

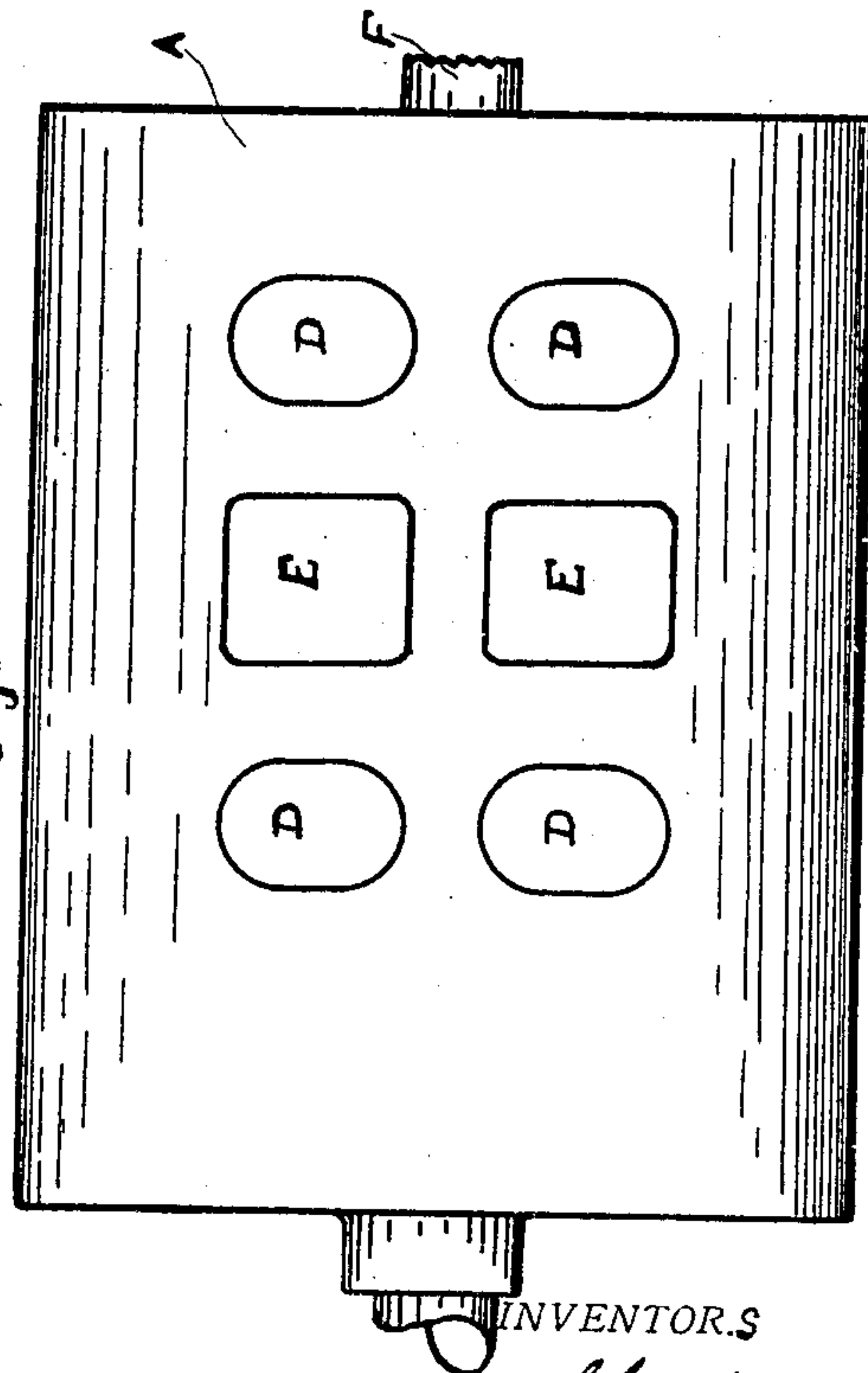
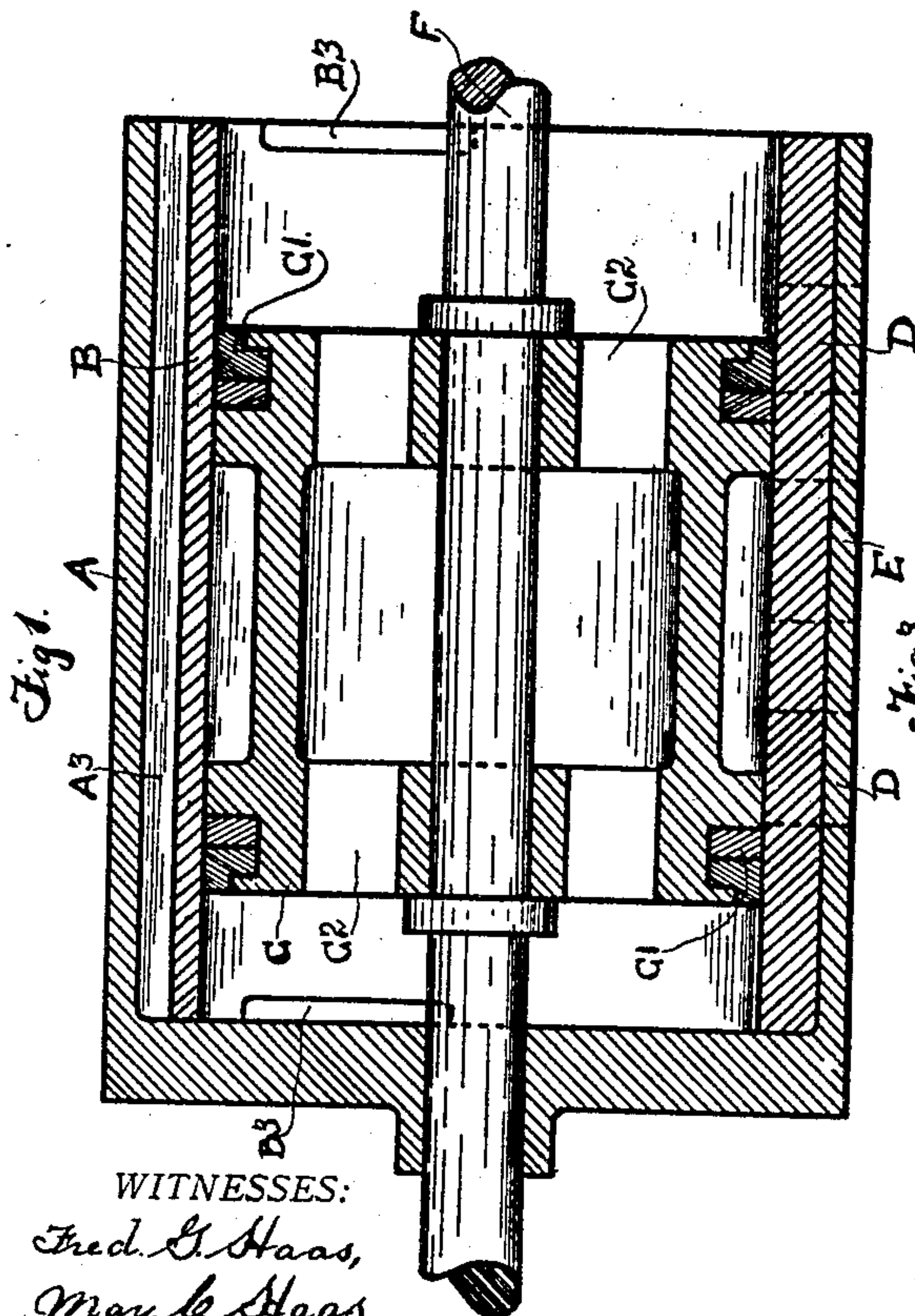
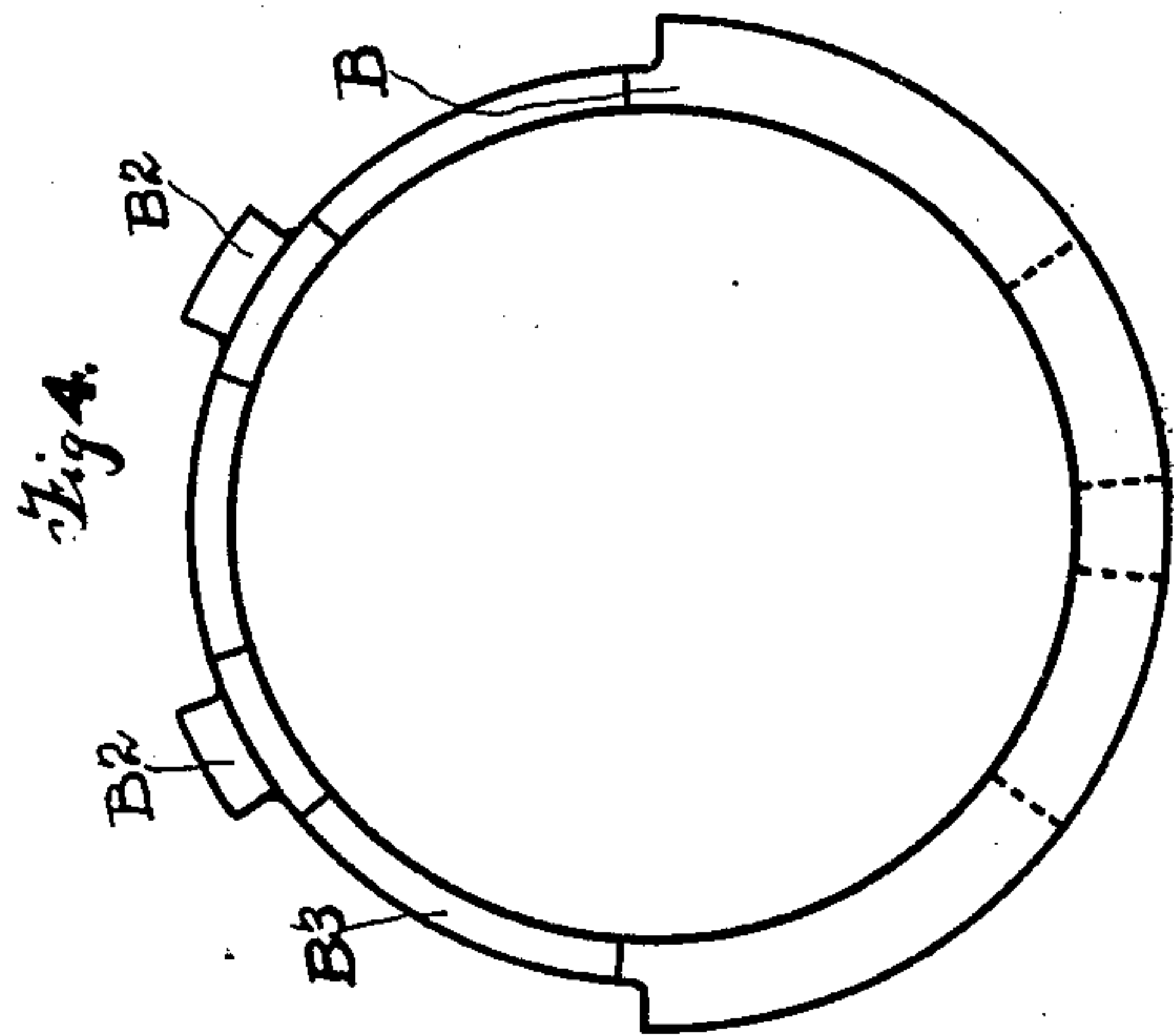
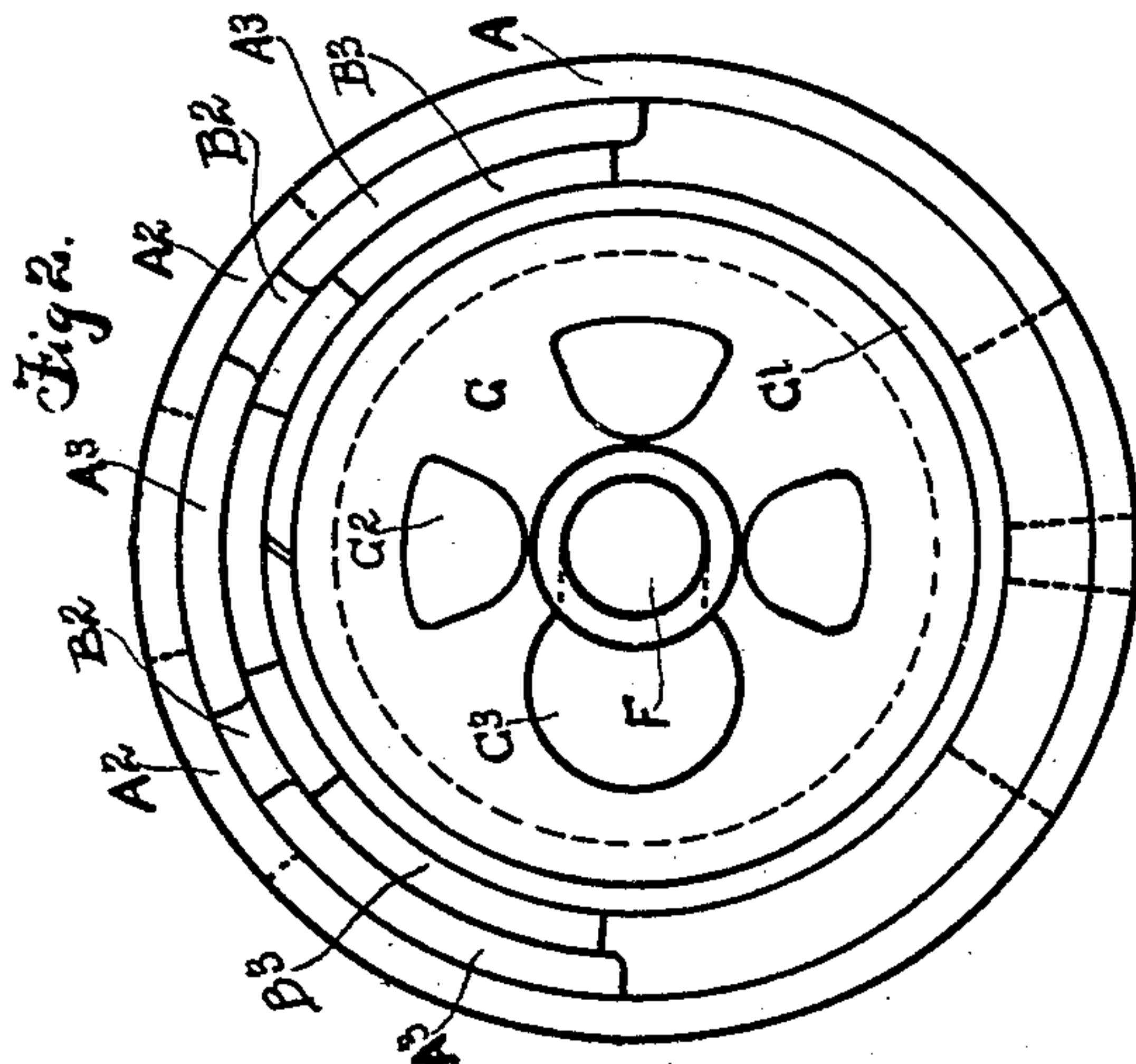
M. CHRISTMAN & E. JOHNSON.  
PISTON VALVE.

APPLICATION FILED OCT. 31, 1907.

904,839.

Patented Nov. 24, 1908.

2 SHEETS—SHEET 1.



WITNESSES:  
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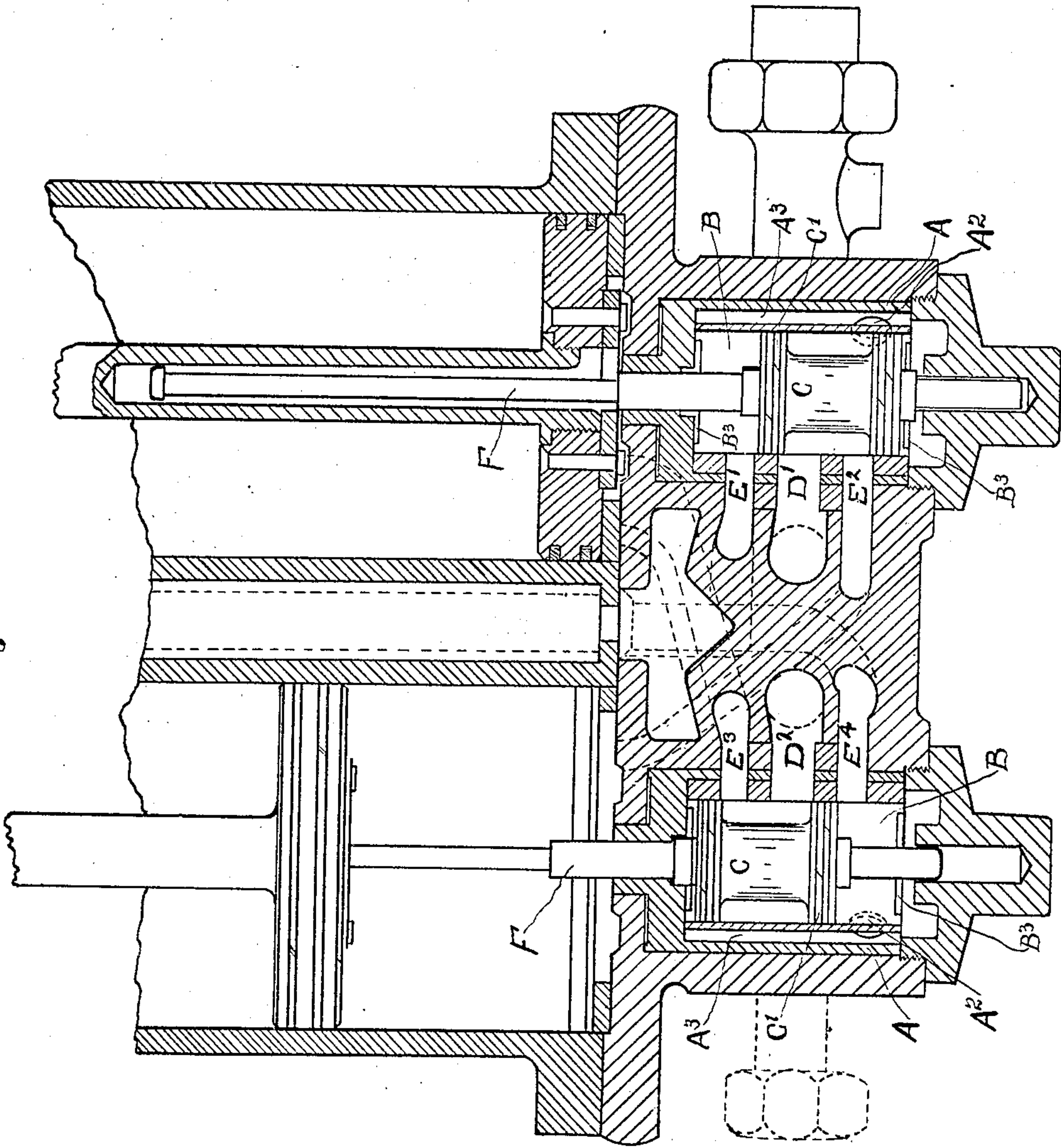
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Fig 5.



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# UNITED STATES PATENT OFFICE.

MATTHIAS CHRISTMAN AND EDWARD JOHNSON, OF SPRINGFIELD, MISSOURI.

## PISTON-VALVE.

No. 904,839.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed October 31, 1907. Serial No. 400,116.

*To all whom it may concern:*

Be it known that MATTHIAS CHRISTMAN and EDWARD JOHNSON, citizens of the United States, residing at Springfield, in the county of Greene and State of Missouri, have invented certain new and useful Improvements in a Reversing Piston-Valve, of which the following is a specification.

Our invention relates to improvements in valves for air and liquid pumps, the object of which is to provide a reversing piston valve that will be steam tight, durable and easily operated.

These objects we obtain by means of the device illustrated in the accompanying drawings, forming a part of this specification in which:

Figure 1, is a longitudinal, sectional view showing the entire device. Fig. 2, is a transverse view. Fig. 3, is the outer bushing, showing steam and exhaust ports. Fig. 4, is the end view of the inner bushing. Fig. 5, is a view showing the valve and bushing applied to a duplex pump.

A is the outer bushing having ports at one end A<sup>2</sup>.

B is the inner bushing that fits into the outer bushing A, and is provided with ribs B<sup>2</sup>, which separate inner and outer bushings, forming ports or passages A<sup>3</sup>, lengthwise of bushings and also has steam passages in each end B<sup>3</sup>.

C is a valve which is made circular to fit into the inner bushing B, and has radial braces or spokes at each end, and is provided with one or more packing rings C<sup>1</sup> (and is provided with openings C<sup>2</sup> at each end of valve). Said valve is made hollow so steam can pass through valve, which makes this valve perfectly balanced. Said valve is provided with a slip pin-hole C<sup>3</sup>, by which the reversing rod F is put into place. The valve being similar to piston throttle valve, as is illustrated in prior Letters Patent #860190 granted to us on the 16th day of July, 1907. Serial #351379.

The valve operates as follows:

The invention is put into the steam chest of a pump as shown in Fig. 5.

Steam from the boiler enters at steam ports A<sup>2</sup>, and then passes through ports or passages A<sup>3</sup>, and then steam passes through ports B<sup>3</sup> to the valve C.

As shown in Fig. 5, the right steam piston has completed its stroke and forced the valve C down, which is connected with the revers-

ing rod F, and the valve C has uncovered the upper steam port E<sup>1</sup>, which will admit steam in the upper port in the left steam cylinder of the air pump through suitable ports or passages between both steam cylinders. The steam forces the left steam piston in the air pump down, which strikes the reversing rod F which is connected with the valve C and moves the valve C down, which closes the lower steam port E<sup>4</sup>, and uncovers the upper steam port E<sup>3</sup>. Steam is then admitted to the right steam piston in the bottom end through suitable ports or passages in the cylinder head of the air pump to the right steam cylinder. The right steam piston then moves upward, pulls the valve C up, which is connected with the reversing rod F and a plate tapped to the bottom of the right steam piston. The valve C then closes the upper steam port E<sup>1</sup>, and the steam that has been expanded in the upper end of the left steam cylinder of the air pump, passes back through suitable ports or passages between both steam cylinders, back through the steam port E<sup>1</sup> and out through the exhaust cavity cut in the valve C and out through the exhaust port D<sup>1</sup>, which corresponds with ports or passages in the cylinder head of the air pump, out into the atmosphere.

The lower steam port, E<sup>2</sup>, is now uncovered. Steam now passes over to the bottom of left steam piston in the air pump through suitable ports or passages in the cylinder head of the air pump. The left steam piston in the air pump is on an upward stroke. It pulls the valve C up, which is connected with the reversing rod F and a plate tapped to the bottom of the left steam piston in the air pump, the valve closes the upper steam port E<sup>3</sup>, and the steam that has been expanded in the lower end of the right steam cylinder of the air pump passes back through suitable ports or passages in the cylinder head of the air pump, back through the steam port E<sup>3</sup>, and out through the exhaust cavity cut in the valve C, and out through the exhaust port D<sup>2</sup>, which corresponds with suitable ports or passages in the cylinder head of the air pump, out into the atmosphere.

The bushings can be made in one piece, but are preferably made separate. The outer bushing made of steel or wrought iron. The inner bushing made of cast iron; making it cheap and easily renewed when worn.



Having thus described our invention what we claim as new, and desire to secure by Letters-Patent of the United States:

1. In combination with an engine cylinder 5 steam chest, suitable inlet and exhaust passages an outer bushing, an inner bushing, longitudinal fluid passages between said bushings, a port at each end connecting the interior of the inner bushing with said longitudinal passages, a piston valve connected to 10 reciprocate within the inner bushing, said valve comprising two heads spaced apart to form an exhaust groove, spring packing rings on each head, and ports through both 15 bushings to connect with said inlet and exhaust passages, substantially as shown and described.

2. In combination with an engine cylinder, steam chest, inlet and exhaust passages, 20 a valve casing comprising two concentric bushings, fluid passages between the bushings connected with the interior of the inner bushing at the ends thereof, a piston valve bored to receive a valve stem, a slip pin hole

to one side of and connecting with the bore 25 to allow the valve stem to be fitted, and a valve stem adapted to snugly fit said bore and having collars thereon to prevent endwise slipping of the valve, substantially as shown and described. 30

3. A piston valve having passages extending therethrough to permit of the valve being perfectly balanced, a central bore 35 through which passes a valve stem, said valve stem fitted with collars at each end of the valve to prevent endwise slipping of the same, and a slip pin hole adjacent to the bore by means of which the valve stem may be fitted to the valve, substantially as shown 40 and described.

In testimony whereof we affix our signatures, in presence of two witnesses. 40

MATTHIAS CHRISTMAN.  
EDWARD JOHNSON.

Witnesses:

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ANNA RANKIN.