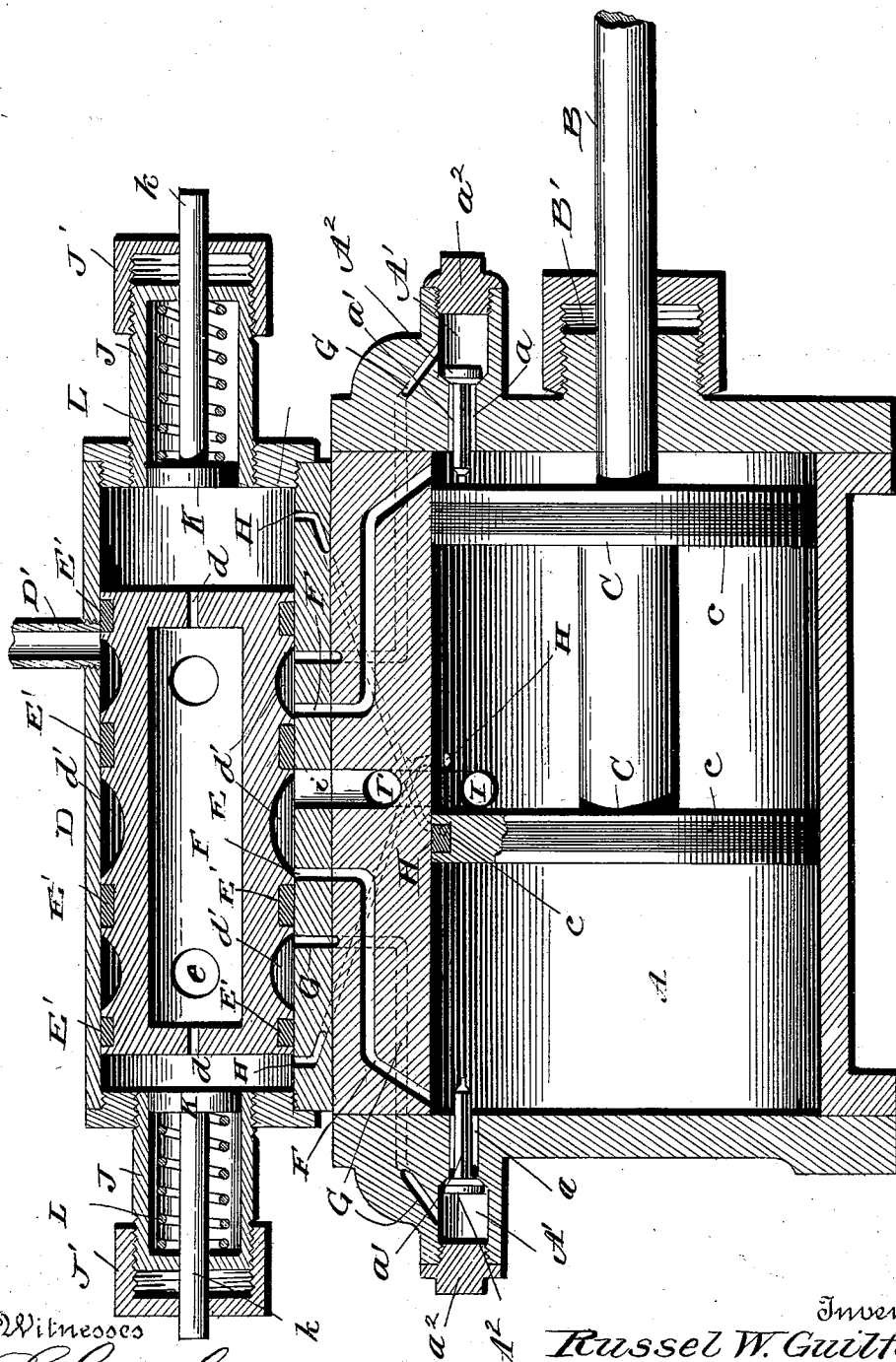


(No Model.)

R. W. GUILFORD.
STEAM ENGINE.

No. 542,930.

Patented July 16, 1895.



Witnesses

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UNITED STATES PATENT OFFICE.

RUSSEL W. GUILFORD, OF AUBURN, INDIANA, ASSIGNOR TO THE AUBURN
IRON WORKS, OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 542,930, dated July 16, 1895.

Application filed November 9, 1894. Serial No. 528,326. (No model.)

To all whom it may concern:

Be it known that I, RUSSEL W. GUILFORD, a citizen of the United States, residing at Auburn, in the county of De Kalb, State of Indiana, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to certain new and useful improvements in steam-actuated valves for steam-engines; and it has for its object to provide an improved valve of novel construction whereby better results are obtained and in which no pounding or knocking is had, this latter result being attained by means of yielding bumpers or cushions at the ends of the steam-chest. I provide a novel arrangement of steam and exhaust ports and a peculiar construction of the valve itself.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention is clearly illustrated in the accompanying drawing, which, with the letters of reference marked thereon, forms a part of this specification, and in which is shown a substantially central longitudinal section through the steam-cylinder, steam-chest, and valve, with portions in elevation and a portion broken away.

Referring now to the details of the drawing by letter, A designates the steam-cylinder; B the piston-rod; B', the stuffing-box, and C the double hollow piston carried by said rod within the said cylinder, the heads of the piston being provided with annular peripheral packing-rings *c* seated in grooves therein, as shown.

The cylinder has at its opposite ends the exterior chambers A', having communication with the interior of the cylinder through the passages *a*, and in these passages are guided the stems *a'* of the valves A². These chambers are closed at their outer ends by the removable caps or plugs *a*², as shown.

D is the steam-chest. It is mounted on the cylinder in any suitable manner and is provided with the steam-inlet supply-pipe D', as shown, adapted to be connected with any suitable generator or source of steam supply.

E is the hollow steam-valve fitted to move within the steam-chest and having at each end a longitudinal port *d* and provided with the peripheral depressions *d'*, as shown, which communicate with the steam-pipe from the generator and with the cylinder by means hereinafter set forth. This valve has also the openings *e* leading from the said depressions to the interior of the hollow valve. These peripheral depressions form live-steam recesses, as will be readily seen. This valve is provided with the packing-rings E' as shown, which are arranged upon opposite sides of the depressions.

F are live-steam ports leading from opposite ends of the cylinder A to the valve-chest near the center thereof to correspond with the depressions in the valve to drive the piston first to the right and then to the left. They extend as shown, entering the cylinder in an inclined direction.

G are ports leading from the steam-chest near the center of the length thereof to the chambers A' at the ends of the steam-cylinder.

H are exhaust-ports from the ends of the valve-chest to the center of the cylinder, crossing each other near their entrance into the cylinder.

I is the exhaust from the cylinder from near the longitudinal center thereof, and I' is the exhaust from the center of the valve-chest through a passage or channel *i* in the wall of the steam-cylinder.

Each end of the valve-chest is provided with an extension J, which, as shown, is detachably secured in the ends thereof and is provided with a stuffing-box J', through which works the stem *k* of a bumper K, around which stem, between the valve or bumper and the end of the extension, is a spring L, as shown. The spring normally holds the bumper or valve flush with the inner end of the extension, as shown.

With the parts constructed and arranged substantially as above set forth the operation will be as follows: Steam being admitted through the pipe D' it will flow into the depressions *d'* of the valve and through them and the holes *e* into the interior of the valve and from thence through the ports *d* at the ends into the valve-chest. As shown, the left-

hand end of the valve-chest is exhausting through the port H at the left-hand end into the double piston and to the atmosphere through the exhaust I. Steam will pass through the port F at the right-hand end and behind the piston, moving it to the left until the packing-ring of the right-hand head of the piston closes the port H of the left-hand end of the valve-chest. Now the right-hand port H has exhausted its pressure from the end of the valve and the pressure will rise through the port *d* and move the valve to the right. This admits steam through the port F to the left-hand end of the steam-cylinder and exhausts the right-hand end. Now the piston will move to the right again, and so on with a continuous stroke. The piston is at one end of its stroke when the valve is at the opposite end of its stroke. The piston is cushioned at the end of its stroke by the noiseless steam-cushion formed by the cavities or chambers A' at the ends of the steam-cylinder and the valve therein as follows: When the piston reaches nearly the end of its stroke, the steam passing through the passage G from the valve-chest, being nearly closed by the valve E, the valve A² is opened and steam admitted, which arrests the piston-head and prevents its striking against the end of the cylinder. When the piston starts on its return stroke the valve A² again closes. This valve forms a sort of governor. When the piston opens the said valve it doubles the portage and the pressure against the said piston.

35 The valve is cushioned by the spring-actuated bumpers K, as will be readily understood.

What I claim as new is—

1. The combination with the steam cylinder having end extensions forming chambers communicating with the cylinder and having independent passages therefor toward the center of the valve chest, valves located in said chambers with their stems guided in openings in the ends of the cylinder, and the steam chest, of a hollow steam valve fitted therein and provided with peripheral depressions and with steam ports at its ends and ports leading from the end peripheral depressions into the interior of the valve, substantially as specified.

2. The combination with the steam cylinder having end extensions forming chambers communicating with the cylinder and

having independent passages therefor toward the center of the valve chest, valves located in said chambers with their stems guided in openings in the ends of the cylinder, and the steam chest, of a hollow steam valve fitted therein and provided with peripheral depressions and with steam ports at its ends and ports leading from the end peripheral depressions into the interior of the valve and peripheral packing rings upon opposite sides of said peripheral depressions, substantially as specified.

3. The combination with the steam cylinder having at each end an exterior chamber communicating with the interior thereof, valves in said chambers, removable caps to said chambers, ports leading to the steam space of the peripheral depressions of the steam valve, a hollow steam valve with peripheral depressions, a steam chest with exhaust ports from the ends to a point near the longitudinal center of the cylinder, substantially as specified.

4. The combination with the steam cylinder having at each end an exterior chamber communicating with the interior thereof, valves in said chambers, removable caps to said chambers, ports leading to the steam space of the peripheral depressions of the steam valve, a hollow steam valve with peripheral depressions, a steam chest with exhaust ports from the ends to a point near the longitudinal center of the cylinder, said valve having steam passages at its ends and passages leading from its interior to the peripheral depressions and removable extensions to the steam chest provided with spring cushions for the valve, substantially as specified.

5. The combination with the steam cylinder and its ports, piston and exterior chambers with valves, of the steam chest with its ports and hollow valve with ports and openings, the extensions on the ends of the steam chest with removable stuffing boxes and the spring actuated pistons in said extensions and constructed to serve as yielding cushions for the valve, all substantially as shown and described.

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

RUSSEL W. GUILFORD.

Witnesses:

JAMES H. ROSE,

ARTHUR L. THOMAS.