

W. I. Lyman,
Rotary Steam Engine.
No 83,186. Patented Oct. 20, 1868.

Fig. 1.

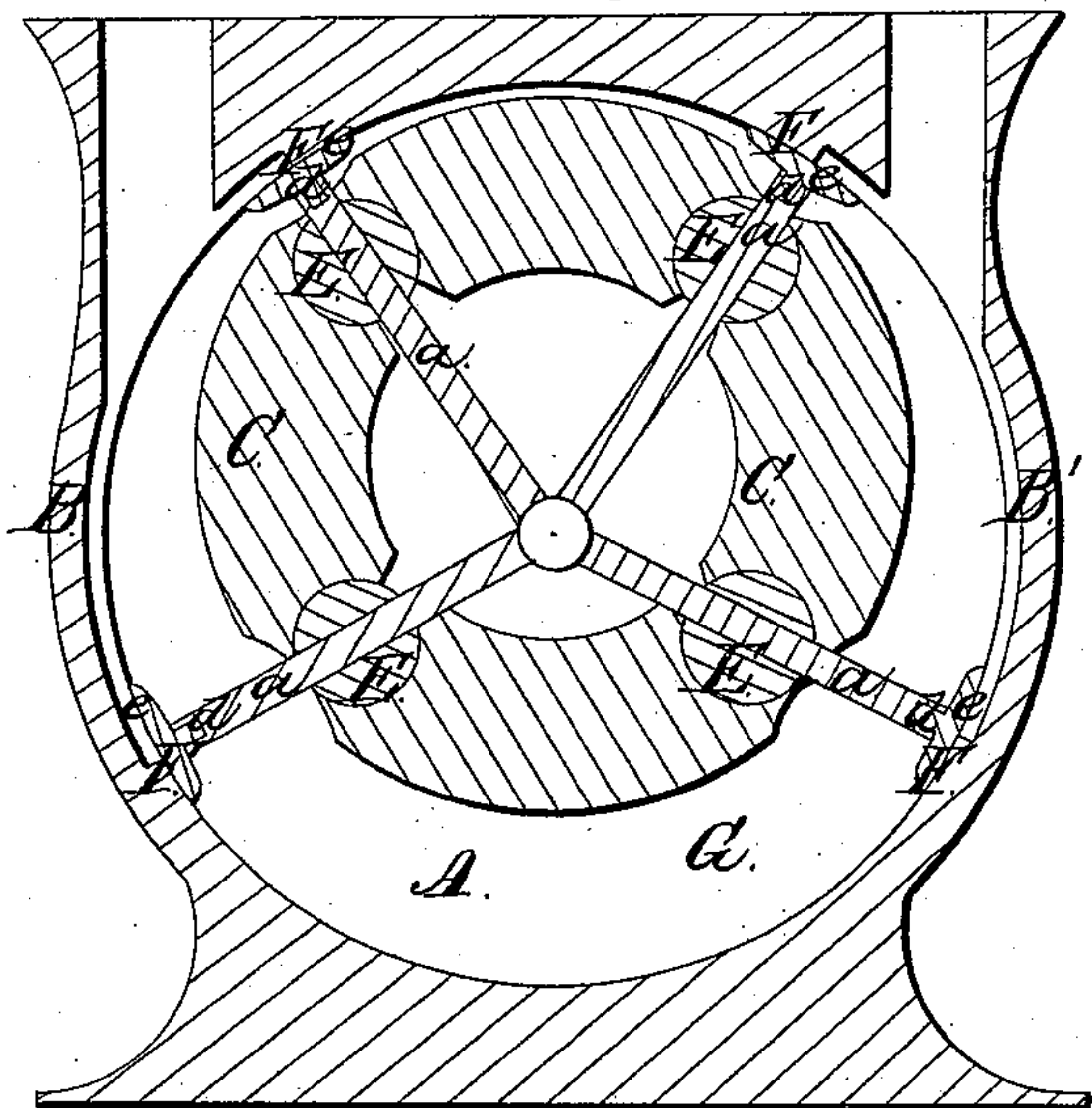


Fig. 3.

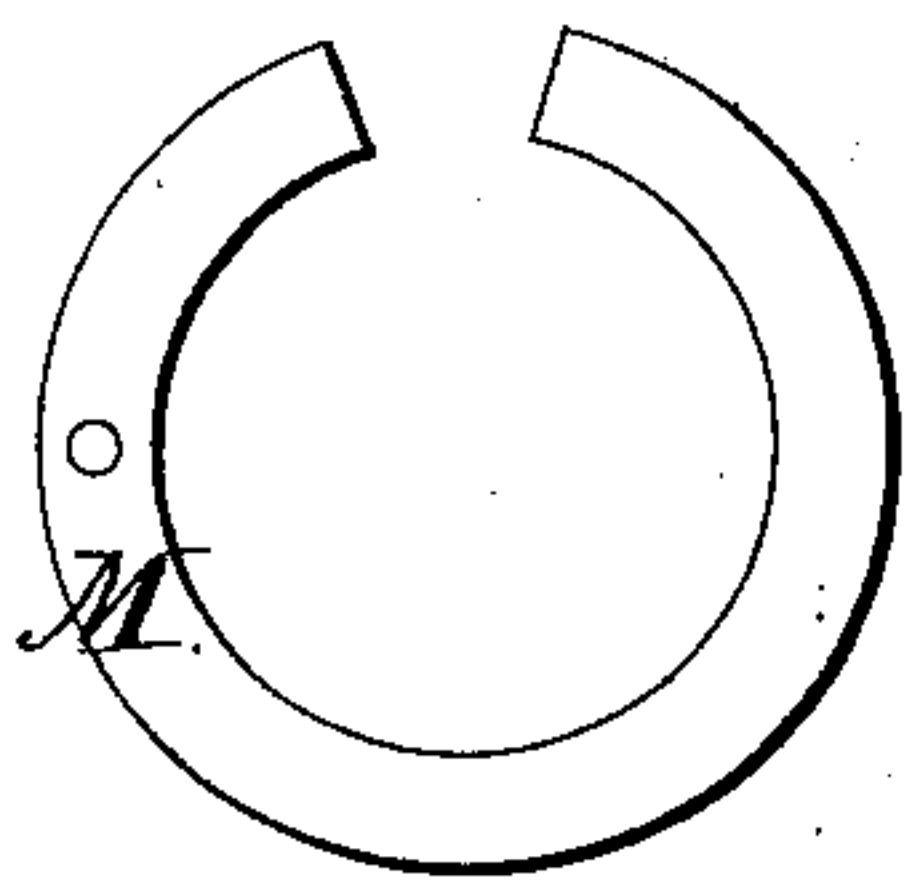


Fig. 4.

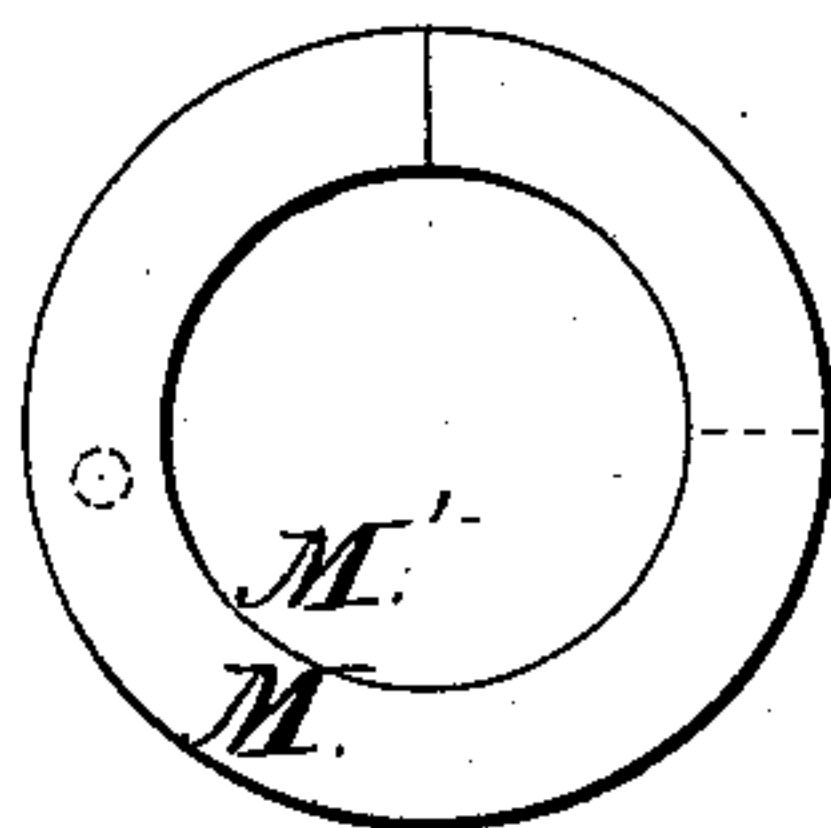
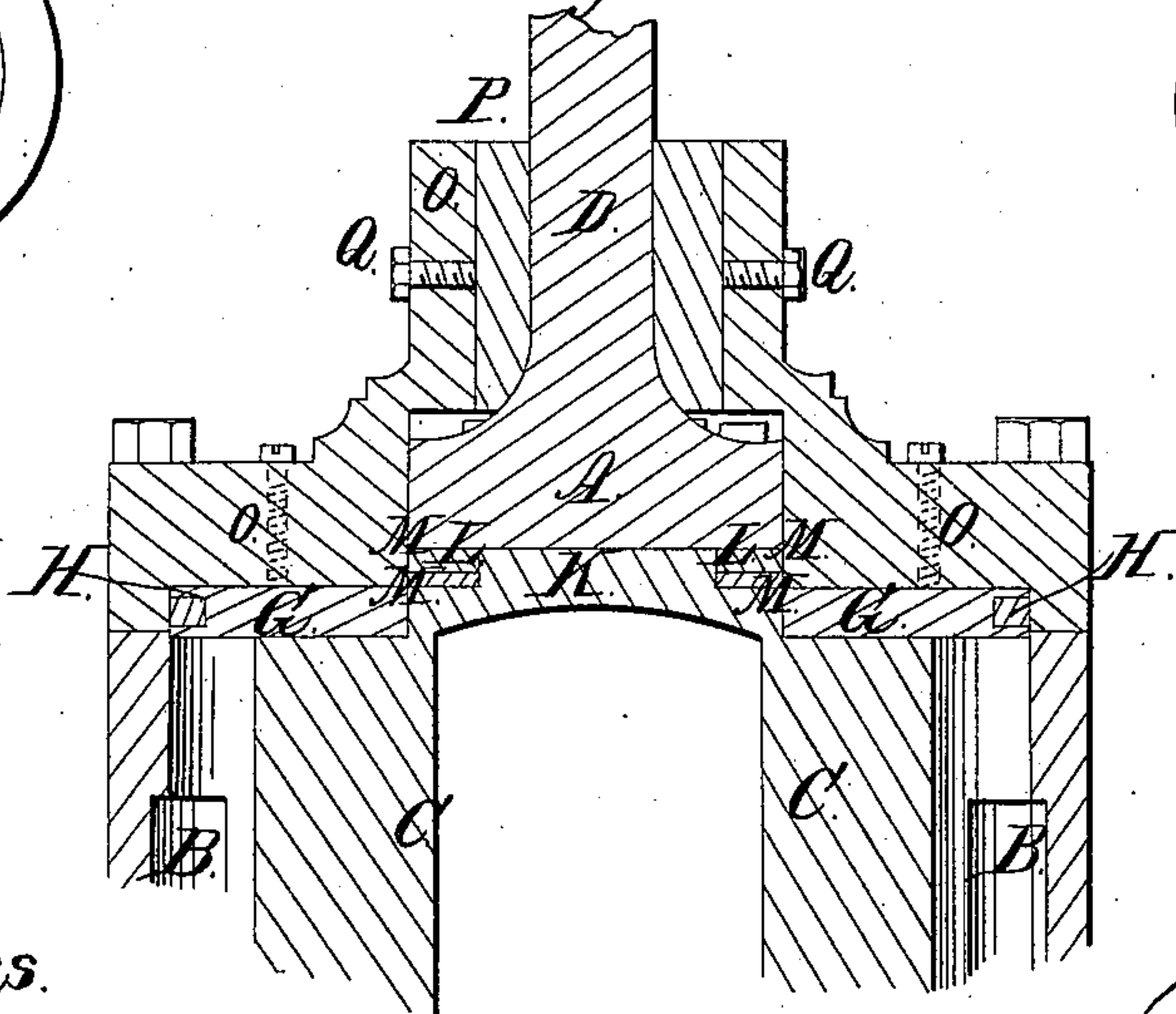


Fig. 2.



Witnesses.

W. W. Emerson
Roswell Lee

Inventor.

W. I. Lyman.
per Gardner & Hyde attys

United States Patent Office.

W. I. LYMAN, OF SPRINGFIELD, MASSACHUSETTS.

Letters Patent No. 83,186, dated October 20, 1868.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, W. I. LYMAN, of Springfield, Hampden county, Commonwealth of Massachusetts, have invented a new and useful Improved "Rotary Steam-Engine;" and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

In the drawings—

Figure 1 is a cross-section through the steam-chamber;

Figure 2, a longitudinal section of the main shaft, and connection with the piston; and

Figures 3 and 4 are detailed views of the means employed in packing.

This invention consists of a rotatory engine, in which power, closeness of joint, and cheapness are considered, with the results obtained by its arrangement and construction, which I will now describe.

The steam-chest consists of a cylindrical chamber, A, the ports B and B' entering at the curved sides, as hereinafter described.

The main shaft passes into the chest at the end, and is set in bearings eccentrically to the axis of the same.

A hollow inside cylinder, C, is attached to the shaft D, and gives it the motion, it receiving it from the piston. This consists of four arms, *a a*, &c., attached to a common central joint, and the arms being of equal lengths and radii to the inside of the steam-chest A. This joint of the piston is kept always in the centre, the outer ends of the piston-arms packing closely against the inner surface of the chest.

The cylinder C is formed with a sufficiently thick shell to allow packing-joints to be placed at the four points where the piston-arms *a a*, &c., pass through it, so that, as the piston-arms, in revolving, sway, in order to accommodate their position to the eccentric revolution of the cylinder C to their axis, there is no displacement whereby the steam can penetrate inside of the cylinder. These joints consist of cylindrical pieces, E, through which the arms of the piston pass, the pieces E E, &c., being made of sufficient diameter to allow this, and still be kept firmly in place by the sockets formed for them in the shell of the cylinder C, and in which they partially revolve, the pieces E being necessarily placed parallel to the axis of the piston and that of the cylinder C, while the inner and outer portions of the shell, in a line with the piston-arms, are bevelled towards the centre of each joint respectively, to give the arms the necessary play.

The shoes F are arranged upon the ends of the piston-arms *a*, for the purpose of making a steam-packing. They have curved faces, *c*, and are connected to the arms by means of the tenons *d*, which fit into the sockets made for them in the ends of the piston-arms.

The steam presses behind them, and keeps them always snug against the surface of the piston-chest, and compensates their wear.

It will be seen that the working-space of the steam is formed by the space left by the difference in diameter of the steam-chest and the cylinder C inside. Only a part of this, however, is used by the direct flow and pressure of the steam, viz, the part contained between the lower ends of the ports B and B'.

In explaining this machine further, we will suppose the left-hand port, B, to be the supply, and the other the exhaust. The points to which these ports extend downward are regulated by the position of the lower piston-arms when furthest apart, which occurs when the vertical through their axis is equidistant from them both, and passes through the axis of the cylinder C, the latter being the proper position of the cylinder C in the construction of the machine.

The ports are arranged so that each piston-arm, in turn, has the full pressure of steam from supply to exhaust, and, at the moment the next arm comes around far enough to take steam from the supply in full effect, by passing the extremity of the supply-port, the preceding one has commenced to exhaust, by passing the extremity of the exhaust-port, and allowing the steam behind it to escape through it.

The packing around the main shaft and its bearings through the side of the chest is formed as shown in fig. 2 by a sectional view of this part, and a part of it in figs. 3 and 4 by detail views.

A packing-head, G, is placed at the end of the chest, and fits in very tightly for a small distance, say the twentieth of an inch, and the chest-head is formed so as to fit over the rest of the head G, which has a ring of packing, H, inserted in a groove in the perimeter. This packing is usually formed of wood.

The shaft D is connected by means of bolts put through a head, J, on this end of the shaft, into a projection, K, on the cylinder C, the packing-head G fitting around it, and being adjusted by screws, *o*, put through the cylinder-head.

A groove, L, is left between the head, J, of the shaft and the projection N at their perimeter, for the insertion of two packing-rings, M and M', which are formed as shown in figs. 3 and 4, fig. 3 showing the shape of one of them before it is compressed and forced into place. These rings, it is seen, consist of spring-metal, cut apart at one point, and, when arranged together, these cuts are put opposite the solid metal of each other respectively, thus breaking the joint. They press outwards by their own elasticity, and the steam, if any escapes to this point, completes the packing by pressing them back, so that the side of the outward one comes against the edge of the groove L, preventing further progress of the escaping steam.

The main bearing of the shaft D is formed in the projecting rim O of the cylinder-head by means of an inner ring, P, formed into three or more segments, which are set to the proper tightness by means of set-screws, g, put through the rim O, and setting against the backs of the segments, one screw to each.

This engine may be operated by an ordinary slide-valve, which, moved either way, reverses it from its previous motion.

Now, having described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

The arrangement of the ports B and B' on each side of the chest, with the four-armed piston hinged centrally, and head, C, substantially as herein shown and described.

W. I. LYMAN.

Witnesses:

EDWARD H. HYDE,
J. B. GARDINER.