

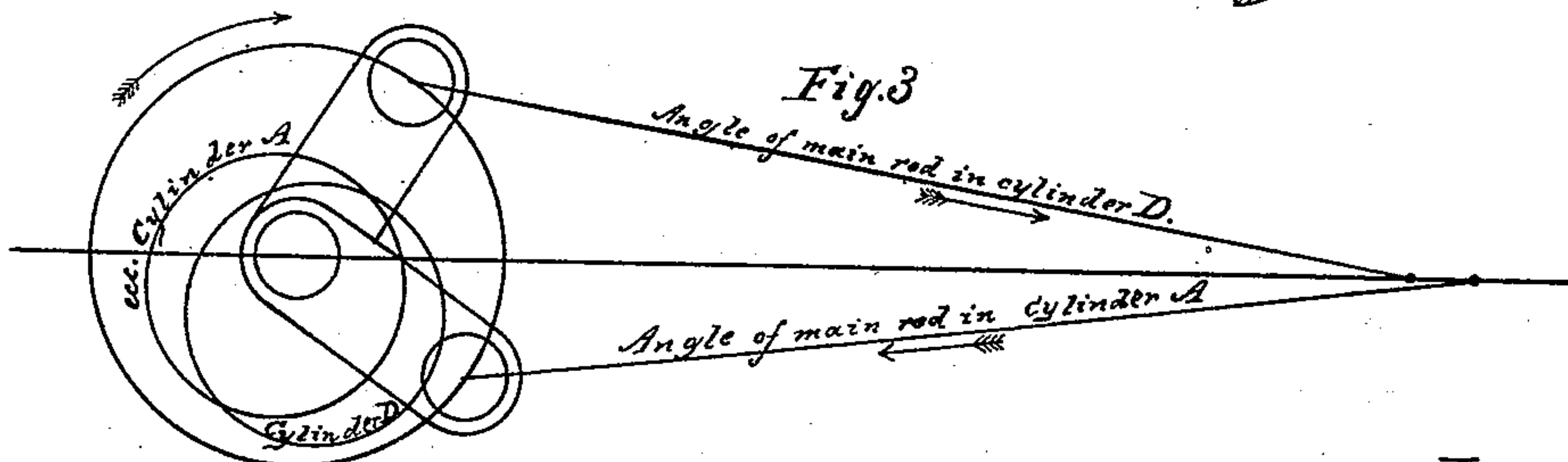
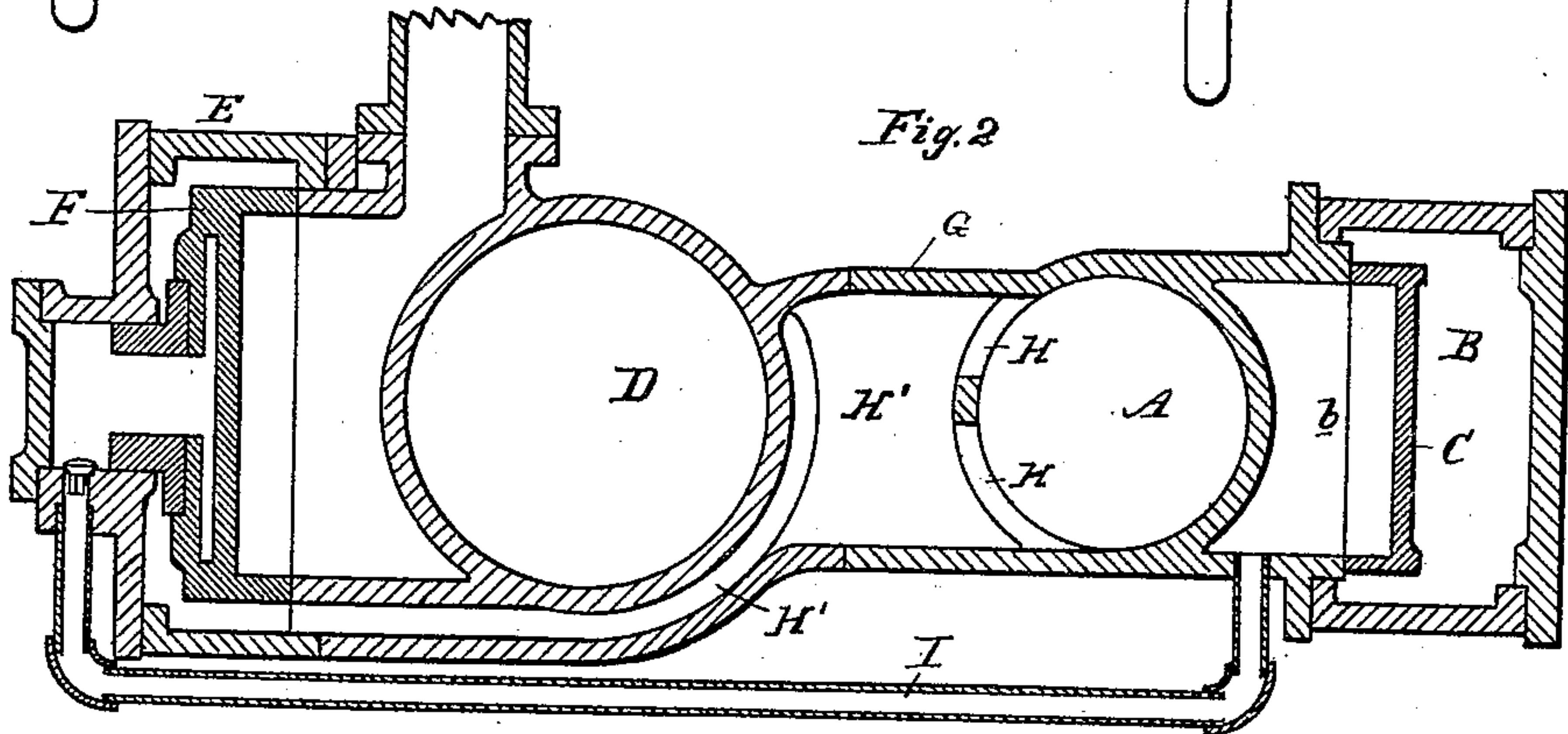
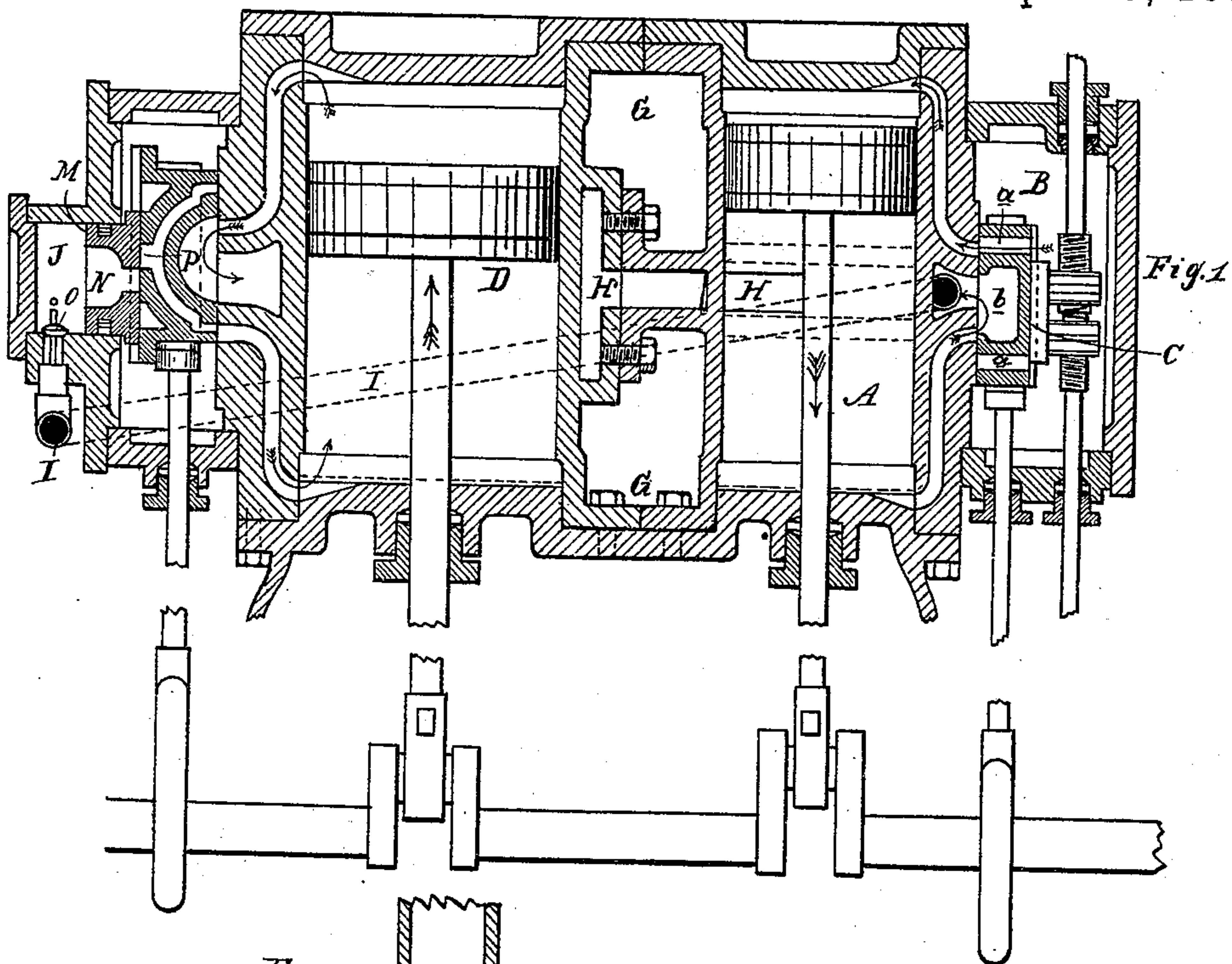
(No Model.)

I. A. TURNER.

STEAM ENGINE.

No. 361,602.

Patented Apr. 19, 1887.



Attest:
John Schuman.
[Signature]

Inventor:
Isaac A. Turner.
by his Atty
[Signature]

UNITED STATES PATENT OFFICE.

ISAAC A. TURNER, OF DETROIT, MICHIGAN.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 361,602, dated April 19, 1887.

Application filed September 23, 1886. Serial No. 214,344. (No model.)

To all whom it may concern:

Be it known that I, ISAAC A. TURNER, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to certain new and useful improvements in that class of steam-motors known as "compound steam-engines."

The improvement consists in the peculiar arrangement and combination of two three-ported slide-valve engines of the ordinary type, whereby the desired distribution of steam is obtained in a very simple manner through both inside and outside connecting-passages.

Figure 1 is a section of my compound engine through the axis of the cylinders. Fig. 2 is a cross-section through the cylinders and steam-chests. Fig. 3 is a diagram showing the position of the cranks and eccentrics in Fig. 1.

The object I design more especially to accomplish in the present invention is to relieve any possible compression in the high-pressure cylinder and utilize the same to operate the piston in the low-pressure cylinder.

In the accompanying drawings, which form a part of this specification, A represents the smaller or high-pressure cylinder, having a steam-chest, B, and slide-valve C, with the usual inlet-ports, *a*, and exhaust-port *b*.

D is the larger, low-pressure, or expansion cylinder, having a steam-chest, E, with slide-valve F, with exhaust and inlet passages, and these are all made in any of the known and appropriate constructions.

G are the adjacent parts of the two cylinders, by means of which the latter are secured together, and H is a port in the cylinder A, communicating through a passage, H', with the steam-chest of the low-pressure cylinder.

I is a pipe connecting the exhaust-passage of the cylinder A with a steam-chest, J, formed on the steam-chest E on the back of the valve F. This steam-chest is provided with the valve-seat M, which has a port, N, communicating through the port P with the steam-ports of the valve F during certain portions in the travel of the valve F. The pipe I is

preferably provided with a check-valve O, located at any convenient point. The cranks on the main shaft, to which the pistons are connected, are at right angles to each other.

The operation of the parts is as follows: The piston in the cylinder A, traveling in the direction of the arrow in Fig. 1, after passing over the port H, permits the live steam (which may have been previously thereto cut off) to flow through the port H and passage H' into the steam-chest E, and from there it is discharged or distributed in the proper manner by the valve F into the cylinder D. What steam there is in front of the piston in the cylinder A will pass into the exhaust-port of the valve C, and thence through the pipe I into the steam chest or receiver J, and from there through the ports N and P into the cylinder D, after the valve F has reached its point of cut off, as shown in Fig. 1. The compression in the cylinder A is thereby utilized to assist in the movement of the piston in the low-pressure cylinder. As soon, however, as the valve F cuts off the admission of steam to the lower side of the cylinder, such steam from the cylinder A finds its way through the ports of the valve F on top of the piston therein and forms the cushion. In the reverse motion of the pistons this travel of the steam is reversed in like manner.

The difference between the steam-engine herein described and the one patented to me February 9, 1886, No. 336,025, consists in the arrangement of the pipe I and steam-chest J. Otherwise the two are substantially the same in construction and operation.

What I claim as my invention is—

1. In a compound engine, the combination, with two three-ported slide-valve engines arranged substantially as described, of a single steam-passage connecting the high-pressure cylinder with the steam-chest of the low-pressure cylinder and the connection between the exhaust-port of the high-pressure cylinder and the steam-chest of the low-pressure cylinder, substantially as specified.

2. In a compound engine, the combination of two three-ported slide-valve engines arranged substantially as described, the steam-education port in the high-pressure cylinder near the middle of its length, a single steam-passage connecting said port with the steam-

chest of the low-pressure cylinder, and a steam-
passage connecting the eduction-port of the
high-pressure cylinder with the steam-chest of
the low-pressure cylinder, substantially as
5 specified.

3. In a compound engine, two three-ported
slide-valve engines arranged substantially as
described, with a steam-port connecting the
cylinder of the high-pressure engine with the
10 steam-chest of the low-pressure cylinder and

forming a steam-port in the cylindrical wall
of the high-pressure cylinder, in combination
with a pipe-connection between the eduction-
port of the high-pressure cylinder and the
steam-chest of the low-pressure cylinder, sub- 15
stantially as and for the purposes specified.

ISAAC A. TURNER.

Witnesses:

H. S. SPRAGUE,
CHARLES J. HUNT.