

A. K. RIDER.

Improvement in Slide-Valves.

No. 116,099.

Patented June 20, 1871.

Fig. 1,

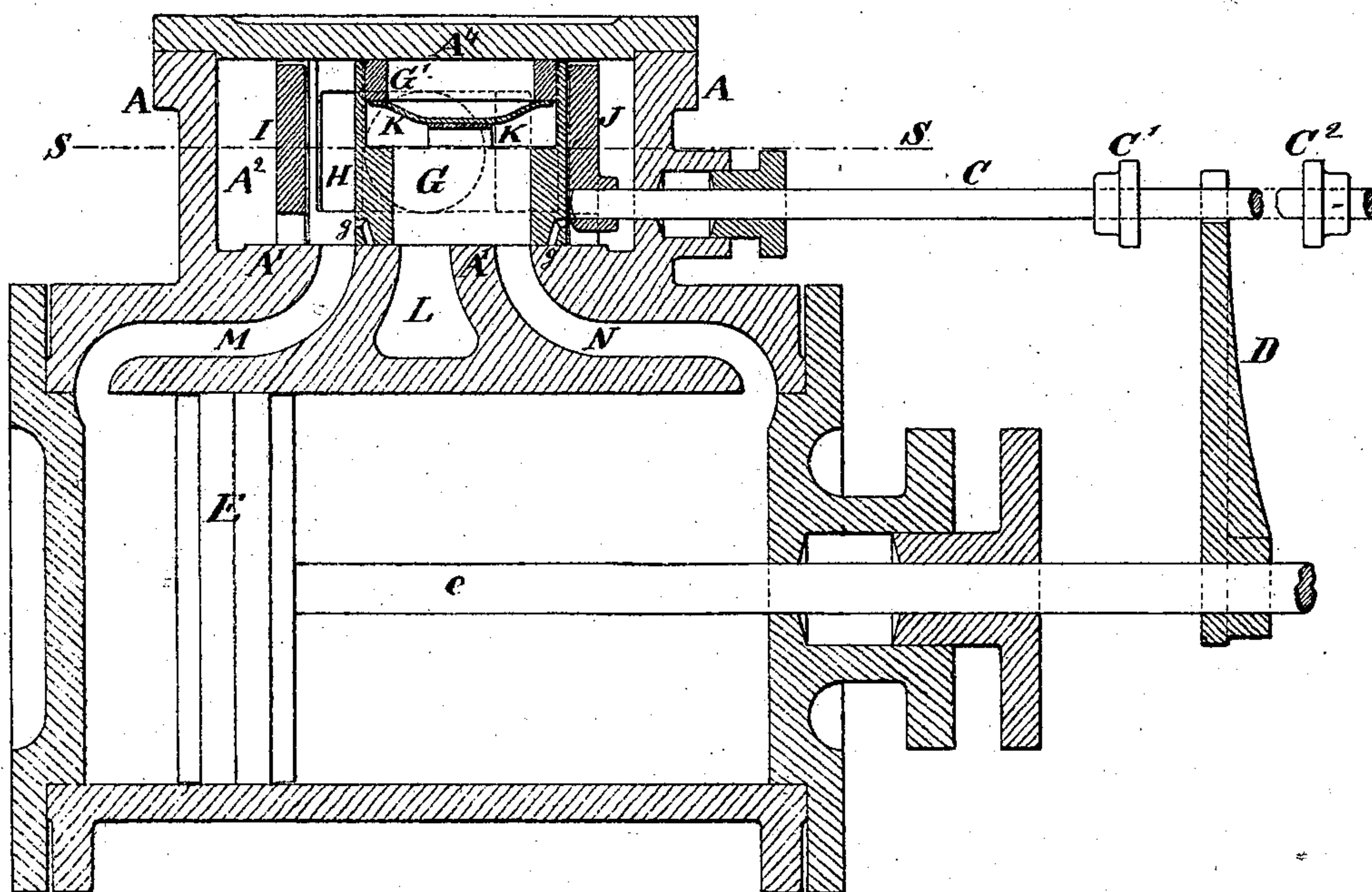
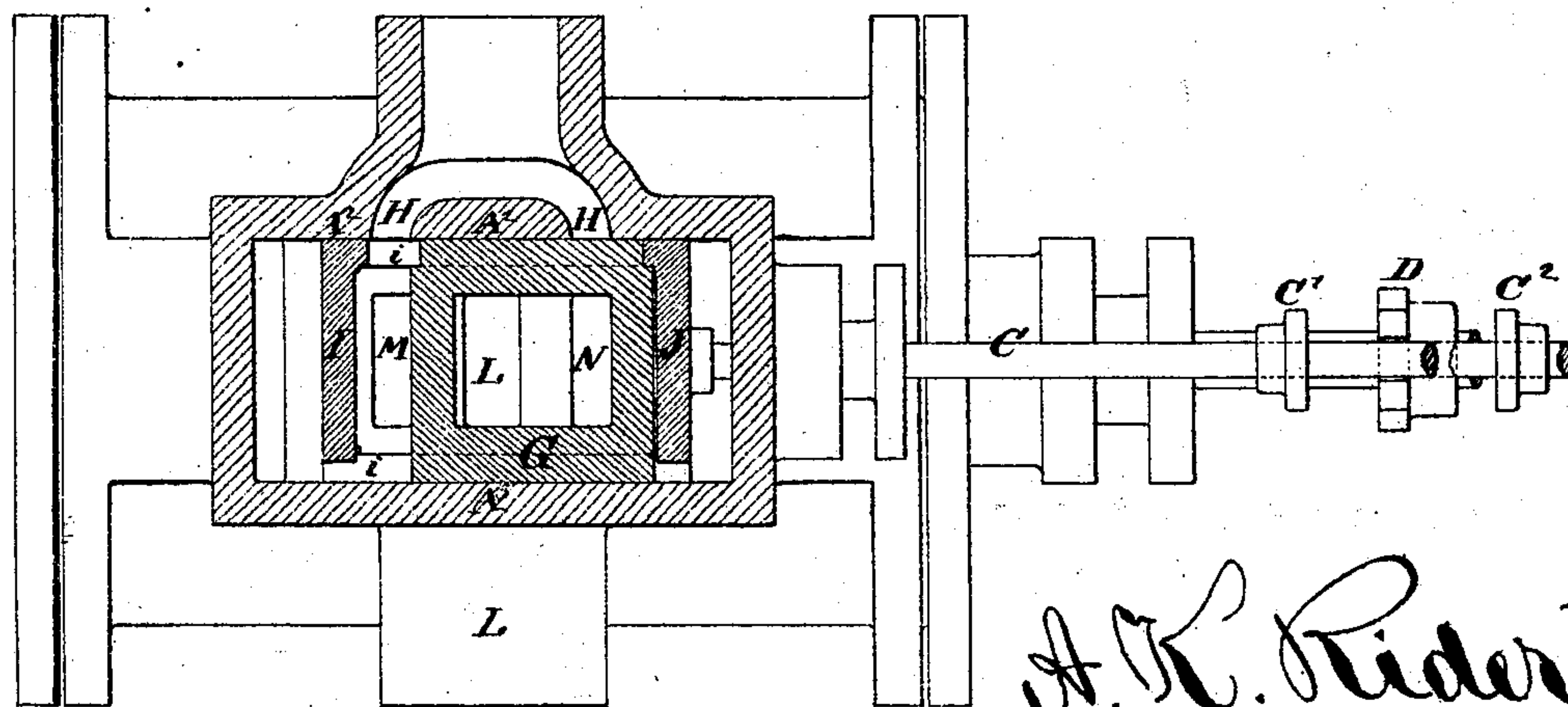


Fig. 2,



Witnesses,

H. Hoermann.

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UNITED STATES PATENT OFFICE.

ALEXANDER K. RIDER, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, C. H. DELAMATER, AND G. H. REYNOLDS.

IMPROVEMENT IN SLIDE-VALVES.

Specification forming part of Letters Patent No. 116,099, dated June 20, 1871.

To all whom it may concern:

Be it known that I, ALEXANDER K. RIDER, of New York city, in the State of New York, have invented certain new and useful Improvements in the Construction and Operation of Slide-Valves for Steam and other Engines.

The mechanism for operating the valve gives it only a portion of its movement. The remainder of its movement is performed instantly by the action of the steam itself, and its motion is arrested gently by cushioning. The following is a description of what I consider the best means of carrying out the invention as applied to the valve of a steam-hammer or direct-acting pumping-engine, or any analogous engine.

The accompanying drawing forms a part of this specification, and represents the novel parts, with so much of the ordinary parts as is necessary to indicate their relations thereto. Figure 1 is a longitudinal vertical section, and Fig. 2 is a longitudinal section on the line S S in Fig. 1.

A is the steam-chest, and M and N are ports leading to the two ends of the cylinder. L is the orifice through which the steam is received by a suitable pipe from a boiler, not represented. C is the valve-stem, and D is an arm on the piston-rod, which, at or near the end of each reciprocation, strikes a tappet, C¹ or C², on the valve-stem and gives an end motion thereto. The piston is marked E and the piston-rod e. G is the main valve. It is open through its center from top to bottom to allow the steam entering through the port or orifice L to have a free admission to the port M or N, according as the valve G is at one end or the other of its motion. There are oblique openings g g leading upward from a point near the outer acting-edge of the valve G, the use of which will be presently explained. The valve G fits tightly to the cylinder-face A¹, as is usual. It also fits tightly against the sides A² A³ of the steam-chest, and it is made to fit also tightly against the upper surface or cover A⁴ of the steam-chest by means of a bearing-ring or packing-ring, G', which is fitted within a suitable enlargement in the cavity through the valve G, and is pressed upward by springs K K. It will be understood that the steam constantly fills the space in the interior of the valve G and of the ring G', while the space exterior to

the valve within the steam-chest is, the greater portion of the time, in free communication with the exhaust. Two large pieces, I and J, are mounted in the steam-chest in the positions represented. They are connected rigidly to each other and to the valve-stem C, the connection with each other being maintained by the parts ii extending along each side of the valve G in a groove or channel provided for the purpose, which they tightly fill. The pieces I and J should not fill the entire cross-area of the steam-chest. It is better that they should not; but it is important that they fit tightly against the side A² of the interior of the steam-chest. The action of the external mechanism, through the medium of the valve-rod C, forces the parts I and J alternately in contact with the valve G, and by such contact pushes it directly for a certain portion of the early part of its throw. When a portion of the movement of the valve G has been thus performed a little further movement of the valve allows the steam to leap up through the small inclined port or series of holes g and fill the space behind the valve G or between it and the end of the steam-chest, which it is moving from. This causes the valve G to jump immediately to the other end of its throw, which movement exposes the port M fully open to receive the steam through the interior of the valve G from the port L, and induce immediate commencement of the return motion of the piston E and its connections. The rapid motion of the valve G is arrested by the cushioning of a quantity of steam between itself and the other end of the steam-chest. On the completion of the return stroke of the piston E a similar series of movements takes place in the opposite direction—that is to say, the piece I is now brought into contact with the valve G and compels it to commence its movement, and at the proper stage the movement of the valve G is again completed in the opposite direction by the rise of the steam through the port g to fill the space in the opposite end of the steam-chest. It will be obvious that this device cannot succeed unless the exhaust-port at the end, which receives the steam through the port g, is stopped or covered temporarily. Such covering is effected by the construction and arrangement of the side of the valve G and the edges of the parts I and J, which apply against the side of

the steam-chest. It is, as already remarked, important that the parts I and J shall not fit steam-tight against all the faces in the interior of the steam-chest; but it is important that they shall fit tightly on the side which contains the exhaust-ports, and also that they shall fit tightly against the adjacent surfaces of the valve G, over which they lap by means of a shoulder, as shown. The proportions are such that when the action of the engine has, through the medium of the valve-rod C, pushed the parts I and J, and consequently the valve G, into the position where steam is about to leap up through the small port *g* and give the valve G a further motion in that position of the parts, the exhaust-port at that end is covered by the valve G and the edge of the part I, taken together. The uncovering of the exhaust-port is effected almost immediately afterward by the movement of the valve. The steam commences to throw the valve G with so much force that its motion is continued by its momentum and by the diminishing force of the steam after it has uncovered the exhaust-port, leaving the steam then free to rise through the main port N and exhaust, as above described. The motion of the valve is arrested by cushioning the exhaust at the other end of the steam-chest, the valve being of such length as to cover and overrun the exhaust-port before the end of its motion.

I have represented the parts I and J as cast or otherwise formed with slight bearing-ridges or points, which hold the valve G at a little distance off, so as to more readily allow the steam to enter the space between and act with full force on the whole area of the valve to

throw it; but I do not esteem such a provision essential to its full and complete success. The shoulder, at the side where the parts I and J—which, together, I sometimes term the yoke—lap upon the side of the valve, is more important. I can increase the extent of this shoulder, if desired in any case, so as to compel the exhaust to remain closed until the valve G has moved further.

What I claim as my invention is—

1. The side bearings of the main valve G and of the pieces I and J, arranged, as represented, relatively to each other and to the exhaust-ports H, so that, when the steam begins to be received upward through the small port *g* to act on the valve G to complete its throw, the exhaust-passages or ports H shall be covered until the valve has leaped forward, and shall then be opened widely, as herein specified.

2. The top bearing-ring G', mounted on the main valve G, and operating, as represented, against the parallel surface or bearing on the upper side of the interior of the steam-chest, opposite the cylinder face, in combination with the means I and J, or their equivalents, for commencing the throw of the valve G by a positive movement of the mechanism, and also with the ports *g*, arranged as specified, and adapted to allow the completion of the throw of the valve G by direct steam-pressure, as herein specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

Witnesses:

A. K. RIDER.

THOMAS D. STETSON,
A. HOERMANN.