

R. C. BRISTOL.  
SLIDE VALVE FOR STEAM ENGINES.

Fig. 1.

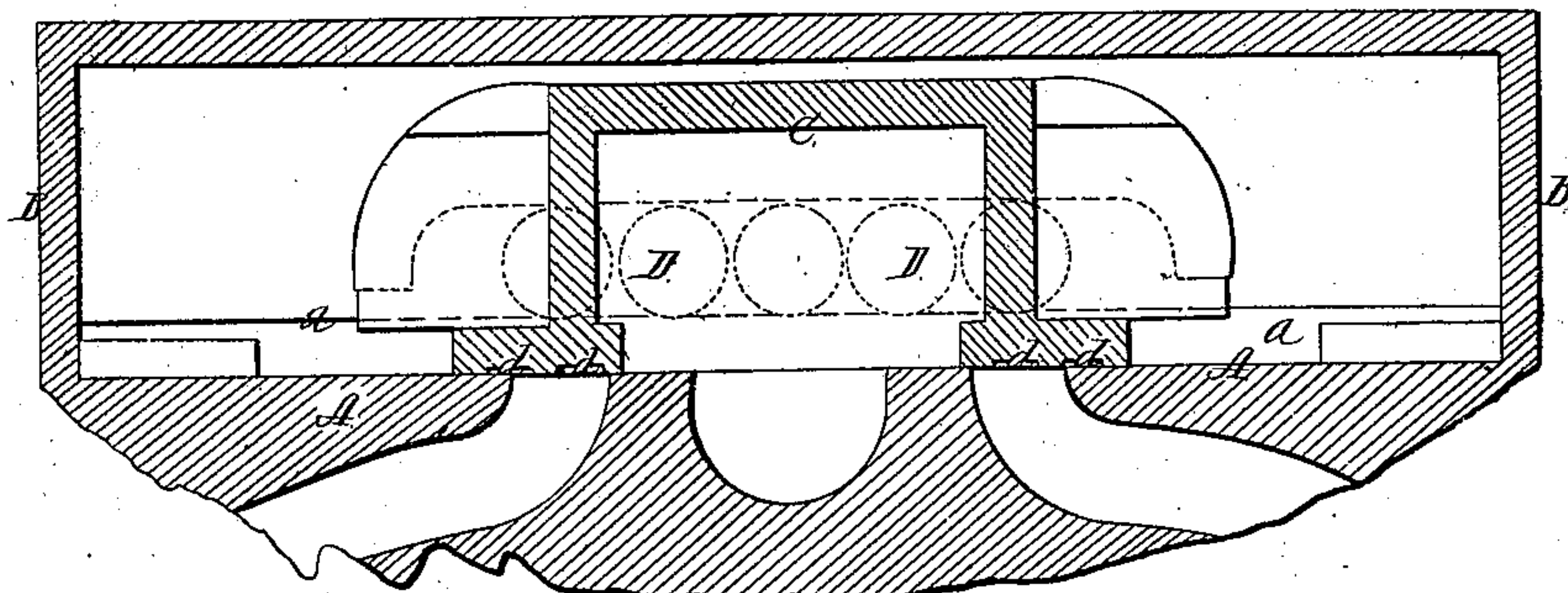
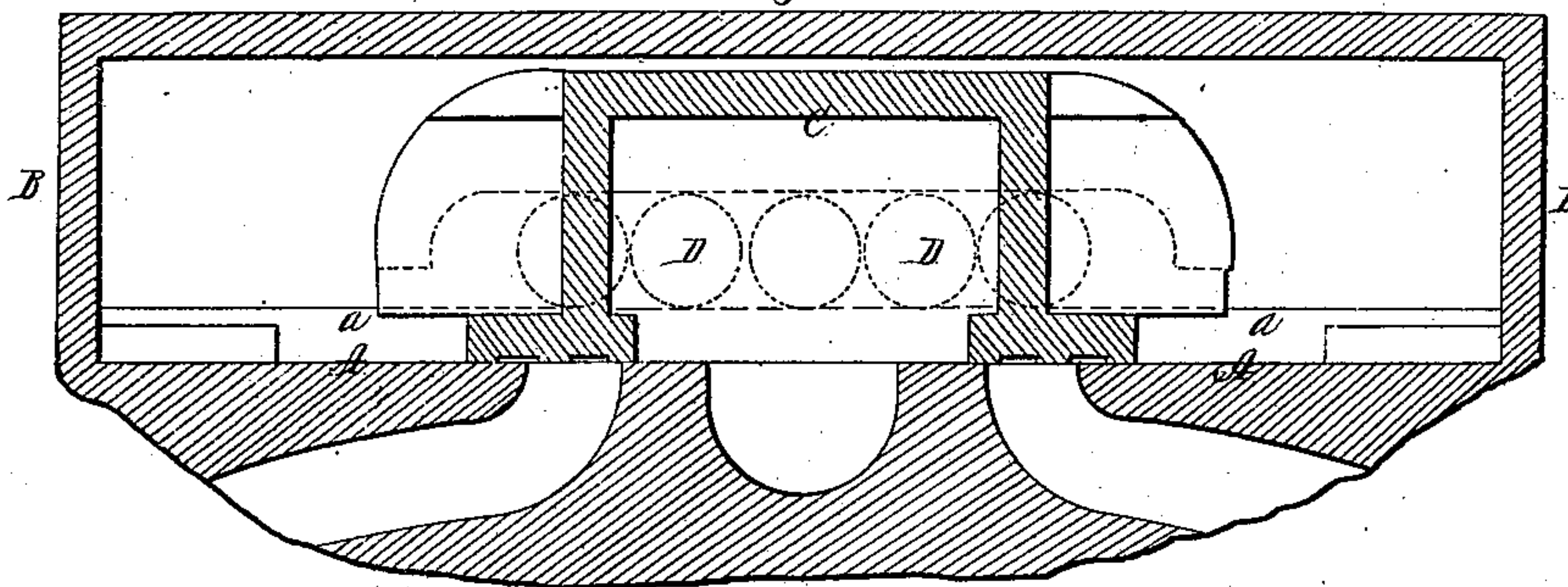


Fig. 2.

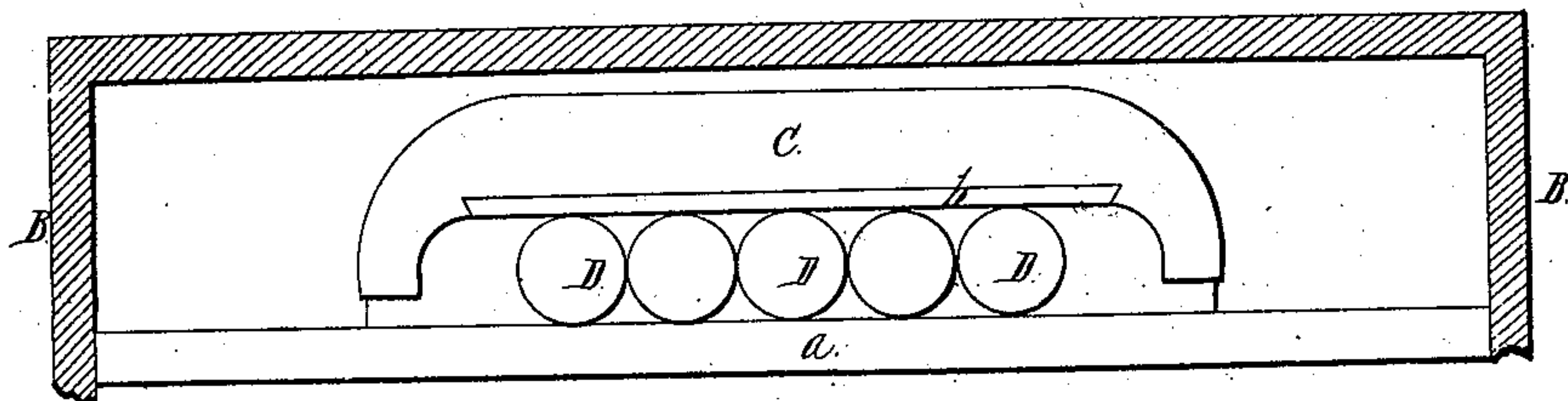


Fig. 3.

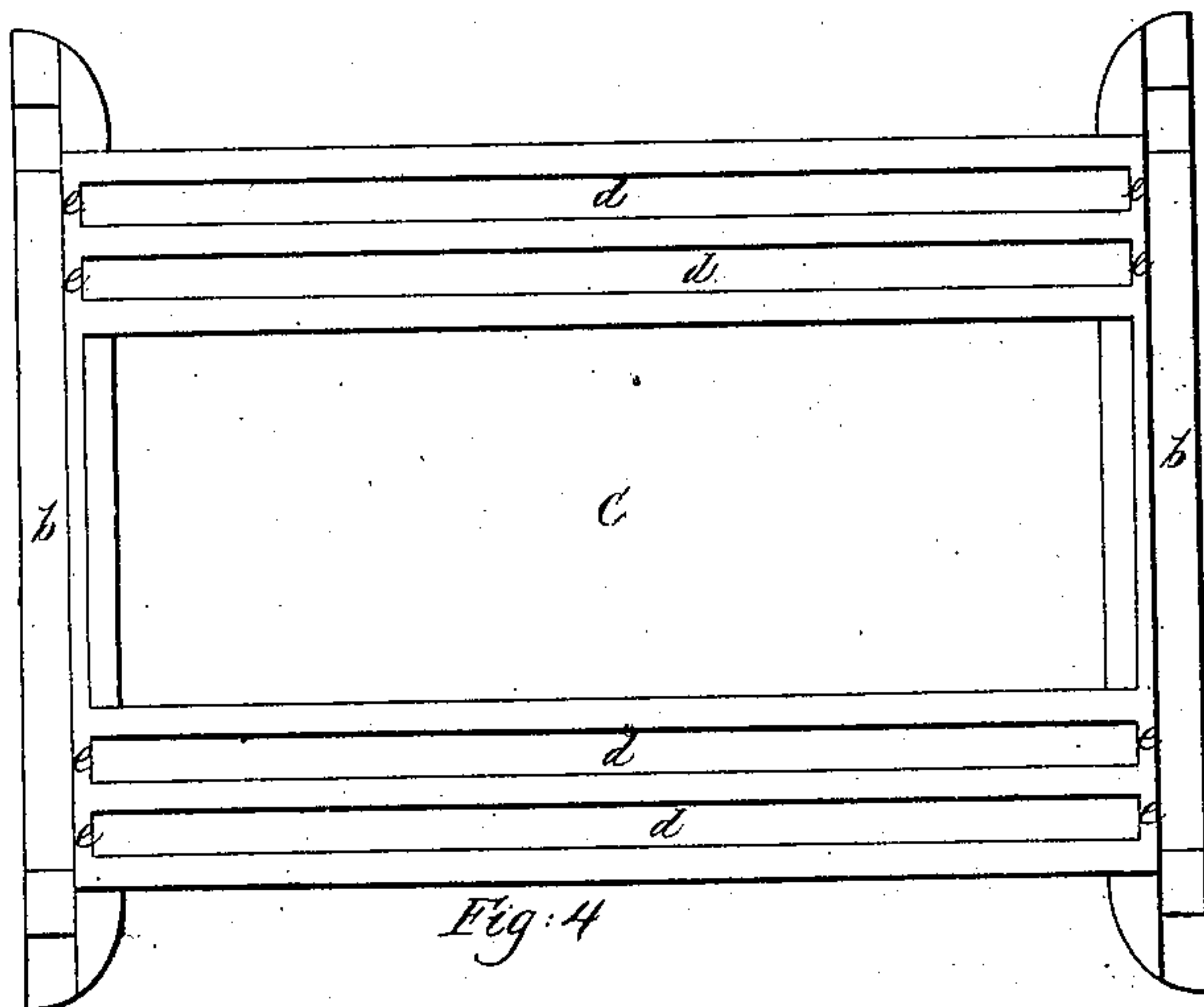


Fig. 4.

Witnesses:

R. T. Campbell

John P. Jacobs

Inventor.

R. C. Bristol

by his Atty.

Marshall & Co.



# UNITED STATES PATENT OFFICE.

RICHARD C. BRISTOL, OF CHICAGO, ILLINOIS.

## IMPROVEMENT IN SLIDE-VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 40,731, dated December 1, 1863.

*To all whom it may concern :*

Be it known that I, RICHARD C. BRISTOL, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Applying Slide-Valves of Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section showing the valve in its free state from the rollers. Fig. 2 is a similar section showing the valve resting on the rollers, it having ground itself down. Fig. 3 is a side view, one side of the steam-chest removed. Fig. 4 is an inverted plan of the valve.

My present invention is designed to render more practical and economical the application of the anti-friction slide-valve patented to me at previous dates—to wit, June 21, 1859, reissued February 7, 1860, and November 13, 1860.

The nature of my present improvement consists in the employment of a slide-valve, which is channeled or grooved on its working-face transversely to its motion, in combination with anti-friction rollers, in such manner that the valve will be self-fitting to its seat without any further labor upon the faces of either than simply planing the surfaces which are to come in contact. It also consists in an arrangement of parallel ways.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

A is the valve-seat, with the usual ports leading to and from the engine-cylinder.

B is the steam-chest, with horizontal side ways for the valve to travel upon and between. These ways are designated by the letters *a a*, and the most practical way of applying them is to construct them of steel or other hard, durable metal and fasten them in the lower side corners of the chest, so that if they wear away they may be replaced.

C is the slide-valve, with a bearing-way on each of its sides. These ways are horizontal and are most practical when formed of steel or other hard, durable metal, such metal being let into recesses in the valve-casting, as indicated at *b b*, Figs. 3 and 4. The working-face of the valve is just wide enough to fit snug between the bearing-ways *a a*, and the exten-

sions or bearing-ways *b b* are so arranged that they extend over the ways *a a*, so as to fit snug to the sides of the steam-chest. The face of the valve beyond and forward of the central space or chamber *c* is channeled from one side to the other, as indicated at *d d*. The channels are narrow and close together, so that narrow ribs shall only exist between them. The ends of the channels are closed by shoulders *e e*, so that steam shall be confined in them, and thus made to aid in balancing the pressure acting on its top. The narrow channels form a divided working-surface, which answers all the ends of a broad continuous surface and enables me to accomplish the end I have in view.

D D are the friction-rollers. They are set upon the ways *a a*, and when the valve is placed in the chest B are confined so as to have every freedom to roll, but at the same time are kept in proper place and operative position. The rollers have no journals, and therefore they support the valve at their circumferences, and the weight of the valve is transferred by them upon the ways *a a*.

It will be seen that instead of constructing the valve in two parts, as in my patent of June, 1859, or of using inclined planes, as in my patent of November 13, 1860, for the purpose of adjustment, I now use straight parallel pieces or ways of hard metal fitted into or under the projecting lips or extensions above the rollers, corresponding in their plane to like pieces fitted into or upon the valve-seat under the rollers, the rollers traveling between these ways.

I claim nothing new here in hard-metal bearing-pieces, as a former patent secures the same to me.

To make the valve self-fitting without grinding its face and the face of the seat, I have grooved the face of the valve so that but a small portion of the surface will come in contact with the seat, and thus, being reduced, will very readily wear away under the pressure to which the valve is subjected. Therefore, when first put on the valve is left a little free of the rollers, or so that it rests directly upon the seat. Thus arranged, a few hours' use is sufficient to wear the valve down and grind it steam-tight. At this stage the whole load will come upon the rollers, and if the rollers or the pieces between which they travel



should in time wear, the surface of the face of the valve is so small that it accommodates this wear by wearing itself down. Thus a mutual accommodation between valve and rollers is obtained without any perceptible additional friction. Whereas, if the face of the valve was left unchanneled or without grooves in it, it would take considerable time for it to wear down, and therefore only a portion of the load would be carried on the rollers. And, too, in this case the grooves carry with them over the seats and bridges of the ports a thin stratum of steam, which to a large extent counterbalances the pressure on the back of the valve, and thus relieves the load the rollers have to carry, thereby rendering them and the parts between which they travel more lasting.

It should be understood that the relief afforded to the valve by the entrance of steam into the grooves or channels *d d* is not sufficient to prevent frictional contact between the valve and its seat, and therefore the leading design of the channeled surface of the valve is not affected injuriously.

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

1. The combination of the parallel overhanging ways formed in the ends of the valve with

the parallel ways of the seat, composed of separate metal, and the friction-rollers, the said ways being in a plane corresponding with the face of the valve, substantially as and for the purposes set forth.

2. The valve, with its face grooved as described, in combination with the straight or parallel ways, having rollers between them for the purpose of making the valve self-fitting and relieving such rollers in part from the load.

3. Constructing a valve with a grooved face, and arranging the same with respect to friction-rollers in such manner that it is free from the rollers during the self-fitting of the valve to its seat, and afterward is mainly supported upon the rollers and operates to always be thus supported, substantially as herein described.

4. The combination of horizontal or parallel ways, friction-rollers, and grooved valve, substantially in the manner and for the purpose set forth.

R. C. BRISTOL.

Witnesses:

W. B. BRIDGES,  
J. A. HOISINGTON.