

No. 726,788.

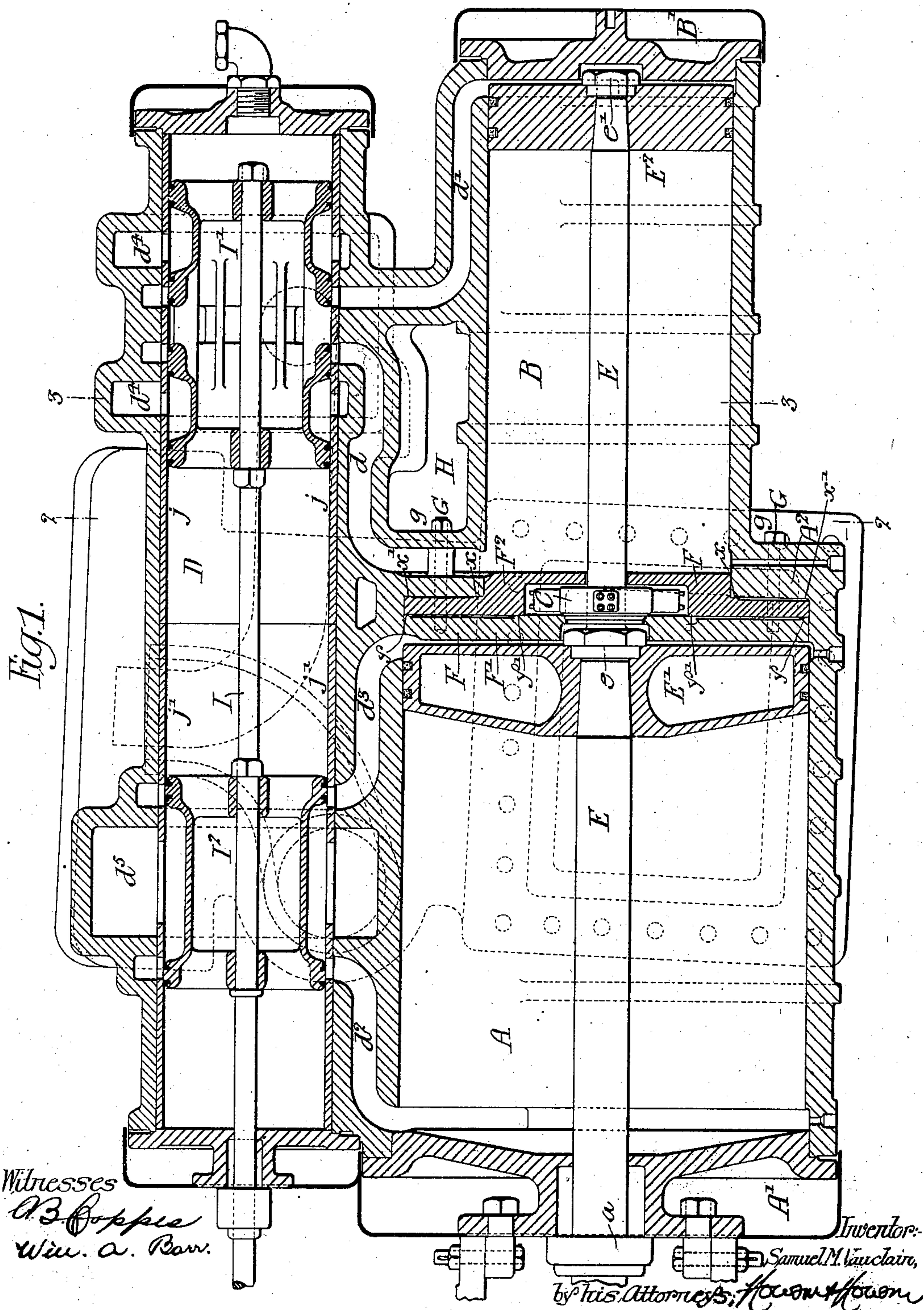
PATENTED APR. 28, 1903.

S. M. VAUCLAIN.
TANDEM COMPOUND ENGINE.

APPLICATION FILED MAR. 7, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 2.

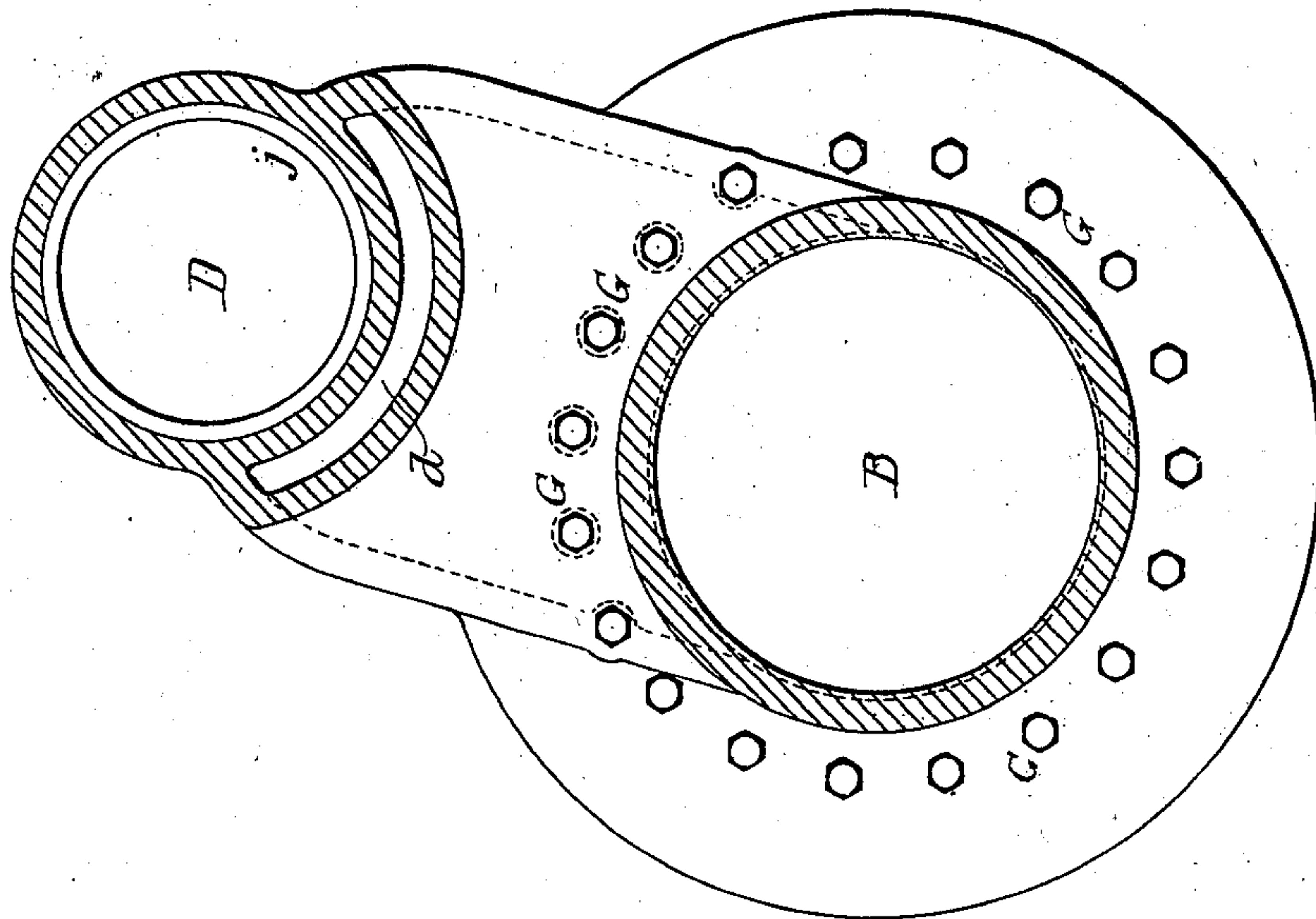
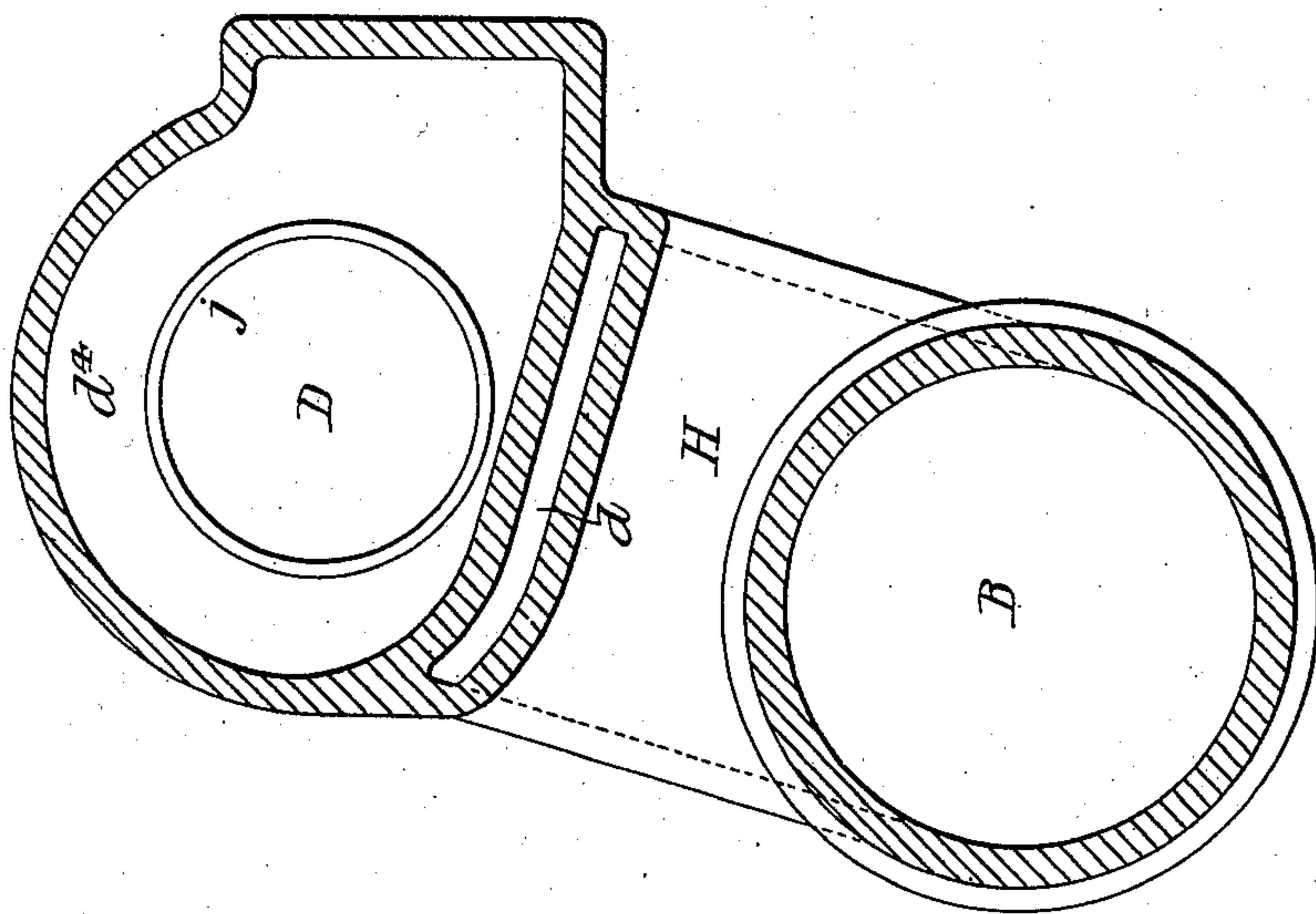


Fig. 3.



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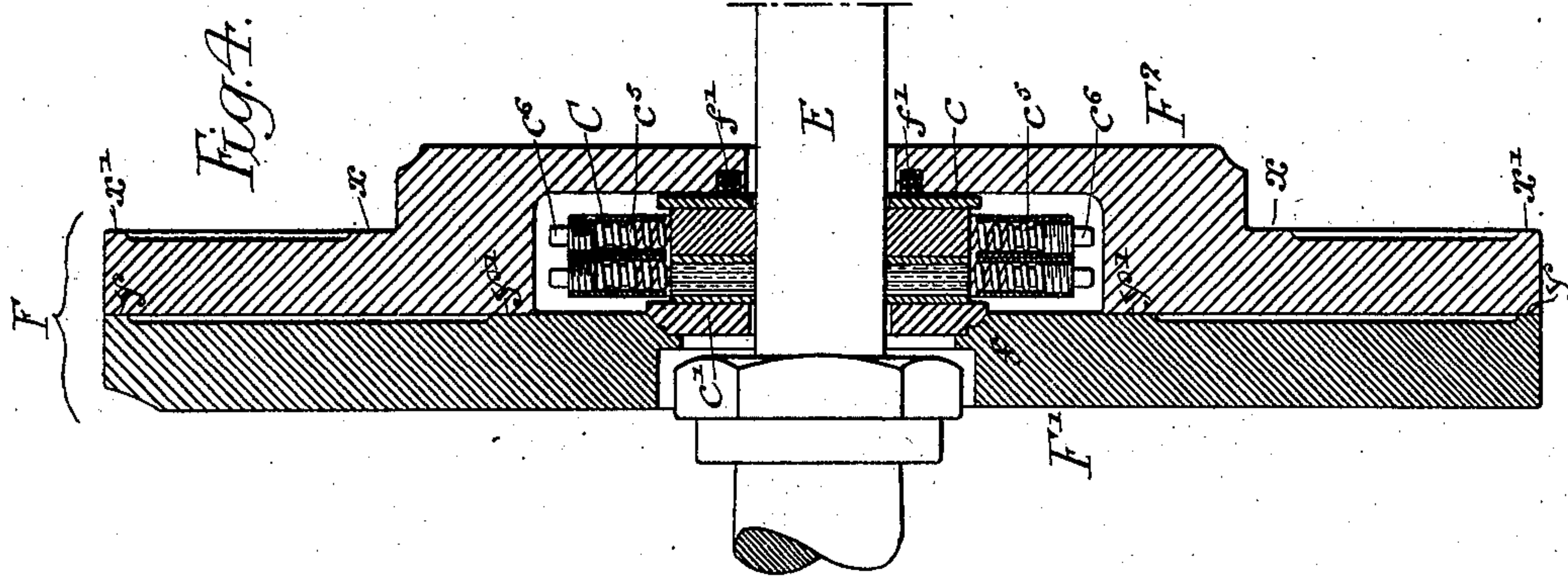
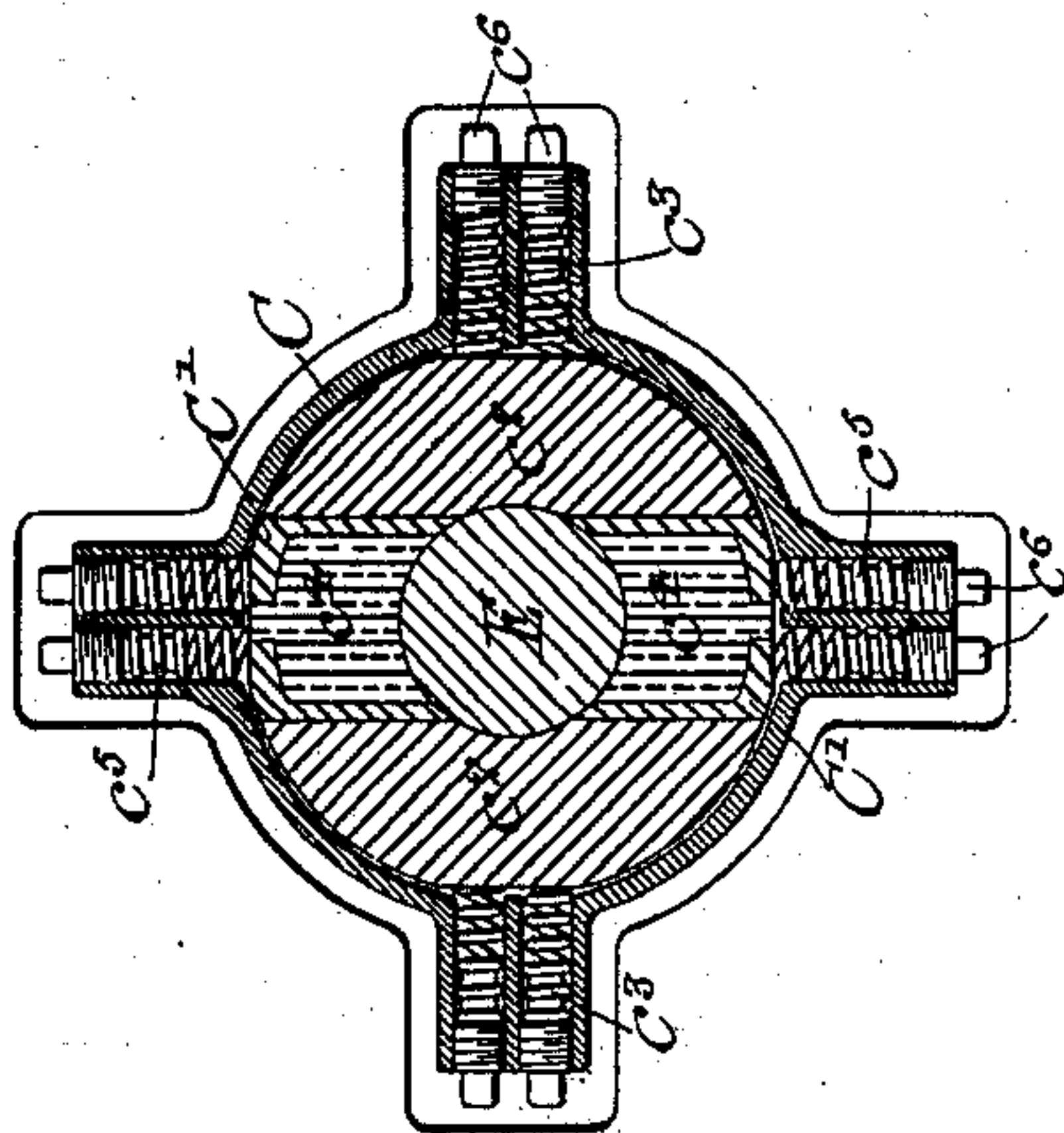


Fig. 5.



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UNITED STATES PATENT OFFICE.

SAMUEL M. VAUCLAIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
BURNHAM, WILLIAMS & COMPANY, OF PHILADELPHIA, PENNSYLVANIA,
A FIRM.

TANDEM COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 726,788, dated April 28, 1903.

Application filed March 7, 1902. Serial No. 97,113. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL M. VAUCLAIN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Tandem Compound Engines, of which the following is a specification.

The main object of my invention is to so construct a tandem compound engine that the partition-head between the high and the low pressure cylinders can be secured in position without the use of internal bolts; and a further object of the invention is to so arrange the parts that the packing-casing is confined between two plates without the use of internal bolts. These objects I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of the high and low pressure cylinders and the valve-chest of a tandem locomotive-engine. Fig. 2 is a transverse section on the line 2 2, Fig. 1. Fig. 3 is a transverse section on the line 3 3, Fig. 1; and Figs. 4 and 5 are detail views of the partition and the packing used between the high and low pressure cylinders.

A is the low-pressure cylinder of a tandem compound locomotive-engine.

B is the high-pressure cylinder.

D is the valve-chest common to both the high and low pressure cylinders.

E is the piston-rod.

E' is the piston of the low-pressure engine, which is forced on the rod and is held in position by a nut *e*, and E² is the piston of the high-pressure cylinder, also forced on the rod E and held in place by a nut *e'*.

A' is the removable head of the low-pressure cylinder, having a stuffing-box *a* of the ordinary type through which the piston-rod E extends.

B' is the removable head of the high-pressure cylinder.

Mounted between the high and low pressure cylinders is the division-head F, in the present instance made up of two sections F' F². The section F² has a recess *f*, in which is a stuffing-box C, through which extends the reduced portion of the piston-rod E. The details of this stuffing-box will be described hereinafter.

In order to make an accurate fit between the partition and the cylinder, I form ground or finished bearings *x x'*, and I also form ground bearings *y y'* between the two parts F' F² of the partition F.

In the present instance the high-pressure cylinder B and the low-pressure cylinder A are formed in a single casting, the two cylinders being connected together by an annular wall A². Stud-bolts G extend through this wall, through the section F², and into the section F' of the partition F, and a nut *g* on these bolts confines the said sections rigidly to the wall A² of the casting, dispensing with all internal bolts or nuts, so that the bolts are accessible at all times from the outside without dismantling the engine. Furthermore, the liability of a bolt or nut becoming loose and causing damage by obstructing the movement of either piston is obviated.

In order that access may be had to the series of bolts G situated between the valve-chest and the high-pressure cylinder, I make the passage *d*, leading from the valve-chest D to the rear end of the high-pressure cylinder B, so that it will hug the valve-chest instead of hugging the cylinder in the ordinary manner. This leaves a clear opening H between the casing of the passage and the valve-chest and the casing of the high-pressure cylinder, as clearly understood on reference to the transverse sectional views, Figs. 2 and 3. The passage *d'*, leading from the valve-chest D to the forward end of the high-pressure cylinder B, hugs said high-pressure cylinder in the ordinary manner. The metal surrounding this port *d'* is also used as a means of rigidly connecting the valve-casing to the high-pressure cylinder. The passages *d² d³*, leading from the valve-chest to the low-pressure cylinder, are formed in the usual manner.

I is a valve-rod, and on this valve-rod is the valve I', controlling the admission of live steam to the high-pressure cylinder and the exhaust of steam therefrom. Also on this rod is a valve I², controlling the admission of steam to the low-pressure cylinder and exhaust of steam therefrom.

The valve-chest in the present instance is one continuous chamber, in which are two

bushings j and j' , having the ports therein communicating with the several passages d d' d^2 d^3 and with the inlet-passages d^4 for the high-pressure cylinder and the final exhaust-
 5 passage d^5 for the low-pressure cylinder.

The valves I I^2 are in the present instance cylindrical valves, having openings through the center, so as to form a sufficiently large expansion-chamber between the high and low
 10 pressure cylinders, and at the same time the valves are perfectly balanced.

The ports d^4 for the admission of live steam may be connected in the usual manner to the steam-supply pipe, and the exhaust-port d^5
 15 may also be connected to its passage in the usual manner.

While I may use any form of packing between the two sections F' F^2 of the partition-head F , I prefer to use the packing illustrated
 20 in Figs. 4 and 5, which I will now proceed to describe.

The casing C has a back c and a cover-plate c' , and mounted in the casing are the two segmental packing-sections c^2 c^3 , each
 25 backed by springs c^3 , and between these two segmental packing-sections c^2 are blocks C' , in which is mounted suitable packing material c^4 . These parts c^4 have segmental bearing-surfaces, which fit the piston-rod, while
 30 the section c^2 bears against each side of the sections c^4 .

The springs c^3 tend to press the sections C' against the piston-rod, so that there is a steam-tight joint between the high-pressure and
 35 low-pressure cylinders. The springs may be taken up by suitable screw-plugs c^6 .

The cap-plate c' has a balled portion, against which the portion f of the section F' of the partition rests, and there are springs
 40 f' resting in cavities in the section F^2 , and these springs bear against the rear of the packing-box, as clearly illustrated in Fig. 4, so that the packing-box is held firmly against the seat f , and yet will have sufficient yield to
 45 allow the packing-box to accommodate itself to the piston-rod.

I claim as my invention—

1. The combination in a tandem compound engine of high and low pressure cylinders, a
 50 removable partition separating said cylinders and constructed to be placed in position and removed therefrom through the low-pressure cylinder, with means wholly exterior of the cylinders for securing said partition in po-
 55 sition, substantially as described.

2. The combination in a tandem compound engine of the high and low pressure cylinders, a partition separating the said cylinders and constructed to be placed in position or re-
 60 moved through one of said cylinders, with a series of bolts securing said partition to the cylinder-casting, said bolts being accessible from the exterior, substantially as described.

3. The combination in a tandem compound engine, of the high and low pressure cylinders, a partition separating the two cylinders, said
 65 partition being made of two sections, with

bolts securing the two sections of the partition to the cylinder-casing, substantially as described. 70

4. The combination in a tandem compound engine, of a casting forming the high and low pressure cylinders, a partition separating the two cylinders, said partition being made in two sections placed within said casting with
 75 bolts passing through the casting and one of the sections of the partition into the other section, said casting being constructed so that access can be had to said bolts from the exterior, substantially as described. 80

5. The combination in a tandem compound engine, of the high and low pressure cylinders, a partition mounted between the two cylinders, said partition being made of two sections secured to the casing, a cavity in one
 85 section covered by the other section, with a stuffing-box for the piston, said stuffing-box being held in place by the other section of the partition, substantially as described.

6. The combination of a single cylinder-
 90 casting having a high and a low pressure cylinder therein arranged in tandem and having an annular wall integral therewith and forming the connection between said two cylinders, a partition resting against the inter-
 95 rior surface of said wall and bolts passing from the exterior of the casting through the wall and into the partition, substantially as described.

7. The combination in a cylinder-casting, 100 of a high and low pressure cylinder therein arranged in tandem, an annular wall connecting the high-pressure cylinder with the low-pressure cylinder, a partition made in two sections, said partition resting against
 105 the inner surface of said wall, with external bolts passing through the wall and through one section of the partition-plate and into the other, whereby the said partition-plates are held together and to the wall, substan-
 110 tially as described.

8. The combination in a tandem compound engine, of a cylinder-casing having a high and low pressure cylinder therein, a valve-chest for the high-pressure cylinder, passages
 115 forming communication between the valve-chest and with each end of the high-pressure cylinder, the forward passage arranged in close proximity to the valve-chest so as to leave a free opening between the high-pres-
 120 sure cylinder and the valve-chest and the passage, with a detachable partition separating the high and low pressure cylinders, and external bolts securing the said partition to the casing, some of said bolts being within
 125 the clear opening so that access may be had to the bolts from the exterior, substantially as described.

9. The combination in a tandem engine, of the high and low pressure cylinders, a de-
 130 tachable partition separating the said cylinders, a valve-chest common to both of said cylinders, passages leading from the said valve-chest to each end of the low-pressure

cylinder, passages leading from the valve-chest to each end of the high-pressure cylinder, one end of each passage hugging the valve-chest so as to form a clear open space
5 between the casing of the passage and valve-chest and the cylinder, the other passage hugging the high-pressure cylinder and communicating with the rear-end of said cylinder, and bolts securing the detachable partition to the casing, some of said bolts being
10 within the clear opening, substantially as described.

10. The combination in a tandem compound engine, of a cylinder-casting, a partition separating the high and low pressure

cylinders, external means for securing the partition in place, said partition being made in two sections forming a cavity, a packing-box within the cavity and resting against a plate bearing on one section of the partition, with springs mounted between the box and the other section of the partition, substantially as described. 20

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

SAMUEL M. VAUCLAIN.

Witnesses:

WILLIAM DE KRAFFT,
W. N. TUTTLE.