

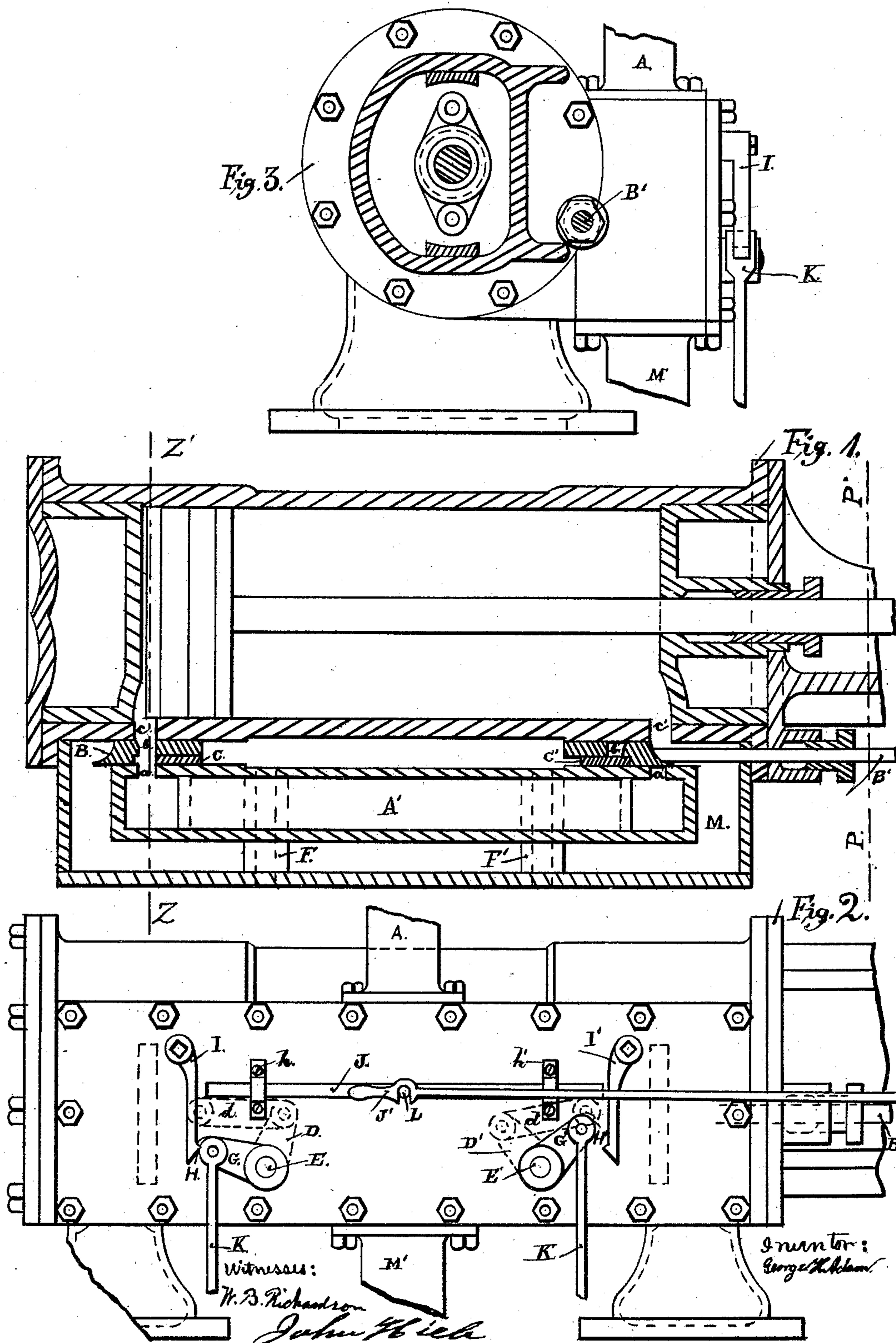
(No Model.)

2 Sheets—Sheet 1.

G. H. ADAM.
STEAM ENGINE.

No. 424,446.

Patented Apr. 1, 1890.



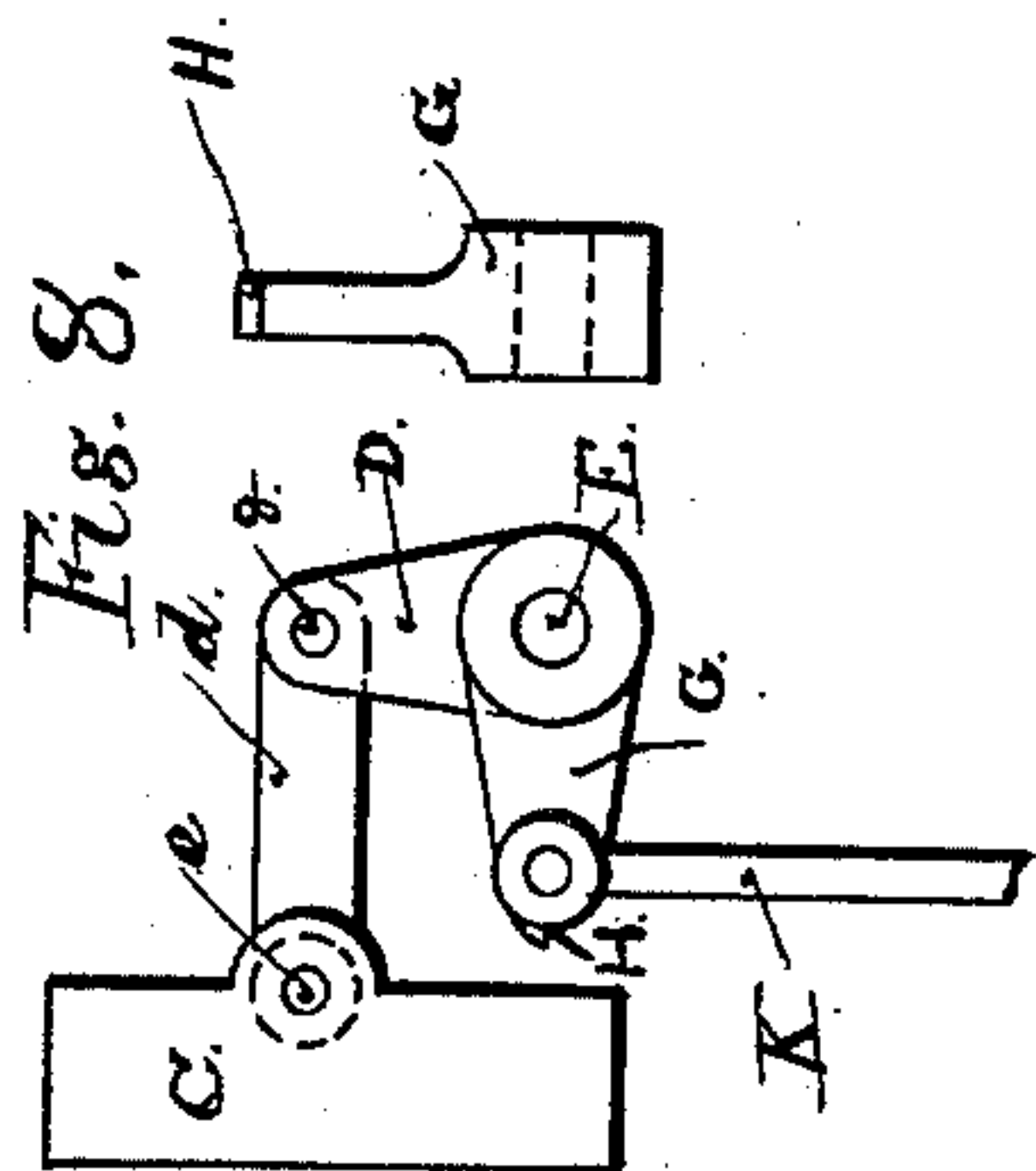
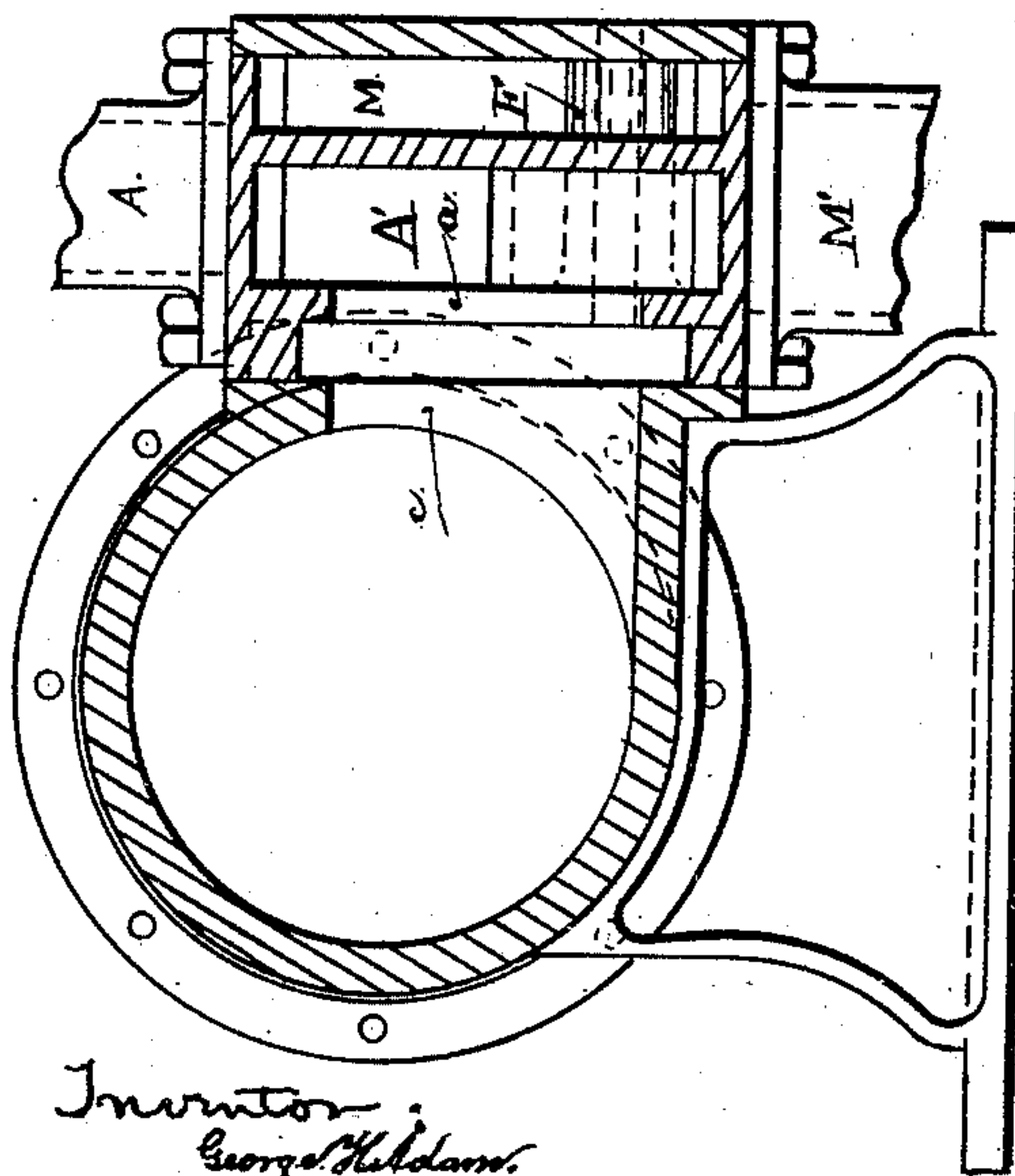
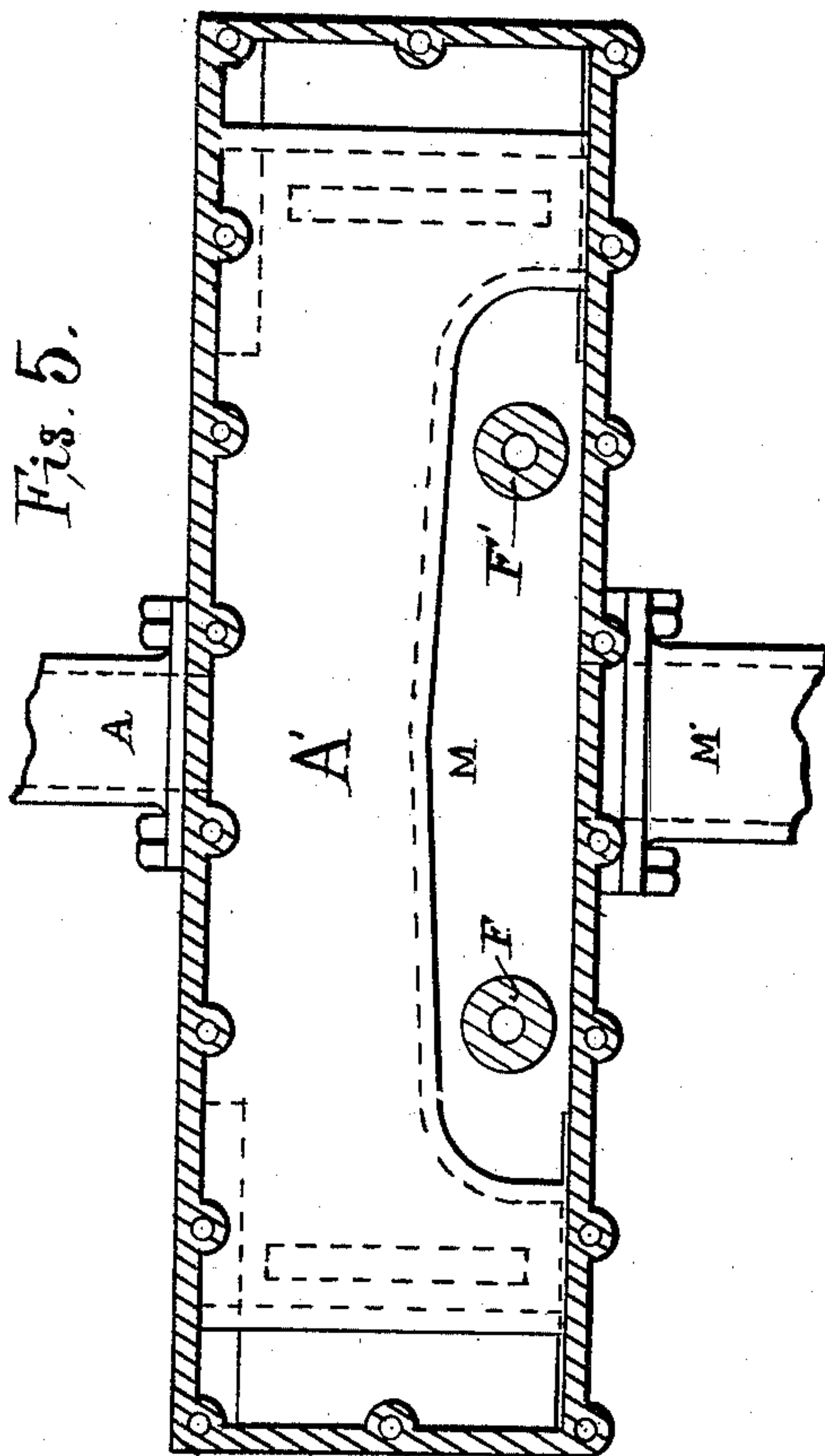
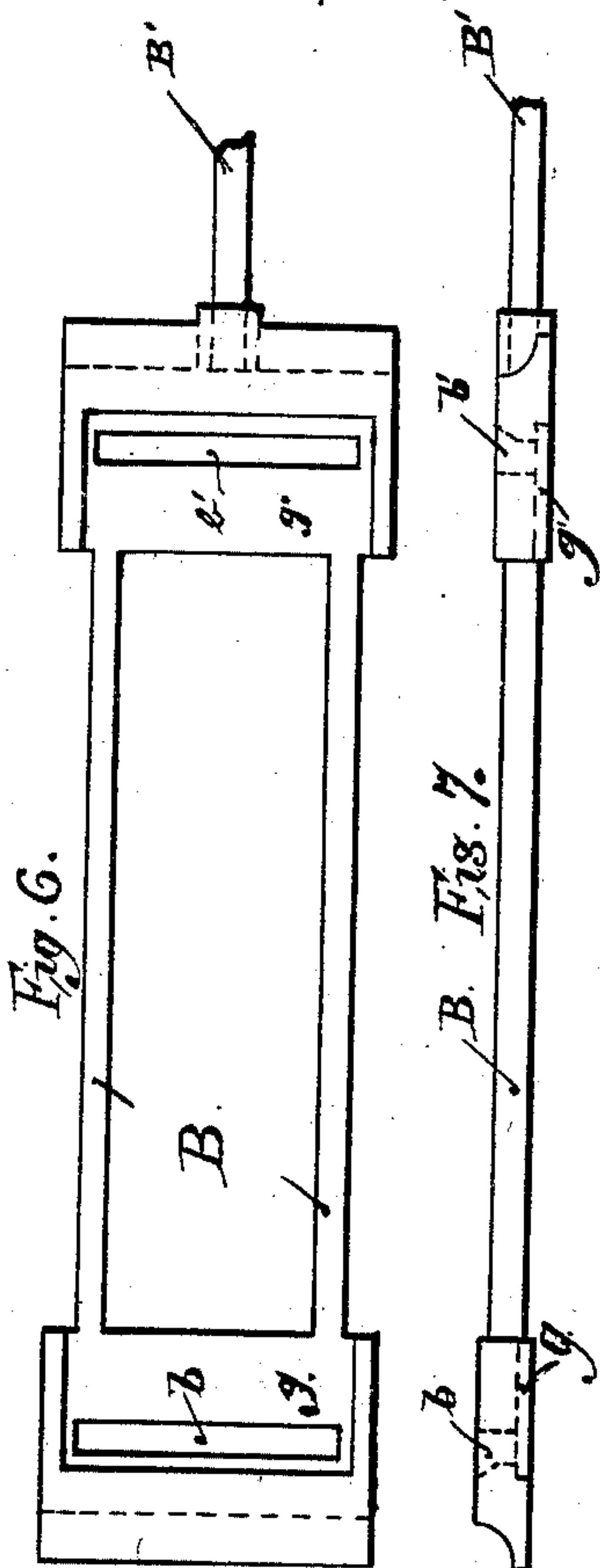
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2 Sheets—Sheet 2.

G. H. ADAM.
STEAM ENGINE.

Patented Apr. 1, 1890.

No. 424,446.



Witnesses:

W. B. Richardson
John H. Cook

Inventor:
George Hildam.

UNITED STATES PATENT OFFICE.

GEORGE H. ADAM, OF NEW ALBANY, INDIANA, ASSIGNOR OF ONE-HALF TO
JOHN H. STOTSENBURG, OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 424,446, dated April 1, 1890.

Application filed March 19, 1889. Serial No. 303,932. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. ADAM, a citizen of the United States, residing at New Albany, in the county of Floyd and State of Indiana, have invented a new and useful Improvement in Steam-Engines, of which the following is a specification.

My invention relates to an improvement in steam-engines; and it consists in the peculiar arrangement of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 shows a section through the cylinder and valves. Fig. 2 shows a side elevation of the cylinder with the dash-pot arrangement. Fig. 3 shows an end view of the cylinder and a cross-section through the frame on the line P P. Fig. 4 shows a cross-section through the cylinder and (valve) steam-chest on the line Z Z. Fig. 5 shows a side elevation and section of the (valve) steam-chest with cover removed. Figs. 6 and 7 show a side and edge view of the slide-valve as it sets in the chest. Fig. 8 shows a view of the cut-off-valve plates with dash-pot arrangement.

The live steam passes through the supply-pipe A into the steam-chamber A', whence it passes out of the steam-chamber through either the ports *a* or *a'*, as the case may be. It is then admitted to the cylinder through either the port *b* or *b'* in the slide-valve B, as these ports are alternately brought to coincide with either the port *a* or port *a'* and either the port *c* or the port *c'* of the cylinder, as the case may be. In a word, the steam passes into the cylinder behind the piston when the ports *a*, *b*, and *c* coincide and steam passes into the cylinder in front of the piston when the ports *a'*, *b'*, and *c'* coincide.

The cut-off valves consist each of a light plate C and C', connected, respectively, by the links *d* and *d'* at the points *e* and *f* and *e'* and *f'*, respectively, to the crank-arms D and D', and the crank-arms D and D', keyed on the shafts E and E', respectively, as shown in Fig. 8. The shafts E and E' pass through the hubs F and F', respectively, which are cast in the steam and exhaust chambers and afford bearing-surfaces for said shafts. The cranks G and G' are keyed on their outer ends

to the shafts E and E', respectively, and have catches H and H' on their outer ends fitted to engage said cranks with the pawls I and I', respectively, as shown in Fig. 2. The cut-off valves work in and on the seats *g* and *g'*, respectively, which are in the face of the slide-valve B at each of its ends. The movements of the cut-off valves are so arranged as to cover the ports *a* or *a'*, alternately cutting the live steam off from the cylinder. The exhaust-steam escapes out of the cylinder through the port *c* and around the end of the slide-valve B into the exhaust-chamber M; thence into the exhaust-pipe M', or through the port *c'* and around the other end of the slide-valve B into the exhaust-chamber M, and thence into the exhaust-pipe M', as the case may be. The exhaust-chamber M lies outside and partly underneath the supply-chamber A', as shown in Fig. 5. The slide-valve B receives its travel by means of the valve-rod B' from any suitable cam or eccentric (not shown in the drawings) on the main shaft of the engine when rotated by the piston and crank in the usual well-known manner. The cut-off-valve seats *g* and *g'*, as shown in Figs. 6 and 7, are in the face of the slide-valve B, as seen in Figs. 1, 6, and 7. The cut-off valves receive their travel from the slide-valve, owing to their position in the seats *g* and *g'*, respectively. For this reason the cut-off valves have no valve-rods and their movements are automatic, as will be shown farther on. During the time the slide-valve B is exhausting at *c'* the cut-off valve C is open, steam being admitted through the ports *a*, *b*, and *c* to the cylinder. The cut-off valve will remain open until the governor forces the trip-bar J, traveling in the guides *h* and *h'*, by means of a suitable governor-rod or throw against the pawl I. The pawl I is then disengaged from the catch H on the end of the outer crank-arm of the dash-pot G, causing the dash-pot K to descend, drawing after it the inner crank-arm D, connected through the shaft E, and the crank-arm D in turn thrusts forward the link *d*, and the cut-off-valve plate C is thus thrust over the ports *a* and *b*, cutting off the steam from the cylinder. The cut-off valve C is then brought forward (stationary in its seat *g*) by the movement of the slide-valve B. A similar

movement of the cut-off-valve plate C' taking place through a similar mechanism at and during another period of the cycle or revolution of the engine. The cut-off-valve plate C has
 5 a movement in its seat *g* independent of the slide-valve B and depended for its movement upon the governor through the series of links, cranks, shafts, pawls, and rods, as heretofore described. When, however, the slide-valve
 10 moves forward, the outer edge of the seat finally comes in contact with the cut-off-valve plate C, and the valve is thus drawn forward along with the slide-valve B. The cut-off valve C does not cover the ports *b* and *a* syn-
 15 chronously unless it be brought about by the action of the governor with its loose eccentric throw J'. A similar description will apply to the action of the cut-off valve C' during another part of the cycle or revolution of the
 20 engine.

A suitable governor in conjunction with the trip-bar J and the throw J' takes the place of the governor, connecting-rod, and rock-shaft of the automatic cut-off valves
 25 heretofore known.

The friction caused by the rocking shaft and its connections is done away with, as the friction of my trip-bar, which takes its place, is reduced to a minimum by its short firm
 30 movement.

In addition to the economy of movement in the trip-bar J there is likewise the same economy of movement in the cut-off-valve plates C and C', as their entire movement is to
 35 fully cover and uncover the necessary supply-ports which they control.

I claim a minimum of friction-surface in my engine, as it will be plainly seen that the friction only occurs on the edges of the slide-
 40 valve B, there being no steam-pressure on the face of the slide-valve during its movement.

The cut-off-valve plates cause no friction when moved by the slide-valve B. There is, however, an infinitesimal friction during the quick movement of the cut-off-valve plates when
 45 started by their respective dash-pots.

I know of no other engine, either automatic or throttling, in which the slide-valve is provided with seats in its face to contain all the cut-off-valve plates necessary to the use of
 50 the engine.

By means of my valve system I can prolong the period of cut-off to almost the entire length of one back and forward stroke of the engine. My system may be successfully ap-
 55 plied to all steam-engines, and the arrangement of the parts of that system may be varied without departure from my invention.

Having thus described my invention, I claim as my own and desire to secure by Let-
 60 ters Patent—

In an automatic steam-engine, the combination of the slide-valve B, having in its face near the ends two valve-seats *g* and *g'*, adapted to receive the cut-off-valve plates C and C',
 65 and connected in turn with suitable dash-pots, the mechanisms composed, respectively, of the links *d* and *d'*, crank-arms D and D', the shafts E and E', the crank-arms G and G', with the catches H and H', the pawls I and I',
 70 fitted to engage the catches H and H', respectively, and the slide trip-bar J, adapted to move in the brackets or guides *h* and *h'* and actuated by any suitable governor-rod J', substantially as described.

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

GEORGE H. ADAM.

Attest:

W. B. RICHARDSON,
 JOHN HILLY.