R. C. SERMON.

BLOW-OFF VALVE.

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1,133,188.

Patented Mar. 23, 1915.

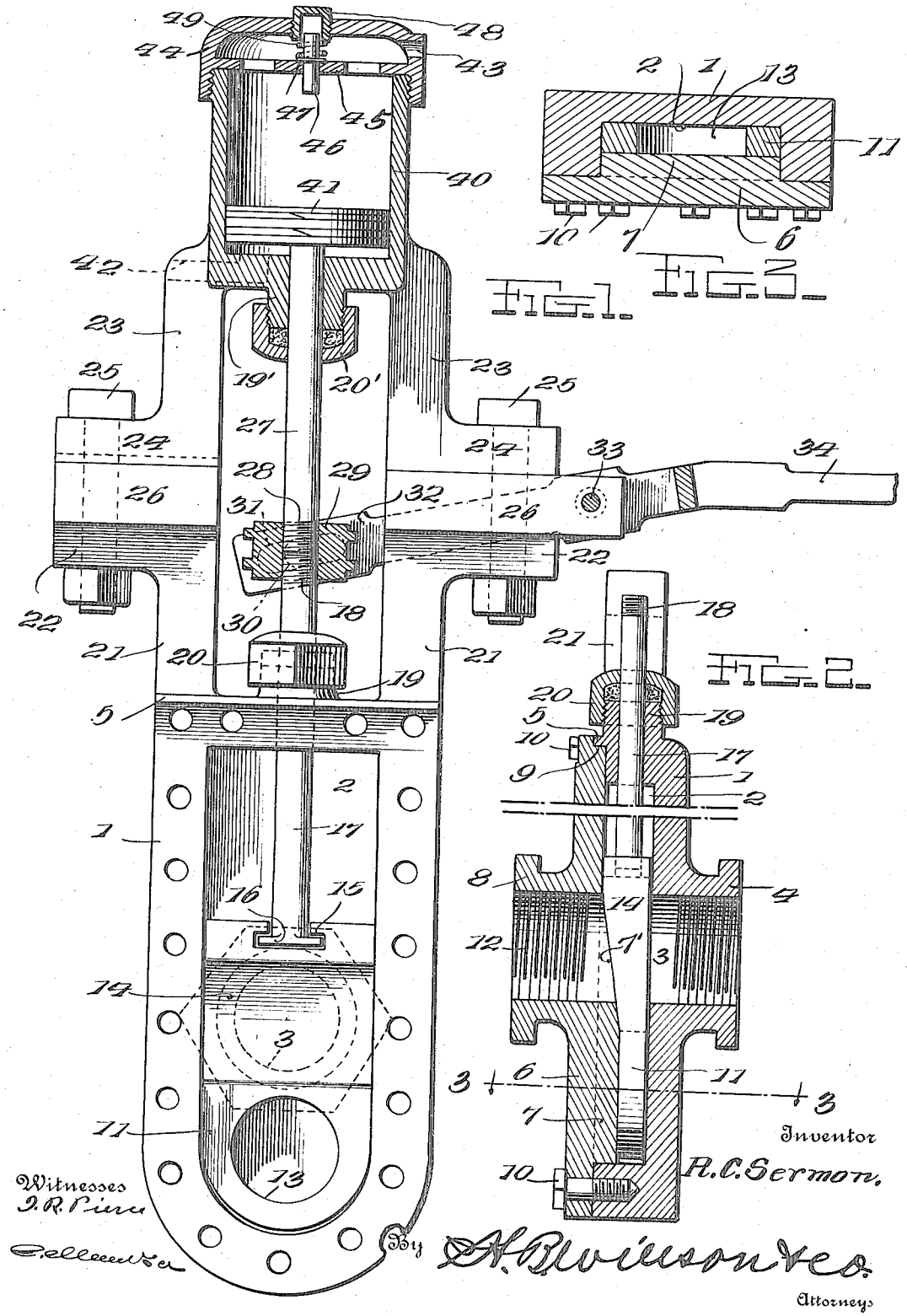


FIG. 1.

FIG. 3.

FIG. 2.

UNITED STATES PATENT OFFICE.

ROBERT CREXFORD SERMON, OF WEST DULUTH, MINNESOTA.

BLOW-OFF VALVE.

1,133,188. Specification of Letters Patent. Patented Mar. 23, 1915.

Application filed October 23, 1913. Serial No. 796,891.

To all whom it may concern:

Be it known that I, ROBERT CREXFORD SERMON, a citizen of the United States, residing at West Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Blow-Off Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to steam engine valves, and more especially to those which slide; and the object of the same is to produce an improved blow-off valve adapted particularly for use on locomotives.

It is well known that sediment and scale accumulate in steam engine boilers to such an extent that they must often be blown off, and on locomotive boilers where the train is passing through a territory in which the water is of alkali nature, the blowing off of the boiler is resorted to in order to relieve it of the foaming which often takes place to a serious extent.

Another feature of the invention is the provision of a peculiar form of gate and gate seat so that sediment will not enter the latter and prevent the closing of the gate.

With these general objects in view my invention consists in the details of construction hereinafter more fully described and claimed, and as shown in the drawings wherein—

Figure 1 is an end elevation of this improved valve with the face plate removed, and a vertical section of the mechanism for actuating it. Fig. 2 is a transverse vertical section of the valve alone, with its parts assembled, and Fig. 3 is a horizontal section on the line 3—3 of Fig. 2.

In the drawing the numeral 1 designates what might be called the rear plate of the valve casing, which plate is channeled as at 2 in its face for the gate seat, pierced with a transverse opening or bore 3 at about the center of the length of said channel, and provided with an integral nipple 4 opposite said opening and with which nipple connection is to be made with the interior of the boiler in a manner not necessary to illustrate, and on the face of this plate above the seat it has a cross rib 5. A front plate 6 overlies the opening of the rear plate, is shouldered at its upper end as at 9 to engage said cross rib 5, and has on its inner face an inwardly projecting upright block-like member 7 which is of equal width with the channel 2, the lower end of the member being sufficiently thick to fill about one half the thickness of the channel and complete the seat as seen in Fig. 2 and provide sufficient room for the valve gate to be described. The upper end 7′ of the member 7 is inclined or beveled as shown. This plate 6 is provided with an opening or bore 12 through it and through the inclined or beveled portion of the member 7, and the opening is surrounded by a nipple 8 on the outer side of the plate. Screws 10 secure the two plates together, and when these are removed the front plate comes off and access to the interior is permitted. Within the gate seat formed between the plates 1 and 6 moves the gate 11 having near one end an opening 13 adapted to register with the openings 3 and 12 when the gate is raised. Above said opening 13 the body of the gate is thicker as at 14, its outer face inclining from its upper end toward the mid-length of the gate at a point above the lower half thereof in which the opening 13 is located, so that in effect the upper half of the gate is wedge-shaped; one face thereof being straight and the other inclined and the inner face of the block 7 is shaped to correspond as shown at 7′ forming in connection with the opposed face of channel 2 a tapered seat. When the gate is closed as seen in Fig. 2 its wedge-shaped portion fits tightly in the tapered portion of the seat and its lower portion which is of uniform thickness rests in the lower parallel walled end of the seat where it is impossible for any sediment to get into the same. When the gate is raised the thinner lower portion thereof having the opening 13 comes opposite the tapering portion of the seat between the two nipples and the water flows through the three registering openings, but yet the lower end of the gate closes the upper end of the lower portion of the seat and renders it impossible for any particles to get into said lower portion of the seat so that they would prevent the gate from being again moved down to closed position. In the upper edge of the gate is a T-shaped recess 15 with which is loosely connected a head 16 carried on the lower end of the valve stem 17, the latter rising through the

upper portion of the rear plate 1 as shown and being threaded at its upper extremity as at 18.

Above the valve proper, the plate 1 has a nipple 19 receiving a gland nut 20 so as to prevent leakage around the stem, and the plate itself is split into two arms 21 having laterally extending projections 22 thereon. In like manner the casing of an air cylinder (described below) is split at its lower end into two arms 23 having lateral projections 24 at the lower ends which overlie the projections 22, and said pairs of projections are connected by bolts 25 which preferably pass through spacing blocks 26 to hold said projections a suitable distance apart as shown. The threaded upper end 18 of the valve stem 17 projects into the space between these arms, and the threaded lower end 28 of a piston rod 27 projects downward into said space as shown. A nut 29 connects said threaded ends and is provided with oppositely projecting pins 30, and the latter are loosely engaged in slots 31 in the arms 32 of a forked lever which may well be pivoted at 33 in one of the spacing blocks 26, its handle 34 projecting to one side of the device so that by depressing the same the gate may be raised. The nut serves an additional purpose, which is that when the stem is turned in the proper direction and the rod 27 remains stationary, their threaded ends are adjusted relatively to each other as may be desired. The arms 23 converge at their upper ends and are provided with a nipple 19′ with a gland nut 20′ to prevent leakage around the rod 27, the same as the parts above described with respect to the stem 17.

For mechanically actuating the blow-off valve I make use of an air cylinder 40 mounted on or formed integral with the upper ends of the arms 23, and a piston 41 therein connected with the upper end of the rod 27, the cylinder having ports 42 and 43 by means of which air may be admitted below or above said piston to cause the latter to rise or to descend, according as it is desired to open or close the gate. The connection between these ports and the air brake system is not shown in the drawings and need not be described herein. As a wedge-shaped gate will doubtless adhere to some extent within its seat, it is quite possible that when air is admitted through the port 42 below the piston 41, the latter when it rises will move quickly. Therefore I have provided a cushion in the upper end of the cylinder, which end is closed by a cap 44 removably secured to the cylinder body in any suitable way so that access to its interior may be had. Said cap has a bridge 45 across it, pierced with an upright hole through which moves a plunger 46 having a shoulder 47 above the bridge, and the upper end of the plunger moves in a cup-shaped plug 48 screwed into the top of the cap. A coiled expansive spring 49 surrounds the upper end of the plunger between the plug and the shoulder, and holds the plunger normally downward. When now the piston 41 rises, it strikes the lower end of said plunger and drives the latter up into the cup within the plug, compressing the spring in a manner which will be clear; and this device therefore prevents the piston from striking the bridge or the cap too forcibly in case it rises suddenly. Even with a wedge-shaped gate, adapted to close downward into a wedge-shaped seat, its descent thereinto will not be sudden when moved by air, and the provision of a cushion on the lower side of the piston 41 is therefore not necessary.

With the parts constructed as above described, the nipple 4 is connected with the interior of the boiler by a suitable pipe not necessary to illustrate, and the ports 42 and 43 are connected with the air-brake system through suitable valves whereby the air may be switched into the upper or lower end of the cylinder 40 as desired. When now it is desired to blow off the boiler, air is admitted below the piston 41 and the latter rises, its rod 27 moves upward through the gland 20′, and this raises the stem 17 of the valve or gate 11. The latter is therefore lifted out of the lower end of the seat and its opening 13 brought opposite the openings 3 and 12 in the valve-casing, and the water and steam mixed with scale, mud, and sediment, is permitted to blow off from the boiler. In its passage through the three alined openings, no particles can get into the lower end of the seat because the lower end of the gate closes said seat even at this time; and therefore, when the gate is closed by a reversal of the operation and the inlet of air through the port 43, its lower end moves downward into the lower portion of the seat without encountering any obstruction. As the valve closes to its seat its beveled or wedge-shaped portion fits snugly into the corresponding portion of the seat, and prevents leakage. If it is desired to blow off the boiler by hand, an operator standing on the ground may reach the handle 34 and depress it with the same result as above described. If the parts need adjustment, the nut connecting the rod or stem 27 with the stem 17 may be turned on one stem while the other stem turns with it; or in other words one stem and the nut may be held stationary and the other stem rotated. If access to the interior of the valve casing is desired, the screws 10 are removed and the face plate can be taken off, then the valve itself can be disconnected from its stem 17 by reason of the T-shaped recess 15 and the corresponding head 16 on the stem. If the beveled portion of the valve or its seat should become worn, the valve will be adjusted a little lower. The

piston should be supplied with suitable rings to prevent leakage of air. I might say it is possible to move this piston by admitting steam or air, or possibly other fluid, but as air is always present in the air-brake system, its use is convenient.

I do not wish to be limited to the materials, proportions, and exact details of construction of the various parts, as changes therein may be made without sacrificing the advantages set forth.

What is claimed as new is:

In a device of the class described, a casing composed of two plates secured together and having registering bores extending transversely therethrough intermediately of their ends, one of said plates having its inner face recessed on opposite sides of its bore, the other plate having a longitudinally extending block-like projection on its inner face of a width corresponding to the width of the recess in the other plate and of less thickness than the depth of said recess, said projection being received in said recess and extending from one end thereof to the remote side of the bore in said block carrying plate, the upper portion of said projection inclining toward its terminal, the spaced inner faces of the two plates coöperating to form a valve seat, said valve seat comprising a tapered portion through which said bores pass and a parallel walled lower portion, a valve plate slidable in said seat and being wedge-shaped for a portion of its length to fit the tapered portion of said seat when in a closed position, said valve plate having below said wedge-shaped portion an apertured extension of uniform thickness snugly fitting said lower portion of said valve seat, and means for reciprocating said valve plate whereby to move said aperture into and out of registry with said bores, said valve plate being of a length sufficient to prevent its apertured extension from being raised beyond the lower side walls of the registering bores in the casing plates whereby the lower portion of the valve seat is closed by said valve plate at all times.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT CREXFORD SERMON.

Witnesses:
ALFRED S. NELSON,
JAMES A. GRAHAM.