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H. J. SANDS

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RELIEF VALVE

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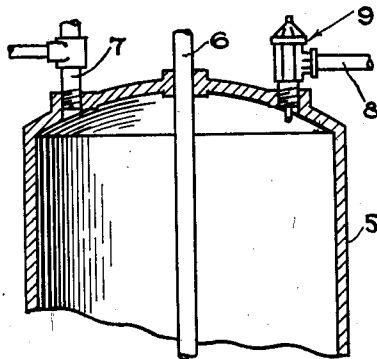


Fig 1

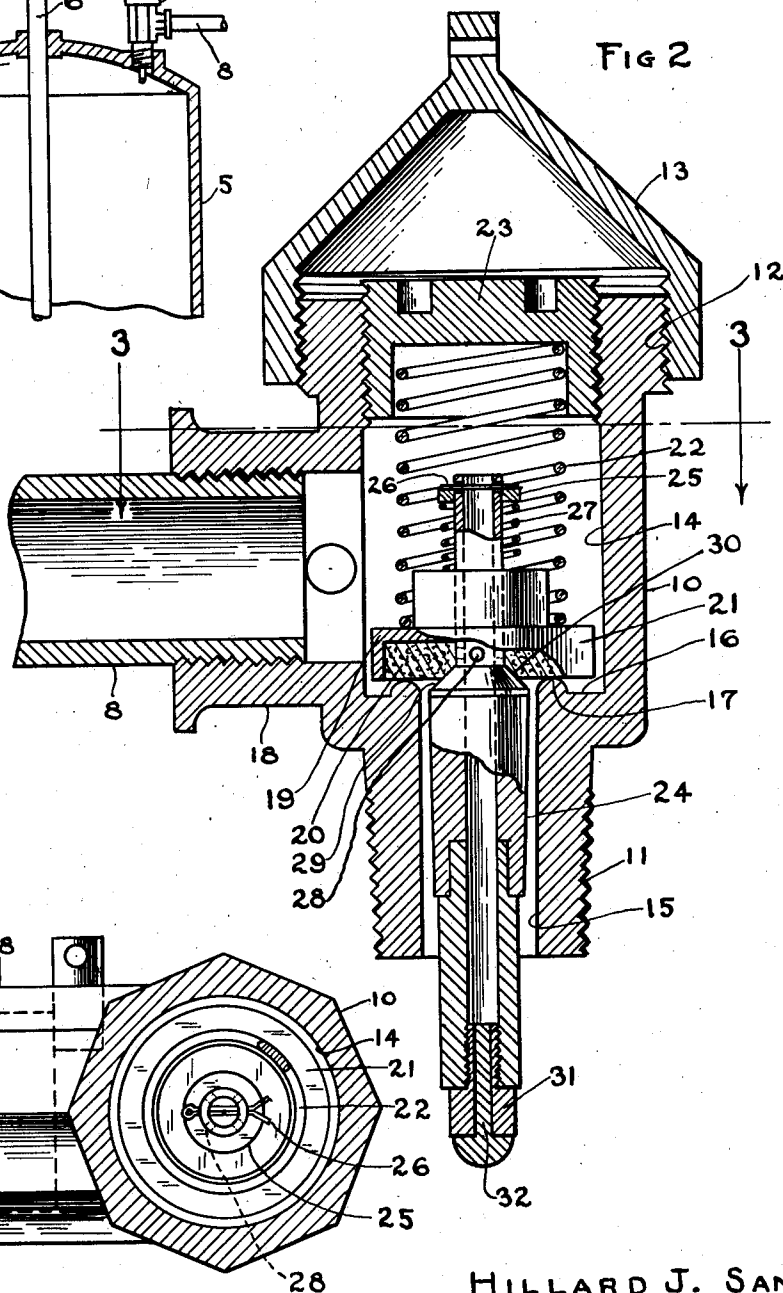


Fig 2

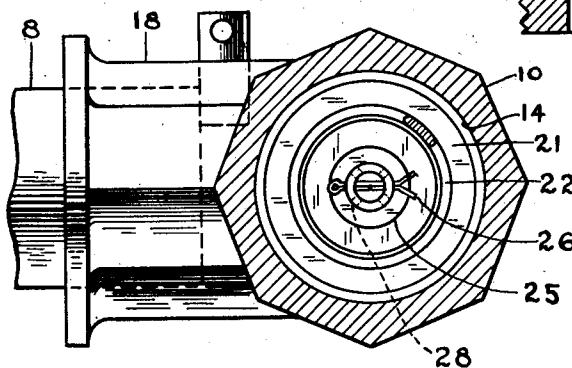


Fig 3

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RELIEF VALVE

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2 Claims. (Cl. 277—45)

This invention relates to relief valves for boilers, and has for an object the provision of a valve of this character which will open when the pressure in the boiler exceeds a predetermined amount, which also will open when the temperature in the boiler exceeds a predetermined amount, and which will open to relieve lack of pressure or vacuum in the boiler, the three types of mechanism being combined in a highly compact and efficient manner.

In the drawing accompanying this specification and forming a part of this application, I have shown, for purposes of illustration, one embodiment which my invention may assume, and in the drawing:

Figure 1 is a fragmentary sectional view, taken through the upper end of a boiler, showing the usual pipe connections, and a safety valve connected to the boiler and constructed in accordance with the present invention.

Figure 2 is an enlarged, fragmentary vertical sectional view of the valve mechanism proper, while

Figure 3 is a horizontal sectional view corresponding substantially to the line 3—3 of Figure 2.

As illustrated in the drawing the invention is shown as applied to an ordinary steam or storage boiler 5, provided with the usual inlet pipe 6, and take-off pipe 7. A safety outlet or discharge pipe 8 is provided at the upper end of the boiler, being connected thereto by means of the safety valve mechanism indicated as an entirety at 9.

The valve mechanism 9 comprises a casing 10, the intermediate exterior portion of which is preferably polygonal in cross-section, as shown in Figure 3, and is provided at one end with an exteriorly threaded nipple 11 adapted to be screwed into the top wall of the boiler 5, the opposite end of the casing being exteriorly threaded, as at 12, for the threaded reception of an enclosing cap 13. Interiorly the casing 10 is circularly chambered as at 14, and this chamber communicates with a circular bore 15 extending through the nipple 11, an annular shoulder 16 separating the chamber 14 and the bore 15, and the shoulder 16 formed with a valve seat 17. Extending laterally from the casing 10, is an outlet nipple 18, threaded for the reception of one end of the drainage pipe 8, the nipple 18 providing communication of the drainage pipe 8 with the chamber 14.

Cooperating with the valve seat 17 is a valve member 19, cup-shaped at its lower end for the

reception of packing material 20, and provided with an upstanding hollow boss 21. A coiled spring 22 bears upon the valve member 19, and at its opposite end bears upon an adjustable plug 23 threaded into the upper end of the casing 10, the degree of pressure of the spring 22 on the valve member 19 being dependent upon the distance the plug 23 is threaded into the casing 10.

Reciprocably mounted in the boss 21 of the valve member 19 is an elongated sleeve member 24, having a collar 25 affixed to its upper end, and held in place by a cotter pin 26, a relatively fine coiled expansion spring 27 being interposed between the collar 25 and the adjacent surface of the valve boss 21, the spring 27 serving normally to hold the sleeve in an elevated position. At a predetermined distance from the upper end of the sleeve 24, a plurality of laterally opening apertures 28 are provided, and immediately below the apertures 28, the sleeve is enlarged and tapered to form a stop and sealing member 29, adapted to cooperate with a recess 30 formed in the packing material 20. Below the stop 29 the sleeve is preferably somewhat enlarged, and the lower end of the sleeve 24 is closed by a thimble 31 threaded into the end of the sleeve, which carries a center plug 32 of fusible material.

In use the coiled spring 22 normally holds the valve member 19 to its seat 17, the pressure by the spring 22 on the valve 19 being regulated by threading the plug 23 a predetermined distance into the casing 10. When excess pressure conditions exist within the boiler 5 sufficient to overcome the pressure exerted by the spring 22, the valve 19 will be unseated so as to relieve such pressure. Should an excessive temperature exist within the boiler, the fusible plug 32 will be melted, opening up passage through the sleeve 24, and through the outlet nipple 18 and discharge pipe 8. Normally the sleeve 24 is held by the spring 27 in such position that the stop 29 engages the recess 30, and the apertures 28 are cut off from communication with the interior of the boiler. Should a vacuous condition exist within the boiler, the suction thus created, coupled with atmospheric pressure within the chamber 14, will overcome the spring 27 and cause the stop 29 to leave the recess 30 and to place the apertures 28, and the chamber 14, in communication with the interior of the boiler, thereby allowing air to enter and relieve the vacuous condition and thus prevent collapse of the boiler.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiment of my invention provides a new and improved

safety valve for boilers, wherein a plurality of functions are performed by the valve mechanism, yet the construction includes a minimum number of parts, is very compact, and highly efficient, and accordingly, accomplishes at least the principal objects of my invention. It further will be obvious to those skilled in the art that the illustrated embodiment of my invention may be variously changed and modified without departing from the spirit of my invention, or sacrificing all of the advantages thereof, and that accordingly, the disclosure herein is illustrative only, and my invention is not limited thereto.

I claim:

1. A relief valve mechanism of the pressure, vacuum and temperature type comprising a housing including a pair of chambers adapted to be positioned in vertical alinement with a boiler with the lower chamber connected therewith, spring urged reversely operating pressure and vacuum relief valves normally separating said chambers, the vacuum valve including a hollow sleeve having a portion slidable through the pressure valve and snugly engaging the same, the upper end of said sleeve being positioned in the upper chamber in constant communication therewith while the lower end extends through the lower chamber, a fusible plug closing the lower end of said sleeve against normal communication with the upper chamber, and the portion of said sleeve that is slidable through the pressure valve

having a plurality of apertures normally held out of communication with the lower chamber by spring pressure and communicating therewith for vacuum relief through said sleeve whereby the hollow sleeve furnishes a single means of communication between the chambers for vacuum and temperature relief.

2. A relief valve mechanism of the pressure, vacuum and temperature type comprising a housing including a pair of chambers adapted to be positioned in vertical alinement with a boiler with the lower chamber connected therewith, spring urged reversely operating pressure and vacuum relief valves normally separating said chambers, the vacuum valve including a hollow sleeve having a portion slidable through the pressure valve and snugly engaging the same, the upper end of said sleeve being positioned in the upper chamber in constant communication therewith while the lower end extends through the lower chamber, a fusible plug closing the lower end of said sleeve against normal communication with the upper chamber, the portion of said sleeve that is slidable through the pressure valve having a plurality of apertures, and stop means on the sleeve engageable with the lower portion of the pressure valve to hold and seal the apertured portion of the sleeve normally out of communication with the lower chamber.

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