(No Model.) 2 Sheets—Sheet 1.

J. A. LIDBACK.

ENGINE.

No. 360,353. Patented Mar. 29, 1887.

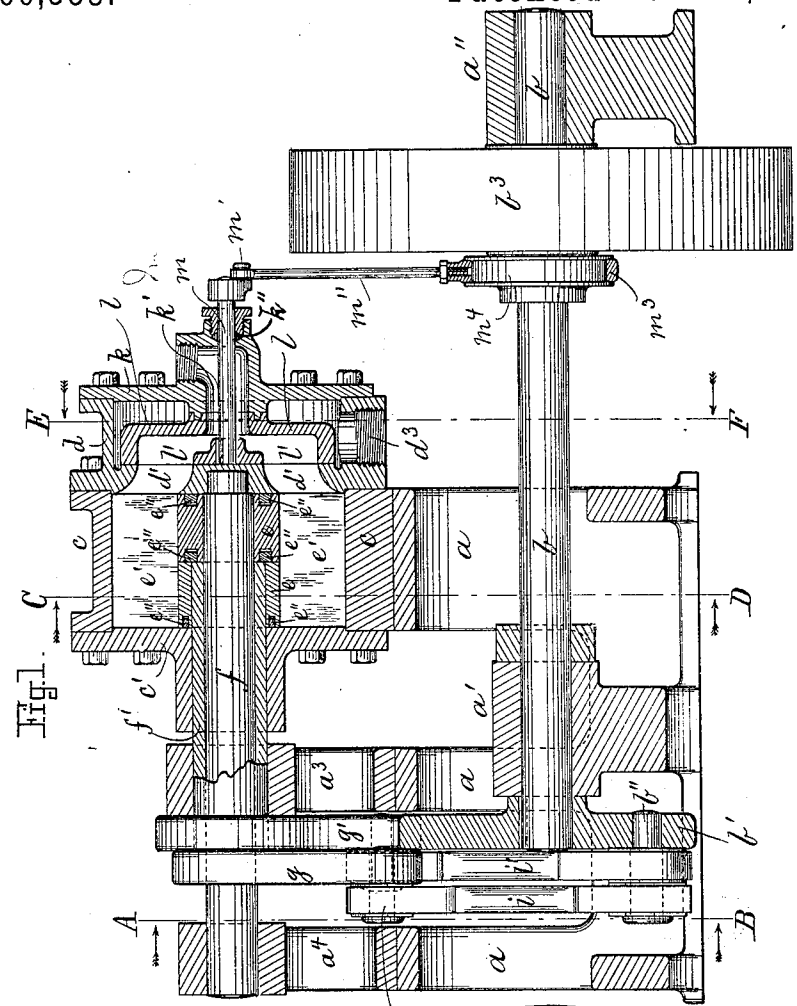

Fig. 1.

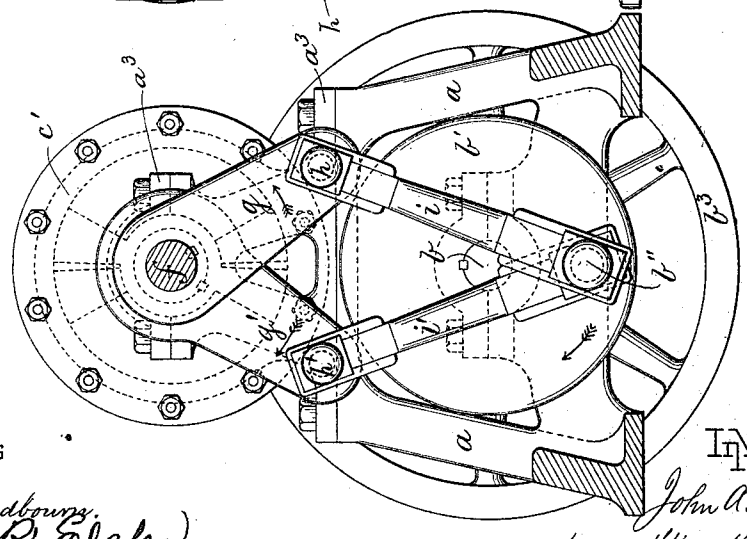

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

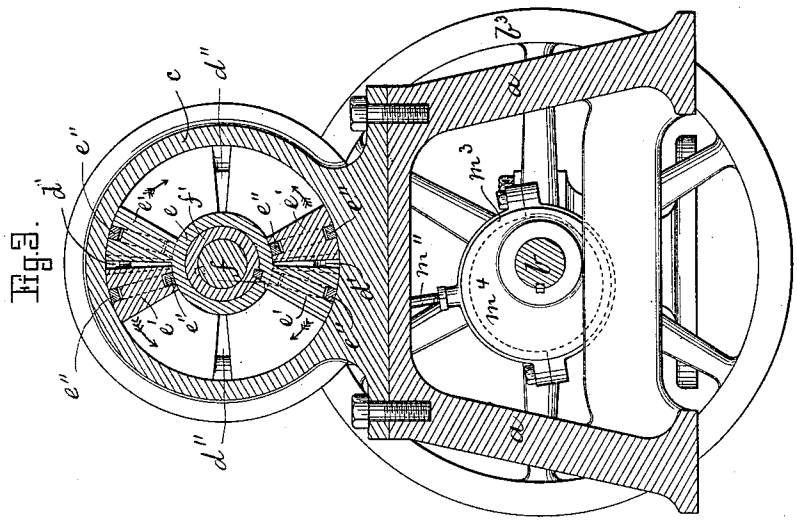


Fig. 4.

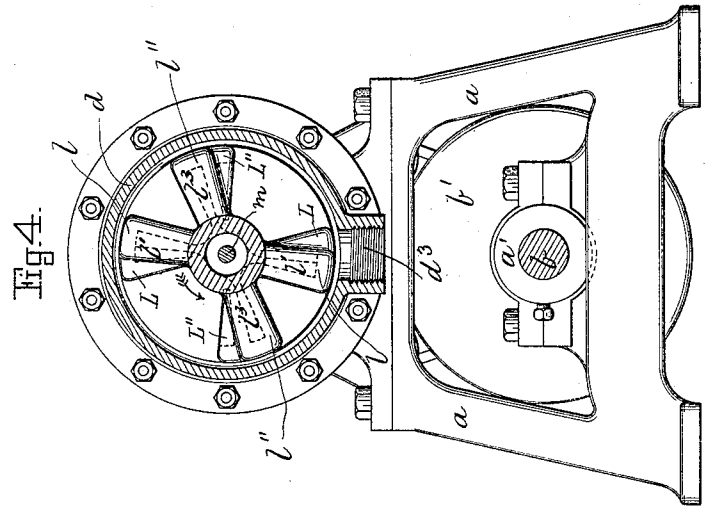
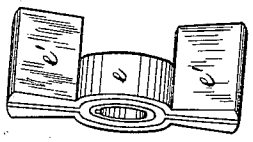


Fig. 5.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN A. LIDBACK, OF PORTLAND, MAINE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 360,353, dated March 29, 1887.

Application filed September 24, 1886. Serial No. 214,417. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. LIDBACK, a citizen of the United States, and a resident of Portland, in the county of Cumberland and State of Maine, have invented new and useful Improvements in Engines, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in steam-engines, and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a central longitudinal section of the improved engine; and Fig. 2 represents a cross-section on the line A B, shown in Fig. 1. Fig. 3 represents a cross-section on the line C D, shown in Fig. 1; and Fig. 4 represents a cross-section on the line E F, also shown in Fig. 1. Fig. 5 represents a perspective view of one of the oscillating pistons.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

a a represent the frame of the engine, and *a'* represents a bearing on it, in which is journaled the rotating crank-shaft *b*, to which is secured the disk *b'*, provided with a crank-pin, *b''*, as shown in Fig. 1.

a'' represents a suitable additional bearing for the shaft *b*, which latter bearing may be made independent from the frame *a*, as shown in Fig. 1, or in any other well-known manner, as may be found most practical.

To the frame *a* is secured the cylinder *c*, that is open from end to end, and has attached to one end the head *c'* and to the other end the exhaust-chest *d*. (Shown in Figs. 1 and 4.) Within the cylinder *c* are located the oscillatory pistons, composed of hubs *e e* and radial wings *e' e'*, two for each hub, as shown in Figs. 1 and 3, and in perspective view in Fig. 5. Each hub *e* is made equal to one-half of the length of the cylinder *c* between its heads, and each wing *e'* is made equal in length to the combined length of both hubs *e e*, and it extends in a radial direction to the interior curved surface of cylinder *c*. One of the pistons is secured to the rock-shaft *f* and the other piston is secured to the sleeve *f'*, surrounding the shaft *f*, as shown in Fig. 1. The sleeve *f'* is supported in a bearing in the head *c'*, as well as in the bearing-block a^3, secured to frame *a*. The shaft *f* is supported in one end in a central recess in the exhaust-chest *d*, and after passing through the sleeve *f'* its outer end is supported in the bearing-block a^4, secured to the frame *a*, as shown in Fig. 1.

b^3 is a balance-wheel secured to shaft *b*, as usual. Between the bearings a^3 and a^4 is secured to the sleeve *f'* the crank or lever *g'*, and to the shaft *f* is secured a similar crank or lever, *g*, as shown in Figs. 1 and 2.

h is a crank-pin attached to the lower end of lever *g*, and *h'* is a similar crank-pin attached to the lower end of lever *g'*.

i and *i'* are links connecting the crank-pin *b''*, respectively, to the crank-pins *h* and *h'* on the levers *g* and *g'*, as fully shown in Figs. 1 and 2.

In that part of the exhaust-chest *d* where it joins the end of the cylinder *c* are made a pair of diametrically-opposed ports, *d' d'*, and at a right angle to the latter are arranged the ports *d'' d''*, through which ports the steam is intermittently admitted to the cylinder *c* and exhausted from the same.

d^3 is the exhaust-opening leading from exhaust chamber or chest *d*, which exhaust-opening may be connected to a suitable exhaust-pipe, as usual.

e'' e'' represent suitable metallic or other packings, located in grooves or recesses in the hubs *e e*, as well as in the sides and ends of the wings *e' e'*, in the usual manner of packing rotary or similar engines or pumps.

k is the head or cover for the exhaust-chamber *d*, such head having central steam-supply passage, *k'*, leading to the delivery-openings of the oscillatory cross-shaped valve, the latter having arms *l l*, diametrically opposed to each other, and provided with openings *l' l'*, leading to the steam-supply *k'*, and, in addition to said valve-arms *l l*, the valve is provided with another pair of diametrically-opposed arms, *l'' l''*, having the valve-openings l^3 l^3, communicating with the steam-supply *k'*, as shown. To the center of the said cross-shaped valve is secured the valve-spindle *m*, that passes through a suitable stuffing-box, *k''*, on the rear side of head *k*, as shown in Fig. 2.

m' is a crank secured to the rear end of the spindle *m*, and *m''* is a link or connection provided with a ring, m^3, by which means and an

eccentric, m^4, secured to shaft b, a rocking motion is imparted to crank m' and the valve, so as to automatically allow the steam to enter and pass from the cylinder c.

The operation of this my improved engine is as follows: Supposing the parts of it to be in the relative positions as represented in the drawings, and steam admitted through the central channel or pipe, k', it will be conducted through valve-openings l' l' and ports d' d' between the piston-wings e' e', causing the latter to swing away from each other in the directions shown by arrows in Fig. 3, the ports d' d' being just on the point of taking steam, and the ports d'' d'' being about ready to exhaust. In the meantime the cross-shaped valve is automatically swung in the direction shown by arrow in Fig. 4, by means of the eccentric m^4 and connecting mechanism, to the valve-spindle m, as described, and as the valve turns in such direction it establishes a full supply of steam through the ports d' d', and permits of a full exhaust from the ports d'' d'' to the chamber d and exhaust-opening d^3, and by such movement of the respective parts the shaft f and sleeve f' are rocked in opposite directions, causing the levers g g' thereon to rock or swing away from each other in the direction of the arrows shown in Fig. 2, and by the connecting-links i i' and crank-pin b'' the disk b' and its shaft b is turned half a revolution around its axis in the direction of arrow shown on it in Fig. 2 until, by the reverse motion of the cross-shaped valve, the steam is cut off from the ports d' d' and admitted through the ports d'' d'', with corresponding exhaust-connections, thereby causing the piston-wings e' e' to return to their original positions, (shown in Fig. 3,) and thereby imparting another half-revolution in the same direction to disk b' and its shaft b, by which arrangement a rapid and continuous rotary motion is imparted from the oscillating piston-wings e' e' to the shaft b without any of the noise, jar, or pounding common to reciprocating piston engines or pumps. According to the exhaust, desired on the valve, its arms may be provided with proper lips, L L'', as shown in Fig. 4.

When so required—as, for instance, for paddle-wheel, propeller, or other engines—a suitable reversing-gear of any of the well-known constructions may be arranged in connection with the oscillating cross-shaped valve. The engine may be used with steam or liquids under pressure as the motive power, or the shaft b may be rotated if the device is to be used as a pump or blower.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. The stationary cylinder c and oscillatory wing-pistons e' e', arranged within it upon the shaft f and sleeve f', and the levers g g', secured, respectively, to said shaft and sleeve and connected to the crank b'' on shaft b by means of the links i i', as and for the purpose set forth.

2. The stationary cylinder c and oscillatory wing-pistons e' e', arranged within it upon the shaft and sleeve f f', and connecting mechanism to the rotary shaft b, as described, combined with the ports d' d'' and oscillating valve having the channels l' l^3, in communication with the steam-supply k', as and for the purpose set forth.

3. In an engine or pump, the stationary cylinder c and a pair of oscillating balanced pistons arranged within it, said pistons consisting each of a hub, e, and radial wings e' e', as set forth and described.

4. The stationary cylinder c and oscillatory wing-pistons e' e', arranged within it upon the shaft and sleeve f f' and having the connecting mechanism to the rotary shaft b, as described, in combination with the exhaust-chamber d, having ports d' d'' and exhaust-opening d^3, and the oscillating valve l l'', having the steam-supply channels l' l^3, in communication with the supply-pipe k', as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 14th day of September, A. D. 1886.

JOHN A. LIDBACK.

Witnesses:

CHARLES L. DRUMMOND,

NICHOLAS EASTMAN.