

N. N. BOYDEN.
BLOW-OFF VALVE.
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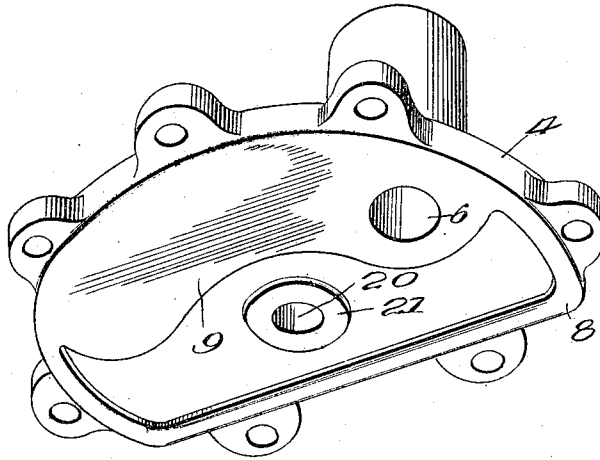
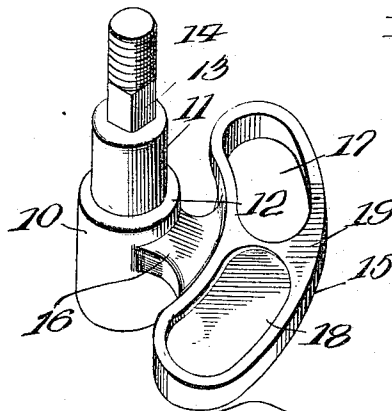
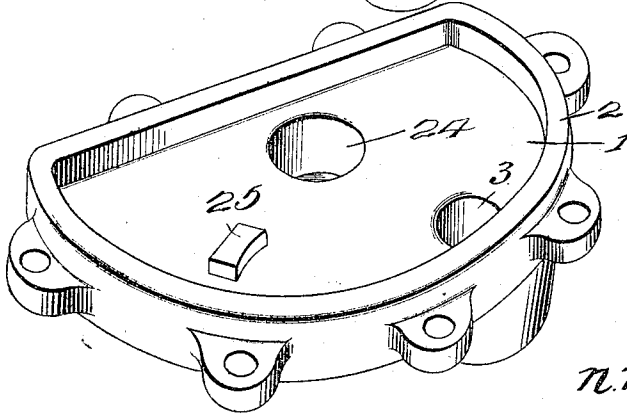


Fig. 4.



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BLOW-OFF VALVE.

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To all whom it may concern:

Be it known that I, NATHANIEL N. BOYDEN, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Blow-Off Valves, of which the following is a specification.

This invention relates to blow off valves for locomotive and stationary boilers and more particularly to that type which require no packing.

It is one aim of the invention to so construct the valve and its seat that these parts will coöperate to prevent leakage when the valve is closed and yet require no packing or means for compensating for wear.

Another aim of the invention is to so construct the valve that the seat thereof will be at all times protected against the accumulation of scale or other solid matter thereon and to so locate and arrange this seat that the same may be readily and conveniently reground whenever found necessary.

Another aim of the invention is to so construct the valve that when the valve proper is in open position the passage through the valve structure will be entirely unobstructed so as to permit the passage of a maximum volume of fluid and yet no accurate adjustment of the valve will be necessary in order to render it certain that it will occupy a full open position when its operating handle is swung in the required direction.

The invention further aims to so construct the valve that access may be had to all parts thereon without the necessity of entirely disconnecting the valve from the boiler and so that that part of the valve structure which carries the seat may be completely removed without disturbing the remainder of the valve in the event it becomes necessary to regrind the seat and the valve proper.

In the accompanying drawings: Figure 1 is a perspective view of the valve embodying the present invention. Fig. 2 is a view in elevation of the valve, the cap plate of the casing being removed and the valve proper being shown in full lines in closed position and in dotted lines in open position. Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2 with the cap plate of the casing in position. Fig. 4 is a group perspective view of the several parts of the valve disassembled.

In the drawings the valve casing is illustrated as comprising an arcuate body 1 which is provided with a flange 2 located substantially at its margin and continuous throughout its length and the said body 1 is provided with an opening 3 into which may be threaded an inlet pipe or the body may be provided with an extension surrounding this opening and exteriorly threaded to fit within a suitable union or connection upon the boiler. The valve casing is closed by a cap plate indicated by the numeral 4 and secured to the valve in any suitable manner as for example by bolts 5 which are fastened through ears formed at corresponding points upon the body 1 of the casing and upon the margin of the said cap plate. The cap plate 4 is provided with an outlet opening 6 which may be interiorly threaded as indicated at 7 for the connection of a discharge pipe, or the opening may communicate directly with the atmosphere. That face of the cap plate 4 which is next adjacent the casing in the assembled relation of the parts is provided with a marginal bearing surface 8 and this surface and the edge of the flange 2 are ground so that when the cap plate is secured to the casing the casing will be closed in a steam and water tight manner and without the necessity of employing a packing of any sort. That face of the cap plate which opposes the interior of the valve casing is formed with a valve seating surface indicated by the numeral 9 and occupying the same plane as the surface 8. The surface 9 extends inwardly from the lower marginal portion of the cap plate and is approximately arcuate in general outline and is so located that the outlet or blow off opening 6 will open at the said surface near one end thereof. This seat is ground to a true surface so that the valve may seat thereagainst in a steam and water tight manner and in a manner to be presently explained.

The numeral 10 indicates the stem of the valve proper and this stem is reduced as at 11 to form a shoulder 12 and is further reduced and squared as indicated at 13 and beyond its portion 13 is threaded as at 14. The valve member comprises a body 15 which is substantially arcuate in general outline and this body is connected at its concave inner side with the valve stem 10 by means of a relatively short neck 16. At one side of its middle the body 15 is formed with an

elongated and substantially crescent shaped or arcuate opening 17 of a width equal to or slightly greater than the diameter of the outlet opening 6 at its inner end and of a length greater than the diameter of the said end of the opening. For a purpose to be presently described, one face of the valve body 15 is formed with a depression 18 of substantially the same general configuration as the opening 17, this recess occupying an area at the other side of the middle of the said valve body. That face of the valve body in which the recess 18 is formed is indicated by the numeral 19 and is ground to a true surface. By reference now to Fig. 3 of the drawings it will be observed that in assembling the valve with the cap plate of the valve casing the portion 11 of the stem of the valve is fitted rotatably in the opening 20 formed in the cap plate so that its shoulder 12 will bear snugly against the annular ground shoulder 21 formed upon the inner face of the cap plate and surrounding the inner end of the opening 20. The ground face of the shoulder 21 is preferably disposed in the same plane with the ground surface 9, as shown. When the valve is thus positioned its surface 19 will rest snugly and in a steam and water tight manner against the said surface 9 of the cap plate and the valve is held thus assembled with the cap plate by being confined between the plate and the inner or bottom wall of the valve casing and also by steam pressure as will be presently made apparent. In other words, when the valve is in closed position, the opposite faces thereof will contact with the inner faces of the casing sections around the inlet and outlet ports, as best shown in Fig. 3 of the drawings. An operating handle 22 is fitted at one end to the portion 13 of the valve stem and a nut 23 is threaded on to the portion 14 of the said stem and bears against the said end of the handle. It will be observed that the neck 16 is connected to the stem 10 near the shoulder 12 and that the stem projects at its other end beyond the said neck and has its projecting end portion seating rotatably in a socket 24 formed in the inner wall of the valve casing 1. By reason of this construction the valve is steadied in its oscillatory movement from open to closed position and vice versa and is caused to more snugly rest against its seat. In order to limit the opening movement of the valve, a lug 25 is formed upon the said inner wall of the valve casing 1 and is adapted to be engaged by that end of the valve body at which the depression 18 is formed when the valve is moved to full open position. The movement of the valve to closed position is limited by the engagement of the other end of the valve body against the flange 2 of the valve casing as will be observed by reference to Fig. 2 of the drawings.

As before stated, the surface 19 of the valve bears snugly against the seating surface 9 of the cap plate 4 and in the open position of the valve substantially the entire area of the surface 9 is covered by the valve and therefore protected. Also, in the open position of the valve the inner end of the outlet opening 6 will be located midway between the ends of the opening 17 as will be observed by reference to Fig. 2 of the drawings and consequently the passage through the valve structure as a whole is not in any way obstructed. In the closed position of the valve that portion of the surface 19 which surrounds the depression 18 will bear snugly against the seating surface 9 and completely surround the said inner end of the discharge opening 6, closing this opening in a steam and water tight manner. In this latter position of the valve the pressure of the steam against the valve body will serve to the more firmly hold the valve against the seating surface 9. Due to the formation of the depression 18 in the face 19 of the valve body the said face of the valve body is adapted to more snugly contact the seating face 9 than would be possible if the depression were not provided. It will be understood by reference to the drawings and from the foregoing description of the invention that when it is desired to regrind the seating surface 9 and the said valve, access may be readily had to these parts by merely removing the cap plate for the valve casing without, however, disturbing the valve casing proper.

It will be understood that when the valve is in full open position that portion of the seating surface 19 which surrounds the opening 17 will rest against the seating surface 9 and protect a certain area of its surface from the action of the steam and prevent the accumulation thereon of scale while the valve is in its said open position and consequently when the valve is moved to closed position that portion of the seating surface 19 which surrounds the depression 18, being of the same outline and dimensions as the first mentioned portion of the area of the said seating surface, will rest against that portion of the area of the seating surface 9 which has been afforded protection in the manner stated, while the valve was open. Therefore, when the valve is in closed position the seating surface 19 will more snugly fit against the surface 9 than would be the case if it were not for the provision of the portion of the valve body in which the opening 17 is formed.

Should it be desired to materially decrease the size of the valve as a whole the extended portion of the valve body in which the opening 17 is formed may be omitted and while, as stated the valve may be in this manner reduced in size, the advantages to be obtained

through the provision of this extension are, of course, sacrificed.

Having thus described the invention, what is claimed as new is:

5 1. A device of the class described comprising assembled casing sections, one of which is provided with an inlet port and the other with an outlet port substantially
10 alined therewith, one wall of one section being formed with a bearing socket and the other section being provided at its inner face with a valve seat surrounding the out-
15 let port and having a smooth continuous seating face, there being a transverse bearing opening formed in the last-mentioned section and spaced from the valve seat, and
20 a valve movable across the face of the valve seat and having its opposite faces contacting with the inner faces of the sections around the inlet and outlet ports when the
25 valve is in closed position, said valve having a stem, one end of which is seated in the socket and the other end thereof extended through the bearing opening for engage-
ment with an operating device, the valve being held against lateral movement with respect to its stem.

2. A device of the class described including assembled casing sections, one of which
30 is provided with an inlet port and the other with an outlet port alined therewith, the first-mentioned section being formed with a seating recess, the wall of which is provided with a bearing socket, the second-
35 mentioned section being provided at its inner face with a valve seat, the said second section being formed with a bearing opening surrounded by an annular shoulder the face of which is disposed in the same plane
40 with the valve seat, a valve comprising a body provided at one face with a projecting stem section rotatably fitted in the bearing socket and provided at its other face with an annular shoulder adapted to bear
45 against the face of the shoulder surrounding the bearing opening and defining a reduced stem section rotatably fitted within said bearing opening, and an operating handle connected with the outer end of the reduced stem section, the valve being held
50 against lateral movement with respect to its stem and designed to constantly contact the seat in both open and closed positions.

3. A device of the class described including mating casing sections having perfor-
55 ated ears adapted to register with each other,

one of said casing sections being provided with a flange defining a seating recess, the wall of which is formed with a bearing socket extending only partially therethrough
60 and having an inlet port communicating with the recess and adapted to register with an outlet port in the mating section, said mating section being provided with a smooth
65 continuous valve seat and having a transverse bearing opening arranged in alignment with the bearing socket, and a valve fitting within the seating recess and hav-
70 ing its opposite faces contacting with the inner faces of the sections around the inlet and outlet ports when the valve is in closed position, said valve being provided with a stem, one end of which is enlarged and fit-
75 ting in the bearing socket and the other end reduced and extended through the bearing opening, there being a shoulder formed on the valve stem at the junction of the enlarged and reduced portions thereof and adapted to bear against the inner face of the adjacent casing section, an operating
80 handle secured to the reduced end of the valve, and fastening devices extending through the perforated ears of the casing sections for holding said sections in assem-
85 bled position, the valve being held against lateral movement with respect to its stem.

4. A device of the class described including a valve casing having registering inlet and outlet ports and provided with a seating recess, one wall of the valve casing be-
90 ing provided with a bearing socket opening into the seating recess, there being a bearing opening formed in the valve casing and registering with the bearing socket, a valve operating within the seating recess for con-
95 trolling the passage of fluid through the casing and having its opposite faces contacting with the inner walls of the casing around the inlet and outlet ports when the valve is in closed position, said valve being
100 provided with a stem one end of which is fitted in the bearing socket, the other end of the stem being provided with a shoulder bearing against the inner wall of the cas-
105 ing, the stem beyond said shoulder being extended through the bearing opening, and means connected with the extended end of the valve stem for operating the valve.

In testimony whereof, I affix my signature.

NATHANIEL N. BOYDEN. [L. s.]