No. 741,064. PATENTED OCT. 13, 1903.

J. A. NICKELSON.

GASOLENE ENGINE.

APPLICATION FILED JUNE 24, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

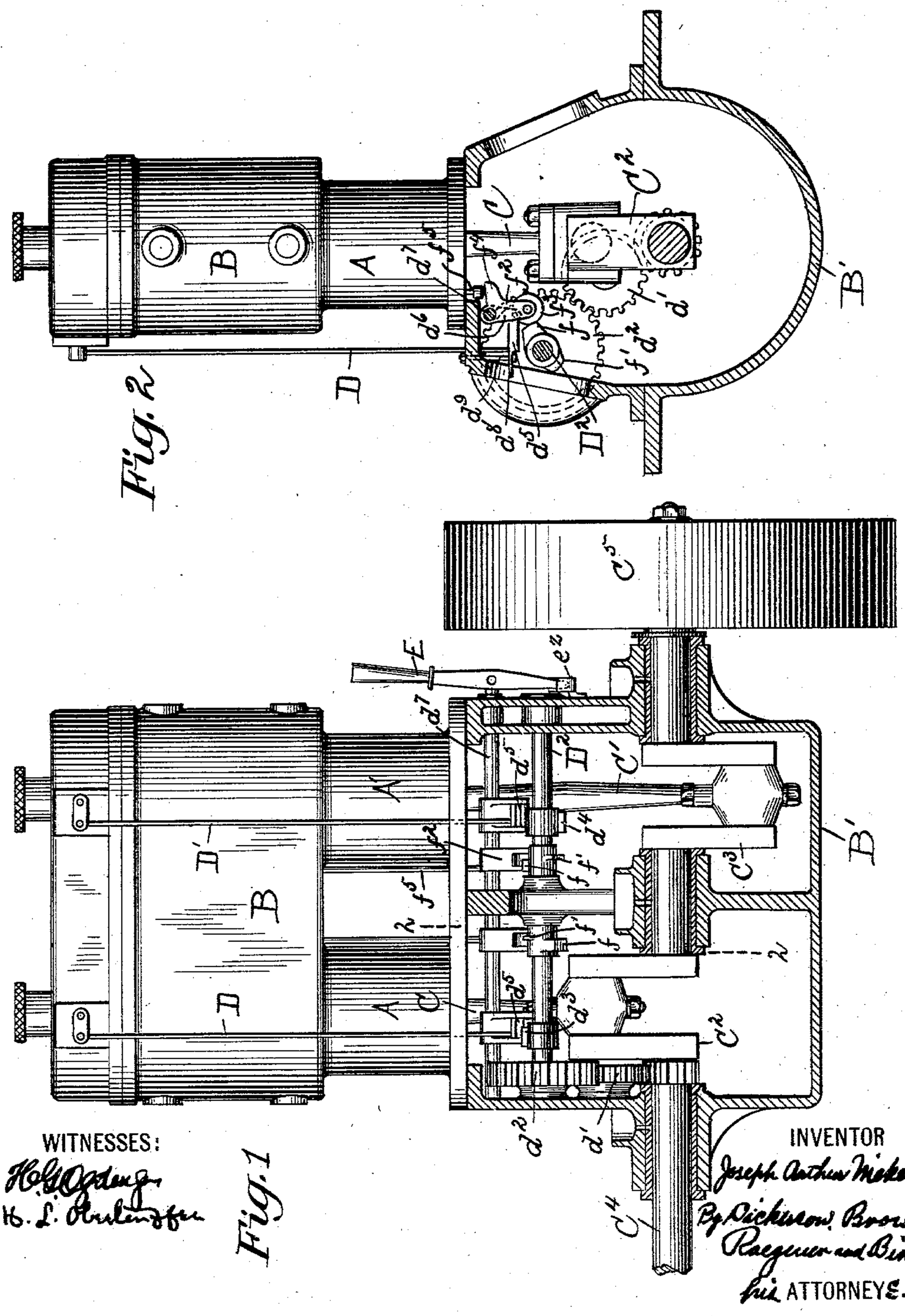

Fig. 2

Fig. 1

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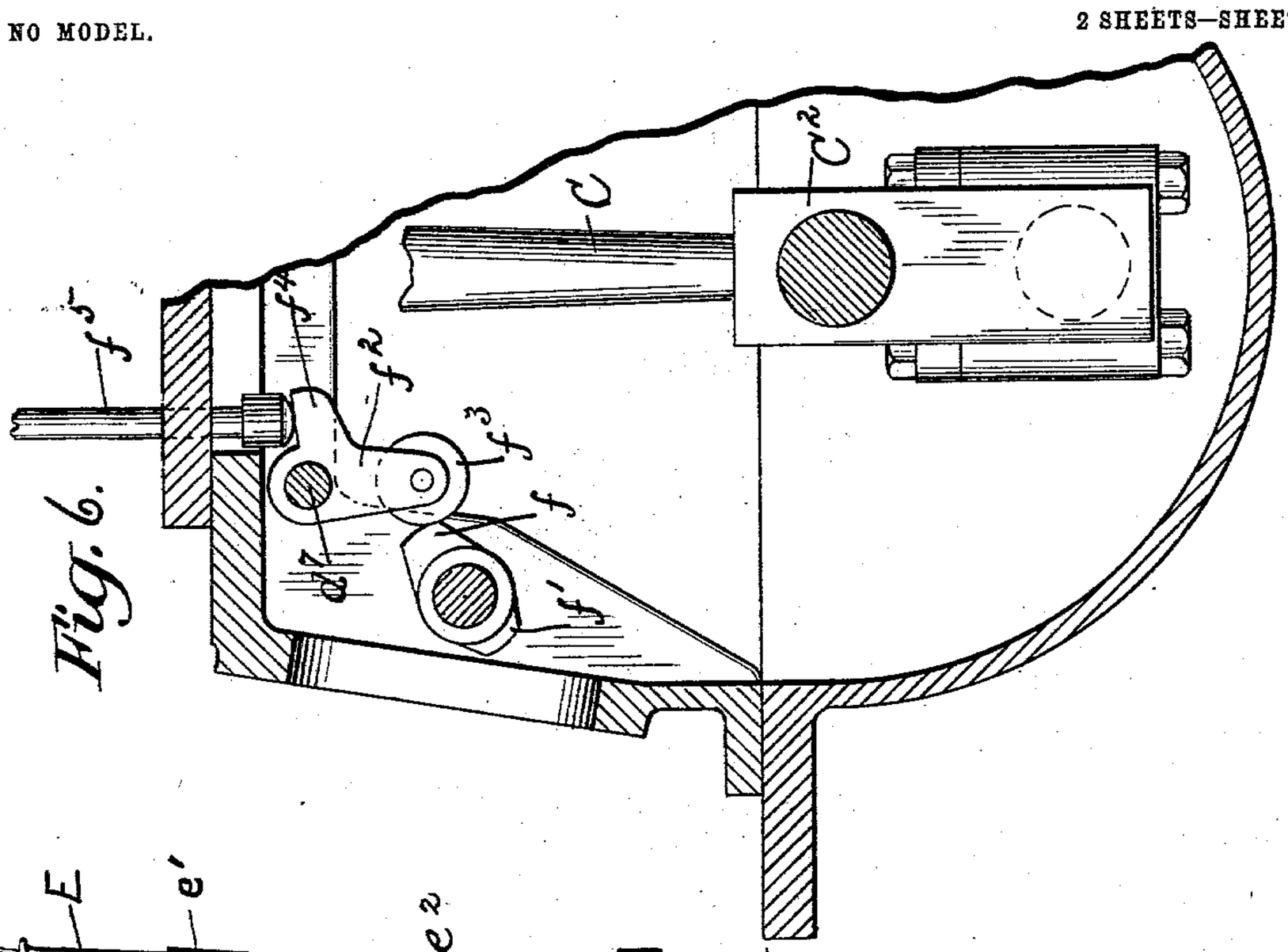

Fig. 6.

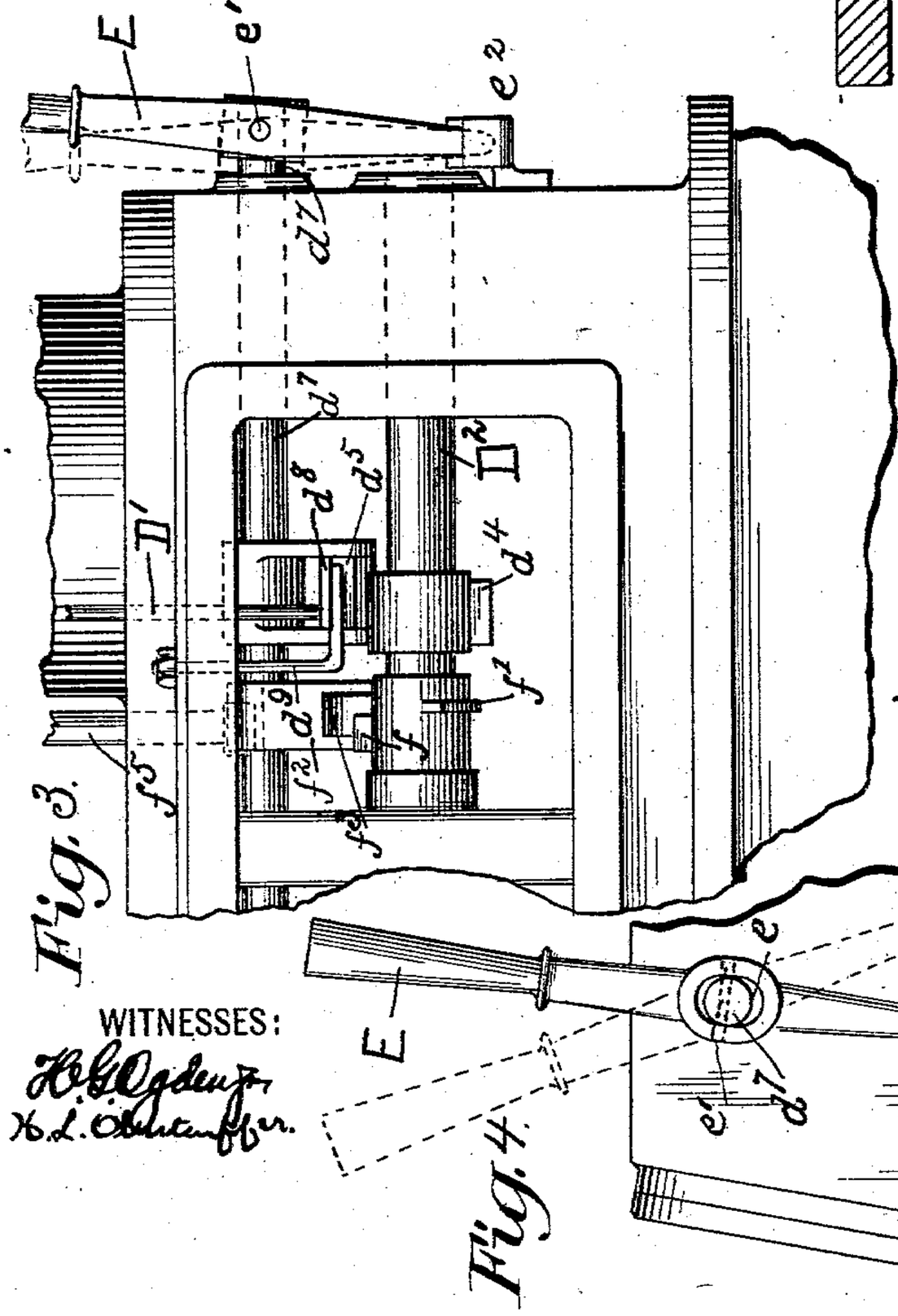

Fig. 4.

Fig. 3.

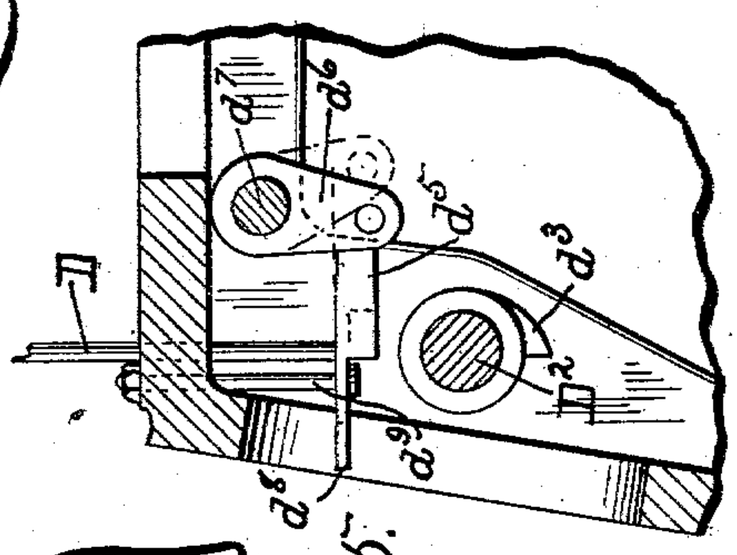

Fig. 5.

WITNESSES:

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No. 741,064. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

JOSEPH ARTHUR NICKELSON, OF NEW YORK, N. Y.

GASOLENE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 741,064, dated October 13, 1903.

Application filed June 24, 1902. Serial No. 113,047. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ARTHUR NICKELSON, a citizen of the United States, residing in the borough of the Bronx, city, county, and State of New York, have invented new and useful Improvements in Gasolene-Engines, of which the following is a specification.

My invention relates to gasolene-engines, and particularly to gasolene-engines of the marine type. I will describe a gasolene-engine embodying my invention and then point out the novel features thereof in a claim.

In the accompanying drawings, Figure 1 is a side view, partly in elevation and partly in vertical section, of a marine gasolene-engine embodying my invention. Fig. 2 is a view partly in elevation and partly in transverse vertical section, the section being taken on the line 2 2 of Fig. 1. Fig. 3 is a detail elevational view of a portion of Fig. 1. Fig. 4 is a detail elevational view. Fig. 5 is a detail sectional view illustrating the sparking mechanism. Fig. 6 is a detail sectional view illustrating the exhaust mechanism. Figs. 3, 4, 5, and 6 are drawn to a larger scale than Fig. 2.

Similar letters of reference designate corresponding parts in all of the figures.

A A′ designate the vertical cylinders of a marine engine, which are closed at their upper ends by a water-jacket B.

B′ designates a chamber or casing the lower portion of which serves to contain cranks C^2 C^3 and the upper portion of which serves to contain mechanism for operating a sparking apparatus and an exhaust mechanism.

C C′ designate piston-rods which are connected with the cranks C^2 C^3, and C^4 a driving-shaft with which the cranks C^2 C^3 are connected.

C^5 designates a balance-wheel for the shaft C^4.

It will be understood that gasolene charges are introduced at the upper ends of the cylinders in the usual manner, and a sparking mechanism of any suitable construction is employed to explode the gasolene charges.

D D′ designate the rods which operate the sparking mechanism, and D^2 a shaft which is rotated by gearing d' d^2 from the driving-shaft C^4. The shaft D^2 carries cams d^3 d^4 for reciprocating the rods D D′. Each cam d^3 d^4 operates upon the outer end of a trip d^5, the inner end of which is connected with a link d^6, secured on a rock-shaft d^7, which also has a limited movement endwise. The outer end d^8 of the trip d^5 is supported by means of a rod d^9, having a horizontally-extending portion.

Referring now to Fig. 5, it will be seen that when the trip d^5 is in the position shown by full lines one of the cams d^3 or d^4 will engage the trip d^5 for a considerable length of time, thereby causing the sparking mechanism to operate after the piston has started on its downstroke. When the trip d^5 is in the position indicated by dotted lines in the said figure, the sparking mechanism will be actuated at an earlier time or approximately when the piston has reached the end of its upstroke. The purpose of changing the time of actuation of the sparking mechanism is to produce different speeds in the engine. It will be readily seen that if the sparking occurs after the piston has started on its downstroke the full force of the explosion will not be obtained, whereas if the sparking occurs approximately when the piston reaches the end of its upstroke or just before the full force of the expansion will be obtained. The shaft d^7 is rocked by means of a lever E, which is pivoted on the end of the shaft d^7 outside of the chamber or casing B′. The pivotal connection between the lever E and shaft d^7 is such that the lever may be employed to either turn the shaft about its axis or to move it lengthwise, and preferably the lever is provided with an opening *e*, into which the end of the shaft d^7 extends, and a pin e' passes through the lever and shaft, as indicated in Fig. 4. The lower end of the lever extends into a socket e^2 on the frame of the engine, and such socket will preferably be of such length that its end walls will serve as stops for the lever to limit the extent to which the shaft may be turned. The socket also serves as a fulcrum for the lever E when the latter is employed to move the shaft d^7 longitudinally.

Referring now to Fig. 4, the position of the lever E indicated in full lines will cause the sparking mechanism to operate after the piston has started on its downstroke, while the position indicated by dotted lines will cause the sparking mechanism to operate at or before the piston reaches the end of its up-

stroke. f f' designate two pairs of cams mounted upon the shaft D^2. The cam f of each pair has a larger actuating-surface than the cam f' of the same pair. The cam f of each pair is also slightly longer than the cam f' of the same pair. Each pair of cams $f f'$ is adapted to actuate a bell-crank lever f^2, which is fulcrumed on the shaft d^7. One arm of the bell-crank lever, f^2, is provided with a roller f^3, with which the cams $f f'$ engage, and the other arm, f^4, is adapted to engage with a rod f^5, connected with the valve controlling the exhaust mechanism for the exploded gasolene charge. The purpose of having the cams $f f'$ of different dimensions is to relieve part of the compression. The cam f' is used when the engine is first started; but after the engine has started the cam f is brought into play, and this cam is used at all times when the engine is operating. The cams $f f'$ are brought into and out of play by moving the shaft d^7 longitudinally, and this movement is produced by means of the lever E, as before described. In starting the engine the small cam is employed. As the piston begins to rise in the cylinder to compress the charge and when it is about half-way up in the cylinder the small cam f' is in operation to hold the exhaust mechanism in such position that the piston will only compress for half of its stroke. This permits of the engine turning over easily. After the engine gains headway the bell-crank lever is then moved so that it will be operated upon by the large cam f.

The engine here shown is of the four-cycle type. At every other revolution the exhaust-valve is lifted for the full stroke, and when the rod is pulled out the exhaust-valve is lifted for half of the compression-stroke.

What I claim as my invention is—

1. In a gasolene-engine, the combination of a sparking mechanism, an exhaust-valve mechanism, a rotary shaft provided with cams, a shaft supported to turn in its bearings and also to move longitudinally therein, devices on said shaft for actuating the sparking mechanism and for actuating the exhaust-valve mechanism and in position to be engaged by said cams, and a single lever connected to said shaft and operative to turn the shaft to change the position of one set of mechanism, and to move said shaft longitudinally to change the position of the other set of mechanism connected with said shaft, whereby their relative times of actuation are varied.

2. In a gasolene-engine, the combination of a sparking mechanism, an exhaust-valve mechanism, a rotary shaft provided with cams, a shaft supported to turn in its bearings and also to move longitudinally therein, devices on said shaft for actuating the sparking mechanism and for actuating the exhaust-valve mechanism and in position to be engaged by said cams, and a single lever connected to said shaft and operative to turn the shaft to change the position of one set of mechanism, and to move said shaft longitudinally to change the position of the other set of mechanism connected with said shaft, whereby their relative times of actuation are varied, a pivotal support for said lever upon the extremity of the said shaft, and a fixed arc-shaped socket adapted to sustain the extremity of the lever and to admit of its oscillation upon the said shaft as a bearing, and of radial movement from said socket with respect to the said shaft to move the same longitudinally.

3. In a gasolene-engine, the combination with a sparking mechanism and an exhaust-valve mechanism, of a rotary shaft provided with cams, a shaft d^7 supported to turn in its bearings and also to move longitudinally therein, devices connected to the latter shaft in position to be engaged by said cams and movable to actuate the sparking and exhaust-valve mechanisms, and a single lever for turning the shaft d^7 and moving it longitudinally to change the position of said devices relative to said cams, whereby the time of actuation of the sparking and exhaust-valve mechanism is varied, substantially as and for the purpose set forth.

4. In a gasolene-engine, the combination with a sparking mechanism and an exhaust-valve mechanism, of a rotary shaft provided with cams, a shaft d^7 supported to turn in its bearings and also to move longitudinally therein, devices connected to the latter shaft in position to be engaged by said cams and movable to actuate the sparking and exhaust-valve mechanisms, a single lever connected to the shaft d^7 and operative to turn it and move it longitudinally to change the position of said devices relative to said cams, and a socket on a fixed support into which one end of the lever projects, substantially as and for the purpose specified.

5. In a gasolene-engine the combination of an exhaust-valve, a movable rod for operating said valve, a rotary shaft, two separated cams of different dimensions on said shaft, a shaft supported to move endwise, a bell-crank lever pivoted on said last-named shaft and movable with it, and means for moving the shaft endwise to bring the bell-crank lever into position to be engaged by either of said cams, comprising a lever connected between its ends to the endwise-moving shaft, and a socket on a fixed support into which one end of the lever projects, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH ARTHUR NICKELSON.

Witnesses:
GEO. E. CRUSE,
H. G. OGDEN, Jr.