

No. 705,145.

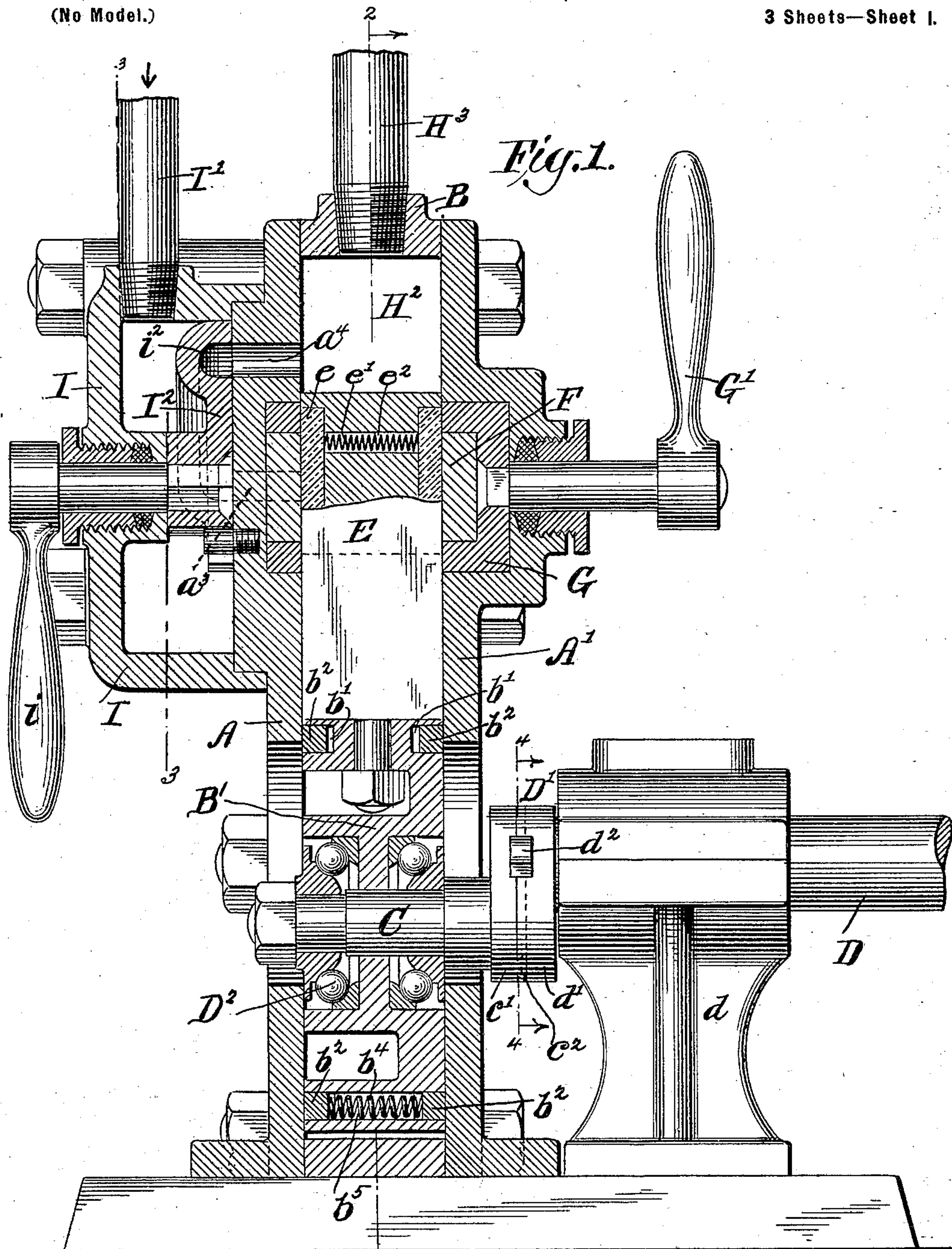
Patented July 22, 1902.

V. L. RICE.  
ENGINE.

(Application filed Nov. 14, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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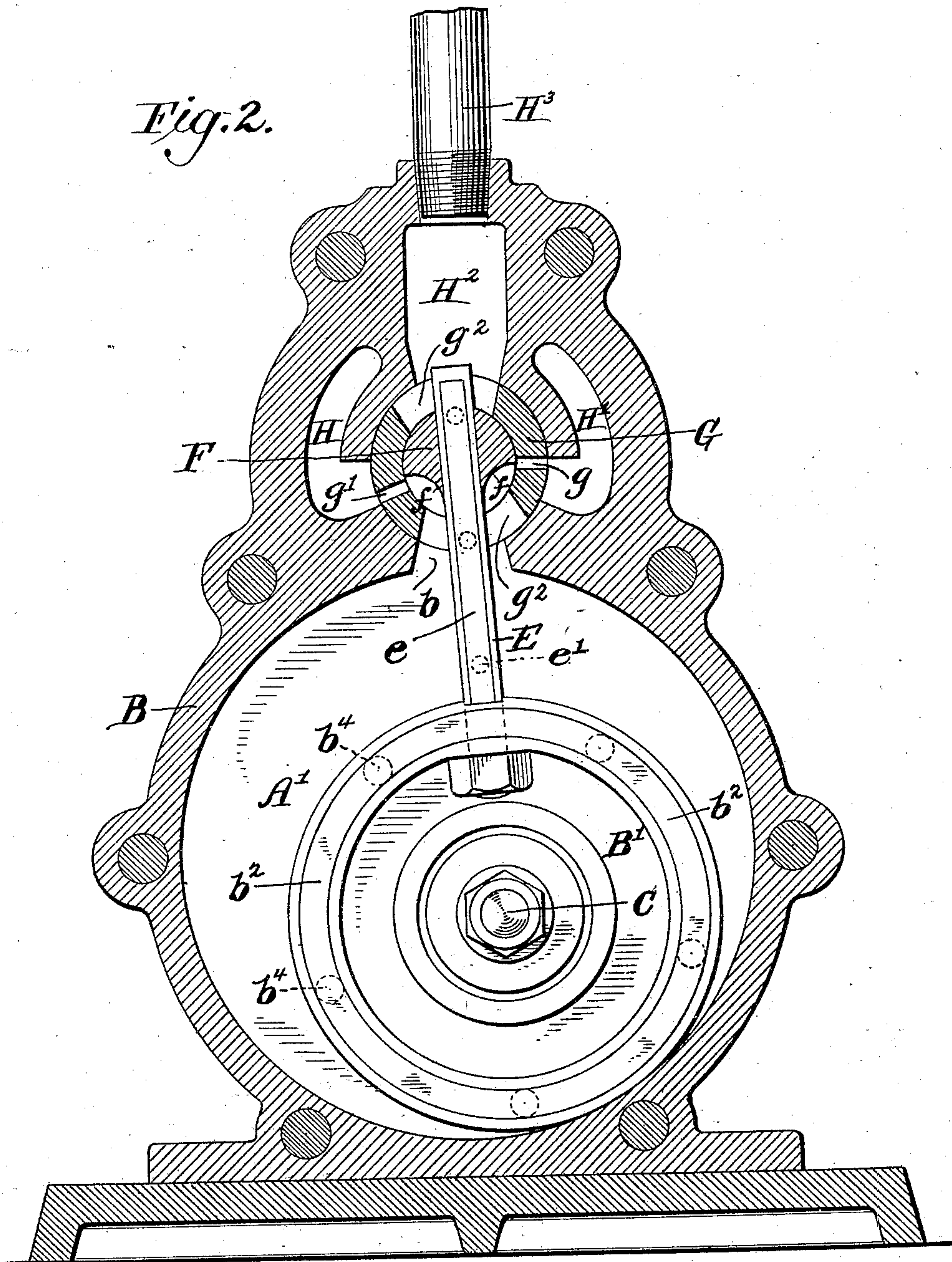
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(No Model.)

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Fig. 2.



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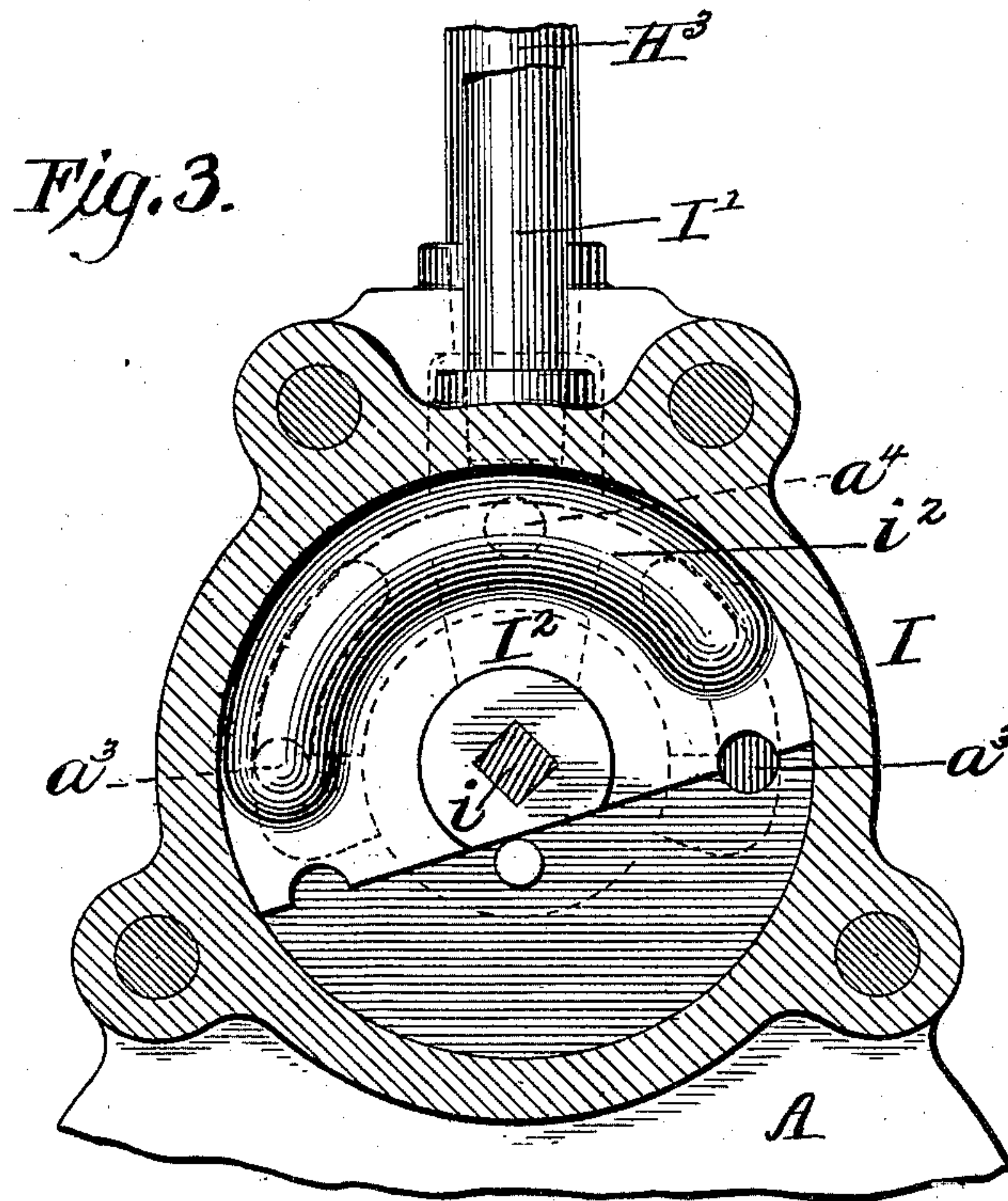
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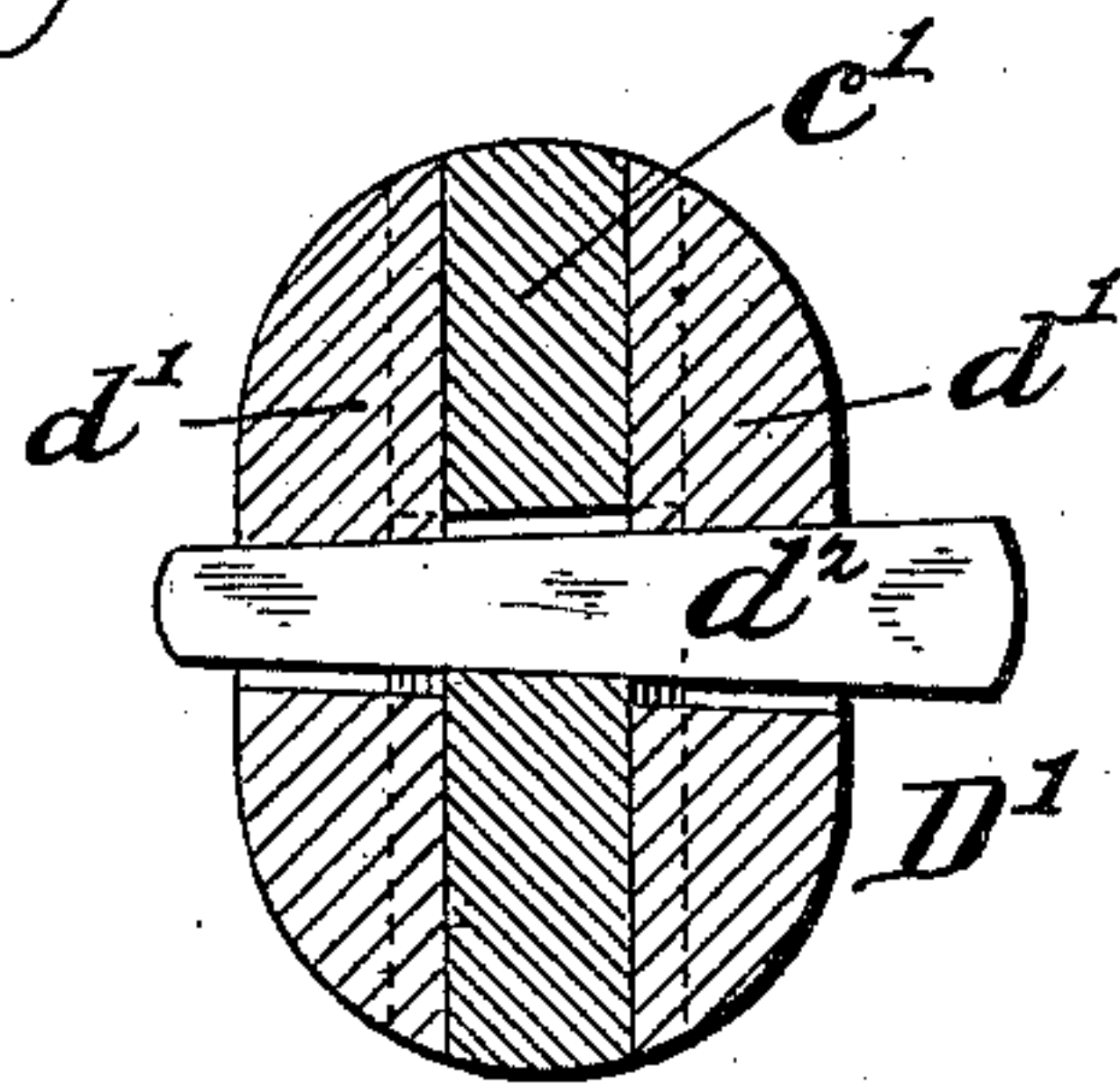
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(No Model.)

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*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

VIETTS L. RICE, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO C. J. DOWNING & CO., INC.

## ENGINE.

SPECIFICATION forming part of Letters Patent No. 705,145, dated July 22, 1902.

Application filed November 14, 1900. Serial No. 36,486. (No model.)

*To all whom it may concern:*

Be it known that I, VIETTS L. RICE, a citizen of the United States of America, residing in the borough of Manhattan, city and State of New York, have invented certain new and useful Improvements in Engines, of which the following is a specification.

My invention relates to engines, and particularly to rotary engines.

I will describe an engine embodying my invention and then point out the novel features thereof in the claims.

In the accompanying drawings, Figure 1 is a view, partly in elevation and partly in vertical transverse section, of an engine embodying my invention. Fig. 2 is a vertical sectional view of the engine of Fig. 1, taken on the line 2 2 of said figure. Fig. 3 is a detail sectional view of the steam-chest, taken on the line 3 3 of Fig. 1. Fig. 4 is a detail sectional view of a crank on the line 4 4 of Fig. 1.

Similar letters of reference designate corresponding parts throughout the drawings.

A A' represent the side walls of an engine, and B a circumferential wall, which is between said side walls. The walls A, A', and B are bolted together, and the walls A A' are provided with bottom flanges, by which the engine may be made secure to any desired support. The upper part of the circumferential wall B is more or less solid, and it is recessed to form steam-chambers H H'. The lower part of the wall B, in connection with the side walls, forms the chamber for the piston. An opening b serves as a passage for the live and exhaust steam entering and leaving the piston-chamber.

B' represents a circular piston provided within the piston-chamber, and it is of such a width as to snugly fit between the walls A A'. The piston B' is mounted on a crank-pin C, carried by a shaft D, journaled in a suitable standard d.

D' represents an adjustable crank-arm between the pin C and shaft D. This crank-arm is here shown as comprising two parts c' and d', carried by the pin C and shaft D, respectively, which parts are coupled together by a dovetail, as shown at c<sup>2</sup>, and slide one upon the other. Each of the parts c' and d' (see Fig. 4) is provided with a tapering open-

ing, and passing through these openings is a wedge-shaped key d<sup>2</sup>. A portion of the wall of one opening bears against one tapered side of the key d<sup>2</sup>, while a portion of the wall of the second opening bears against the opposite tapered side of the key d<sup>2</sup>. The purpose of this construction for the crank-arm is to lengthen or shorten the crank and permit of the piston B' being adjusted to compensate for any wear in the piston-chamber caused by the rotation of the piston therein. The walls A A' are open at their middle to permit of the rotation of the crank-pin. Ball-bearings D<sup>2</sup> are provided between the piston B and crank-pin C. These bearings may be arranged and made adjustable in the usual manner.

Each wall of the piston B' is provided with an annular recess b', in which a packing b<sup>2</sup> is fitted, and the packings b<sup>2</sup> are held against the inner faces of the walls A A' by means of coil-springs b<sup>4</sup>, which are confined in transversely-arranged openings b<sup>5</sup>, provided at different points near the peripheral edge of the piston B'.

E represents a stem or abutment which is connected at one of its ends with the piston B' at the piston's periphery in any desired manner. The stem is of a width substantially equal to the width of the piston, and it is provided with a packing-strip e in each of its longitudinal edges. The packing-strips e are forced outwardly by coiled springs e', which are confined in openings e<sup>2</sup>, provided for them in the stem. The free end of the stem moves in and out of an admission-valve F, and as the piston B' is moved the abutment operates the valve F to open and close a steam-supply duct provided in a control-valve G, here shown as being in the form of a cylinder. The stem E also moves in and out of the cylinder G, but it does not move it in any way. The valve F is cylindrical and is inclosed by the valve G, in which the valve F is adapted to oscillate. The valve F is provided with cut-away portions f on each side of the stem to enable steam to pass into and out of the cylinder. The valve G is suitably mounted in the walls A A', and it is provided with the steam-ducts g g' and with opposite cut-away portions g<sup>2</sup> to give a clearance for



the abutment E. G' represents a lever-handle for giving a rotary movement to the cylinder G when it is desired to operate the piston B' in a reverse direction. The valve is also adapted to regulate the amount of steam which is supplied to the piston, and thereby the speed of the engine. This is done by partially rotating the cylinder to such position that in the oscillation of the valve F either of the ducts  $g$  or  $g'$  will be wholly or only partially opened to admit steam.

H H' are steam-chambers provided in the wall B and with which the steam-ducts  $g$   $g'$  communicate. One of the chambers H H' is to receive exhaust-steam from the piston-chamber, while the other chamber supplies live steam thereto. It may be here remarked that the duct  $g$  or  $g'$ , whichever is receiving exhaust-steam, is never wholly closed by the valve F, and the duct  $g$  or  $g'$ , which supplies live steam, is wholly closed when the piston B' is about at its lowest point in the piston-chamber and remains so until the piston B' is at its highest point in its chamber.

I represents a steam-chest which is suitably secured to one of the walls A A'—for example, the wall A—and I' represents a steam-supply pipe.

I<sup>2</sup> represents a valve provided within the steam-chest. It is here shown as being in the form of a disk and acts to completely shut off steam from the chambers H H' and to change the steam's course. It is provided with a valve stem and handle  $i$  and is adapted to move over the surface of the wall A, limiting movement of the valve. The wall A is provided with openings  $a^3$ , which form passage-ways for steam from the chest I to the chambers H H', and with an opening  $a^4$ , through which exhaust-steam escapes into the exhaust-chamber H<sup>2</sup>, provided in the plate B. H<sup>3</sup> is an outlet for said chamber.

The valve I<sup>2</sup> is provided with a raised and curved portion  $i^2$ , constituting an arch-shaped chamber or channel which serves to conduct exhaust-steam from either of the chambers H H' to the chamber H<sup>3</sup>. It will therefore be understood that when steam is permitted to pass into one of the chambers H H'—for example, the chamber H'—and this is accomplished by having the valve I<sup>2</sup> in such a position as to leave the opening  $a^3$  for the chamber H' open, one end of the arch-shaped chamber of the valve will be over the opening  $a^3$  of the chamber H to receive exhaust-steam, while the other end of the said chamber will be over the opening  $a^4$  to allow the

exhaust-steam to enter the chamber H<sup>3</sup>. As hereinbefore stated, the valve I<sup>2</sup> may be moved to such position as to completely cut off steam from both openings  $a^3$ . It may also be moved to such position as to permit live steam to pass through the opening  $a^3$  of the chamber H, in which case the arch-shaped chamber of the valve will be in such position as to receive the exhaust-steam from the chamber H'. When the engine is reversed, as just described, the valve G is given a partial turn in order that the duct  $g$  or  $g'$ , through which the exhaust-steam is to pass, will be in such position relatively to the valve F as to be always open.

What I claim as new is—

1. The combination in an engine of side walls and a circumferential wall, the latter being provided with steam-chambers, a piston-chamber formed by said walls, a rotary piston in said piston-chamber, an admission-valve operated by said piston, a steam-chamber secured to one of said side walls and in communication with said steam-chambers, and an oscillating reversing-valve provided in said steam-chamber.

2. The combination in an engine of side walls and a circumferential wall, the latter being provided with live-steam chambers and an exhaust-chamber and one of said side walls being provided with openings which lead to said chambers, a steam-chamber inclosing said openings, an oscillating valve in said chamber which is movable over said openings and is provided with a channel which is adapted to be in communication with one or the other of said live-steam openings and the exhaust-opening, a rotary piston, and an admission-valve operated by said piston.

3. In an engine, the combination of a piston-cylinder, a steam-cut-off valve and an admission-valve therefor, a piston movable in the cylinder and mounted on a crank-pin, a shaft, and a crank-arm between said pin and shaft which is adjustable longitudinally, said crank comprising two parts dovetailed together so as to be movable one on the other and each provided with an opening, and a tapered key fitted in said openings.

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

VIETTS L. RICE.

Witnesses:

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R. H. E. STARR.