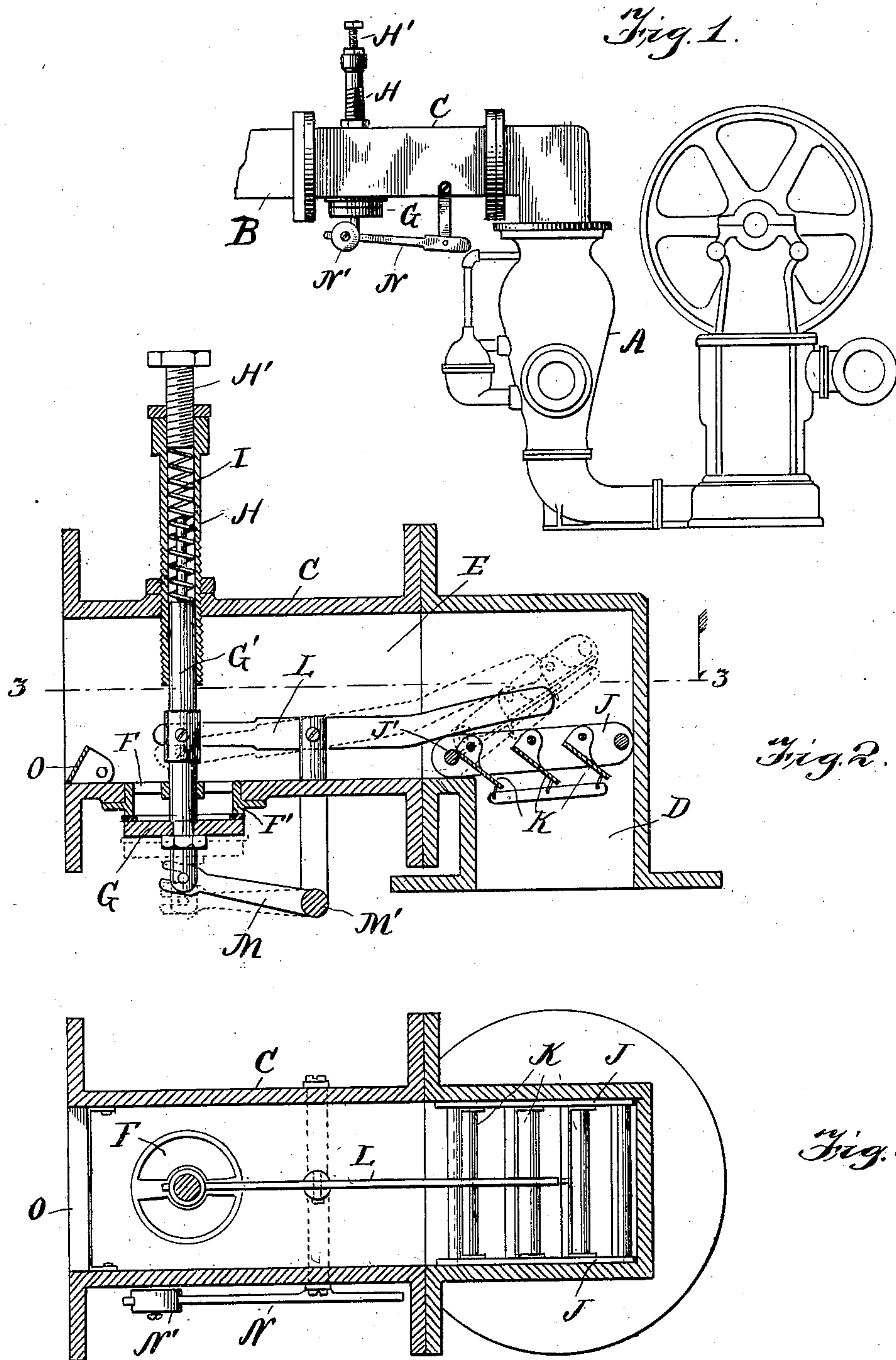


No. 840,993.

PATENTED JAN. 8, 1907.

F. A. COOPER.
AUTOMATIC WATER RELIEF VALVE.
APPLICATION FILED MAY 1, 1906.



Witnesses:
S. M. Gallagher.
S. Williamson

Inventor:
Frederick A. Cooper
By *W. T. Williams* Atty.

UNITED STATES PATENT OFFICE.

FREDERICK A. COOPER, OF ADAMS, MASSACHUSETTS.

AUTOMATIC WATER-RELIEF VALVE.

No. 840,993.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed May 1, 1906. Serial No. 314,709.

To all whom it may concern:

Be it known that I, FREDERICK A. COOPER, a citizen of the United States, residing at Adams, county of Berkshire, and State of Massachusetts, have invented a certain new and useful Improvement in Automatic Water-Relief Valves, of which the following is a specification.

My invention relates to a new and useful improvement in automatic water-relief valves, and has for its object to provide a device of this description for the purpose of automatically preventing the flooding of the low-pressure cylinder of steam-engines or any other cylinder which may be connected with condenser or air pumps.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of a condenser with my invention applied thereto; Fig. 2, a vertical section through the automatic relief-valve; Fig. 3, a section on the line 3 3 of Fig. 2.

My automatic relief-valve is adapted to be interposed between a condenser or air-pump and the exhaust-pipe of the cylinder.

A represents the condenser, and B the exhaust-pipe.

My invention consists of a casing C, having a vertical opening or passage D at one end, where it is connected with condenser. This vertical passage D connects with the horizontal passage E, which extends to and connects with the exhaust-pipe of the cylinder of a steam-engine.

F is an opening formed through the bottom of the horizontal portion, and in this opening is fitted a valve-seat F'.

G is a valve-disk secured to a valve-stem G', which is adapted to slide vertically in suitable guides and when pressed upward comes in contact with the valve-seat F'. The upper end of the valve-stem is guided within a tube H, threaded through the top of the casing, and in the upper end of the tube

is threaded an adjusting-bolt H', secured in position by the usual jam-nut.

I is a spring interposed between the upper end of the valve-stem and the adjusting-bolt H', said spring always tending to force the valve-disk from off its seat.

J represents two arms arranged upon each side of the device next to the wall of the casing, and these arms are pivoted to the casing at the point J'.

K represents slats, each slat pivoted at one end to the arms J, so that the normal position of said slats will be in an incline position, as shown in Fig. 2, leaving a space between the slats, and any pressure from above may freely pass over the slats to the condenser, but any pressure from below will act to close the slats, so that they overlap one another, and thus form a solid wall.

L is a lever pivoted intermediate of its two ends to the casing C, one end of said lever pivoted to the valve-stem G' and the other end lying above the shutter formed by the slats K and arms J when said shutter is in its normal position. M is a lever pivoted to a post at the point M' below said casing, the other end of said lever engaging the valve-stem below the valve-disk.

N is a lever secured to the same pivot as the lever M, this lever N being provided with a sliding weight N' to aid in opening the valve.

In operation when the engine is ready to start the valve-disk G is raised to its seat by means of the lever N until the engine has started. Then the vacuum caused by the pump keeps the valve closed; but should the pump stop or fail to work and the water should rise to the top of the condenser through any cause whatever the water would strike the slats K of the shutter and close the shutter and cause it to rock upward upon its pivot J' and it coming in contact with the end of the lever L would depress the other end of the lever L and remove the valve-disk G from its seat, the spring H aiding in opening the valve quickly, thus allowing the water to flow out through the valve-opening before it had time to get to the cylinder and wreck the engine.

O is a stop-plate secured to the lower wall of the casing and extending entirely across the casing, located between the valve-opening F and the exhaust-pipe B. This would prevent any water entering the cylinder, as the water

would necessarily have to rise above the plate O to enter the cylinder, and therefore the water would flow out of the opening F before it could rise above the plate O. A
5 hand-hole may be provided on each side of the device for inspection of the same.

Of course I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of my invention.
10

Having thus fully described my invention, what I claim as new and useful is—

1. In an automatic water-relief valve, a casing connecting the condenser or air-pump
15 with the exhaust-pipe of the cylinder, the casing provided with an opening through the lower wall of its horizontal portion, a valve-seat adapted to said opening, a valve-disk adapted to contact the valve-seat from below, a vertically-sliding valve-stem, a spring
20 adapted to exert tension downward upon the valve, a lever upon the outside of the casing for raising the valve, movable means adapted to allow the passage of the exhaust-steam
25 from the cylinder to the condenser, but adapted to be moved by any pressure in the opposite direction, means whereby the movement of said movable means will remove the valve-disk from its seat, as and for
30 the purpose specified.

2. In a device of the character described, a hollow casing connecting a condenser or air-pump with the exhaust-pipe of a steam-engine cylinder, said casing consisting of a horizontal and vertical portion, the vertical portion connecting with the condenser and the horizontal portion with the exhaust-pipe, the bottom of the horizontal portion provided with an opening, a valve-seat adapted to said
35 opening, a valve-disk adapted to contact the valve-seat from below, a vertically-sliding valve-stem connected to the valve-disk, a spring adapted to exert pressure downward upon the valve-stem, means for adjusting the tension of said spring, a movable shutter arranged in the casing over the vertical passage, said shutter consisting of a series of plates normally separated by their own weight and allowing the passage of steam
40 from the cylinder to the condenser, said plates adapted to close so as to overlap one

another on pressure from beneath so as to cause the shutter to rise with the pressure from beneath, and a lever adapted to be operated by the raising of the shutter to depress the valve-stem, as and for the purpose specified. 55

3. In a device of the character described, a hollow casing connecting a condenser or air-pump with the exhaust-pipe of a steam-engine, said casing consisting of a horizontal and vertical portion, the vertical portion connecting with the top of a condenser, and the horizontal portion connecting with the exhaust-pipe, the bottom of the horizontal portion of the casing provided with an opening formed therethrough, a valve-seat formed around the lower rim of said opening, a valve-disk adapted to contact the valve-seat from below, a vertically-sliding valve-stem connected to the valve-disk, a spring adapted to exert pressure downward upon the valve-stem, means for adjusting the tension of said spring, a lever connected to the valve-stem upon the outside of the casing for primarily raising the valve to its seat, two arms arranged within the casing and upon each side close to the side walls, said arms pivoted at one end to the casing, the other end being free to rock upward, a series of slats pivoted at their upper ends to the arms and extending in between the same, said slats normally being separated to allow the passage of steam downward through the same but adapted to be closed and overlap one another on pressure from below so as to cause the shutter to rock upward upon its pivot, a lever pivoted intermediate of its two ends to the casing, one end of said lever lying above the shutter, the other end of the lever pivotally connected to the valve-stem, and a stop-plate, arising from the bottom of the casing and extending entirely across the same, located between the valve-opening and the exhaust-pipe, as and for the purpose specified. 60 65 70 75 80 85 90 95

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

FREDERICK A. COOPER.

Witnesses:

CLARENCE E. BENSON,
ALFRED PARKINSON.