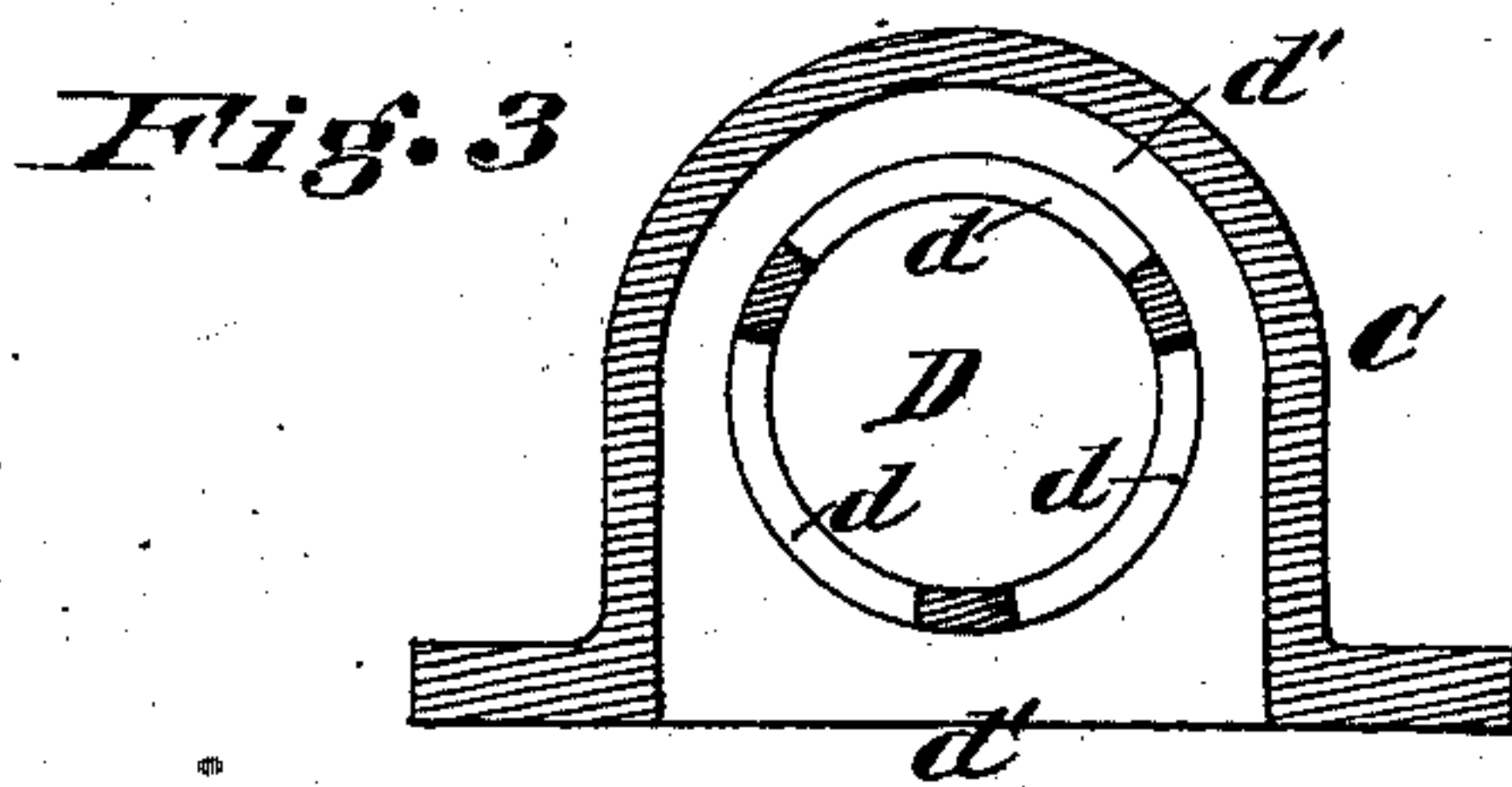
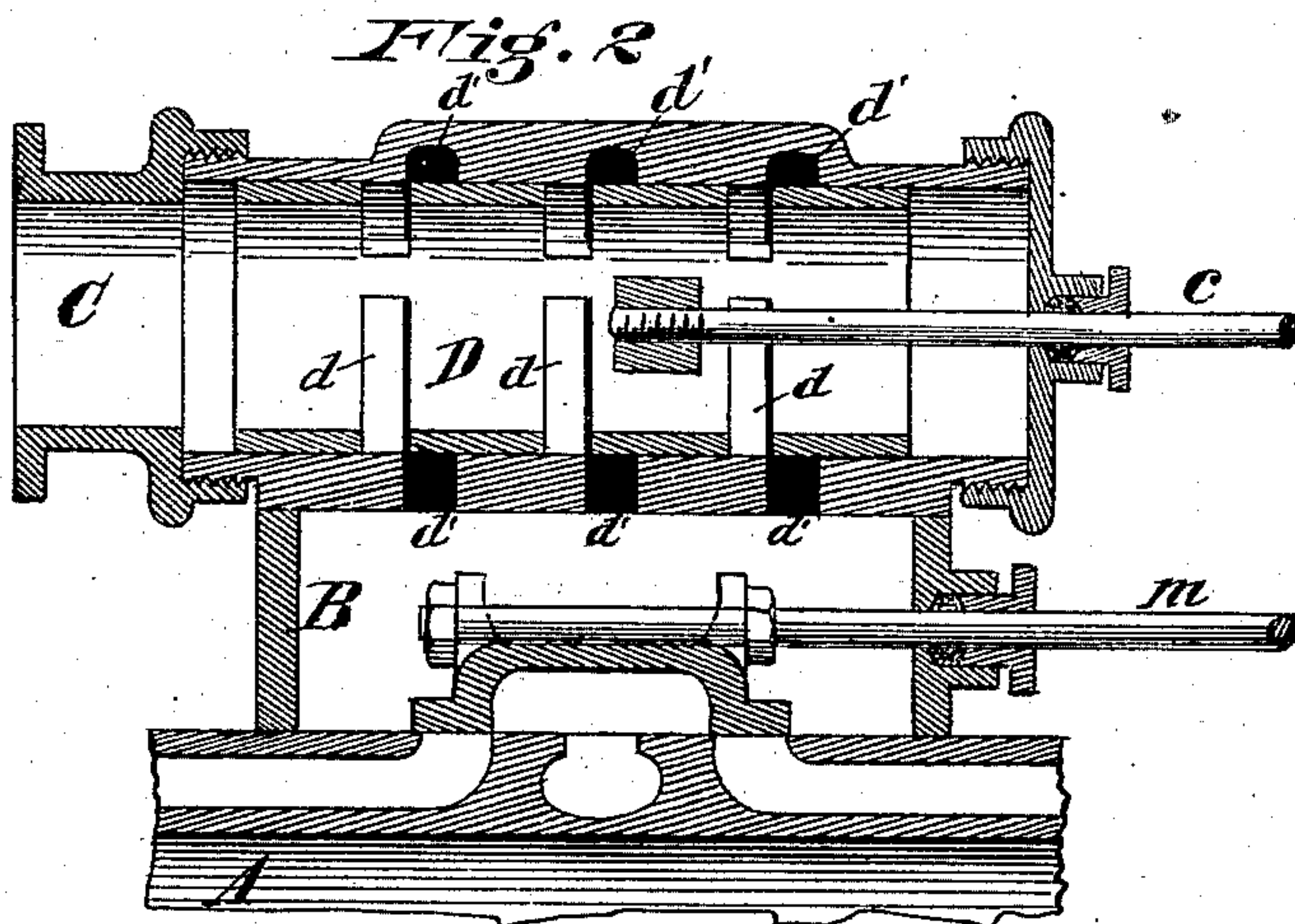
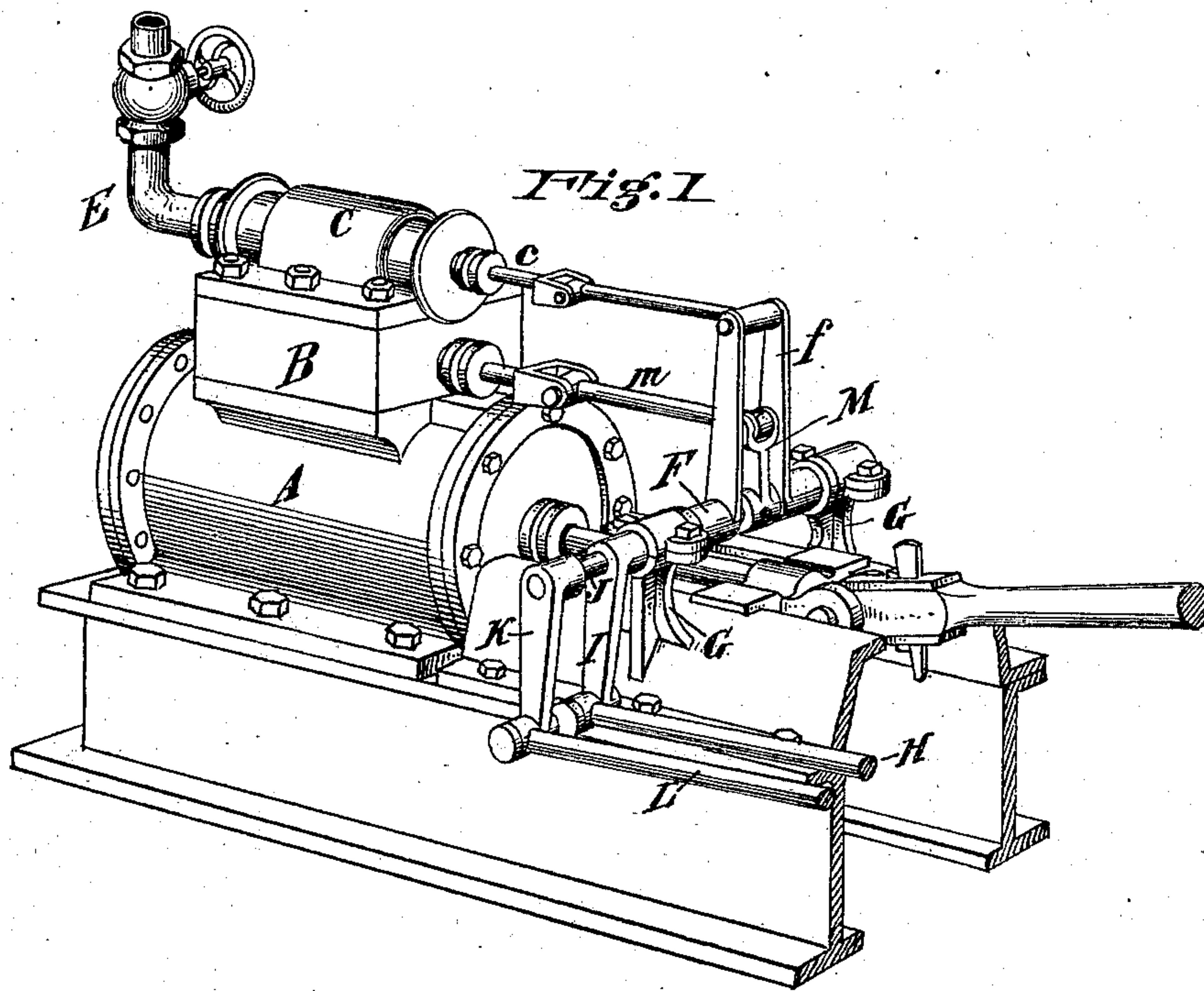


P. BREEN.
Valve Gear for Steam Engines.
No. 238,842. Patented March 15, 1881.



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UNITED STATES PATENT OFFICE.

PETER BREEN, OF CINCINNATI, OHIO.

VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 238,842, dated March 15, 1881.

Application filed February 11, 1880.

To all whom it may concern:

Be it known that I, PETER BREEN, of Cincinnati, Ohio, have invented a new and useful Improvement in Valve-Gear for Steam-Engines, of which the following is a specification.

My invention relates to improvements in steam-engines in which a cut-off valve is employed; and the objects of my improvements are, to provide a cut-off valve which shall be simple, effective, and operate in connection with the main valve, to regulate the flow of steam to the working-cylinder, and at the same time relieve the pressure upon the main valve, and also to provide a means for operating the supplemental valve in connection with but independently of the main valve. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of the cylinder portion of an ordinary slide-valve engine, showing the valve-chambers and the immediate valve-connections. Fig. 2 is a vertical section of both valve-chambers and valves; and Fig. 3 is a cross-section of the supplemental-valve chamber and valve through one of its ports.

A in the drawings is the cylinder, and B the steam-chest, of an ordinary slide-valve engine to which my invention is applied.

The supplemental-valve chest C is cast with or secured to the cover of the slide-valve chest B. The valve-chest C is a cylinder, horizontally arranged, in which reciprocates a closely-fitting hollow piston-valve, D, having one or more peripheral openings, *d*, registering with an equal number of similar ports, *d'*, in the inner periphery of the cylinder, opening through the cover into the main-valve chest B. The combined port-area of the valve D and also its chamber C should be equal to the area of the delivery steam-pipe E, which enters at the rear end of the supplemental-valve chamber C. Suitable packing-rings may be secured upon the periphery of the piston-valve D at each side of the port-openings, in order to insure a steam-tight fit. The steam is delivered at the rear end of the valve-chamber C, and passes through the hollow valve D and radially through its openings *d* into and through

the ports and channels *d'* into the main-valve chest B.

I prefer to employ a piston-valve and chamber with two or three separate openings, in order to insure a quick passage and avoid "wire-drawing" of the steam.

The valve D is operated by means of a stem, *e*, in the same manner as the main slide-valve. The mechanism for this purpose is as follows: A hollow rock-shaft, F, with cranks *f*, for operating the supplemental valve D, is mounted, in the usual manner, upon bearings G G, rising from the engine-bed or cross-head guides, and is operated from an eccentric upon the main shaft through a connecting-rod, H, and a crank-arm, I, upon the projecting end of the rock-shaft. Another rock-shaft, J, is fitted within the hollow bore of the rock-shaft F, and to its projecting end is secured a crank-arm, K, by means of which a connecting-rod, L, transmits motion from an eccentric upon the main shaft. At the center of and upon the rock-shaft J, and between the cranks *f* of the hollow rock-shaft F, is secured a crank-arm, M, which rises and operates between the cranks *f*, to reciprocate the main-valve rod *m*. Thus the two valves are actuated independently of each other by eccentrics upon the main shaft by combined though independent mechanism.

The operation is as follows: The actuating mechanism of the valve D is set to open its ports very slightly in advance of the main valve. Thus no steam is admitted to the main-valve chest until the main-valve ports are about opening to admit it to the working-cylinder, and it continues to enter only while the supplemental ports *d'* remain open. The proportion of the stroke during which steam is admitted to the main cylinder depends, therefore, upon the construction of the valve D and its seat, or upon the rapidity with which the valve D moves. When it is arranged to be driven by the ordinary circular eccentric upon the main shaft, as in the illustration given, the admission is regulated entirely by the width of the openings or ports of the valve-chamber C, since the speed is governed by the rotation of the main shaft.

One of the advantages of my invention is due to the fact that no steam is admitted into

the valve-chest except at times when one of its delivery-ports is open or about opening, and that the steam is shut off before the said port is closed. The result is, that the pressure upon the main slide-valve, which is so detrimental to the ordinary operation of the engine, is practically relieved. The supplemental valve acts, therefore, as a cut-off valve, and also produces the effect of a balanced slide-valve.

10 In the practical use of my invention through a period of many consecutive months I have realized a saving of nearly twenty per cent. in fuel, and also a considerable saving in the oil used in lubricating the valve and its connections.

15 It will be obvious that my invention may be used with advantage with a rotary or any other form of valve for regulating the admission of steam to the cylinder; but it is especially advantageous with the ordinary slide-valve engine, as it practically relieves the pressure upon the slide-valve and avoids the usual waste of power and other disadvantages attending that form of the steam-engine.

25 I am aware it is not new to combine a supplemental-valve cylinder with the valve-chest of a steam-cylinder, said supplemental-valve cylinder having arranged within it a rotating hollow piston-valve, and such I therefore dis-
30 claim.

Having described my invention, I claim and desire to secure by Letters Patent—

1. The combination, with a steam-cylinder, its steam-chest and valve, of a reciprocating steam-engine, of a supplemental-valve cylinder, C, arranged upon the steam-chest, and constructed with annular ports d' , (one or more,) opening into the valve-chest, and a longitudinally-reciprocating hollow piston-valve having peripheral openings d (one or more) through its wall, all constructed and arranged for operation substantially as and for the purpose described.

2. The combination, with the steam-cylinder, its steam-chest and valve, of the supplemental-valve cylinder C, connected with the detachable cover of the steam-chest, and having annular peripheral ports d' , (one or more,) and the longitudinally-reciprocating hollow piston-valve having peripheral openings d , (one or more,) all constructed and arranged for operation substantially as described.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses, this 24th day of January, 1880.

PETER BREEN.

Witnesses:

JAMES BREEN,
L. M. HOSEA.