

(No Model.)

D. A. FRAZER.
REVERSING GEAR FOR STEAM ENGINES.

No. 403,881.

Patented May 21 1889.

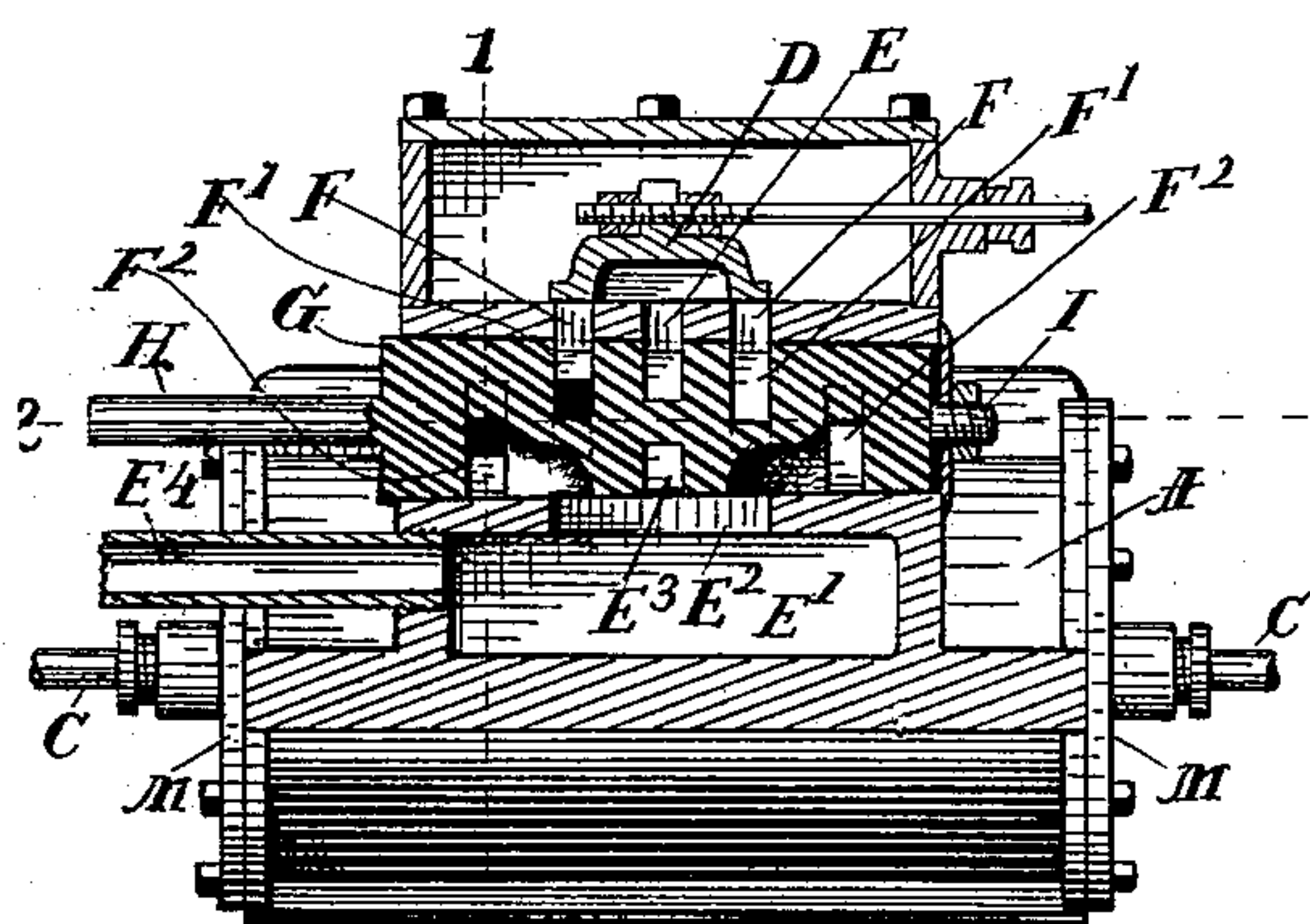


Fig. 1.

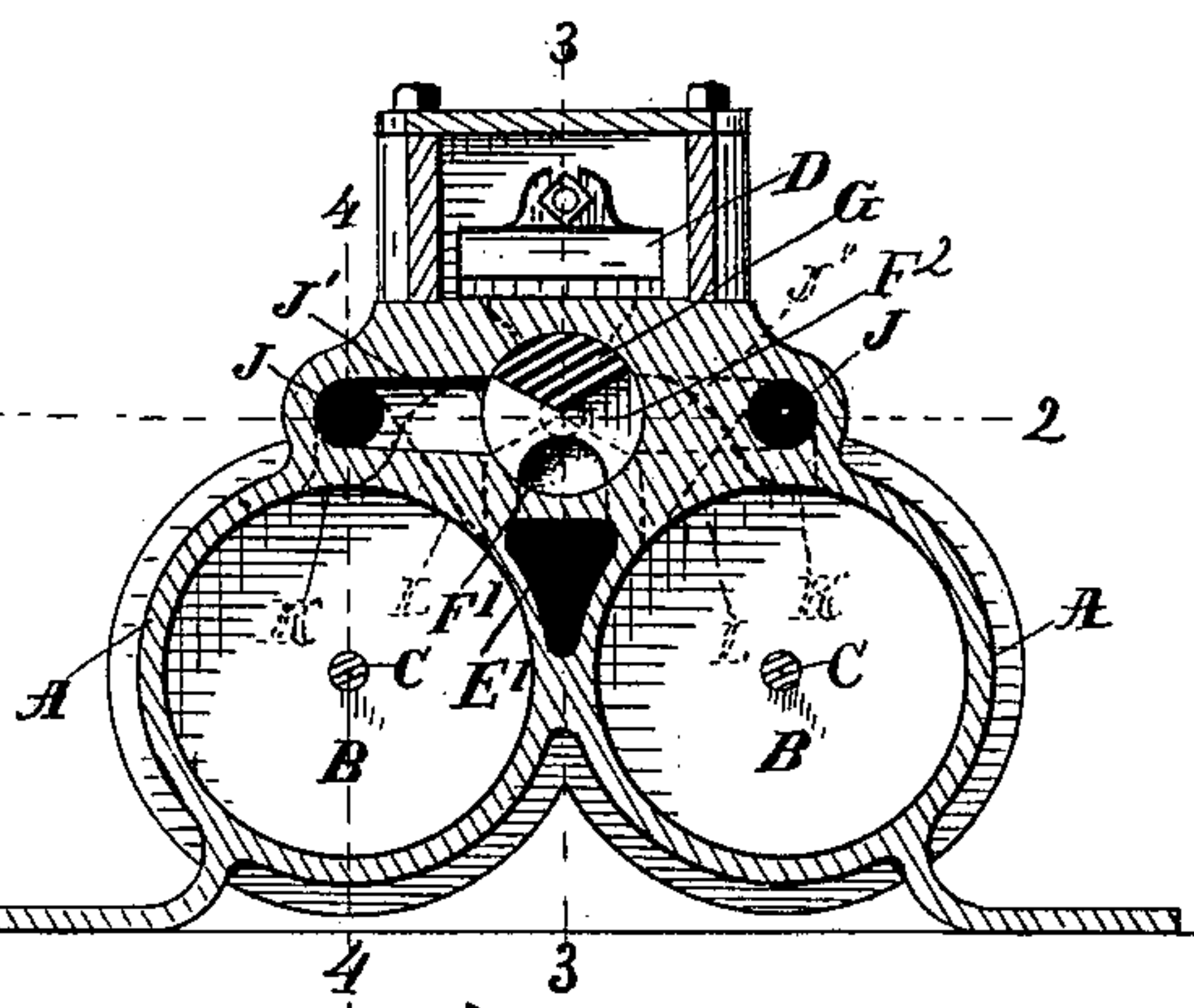


Fig. 2.

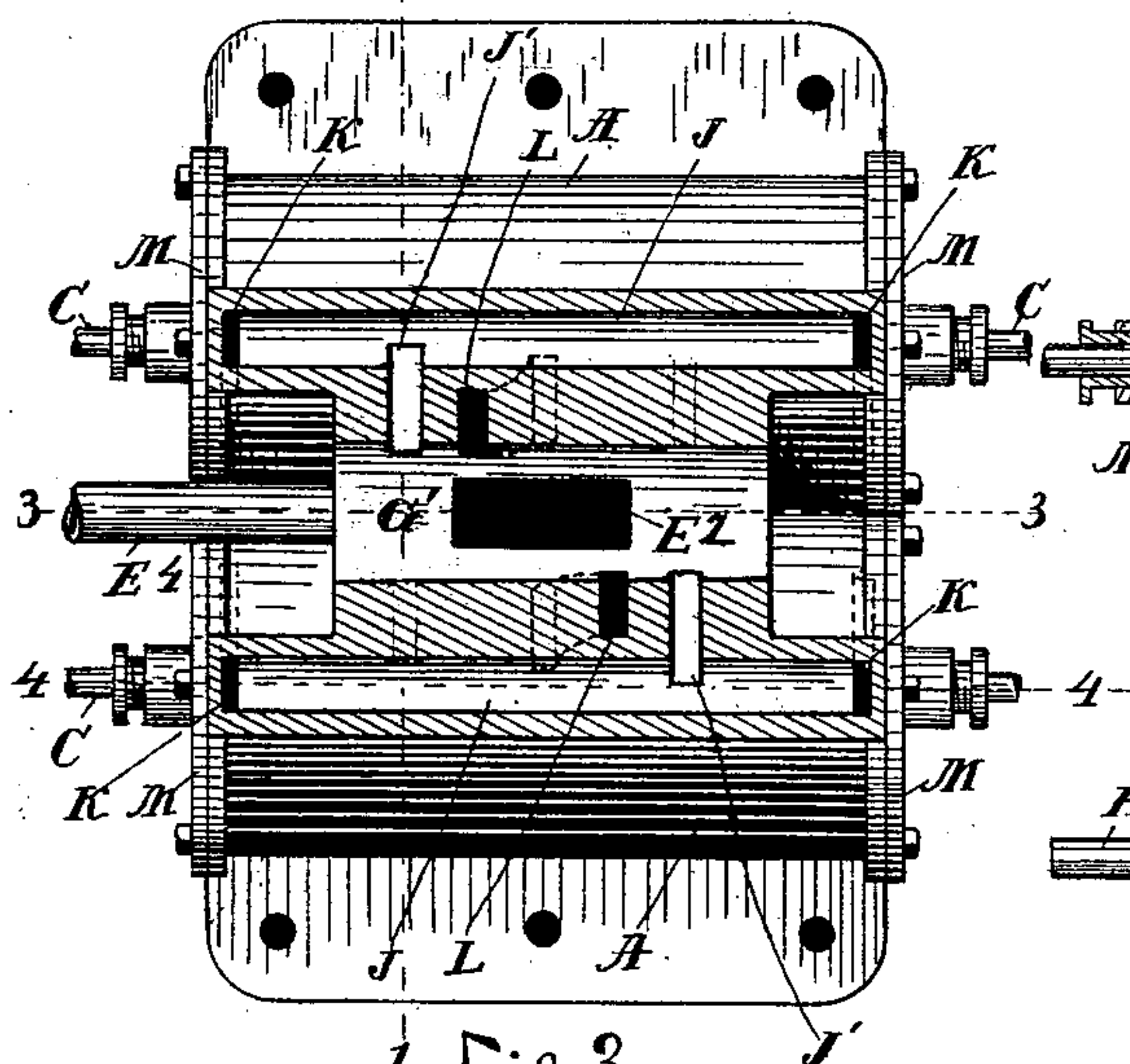


Fig. 3.

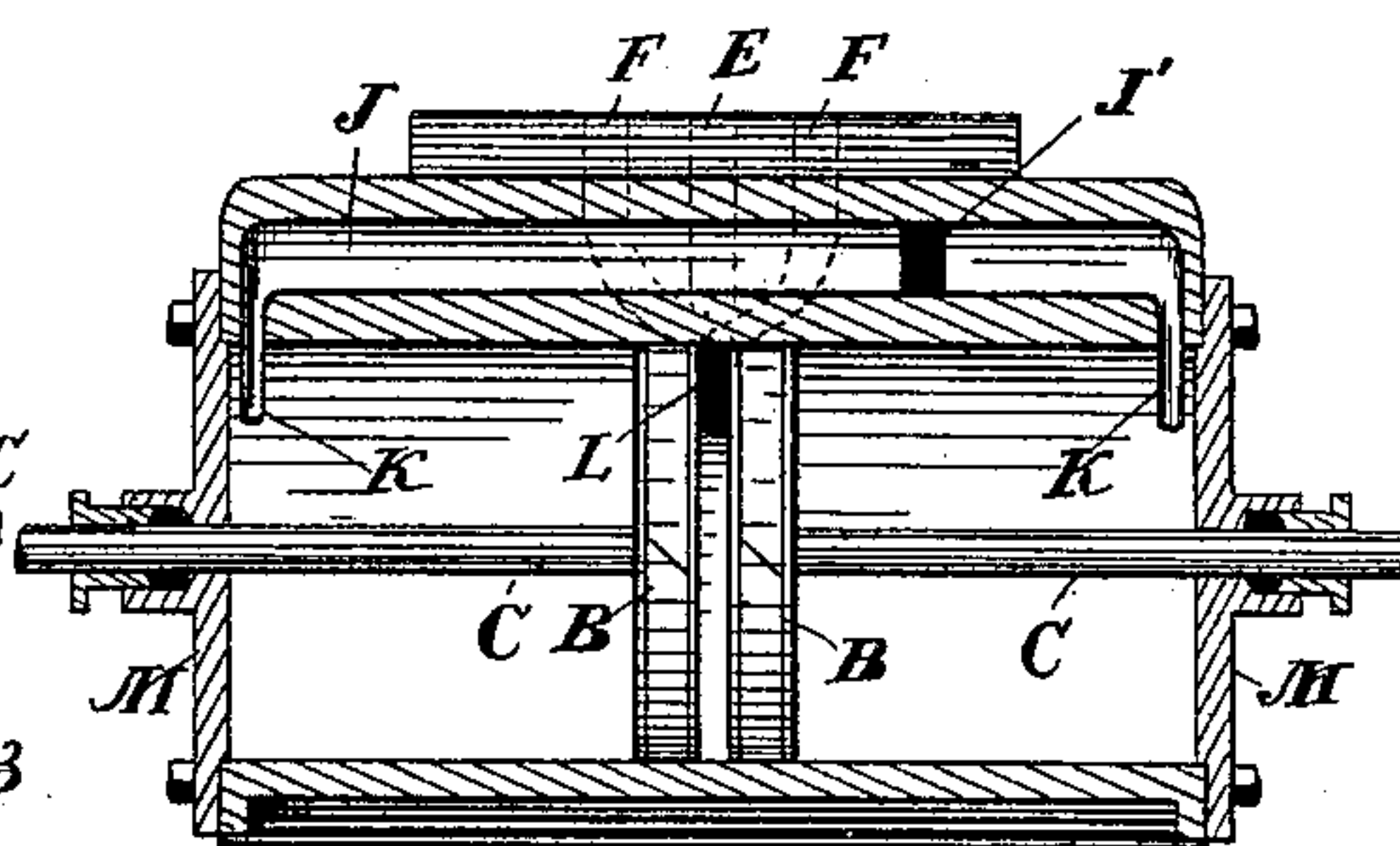


Fig. 4.

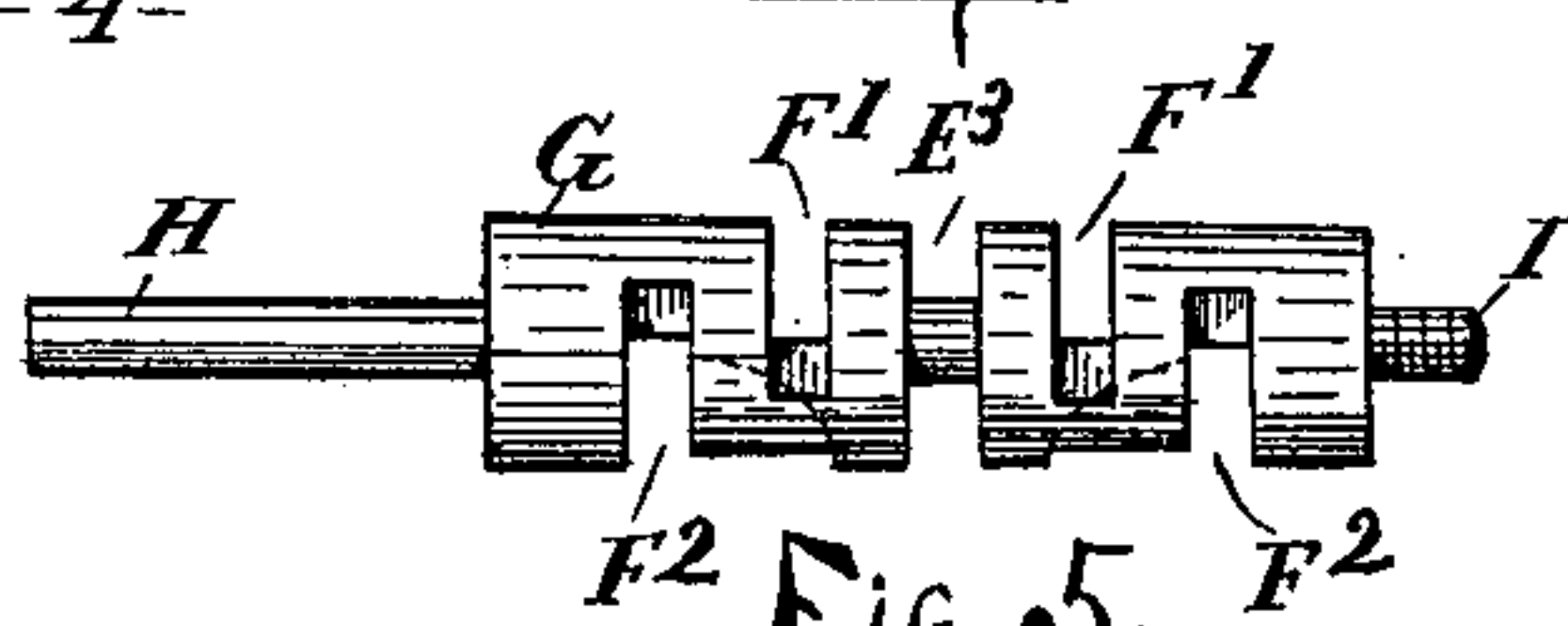


Fig. 5.

Witnesses.

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DANIEL A. FRAZER, OF MANCERLONA, MICHIGAN, ASSIGNOR OF TWO-THIRDS
TO OSCAR S. RODENBAUGH AND ISAAC N. RODENBAUGH.

REVERSING-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 403,881, dated May 21, 1889.

Application filed February 21, 1889. Serial No. 300,763. (No model.)

To all whom it may concern:

Be it known that I, DANIEL A. FRAZER, a citizen of the United States, residing at Mancelona, in the county of Antrim and State of Michigan, have invented certain new and useful Improvements in Reversing-Gear for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to reversing-gear for steam-engines, more particularly to the steam-engine for which I obtained Letters Patent of the United States, dated January 8, 1889, No. 395,822; and it consists in the construction and arrangement of parts hereinafter described, and more particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section on the line 3 3 of Fig. 2. Fig. 2 is a transverse vertical section on the line 1 1 of Figs. 1 and 3. Fig. 3 is a longitudinal section on the line 2 2 of Figs. 1 and 2. Fig. 4 is a longitudinal vertical section on the line 4 4 of Fig. 2, and Fig. 5 a detail of the plug-valve G.

Like letters of reference refer to like parts throughout the several figures.

A A are two cylinders of equal dimensions, side by side, and parallel to each other and open at both ends; B B, the piston-heads, each traversing its respective end of the cylinder and having the pistons C, which pass through heads M M, attached to each end of said cylinder and are connected to the main shaft, as shown and described in the Letters Patent above referred to.

D is a common slide or D valve, operated in the usual way, and needs no further description. Under said valve are three ports—ordinary exhaust-port E and ports F F—which open downward into a cylindrical chamber, G', within which is a cylindrical or plug valve, G, hereinafter more fully described. A port, L, connects the middle of each cylinder to the respective sides of said chamber G' at points in line with the respective steam-ports F F. Said cylinders have also the ports K K at each end, which connect with passages J, which in turn have ports J' opening into the respective sides of said chamber G', the ports J' and

L of each cylinder being so located as to receive steam from the respective ports F F, each port F supplying steam to the middle of its respective cylinder when the engine is running forward and to the ends of same cylinder when the engine is running backward.

E² is an opening connecting chamber G' with the exhaust-chamber E', the length of said opening being equal to the distance between the outer edges of the steam-ports F F. The chamber G' and plug G are slightly tapered and ground to fit, said plug being tightened by the usual nut and washer, I, and provided with the stem H, which may be provided with any suitable device for turning said plug through a half-revolution. In said plug, directly beneath the exhaust-port E, is the annular channel E³, which in all positions of the plug permits the exhaust-steam to freely escape downward through the opening E² into the chamber E', and from thence to the open air by the pipe E⁴. On one side of said plug and opposite steam-ports F F are the channels F' F', which partially sever the plug at these points, extending nearly three-fourths around its circumference, as shown in Fig. 2. These channels, when turned upward, connect the ports L L with the steam-ports F F, and when turned downward connect the same with the exhaust-opening E². On the other side of said plug and opposite the ports J' are the channels F² F², of similar shape to F', with lateral extensions underneath and opposite to the same, which, when turned upward, serve to connect the ports J' J' with the ports F F, and when turned downward connect the same with the exhaust-opening E².

From the foregoing description the operation of my device will be readily understood. When the steam-ports L L are connected with the ports F F, the steam will act from the middle of the cylinder outward and the engine will run forward with a thrust upon the connections, the outer ends of the cylinders being permanently opened to the exhaust and running idle. When the plug G is turned a half-revolution and the steam-ports J' J' connected with the ports F F, the engine will be reversed, the steam acting from the ends of the cylinders inward toward the middle with a pulling action upon the connections, the middle of the cylinders being permanently con-

nected with the exhaust and running idle. With both cranks on the centers and the left-hand pistons in the position shown in Fig. 4, the pistons in the other cylinder would be near
5 the ends of the cylinder and the **D**-valve on the mid-stroke, as shown. If, now, the plug **G** be adjusted as shown in the drawings, the valve will move to the right and steam will pass into the middle of the cylinder shown in Fig.
10 4. If, now, the position of the plug be reversed and the engine started in the opposite direction, the motion of the valve **D** will be reversed and it will now move to the left, allowing steam to pass into the outer ends of
15 the opposite cylinder, driving its pistons toward the middle, and the engine will run in the opposite direction.

As in the device shown in my patent above referred to, so also in this, one piston and its
20 connections can be omitted and the engine will still be operative, in which case the ports **L L** would connect with one end of the respective cylinders and the ports **J' J'** with the other ends of the same, the valves and
25 ports in all other respects remaining the same.

What I claim and wish to secure is—

1. In a steam-engine having two cylinders and two single-acting pistons, said cylinders having ports at each end of the stroke of said
30 pistons and having a **D**-valve adapted for

admitting steam to said ports, an intermediate valve adapted to change the steam to the opposite sides of said ports for reversing the motion of the engine, substantially as described.

2. In a steam-engine, the combination of two cylinders having single-acting pistons and ports at each end of the stroke of said pistons, a slide-valve having a port at either end, each port adapted for supplying steam to a separate cylinder, and an intermediate valve
40 adapted to shift the current of the steam to the opposite sides of the respective pistons, substantially as described.

3. In a steam-engine, in combination with
45 two cylinders having single-acting pistons and ports at each end of the stroke of said pistons, a slide-valve having a port at either end, each port adapted for supplying steam to a separate cylinder, and an intermediate rotary
50 valve having segmental chambers adapted to shift the current of the steam to opposite sides of the respective cylinders, substantially as described.

In testimony whereof I do affix my signature 55 in presence of two witnesses.

DANIEL A. FRAZER.

Witnesses:

C. L. BAILEY,
THOS. W. SINES.