

(No Model.)

3 Sheets—Sheet 1.

G. F. EGGERDINGER & G. R. SWAINE.
GAS ENGINE.

No. 561,774.

Patented June 9, 1896.

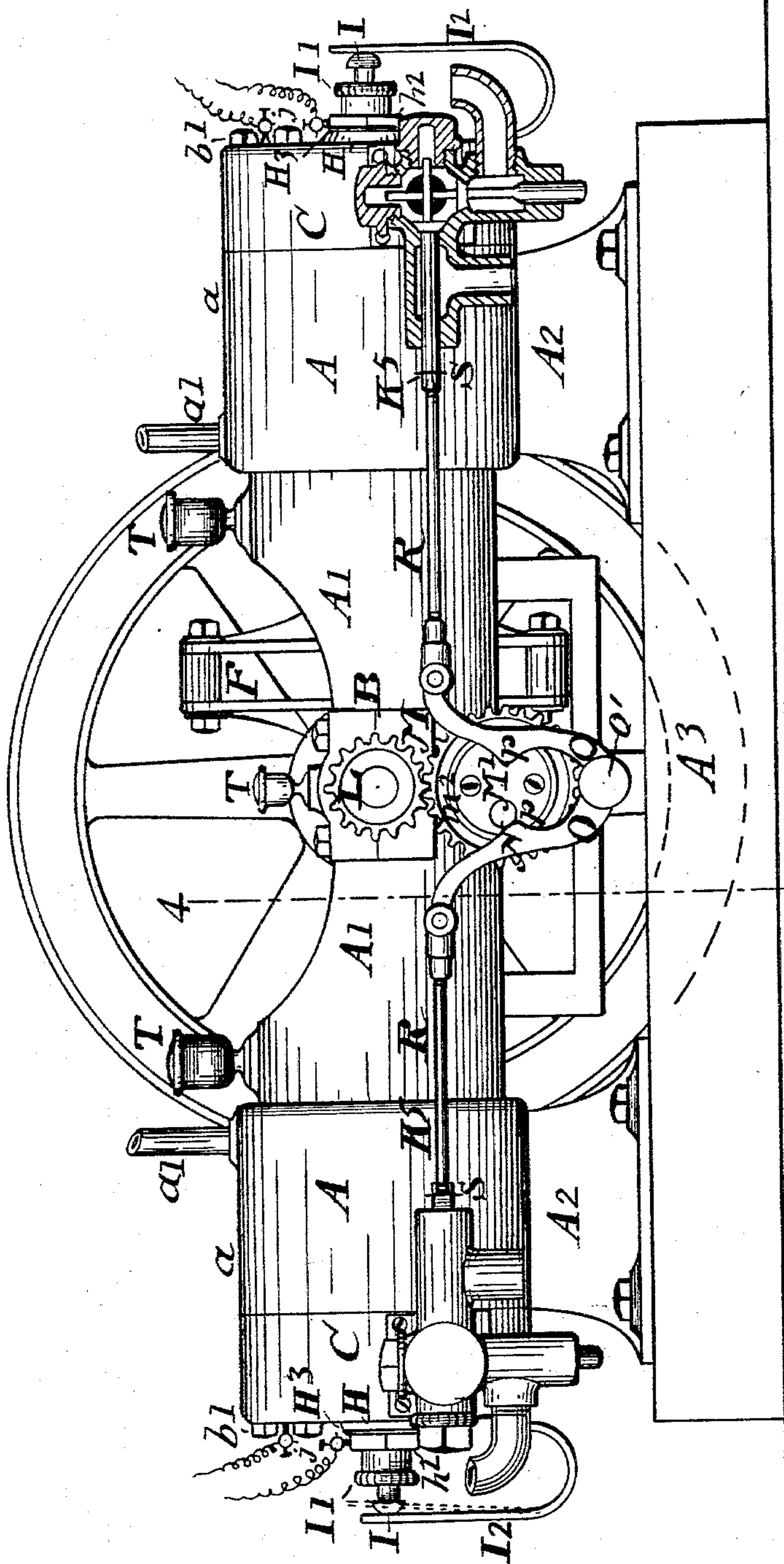


Fig. 1.

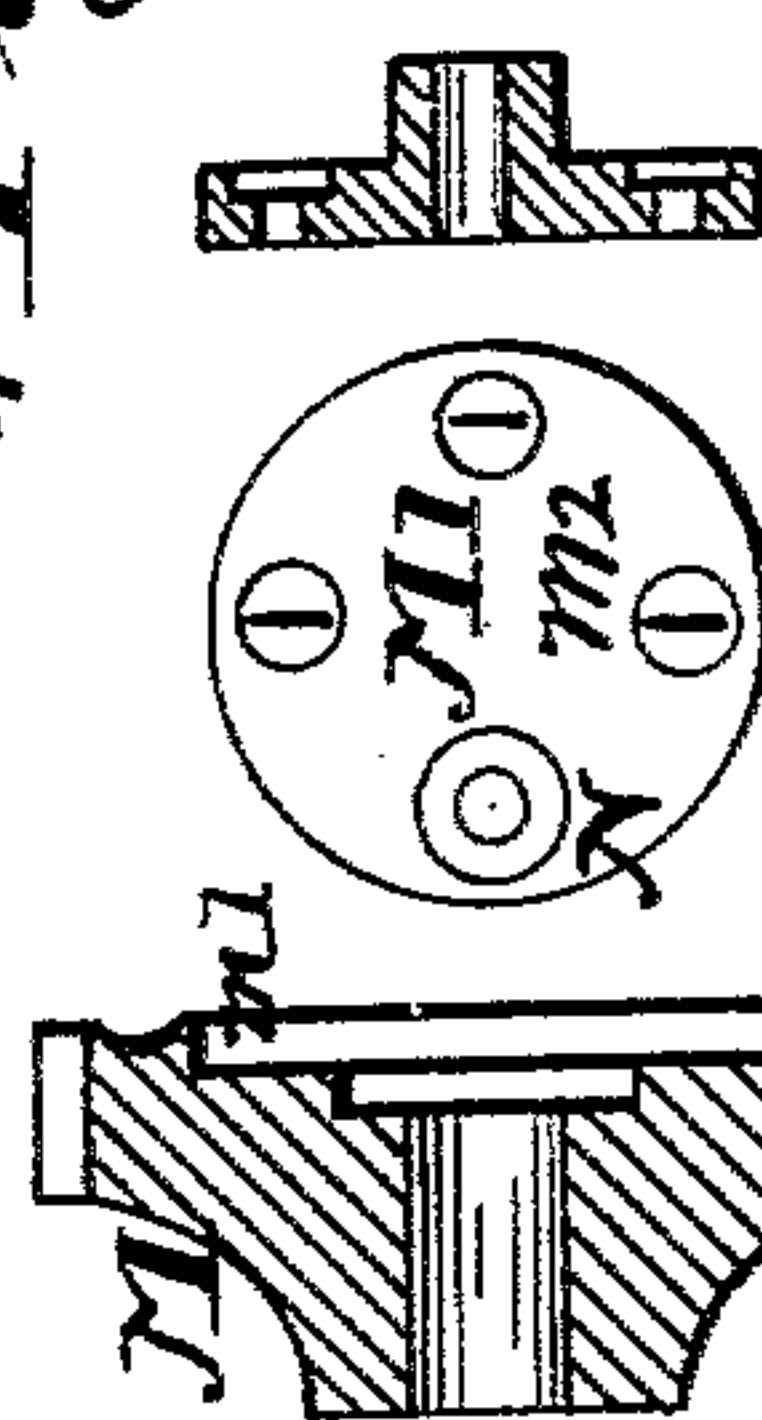
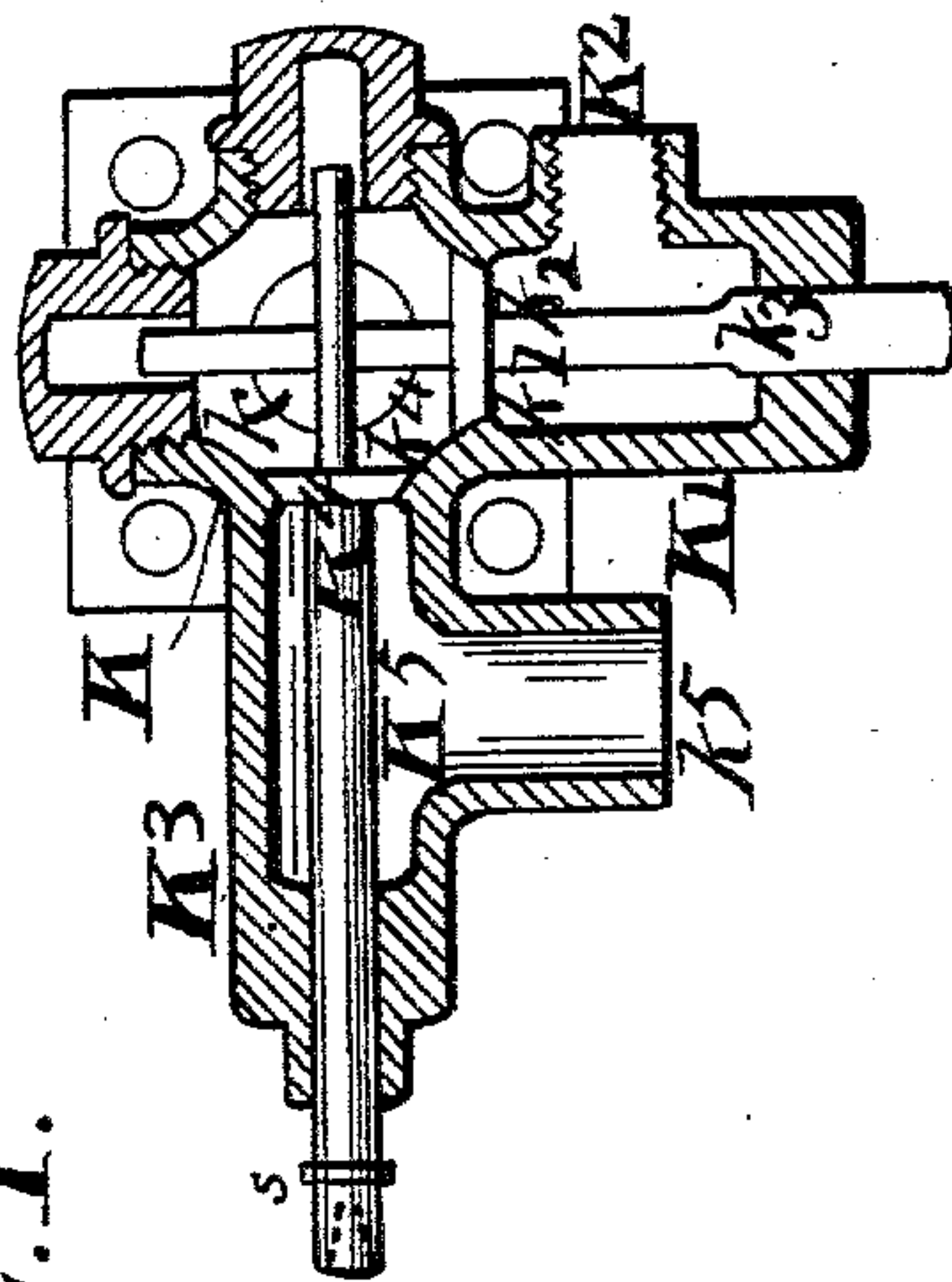


Fig. 9. Fig. 10.

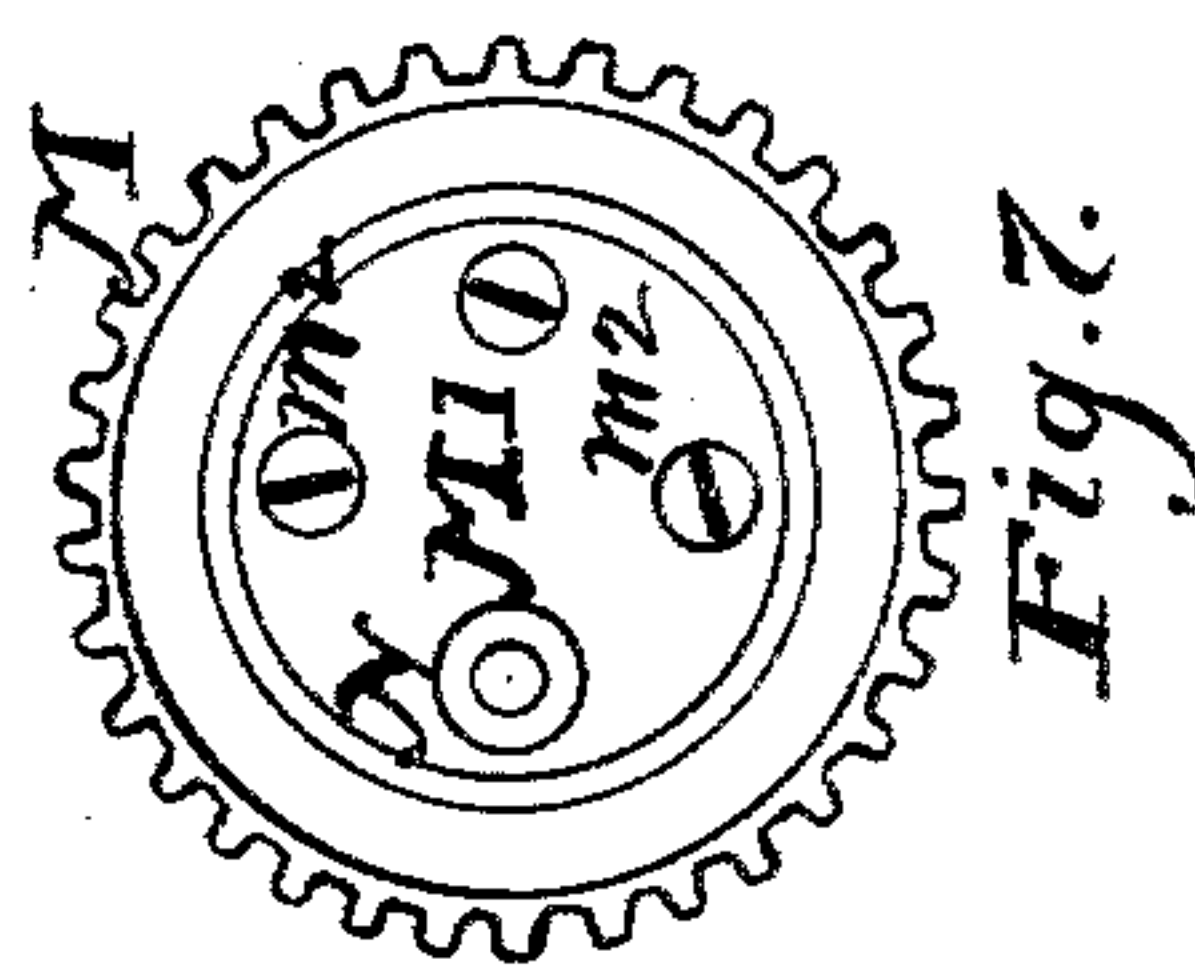


Fig. 8

Fig. 7.

Witnesses,

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Inventors.

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3 Sheets—Sheet 2.

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GAS ENGINE.

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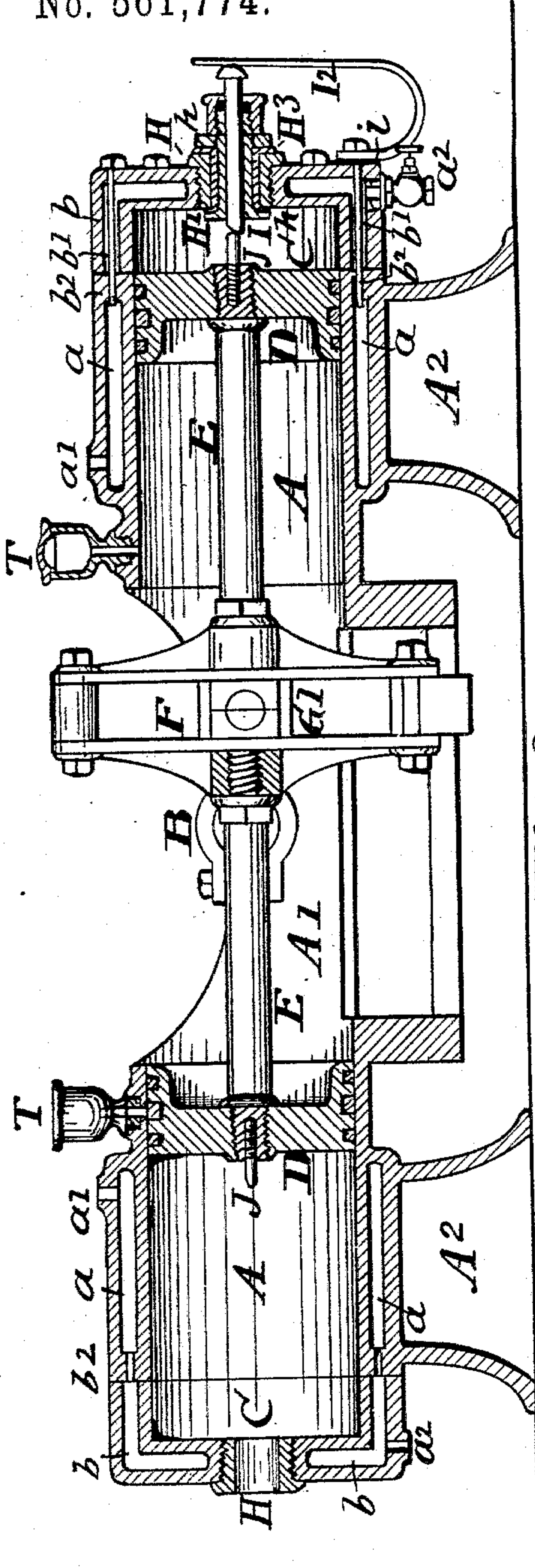


Fig. 3.

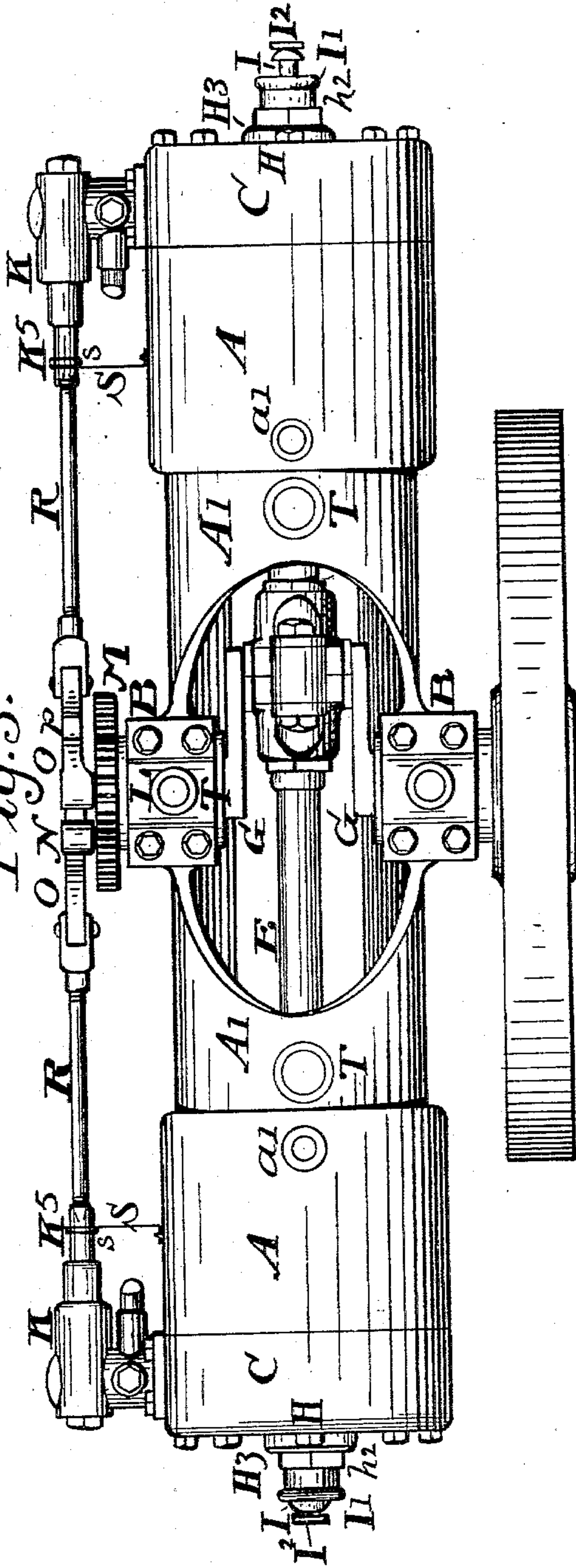


Fig. 2.

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(No Model.)

3 Sheets—Sheet 3.

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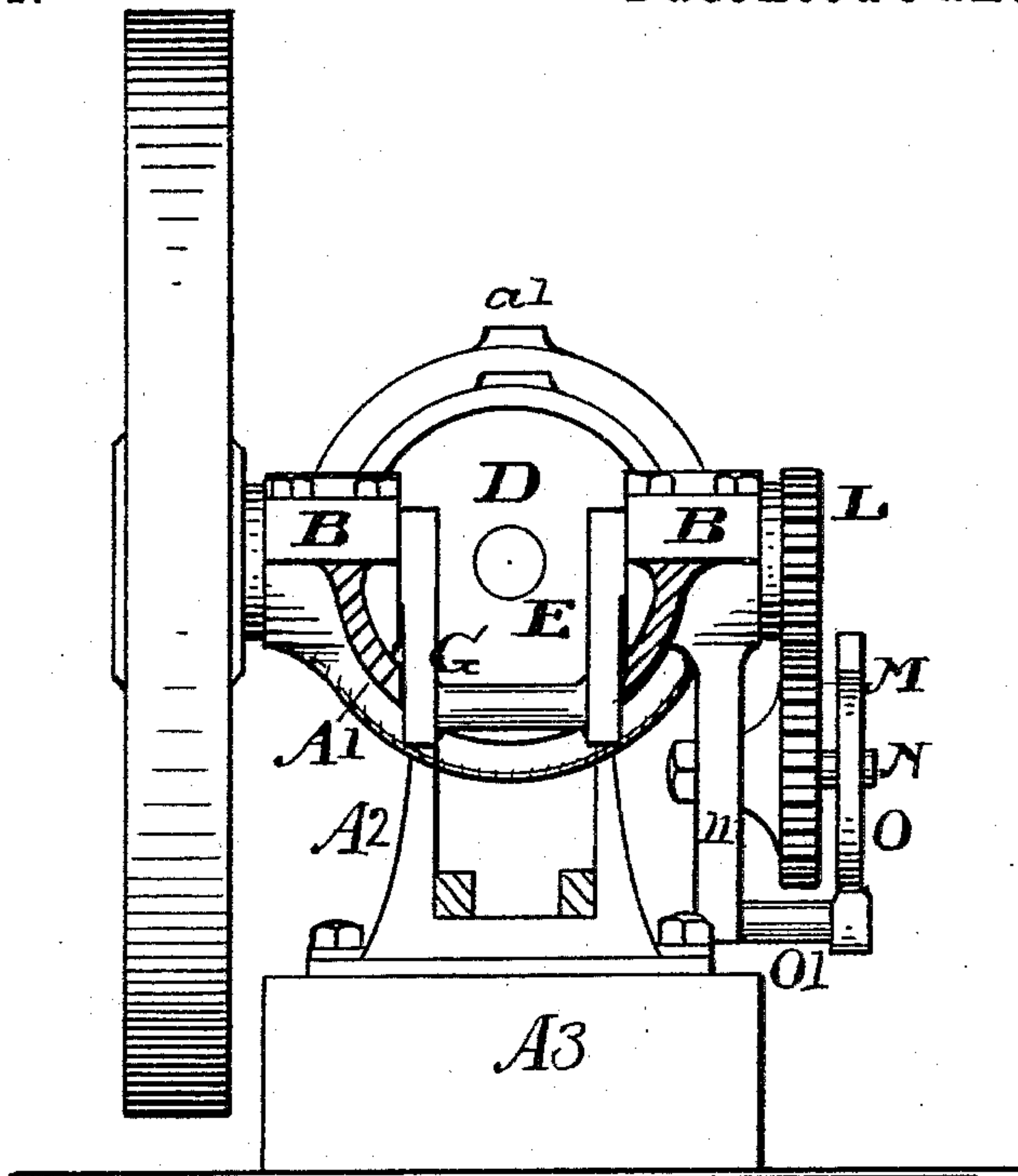


Fig. 4.

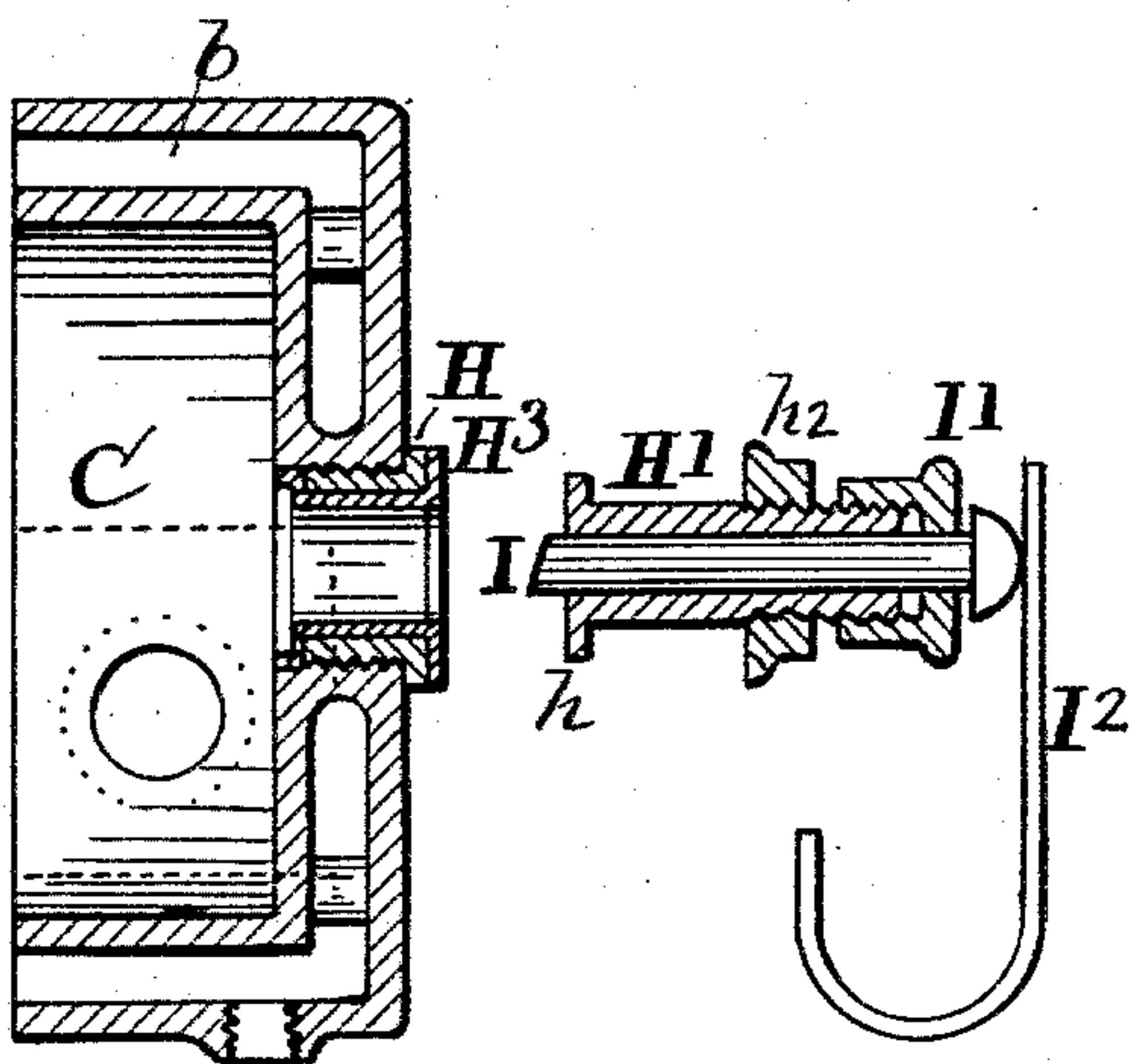


Fig. 6.

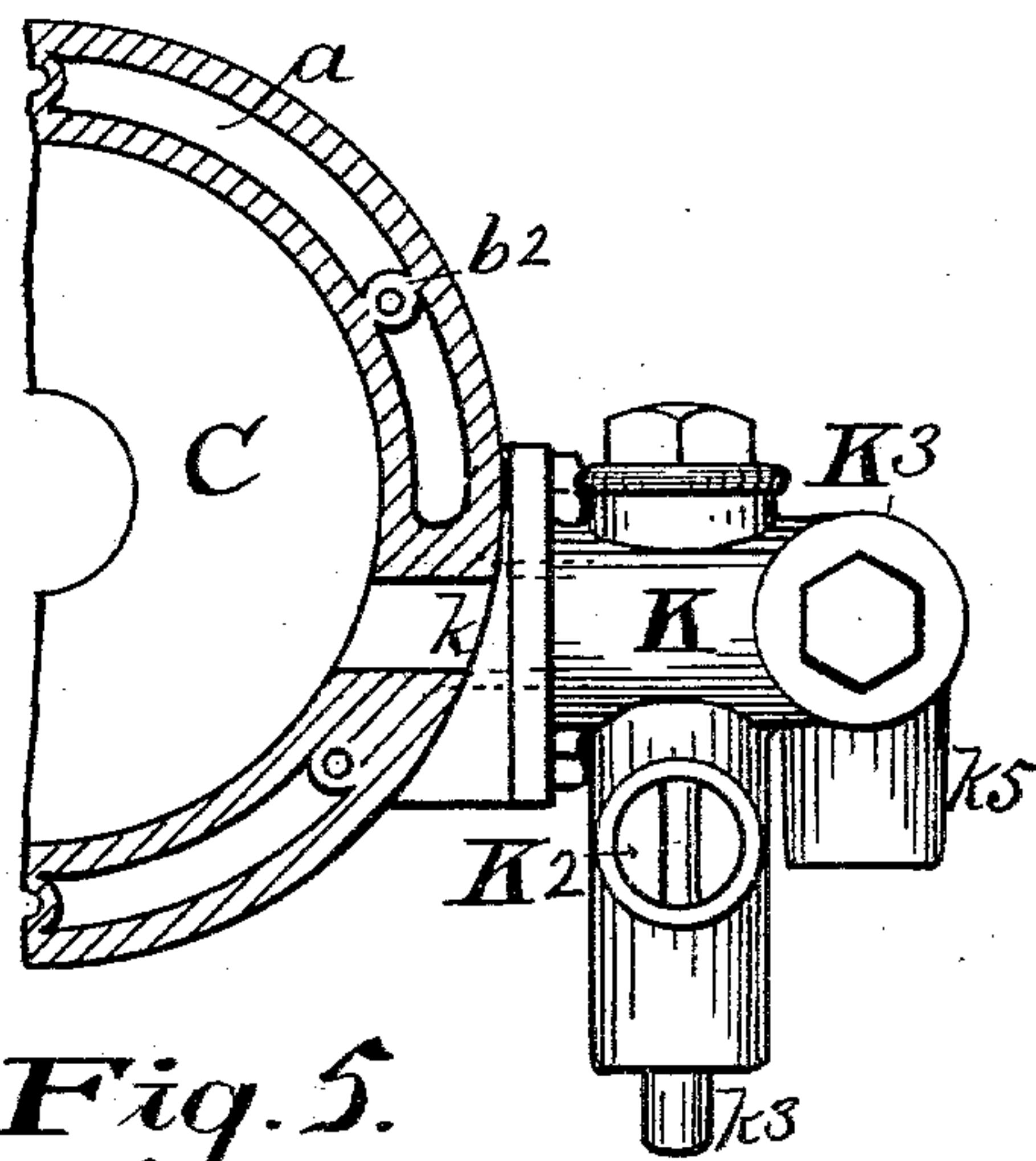


Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE F. EGGERDINGER AND GEORGE R. SWAINE, OF CLEVELAND, OHIO.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 561,774, dated June 9, 1896.

Application filed August 3, 1895. Serial No. 558,177. (No model.)

To all whom it may concern:

Be it known that we, GEORGE F. EGGERDINGER and GEORGE R. SWAINE, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

This invention relates to that class of engines in which a mixture of gas or gasolene and air under compression is ignited by an electric spark to operate the piston.

The objects of our invention are to provide a gasolene-engine in which the cylinders are located directly opposite each other, having their pistons working in a direct line on one or practically one piston-rod, dispensing with connecting-rods, the crank working in a reciprocating frame carried by the piston-rod.

The invention consists in the peculiar construction and combinations, substantially as hereinafter described, and pointed out in the claim, whereby simplicity of construction, facility of management, ease of repair, readiness of removal, and access to the principal parts are the advantages derived.

This engine is light and compact in structure, is portable, is admirably adapted for cycle or yacht purposes, or for all light work to which small motors are applicable. The cylinder-heads having the igniting and valve mechanisms attached enables, when removed, easy access to all the working parts for adjustment, repairs, or cleaning.

In the accompanying drawings, Figure 1 is a side elevation of our new gasolene-engine, showing one of the valve mechanisms in section. Fig. 2 is a top or plan view of the engine. Fig. 3 is a longitudinal section of the same. Fig. 4 is a cross-section on line 4 4 on Fig. 1. Fig. 5 is a detached view of one of the cylinder-heads, showing one of the valve mechanisms and manner of attaching same. Fig. 6 is a cross-section of a cylinder-head, showing the construction and manner of insulating the igniting device. Figs. 7, 8, 9, and 10 are details of the valve-operating mechanism.

A A represent two cylinders united in one casting by an intermediate barrel-shaped body A', having an oval opening in its top side and a slotted opening in its under side.

A² A² are pedestals cast with and on the under sides of the cylinders, by which the whole structure is supported on a suitable foundation-block A³.

B B are the boxes or bearings for the crank-shaft, which are also cast with the cylinders. The purpose of casting the cylinders, the cylinder connection, the pedestals, and bearings all in one piece is to give them strength and rigidity. The cylinders are made open at the ends and have water-jackets *a a* with inlets *a' a'* and outlets *a² a²*.

C C are the cylinder-heads, partly in cylindrical form, making an extension of the cylinders beyond the throw of the pistons and forming the combustion-chamber. The heads are also provided with water-spaces *b b*, and the heads are fastened to the cylinders by bolts *b' b'*, reaching into solid portions *b² b²* in the ends of the cylinders.

D D are pistons, and E E are piston-rods connecting the pistons to a frame F, which joins the piston-rods and makes them practically one.

G is a crank and crank-shaft supported in the boxes B B. The wrist-pin of the crank is held in a sliding block G', working in the reciprocating frame F, and by means of which the crank-shaft receives rotary motion.

In each of the heads is provided an electric igniting device, consisting of electrical contact-points, described as follows: H is a sleeve screwed into the center of the head. H' is a tube having a flange *h* on its inner end and is screw-threaded on its outer end, and is held in the sleeve H by jam-nut *h²*. H³ is an insulating packing interposed between the sleeves H and H'. I is a contact-pin inserted through the sleeve H', having a head on its outer end. I' is a stuffing-box cap-screwed onto the end of the sleeve H', and I² is a bent spring attached to the head C and insulated therefrom by mica or hard-rubber washers *i*. The upper end of the spring bears against the head of the pin I for the purpose of pushing it inward. J is a contact-pin fixed in the center of the pistons D D, which at each outward stroke of the pistons contacts with pins I for igniting the gasolene. *jj* are binding-posts, one of which is attached to the heads C, and the other to the jam-nuts *h²* for attaching the wires of a battery.

The valve mechanism is described as follows: K is a casting having a flange by which it is bolted to one side of the cylinder-heads C C, provided with an inlet-port k . K' is a downwardly-extending arm of said casting, having a chamber in communication with said inlet-port k , in which is a valve-seat k' , a valve k^2 , having a vertical stem k^3 , acting in said valve-seat. K² is an inlet to the chamber under the valve for the ingress or suction of air and gasolene. K³ is a horizontal side chamber also in communication with the inlet-port k , in which is also provided a valve-seat k^4 , and k^5 is an exhaust-outlet. K⁴ is a valve on a horizontal stem K⁵, acting in said seat k^4 .

The mechanism for operating said valves is described as follows: L is a pinion on the end of the crank-shaft, having sixteen teeth, and M is a gear having thirty-two teeth, revolving on a pin fixed in a hanger m below the pinion L and in mesh with the pinion. In the face of said gear is made a recess m' , in which a disk M' is fitted and adjustably held by set-screws m^2 . N is a stud or pin on said disk at one side of the center. O O are curved levers fulcrumed at their lower ends to a pin or arm O' on the lower end of the hanger m below the gear M. The upper ends of these levers O O are joined by connecting-rods R R with the valve-stems K⁵. Retracting-springs S S, attached to the cylinders and bearing on a collar s on the valve-stems, serve to return the valves to their seats when free. On the inside edges of the levers O O, about midway of their length, are made projections p p , against which the stud-pin N strikes in its revolutions for pushing the levers and actuating the valves. T T T are oil-cups for lubricating the pistons and crank-journals.

The workings of this engine are as follows: The pistons being in the positions in the cylinders seen in Fig. 3, and the suction-pipes being connected with a suitable gasolene-supply vessel, the engine may be started by grasping the balance-wheel and giving the crank a half-turn. This carries the pistons to the left. The suction caused by the movement of the pistons lifts the valve k^2 and draws into the cylinder at the right a supply of air and gasolene. Now by giving the balance-wheel a further half-turn the pistons are again moved to the right. This produces the like result in the cylinder at the left and at

the same time compresses the air and gasolene in the right-hand cylinder, and when the contact-pins I and J meet the electric current is closed and an explosion takes place, driving the pistons to the left again. As the pistons have moved to the right, air and gasolene have been drawn into the left-hand cylinder, and as the pistons have moved to the left the air and gasolene have been compressed therein and the contact-points met and explosion has taken place. Explosions and exhaustions take place in each cylinder at every other inward stroke of the pistons, so that as the explosion in the left-hand cylinder was taking place the right-hand cylinder was exhausting. This was produced by the stud-pin N on the gear M pushing the lever O and opening exhaust-valve K⁴. Said gear M, as before described, makes but one revolution to every two revolutions of the crank. Therefore the stud-pin moving at half the rate of the pinion L does not strike the levers O O only at each inward stroke of the pistons. Thus as one cylinder is exhausting the other is exploding, and vice versa. The revolutions of the gear M being at half the rate of the pinion also holds the valves open longer and permits of complete exhaustion in the cylinders during an inward stroke of a piston.

These engines are capable of running with only one cylinder at a time, if desired, when less power is required.

Having described our invention, we claim—

In a gas-engine of the character described, the combination with the cylinders A, A, of the valve mechanism consisting of the valve-body K having port k leading into the cylinders, chambered extension K' having valve-seat k' and valves k^2 , the chambered extension K³ having valve-seat k^4 and valve K⁴, suction inlet-port K² and exhaust-port k^5 , valve-stems K⁵, levers O, O, fulcrumed to hanger m and connected by rods R, R, to the valve-stems, a pinion L on the crank-shaft, gear M journaled on the hanger m and in mesh with the pinion, stud-pin N on said gear M, all constructed and adapted to operate substantially as described.

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