

H. A. Morrill,
Oscillating Steam Engine.
N^o 3,383. Patented Dec. 20, 1843.

Fig. 2.

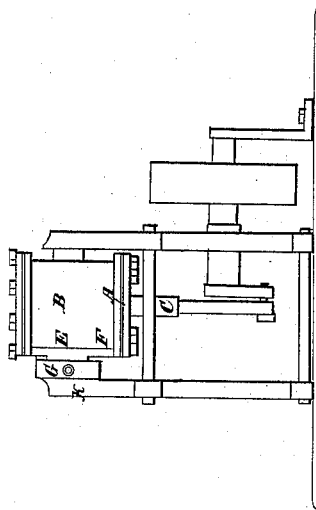


Fig. 3.

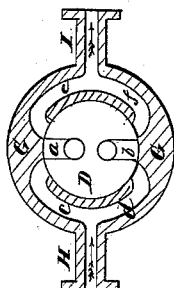


Fig. 4.

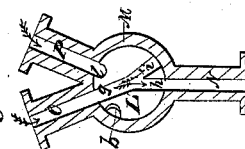
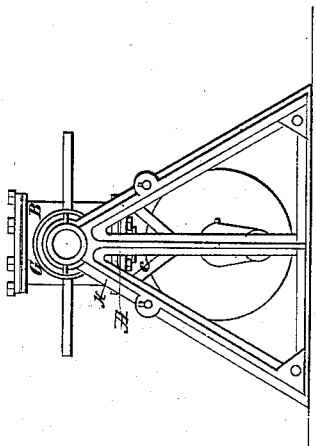


Fig. 1.



UNITED STATES PATENT OFFICE.

HENRY A. MORRILL, OF BOSTON, MASSACHUSETTS.

VALVE FOR REVERSING THE ACTION OF STEAM-ENGINES.

Specification of Letters Patent No. 3,383, dated December 20, 1843.

To all whom it may concern:

Be it known that I, HENRY A. MORRILL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Vibrating or Oscillating Steam-Engines, and that the following description, taken in connection with the accompanying drawings, constitutes a full and exact specification of the same.

Figure 1 of the drawings above mentioned represents a front elevation and Fig. 2 a side elevation of a vibrating engine having my improvements applied to it. Fig. 3 is a vertical section of the valves or steam passages, for the supply to and escape of steam from the cylinder. Fig. 4 is a section of what I term a three way reversing cock and steam passages connected with the same.

It is well known that the objection to the employment of vibrating engines (or those whose cylinder is supported by journals and bearings which permit it to rock or move to and fro and whose piston rod is applied directly to the crank of the fly wheel shaft) have arisen principally from the tendency of the piston to wear the interior of the cylinder and the stuffing box unequally or into an elliptical shape. In order to prevent this wear to an injurious degree I apply to the head A of the cylinder B or to the sides of the cylinder a triangular or other proper shaped brace C, Figs. 1, 2, which (brace) shall extend some distance below the cylinder head and have a cylindrical hole or box of the diameter of the piston rod formed through its lower part or apex, through which (hole) the piston rod shall extend and play freely. The piston rod is thus supported at two points, viz., by the stuffing box of the cylinder head and by the brace. Consequently the tendency to wear the interior surface of the cylinder unequally is greatly if not entirely diminished.

My next improvement consists in the arrangement of the induction and eduction passages, for the steam, of the cylinder. Upon the axis of the steam cylinder B or between one of the journals thereof and the cylinder, a small cylinder D, Fig. 3, is fixed, the said cylinder having two vertical passages *a*, *b*, bored through opposite sides of the periphery and toward the center thereof as seen in the drawing. The passage *a* is continued horizontally a short distance and is then connected by a suitable passage or

pipe E, Fig. 2, with the top of the cylinder the said pipe communicating with that part of the interior of the cylinder which is over the piston. The passage *b* is similarly connected (by a pipe F, Fig. 2) with that part of the interior of the cylinder which is below the piston. The cylinder D is surrounded by a ring or hollow cylinder G, into opposite sides of which two pipes H I open, each terminating in two branches or passages, *c*, *d*, and *e*, *f*, formed within the ring G as seen in the figure and opening against the periphery of the cylinder D on each side of the passages *a*, *b*, as seen in the drawing. The cylinder G and its pipes are firmly fixed in their position by being secured to the framework K which supports the steam cylinder B. The oscillations of the cylinder B alternately bring the openings of the passages *a*, *b*, in opposition with the branch pipes *c* and *f*, *e* and *d*. We will now suppose that the pipe H is the induction pipe, or that by which the steam is conveyed from the boiler or generator to the cylinder B. When the openings of the passages *a* and *b* are brought in opposition or contact with the branches *c* and *f* of the pipes H, I, the steam will rush into the top of the cylinder B passing through the branch *c* and the passage *a*, and the waste steam will pass out of the bottom of the cylinder through the passage *b* and the branch *f* and will escape through the eduction pipe I either into the atmosphere or into the condenser as the case may be. So when the passages *a* and *b* are turned so as to be respectively in opposition with the branches *d* and *e*, the steam will enter the lower part of the cylinder B through the branch *d* and be discharged from the upper part of the said cylinder, through the branch *e*. This peculiar arrangement of the induction and eduction passages with double branches formed within the ring G and acting in combination with the cylinder D renders the whole valve apparatus very simple, effective in its operation and not very liable to derangement or wear.

When the above engine is used upon a railway carriage as a locomotive, it becomes necessary to employ a somewhat different arrangement of the steam passages in order that the operation of the engine may be easily reversed at any time. For this purpose I employ a contrivance which I term a three way passage cock a section of which

is exhibited at Fig. 4. This cock consists of a cylinder L having a passage *g* bored in it from its periphery toward its center, and at the said center branching into two passages *h*, *i* which continue through the cylinder to its opposite side as seen in the drawing. The cylinder L is ground or fitted steam tight into an exterior case or box M, the said box having one entering pipe N on one side of it and two exit pipes O, P on the opposite side thereof as seen in the drawing. There are two passages *k*, *l* formed in the periphery of the cylinder L on opposite sides of the passage *g* and extending in a direction at right angles to that of the passage *g*. The several passages correspond with each other in their diameters. The cylinder L is moved within the case M, by means of a lever, as an ordinary steam cock is operated. The two pipes O, P are respectively connected, by suitable intervening pipes, with the pipes H, I, Fig. 3, and the pipe N with the boiler. Therefore in this arrangement the pipe N becomes the induction pipe, and when the passage *h* is brought in opposition with the pipe N, the passage *g* is in opposition with the pipe O, and the passage *l* with the pipe P. The steam then passes through N, *h*, *g*, O and into the pipe H, Fig. 3, and thence through the branch *c* and passage *a* into the upper part of the cylinder B; the steam driven out of the lower part of the cylinder escaping through the passages *b*, *f*, I, Fig. 3, P and *l* of Fig. 4. In order to reverse the engine it is only necessary to turn the cylinder L within the case M so as to bring the passage *i* in opposition with the pipe N, at the same time bringing the passages *g* and *k* in opposition respectively with the passages P and O. The steam will then pass

into the cylinder B by means of the passages N, *i*, *g*, P, I, *f*, *b*, the waste steam escaping out of the cylinder by means of the passages *a*, *c*, H, O, *k*.

The three way cock may be used as a valve to supply a steam cylinder independently of the cylinder D and its passages. If we suppose the pipes O and P to be respectively connected with the top and bottom of a steam cylinder and the pipe N to be connected with the boiler the steam will pass through the pipe N and the passages *h*, *g*, O to the upper part of the cylinder and as the piston descends the expelled steam will escape through the passages P and *l*. By turning the cylinder L so as to bring the passages *i*, N in opposition, the steam will enter the bottom part of the cylinder through the passages N, *i*, *g*, P, the waste steam escaping from the top part of the cylinder through the passages O and *k*.

A forcing pump for supplying the boiler with water may be easily arranged so as to act on the principles above set forth.

Having thus set forth my invention I shall claim—

The combination of the three way reversing cock with the induction and eduction pipes of a steam valve apparatus or the double branch pipes H, I of a vibrating cylinder D, having passages *a*, *b* as described or otherwise suitably arranged.

In testimony that the above is a correct specification of my invention I have hereto set my signature this twenty-third day of November A. D. 1843.

HENRY A. MORRILL.

Witnesses:

R. H. EDDY,
CALEB EDDY.