

UNITED STATES PATENT OFFICE.

RALPH W. CADMAN, OF EDGEWOOD, PENNSYLVANIA.

BLOW-OFF VALVE.

1,298,173.

Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed July 5, 1916. Serial No. 107,526.

To all whom it may concern:

Be it known that I, RALPH W. CADMAN, a citizen of the United States, and resident of Edgewood, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Blow-Off Valves, of which the following is a specification.

This invention relates to a blow-off valve of the general type shown in patent to Alexander W. Cadman, No. 662,249, November 20, 1900, and one object is to improve and simplify that portion of the structure relating to the reversible valve proper and the seat with which it coöperates. A further object is to provide an efficient connection between the valve base and the casing body within which the valve operates, the arrangement being such as to completely pocket the removable valve seat and preclude the blowing out of gaskets under the high pressures and excessive temperatures to which blow-off valves are subjected. The invention also includes the provision of through bolts for securing together the valve base and arch-carrying head with the valve body in position therebetween.

Still a further purpose of the invention is to so arrange the valve inlet that the high velocity current of steam and condensate flowing therethrough when the valve is open will be caused to swirl or eddy within the casing and before passing the valve and outwardly through the seat, whereby scale and other accretions blown from the boiler are so deflected as not to strike the valve and seat in such manner as to cut or pit them, the action of the current being somewhat similar to a whirlpool or waterspout with the discharging solids passing out approximately through the center of the outlet.

In the accompanying drawings, Figure 1 is a vertical section of a blow-off valve embodying the several features of the present invention. Fig. 2 is a sectional view taken on lines 2—2 of Fig. 1. Fig. 3 is a sectional plan on line 3—3 of Fig. 1. Fig. 4 is a detail view of the valve disk, and Fig. 5 is a detail of the valve seat.

Referring to the drawings, 2 designates the hollow base of the valve casing that may be connected by coupling flange 2' or other suitable means with the part into which the valve discharges. The inner or upper end of the cavity of base 2 is enlarged to form the

annular seat 3 which is encircled by the flange-like extremity 4 of the base. Entered in this enlargement is the reversible valve seat 5, the opposite faces 6 thereof being of like curved or dished bevel formation, clearly shown in Fig. 5. The continuous flange 7 at the exterior of the seat is disposed centrally between faces 6 and is adapted to fit within seat 3, and as the thickness of the flange is less than the depth of the seat, base flange 4 extends above or beyond flange 7, with the extremity of casing body 8 entered within flange 4 and against seat flange 7 for holding the valve seat 5 in place. The connection between the casing body and the base is thus pocketed within flange 4, and it is quite impossible for the packing gaskets 9 at opposite faces of seat flange 7 to blow out under the high pressure and excessive temperature of the steam and condensate passing through the valve.

Fitting the upper end of the body 8 of the casing is head 10, the latter being countersunk at 10' to receive the casing extremity as shown. Carried by head 10 is arch 11 and operative therethrough is the threaded valve stem 12 which extends through gland 13. The latter may be adjustably confined by bolts 14 having their heads 14' confined in sockets in lugs 11' of arch 11.

At the inner end of stem 12 is the valve head 15 to which the headed extremity of the stem is secured by nut 16. The face of head 15 disposed toward the valve seat is recessed at 17, the recess being of such size and shape as to confine or pocket approximately one-half of the valve disk 18. The disk is formed with a central passage to fit over a stud 19, one end of the stud being threaded to enter a similarly threaded aperture in head 15, and the opposite end threaded in like manner to receive the disk clamping nut 19'.

The opposite faces of disk 18 are each formed with the dished or rounded bevel 20 complementary with the formation 6 of valve seat 5, so that with either face of the disk disposed outwardly the disk accurately fits the seat. Cavity 17 in extremity of head 15 has the exact contour of approximately one-half of disk 18 so that the latter snugly fits therein when clamped in place by nut 19'. From the foregoing it will be seen that the valve disk may be reversed whenever desired without removing head 15 from the

valve stem. Seat 5 may be reversed by simply separating the valve casing parts.

The parts of the casing are clamped together by the through bolts 21 which extend through apertures in base flange 4 and head 10, the bolts being somewhat longer than casing body 8 in order that the parts may be united as described.

The valve inlet is at one side of body 8, being disposed approximately at right angles to the valve axis. When the valve is open the steam and condensate discharge at high velocity and the tendency of the scale and other hard accretions blown from the boiler is to cut the valve and the seat. To forestall this, the valve inlet 22, which may be connected to the boiler outlet by flange 22' or in any other suitable manner, has its inner portion deflected or flattened at 23, and the surface thus formed serves to baffle the entering stream and deflect it in such manner as to cause it to swirl within the latter with a whirlpool effect and cause the scale, etc., to pass out through the valve seat in a circular course and in such manner as not to injuriously impinge either the latter or the valve disk.

I claim:—

1. In a blow-off valve, the combination of a base having a through passage, the passage enlarged at one end and having a smooth bore to freely receive a valve seat and also the extremity of a valve casing, a valve seat fitting the passage enlargement, a valve casing having its extremity entered in the enlargement and confining the seat therein, said seat extending beyond the face of the casing extremity, means securing together the casing and the base with the valve seat and the casing extremity pocketed in the passage enlargement, and a valve operative within the casing and cooperating with the seat.

2. In a blow-off valve, the combination of a base having a through passage, the passage enlarged at one end with the enlargement having a smooth bore, a valve seat entered in the passage and having a continuous outwardly projecting flange fitting within and of less depth than the passage enlargement to provide space within the enlargement for the extremity of a casing, a valve casing having its extremity fitting within the enlargement and against the valve seat flange, said seat overlapping the opposing faces of the casing extremity and base, means securing together the casing and base, and a valve within the casing and adapted to cooperate with said seat.

3. In a blow-off valve, the combination with a valve casing and a seat therein, of a valve actuating stem, a head secured to the stem within the casing bore and extending toward the seat and with the face of the head recessed, and a reversible disk removably secured to the head with one or the other of

its faces fitting the head recess and the remaining face projecting toward and adapted to cooperate with the valve seat, said casing having its inlet intermediate the ends of the casing bore and spaced from the seat a distance sufficient to locate the disk entirely beyond the inlet when the valve is seated, whereby said disk will be held against lateral expansion under seating pressure.

4. In a blow-off valve, the combination with a valve casing and a seat therein having a beveled face, of a valve stem operative in the casing, a head secured to the stem and having a beveled recess, and a reversible disk having its opposite faces beveled complementary with the seat and adapted to fit the same interchangeably, the disk faces each shaped complementary with and adapted to fit interchangeably within the head depression, said casing having its inlet intermediate the ends of the casing bore and spaced from the seat a distance sufficient to locate the disk entirely beyond the inlet when the valve is seated, whereby said disk will be held against lateral expansion under seating pressure.

5. In a blow-off valve, the combination with a valve casing and a seat therein, of a valve stem operative within the casing, a recessed head secured to and projecting from the stem and formed with a central threaded aperture, a stud having its opposite ends threaded with one of the threaded ends entered in said aperture, a valve disk adapted to fit the head recess with an opening through the disk to pass and be axially supported by the stud, said stud projecting beyond the disk, and a disk-retaining element threaded to the projecting end of the stud, whereby said disk may be removed without affecting the connection between the stud and head.

6. In a blow-off valve, the combination of a base, an arch-carrying head, a casing body fitting between and separating the base and head, said body having its opposite extremities pocketed within the base and head, the body-receiving pockets of the arch and base having smooth bores to freely receive the body, a valve operative within the casing a valve operating stem adjustable in the head arch, and clamping bolts longer than the casing body with the ends of the bolts secured to the base and head.

7. In a blow-off valve, the combination of a valve casing having an inlet and an outlet, a valve operative within the casing, a valve seat, the casing inlet being deflected relatively to the axis of the casing for causing the entering current to swirl within the casing before emerging through the outlet, said seat having such a configuration and being so positioned relative to the casing bore as to prevent collection of sediment within the casing in advance of the outlet.

8. In a blow-off valve, the combination of a valve casing having an outlet concentric

5 with the casing axis, the casing having an inlet disposed at right angles to the outlet and deflected laterally relatively to the axis of the casing for causing the entering current to swirl within the casing before emerging through the outlet, a valve seat, and a valve operative within the casing, said seat having such a configuration and being so positioned relative to the casing bore as to

prevent collection of sediment within the casing in advance of the outlet. 10

In testimony whereof I affix my signature in presence of two witnesses.

RALPH W. CADMAN.

Witnesses:

J. M. NESBIT,
ALEX. S. MALON.