(No Model.)

C. N. LEONARD.

REVERSING VALVE FOR ENGINES.

No. 263,711. Patented Sept. 5, 1882.

Fig. 1.

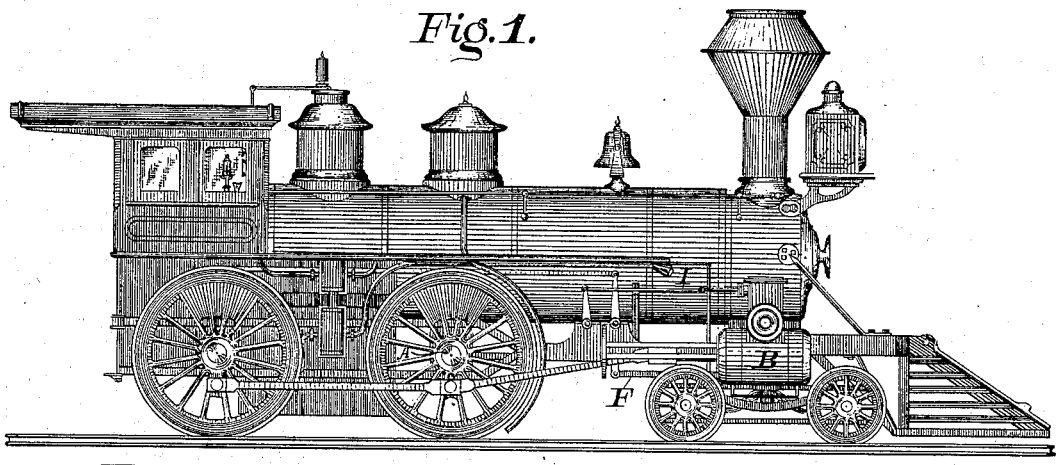


Fig. 4.

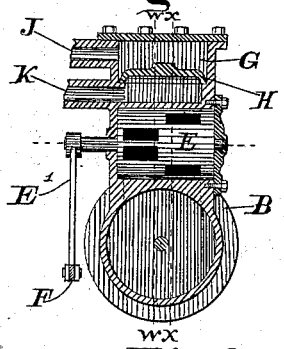


Fig. 5.

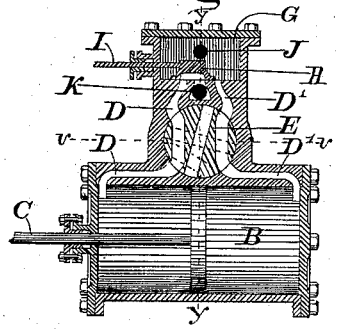


Fig. 6.

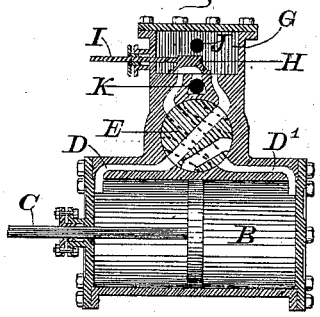


Fig. 9.

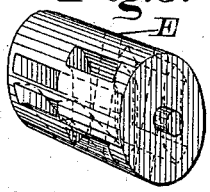


Fig. 8.

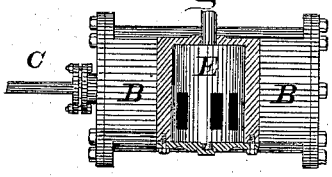


Fig. 7.

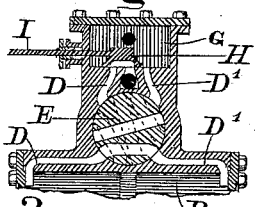


Fig. 2.

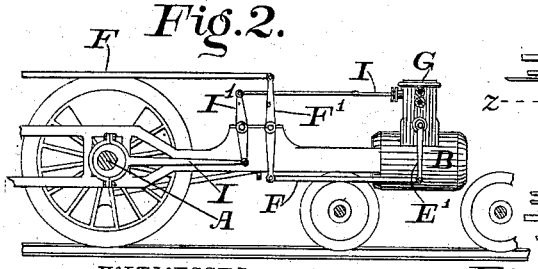
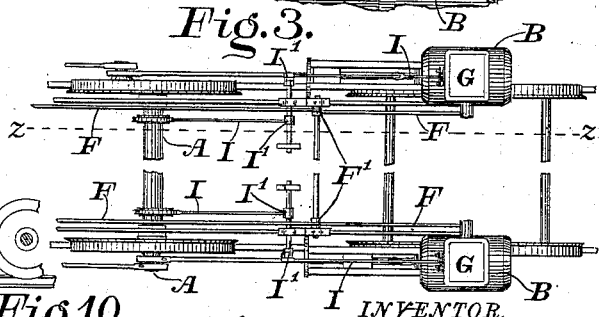


Fig. 3.

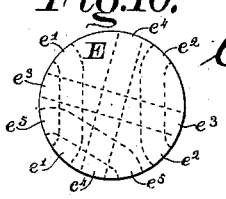


WITNESSES.

Chas. L. Hurber.

L. L. Norton.

Fig. 10.



INVENTOR.

Chas. N. Leonard,

PER

C. Bradford.

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES N. LEONARD, OF INDIANAPOLIS, INDIANA.

REVERSING-VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 263,711, dated September 5, 1882.

Application filed May 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES N. LEONARD, of the city of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Reversing-Valves for Engines, of which the following is a specification.

The object of my said invention is to produce a valve by which a steam or other similar engine may be reversed, thereby dispensing with expensive reversing-link and other devices of like character and purpose, my invention being a perfect substitute therefor. This object is accomplished by placing between the ordinary slide or other valve for governing the admission of steam to the cylinder and said cylinder a valve through which the steam-ports shall pass, and which is capable of being moved so that the course of said ports shall be changed, as will hereinafter be more specifically set forth.

Being aware that valves have been heretofore produced for the same purpose, though of a different construction, I desire to be understood as limiting myself to that which is hereinafter particularly described and claimed as new.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a side elevation of a locomotive embodying my invention; Fig. 2, an elevation of the cylinder, wheels, and parts connecting them, as seen when looking upwardly from the dotted lines *z z* in Fig. 3; Fig. 3, a top plan of substantially the parts shown in Fig. 2; Fig. 4, a transverse section of the cylinder and steam-chest on the dotted line *y y*, my improved valve being shown in elevation; Fig. 5, a longitudinal section on the dotted line *x x*, showing the valve in one position; Fig. 6, a similar section on the dotted line *w w*, and showing the valve in another position, as when the engine is reversed; Fig. 7, a section on the same dotted line, showing the valve in still another position, as when the steam is entirely cut off; Fig. 8, a horizontal sectional view, looking downwardly from the dotted line *v v*; Fig. 9, a perspective view of the valve, and Fig. 10 an end elevation thereof, showing the location of the several orifices therein by means of dotted lines.

In said drawings, the portions marked A represent the axle of one pair of the driving-wheels of the engine; B, the cylinder; C, the piston-rod; D D′, the ports; E, my reversing-valve; F, the rod for operating the same; G, the steam-chest; H, the slide-valve; I, the rod for operating the same; J, the steam-pipe, and K the exhaust-pipe. The several parts A, B, C, G, H, J, and K are or may be of any usual or approved form, and need no special description.

The upper and lower ends of the ports D D′ are similar to ordinary ports. The central portions, however, consist of orifices through the reversing-valve E, as will be presently explained. It is desirable that the portions of the ports which join the orifices in the valve E be somewhat increased in depth to compensate for the decreased width which results from the forming of two sets of orifices in said valve.

The reversing-valve E is preferably a plain cylindrical body having two sets of orifices of two each (or four in all) running through the same, the orifices of one set being substantially parallel and those of the other set crossing each other. A fifth single orifice is also preferably added for the purpose illustrated in Fig. 7, and hereinafter explained. The first set of orifices, e' e^2, form a part of the ports D′ D^2 when the valve is in the position shown in Fig. 5, and said ports, when these orifices form part thereof, conduct the steam to that end of the cylinder which corresponds to the end of the steam-chest from which it enters. A second set of orifices, e^3 e^4, form a part of the ports when the valve is in the position shown in Fig. 6, and said ports, when these orifices form part thereof, conduct the steam to that part of the cylinder opposite to the end of the steam-chest from which it enters, thus reversing the action of the engine. The single orifice e^5 forms a connection between the lower portions of the two ports when the valve is in the position shown in Fig. 7 and completes a passage between the two ends of the cylinder when the steam is cut off, allowing the contents of the cylinder to pass from one end of the cylinder to the other and preventing the drawing in of cinders or other extraneous matter from the smoke-box or elsewhere. As will also be noticed, when this valve is in this position the steam is fully cut off from the cylinder, and

therefore this valve is adapted to serve temporarily as a throttle-valve should the latter get out of order, or should it from any other reason be desirable or necessary for it to perform such service.

The rod F is adapted to operate the valve E through the arm E′ upon its stem. It is preferably composed of the parts most clearly shown in Fig. 2, (including the rock-beam F′,) for the purposes of convenience, and terminates in the ordinary reversing-lever at the engineer's station. This construction and arrangement of parts will be readily understood by an examination of the drawings, as it is a common one in machinery.

The manner of connecting the rod I to the eccentric on the shaft A is by the use of a construction similar to that employed in the rod F, and for similar reasons. The rock-beam I′ is employed for the purpose of permitting the parts to work on as nearly a direct line as is possible.

As will be noticed, the reversing-link usually employed is entirely dispensed with. The parts substituted therefor are simple, inexpensive, and easily operated, besides which they accomplish additional valuable results.

This invention is shown applied to a locomotive; but it will of course be understood that it can be applied to any other engine as well.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the steam-chest and cylinder of a steam-engine, of the cylindrical device E, interposed between them, and provided with one set of ports, e' e^2, which pass down through its sides substantially parallel with each other, and a second set, e^3 e^4, which pass centrally through it and cross each other, substantially as shown and described, and for the purposes specified.

2. The combination, with the steam-chest and cylinder of a steam-engine, of the cylindrical device E, interposed between them, and provided with the several ports e' e^2 e^3 e^4 e^5, arranged and operating substantially as shown and described, and for the purposes specified,

3. The combination, with an engine, of a valve adapted to cut off the ports from the steam-chest, and provided with an orifice, e^5, by which, in connection with portions of the ports, a passage is formed from one end of the cylinder to the other, for the purposes set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 20th day of May, 1882.

CHAS. N. LEONARD. [L. S.]

Witnesses:
C. BRADFORD,
CHAS. L. THURBER.