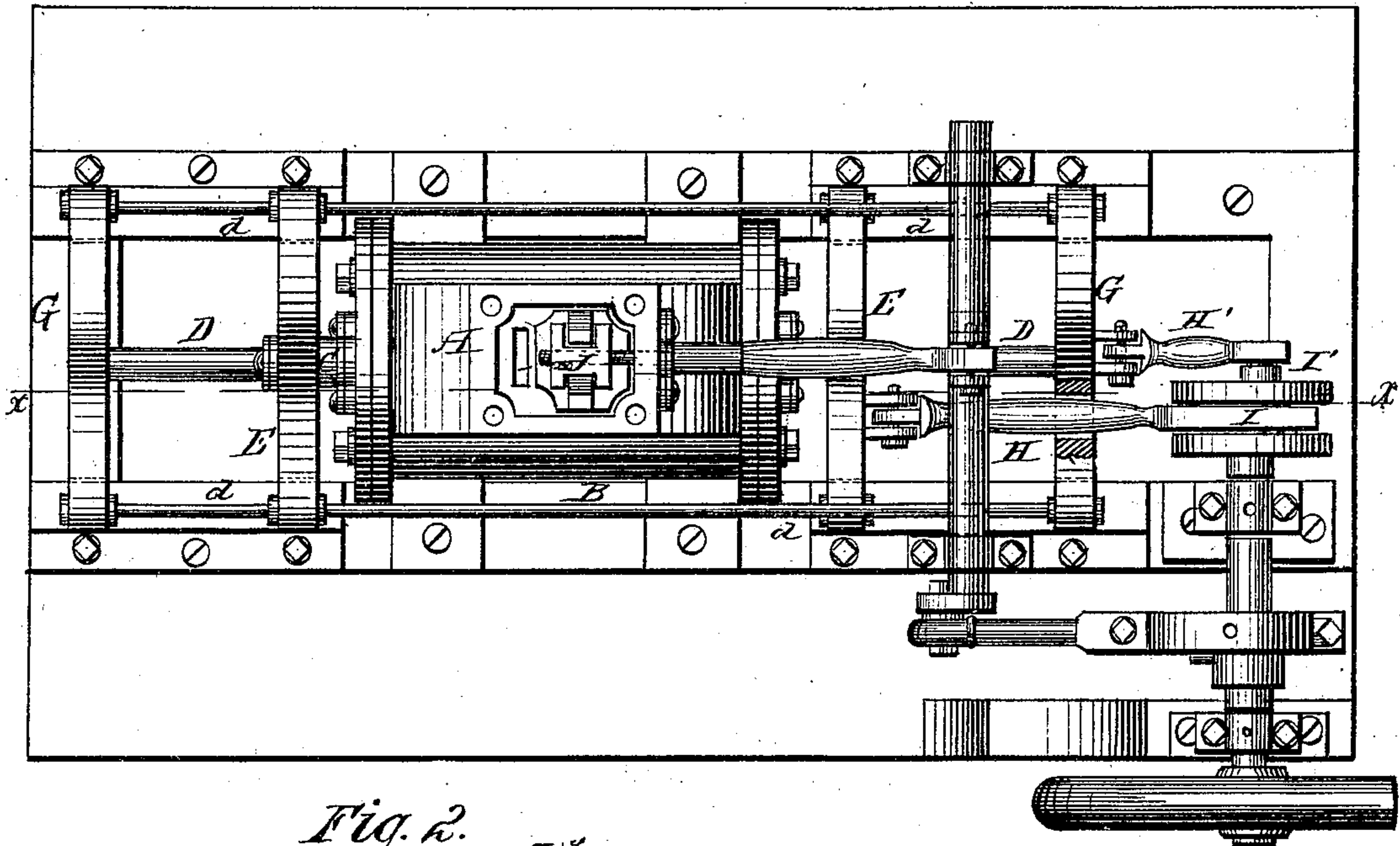


S. B. FRANK.  
Steam-Engine.

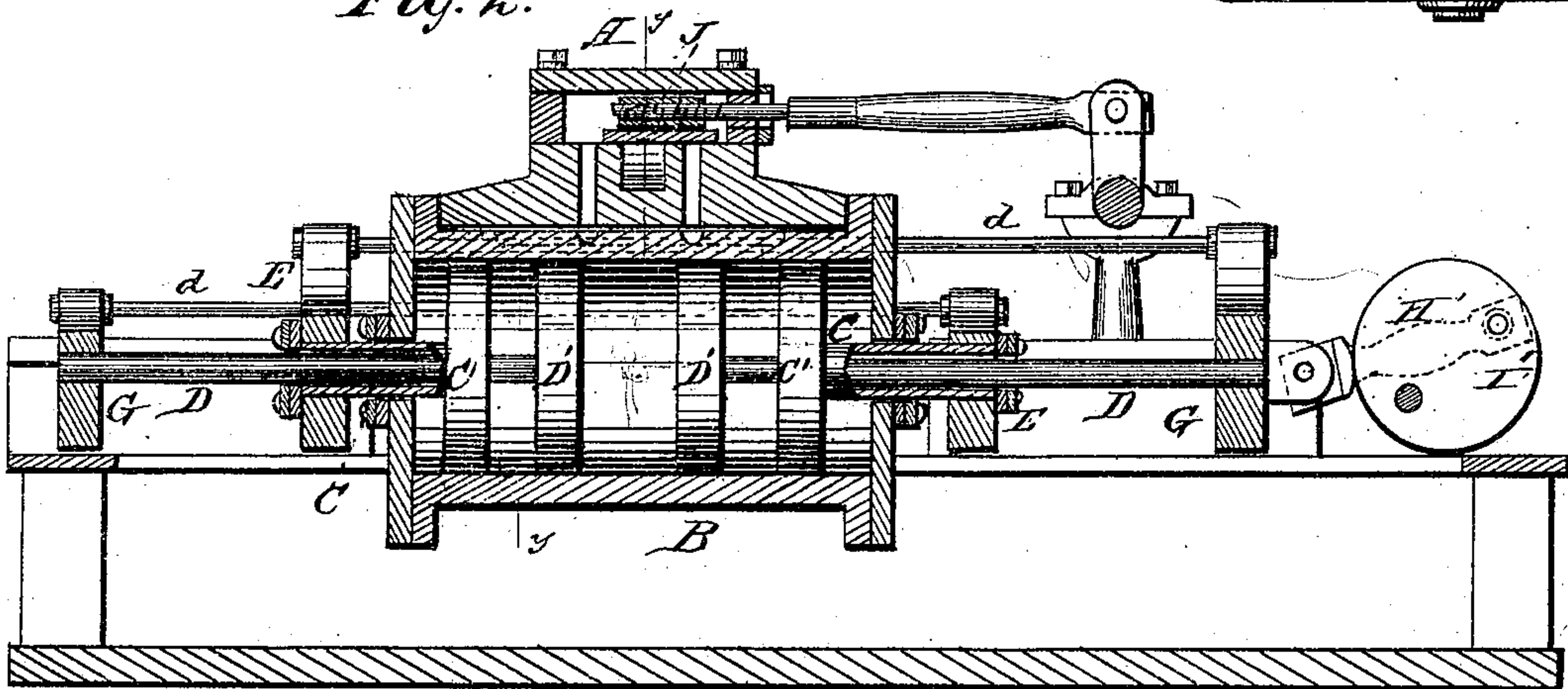
No. 169,249.

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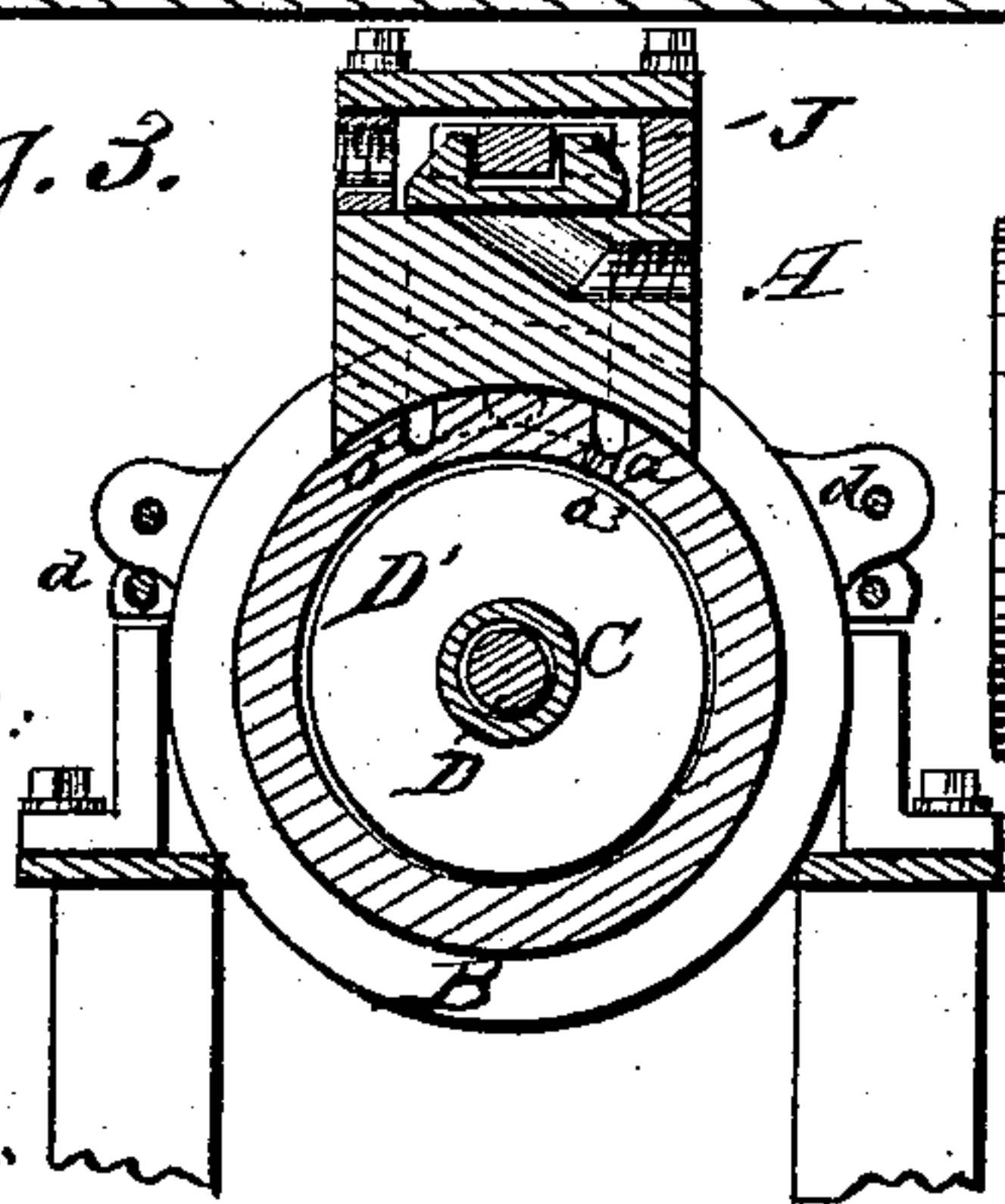
*Fig. 1.*



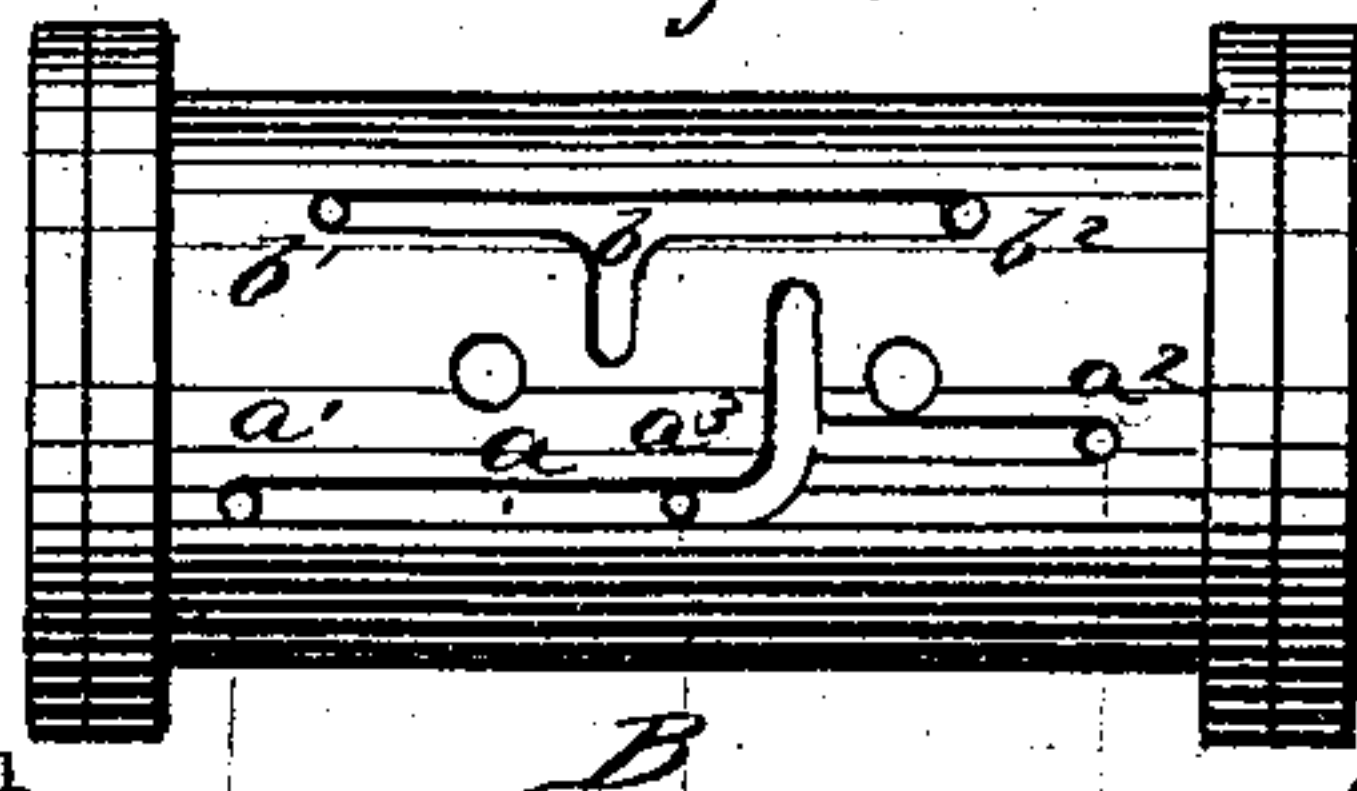
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



WITNESSES:

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# UNITED STATES PATENT OFFICE

SAMUEL B. FRANK, OF MARSHALL, MISSOURI.

## IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **169,249**, dated October 26, 1875; application filed October 6, 1875.

*To all whom it may concern:*

Be it known that I, SAMUEL B. FRANK, of Marshall, in the county of Saline and State of Missouri, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists in the construction and arrangement of a steam-engine worked by four pistons, with two connections, as will be hereinafter more fully set forth.

In the annexed drawing, Figure 1 is a plan view of my improved steam-engine. Fig. 2 is a longitudinal section of the same. Fig. 3 is a transverse section through the line *y y*, Fig. 2. Fig. 4 is a plan view of the steam-cylinder in reduced dimensions.

A represents the ordinary steam-chest, provided with two ports, *a* and *b*, which are divided into five channels, *a*<sup>1</sup> *a*<sup>2</sup> *a*<sup>3</sup> and *b*<sup>1</sup> *b*<sup>2</sup>, so arranged that the steam will pass from the chest by the port *a* along the three channels *a*<sup>1</sup>, *a*<sup>2</sup>, and *a*<sup>3</sup>, into the cylinder, said three channels or inductions opening into the cylinder, one at each extremity and one midway thereof. The steam will pass from the chest by the port *b* along the two channels *b*<sup>1</sup> *b*<sup>2</sup> into the cylinder at points one-fourth the distance, respectively, from the ends of the cylinder. B represents the cylinder, in which are arranged four piston-heads, C' C' and D' D', each of which traverses or plays one-fourth of the length of the cylinder. C C are the piston-rods for the piston-heads C' C', and are made hollow, as shown. D D are the piston-rods for the piston-heads D' D', and are made solid. The piston-rods C C and D D are connected to cross-heads E E and G G, respectively, and the solid rods D D pass through the hollow rods C C. The outside cross-head

G at each end connects with the inside cross-head E at the opposite end by means of rods *d d*, as shown in Fig. 1. The two cross-heads E and G at the front end of the cylinder are by ordinary strap-joints and connections H H' connected with wrists I and I', respectively, said wrists being so set as to be always at opposite points. The steam entering the cylinder through the channels *b*<sup>1</sup> *b*<sup>2</sup> forces the two piston-heads C' C' to the ends of the cylinder, and the other two piston-heads to the middle of the cylinder, and then when the steam enters through the three channels *a*<sup>1</sup>, *a*<sup>2</sup>, and *a*<sup>3</sup>, it forces the piston-heads C' D' on one side of the center toward each other to a point one-fourth of the distance from one end of the cylinder, and the other two piston-heads in similar manner to a like point from the other end of the cylinder. J is the ordinary slide-valve in the steam-chest A, operated in the usual manner, from the engine-shaft.

By this construction of the engine there is secured from a given amount of steam four times the quantum of power, and, consequently, four times the quantum of motion of the ordinary engine, and the driving-pulley for any machine needs to be only one-fourth of the usual size to secure any given motion.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is—

The combination, with four pistons working within a single cylinder and having separate and independent piston-rods projecting from opposite ends of the cylinder, of the four cross-heads connected two and two, as described, and then by strap-joints and connections with two separate wrists, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

SAMUEL B. FRANK.

Witnesses:

WM. H. LETCHER,  
J. R. LETCHER.