

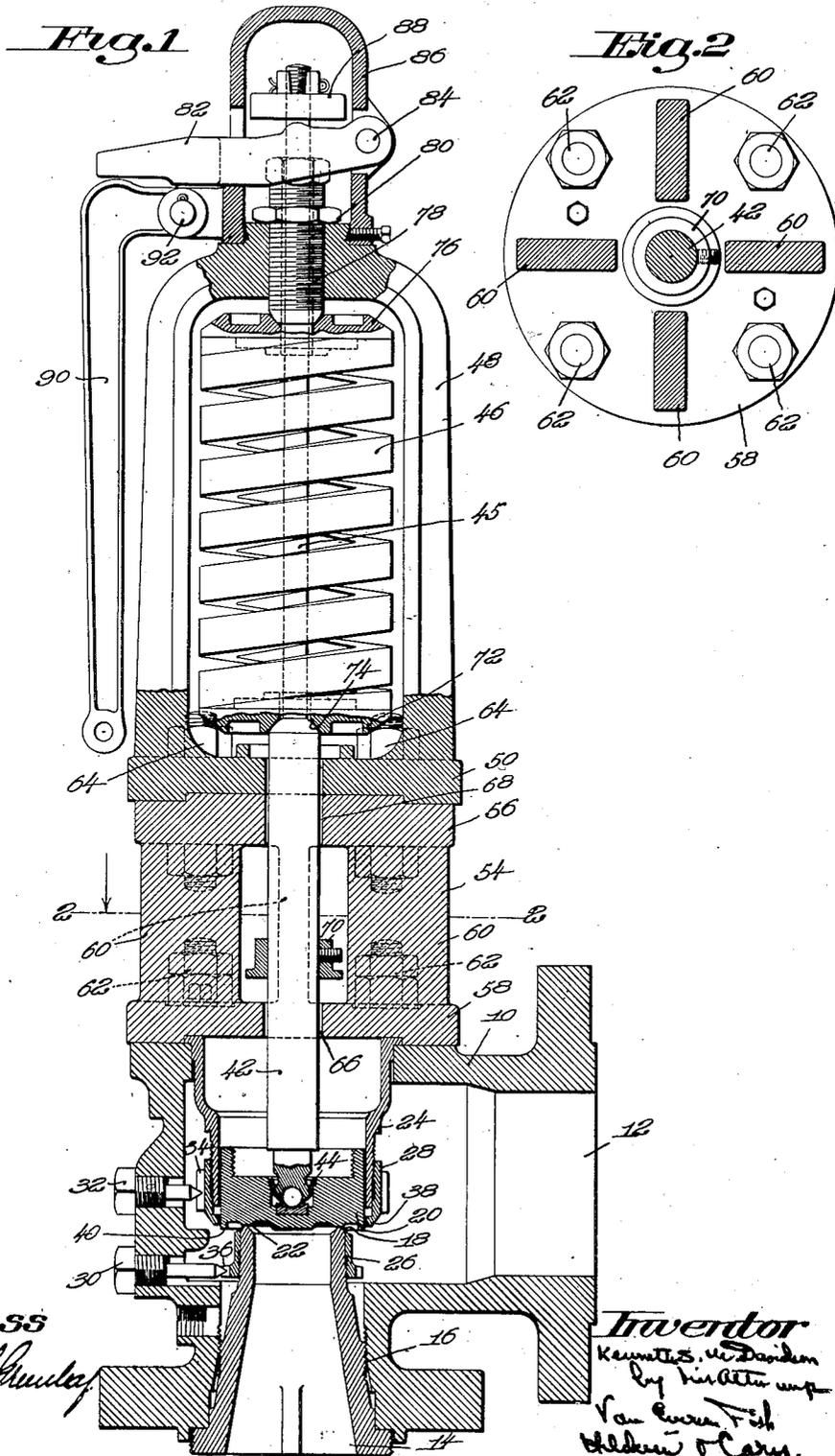
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STEAM VALVE

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Witness

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STEAM VALVE

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5 Claims. (Cl. 137—53)

The present invention relates to safety valves more particularly employed for the relief of high-pressure steam lines.

In valves of this character adapted to relieve steam pressures on the order of 700 to 1200 pounds per square inch, it is important that the valve on opening shall have a comparatively large capacity for escaping steam and shall be capable of continued operation with relatively slight variation in operating characteristics. I have found that in valves of this type as previously constructed, continued operation with the high temperatures at present employed tends to alter the pressure at which the valve opens, in certain cases a reduction of six to eight per cent. in popping pressure having occurred.

I have discovered that this undesirable variation in popping or opening pressure of the valve can be avoided by removing the valve loading spring from the immediate vicinity of the escaping high temperature steam, and suitably preventing undue elevation of temperature of the spring through conduction of heat thereto. To this end I have elevated the loading spring well above and removed from the discharge port of the valve, and have provided for radiation of heat away from the spring and minimized the conduction of heat thereto.

Still further features of my invention consist in novel features of construction, combinations and arrangements of parts, hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art from the following description.

In the accompanying drawing illustrating the preferred form of the invention,

Fig. 1 represents a sectional elevation of the valve embodying the improved features of my invention; and

Fig. 2 is a section upon the line 2—2 of Fig. 1.

In the valve shown in the illustrated embodiment of the invention, a body 10 of cast steel is provided with an outlet nozzle portion 12, and a separable throat tube 14 formed as a steel forging. The throat tube, as indicated, is integral throughout its entire length, and is threaded to the cast steel body at 16. The upper edge or face of the throat tube 18 forms the valve seat, and for this purpose cooperates with a forged disk valve 20 having a raised rib or annulus 22 aligned with the seat. The disk normally moves within a guide sleeve or tube 24 mounted within the upper portion of the body 10. Control of relieving and blow-down pressures is accomplished by the adjustable seat ring 26 and shroud ring 28, which

are respectively threaded on the throat tube 14 and guide tube 24. Adjustment of the seat and shroud rings is maintained by virtue of threaded members 30 and 32 having inner ends which engage slots 34 and 36 in the rings. As will be indicated, the shroud ring has an inwardly projecting lower portion 38 which serves to bring the active deflecting portion of the ring into close proximity to the valve disk. In addition, the valve disk 20 is provided with a deflecting lip 40 at its outer periphery. The disk is supported from the lower end of a valve stem 42 through the swivel connection indicated at 44. The main portion of the stem 42 is surmounted by a reduced and elongated stem 45 which extends upwardly within a loading spring 46 mounted within an open yoke or frame 48. The spring yoke is provided with an integral base portion 50, and is connected to the body 10 through an intermediate spool frame 54. The spool frame comprises upper and lower head portions 56 and 58 connected by vertical radial fins 60. The lower head portion is secured by bolts 62 to the top flange of the body, and the upper head portion is bolted to the skeleton bonnet by securing bolts 64. The stem, as indicated, extends upwardly through an opening 66 in the lower head 58 amply large to provide clearance for the stem, and through aligned openings 68 formed in the heads 50 and 56 to prevent an undue volume of steam from passing into the region immediately surrounding the spring. To further prevent passage of steam upwardly around the stem, a deflector 70 is connected to the stem within the spool and above the stem opening 66 to deflect steam leaking through the openings upwardly between the radial fins 60. Heat conducted to the spool frame 54 from the body 10 of the valve is to a considerable extent radiated from the fins 60 through which air can circulate freely. Heat conducted along the stem 42 is also radiated from the stem by circulation of air thereabout in the open region of the cooling spool through which the stem passes. By virtue of this construction, the temperature of the loading spring 46 is not altered sufficiently to vary the operating characteristics of the spring. The construction of the cooling spool makes it feasible and possible to modify existing valves of this general type by removing the spring frame from the body, lengthening the stem, and interposing the cooling spool between the spring frame and body.

The thrust of the loading spring 46 at the lower end is resisted by a head 72 which rests upon the shoulder 74 formed on the upper end of the stem 42. The upper end of the spring is engaged

by an adjustable abutment 76, the position of which is varied to control the loading pressure of the spring by a sleeve 78 threaded within the head of the spring yoke 48 and retained in position by a lock nut 80. The valve disk may be manually raised from its seat in the usual manner through the provision of a lever 82 fulcrumed at 84 in a bonnet 86 at the upper end of the spring yoke, the lever engaging a nut 88 connected to the upper end of the stem and being operated by a depending arm 90 fulcrumed on the arm side of the bonnet at 92, and adapted when moved outwardly to engage the outer end of the lever 82 to elevate the stem and valve against the pressure of the spring.

15 What is claimed is:

1. A relief valve for high pressure steam comprising a valve body having a discharge port therein, a cooperating valve and seat for controlling the discharge through the port, an elongated stem connected to the valve, a spring mounted on the stem at a location remote from the valve, an open frame having radiating fins surrounding the stem intermediate the spring and valve and having a loose passage for the stem communicating with the valve body, and a deflector mounted upon and surrounding the stem within the open frame and arranged to deflect outwardly through the frame, steam escaping from the valve body about the stem.

2. A relief valve for high pressure steam comprising a valve body having a discharge port therein, a cooperating valve and seat for controlling the discharge through the port, an elongated valve stem connected at one end to the valve, a spring surrounding the stem at the other end thereof, an open frame between the valve and the spring having head portions loosely fitting about the valve stem and connecting members arranged to provide openings between the head portions, a sleeve connected at one end to the valve body and surrounding the valve at the other end thereof for guiding the valve in its movement away from the valve seat, and a deflector within the open frame fitting the valve stem closely to prevent contact of the steam with the spring and for directing it through the openings in the frame.

3. A relief valve for high pressure steam comprising a valve body having a discharge port therein, a cooperating valve and seat for controlling the discharge through the port, an elongated valve stem connected at one end to the

valve, a spring mounted on the stem at the other end thereof, a frame between the valve and the spring having disk-shaped head portions fitting loosely around the valve stem and a series of narrow fins arranged lengthwise of and spaced in angular relation about the valve stem between the disk members for reducing the escape of steam around the stem from the main valve body and for preventing contact of the steam with the spring, and a steam deflector fixed to the portion of the valve stem between the head portions of the frame for directing the steam which escapes between the head portion nearest the valve and the stem away from the head portion nearest the spring and through the spaces between the fins.

4. A relief valve for high pressure steam comprising a valve body having a discharge port therein, a cooperating valve and seat for controlling the discharge through the port, an elongated valve stem connected at one end to the valve, a spring surrounding the stem at the other end thereof, a frame between the valve and the spring having disk-shaped head portions fitting loosely around the valve stem and connecting members arranged to provide openings between the head portions and spaced from the valve stem for reducing the escape of steam around the stem from the valve body and for preventing contact of the steam with the spring, and means movable with the valve stem operating between the head portions of the frame for deflecting the steam passing through the head portion nearest the valve away from the head portion nearest the spring and through the openings formed by the connecting members.

5. A relief valve for high pressure steam comprising a valve body having a discharge port therein, a cooperating valve and seat for controlling the discharge through the port, an elongated stem connected to the valve, a spring mounted on the stem at a location remote from the valve, an open frame having heat radiating fins surrounding the stem intermediate the spring and valve and providing a loose passage for the stem in communication with the valve body, and means for immediately deflecting steam escaping outwardly from the valve body through the loose passage away from the region of the stem and outwardly between the radiating fins.

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