

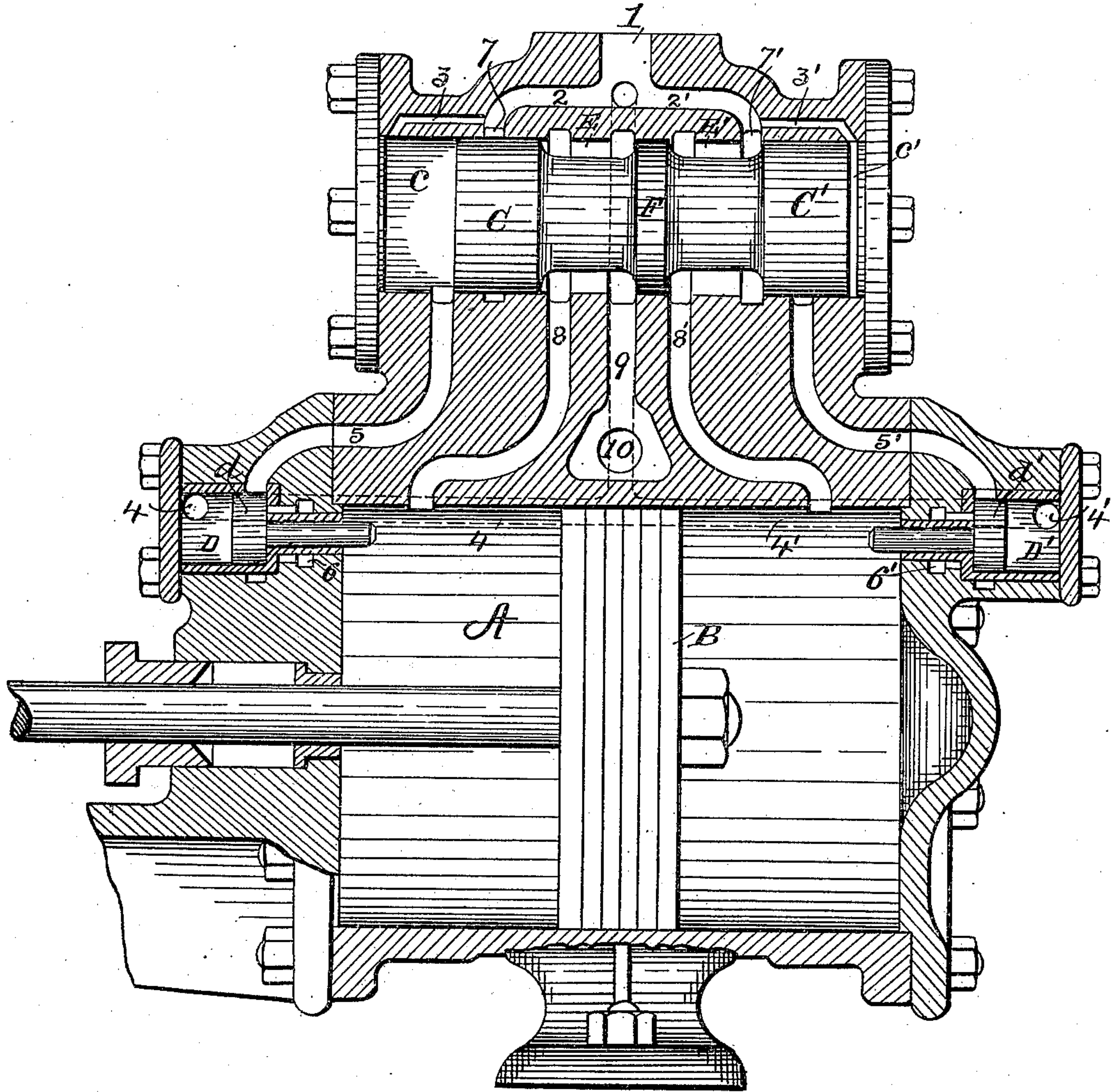
No. 688,598.

Patented Dec. 10, 1901.

E. M. CORYELL.
STEAM ENGINE.

(Application filed Mar. 14, 1901.)

(No Model.)



Witnesses.
H. R. Edgson.
[Signature]

Inventor.
Edwin M. Coryell
by *[Signature]*
his atty.

UNITED STATES PATENT OFFICE.

EDWIN M. CORYELL, OF NEW YORK, N. Y., ASSIGNOR TO JULIA E. CAMERON, OF NEW YORK, N. Y.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 688,598, dated December 10, 1901.

Application filed March 14, 1901. Serial No. 51,179. (No model.)

To all whom it may concern:

Be it known that I, EDWIN M. CORYELL, of New York city, in the State of New York, have invented a new and useful Improvement in Steam-Engines, which is fully set forth in the following specification.

My invention relates to steam-engines, and has for its object to provide for the steam-cylinder a main valve that shall not be a "slide-valve" in the ordinary sense of the term—that is, a valve which is subjected to great wear and is liable to leakage.

The invention consists in providing a steam-controlled and steam-balanced piston that is itself a valve, whereby there is practically no pressure on the valve to cause it to grind upon its bed.

The invention consists, further, in certain details of construction that will be pointed out.

The annexed drawing is a vertical section to illustrate my invention.

In the drawing, A is the ordinary steam-cylinder, and B its piston. In the valve-chamber is the valve comprising the attached pistons C, F, and C'. Live steam is admitted at connection 1 and enters through passages 2 2' and ports 3 3' into the ends c c' of the valve-chamber, so that there is the same pressure on the end of each piston C and C', so that the valve is in equilibrium or "steam-balanced." Steam also passes from connection 1 downward (as indicated by the dotted lines) and through passages 4 4' into the exhaust-valve chambers D D', where it operates to hold closed the tappet-valves d d'. The latter close the exhausts from the valve-chambers c c', the exhaust being through passages 5 5' and ports 6 6'. As piston B nears the end of its stroke (say to the left) it pushes exhaust-valve d from its seat and permits some of the steam to escape from valve-chamber c. Instantly the excess of pressure on the other (right) end, at piston c', shoves the valve to the left, whereupon the piston C closes the exhaust-passage 5 and equilibrium is once more restored, and so at the other end of the stroke of piston B. Thus the valve is also steam-controlled—that is, there is no mechanical device to shift it. This valve has the two annular grooves E E', which thus out-

line the median flange or belt F (that constitutes the main valve) as well as the two heads C and C', (that form the piston proper.) Of course the belt F and the heads C C' fit snugly within the valve-chamber. Steam from connection 1 enters through passage 2', (or 2,) outlet 7', (or 7,) annular space E', (or E,) and passage 8' (or 8) into the main cylinder. The exhaust-port from the main cylinder is indicated at 10 and extends back through passage 9, annular space E, (or E'), and passage 8 (or 8') to the main cylinder.

The grooves E E', belt F, and ports 7 7', 8 8', and 9 bear such relation to one another that at one position of the piston-valve live steam is admitted freely to the steam-cylinder A at one side of its piston B, while the steam is as freely exhausted from the other side of piston B, and at the other position of the piston-valve this operation is reversed. The valve F is not in constant motion, but shifts instantly at the moment before the completion of each stroke of piston B, and then it remains at rest until just before the next stroke.

Except for the very brief periods when the steam is exhausting from one or the other of the spaces c c' of the valve-chamber the valve C F C' is in equilibrium—that is, the pressure on each end is the same. Further, during the period of exhaust from the main steam-cylinder and when the piston-valve is shifting the pressure of the steam does not force this valve down against this valve-seat, but merely shifts it laterally and against atmospheric pressure alone, so that there is an entire absence of grinding and wear. Therefore because of the absence of any pressing against any valve-seat my piston-valve is very sensitive and will act under low steam-pressure and can be made to run very slowly—almost imperceptibly. It is also positive and unfailing in its action, because there is no friction or any other cause to check its movement, while, on the other hand, in the absence of any mechanical shifting device with its entailed packings and by reason of the positive and automatic action of the piston-valve the engine equipped with my improvement may be employed with abnormally high steam-pressure and may be run at very high speeds. Thus the life of this valve is much longer

than was heretofore possible, while the engine may be operated satisfactorily at any speed desired and within any range of pressure.

Of course it is to be understood that the drawing and detailed description are given merely for the sake of illustration and that changes may be made therein or the idea embodied in other forms without in any case departing from the spirit of my invention.

Having thus described my invention, I claim—

In a steam-engine the combination of the following parts: a piston-valve consisting of two piston-heads and a median flange constituting the main valve; a valve-chamber therefor containing an inlet for live steam, two passages branching therefrom for admitting steam alternatively to opposite ends of the steam-cylinder but controlled by the said

valve, and two always-open ports of reduced size for admitting steam behind the ends of the said piston-heads; a steam-cylinder having (in addition to the two inlet-passages aforesaid) an exhaust-port controlled by said valve; and two exhaust-passages leading from the rear of said piston-heads and controlled by steam-pressure valves, said steam-pressure valves operated by the main piston; the parts coöperating substantially in the manner described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDWIN M. CORYELL.

Witnesses:

ELISHA K. CAMP,
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