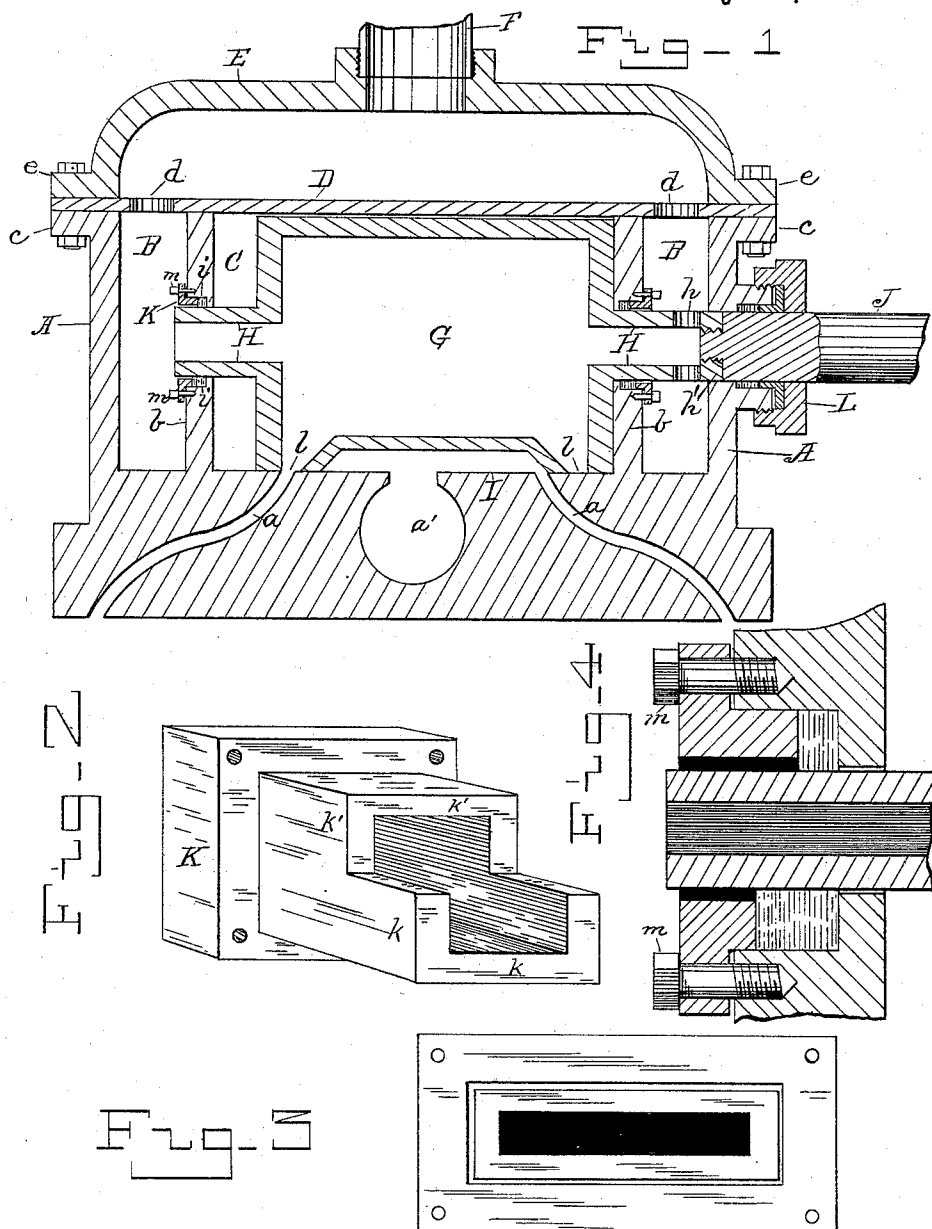


(No Model.)

M. N. PACKARD.
BALANCED SLIDE VALVE.

No. 342,033.

Patented May 18, 1886.



Witnesses

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UNITED STATES PATENT OFFICE.

MORRILL N. PACKARD, OF BALTIMORE, MARYLAND.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 342,033, dated May 18, 1886.

Application filed September 21, 1885. Serial No. 177,868. (No model.)

To all whom it may concern:

Be it known that I, MORRILL N. PACKARD, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented a certain new and useful Improvement in Balanced Slide-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in balanced valves for steam-engines of the class described in my Patent No. 325,963, dated September 8, 1885; and it has for its object to dispense with the use of spring-packing to resist the upward pressure of the steam in the valve.

The invention consists in packing the openings in the partitions through which the barrels of the valve work in such a manner that there will be less packing above the barrels than below them, whereby a greater surface of the barrels is exposed to steam-pressure on their tops than on their bottoms.

In the accompanying drawings, Figure 1 represents a vertical section of a steam-chest and a valve embodying my invention. Fig. 2 is a perspective view of one of the glands used in packing the openings in the partitions through which the barrels of the valve work. Fig. 3 is a front view of one of said glands and a barrel. Fig. 4 is an enlarged vertical sectional view illustrating the packing of the openings in the partitions.

Referring to the drawings, A represents the steam-chest, in the bottom casting of which is formed the usual steam-ports, *aa*, and exhaust-port *a'*. The chest is provided at each end with a steam-chamber, B, formed by partitions *b*, preferably cast integral with the chest. In these partitions are formed openings for the barrels of the valves, and surrounding these openings are recesses for the reception of the packing. The space between partitions *b* forms the valve-chamber C, in which the valve is located. The outer walls of the steam-chest at the top are flanged, as at *c*, and resting on top of partitions *b* and on the flanges *c* is the top plate, D, of the steam-chest. Through the top plate, and directly over chambers B, are apertures *d*, forming open communication between said chambers and a steam-dome, E, placed on top of the chest. The dome also is flanged,

as at *e*, and is secured to the chest by bolts passing through its flanges, plate D, and flanges *e*, as clearly shown. Into the top of the dome is screwed a pipe, F, for conveying steam from the boiler.

Thus far the description embraces nothing but what is shown and described in my aforesaid patent; but in order that my present invention may be clearly set forth such description is deemed necessary. I will now describe my improvement.

G represents a slide-valve located in the valve-chamber, and fitting loosely between valve-seat I and top plate, D. The valve is provided at each end with what may be termed a "barrel," H, preferably cast integral therewith. As shown in the drawings, these barrels are rectangular in shape, although, if preferred, they may be made round, or of other shape, without departing from my invention. Through the inner barrel is formed a perforation, *h*, for the admission of steam to the interior of the barrel, and thence to the interior of the valve. This inner barrel is not hollow throughout its entire length, as is the outer barrel, but is closed at one end by a solid wall, *h'*, into which is screwed the valve-stem J, as shown. The steam-chest is packed at the opening for the valve-stem, and this packing is held in place by an ordinary gland, L. In the bottom of the valve at each end is formed the usual steam-port, *l*. In packing the openings in partitions *b*, in which barrels H work, I use any ordinary steam-packing, *i*, which is held in place by a gland, K, of the form shown in Fig. 2, wherein, for the purpose of good illustration, the gland is shown bottom side up. Less packing is placed in the upper side of the opening than in the lower side, and for this reason the top part, *k*, of the gland is made longer than the bottom part, *k'*. The glands do not fit neatly over the barrels, but, on the contrary, there is considerable space between them, as clearly shown in the drawings. By reason of there being less packing in the upper part of the opening in each partition than in the lower part the tops of the barrels present a greater surface exposed to steam-pressure than do the bottoms, and the difference in the areas of these exposed surfaces of the barrels is designed to equal the area of the valve-ports, so that the excess of pressure on the tops of the

barrels may counteract the pressure of the steam on the inside of the valve in its reaction from the valve-face and from the piston. Of course the difference in the areas of the exposed surfaces of the barrels above alluded to may be varied if in practice such variation is found desirable.

The operation of the valve is as follows: Steam is admitted from the boiler through pipe F into dome E, whence it is distributed through openings *d* in top plate, D, to steam-chambers B, and thence through barrels H to the interior of valve G. Now, it is apparent that when one of the ports *a* is open the steam will exert pressure against the piston, and the other port being closed the steam will also exert pressure, through the valve-port *l*, against the valve-seat, and as a consequence the steam in its reaction will exert an upward pressure against the top of the valve, tending to bind the valve against the top plate of the chest. It is therefore evident that the excess of surface exposed to steam-pressure on the tops of the barrels over that on their under sides equaling the area of the valve-ports there will be just sufficient pressure on the tops of the barrels to counteract the pressure of the steam against the top of the valve, and that the valve will therefore be practically balanced.

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

1. The combination, with a steam-chest and a slide-valve of the class described, of packing in recesses in the partitions of the chest, said packing being so arranged that, while preventing ingress of steam around the barrels of the valve to the interior of the valve-chamber, there will be left exposed to steam-pressure a

greater surface of the tops of the barrels than of the bottoms thereof.

2. The combination, with a steam-chest and a slide-valve of the class described, of packing in recesses in the partitions of the chest, less packing being placed in the upper part of said recesses over the barrels of the valve than in the lower part under the barrels, whereby a greater surface is left exposed to steam-pressure on the tops of the barrels than on the bottoms thereof.

3. The combination, with a steam-chest and a slide-valve of the class described, of packing in recesses in the partitions of the chest, the quantity of packing placed in the upper part of said recesses over the barrels of the valve being so proportioned to the quantity placed in the lower part of the recesses under the barrels as that the areas of the surfaces of the tops of the barrels left exposed to steam-pressure will equal the combined areas of the valve-ports and of the exposed bottom surfaces of the barrels.

4. The combination, with a steam-chest and a slide-valve of the class described, of packing in the recesses in the partitions of the chest, less packing being placed in the upper part of said recesses over the barrels of the valve than in the lower part under the barrels, and a loosely-fitting gland for holding the packing in place, the upper part of said gland being longer than its lower part, substantially as described.

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

MORRILL N. PACKARD.

Witnesses:

M. C. MASSIE,

G. W. BALLOCH.