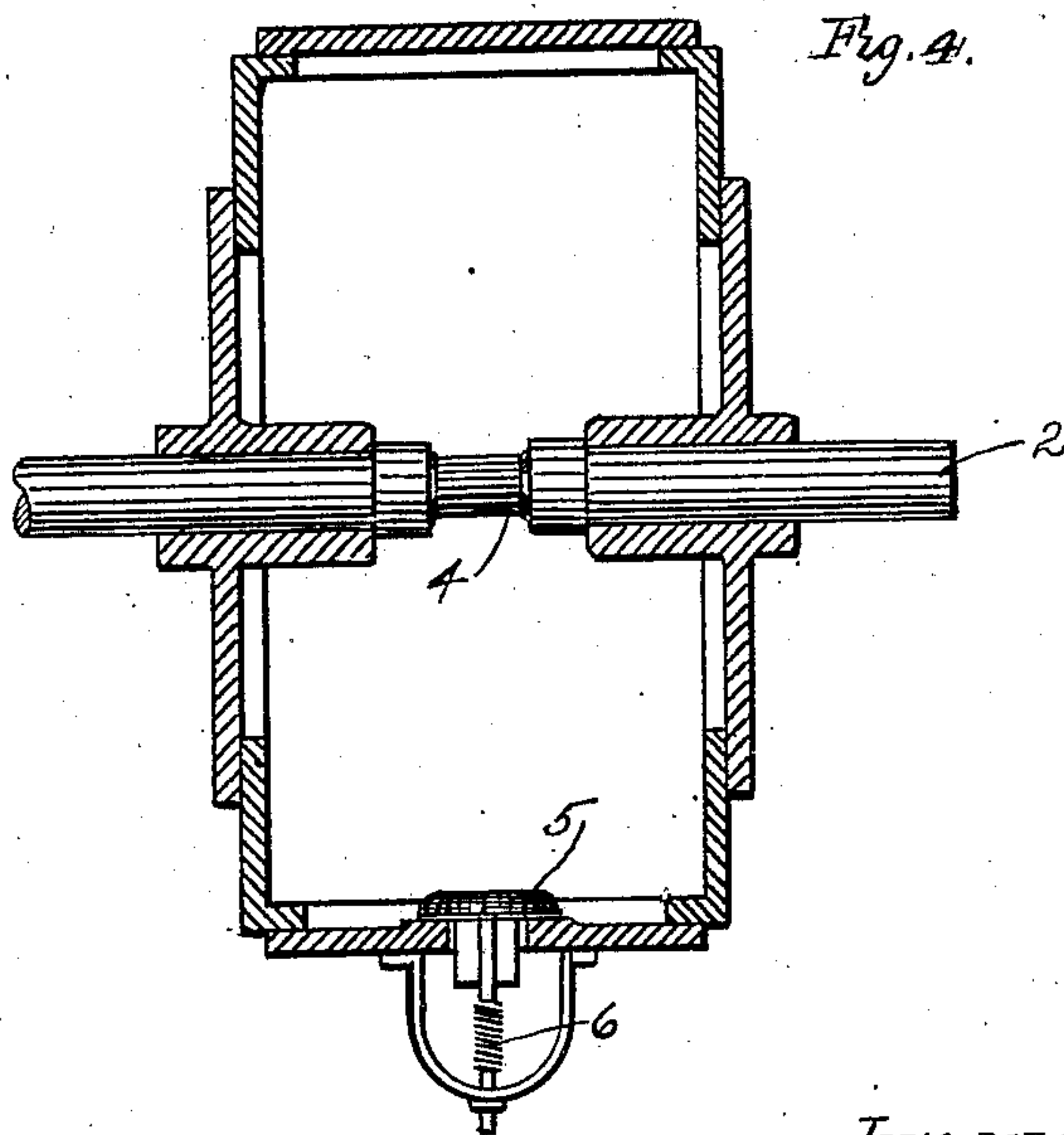
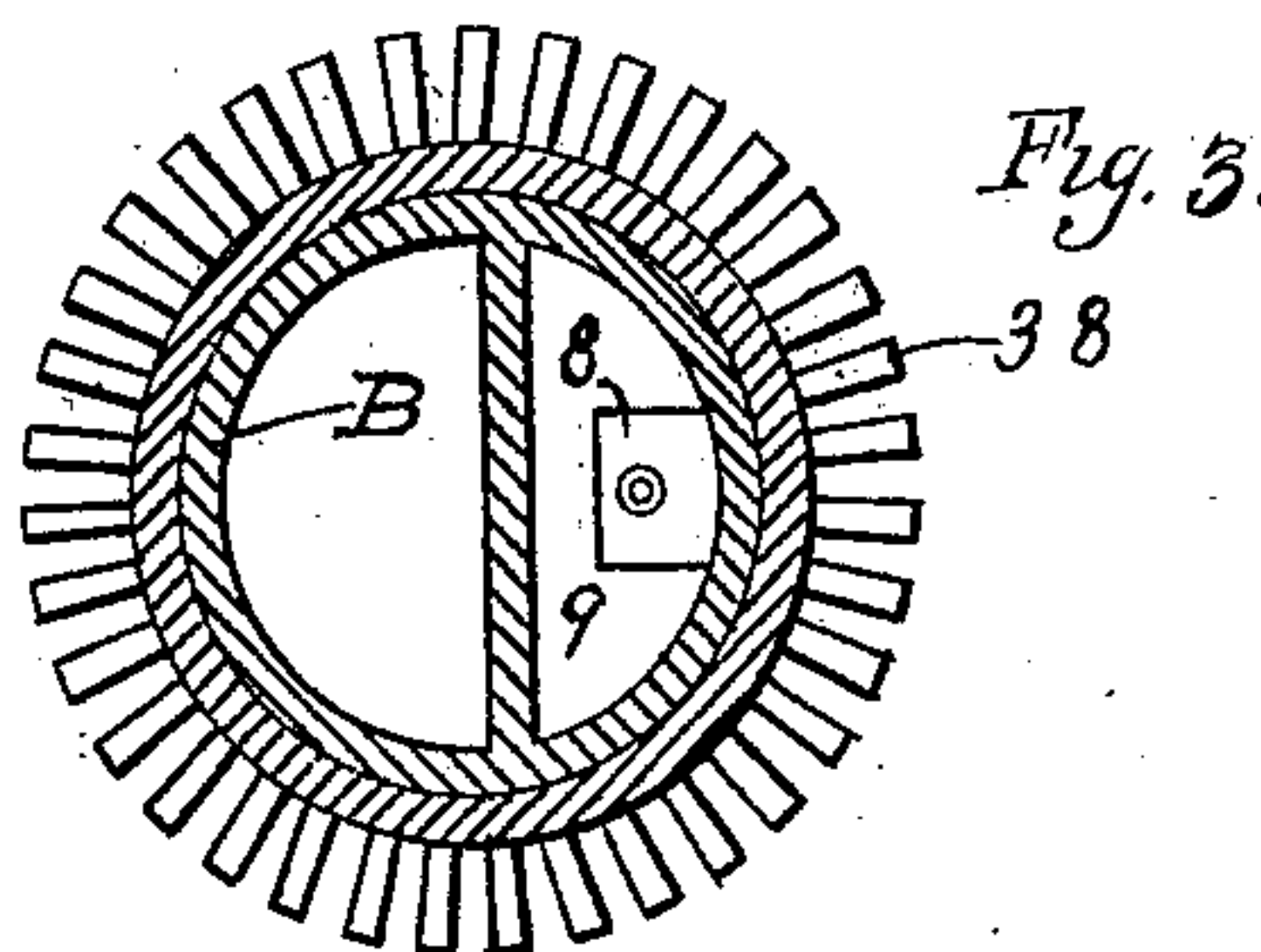
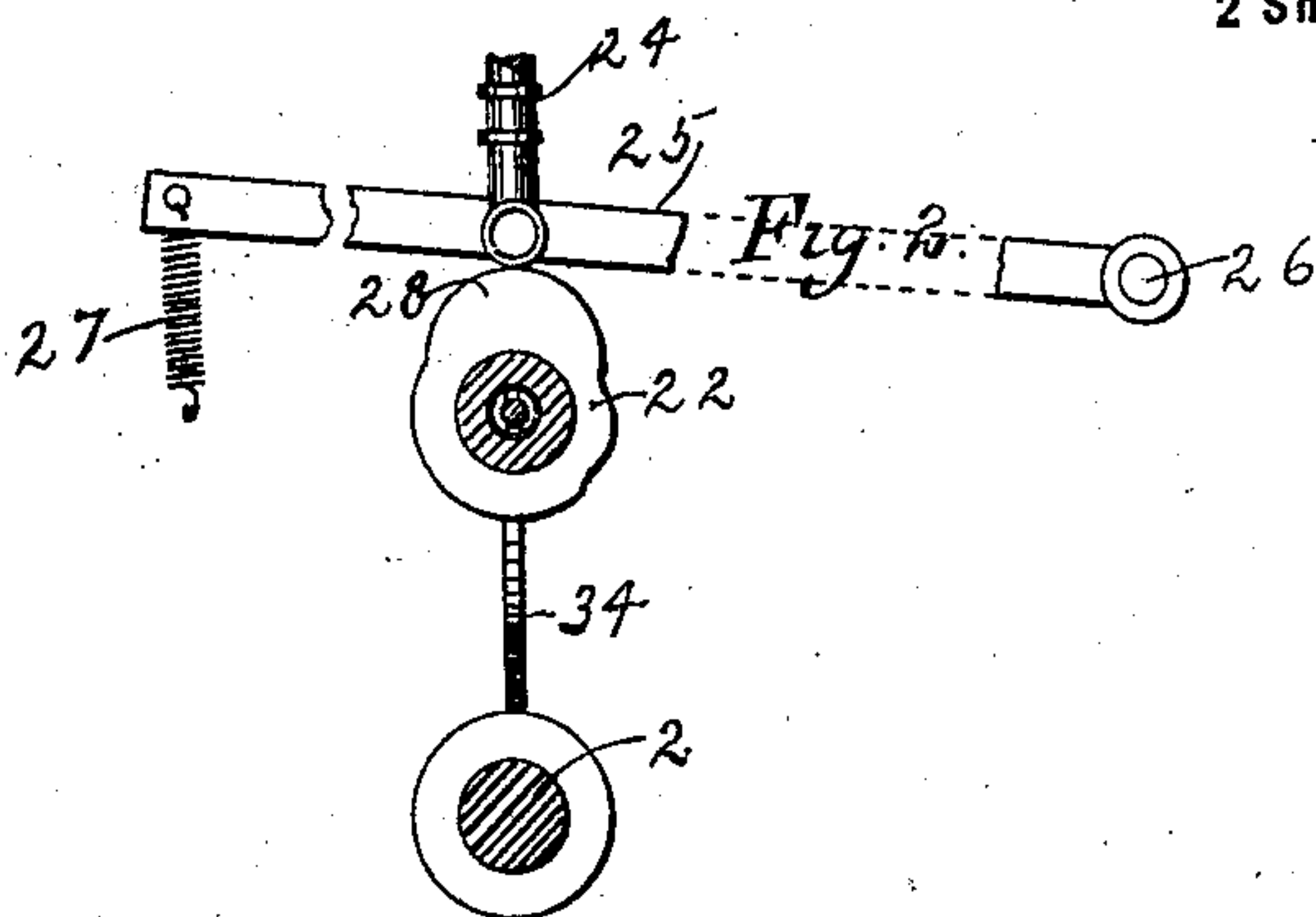
Victor St. John.  
per: Myron D. Atrop & Johnson.  
Attorneys.

V. ST. JOHN.  
EXPLOSIVE GAS ENGINE.

(Application filed May 8, 1899.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:

Willis J. Riley:  
O. L. Phauwald.

Inventor:

Victor St. John.  
per: Merwin Lockrop & Johnson  
Attorneys.



# UNITED STATES PATENT OFFICE.

VICTOR ST. JOHN, OF FAIRMONT, MINNESOTA.

## EXPLOSIVE-GAS ENGINE.

SPECIFICATION forming part of Letters Patent No. 683,152, dated September 24, 1901.

Application filed May 8, 1899. Serial No. 716,073. (No model.)

*To all whom it may concern:*

Be it known that I, VICTOR ST. JOHN, of Fairmont, Martin county, Minnesota, have invented certain Improvements in Explosive-Gas Engines, of which the following is a specification.

My invention relates to improvements in the construction of explosive-gas engines; and it consists in the features of construction and combination hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of a gas-engine embodying my improvements. Fig. 2 is a view of part of the operating mechanism. Fig. 3 is a cross-section on line *xx* of Fig. 1. Fig. 4 is a section on line *yy* of Fig. 1 with the fly-wheel removed.

In the drawings, A represents the cylinder of the gas-engine, and 2 the crank-shaft, upon which is mounted the fly-wheel 3. The crank portion 4 of the shaft, as shown in Fig. 1, is entirely inclosed within the base of the engine. The base of the engine is provided with an air-inlet valve 5, held to its seat by suitable springs 6. Arranged in the cylinder 7 of the engine above the crank is the piston B. For the purposes of my invention I form the piston with a vertical passage 8, the upper end 9 of which is enlarged and communicates with the space above by an opening 10, normally closed by a gravity-valve 11. Said passage 8 is connected by means of a pipe 12 with the gasoline-reservoir 13, arranged on the outside of the engine. The gas-inlet pipe 12 is closed by a gravity-valve 14, supported on the rods 15 and which are actuated to open the valve in the manner hereinafter described. Arranged in the top of the engine is the exhaust-valve 16, supported by the lever 17, having fulcrum support 18 upon the top of the engine, a spring 19 being provided which tends to hold the valve closed. The lever 17 is actuated to close and open the valve by the following-described parts: Mounted upon the crank-shaft 2 is the gear 20, which intermeshes with a gear 21, journaled above the crank-shaft, as shown in Fig. 1. Upon the inner side of the gear 21 is a cam 22 of the shape shown in Fig. 2. Said cam engages with a roller 23, carried by the lower end of

the rod 24, the upper end of the rod being connected with the exhaust-valve supporting-lever 17. The lower end of said rod 24 is supported upon the lever 25, one end of which has journal support 26 and the other end spring connection 27 with the framework of the engine, the point of connection not being shown. It will be evident that as the gear 21 is rotated in the operation of the engine and the projecting portion 28 of the cam is brought into contact with the roller 23 the rod 24 will be raised, opening the exhaust-valve, and as the projecting portion of the cam is carried past the roller the rod 24 will be allowed to drop, permitting the spring 19 to carry the exhaust-valve to closed position.

The speed of the engine is governed in the following manner: A weight 29 is arranged in an opening 30 in the gear 21 and is supported upon a lever 31, the other end of which lever bears upon the face of the gear. Said lever is loosely mounted upon the rod 32, which passes through the hollow gear-supporting shaft and is held inward by means of a coil-spring 33. Extending transversely through the hollow shaft is a spring 34, secured at its lower end to the frame of the engine and having its upper end 35 beveled to engage with the grooved contact 36, which is carried by the lower end of the rod 24, thus forming a knife-contact. The spring 34 is connected with the rod 32, so as to be actuated in the movement thereof. The spring 34 is normally held away from the contact 36 by means of the spring 33. As in the operation of the engine the speed of the gear 21 increases, the governor-weight 29 is thrown outward by centrifugal action, carrying with it the rod 32 and carrying the knife-contact 35 into engagement with the contact 36. In Fig. 1 the parts are shown in this position. If the spring-contact 35 is carried under the projecting edge of the contact 36 when the exhaust-valve is opened by means of the cam 22 raising the rod 24, the exhaust-valve will be then held open until the projecting portion of the cam again comes in contact with the roller, for the reason that the roller drops after passing the projecting portion of the cam and allows the contacts 35 and 36 to interlock. As each revolution of the cam raises the roller 23 sufficiently to disengage the knife-contacts, the



spring-contact 34 will be drawn back to dis-  
engaged position as soon as the speed falls  
enough. This, as will be seen, is the ordi-  
nary hit-or-miss principle of governing gas-  
5 engines. The valve 14, closing the gasoline-  
pipe, is actuated to allow an inflow of gas by  
means of the collar 37, mounted upon the rod  
24. A suitable spring (not shown) may be  
used to normally hold said valve in closed po-  
10 sition. Upon the outside of the engine-cyl-  
inder are formed series of projections 38, the  
purpose of which is to so increase the radiat-  
ing surface as to render unnecessary the use  
of an ordinary water-jacket. That may be  
15 done in other equivalent ways, such as pro-  
jecting corrugations, strips, &c. A plate 39 is  
fitted loosely under the valve 14, forming a  
section to retard the inrushing air and more  
thoroughly vaporize the gasoline.

20 The cycle of the engine is as follows: On  
the upstroke of the piston air is drawn in at  
the valve 5. On the next downstroke the air  
that has been drawn in will be forced through  
the passage 8 and through the valve-opening  
25 10 into the cylinder beyond the piston. As  
the air rushes past the the end of the gasoline-  
pipe it will draw the gasoline with it through  
the valve. On the next upstroke of the pis-  
ton the charge is compressed and exploded in  
30 the usual manner. The next downstroke of  
the piston will therefore be the working  
stroke. As the piston reaches the lower end  
of the working stroke the air below the pis-  
ton, which is compressed, raises the valve 11  
35 in the piston and passes into the cylinder,  
cleaning out the burned gases and cooling the  
cylinder.

It will be noticed that the cam is so shaped

that the roller 23 will be given a downward  
movement immediately after the upward 40  
movement which opens the exhaust, this down-  
ward movement opening the gasoline-inlet  
valve by reason of the engagement of the  
collar 37 with the lever-rod 15.

I claim—

1. A gas-engine of the class described, com- 45  
prising the cylinder, the piston working in  
said cylinder, its actuating-crank, the passage  
in said piston, the pipe connecting said pas-  
sage with the source of gas-supply, and the 50  
valve arranged in said piston between said  
passage and the interior of the cylinder,  
whereby upon the working stroke of said pis-  
ton the rushing of the air through said pas-  
sage and valve will carry the gas into the 55  
cylinder.

2. A gas-engine of the class described, com-  
prising the cylinder, the piston working there-  
in, its actuating-crank, the passage through 60  
said piston, the valve normally closing said  
passage, the gas-inlet pipe leading from said  
passage to a source of supply, the valve clos-  
ing said pipe, the exhaust-valve for the cyl-  
inder, the gear driven from the main crank- 65  
shaft, and the cam carried by said gear and  
operatively connected with the exhaust-valve  
and inlet-pipe valve, and so constructed as  
to open the exhaust-valve, and to open the  
valve closing the inlet-pipe when the exhaust-  
valve is carried to closed position. 70

In testimony whereof I affix my signature  
in presence of two witnesses.

VICTOR ST. JOHN.

Witnesses:

C. N. PETERSEN,  
MAUD FELHAN.