

(No Model.)

E. NARJOT.
GAS ENGINE.

No. 448,989.

Patented Mar. 24, 1891.

Fig. 1.

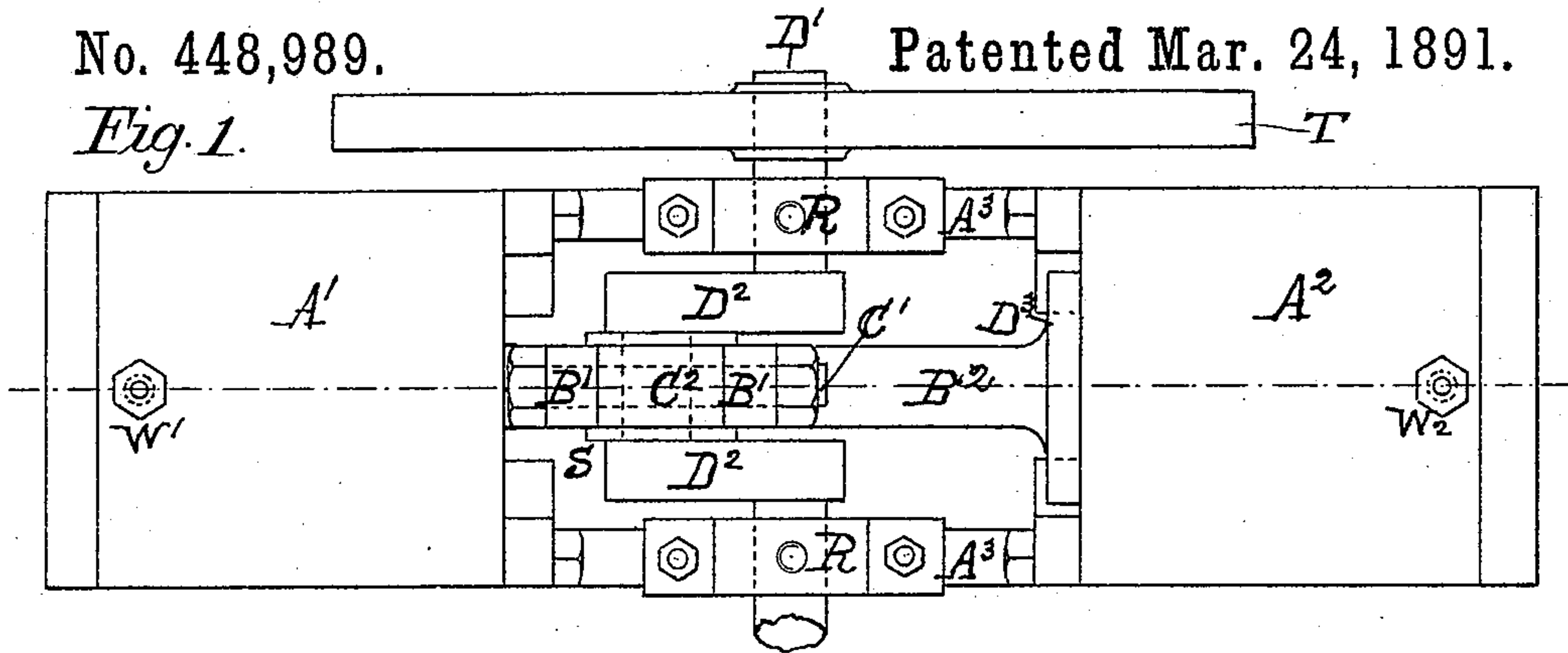


Fig. 2.

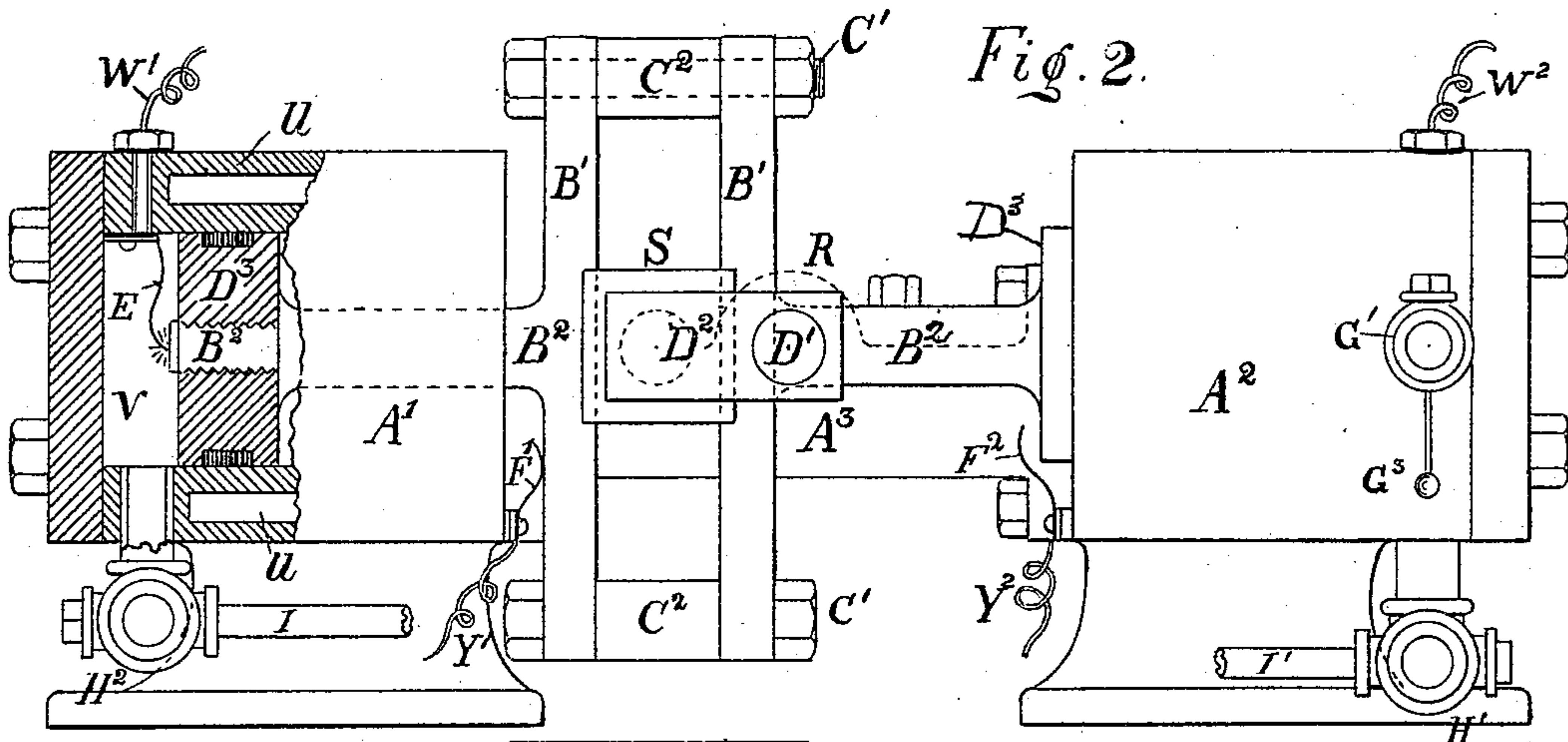
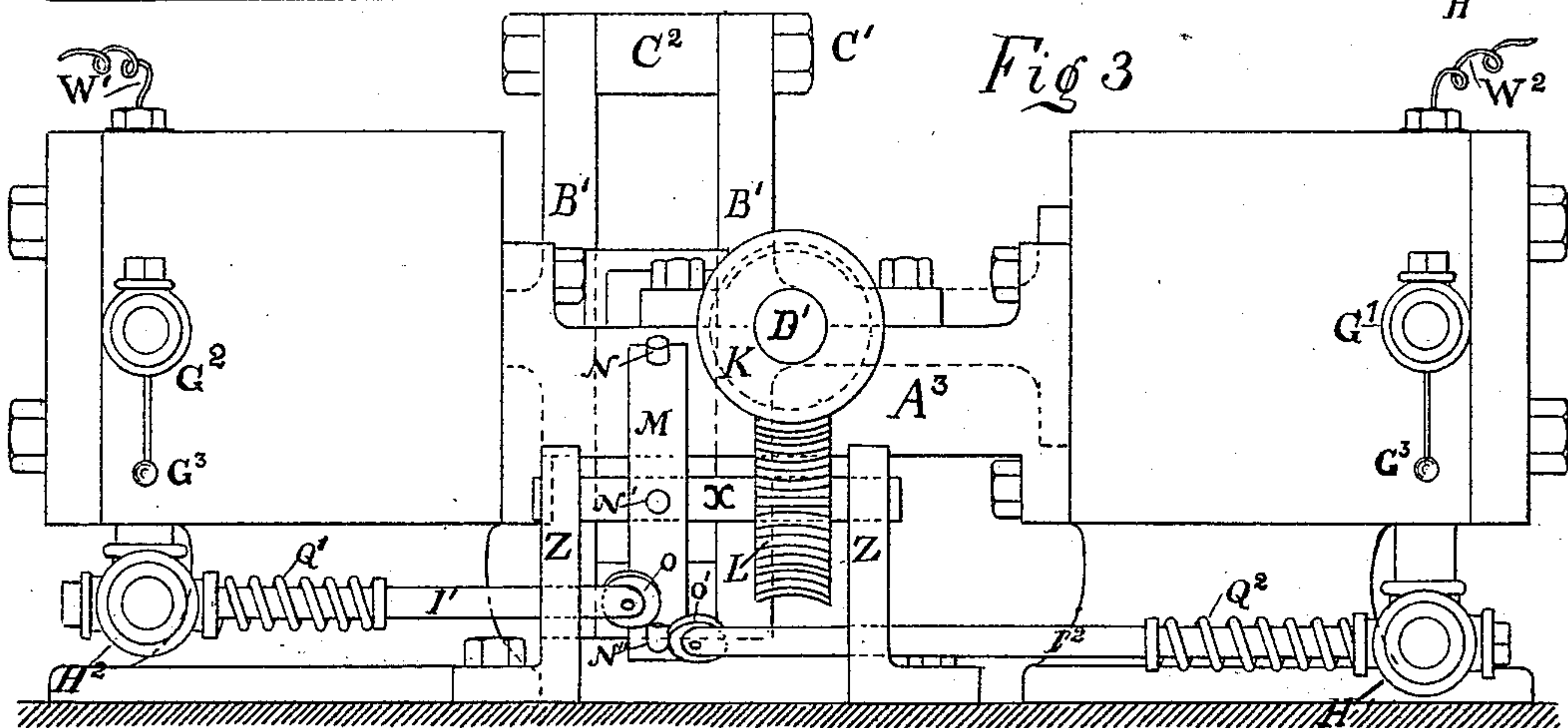


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

ERNEST NARJOT, OF SAN FRANCISCO, CALIFORNIA.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 448,989, dated March 24, 1891.

Application filed November 20, 1890. Serial No. 372,046. (No model.)

To all whom it may concern:

Be it known that I, ERNEST NARJOT, of the city and county of San Francisco, State of California, have invented certain new and useful

5 Improvements in Gas-Engines; and I hereby declare the following to be a full, clear, and exact description of the same, such as will enable others to make and use my improvements.

10 My invention relates to what are called "gas-engines," deriving their force from the combustion of gas mingled with air in such proportion as to produce the best effect and utilize the greatest expansive force, and especially to means for distributing the power thus derived within a small space and with short intermission between the impulses given to the pistons; also to an improved method of ignition by means of an electric spark.

20 My invention consists in the employment of two open-ended cylinders, two shortly-connected pistons with a driving-yoke between to communicate rotary motion to a crank-shaft in the center; also the employment of tangent gearing connected with the crank-shaft, operating a rotary disk or wheel provided with tappets to open the exhaust-valves in such time and relation as is required.

Referring to the drawings, Figure 1 is a partial plan view taken on top of my improved engine, showing the crank, fly-wheel, and other details in a horizontal plane. Fig. 2 is a side view of the same, partially in section, and with the exhaust-valve gearing omitted; and Fig. 3 is another side view showing the exhaust-valve gearing in front.

Similar letters of reference on the different figures indicate corresponding parts of the engine.

40 The operation of my improved gas-engine is the same as others of its class, an impulse being given to the pistons at alternate backward strokes, every other forward stroke being employed to expel the vapor and residuum of the burned gases and the next backward stroke to draw in the required charge of gas and air.

50 The two cylinders A^1 and A^2 are joined by a strong strut A^3 , on which is mounted the crank-shaft D^1 , supported in bearings R . The crank D^2 is formed solid with the shaft D^1 , and is driven by a yoke and sliding bearing, as shown in Figs. 2 and 3. This yoke is formed

of the members B^1 , formed integrally with the piston-rods B^2 , and connected together by bolts C^1 and distance-pieces C^2 . The bearing-block S slides up and down in the yoke, permitting reciprocation in a straight line of the piston-rods B^2 , and produces rotative movement of the crank-shaft D^1 in the usual manner of such gearing. A fly-wheel T is employed to equalize the motion and provide for the irregularity of the explosive force on the pistons and crank.

The cylinders A^1 and A^2 are open at one end and surrounded by an annular chamber 65 U , Fig. 2, through which water is circulated to prevent the heat from rising to an injurious point. At alternate back-strokes of the piston D^3 gas and air are drawn in through the inlets at G^1 and G^2 , which on return of the piston is compressed in the chamber V , Fig. 2, at the end of the cylinder A^1 , and is there ignited by an electric spark generated in the following manner: W^1 and W^2 are conducting-wires connected to the negative 75 pole of a galvanic battery. Y^1 and Y^2 are wires connecting to positive poles of the same battery. These wires W^1 and W^2 are led into the cylinder by insulated pins or screws X^1 and X^2 , connecting to a deflecting spring 80 or electrode E . The other wires Y^1 and Y^2 are connected to two similar electrodes F^1 and F^2 at the inner ends of the cylinders. When the piston D^3 moves forward, the member B^1 comes in contact with the electrode F^1 , 85 as shown in Fig. 2, at the same time the end of the piston-rod B^2 comes in contact with the electrode E , and a current is established through this circuit, the electrical current following the shortest line, and no insulation 90 being required for the piston-rod B^2 . When the piston D^3 moves back, there is caused an electrical spark which fires the mingled gas and air contained in the chamber V , giving a powerful force on the piston D^3 . This cycle 95 of operations is the same in each cylinder, so that the crank-shaft D^1 receives an impulse at each alternate half of its revolution. The burned gases are exhausted through the valves H^1 and H^2 , which are opened positively 100 at each alternate stroke of the piston in the following manner: On the crank-shaft D^1 is fastened a worm or screw pinion K , meshing into the tangent wheel L on the shaft or

spindle X, supported in bearings Z. On this shaft X is fastened a disk M, having in its periphery pins or tappets N, that engage alternately the rollers O and O' on the ends of the rods I' and I². These rods, when moved endwise by the tappets N, open the exhaust-valves H' and H², permitting the escape of the burned gases from the cylinders A' and A² in regular sequence of the explosions and rotation of the shaft D'. When the tappets N pass or disengage the rollers O and O', the valves H' and H² are closed by the action of the springs Q' and Q².

The inlet-valves G' and G² for air and gas act automatically, but are provided with small weights G³, that assist in closing when pressure is removed.

The object of my invention and the arrangement of my engine, as shown, is to provide a more regular application of power, by reason of two cylinders, and to reduce the dimensions of the engine by bringing these cylinders as near together as possible by means of a slotted yoke applied to the crank, as shown; also to simplify the electrical igniting apparatus by electrodes touched by the yoke at its extreme movement each way, as shown in Fig. 2.

In some cases I substitute a pump for one of the cylinders, employing the other one for generating power, the mechanism and operation otherwise remaining the same as shown in the drawings, and hereinbefore described.

Having thus explained the nature and objects of my invention and the manner of constructing the same, what I claim as new, and desire to secure by Letters Patent, is—

1. In a gas-engine, the combination of the open-ended cylinders A' and A², the shaft D', the yoke, and the sliding bearing S, together with the worm-pinion K and tangent wheel L, substantially as described.

2. In a gas-engine, the two open-ended cylinders A' and A², connected by the struts A³, the latter forming bearings for the crank-shaft D,

a crank and yoke to produce rotary motion of the shaft, a worm-pinion K and tangent wheel L to operate the exhaust-valves of both cylinders, operating in the manner and for the purposes substantially as herein set forth.

3. In a gas-engine, the worm-pinion K, tangent wheel L, shaft X, and disk wheel M, the latter provided with tappets N for opening the exhaust-valves H' and H², in positive and proper sequence for the two engines, constructed and operating substantially as shown and described.

4. In a gas-engine, the disk M, provided with tappets N, the rollers O and O', and reciprocating rods I' and I², provided with coil-springs Q' and Q², so arranged that the exhaust-valves H' and H² are opened at the proper point and closed automatically, in the manner substantially as set forth and described.

5. In a gas-engine, the combination of the open-ended cylinders A' and A², connected by the struts A³, the latter forming bearings for the crank-shaft D, a worm-pinion K, tangent wheel L, disk M, and tappets N, together with the yoke-pieces B', electrodes F' and F², and the electrodes E within the cylinder, arranged to make and break the electric circuit at each forward stroke of the piston D³, substantially as described.

6. In a gas-engine, the two open-ended cylinders A' and A², connecting-struts A³, a cranked shaft D' between, a worm-pinion K, and tangent wheel L, the disk M, and tappets N, the whole combined and operating in the manner substantially as shown and specified herein.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

ERNEST NARJOT.

Witnesses:

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