

(No Model.)

3 Sheets—Sheet 1.

O. VEZIN.
MULTIPLE CYLINDER ENGINE.

No. 545,989.

Patented Sept. 10, 1895.

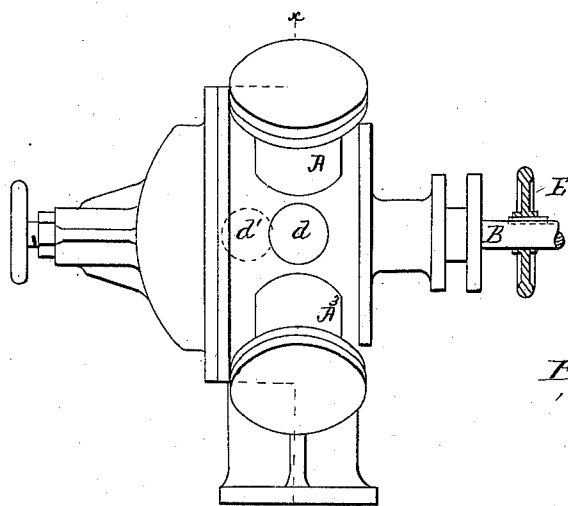


Fig. 1.

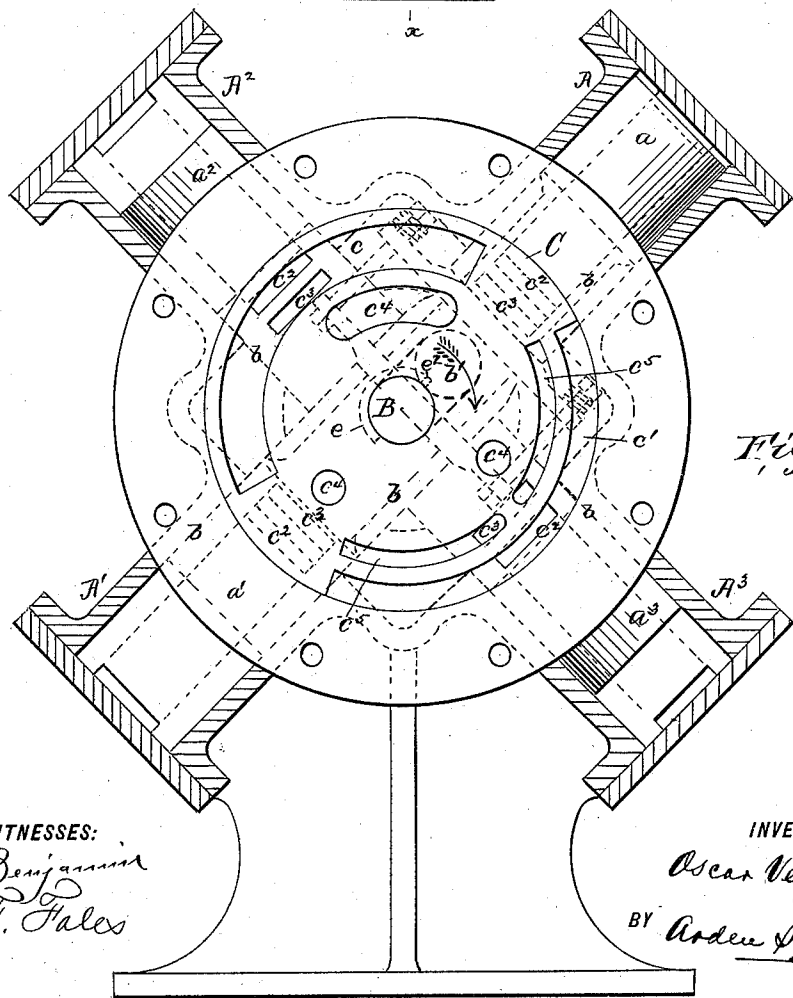


Fig. 2.

WITNESSES:
C. M. Benjamin
A. J. Fales

INVENTOR
Oscar Vezin
BY *Arden J. Fitch*
ATTORNEY

(No Model.)

3 Sheets—Sheet 2.

O. VEZIN.
MULTIPLE CYLINDER ENGINE.

No. 545,989.

Patented Sept. 10, 1895.

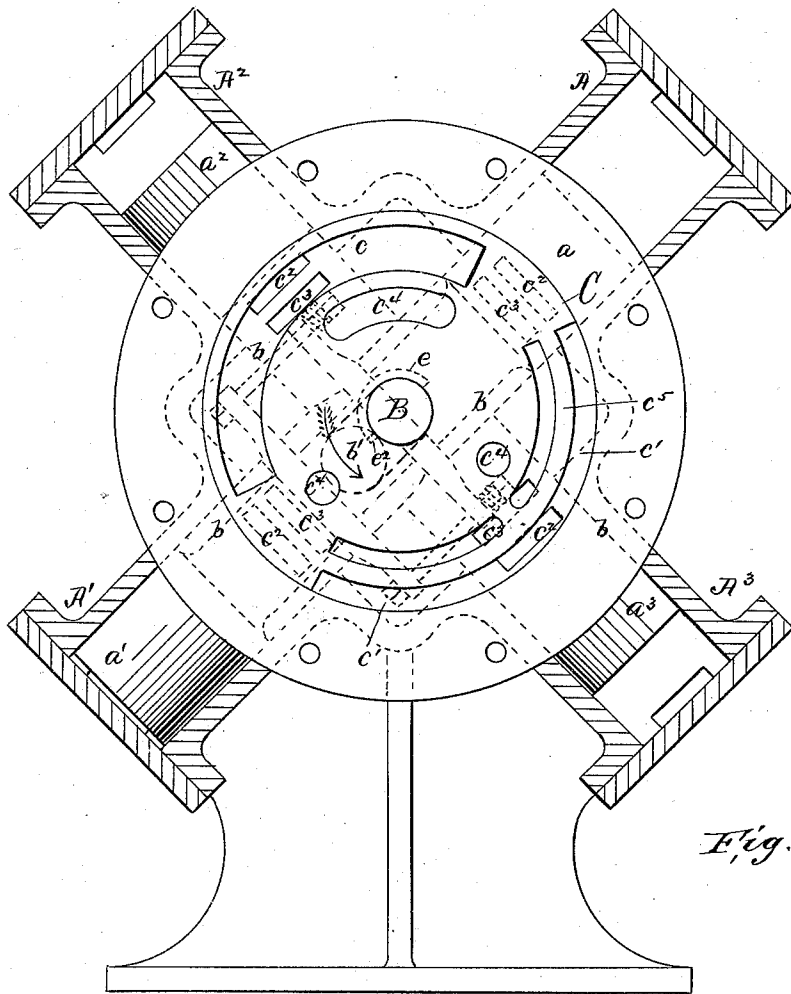
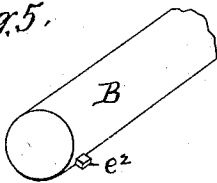


Fig. 3.

Fig. 5.



WITNESSES:

C. W. Benjamin
A. T. Fales.

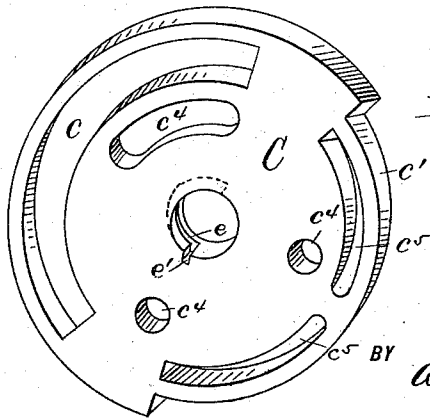


Fig. 4.

INVENTOR

Oscar Vezin

BY Adam S. Fitch.

ATTORNEY

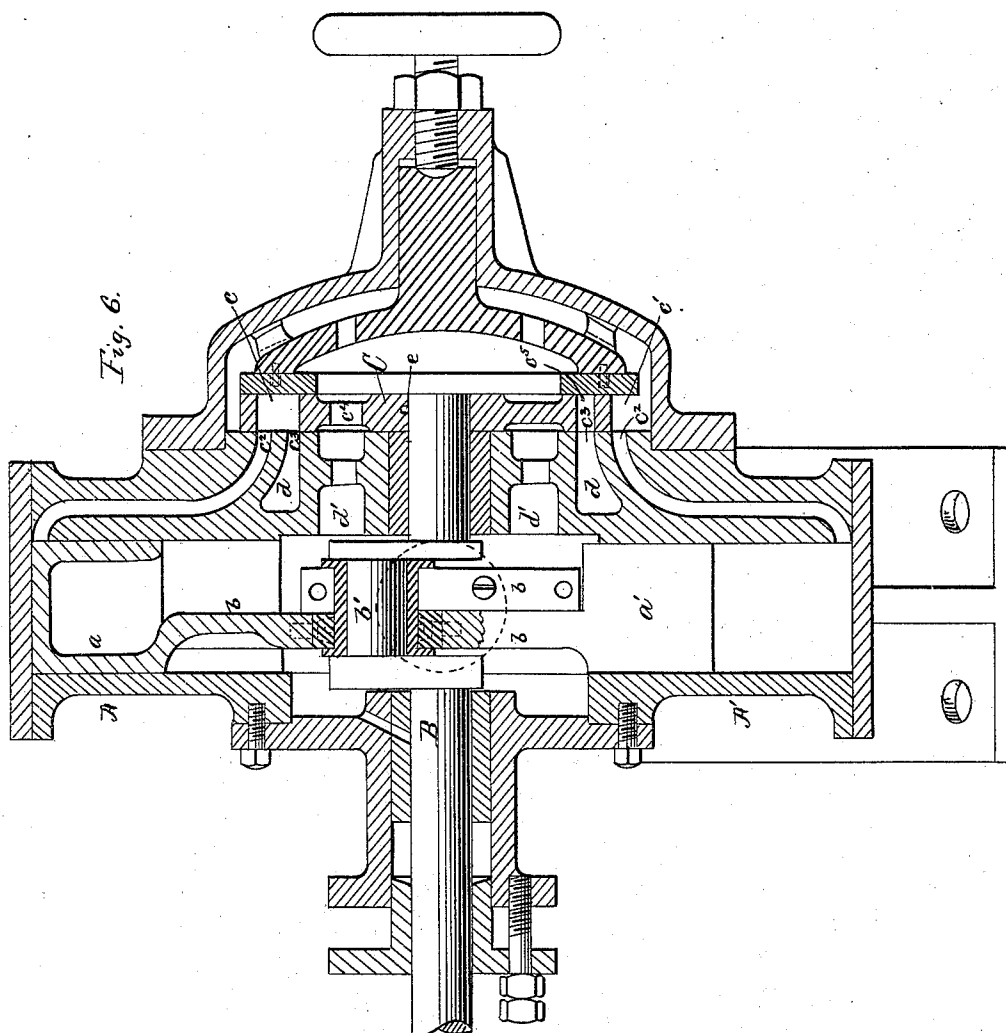
(No Model.)

3 Sheets—Sheet 3.

O. VEZIN.
MULTIPLE CYLINDER ENGINE.

No. 545,989.

Patented Sept. 10, 1895.



WITNESSES:

C. W. Benjamin
C. F. Fales

INVENTOR

Oscar Vezin,

BY *Arden S. Fitch.*

ATTORNEY

UNITED STATES PATENT OFFICE.

OSCAR VEZIN, OF NEW YORK, N. Y., ASSIGNOR TO THE CROSS ENGINE COMPANY, OF WEST VIRGINIA.

MULTIPLE-CYLINDER ENGINE.

SPECIFICATION forming part of Letters Patent No. 545,989, dated September 10, 1895.

Application filed February 5, 1895. Serial No. 537,345. (No model.)

To all whom it may concern:

Be it known that I, OSCAR VEZIN, a citizen of the United States, residing at New York, county and State of New York, have invented certain new and useful Improvements in Multiple-Cylinder Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a multiple-cylinder engine in which the several cylinders are radially arranged about a common crank-shaft, with their respective pistons connected to the crank thereof, and in which the said cylinders are governed in lead, cut-off, and exhaust by a disk-valve mounted on and rotating with the crank-shaft; and the object of my invention is to provide means whereby the reversal of the direction of rotation of the crank-shaft may be readily effected by the engineer.

My invention consists in the combination, with the cylinders and their pistons and ports in an engine of the class stated, of the disk-valve, adapted to govern the cylinder ports, as aforesaid, provided with a channel in the bearing-face of its axial aperture coincident therein with the lateral aperture in said disk constituting the steam-port of the valve, and a slot leading from said channel to a perimeter of said disk-valve, together with the crank-shaft common to the pistons of the several cylinders, as aforesaid, provided at its bearing for said disk-valve with a feather adapted to pass said slot and to enter and seat loosely in said channel in the disk-valve, whereby, when the rotation of said shaft in either direction by the said several pistons is stopped, the shaft may be reversely rotated through the distance of the duration of the steam-port of the valve independently of and without moving the valve, so that the positions of the several pistons will be reversed in their respective cylinders relatively to the steam-port in the valve, thereby causing the rotation of the shaft in said reverse direction when steam is readmitted to the cylinders through said valve-port, substantially as hereinafter particularly described.

In the drawings, Figure 1 is a side elevation of a multiple-cylinder engine containing my invention. Fig. 2 is a sectional rearward

end elevation of the engine on the line xx of Fig. 1, illustrating the relative positions of the pistons, crank-shaft, and disk-valve to effect the rotation of said shaft in one direction. Fig. 3 is a similar view of the same parts, illustrating the relative positions of the pistons, crank-shaft, and disk-valve to effect the reverse rotation of the shaft. Figs. 4 and 5 illustrate, respectively, the disk-valve and crank-shaft constructed in accordance with my invention; and Fig. 6 is a sectional view of the engine through the central line of cylinders $A A'$ at right angles to the section shown in Fig. 2.

In the engine shown in the drawings the cylinders $A A' A^2 A^3$ are single-acting and are radially arranged about a common crank-shaft B in pairs, with the cylinders of each pair thereof diametrically opposite to each other. The several pistons $a a' a^2 a^3$ in the respective cylinders have each an arm b , which reaches to the crank b' , with the arms of each pair of pistons connected to said crank.

The disk-valve C is mounted on the shaft B and works between a seat on the engine-body and an outward adjustable plate in a valve-chest in the usual manner in engines of this class. The steam-port of the valve is shown at c and the exhaust-port at c' , by which the valve in its rotation governs the ports c^2 of the several cylinders. Steam enters the chest at d and passes to the cylinder-ports through the chest-ports c^3 and the said valve-port c . The exhaust passes from the cylinder-ports through the valve-ports c' and thence through apertures c^4 in the valve-disk into the central chamber of the engine, whence it escapes at d' . The valve is desirably balanced by means of the lateral apertures c^5 in the disk, as shown.

In carrying out my invention a channel e is formed in the bearing-face of the axial aperture of the disk, as shown, and a lateral slot is provided at e' leading from said channel to one side or perimeter of the disk, and preferably to that side thereof which is adjacent to the valve-seat when the valve is in position. A feather is formed upon the shaft at its bearing for the disk-valve, as at e^2 , adapted in dimensions to pass the slot e' in the disk where the valve is mounted on the shaft and

to enter and have play in the aforesaid channel e . It will be noted that the steam-port c in the valve shown is of such extent or duration that the cut-off is at the end of the full stroke of each piston, and in constituting the aforesaid channel e in the bearing of the disk in accordance with my invention said channel is made coincident in length or duration to that of said steam-port c , as shown. When the steam-port c is shortened so that the cut-off is advanced to some point during the piston's working stroke, the length or duration of the channel e in the disk-bearing should be correspondingly reduced to make said channel coincident with said valve-port.

To mount the disk-valve on the shaft, the axial aperture in the disk is slipped upon the rearward end of the shaft with the shaft-feather opposite to or in line with the slot c' in the disk. As the disk passes onto the shaft, the feather enters and is passed over by said slot until said feather rests in the channel e , as described, and as shown in Figs. 2 and 3. When the feather e^2 bears against the disk-body at one end of said channel e , the rotation of the shaft in the direction toward said end of the channel will cause the rotation of the valve in the same direction, and when the feather bears against the disk-body at the opposite end of the channel e the rotation of the shaft in the direction of said opposite end of the channel will cause the rotation of the valve in said opposite direction, and it is evident that by means of the said feather e^2 engaging said channel e the shaft may be rotated in either direction through the distance of the length of said channel without causing the rotation of the disk-valve thereby.

The operation of my invention is as follows: When the working of the engine has rotated the shaft in the direction indicated by the arrow in Fig. 2, and it is desired to reverse the engine, the steam is first cut off and the engine brought to rest with the pistons and disk-valve in the relative positions, say, shown Fig. 2—that is to say, with the piston a in position at beginning of a working stroke and its cylinder A ready to or beginning to take steam, the opposite piston a' of the pair thereof being at the end of its working stroke and its cylinder A' ready or beginning to exhaust, while the pistons a^2 and a^3 of the other pair are at half-stroke, the cylinder A^2 taking steam and the cylinder A^3 exhausting. The shaft B is now reversely rotated through the distance of the length of the channel e , which causes the positions of the several pistons to be reversed relatively to the disk-valve, which remains motionless during the said rotation of the shaft. The parts are now in the relative position shown in Fig. 3—that is to say, the piston a is brought to the end of a working stroke in the cylinder A and said cylinder is ready to exhaust, while the opposite piston a' of the pair is at the beginning of the

working stroke in its cylinder A' and said cylinder is ready to take steam, the pistons a^2 and a^3 of said other pair having been thrown by said rotation of the shaft to the outward and inward ends, respectively, of their cylinders A^2 and A^3 and returned to positions of half-stroke therein, respectively, with the cylinder A^2 in communication with the steam-chest through the steam-port of the valve, and the cylinder A^3 in communication with the exhaust, as shown in Fig. 3. It is evident that when steam is now turned on to the engine the movement of piston a^2 thereby will operate to throw the crank in the direction indicated by the arrow in said Fig. 3 and that the successive movements of all the pistons will operate to continue such throw of the crank, thereby effecting the rotation of the shaft and disk-valve in the reverse direction to that indicated in Fig. 2.

It is obvious that the positions of the feather and its channel may be reversed, the former being placed on the valve and the latter and its slot formed in the shaft, without material departure from the essential feature of my invention.

For convenience in manipulating the shaft to effect the hereinbefore-described rotation thereof through the distance of the length of the said channel e a hand-wheel or equivalent device may be fixed on the shaft, as shown at E , Fig. 1.

My invention will be found specially serviceable in engines of the class shown and described which are employed in marine propulsion, where the occasion for a prompt reversal of the direction of rotation of the shaft frequently occurs, as well as in other uses in which such a reversal is demanded or desirable.

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

In a multiple cylinder engine in which the several cylinders are radially arranged about a common crank-shaft to which the respective pistons of said cylinders are connected, the combination with said cylinders and their ports and pistons, of a rotary disk-valve which governs the cylinder-ports in lead, cut-off and exhaust, provided in the bearing-face of its axial aperture with a channel that is coincident in length or duration with that of the steam-port in said valve, and a slot leading from said channel to a side of the valve, together with the common crank-shaft provided at its bearing for said disk-valve with a feather adapted to pass said slot and to enter and have play in said channel in said bearing-face of the valve-disk; substantially as and for the purposes set forth.

OSCAR VEZIN.

Witnesses:

ARDEN S. FITCH,
A. T. FALES.