

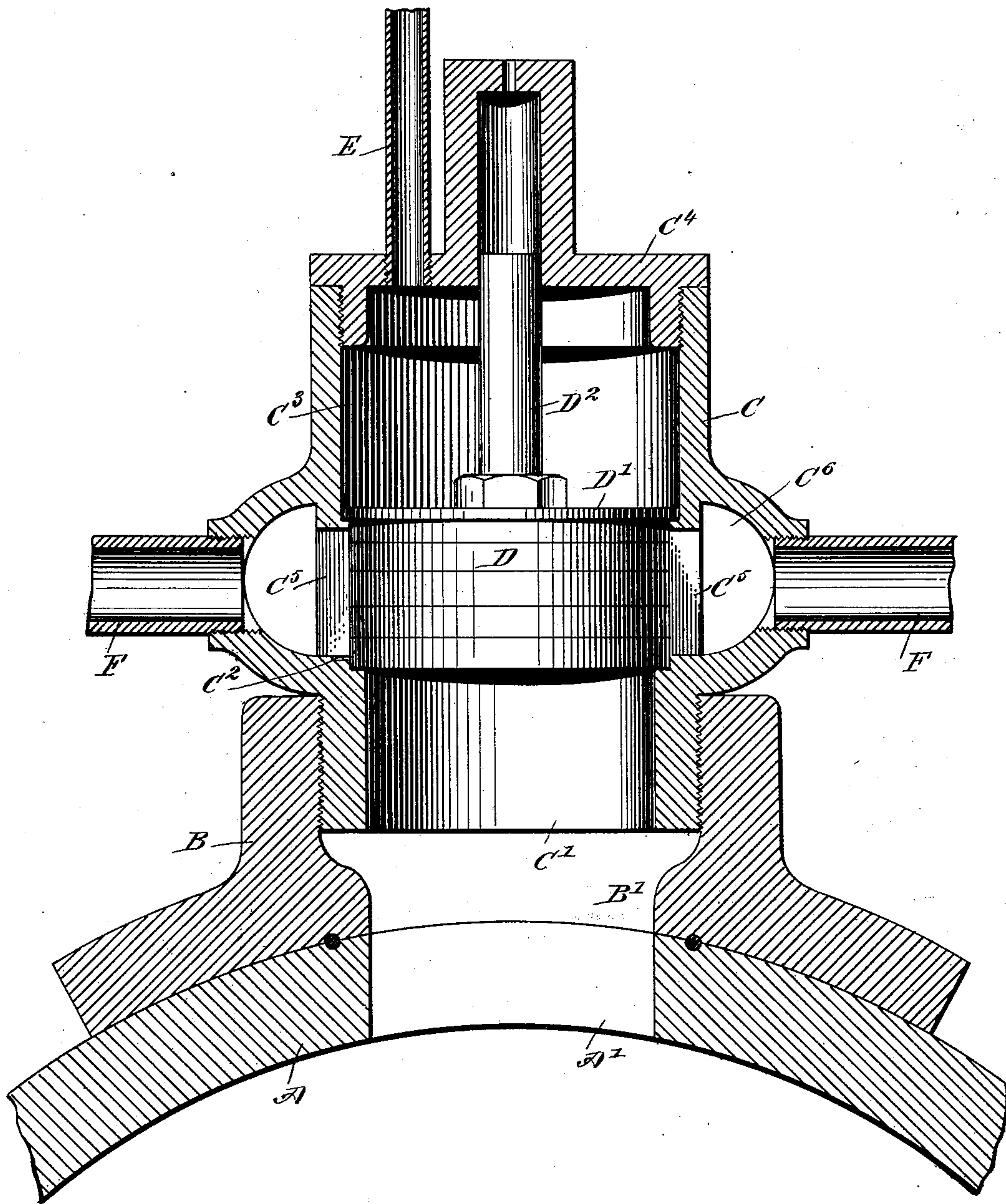
No. 747,538.

PATENTED DEC. 22, 1903.

C. A. CUNNINGHAM.
BACK PRESSURE RELIEF VALVE.

APPLICATION FILED MAR. 27, 1903.

NO MODEL.



WITNESSES:

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COLIN ALLEN CUNNINGHAM, OF BRAINERD, MINNESOTA.

BACK-PRESSURE RELIEF-VALVE.

SPECIFICATION forming part of Letters Patent No. 747,538, dated December 22, 1903.

Application filed March 27, 1903. Serial No. 149,843. (No model.)

To all whom it may concern:

Be it known that I, COLIN ALLEN CUNNINGHAM, a citizen of the United States, and a resident of Brainerd, in the county of Crow Wing and State of Minnesota, have invented a new and Improved Back-Pressure Relief-Valve, of which the following is a full, clear, and exact description.

The invention relates to steam-engines; and its object is to provide a new and improved back-pressure relief-valve arranged to completely relieve the piston in the steam-cylinder of back pressure, thus insuring a steady running of the engine and utilization of the motive agent to the fullest extent.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is a cross-section of the improvement.

On each end of the cylinder A of the engine is externally secured a seat B, in which is fastened a valve-casing C, containing a piston-valve D, formed with concentric bores C', C², and C³, of which the smallest bore C' connects with a port B' in the seat B, which registers with a port A', formed in the cylinder A. The uppermost or largest bore C³ is connected by a pipe E with the boiler-pressure, preferably at the steam-chest of the engine, the said pipe E being fastened in a cap C⁴ for closing the upper end of the valve-casing C. The bore C², arranged between the bores C' and C³, connects by ports C⁵ with an annular chamber C⁶, from which lead outlet-pipes F, connected with the boiler-pressure, preferably at the steam-chest, the same as the pipe E.

The piston-valve D is normally seated in the bore C², and the upper end of the said piston-valve is provided with an enlarged head D', engaging the bore C³. The piston-valve D is also provided with a guide-stem D², mounted to slide in a suitable bearing formed in the cap C⁴ of the valve-casing C.

It will be seen that the piston-valve D is normally held to its seat, as shown in the drawing, by the boiler-pressure passing by way of the pipe E into the bore C³, so that

the boiler-pressure is exerted against the head D', which is larger in area than the bottom face of the piston-valve D, exposed to the cylinder-pressure. Now as soon as the valve closes the exhaust-port and the steam in the exhaust end of the cylinder is compressed then the piston-valve D slides upward as soon as the pressure of the steam in the piston exceeds that of the boiler-pressure, and consequently the ports C⁵ are uncovered and the steam from the cylinder can pass through the bores C' and C² and ports C⁵ into the chamber C⁶ and from the latter by way of the pipes F to the steam-chest. Thus by the arrangement described equalization takes place in the steam-chest and the exhaust end of the cylinder.

From the foregoing it will be seen that the boiler-pressure on top of the piston-valve D is utilized as a cushion for the cylinder-pressure, thereby relieving the piston and parts connected therewith from undue strain, thereby preventing injury to the piston, piston-rod, cross-head, main rod, and other parts of the engine, at the same time allowing the piston to cross over full stroke without danger of bending or breaking any of the parts mentioned. It will further be seen that by the arrangement described the piston-rod packing is relieved of undue strain, and consequently long life of the same is insured. On locomotive-engines the engineer is enabled to operate the engine at any stroke or to allow the valve to travel any distance without the usual strain upon the piston and cushions. Furthermore, the valve of the engine may be worked with a greater inside lap, so as to allow of closing communication from the cylinder to the atmosphere and allowing the piston to commence compression early in the stroke of the piston by forcing the compressed steam into the steam-chest by way of the pipes F, as above explained, to allow reusing this steam in working the engine.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A relief-valve for engines, comprising a valve-casing having concentric bores spaced apart, of which the smallest is in communication with the interior of the engine-cylinder, and the largest bore is in communication

with the boiler - pressure, preferably at the steam-chest, and a piston-valve fitted to slide in the said valve-casing intermediate said bores and controlling an outlet from the said valve-body, as set forth.

2. A relief-valve for engines, comprising a valve-casing having concentric bores of which the smallest is in communication with the engine-cylinder, and the largest bore is in communication with the boiler - pressure, a central bore of intermediate size connecting said bores, said valve-casing having an annular chamber in communication with the steam-chest of the engine and surrounding said central bore, said valve-casing also having ports leading from said central bore into said chamber, and a piston-valve fitted to slide in said central bore and controlling said ports, as set forth.

3. A relief-valve for engines, comprising a valve-casing having two bores, a larger and a smaller, in central alinement, the two opening into each other with an annular shoulder at their point of union, the smaller bore being in communication with the interior of the engine-cylinder, and the larger in communication with the boiler, a piston-valve sliding in said bores, said annular shoulder limiting

the movement of said valve in one direction, said valve-casing having an annular chamber in communication with the steam-chest of the engine and surrounding said smaller bore, said valve-casing also having ports leading from said smaller bore into said annular chamber, said ports being controlled by the reduced portion of the piston operating in said smaller bore, as shown.

4. A relief-valve for engines, comprising a valve-casing having concentric bores, of which the smallest is in communication with the interior of the engine-cylinder, a pipe leading from the largest bore to a steam-chest, a piston-valve fitted to slide in the intermediate bore and having an enlarged head extending into the largest bore, the said piston-valve controlling ports formed in the valve-casing and leading to an annular chamber therein, and pipes leading from the annular chamber to the steam-chest, as set forth.

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

COLIN ALLEN CUNNINGHAM.

Witnesses:

FRANK H. PORTZ,
GEO. A. KEENE.