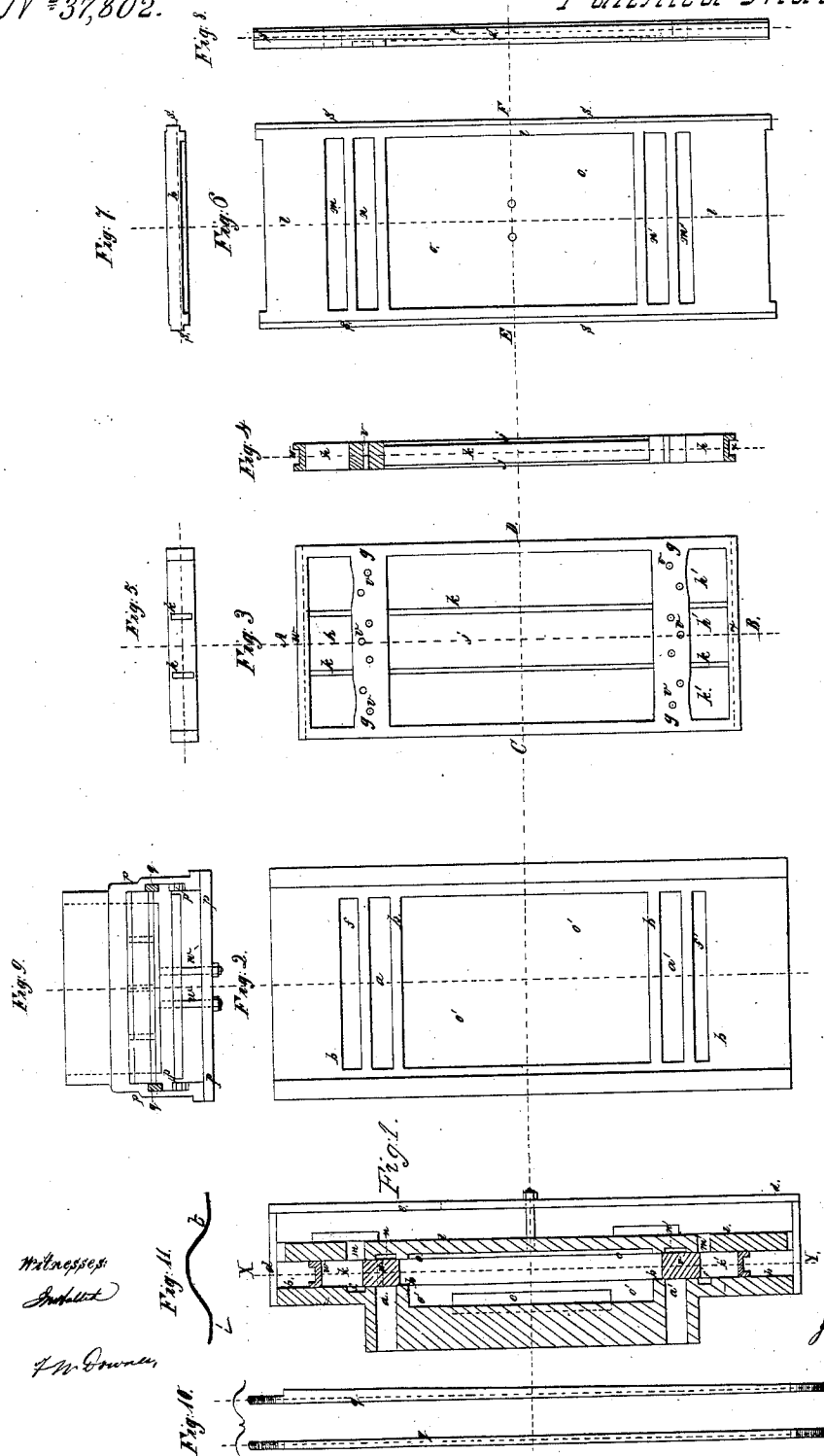


J. Baird, Steam-Engine Valve.

N^o 37,802.

Patented Mar. 3, 1863.



Witnesses:
J. M. Downer,

Inventor,

John Baird

UNITED STATES PATENT OFFICE.

JOHN BAIRD, OF NEW YORK, N. Y.

IMPROVEMENT IN VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 37,802, dated March 3, 1863.

To all whom it may concern:

Be it known that I, JOHN BAIRD, mechanical engineer, of the city, county, and State of New York, have invented certain new and useful Improvements in Valves for Steam-Engines; and I do hereby declare that the following, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings, Figure 1 is a longitudinal vertical section through the valve-chest, valve, face-plate, &c. Fig. 2 is a top view or plan of the valve-seat, showing the ports and equalizing recesses or pockets therein. Fig. 3 is a plan of the valve. Fig. 4 is a longitudinal vertical section through the valve on the line A B of Fig. 3. Fig. 5 is a vertical cross-section through the same on the line C D of Fig. 3. Fig. 6 is a plan of that side of the face-plate nearest the valve. Fig. 7 is a vertical section through the face-plate on the line E F of Fig. 6, and Fig. 8 is a side elevation of the same. Fig. 9 is an end view, partly in elevation and partly in section, of the parts shown in Fig. 1. Fig. 10 contains a plan and an elevation of the adjusting-keys, and Fig. 11 is an elevation of a spring or part of a spring.

My invention relates solely to that class of valves which open and close their ports by sliding over them; and the object of my invention is twofold, first, to relieve the valve from pressure, so that it may be moved over its seat with a comparatively small expenditure of power; and, second, to prevent a rocking or tilting motion of the valve, such rocking being due to the facts of unequal pressure upon the ends of the valves, alternately greater at one end than the other, and resulting in the valve grinding itself out of a plane surface, thus making it leaky. These objects have been essayed before in many different ways. The end to be accomplished is not new. The manner in which I accomplish it I believe to be new.

I describe my invention by reference to the drawings, in which it is embodied in a certain form, and, in referring to the drawings, I shall, for the sake of shortening the description, speak of the valve as if lying on the upper side of a horizontal cylinder, the invention being applicable, however, to valves placed on any side of a cylinder, either oscillating or fixed in any given position.

In the drawings the two steam-ports lead-

ing from the valve-seat to the cylinder are shown at *a a'*, the valve-seat at *b b*, the exhaust-aperture at *c*, the valve-chest at *d d*, and the entrance for steam from the boiler at *e*. In addition to the ports there are two equalizing recesses or pockets, *f f'*, formed in the face of the valve-seats. The valve-chest may be of any usual or proper construction. I prefer to make it with longitudinal grooves or recesses in its sides, and with either one or both ends removable. Upon the valve-seat slides the valve *g g*. This valve has three apertures through it, at *h*, *h'*, and *j*, and may be strengthened by rods or ribs *k k*. The valve has two faces parallel to each other. One face rests upon the valve-seat, and the other face slides in close contact (steam-tight) with the under side of a face-plate, *l l*. This face-plate has cut through it two passages, *m m'*, and has on its lower side two equalizing-recesses, *n n'*, and a large recess, *o*. This latter recess, like the one, *o'*, in the top of the valve-seat, is cut so as to avoid a large rubbing-surface when the valve moves, and to facilitate the planing, scraping, and grinding of the valve-seat and lower side of the face-plate. The valve is, according to my plan, to slide with one side in contact with the valve-seat and the other in contact with the surface of the face-plate. The valve must, therefore, have parallel faces, and there must be proper means for adjusting and securing the working-face of the face-plate in contact with the valve. The plan which I have devised is shown in the drawings; and it consists in recessing the sides of the steam-chest as at *p p*, Fig. 9, and then making the face-plate so wide as to enter these recesses. The lower sides of these recesses are planed fair and parallel with the valve-seat, and on them rest two long tapering keys, *q q*, planed or made plane surfaces on the top and bottom, but with those surfaces inclined to each other. The edges of the face-plate which enter the recesses have their lower sides planed at the same inclination to the valve-seat that the upper sides of the keys have, and this inclined part of the face-plate (see *s s*, Figs. 6, 7, and 8) rests upon the upper surface of the keys. The lower side of the face-plate is therefore supported parallel with the valve-seat, and by moving the keys endwise the face-plate may be adjusted to and from the valve-seat so as to embrace closely between them different thick-

nesses of valve, or the same valve, when new and when worn by use.

In order to adjust the keys I cut screws upon their ends, let them project through the ends of the valve-chests, and screw nuts upon them, being thus enabled to set and hold the keys as required. When the valve-chest lies on top of a cylinder, the steam will hold the face-plate down upon the keys; but I prefer not to trust to its force, but in all cases to hold the face-plate down either by keys, like those that hold it up, or by set-screws or by springs, as at *t t t*, forced in between shoulders on the chest and the top of the face-plate.

As a measure of precaution, to prevent the steam from springing the face-plate, I support it along its center by screw-bolts, as at *u u*.

In practice, the valve is to be laid on its seat. The face-plate is then to be adjusted so as to be in contact with the upper surface of the valve and held there, and then the valve is to be moved, and if necessary both it and the face-plate trued up until the valve slides steam-tight between its seat and the face-plate, and this latter must not be confounded with a packing. It is not intended to rest upon or be supported by the valve, but is to be held in its place by appropriate supports entirely independent of the valve. Through the valve are drilled holes *v v*, and by referring to Fig. 3 it will be perceived that one side of the openings *h h'* is curved.

By examining Fig. 1 the action of the valve can be most easily understood. Both ports are closed when the valve is in the position there represented, but as it moves from *X* toward *Y* the opening *h* will come over the port *a*, and as it uncovers this port steam will pass from the chest through *m*, through *h*, and into the port *a*, that part of the valve at any time lying over the port having the pressure thereon balanced so long as the port *a* is in connection with the pocket *m* by means of the holes *v*. Before the port *a* is opened for the entrance of steam the port *a'* will, by the same motion, be uncovered by the valve, and exhaust will come out of that port into the aperture *j*, thence into the cavity *o'*, and so out through the exhaust-aperture *c*. When the valve gets fairly under the aperture *m'*, the holes *v* make a connection between it and the pocket *f'*, and the steam-pressure on the valve is balanced. When the piston is at half-stroke, (minus the lead,) the valve comes to rest and commences to move from *Y* toward *X*, and steam continues to enter through *a* and exhaust to flow out of *a'* until those ports are covered by the valve. At that time the holes *v v* connect the ports with the pockets *n n'*, equalizing the pressure due to their area, and, as the valve continues to move toward *X*, port *a'* is opened and steam flows through *m'*, *h'*, and *a'* into the cylinder, while exhaust escapes from

a through *j* and *o'* into the aperture *k*. When the valve comes under the opening *m*, the holes *v* connect it with the equalizing-recess *f*, and the steam-pressure due to the size of the aperture is balanced. When the piston is again at half stroke, (minus the lead,) the valve ceases to move and again returns toward *Y*. If no separate cut-off valve is used, or if such valve slides on or works in seats, making a tight partition across the chest above the face-plate, then the two ends *w x* of the valve may be removed, and so may all that part of the face-plate ends which is outside of the passages *m' m'*; but when the cut-off valve or valves slide on the upper side of the face-plate, as at *y y*, then the ends both of the valve and face-plate are essential, for when the cut-off valve covers either of the passages *m m'*, and either port is still open for steam or uncovered by the valve, then one of the ends *w x*, lying under the face-plate and on the valve-seats, prevents steam from passing down at the ends of the face-plate, and so into the ports. The curved sides of the apertures in the valve unclos the ports for the admission of steam, and this curved edge opens but part of the width of the port at a time, and thus lets the steam in gradually. The same effect would be produced by inclining that edge of the valve which opens the port so that it is out of perpendicular to the line of travel of the valve; or by inclining the edge of the port itself so that one side of the port is uncovered before the other side.

Equalizing recesses or pockets are not new devices, but in no case that I know of is the connection between the pocket and the port made by apertures through the valve itself, as herein described.

I claim as my own invention—

1. The combination of a valve with parallel faces with a seat and a face-plate, all operating substantially as described by means of keys supporting the face-plate and permitting its adjustment, substantially in the manner specified.

2. In combination, keys to support a face-plate, springs to hold the latter in contact with the former, a face-plate, and a sliding valve with parallel faces, the combination being substantially such as specified.

3. In combination with a slide-valve and equalizing recesses or pockets, substantially such as described, apertures through the valve itself, which, at the proper time, make a connection, substantially as specified, between a passage for steam or exhaust and a recess or pocket, for the purpose specified.

In testimony whereof I have hereunto subscribed my name, in the city of New York, on this 23d day of May, A. D. 1862.

JOHN BAIRD.

In presence of—

F. W. DOWNER,
J. M. HALSTED.