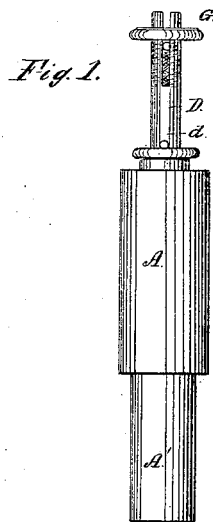
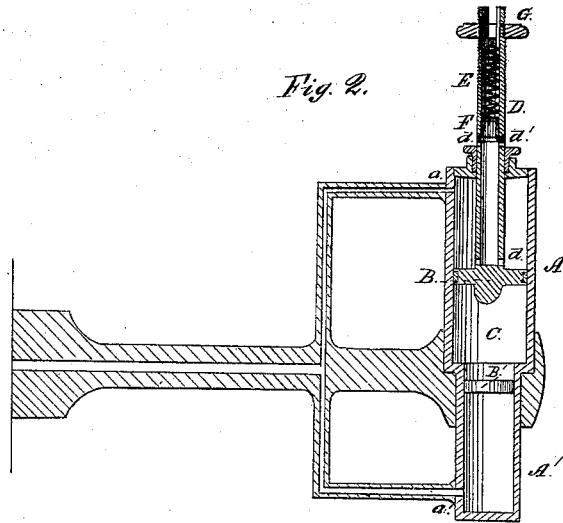


P. Riordan,
Steam Safety Valve.
N^o 46,142. Patented Jan. 31, 1865.



Witnesses:
Charles D. Smith
Edward H. Knight

Inventor:
Peter Riordan

UNITED STATES PATENT OFFICE.

PETER RIORDAN, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN SAFETY-VALVE REGULATORS.

Specification forming part of Letters Patent No. 46,142, dated January 31, 1865.

To all whom it may concern :

Be it known that I, PETER RIORDAN, of the city and county of Washington, in the District of Columbia, have invented a new and useful Improvement in Safety-Valve Regulators for Steam-Boilers; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of my improved safety-valve regulator. Fig. 2 is a longitudinal section of the same, and also a sectional view of the parts which afford communication between the regulator and boiler.

Similar letters of reference indicate corresponding parts in the several figures.

The object of this invention is to provide novel and simple means for indicating the amount of pressure which the steam exerts upon the boiler, and for reducing such pressure when it becomes excessive, as will be hereinafter fully explained.

To enable others skilled in the art to which my invention appertains to fully understand and use the same, I will proceed to describe its construction and operation.

In the accompanying drawings, A A' represent a cylinder, into which steam is admitted from a steam-boiler through the apertures *a a'*. The part A of the cylinder is of larger diameter than the part A', and in said part A is fitted a circular head, B, which is formed on or secured to the upper end of a shaft or stem, C. The other end of the shaft C carries a head, B', which works in the part A' of the cylinder, and is consequently of smaller diameter than the head B. Conjoined to and extending upward from the head B is a hollow shaft, D, which, when the heads B B' are in motion, is adapted to work through a suitable stuffing-box or steam-tight bearing in the end of the cylinder.

E is a spiral or other spring, placed within the hollow shaft D in the manner represented, and having affixed to one of its ends a valve, F, which, when in its normal position, closes egress-apertures *d' d'* in the shaft D. Steam may enter the shaft D through the apertures *d d*. The power of the spring E in resisting the pressure which the steam exerts upon the valve F may be varied by the contraction and extension of the spring itself, and this can be

effected with facility by turning the nut or collar G, which works on a threaded part of the hollow shaft D. The latter may also be graduated, in order that the position of the collar G may indicate to the eye the exact amount of pressure which the spring E enables the valve F to withstand before being moved, so as to uncover the apertures *d*.

The heads B B' form tight joints with the sides of the cylinder A A', and the space between the two heads is occupied by air, no steam having access thereto.

When the engine is not in operation, the head B will, through the influence of gravity, assume such a position as the safety-valve sitting in its seat, and the length of the hollow rod D, which is connected at the upper end with the lever of the safety-valve, will allow, and this length must be made so as that the head B' will be near the bottom of the upper or large part, A, of the cylinder and the apertures *d' d'* without and a little clear of the stuffing-box. When steam is generated in the boiler and admitted through the apertures *a*, the pressure of the steam on the upper face of the head B is greater than the pressure on the under face of the head B' by as much as will, when there is an equilibrium of pressure on both and on the safety-valve, counterbalance the effective lifting force of the safety-valve on the safety-valve lever that is attached to the hollow rod D, this result being effected by the difference between the effective areas of the heads B B'. The nut or collar G is then screwed down and adjusted by the graduated face to control any specific pressure on the valve F, which only slightly covers the apertures *d' d*.

As long as the pressure on the boiler, and consequently in the cylinder A A', does not exceed that at which the spring is set to control, the safety-valve is held down, and does not blow off any steam; but when the steam in the boiler exceeds this pressure, it, entering the hollow shaft D through the apertures *d d*, forces up the valve F and escapes into the air through the apertures *d' d'*, so that the pressure on the head B cannot exceed that at which the spring is set to control, while the pressure on the head B' increases in the same ratio as that in the boiler, the effect of which will be to lessen the holding-down power of the steam on the head B by as much as the

pressure of the steam on A is greater than on A', and consequently allow the safety-valve to blow off much sooner and faster than usual, and thus preserve a more uniform pressure in the boiler. For example, if the lifting-power of the safety-valve on the end of its lever attached to the end of the rod D be twenty-five pounds when the pressure on the boiler is fifty pounds on the square inch, and if the area of the head B, on which the steam exerts pressure, be two square inches, the area of the head B', on which the steam acts, must be one and a half inches. Now, the total effective pressure at fifty pounds to the square inch on the head B will be one hundred pounds, while that on B' will be seventy-five pounds, but when the steam gets up to a pressure of fifty-one pounds on the square inch in the boiler that in the cylinder A blows off through *d' d'*, and cannot exceed one hundred pounds, while that in A' becomes seventy-six and a half, and consequently lessens the holding-down power of B by one and a half pounds, or from twenty-five pounds to twenty-three and a half, and thus the safety-valve blows

off with increasing rapidity as the pressure in the boiler gets up.

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

1. In combination with a cylinder formed in two parts, A A', of different diameters, the piston-heads B B', when so arranged that the effective area of the head B on that side next the steam-port *a*, exceeds the effective area of the head B' on the side next the port *a'* by as much as the area of the safety-valve divided by the number of times by which the length of the long arm of the safety-valve lever exceeds that of the short arm.

2. The combination of the valve F, spring E, and adjustable nut or collar G, with the hollow-graduated shaft D and apertures *d*, the whole being arranged and employed substantially as and for the purpose set forth.

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Witnesses:

CHARLES D. SMITH,
EDWARD H. KNIGHT.