A. K. RIDER.

Improvement in Slide-Valves.

No. 114,344. Patented May 2, 1871.

Fig. 1,

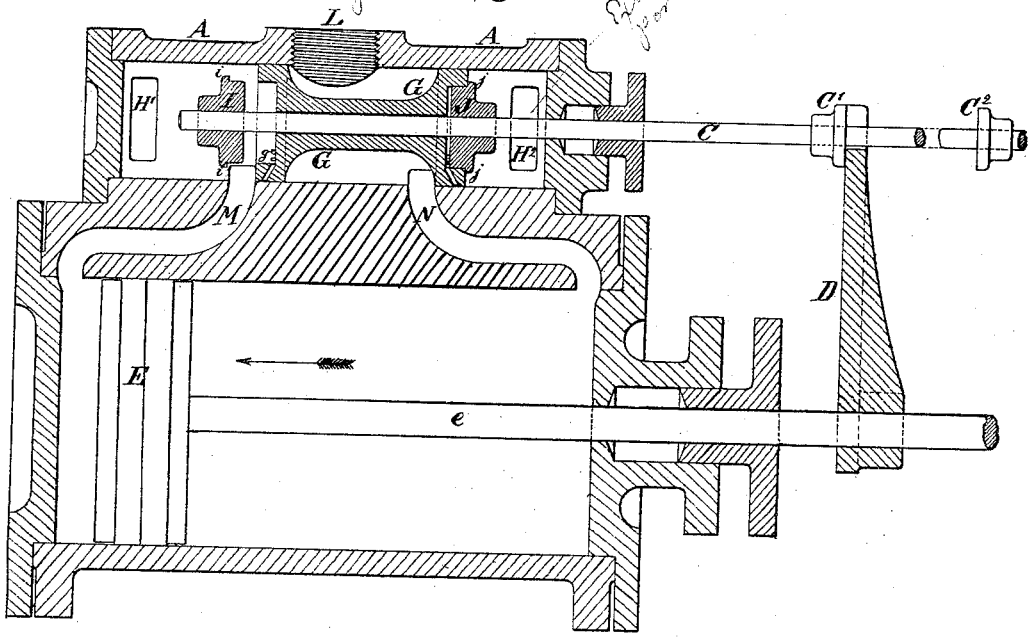
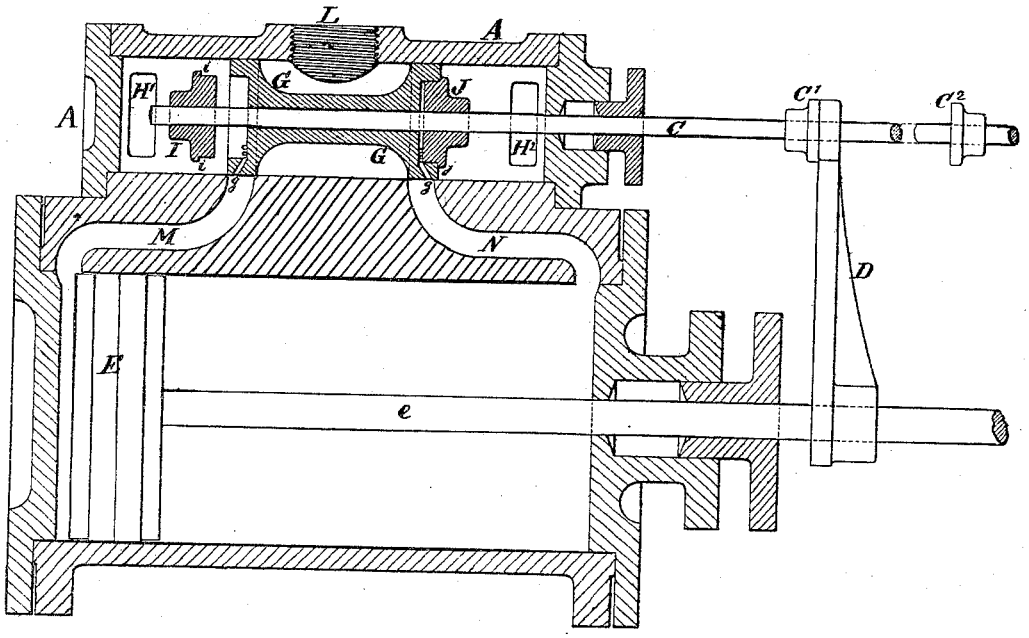


Fig. 2,



Witnesses,

A. Hoemann.

C. L. Livings

Inventor,

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United States Patent Office.

ALEXANDER K. RIDER, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, CORNELIUS H. DELAMATER, AND GEORGE H. REYNOLDS, OF SAME PLACE.

Letters Patent No. 114,344, dated May 2, 1871.

IMPROVEMENT IN SLIDE-VALVES.

The Schedule referred to in these Letters Patent and making part of the same.

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 then arrested gently by cushioning on a quantity of steam.

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, direct-acting, pumping, or an 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 section through my improved valve, showing the steam-ports uncovered.

Figure 2 is a corresponding section with the ports covered.

Similar letters of reference indicate like parts in both the figures.

I can use the ordinary rectangular steam-chest and slide-valve, with slight modifications, as described further on; but prefer the cylindrical steam-chest and piston-valve, which modification of my improvements I will first describe, as follows:

A is the cylindrical steam-chest, and

M and N ports leading to the two ends of the cylinder.

L is the orifice through which 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, C^1 or C^2, 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 perforated through its center to allow the easy passage of the valve-stem C, and is deeply chambered in a belt around its middle, to allow the steam entering through the port L to have a free admission to either of the ports, M or N, according as the valve G is at one end or the other of its motion.

In each end of the valve G there is a shallow cylindrical recess, of such diameter as to receive one of the abutment collars I and J.

There are, also, oblique openings, *g g*, communicating from the bottom of each cylindrical recess and near the outer acting edges of the valve G; the use of this will be presently explained.

It will be understood that the valve G is made to fit steam-tight in the cylindrical steam-chest, as piston-valves are usually made, and that the steam fills the belt around the valve, while the space outside of the valve at each end is open to the exhaust.

H^1 H^2 are the exhaust-ports communicating with an exhaust-pipe, not represented.

I and J are abutment-collars or buffers, firmly fixed on the valve-stem C in the position represented. They are, substantially, circular disks, of such diameter as to fit snugly into the recess in each outer end of the main valve. They are in the drawing represented as having an external flange, *i j*; but this is not essential to this operation.

These abutment-collars serve three distinct purposes, viz:

First, moving the main valve by contact motion;

Second, forming an abutment for the steam to react against in continuing the movement of the main valve; and

Third, serving as a cushion-plate to receive the impact of the main valve and gently arrest its motion by cushioning at the end of its movement.

There are small oblique parts, *g g*, arranged as represented. These may be formed by drilling one or more holes obliquely in the position shown. They need not be large, but should be sufficiently numerous to allow a sufficient flow of steam through their united areas.

When the valve G is at one end of its motion, as shown in fig. 1, the steam enters freely through the port N and drives the piston E in the direction indicated by the arrow; but, as the piston E approaches the end of its stroke, the arm D, striking the tappet C^1 on the valve-stem C, moves the latter, and with it the abutment-collars I J. This motion brings the flange or end, or other portion of the piece J, into contact with the corresponding end of the valve G, and commences to move the valve G. This movement progresses till the exhaust from the main cylinder is arrested, and a little further movement brings the parts into the position indicated in fig. 2. In this position the strong steam from the port N is free to leap up through the small port or series of holes *g* into the cavity between the abutment-piece J and the valve G. The steam rushing up into this space instantly generates a sufficient pressure to powerfully separate the abutment J and valve G. As the piece J is fast on the valve-stem C and cannot yield, the valve G moves in obedience to this force, and leaps instantly to the opposite end of its throw. This violent motion is gently arrested by the cushioning of steam in the space between the other abutment-collar or piece I and the valve G.

In this new position the ports are exposed in the

opposite condition to that shown in fig. 1, and the steam is discharged from the end which before received steam, and is taken in at the end which previously discharged it. The consequence is, necessarily, a movement of the piston E and its connections in the opposite direction, terminating with a corresponding movement of the valve-stem C and valve G in the direction opposite to that just described. The movement continues regularly as long as the engine is worked. I have in my experiments succeeded in making, by this device, many hundred strokes a minute with a small engine of this construction.

I would state that, in describing my improvements, I have supposed the steam to be received in the chamber around or between the two heads of the main valve; likewise, further on, I have supposed a like position of the steam inlet-passage in describing the rectangular chest and valve modification of my improvement, the exhaust-passages being outside the valve, or toward the ends of the steam-chest. This position of inlet and egress is not essential, as it may be reversed—that is, the present steam-inlet may become exhaust, and the present exhaust may become inlet, if expedient; but, in that case, the pieces I and J are between the heads of the main valve and face outward.

I claim as my invention—

1. The ports *g*, arranged to serve, as represented, in a main valve, G, when the latter is fitted to move in the steam-chest, or equivalent casing, so as to complete its stroke by the action of steam received through the ports *g* after the commencement of the stroke has been initiated by other means, all substantially as herein specified.

2. The pieces I J, fixed firmly on the valve-stem C, and arranged to operate relatively to cavities in a main valve, G, interposed between them so as to receive the action of steam in the small space between themselves and the main valve, to complete the throw of the main valve with a small quantity of steam, as herein specified.

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

A. K. RIDER.

Witnesses:

THOMAS D. STETSON,

C. C. LIVINGS.