(No Model.)

B. CARLEY.

SLIDE VALVE.

No. 282,162. Patented July 31, 1883.

Fig 1.

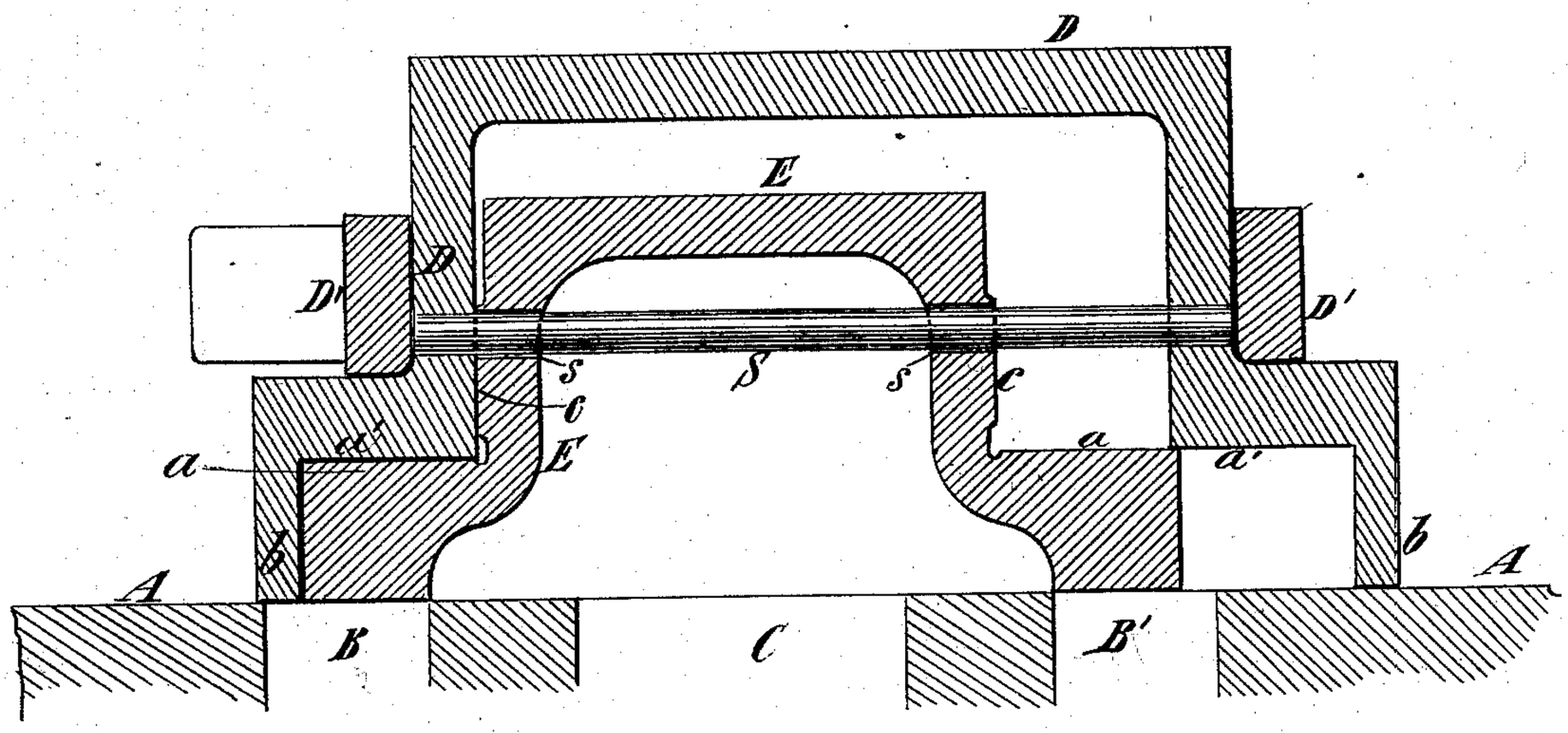
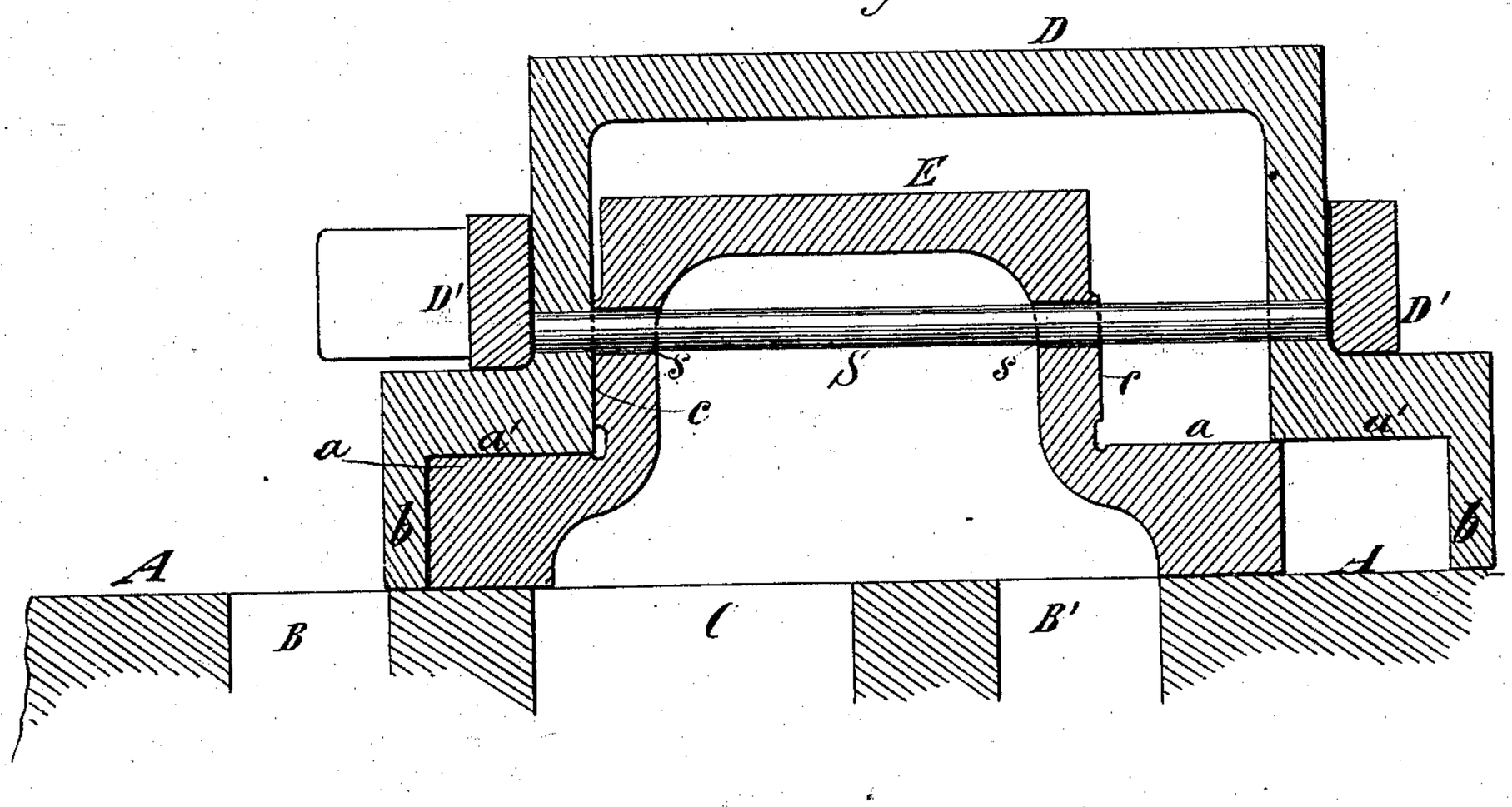


Fig 2.



Witnesses
Fred'k Haynes
E. L. Moran

Inventor
Benjamin Carley
by his Attorneys
Brown & Brown

UNITED STATES PATENT OFFICE.

BENJAMIN CARLEY, OF PATERSON, NEW JERSEY, ASSIGNOR TO CHARLES HOLLAND, OF NEW YORK, N. Y.

SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 282,162, dated July 31, 1883.

Application filed November 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN CARLEY, of Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Cut-Off Slide-Valves of Engines, of which the following is a specification.

Although my invention is applicable to steam-engines generally, it is especially intended for locomotive-engines.

The invention relates to that class of engines in which is employed an outer slide-valve for controlling the passage of steam to the induction-ports, and an inner slide-valve contained within said outer valve and serving to control the exhaust of the motive agent, sufficient play or lost motion being allowed between the valves to enable the outer valve to make the first portion of each movement without operating the inner valve, so as to provide for a free exhaust throughout a large part of the stroke while working steam expansively.

The invention consists in a novel construction and manner of combining the two valves so that the accidental movement of the inner valve during the first part of the movement of the outer valve will be prevented. The two valves may be connected by a rod passing through them both and fitting loosely in holes in the inner valve, and the raising of either valve from its seat independently of the other valve will thereby be prevented.

In the accompanying drawings, Figure 1 represents a sectional view of a valve-seat and two slide-valves adapted to travel thereon and embodying my invention; and Fig. 2 represents a similar section, showing the parts in a different position.

Similar letters of reference designate corresponding parts in both figures.

A designates the valve-seat, wherein are the usual ports, B B′, serving as induction and eduction ports for the cylinder, and the usual eduction or exhaust port, C.

D designates the outer slide-valve, which controls the admission of steam or other motive agent through the ports B B′ to the cylinder; and E designates the inner slide-valve, which controls the exhaust of the motive agent from the ports B B′ to the port C.

The outer valve, D, is or may be operated, in the usual way, by a yoke, D′, surrounding the valve, while the inner valve, E, is operated by the said outer valve abutting against it.

At each end of the inner valve, E, is a projecting portion, the upper surface, *a*, of which is flat, and upon each end of the outer valve is a corresponding surface, *a′*, which has a bearing on the surface *a*, and these bearing-surfaces serve to hold the inner valve to its seat. The bearing-surfaces *a a′* at each end of the valves form a steam-tight ground joint, or may be provided with suitable packing to form a steam-tight joint and prevent steam from entering between the valves.

The length of the outer valve, D, between the ends *b*, is considerably greater than the length of the inner valve, E, and it will be seen that upon the change of direction of the movement of the outer valve it will move a distance equal to this play or clearance between the valves before the inner valve will be moved at all.

To avoid any danger of breaking off the ends of the outer valve by the portions *b* striking the inner valve I may provide surfaces *c* on the inner valve, against which the said outer valve abuts, and, to avoid any violent concussion, springs may be placed between the inner and outer valves, so as to cushion the latter in its movements; or steam may be admitted between the ends of the inner valve and the end portions, *b*, of the outer valve for a like purpose.

In Fig. 1 the valves are represented as in their movement toward the right. The inner valve, E, now covers and entirely closes the ports B B′; but as the valves continue to move, the exhaust is opened from the port B′, and immediately thereafter the valve D opens the port B for live steam.

Fig. 2 represents the two valves in their extreme right-hand position, the exhaust-port C and the port B both being full open.

In moving toward the left the outer valve, D, moves alone until the right end portion *b* strikes the inner valve, E, and consequently the exhaust from the port B′ is free and unimpeded until steam is cut off from the port B.

The steam-tight joint formed between the sur-

faces *a a'* at each end of the valves is very advantageous, as can best be understood by reference to Fig. 2. As soon as the left-hand end portion *b* of the outer valve, D, passes onto the port B, so that steam can enter behind it, the end of the projecting portion of the inner valve will be acted upon by steam of full pressure, while the projecting portion at the opposite end of the valve will be acted upon by dead steam, which will be of slightly less pressure. Consequently the greater pressure is on the left-hand end of the inner valve, and prevents it from moving with the outer valve until it is acted upon by the right-hand end portion *b* of said outer valve. If the joints formed by the surfaces *a a'* were not steam-tight, the live steam, as soon as one end portion *b* of the outer valve passed onto the port B or B', would pass backward over the inner valve, and would act with exactly equal pressure on both ends of the inner valve, and in such case the inner valve might be moved by frictional contact of the outer valve during the early stages of its movements and the purpose of having two valves defeated.

In case steam should get under the outer valve, D, it might rise from its seat; but the inner valve could not so rise, because its inner side is exposed to the atmosphere; and to hold the outer valve down I may connect the two valves by a rod, S, which passes loosely through holes *s* in the inner valve, E, and prevents either valve from rising independently of the other.

I do not claim, broadly, as of my invention an outer valve operated by ordinary connections and an inner valve which is moved by the outer valve during the latter part of each of its movements, lost motion being provided between the valves. I only claim such a combination when the inner valve has projecting portions at its ends on which the outer valve has steam-tight bearings for the purpose before described.

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

1. The combination, with an ordinary valve-seat, A, provided with the induction and eduction ports B B', and an exhaust-port, C, of an outer valve, D, for controlling the passage of the motive agent to the induction-ports, connections for operating said valve, and an inner valve, E, contained within the outer valve, for controlling the exhaust of the motive agent, and adapted to be operated by said outer valve, sufficient play or lost motion being allowed between the two valves to enable the outer valve to make the first portion of each movement without operating the inner valve, and said inner valve having at its ends projecting portions, on the upper surfaces, *a*, of which the surfaces *a'* of said outer valve have steam-tight bearings, substantially as herein described.

2. The combination of the valve-seat A, containing the ports B B' C, the outer valve, D, and the inner valve, E, having play or lost motion between them, and the rod S, passing through both valves, substantially as and for the purpose described.

BENJAMIN CARLEY.

Witnesses:
THOMAS W. RANDALL, Jr.,
CHAS. HOLLAND, Jr.