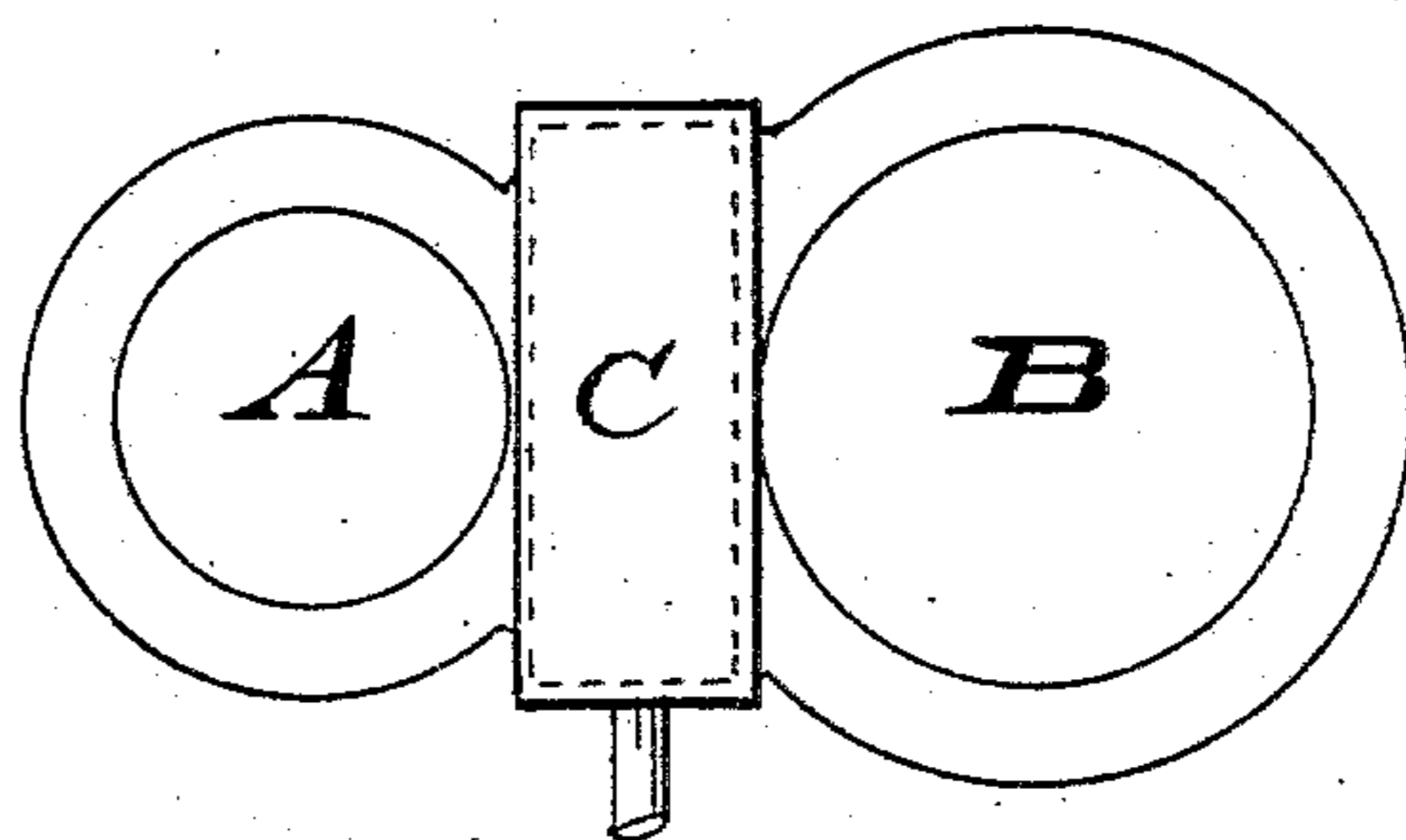
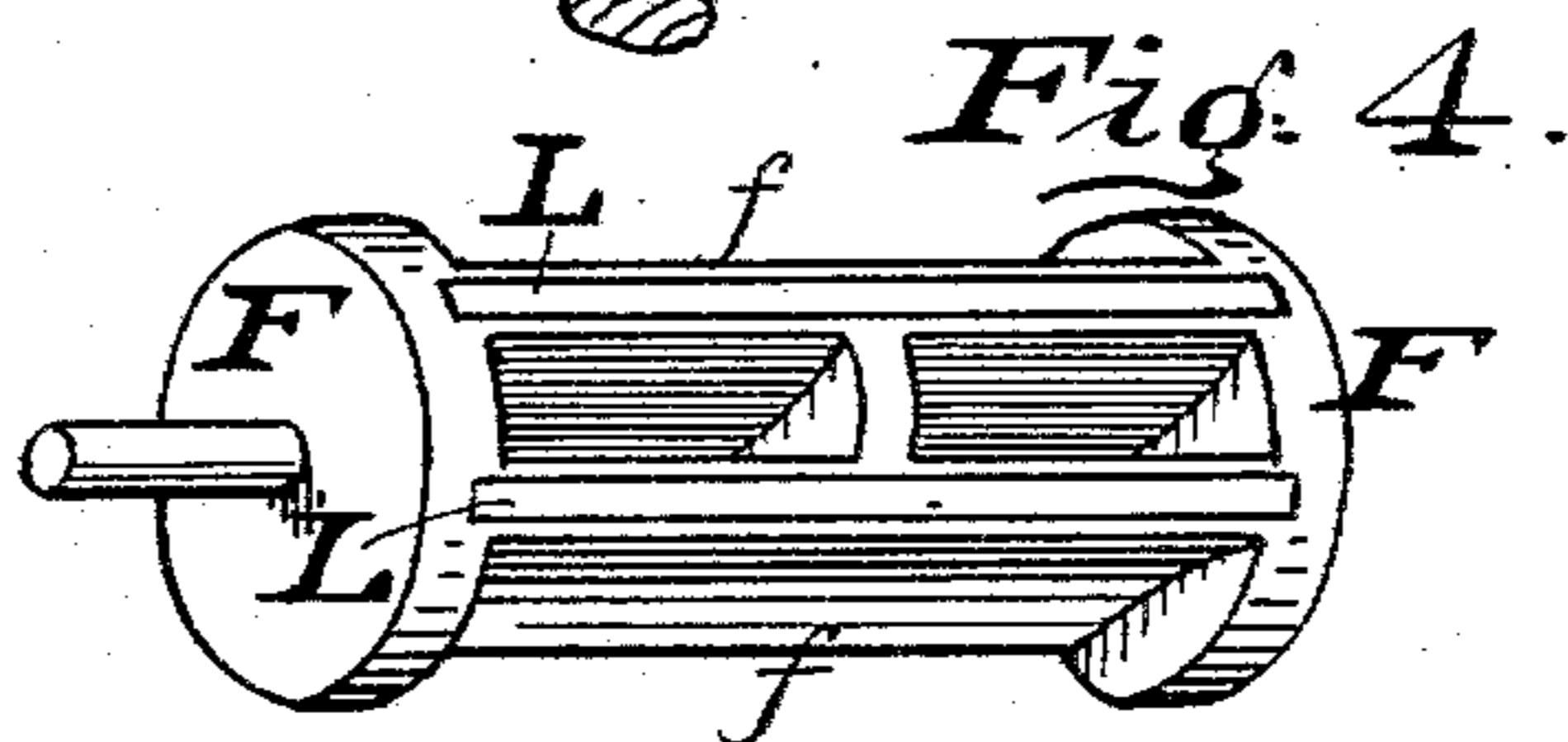
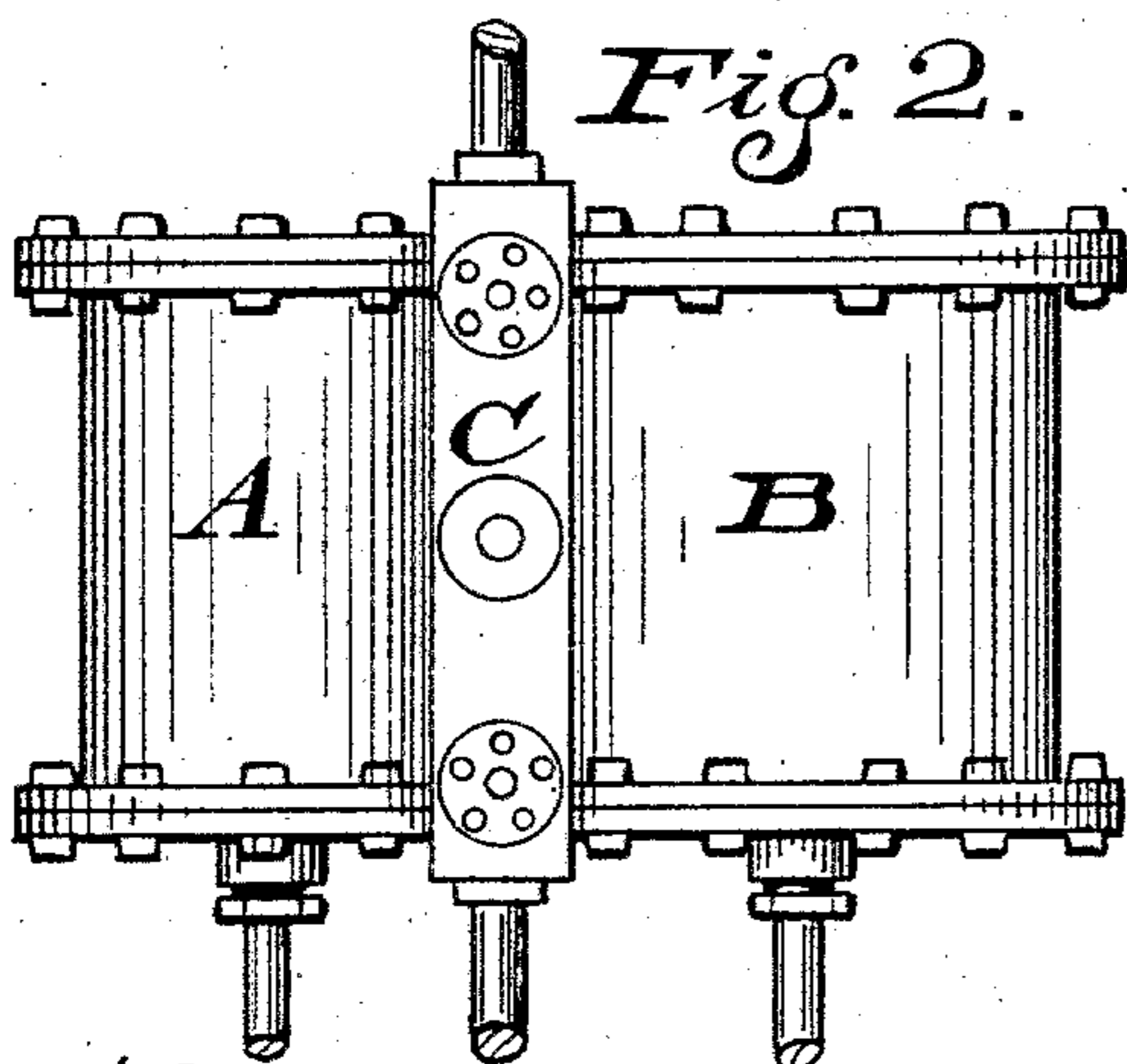
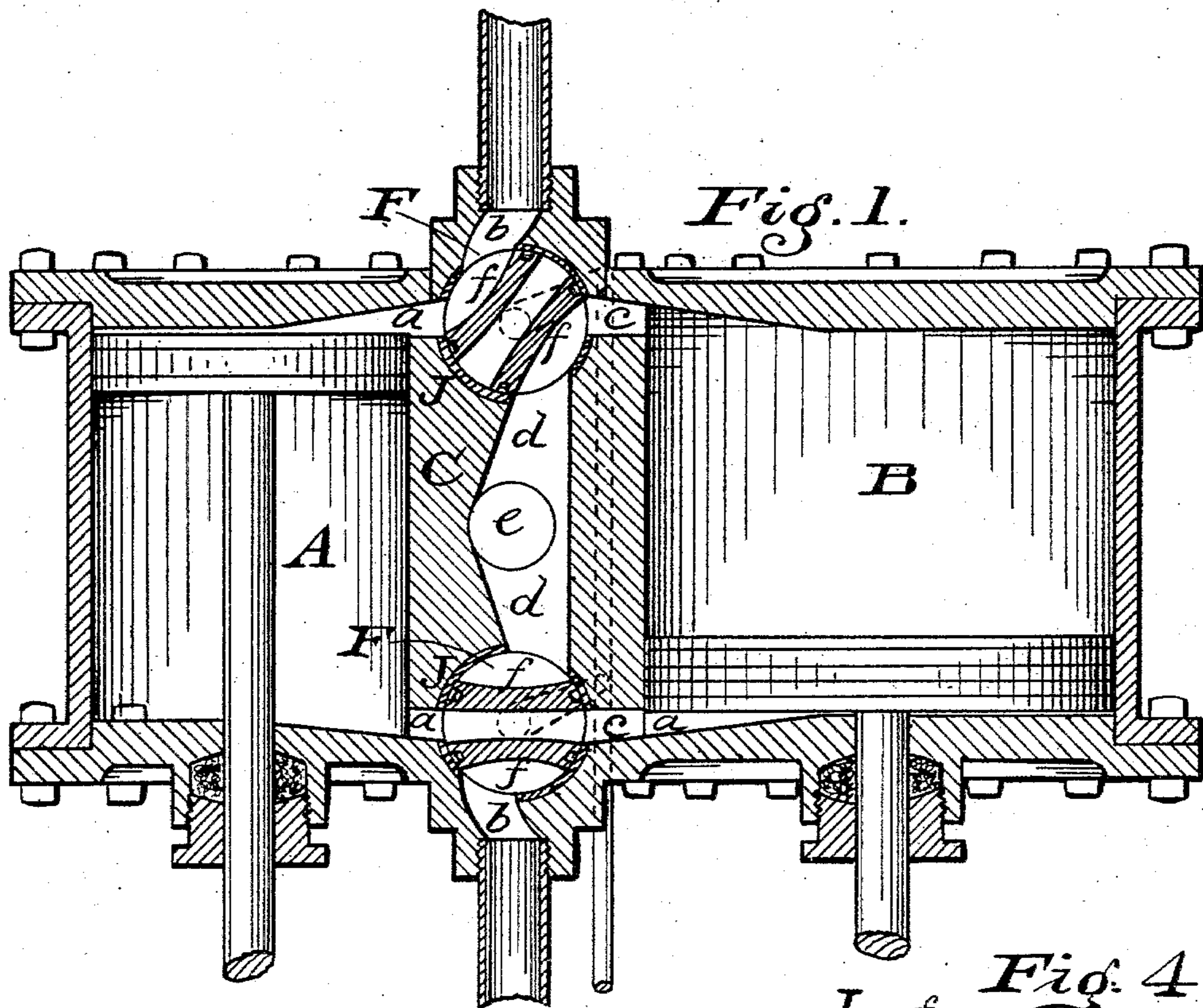


(No Model.)

G. S. WOLF & G. H. POND.  
COMPOUND STEAM ENGINE.

No. 565,063.

Patented Aug. 4, 1896.



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# UNITED STATES PATENT OFFICE.

GEORGE SAAL WOLF, OF DETROIT, MICHIGAN, AND GOLDSBURY HARDEN  
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## COMPOUND STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 565,063, dated August 4, 1896.

Application filed August 31, 1894. Serial No. 522,309. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE SAAL WOLF, residing at Detroit, county of Wayne, and State of Michigan, and GOLDSBURY HARDEN POND, residing at Ashburnham, county of Worcester, and State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention relates to improvements in compound steam-engines; and it consists in the combination, with two cylinders, of a valve mechanism interposed directly between the two cylinders in such a manner that the steam-passages lead in short direct lines from one cylinder into the other and one pair of valves serves for both cylinders, the objects being to obtain very short steam-passages for avoiding the cooling of the steam and the turning of sharp corners in the steam-passages, resulting in great simplicity of construction and in economy of operation, substantially as hereinafter described, and pointed out in the claim.

In the accompanying drawings, Figure 1 is a vertical section through the cylinders and the valve mechanism, showing the location and arrangement of steam-passages between the cylinders, the relative position of the inlet and exhaust ports, and the valves controlling said ports and passages. Fig. 2 is an exterior view of valves and cylinders. Fig. 3 is an end view of the same. Fig. 4 is a detached view of one of the valves.

A represents a high-pressure cylinder, and B a low-pressure cylinder. Between these cylinders is located a compact valve mechanism, consisting of a steam-chest C, cast solid with the two cylinders, the inlet-ports being at each end of said chest. The heads of the cylinders are attached in the usual manner. In said heads are made broad grooves *a a a a*, which connect with the straight passages *c c* through the chest leading from one cylinder to the other. Inlet-ports *b b* are provided in each end of the chest, and a common exhaust-port *e* at the middle of the chest connected by passages *d d* with the valves. The valve-seats consist of straight bores through the chest transversely with the cylinders and the said straight steam-passages *c c*. The valves consist of two disks *F F*, joined by two

webs *f f*, which provide a passage between and at each side of said webs, as seen in Figs. 1 and 4. These valves are fitted in the bores or seats, as seen in Fig. 1, with one valve having its middle passage in open communication with the lower steam-passage *c*, thus making a perfectly straight short communication for the exhaust from cylinder A into cylinder B. At the same time the other valve has its middle passage in a diagonal line, which brings its side passages one in open communication with the inlet-port at the upper end of the chest and its opposite side passage in open communication with the exhaust-port in cylinder B and the exhaust-outlet at the middle of the chest. It will be seen that by reversing the position of the valves relatively that the steam will be admitted to the opposite end of cylinder A and the exhaust from said cylinder A will be into the upper end of cylinder B.

The ends of the valve-chambers are closed by caps and the valve-stems project at one end and are provided with cranks connected to a reciprocating rod for operating the valves by eccentric or link motion in the usual manner. (Not shown.)

Sleeve-linings *J* are provided in the valve-seats, composed of hard white metal, to produce a frictionless and steam-tight bearing, and strips of same metal are placed in grooves *L L* in the edges of the webs of the valve for the same purpose.

By this construction the advantages of very short and direct steam-passages are derived, and the valves are practically balanced by an equal pressure of steam on all sides, so there will be very little wear.

Having described our invention, we claim—

The combination in a compound engine, of cylinders A and B, the steam-chest C interposed between said cylinders, the direct passages *c c* through said chest leading from one cylinder into the other, inlet-ports *b b* at each end of said chest, and the exhaust-port at its middle, the transverse valves *F F* crossing the passages *c c*, constructed and adapted to operate substantially as described.

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