

C. F. HENRY & L. E. BRANNING.

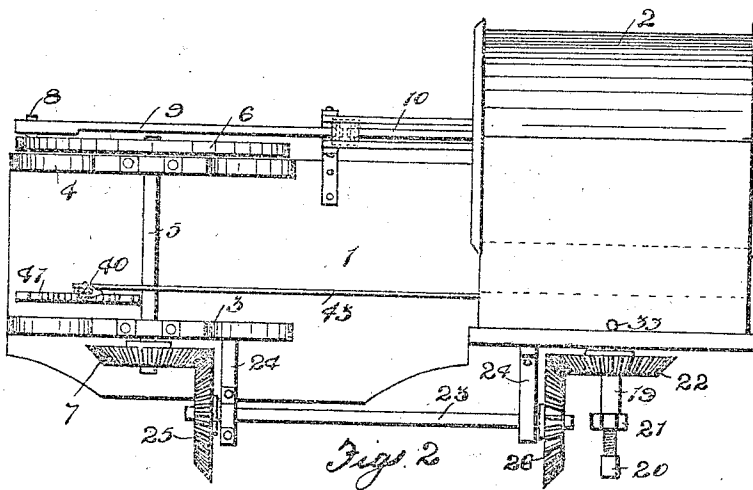
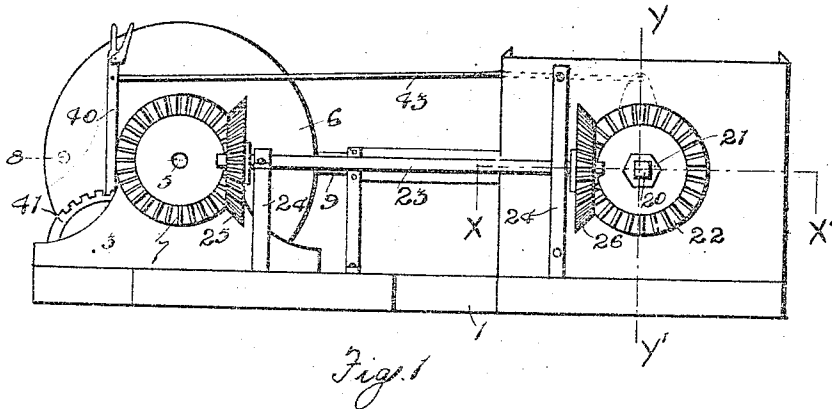
DISK VALVE.

APPLICATION FILED JUNE 27, 1912.

1,055,531.

Patented Mar. 11, 1913.

3 SHEETS—SHEET 1.



Witnesses
Roland Foster
W. Wakefield

Inventors
C. F. Henry
L. E. Branning
By *Frank J. Schuchman*
Att'y

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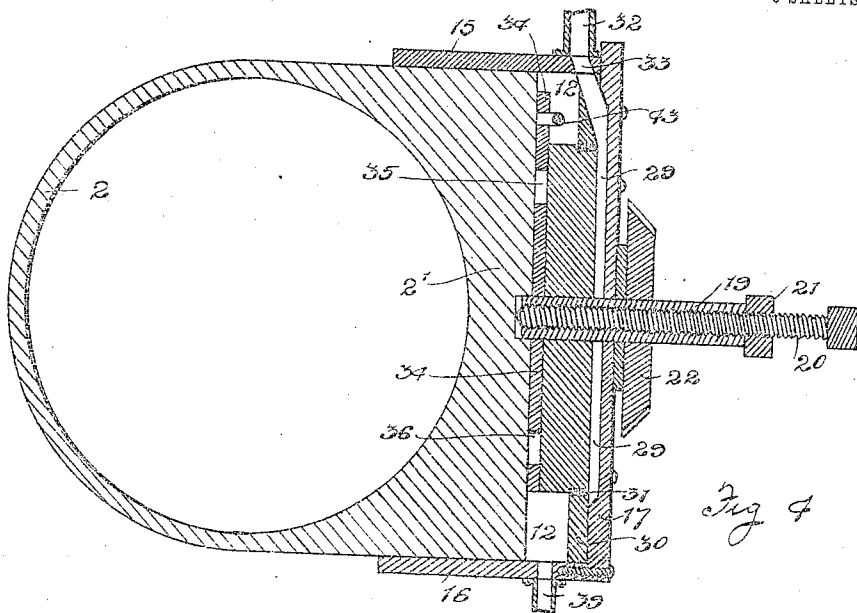


Fig 4

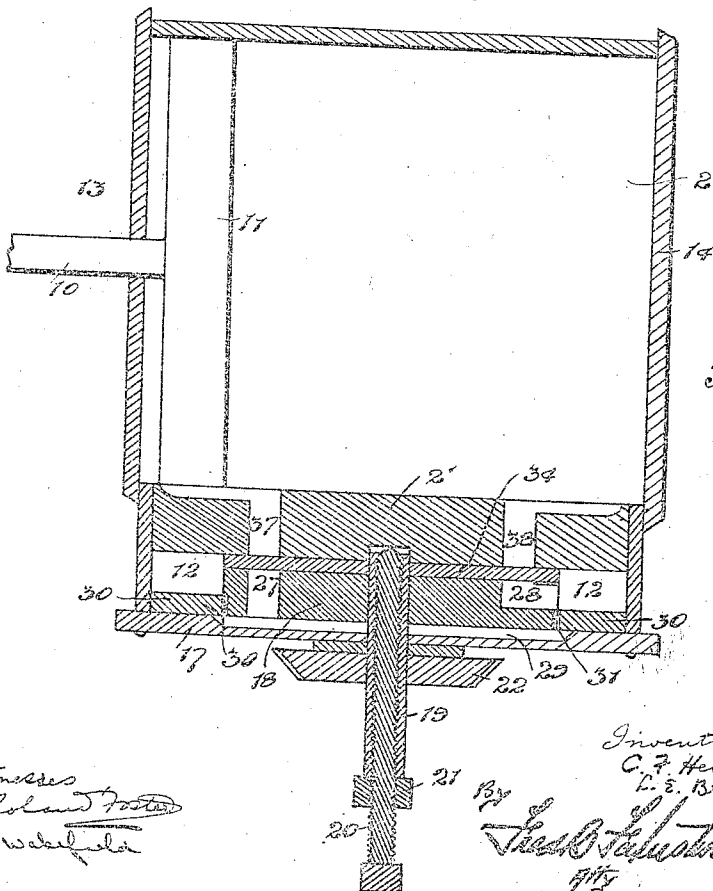


Fig 5

Witnesses
Roland Foster
w. whitefield

Inventors
C. F. Henry
L. E. Branning
By
Charles E. Branning

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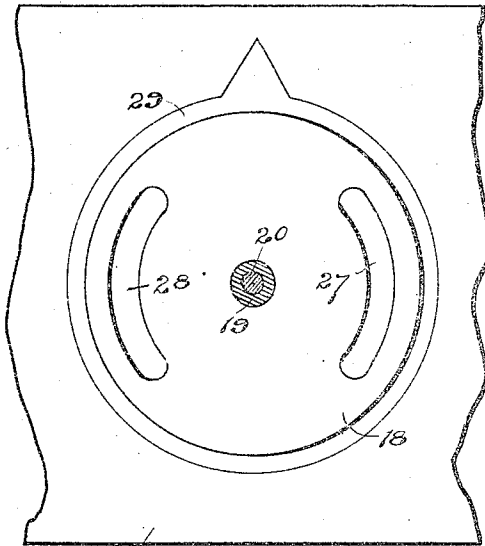


Fig. 5

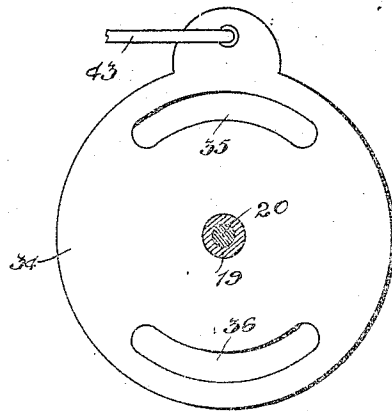


Fig. 7

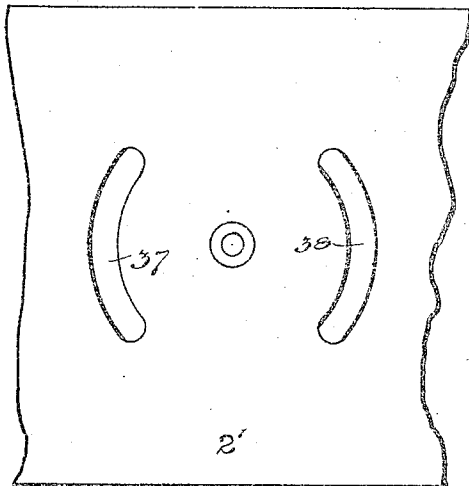


Fig. 6

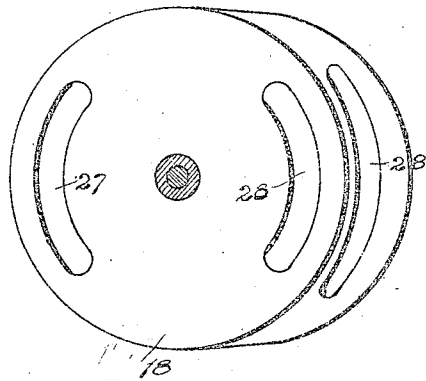


Fig. 6

Witnesses
Roland Foster
W. W. H. H. H.

Inventors
C. F. Henry
L. E. Branning
By
J. B. H. H. H.

UNITED STATES PATENT OFFICE.

CHARLES FREMONT HENRY AND LUCIAN EMMERY BRANNING, OF BOW ISLAND,
ALBERTA, CANADA.

DISK VALVE.

1,055,531.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed June 27, 1912. Serial No. 706,302.

To all whom it may concern:

Be it known that we, CHARLES FREMONT HENRY and LUCIAN EMMERY BRANNING, both of the village of Bow Island, in the Province of Alberta, Canada, have invented certain new and useful Improvements in Disk Valves, of which the following is the specification.

The invention relates to a valve applicable to steam and other such engines and the object of the invention is to do away with the various slide and rocker valves, valve gears and eccentrics now in common use on engines and substitute therefor a revolving valve whose motion is continuous, thus causing no jerks or jars, and supplying one which may be run at a very high rate of speed without danger of displacement of the valve or injury to it.

A further object of the invention is to provide a steam tight valve which can be easily operated to reverse the engine and one in which the operator can regulate the lead and cushion of the stroke without resetting the valve or removing the steam chest cover.

Referring now to the drawings,—Figure 1 represents a side-elevation of the device. Fig. 2 a plan view of the same. Fig. 3 is an enlarged horizontal sectional view through the cylinder and the adjoining parts, the section being taken in the plane denoted by the line X—X' Fig. 1. Fig. 4 is an enlarged vertical sectional view through the device the section being taken in the plane denoted by the line Y—Y' Fig. 1. Fig. 5 is a rear view of the plate and rotary valve as they appear when detached from the cylinder. Fig. 6 is a perspective view of the valve. Fig. 7 is a side elevation of the disk detached. Fig. 8 is a side elevation of the cylinder wall showing the location of the port holes therein.

In the drawings like characters of reference indicate corresponding parts in each figure.

1 represents a suitable base plate supporting an engine cylinder 2 and a set of bearing blocks 3 and 4, in turn carrying a cross shaft 5. The shaft is supplied with a wheel 6 and a bevel gear 7 the wheel being supplied with an eccentric pin 8.

9 is a crank connecting the pin 8 with a piston rod 10 secured to a piston 11 which operates in the cylinder. Adjoining the side of the cylinder is formed a steam cham-

ber 12 bounded by the wall 2' of the cylinder, end plates 13 and 14, top and bottom plates 15 and 16 and a side plate 17, the side plate being securely fastened to the top and bottom plates as indicated.

18 is a rotary disk valve located within the steam chamber and mounted securely on a hollow shaft 19 carried by the plate 17. The interior of the shaft is threaded to receive an adjusting screw 20 which bears against the wall 2' of the cylinder. A lock nut 21 is supplied on the screw whereby it can be fastened in any set position.

22 is a bevel gear fixed on the outer end of the shaft 19 and of the same size as the bevel gear 7 already referred to. 23 is a counter shaft mounted in suitable brackets 24 and carrying smaller bevel wheels 25 and 26 which mesh continuously with the beveled gears 7 and 22 already referred to.

The inner end of the shaft 19 rides in a pocket 19' formed in the wall 2' of the cylinder, and if desired ball bearings can be placed at this point to insure that the shaft will rotate freely.

The disk valve 18 is supplied with elongated port holes 27 and 28, the port hole 27 passing directly through the valve from side to side, while the port hole 28 passes from the inner face of the valve to the circumference thereof, the opening at the circumference being kept over toward the inner face of said valve.

The inner face of the plate 17 is hollowed out to provide a chamber at 29 which is inclosed by the face of the valve and a partition 30 which is fitted within the steam chamber and is rounded out centrally to receive the disk which rotates partially within it. Expansion rings 31 are placed around the circumference of the disk where it engages with the partition. It is here pointed out that the port hole 27 connects with the chamber 29 while the port hole 28 enters the steam chamber 12, having no connection whatever with the chamber 29.

32 is the live steam feed pipe which admits steam to the engine. This pipe is connected directly through an opening 33 supplied in the top of the partition with the chamber 29.

34 is a reversing disk centered on the inner end of the shaft 19 adjoining, immediately between the inner face of the valve 18 and the side 2' of the cylinder. The disk

is supplied with a pair of ports 35 and 36 designed to register with the ports 27 and 28 of the valve and also with ports 37 and 38 formed in the wall 2' of the cylinder.

39 is an exhaust pipe passing directly from the steam chamber 12 at the bottom.

40 is a lever operating over a quadrant 41 carried by the base plate 1, which lever is supplied with the usual hand latch and detent whereby it can be adjusted on the quadrant. A link 43 connects the lever with the disk 34 so that one can, by turning the lever, set the disk in any desired position.

In order to understand the operation of the device we will now describe it, assuming at the outset that the lever 40 is in the upright position and that the disk 34 is in the position as indicated in the drawing with the port holes 35 and 36 above and below the center or as best shown in Fig. 7. Assuming further that the engine is at what might be termed rear center, and that the valve 18 is set on the shaft so that the intake port is directly opposite the port 37 in the wall 2' although it is to be remembered that the disk intervenes between these points. Upon the operator turning the engine off center the valve will turn slightly as it is forced to rotate on account of the beveled gears. Steam is next turned on and the operator moves the lever forward or backward to either of its extreme positions. The port hole 27 of the valve gradually becomes connected with the opening 37 in the cylinder wall through one or other of the ports 35 and 36 in the disk (depending upon the direction it is turned by the lever). This allows steam to enter the cylinder at the rear end, consequently, the piston is driven to the front end. As this motion takes place the valve 18 is also rotated half way around so that the opening 27 is connected with the opening 38 through either one or other of the openings 35 and 36 in the disk. This admits steam to the front end of the cylinder. Simultaneously the exhaust port 28 becomes connected with the entrance opening in the cylinder which is at the opposite end to that taking steam. When the reverse disk 34 stands in the extreme positions a large quantity of steam is admitted to the cylinder and there is then but little lead and cushion to the stroke. Shifting the reverse disk from either of the extreme positions to the central position admits a smaller amount of steam to the cylinder and consequently increases the lead and cushion of the stroke. Should the attendant wish to reverse his engine when the lever is over toward the extreme left position he shifts it over past the central position toward the extreme right position which rocks the disk 34 on the shaft 19 and throws the port 36 of the disk 34 into registration with the intake ports 27 and 37 to admit steam behind the piston 11, and if the lever

should stand in the extreme right position he can reverse it by simply forcing the lever to the extreme left position, which throws the port 36 into registration with the port 38 to admit steam therethrough to the front of the piston 11. The set screw 20 allows one to adjust the pressure of the valve 18 against the face of the reversing disk.

What we claim as our invention is:—

1. The combination with a cylinder having suitable inlet and outlet ports therein, and a reciprocating piston within the cylinder, of a steam chamber to the side of the cylinder and communicating with the same through the ports aforesaid, a partition within the chamber bearing against the outer wall thereof, said wall being cut away to form a second chamber between the partition and the wall, a supply pipe communicating with the second chamber, and an exhaust pipe with the first chamber, a rotatably mounted disk valve entering both chambers and passing through the partition, said valve being supplied with inlet and exhaust ports, one of said ports passing completely through the valve from face to face and communicating with the second chamber, and the other of said ports passing from the inner face of the valve to the circumference thereof, at which point it opens to the first chamber, a shiftable disk interposed between the inner face of the valve and the cylinder, said disk being supplied with openings designed in the rotation of the valve to connect the ports in the valve with those in the cylinder, means for rotating the valve one revolution for each reciprocation of the piston, and a lever connected through a suitable link with the disk, as and for the purpose specified.

2. The combination with a cylinder having suitable inlet and outlet ports therein, and a reciprocating piston within the cylinder, of a steam chamber located to the side of the cylinder and communicating with the interior thereof through the ports aforesaid, a partition passing across the chamber and bearing against the outer wall thereof, which wall has its inner face cut away to form a second chamber between the wall and the partition, an inlet pipe communicating with the second chamber, an exhaust pipe communicating with the outlet chamber, a rotatable shaft passing across the chambers and mounted in the side of the cylinder and the aforesaid wall of the chamber, a disk valve fixed on the shaft and entering both chambers, which valve passes through the partition which is cut away to receive it and make a steam tight joint with the circumference thereof, and is further supplied with inlet and exhaust ports, the inlet port passing from the inner face thereof to the outer, at which point it communicates with the second chamber, and the exhaust port passing from the inner face thereof to the cir-

cumference, at which point it communicates with the first chamber, a disk centered on the shaft and interposed between the valve and the cylinder, said disk being supplied with openings designed to connect the valve ports with those of the cylinder in the rotation of the valve, means for rotating the shaft one revolution for each reciprocation of the piston, and a pivoted lever connected

through a suitable rod with the disk, as and for the purpose specified.

Signed at Bow Island this ninth day of December, 1911.

CHARLES FREMONT HENRY.

LUCIAN EMMERY BRANNING.

In the presence of—

C. H. BELL,

E. C. LUDTKE.