(No Model.) 2 Sheets—Sheet 1.

F. J. HUTCHINGS.

OSCILLATING STEAM ENGINE.

No. 428,776. Patented May 27, 1890.

Fig. 1.

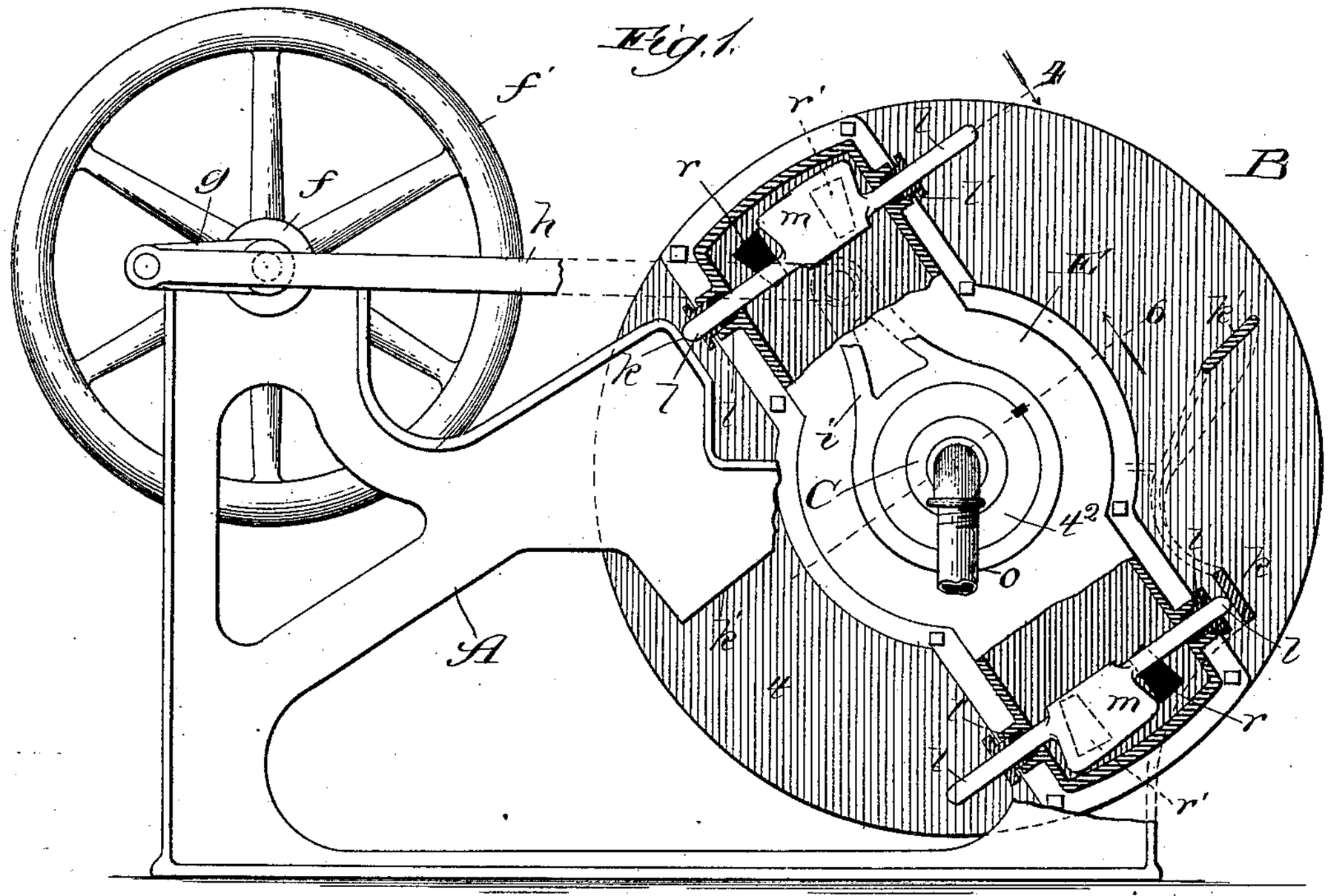
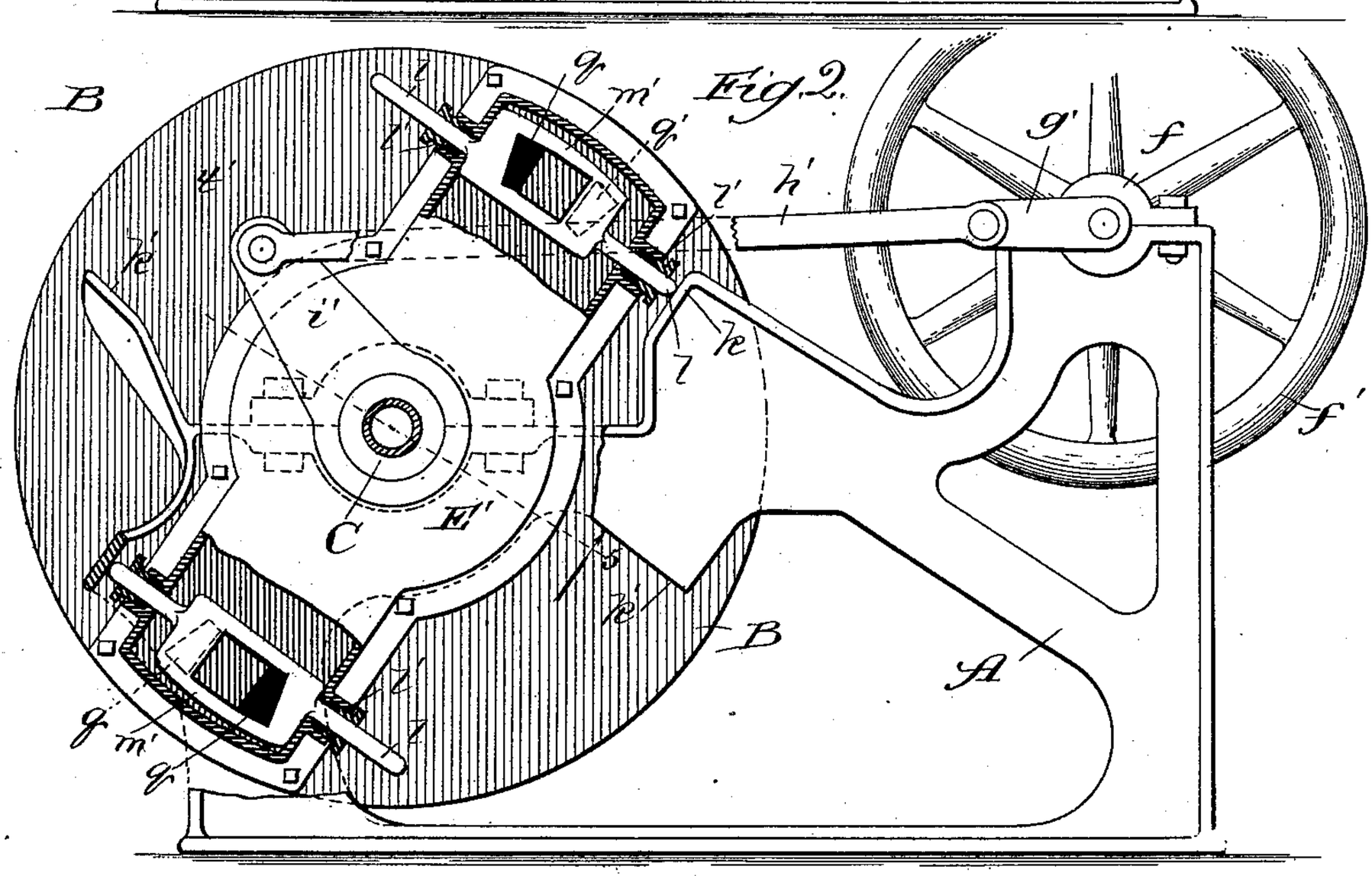


Fig. 2.



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Att'ys.

(No Model.) 2 Sheets—Sheet 2.

F. J. HUTCHINGS.

OSCILLATING STEAM ENGINE.

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Fig. 3.

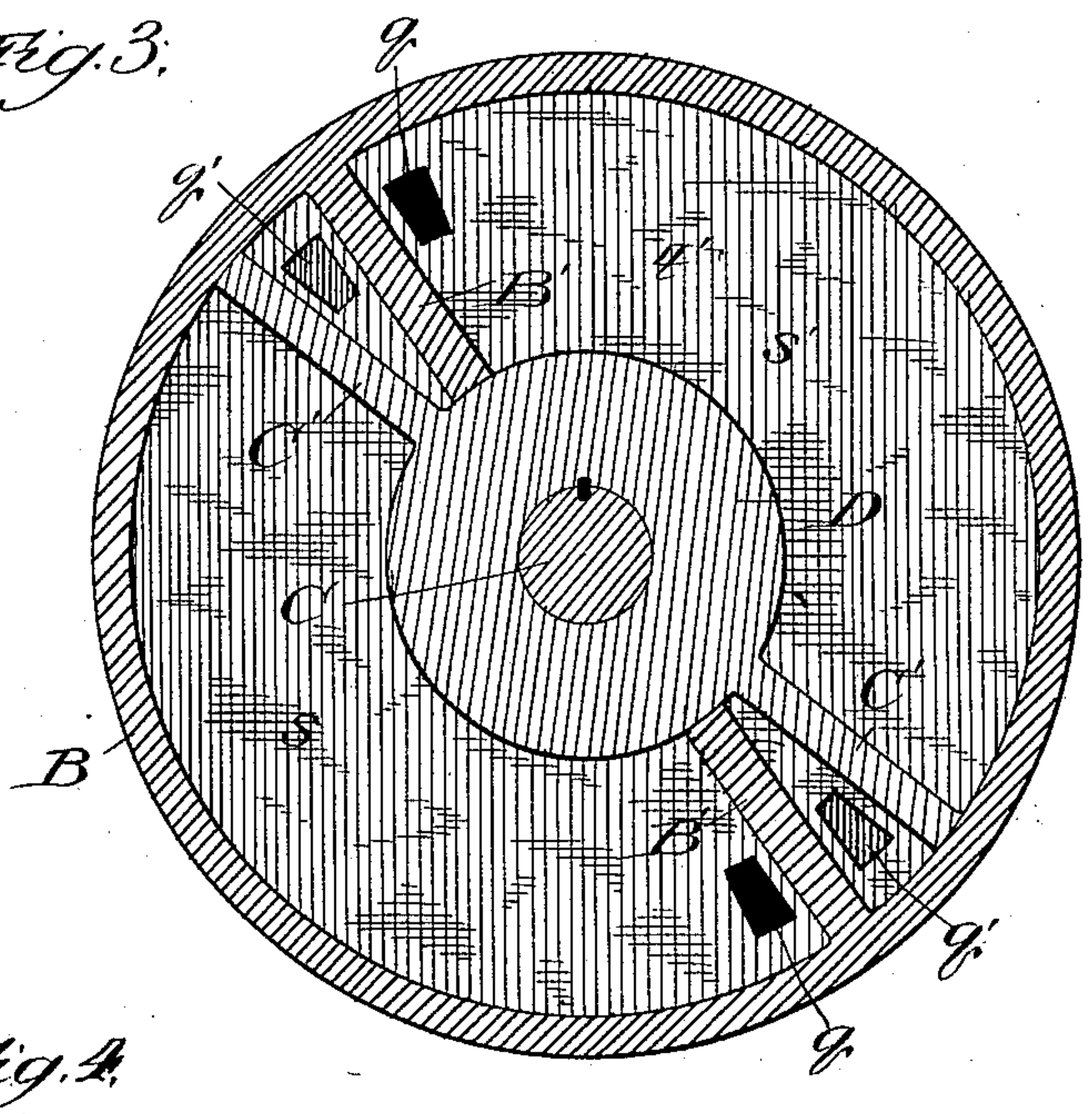


Fig. 4.

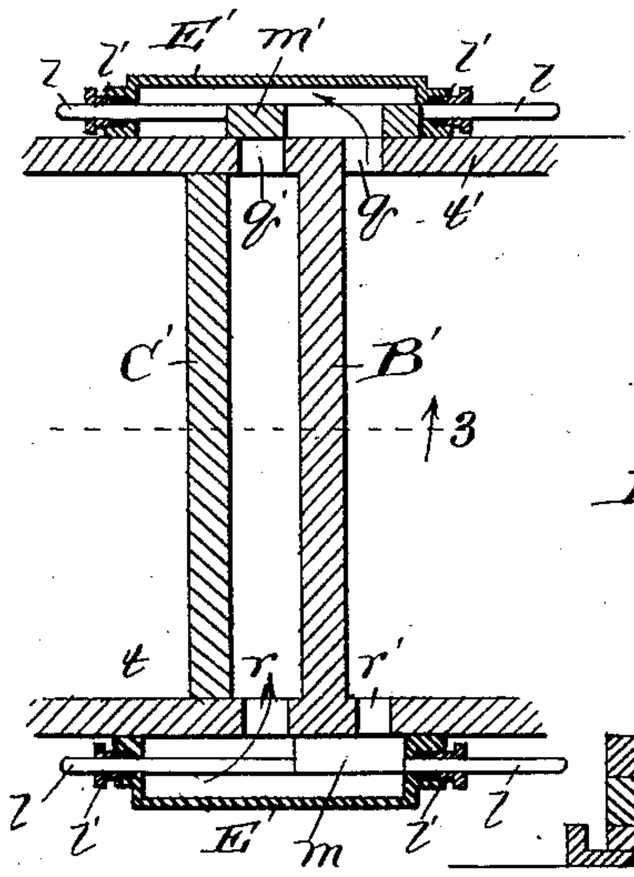


Fig. 5.

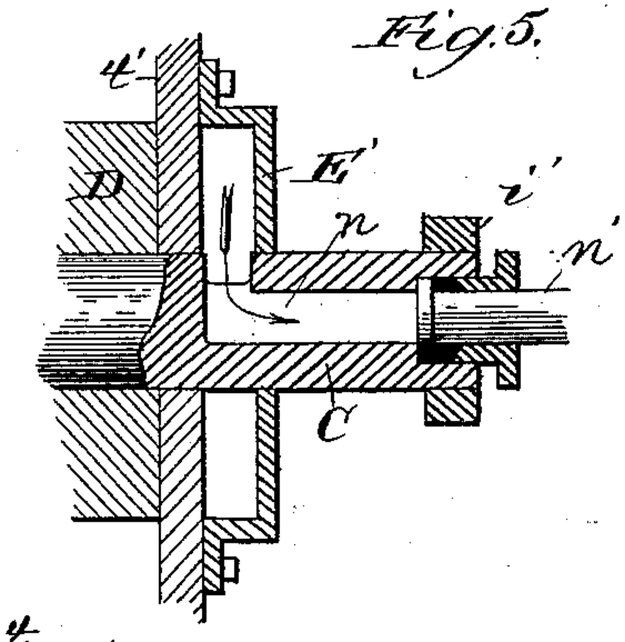


Fig. 6.

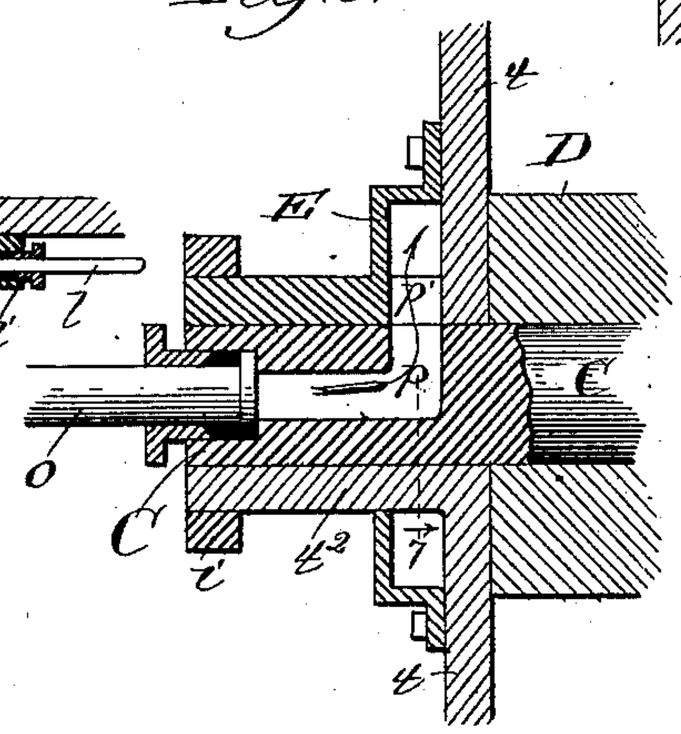
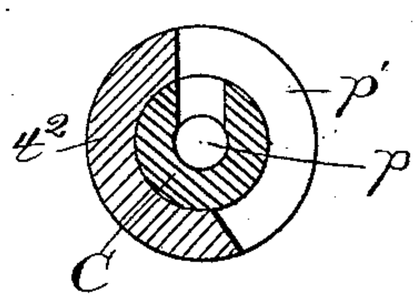


Fig. 7.



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UNITED STATES PATENT OFFICE.

FREDERICK J. HUTCHINGS, OF OAK GLEN, ILLINOIS.

OSCILLATING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 428,776, dated May 27, 1890.

Application filed September 25, 1889. Serial No. 325,073. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK J. HUTCHINGS, a citizen of the United States, residing at Oak Glen, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Oscillating Steam-Engines, of which the following is a specification.

The object of my invention is to provide an oscillating steam-engine of a simple and improved construction, which will render its operation thoroughly reliable and effective and economical as compared with other devices of a like nature.

In the drawings, Figures 1 and 2 are views in elevation showing, respectively, opposite sides of my device, partly sectional, with parts broken away and other parts indicated by dotted lines, for purposes of illustration; Fig. 3, a section taken on the line 3 of Fig. 4 and viewed in the direction of the arrow; Fig. 4, a broken section taken on the line 4 of Fig. 1 and viewed in the direction of the arrow; Fig. 5, a broken section taken on the line 5 of Fig. 2 and viewed in the direction of the arrow; Fig. 6, a section taken on the line 6 of Fig. 1 and viewed in the direction of the arrow; and Fig. 7, a detail view in section, the section being taken on the line 7 of Fig. 6 and viewed as indicated.

A is the frame of the engine, which is arranged to afford bearings for the rotating parts, and having stops in position to actuate the various cut-offs, all as hereinafter describgd.

The cylinder B of the engine is in the form of a drum, with a smooth circular inner periphery and flat ends t and t'. Projecting centrally from the end t and integral therewith is a sleeve t^2.

C is a rock-shaft which extends centrally and loosely through the cylinder ends and through the sleeve t^2. Beyond the end t' the shaft C is journaled in the frame A, and beyond the end t it has its bearings in the sleeve t^2, which in turn is journaled in the frame. The shaft D and cylinder B are thus rendered independently movable.

Rigid upon the shaft C is a cylindrical boss D, provided on diametrically-opposite sides with radial wings C′. The boss D and its wings abut at outer edges against the inner surfaces of the ends t t', and the wings extend at their outer edges into contact with the inner peripheral surface of the cylinder. The cylinder is divided into two chambers S and S′ by partitions B′ in direct radial line with each other and integral with or secured at their opposite extremities and outer edges to the ends and inner periphery, respectively, of the cylinder. The inner edges of the partitions B′ extend against the surface of the cylindrical boss D. The contact of the ends of the boss and edges of the wings C′ with the inner surfaces of the cylinder B, of the edges of the partitions B′ with the surface of the boss, and of the ends t t' and sleeve t^2 with the shaft is such as to afford steam-tight joints without material interference with movement of the surfaces against each other. In the ends t t' of the cylinder and on opposite sides of and close to each partition B′ are ports r r' and q q'. The ports r r' are in the wall t and afford inlets for live steam, while the ports q q' are in the wall t' and afford outlets for the exhaust. Rigid upon the outer sides of the ends t t' are chambers E E′, which extend diametrically across the respective ends and cover the ports therein.

The chamber E constitutes the steam-chest of the engine and communicates with the source of steam-supply through a passage p and pipe o. The passage p extends from the end of the shaft, where it connects with the pipe o (forming a steam-tight swivel-joint) a short distance inward, thence at a right angle through the side of the shaft to an elongated slot p' in the sleeve. The chamber E′ is the exhaust-chamber of the engine, and a passage n leads from it through the shaft and a pipe n', as in the case of the passage p. The ports r r' and q q' are provided with sliding valves m m', located, respectively, in the chambers E and E′ and mounted upon rods l, which extend through and slide in stuffing-boxes l' in the side walls of the chambers. Stops k k' are provided upon the frame A in the paths of the rods l and operate to slide the valves from one port to the other in the oscillation toward them, respectively, of the cylinder B, as hereinafter described.

When the cylinder is in the position shown in Figs. 1, 2, and 3, the valves m have been caused by contact of their rods l with the

stops k on one side of the frame to close the ports r' and open the ports r, and the valves m' have been caused by contact of their rods l with the stops on that side of the frame to close the ports q' and open the ports q. The arrangement of the ports, as shown in the drawings, is such as to give to each chamber S and S′ a port r, r', q, and q', the ports bearing like reference-marks being diametrically opposed to each other, and thus on opposite sides of the partitions B′, while the ports q' are directly opposite the ports r and the ports q similarly located with reference to the ports r'. Steam from the steam-chest E, therefore, passing through the ports r, enters the chambers S and S′ simultaneously between the walls or pistons B′ C′, and forcing the latter apart rotates the cylinder B and shaft C in opposite directions, the exhaust at the same time passing out through the ports q. As the pistons B′ and C′ approach each other from opposite sides, contracting the space about the ports r' and q, the rods l strike the stops k', and sliding the valves m m' cause them to close the ports r q and open the ports r' q'. Steam is thus caused to enter at the ports r' and force the pistons apart in the same manner as before, but in the opposite directions, the exhaust escaping through the ports q'.

Rigidly secured to the outer end of the sleeve E on one side and the shaft D on the other are crank-arms i i', connected by means of pitmen h h', respectively, with the cranks g g' of a power-shaft f. The cranks i and i' are each so adjusted as to oscillate equally beyond the vertical line, and the cranks g g' extend in opposite directions, so that the oscillation of the cranks i i', which are of course in contrary directions, produces a continuous rotary motion of the shaft f and fly-wheel f'. It will thus be seen that in my improved engine the steam as it enters each chamber operates against two pistons and moves them simultaneously in opposite directions. In this way the expansive force of the steam is utilized more quickly, and therefore to a greater extent, which obviously renders the use of my engine more economical than those where a single piston is employed.

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

1. In a steam-engine, the combination of an oscillating cylinder B, having internal pistons B′, diametrically opposite each other and affording chambers S and S′, steam-inlet ports r and r', leading into each chamber near the said pistons and provided with suitable valve mechanism for alternately opening and closing the said ports, exhaust-ports q and q' in each chamber S and S′ and provided with suitable valve mechanism for closing the exhaust-ports alternately in each chamber when the inlet-ports thereof are open, an oscillatory shaft C, carrying a boss D within the cylinder and movable independently thereof, and pistons C′, extending diametrically opposite each other from the said boss, substantially as and for the purpose set forth.

2. In a steam-engine, the combination of an oscillating cylinder B, having internal pistons B′, diametrically opposite each other and affording chambers S and S′, steam-inlet ports r and r', leading into each chamber near the said pistons and provided with suitable valve mechanism for alternately opening and closing the said ports, exhaust-ports q and q' in each chamber S and S′ and provided with suitable valve mechanism for closing the exhaust-ports alternately in each chamber when the inlet-ports thereof are open, an oscillatory shaft C, carrying a boss D within the cylinder and movable independently thereof, pistons C′, extending diametrically opposite each other from the said boss, and a rotary power-shaft f, connected eccentrically toward opposite ends, respectively, with the shaft C and cylinder B, substantially as and for the purpose set forth.

3. In a steam-engine, the combination, with a frame A, provided with stops k k', of an oscillatory cylinder B, a sleeve t^2 on one side of the cylinder and journaled in the frame, a rock-shaft C, extending through the sleeve at one end and journaled in the frame on the opposite side of the cylinder, pistons B′, rigid in the cylinder, diametrically opposite each other and affording chambers S and S′, a steam-chest E on the cylinder, steam-inlet ports r and r', leading from the steam-chest into each chamber near the said pistons, valves m upon the cylinder, operating in the oscillation of the latter by contact with the stops k k' to open and close the ports r r' alternately, exhaust-ports q and q' in each chamber S and S′ and provided with valves m', operating with the oscillation of the cylinder by contact with the stops upon the frame to close the exhaust-ports alternately in each chamber when the inlet-ports thereof are open and open them when the said inlet-ports are closed, a boss D on the shaft C within the cylinder and movable independently of the latter, pistons C′, extending diametrically opposite each other from the said boss, and a rotary power-shaft f, connected eccentrically toward opposite ends, respectively, with the shaft C and cylinder B, substantially as and for the purpose set forth.

FREDERICK J. HUTCHINGS.

In presence of—
J. W. DYRENFORTH,
M. J. FROST.