C. A. DUNHAM.

STEAM TRAP.

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1,035,557.

Patented Aug. 13, 1912.

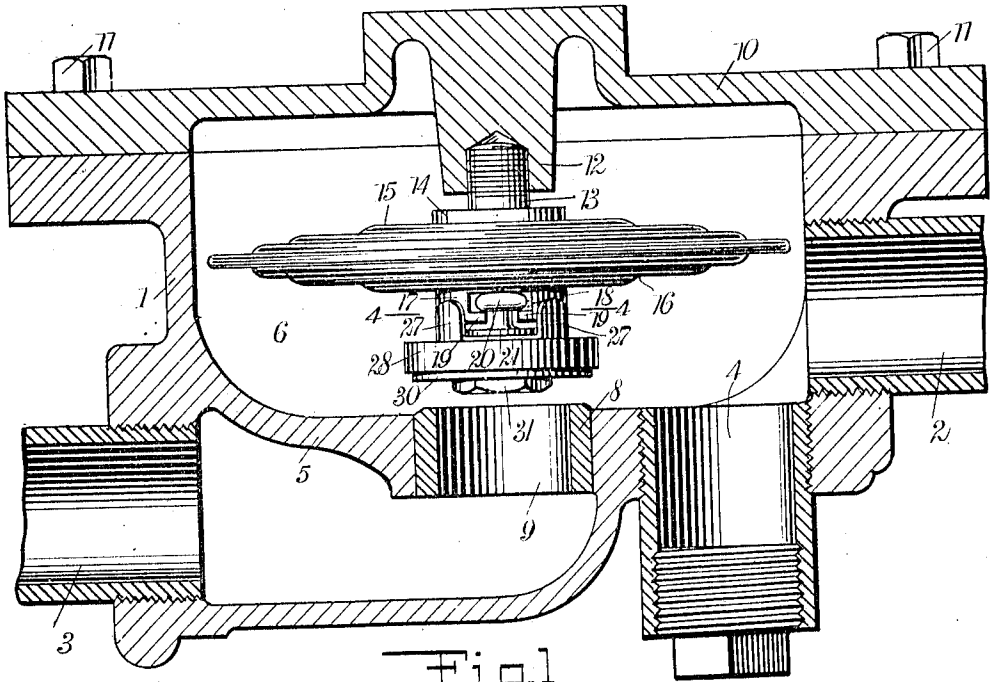

Fig. 1

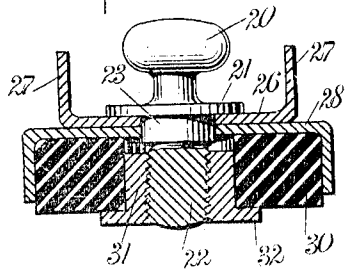

Fig. 2

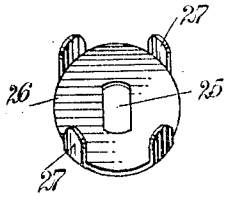

Fig. 5

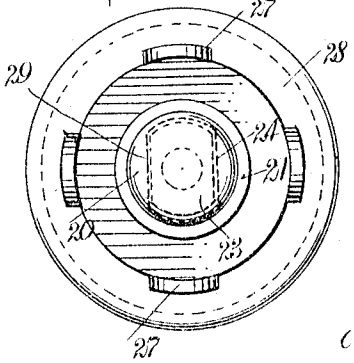

Fig. 3

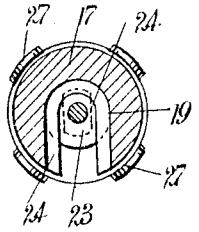

Fig. 4

WITNESSES

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STEAM-TRAP.

1,035,557. Specification of Letters Patent. Patented Aug. 13, 1912.

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To all whom it may concern:

Be it known that I, CLAYTON AUBRA DUNHAM, a citizen of the United States, and a resident of Marshalltown, in the county of Marshall and State of Iowa, have invented a new and Improved Steam-Trap, of which the following is a full, clear, and exact description.

This invention relates to improvements in steam traps generally, and although adapted to be used in steam traps, drain valves and thermostatic regulators of various kinds, it is especially designed for a blast trap used in heating systems wherein a large quantity of air is forced over steam coils, thereby making an excessive amount of condensation and giving off water at a very high temperature, and the primary objects of the invention are to provide suitable means for carrying away the accumulated air and water of condensation from the heating system, and to that end to provide a thermostatic trap with a full, unobstructed valve opening for the passage of air and the water of condensation, and a valve having a large, flat bearing surface, with means for adjusting itself to any irregularities existing between the expansive parts of the valve and the valve seat and yet retain its position centrally over the valve seat, and to provide in connection therewith means for enabling the valve to be quickly and easily removed and repaired. These and other objects of the invention hereinafter stated in connection with the individual parts are accomplished by the means illustrated in the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views, and in which—

Figure 1 is a vertical, transverse section of a valve casing with pipe connections, and a side elevation of a thermostatic disk and valve connected therewith; Fig. 2 is a vertical transverse section of the valve removed from the thermostatic disk, having a valve stud, shown partly in front elevation; Fig. 3 is a plan of the valve removed from the thermostatic disk; Fig. 4 is a horizontal section, taken on the line 4—4 of Fig. 1, and Fig. 5 is a perspective view of a retaining plate forming part of the valve proper.

As illustrated in the drawings, 1 represents a valve casing having an inlet pipe 2 and an outlet pipe 3 connected therewith. The casing is also provided with a plug opening or pipe 4, for removing sediment and scale from the interior of the casing.

The casing 1 is provided with a bridge 5, separating the casing into an upper or receiving chamber 6 and a lower or discharge chamber 7. The bridge 5 is provided with a valve seat 8 which, in its preferred form, is mounted upon or formed integrally with the bridge 5. This valve seat preferably consists of an annular ring having a full, unobstructed opening or discharge orifice 9, making a passageway between the upper chamber 6 and lower chamber 7. A cap 10 is attached to the upper portion of the casing by means of bolts 11, and forms a closure for the upper portion of the valve casing. The inner side of the cap 10 is provided with a boss 12, having a thread engaging a threaded stud 13. This stud is provided with a flange 14, which is soldered or otherwise secured to a thermostatic disk, formed of two annular sheets of thin metal 15 and 16, joined together at their outer edges and holding interiorly a volatile liquid. The sheets 15 and 16 are provided with concentric corrugations, to facilitate the expansion and contraction of the disk when subjected to the varying temperatures of steam and the water of condensation. The lower central portion of the thermostatic disk is provided with a hub 17, having a groove 18 extending partway across the hub, and with ledges 19, adapted to receive and hold the head or knob 20 of a valve stud or coupling to which the remaining portions of the valve proper are attached. The valve stud is also provided with a flange or shoulder 21 and with a threaded shank 22. The flange 21 of the valve stud or coupling is provided with an offset 23, forming substantially parallel shoulders 24, adapted to engage a slot 25 formed in a retaining plate 26, said slot being preferably slightly longer than the offset 23 of the valve stud or coupling, so that the retaining plate may be set or adjusted on or with the valve stud or coupling. The retaining plate 26 is provided with ears or projections 27 which, when in place, extend upward and opposite to the side wall of the hub 17 on the lower portion of the thermostatic disk. The ears 27 are slightly wider apart than the diameter of the hub 17, so as to allow a limited adjustment of the retaining plate 26 relatively to the hub 17. The knob 20 of the valve stud or coupling is pref-

erably rounded on its upper end, so as to permit a limited rocking movement of said knob within the groove of the hub 17, and thereby enable the bearing portion of the valve attached to said stud to adjust itself to any inequality in the surface of the valve seat. A cup 28 is also attached to the valve stud and is provided with a slot 29, longer than the offset 23 of the valve stud or coupling, by means of which said cup may be adjusted relatively to the valve stud. The cup 28 holds a bearing ring 30, preferably composed of vulcanized rubber. The retaining cup 28, the bearing ring 30 and the retaining plate 26 are held in position by means of a threaded nut 31, preferably provided with a flange 32, adapted to overlap the bearing ring 30 to a limited extent.

When the device is in use, steam at a high temperature enters the interior of the valve casing through the inlet pipe 2, and, by coming in contact with the thermostatic disk, causes the volatile liquid therein to expand, and at the same time expanding said thermostatic disk. The bearing ring 30 of the valve proper is so positioned relatively to the valve seat that when the thermostatic disk becomes heated and expands, the bearing ring 30 bears against the valve seat and closes the valve opening 9, so as to prevent further passage of steam through the trap. The parts remain in such position until the water of condensation accumulates in the return pipe of the system and enters the upper chamber 6 of the trap. The temperature of the water being lower than that of the steam, causes the thermostatic disk to contract, and by said contraction of the disk the valve is raised from its seat into the position indicated in Fig. 1 of the drawings. The water of condensation and the accumulated air within the trap and the return pipe are then free to pass through the opening 9 into the discharge chamber 7 and out through the discharge pipe 3. The opening 9 being full in area and free from any obstruction, such as a valve stem, enables the water of condensation and air to pass freely and quickly out through the trap. The steam then enters the interior of the trap through the inlet pipe 2, and, coming in contact with the thermostatic disk, again expands the disk and brings the valve down on its seat and prevents any unnecessary discharge and waste of steam through the trap.

In assembling the parts composing the valve, the head or knob 20 of the valve stud or coupling is first inserted in the groove 18 of the hub 17. The retaining plate 26 is then mounted on said stud or coupling, the cup 28 attached to said stud, and the nut 31 applied to the threaded end of said stud, so as to hold said parts together.

In the construction shown and described, the expansion disk and valve connected therewith are adjustable toward or from the valve seat by means of the threaded connection between the stud 13 of the disk and the boss 12 of the cap of the casing, the valve is adjustable bodily to a limited extent transversally of the expansion disk by means of the head 20 of the valve stud engaging the groove 18 of the hub of the expansion disk, and the retaining plate 26 is adjustable transversally of said valve stud so as to properly arrange the valve stud in said groove. In addition to such adjustments, the valve itself comprising a cup 28 holding the bearing ring 30, is adjustable laterally on said stud, so that all of said parts although attached to a detachable cover of the trap, may be readily adjusted relatively to the valve seat and opening, while the valve itself has a limited rocking movement by virtue of its loose jointed connection with the hub 17 of the expansion disk so as to insure an even bearing for the valve on its seat, and permit the bearing surface 30 of the valve to adjust itself to any inequality there may be in the valve seat. By means of such construction, moreover, a valve is provided which is simple in construction, effective in operation, and durable in use, and adapted to enable all of the parts thereof to be readily removed and cleaned or repaired.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A steam trap comprising a casing provided with a bridge forming inlet and outlet chambers, a cap detachably secured to said casing, an expansion disk detachably mounted on said cap and provided with a hub having a slot and oppositely-disposed ledges, a valve having a stud provided with a rounded head adapted to have a limited rocking movement within said slot, on said ledges, a retaining plate provided with projections extending opposite the outer wall of said hub and spaced slightly therefrom, a cup mounted on said stud, a bearing ring arranged within said cup, and means for binding said stud, retaining plate and cup together.

2. A steam trap comprising a casing having a bridge forming inlet and outlet chambers, a cap detachably secured to said casing and provided with a boss extending into the inlet chamber, an expansion disk arranged within the inlet chamber detachably secured to the boss of said cap and provided with a slotted hub, a valve having a stud provided with a rounded head freely engaging the slot of said hub and a flange having an offset, a retaining plate having a slot slightly longer than the offset of said stud and provided with projections extending opposite the side wall of said hub, a cup having a slot slightly longer than the offset of said

stud, a bearing ring held in said cup, and means for binding said stud, retaining plate and cup together.

3. In a steam trap the combination with a casing having an interior valve opening and seat, a cap detachably secured to said casing and provided with an interior boss, an expansion disk adjustably mounted on said boss, a valve stud having a limited rocking movement on said disk and a limited adjustment transversally thereof, and a valve mounted on said stud and adjustable laterally thereon.

4. In a steam trap having a suitable casing, an expansion disk having a hub provided with a slot and oppositely disposed ledges extending partway through said hub, a valve having a stud provided with a head adapted to have a limited rocking movement within said slot, a retaining plate mounted on said stud adjustable transversely of said stud and provided with projections extending opposite the outer wall of the hub of said disk, a cup mounted on said stud and adjustable transversely of said stud, a bearing ring arranged within said cup, and means for binding said stud retaining plate and cup together.

5. A steam trap comprising a casing, a cap provided on its inner side with a stud, an expansion disk having a threaded engagement with said stud, and provided with a hub having a slot and oppositely disposed ledges extending partway across said hub, a valve provided with a stud having a loose jointed connection with said hub, a retaining plate mounted upon and adjustable transversely of said stud and provided with projections extending opposite the lateral wall of said hub, a cup mounted on said stud and adjustable transversely of said stud independently of said retaining plate, a bearing surface separable from and mounted in said cup, and means for binding said stud retaining plate and cup together.

6. A steam trap having a suitable casing provided with a valve opening and seat, a cap detachably secured to said casing and provided with an interior boss, an expansion disk adjustably secured to said boss, a valve stud connected with said disk and having a limited adjustment transversally thereof, means for limiting the transverse adjustment of said stud relatively to said disk, and a valve mounted on said stud and adjustable laterally thereon.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLAYTON AUBRA DUNHAM.

Witnesses:
A. RAY WELKER,
D. R. SALISBURY.