No. 758,317. PATENTED APR. 26, 1904.

O. JACKSON.

VALVE GEAR FOR ENGINES.

APPLICATION FILED MAY 14, 1903.

NO MODEL.

Fig. 1.

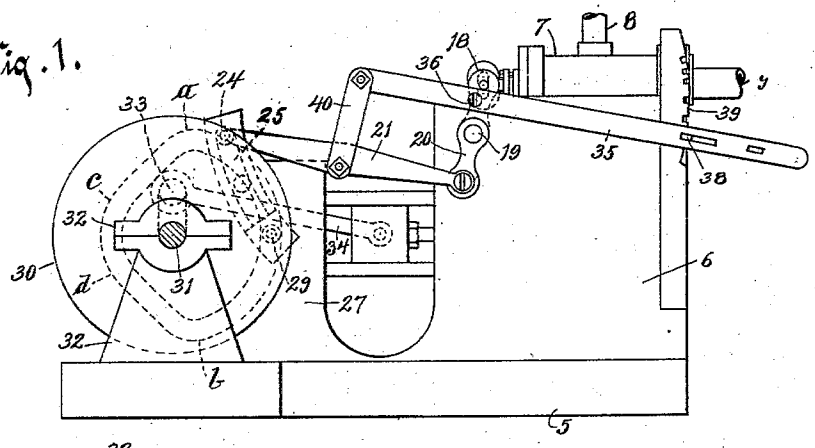


Fig. 2.

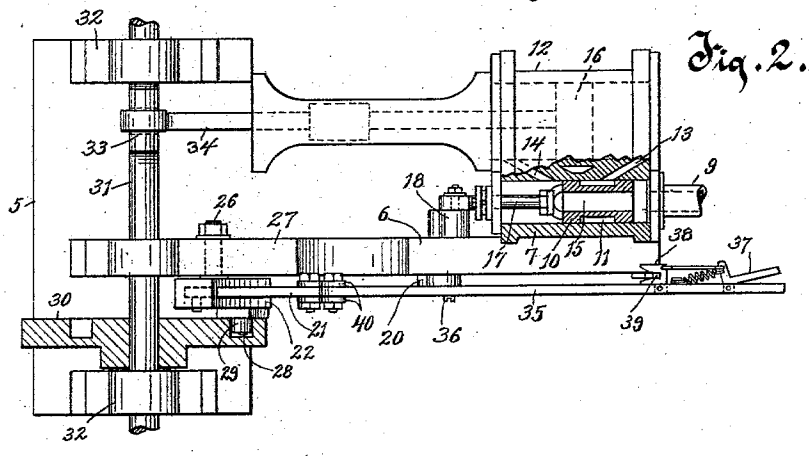


Fig. 4.

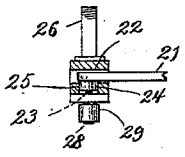
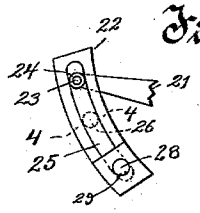


Fig. 3.



Witnesses.

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No. 758,317. Patented April 26, 1904.

UNITED STATES PATENT OFFICE.

OSWALD JACKSON, OF CARROLLTON, ILLINOIS.

VALVE-GEAR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 758,317, dated April 26, 1904.

Application filed May 14, 1902. Serial No. 107,280. (No model.)

To all whom it may concern:

Be it known that I, OSWALD JACKSON, residing at Carrollton, in the county of Greene and State of Illinois, have invented a new and useful Improvement in Valve-Gear for Engines, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in valve-gear for engines. It is a well-known fact among those skilled in this particular line of machinery that that engine, other things being equal, which most nearly obtains the highest boiler-pressure on its piston at the commencement of the stroke may cut off that pressure the earliest, attain the highest rate of expansion, and exhaust the steam at the lowest pressure.

It is therefore one of the important objects of my invention to obtain the above-referred-to desirable ends, the construction being such that a full head of steam is admitted at once against the end of the piston, thus doing away with the gradual admission of steam, technically known as "wire-drawn" steam, my improved construction also being such that the steam is fully exhausted, whereby the back pressure existing in the cylinders of ordinary engines is obviated.

A further important object accomplished by my invention is the doing away with a number of wearing parts necessary in the ordinary locomotive valve-gear.

In the accompanying drawings, Figure 1 is a side elevation of the invention. Fig. 2 is a plan view thereof. Fig. 3 is a side elevation of the pivoted slotted plate, and Fig. 4 is a cross-section on the line 4 4 of Fig. 3.

The frame of the engine may be of any desirable construction best adapted for supporting the operative parts of the invention.

In the accompanying drawings I show a bed 5, on which the different parts are supported and carried. At one end of the bed is an upward extension 6, on which is supported a valve-casing 7, in which steam is admitted in any desirable manner, preferably from the top through a steam inlet-pipe 8. The steam is exhausted from the valve-casing through an exhaust-pipe 9, preferably extending from one end of said casing. Within the chamber of the valve-casing is adapted to reciprocate a valve 10, having centrally therearound an annular steam-channel 11. Leading from the valve-chamber and extending to the cylinder 12 are the usual channels 13 and 14. The valve is provided centrally therethrough and from end to end thereof with a channel 15. In the position of the valve shown in Fig. 2 the annular channel 11 is in registration with the channel 13, and consequently the inlet-steam admitted to the channel 11 from the pipe 8 is free to pass by way of channel 13 into the cylinder 12 and there act against the piston 16 in said cylinder. The steam in advance of the piston is free to exhaust by way of the channel 14 into the valve-chamber, thence through the longitudinal channel 15 of the valve to the exhaust-pipe 9. Extending from the valve and through one end of the valve-casing is a valve-rod 17. To one end of this valve-rod is connected the upper end of a crank-arm 18, said crank-arm extending from one end of a rock-shaft 19, said rock-shaft having its bearing in an opening in the upward extension 6. The opposite end of said rock-shaft has secured thereto and depending therefrom a crank-arm 20, and the lower end of this arm has pivoted thereto a link or lever 21. The rear end of this link extends in between the side members of a plate 22 and is provided with a lateral pin 23, on which is mounted a roller 24, said roller riding in an elongated slot 25, (preferably struck in the arc of a circle,) formed in one of the side members of said plate 22. The plate 22, which in this art is termed a "link," is pivoted on a pin 26, projecting laterally from an upward extension 27 of the bed-plate. Projecting from the lower end of the plate 22 is a stud 28, said stud having mounted thereon a roller 29, which is adapted to work in a cam-groove formed on a disk 30. This disk is mounted fast on the crank-shaft 31 of the engine, said crank-shaft being mounted in upwardly-extending bearings 32 32. It will be noticed that the portion of the cam-groove from the points *a b* is in the form of an arc of a true circle, the portions from *a c* and *b d* are irregular in shape or out of true circular form,

while between the points *c* and *d* a short arc of a true circle is described. The crank-shaft has formed thereon the usual crank 33, to which is connected the end of the piston-rod 34 which extends from the piston of the cylinder.

The numeral 35 indicates a medially-pivoted reversing-lever, the pivot thereof being at the point 36. This lever has pivoted thereto near its outer end a spring-controlled finger 37, which is adapted to operate a dog 38, said dog working over the curved edge of a notched bar 39. The end of the short arm of the lever 35 is connected to the link 21 by means of links 40.

The upward extensions 6 and 27 of the bed-plate constitute a single vertical wall, to which the valve-casing 7 is secured and in which the rock-shaft 19 and the pivot-pins 36 and 26 are mounted, and forming a bearing for the crank-shaft 31 and a support for the notched bar 39.

In the operation of the mechanism when the shaft 31 is revolved the disk 30 is of course revolved therewith. In the revolution of this disk when one of the portions *a* to *c* or *b* to *d* of the cam-groove is brought into engagement with the roller 29 the medially-pivoted plate 22 is of course actuated, and inasmuch as the roller 24, carried by the pin 23 of the link 21, rides in the slot 25 of this pivoted plate said link is also actuated. This actuation of the link will, through the crank-arm 20, cause a turning of the rock-shaft 19 and also a turning of the crank-arm 18 on the opposite end of said rock-shaft, and hence the valve 10 is moved in a direction to fully open the inlet or fully open the exhaust, in accordance with which of the channels 13 or 14 is acting as the inlet or as the exhaust. At this time the roller 29 will have passed from the irregular portion *a* to *c* or *b* to *d* and on to the true circular portion of said groove between the points *a* and *b*, and while said true circular portion of the groove remains in engagement with the roller the admission and exhaust channels are maintained open to their full extent. By this arrangement a full head of steam is admitted at once against the end of the piston, and an instantaneous and full exhaust is also provided, the exhaust starting a little prior to the admission of the inlet-steam. Heretofore the admission of the inlet-steam and the exhaust of the exhaust-steam has been gradual, and by the time the inlet-port is open fully the valve is commencing to close said port. In my improved construction the inlet and exhaust ports, as stated, are opened instantly and remain open for a short period of time in order that the piston may derive the benefit of the full head of steam, and at the same time the exhaust-steam in advance of the piston is exhausted, thereby obviating the back pressure existing in cylinders of the ordinary form of engines. It will also be apparent that in my form of valve-gear during this period of inaction of the valve the parts are not subjected to wear, as is the case in constructions wherein the valve is under constant and continual reciprocation.

Attention is directed to the fact that there is a small portion of the cam-groove between the points *c* and *d*, and connecting the irregular portions of said grooves, which is also on a true circle, and consequently when the roller is on this smaller true circle the valve is also inactive. Again, when the valve is in motion there is of course a short period of time when both the inlet and exhaust channels are closed by said valve. During this brief period the piston 16 is actuated by the expansion of the steam in the cylinder.

While I prefer to construct the cam-groove as illustrated in the drawings, yet I do not wish to limit myself specifically thereto, inasmuch as said groove may be of any shape which will effect the cutting off of the steam at any desired point of the stroke of the piston. For instance, the same result and operation could be obtained if the true irregular portions between *a* and *b* and *c* and *d* were omitted altogether and only the irregular or inclined portions of the groove provided. It is obvious that in such arrangement on the revolving of the disk the inclined or irregular portions of the groove would alternately engage the roller 29, and hence actuate the pivoted plate 22, and when these irregular portions of the groove leave the roller 29 the pivoted plate 22 would remain inactive.

For stopping altogether the operation of the valve or for reversing the direction of rotation of the crank-shaft and for regulating the degree of movement of the valve I employ the lever 35. When this lever is adjusted to the central notch of the bar 39, the link 21 is thrown so that the roller 24 thereof is brought to the center of the slot 25. It will be apparent that under this adjustment there is no rocking movement imparted to the link 21, and consequently the valve 10 is not actuated. When the lever 35 is thrown downwardly to the position shown in Fig. 1, the roller 24 is of course raised to the upper end of the slot 25, and consequently full movement is imparted to the link 21 and a full actuation of the valve 10 thereby obtained. In order to reverse the direction of rotation of the engine, all that is necessary to be done is to thrust the lever 35 upwardly above the central point, and the engine will be thereby caused to rotate in the reverse direction.

It will be further apparent that gradations in the degree of movement of the valve in the running of the engine in eitheir direction may be readily effected merely by adjusting the lever 35 to certain positions in order to bring the roller 24 varying degrees from the center of the slot 25.

Besides the advantages already pointed out in regard to my invention I would further call attention to the fact that the particular construction thereof is such that a number of wearing parts necessary in the ordinary locomotive valve-gear are dispensed with.

What I claim as my invention is—

In a valve-gear, a bed-plate, a vertical wall thereon, a valve-casing secured to the vertical wall, a rock-shaft passing through the vertical wall and having a crank on one end in connection with the valve-rod, a crank-shaft journaled through the vertical wall, a disk thereon, a link pivoted to the vertical wall and having a roller traveling in a cam-groove of the disk, a lever pivoted at one end to a crank on the other end of the rock-shaft and having its other end guided by the longitudinal groove of the link, a lever pivoted to the vertical wall and having a link connection with the first-named lever, and a notched bar on the vertical wall to retain the second-named lever in its adjustments.

In testimony whereof I affix my signature in presence of two witnesses.

OSWALD JACKSON.

Witnesses:
W. L. CLOSE,
H. H. MONTGOMERY.