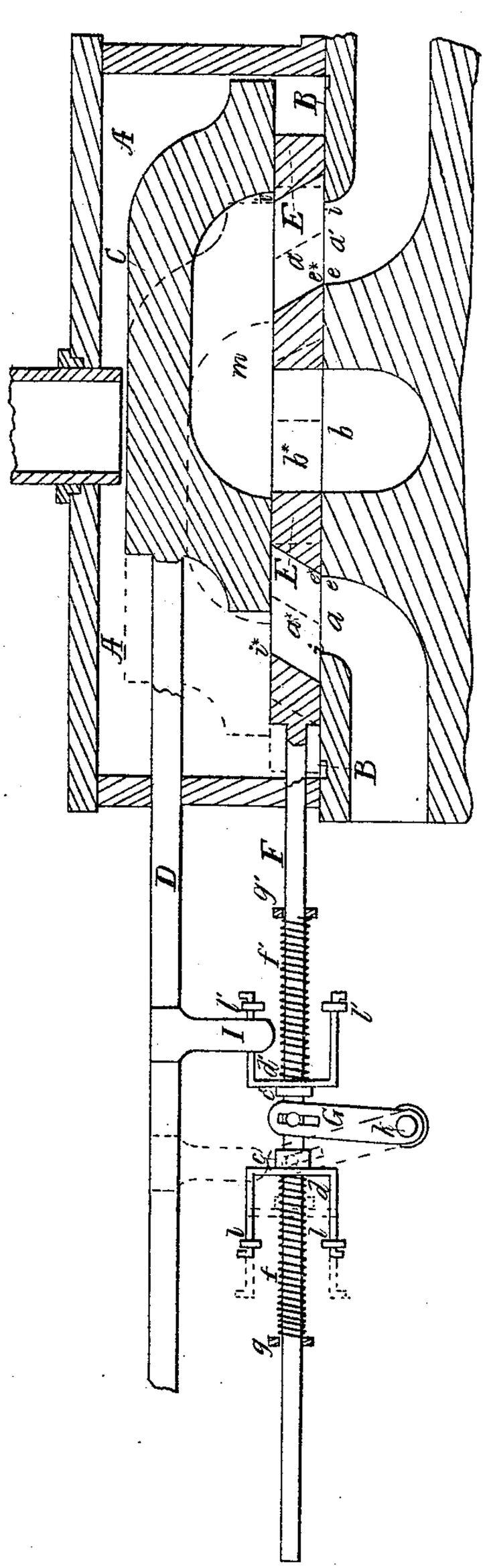
# J. F. Allen,

## Steam Cut-Off.

No. 14,991. Patented May 27, 1856.



# UNITED STATES PATENT OFFICE.

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## OPERATING SLIDE-VALVES FOR STEAM-ENGINES.

Specification of Letters Patent No. 14,991, dated May 27, 1856.

*To all whom it may concern:*

Be it known that I, JOHN F. ALLEN, of the city, county, and State of New York, have invented a new and useful appendage to be employed in connection with the slide-valve of the steam-engine to prevent the cushioning of the steam in the cylinder on the exhaust side of the piston; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, which represents a longitudinal section in a plane perpendicular to the valve-seat of a steam-chest and slide-valve of a locomotive-engine, showing also my appendage applied.

This invention consists in a movable valve seat arranged and applied to operate as hereinafter described, between the face of the slide valve and the usual stationary seat, to obtain a free exhaust of steam to the termination of the stroke of the piston or till the lead of the valve for the induction of steam commences, thereby obviating the resistance which is caused by what is known to engineers as the "cushioning" of the steam in the cylinders. The invention is applicable with especial advantage when a lap valve is employed, as with that kind of a valve the exhausting port is generally entirely closed some time before the stroke of the piston terminates.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A, is the steam chest.

B, B, is the usual stationary valve seat with the usual arrangement of steam ports, *a*, *a'*, and exhaust port, *b*.

C, is the slide valve, which is what is termed a lap valve.

D, is the valve stem.

E, is the movable valve seat which constitutes the subject of my invention. This consists of a plate of metal which may be of a thickness about equal to the width of the ports, *a*, *a*, and is faced parallel on both sides to fit between the valve C, and stationary seat, B. This seat is provided with ports, *a**, *a'**, and *b**, extending through it. The port, *b**, which is in the center of the movable seat, is of precisely the same size as the port, *b*. The ports, *a**, *a'**, are of such width and so arranged that when the port, *b**, is over the port *b*, in the fixed seat B, B, as shown in black outline, the inner edges *e**, *e**, of the said parts *a**, *a'**, in the lower face of the movable seat just meet the inner edges, *e*, *e*, of the ports, *a*, *a'*, and the outer edges *i**, *i**, thereof in the upper face of the movable seat stand exactly opposite the outer edges *i*, *i*, of the ports, *a*, *a'*, but from the edges, *e**, *e**, and *i**, *i**, the sides of the ports, *a**, *a'**, are beveled to increase their width.

The movable seat is furnished with a stem, E, which works through the same end of the steam chest as the valve stem, D, and should be fitted with a suitable stuffing box. This stem is fitted with two light collars, *c*, *c'*, and with two loose yokes, *d*, *d'*, and two spiral springs, *f*, *f*, are coiled around it between the two yokes, *d*, *d*, and two fixed guides, *g*, *g'*, through which the rod, F, works. These springs, *f*, *f'*, act in opposite directions to force the yokes into contact with the collars *c*, *c'*, and two fixed stops, *l*, *l'*, are provided to stop the yokes in such a position, shown in black outline, that when the stem, F, is not under any other influence, they hold it in such a position as to keep the movable seat with its ports opposite the ports of the fixed seat, as shown in black outline. The stem, F, is also provided with a stud, *h*, on one side, which fits to a slot in a rocker, G, which is arranged to rock on a fixed pin *k*. The valve stem, D, has a wiper, I, rigidly attached to it in such a position that as the valve is moved in the common way for the induction and eduction of steam, the said wiper at every stroke of the valve in either direction wipes against the end of the rocker, G, and by that means, through the action of the rocker on the stud *h*, in the stem, F, moves the seat, E, along with the valve, and then passes the said rocker and allows the seat to be returned by the action of the springs, to the central position shown in black outline. The effect of this movement of the seat, E, is to keep up a wide communication between the exhaust cavity, *m*, of the valve and the port, *a*, or *a'*, as the case may require, through the port *a**, or *a'**, and thus provide for a free exhaust till the end of the stroke of the piston or till the valve begins to take a lead to reverse the stroke, and then to let the seat, E, fly back to its central position for the induction of steam

to that end of the cylinder which has been exhausting.

The above operation is illustrated by the different positions of the valve and movable seat represented in the drawing, and by the aid of these positions I will endeavor to make it intelligible. Suppose, first, the valve to be at one end of its travel, as shown in black outline; the movable seat is in its central position with its ports exactly over those of the stationary seat, and the eduction of steam takes place through the port, $a^*$, and eduction through the port, $a'^*$, the same as it would through the ports, $a$, $a'$, if the movable valve seat were not there. The valve now commences to move to the right and after having moved far enough to close the port, $a^*$, to cut off the steam from the induction side of the piston, the wiper, I, strikes the rocker, G, and thus causes the movable seat to travel along with the valve and thereby to keep a communication between the cavity, $m$, and port, $a'$, in an oblique direction through the port $a'^*$, as will be seen by examining the the relative positions of the valve and movable seat shown in red outline. When the valve has arrived in the position shown in red outline and passed the edge, $i$, of the port, $a'$, in the fixed seat, the lead has commenced for induction through the said port, $a'$, and consequently it is time for the wiper, I, to escape over the rocker, G, to let the seat be thrown back by the spring, $f$, to the position shown in black outline which opens one communication from the steam chest through the ports, $a'^*$, into the port, $a'$, and another from the port, $a$, through the port, $a^*$, into the cavity $m$. During the movement of the valve in the opposite direction, the wiper, I, acts upon the rocker, G, in a similar manner, only in the opposite direction, and the operation of the ports, $a$, $a^*$, are relatively the same as the above described operations of $a'$, $a'^*$, while the operation of $a'$, $a'^*$, are relatively the same as the above described operations of, $a$, $a^*$.

I do not confine myself to the particular mechanism herein described for giving the requisite movement of the movable seat, E, as this may be done by various mechanical contrivances.

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

The movable valve seat, E, arranged and operating substantially as herein described, between the valve and the usual stationary valve seat.

JOHN F. ALLEN.

Witnesses:

WM. TUSCH,

JAMES F. BUCKLEY.