July 3, 1962 D. B. DEEKS 3,042,363

STEAM TRAPS

Filed June 2, 1960

2 Sheets-Sheet 1

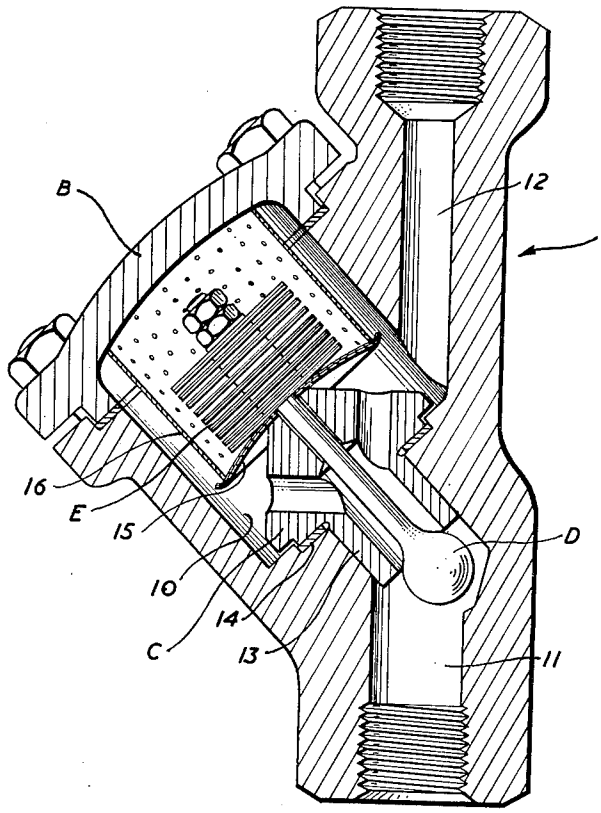


FIG.1

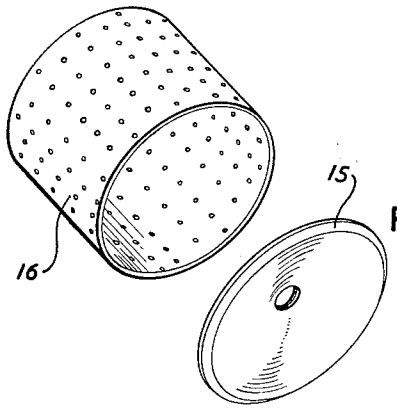


FIG.2

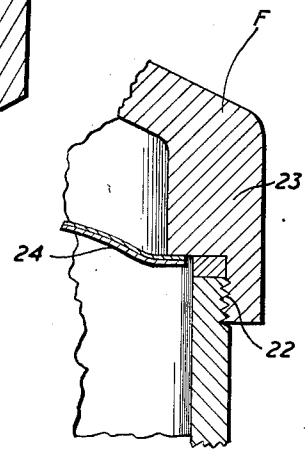


FIG.7

INVENTOR
DOUGLAS B. DEEKS

BY: Fetherstonhaugh & Co.
ATTORNEYS

July 3, 1962 D. B. DEEKS 3,042,363

STEAM TRAPS

Filed June 2, 1960 2 Sheets-Sheet 2

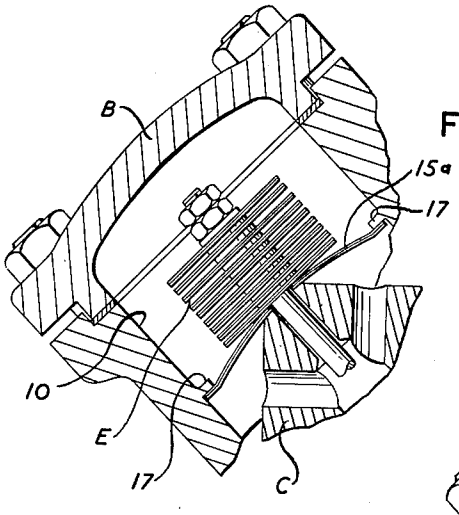


FIG. 3

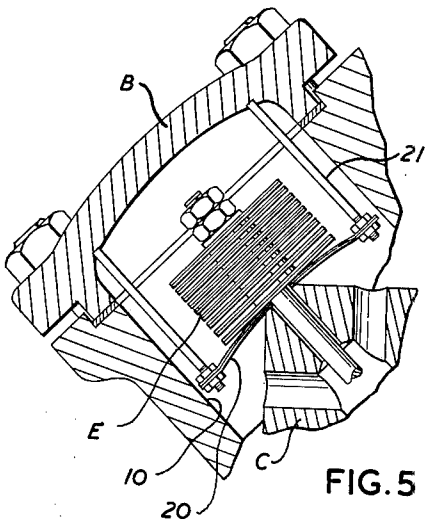
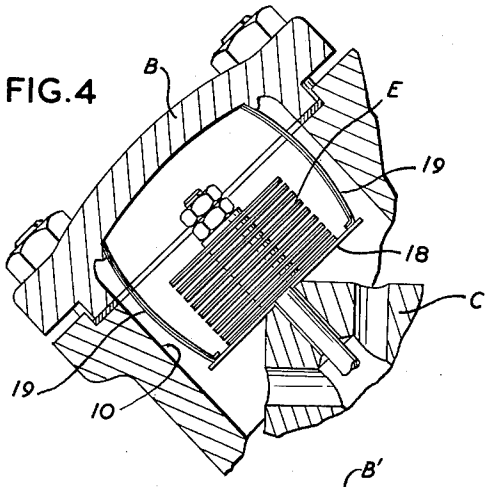


FIG. 5

FIG. 4



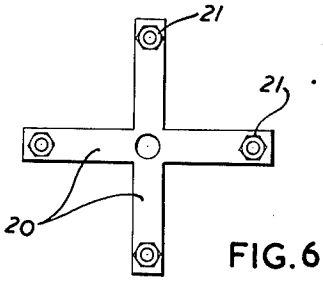


FIG. 6

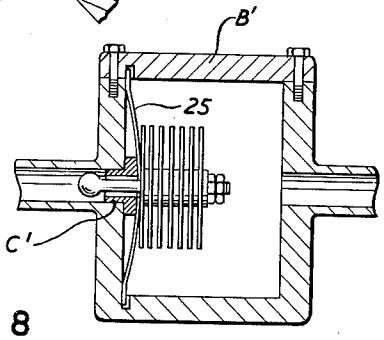


FIG. 8

INVENTOR
DOUGLAS B. DEEKS

BY: Fetherstonhaugh & Co.

ATTORNEYS

United States Patent Office

3,042,363

Patented July 3, 1962

3,042,363

STEAM TRAPS

Douglas B. Deeks, 197 Forest Hill Road, Toronto, Ontario, Canada

Filed June 2, 1960, Ser. No. 33,588
7 Claims. (Cl. 251—362)

This invention relates to steam traps, and more particularly to means of retaining the valve seat therein as to make it easily removable when required.

At the present time, three general methods are employed for retaining the valve seat in steam traps: (*a*) screw threading the seat into the housing or securing by a pressed fit; (*b*) connecting the seat within the housing by screws; and (*c*) employing a coil spring on the valve assembly to apply pressure thereto when the cap of the trap is secured in place.

The first method presents some difficulty as special tools are usually required to enter the trap and accomplish the removal of the seat whereas following a period of use under heat conditions, the screw threaded union or pressed fit may seize so that it may be necessary to remove the trap from the line in order to remove the seat. In the second instance, it is necessary to remove the seat by means of a screw driver, socket wrench or other special tool and one may run the risk of stripping the threads whereas under heat conditions, the screws may also seize so that this form of construction has equal disadvantages with the first.

The third method has practical advantages over the first two by reason of the ease of removal of the seat when desired. However, due to extreme heat conditions, the force of the spring will be weakened which may tend to permit the seat to give. Of course, the higher the pressure the higher the temperature and consequently under higher pressures, it would tend to seat less firmly and could leak. Thus, whereas the third type has advantages over the first two, it has a disadvantage not apparent in the others but in any case, all have the disadvantages outlined.

The present invention seeks completely to overcome the disadvantages of all these types of steam traps by providing a means of securing the valve seat in a simple manner much that it will be tight at all times in operation and will tend to seat even more firmly under higher pressure and heat conditions and which has the particular advantage that it is very readily removed when necessary.

The invention generally comprises a free seating valve seat combined with bimetallic means so applied as to exert firm seating pressure under non-operating conditions and which seating pressure increases proportionately under operating conditions with increased steam pressure and heat.

The invention will be clearly understood by reference to the following detailed specification taken in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal section taken through one form of bimetal steam trap illustrating one manner in which the bimetal retaining element may be applied to the freely fitted seat.

FIGURE 2 is an exploded perspective of the foraminous cylinder and bimetallic disc cooperating therewith as incorporated in FIGURE 1.

FIGURES 3, 4 and 5 are fragmentary sections through part of a steam trap of the type shown in FIGURE 1 illustrating alternative means of causing pressure engagement between the bimetal element and the seat.

FIGURE 6 is a bottom plan view of a form of bimetallic element arrangement which may be employed as in FIGURE 5.

FIGURE 7 is a fragmentary view of a steam trap structure showing a further alternative means of causing the bimetallic element to engage the seat under pressure; and

FIGURE 8 is a further fragmentary section of a trap showing another alternative manner of mounting the bimetallic element in pressure engagement with the seat.

Referring to the drawings and to FIGURES 1 and 2 in the first instance, A indicates a steam trap as a whole having a body cavity **10** normally closed by the cap B and which includes a valve seat C. The body cavity is in communication with the steam passages **11** and **12**, communication between the two being controlled by means of the valve D operated in the usual manner by means of multiple disc bimetallic unit E as to cause the valve to seat under predetermined conditions of steam pressure.

According to the present invention, the valve seat C is freely fitted in the opening **13** between the steam passage **11** and the body cavity **10** as to be readily removable when this may be necessary. The valve seat C, of course, is seated either in conjunction with or without a gasket **14**, according to the construction that may be employed, and to hold the seat firmly in position I employ bimetallic element **15**, extending transversely of the longitudinal axis of the valve seat and shown here as a composite disc which is engaged by the foraminous cylinder **16**, in turn engaged by the cap B of the body cavity so that the bimetallic element is placed under tension and in turn engages the seat under pressure to retain it firmly in position under non-operating conditions of the valve. Consequently, under operating conditions when hot condensate or heat from steam pressure enters the body cavity the bimetallic element is caused to engage the seat with proportionately increasing pressure having regard to the fact that the bimetallic combination is such as to bias the bimetallic element under heat conditions and cause it to apply proportionately increasing force against the seat. The higher the steam pressure the more firmly the seat will be held in position, as steam temperature always rises with steam pressure. Saturated steam only adds to the effectiveness of the device.

It is obvious from a consideration of this structure that it may be dismantled for inspection purposes or the like with great ease since it is only necessary to remove the cap B closing the body cavity **15** and the cylinder is readily removed whereas the complete working unit embodying the valve and valve seat is freely withdrawable without necessity of tools of any kind. It is, of course, apparent that the bimetallic element **15** though shown as a disc, may readily take the form of a bar or a plurality of bars as may be deemed expedient.

In the form of construction illustrated in FIGURE 3, it will be noted that the bimetallic element **15***a* is engaged with the valve seat C under pressure by means of lugs **17** projecting from the body wall into the body cavity. In the case of FIGURE 4, the valve seat is engaged by a plate or bar **18** which in turn is engaged or may have secured thereto the bimetallic elements **19** disposed in the direction of the longitudinal axis of the valve seat and which extend through the opening of the body cavity to be engaged by the cap B when mounted as to cause such elements to exert a physical pressure force on the plate **18**. These elements are likewise biased as to increase the pressure force of the plate **18** on the valve seat proportionately to heat increase by steam pressure or hot condensate.

In the case of FIGURE 5, the bimetallic element **20** which may be in the form of a bar, a disc or a plurality of angularly disposed bars such as shown in FIGURE 6 is engaged with the valve seat C under pressure by means of rods or bolts **21** which may be carried by or engaged by the cap B so as to exert a pressure on element **20** when the cap is placed in position, thus in a

similar manner to retain the valve seat firmly in position under nonoperating conditions. The element 20 is, of course, biased in a similar manner as described to increase pressure engagement with the seat under conditions of heat.

In the case of FIGURE 7 an alternative to the construction of FIG. 3 is shown for applying pressure to the bimetallic element. Instead of employing the lugs 17, as in FIG. 3, the cap F of the valve body is screw threadedly engaged as at 22 with the body and is formed with an inwardly projecting shoulder 23 such that it will engage the bimetallic element 24 and achieve a similar condition for operating purposes, as described in FIG. 3.

Referring to FIGURE 8 wherein a different type of trap body is illustrated, the bimetallic element 25 is engaged under pressure with the valve seat C' by anchoring one end in a suitably provided recess in the body wall and anchoring the other end in a suitably formed recess in the cap B' as to achieve a condition of pressure engagement between the bimetallic element and the freely mounted seat and which obviously will operate in a similar manner to the other general examples as to increase pressure on the seat proportionately with increase of heat conditions.

In essence, the examples above given will clearly indicate that the basic principle of the invention is the exertion of an increasing pressure on the valve seat by a bimetallic element suitably anchored to achieve a seat holding pressure under non-operating conditions and to provide for increased pressure between the element and seat under operating conditions of increasing heat and/or increasing steam pressure. It should be understood, of course, that the illustrations given above are by way of general example and that the principle can also be applied equally to other types of bimetal steam traps, bucket steam traps, flow steam traps and thermostatic bellows or diaphragm steam traps. It will also be equally obvious, in relation to their various types, that by reason of this extremely simple construction employing a freely mounted valve seat, dismantling to any extent necessary is accomplished in an extremely simple operation upon removal of the body cap and without the necessity of special tools. Obviously also it eliminates difficulties arising from seizure of the valve seat which may occur in known types of traps wherein the seats are not free but specially fastened in position.

What I claim as my invention is:

1. In a steam trap, a valve seat freely fitted therein, means for retaining said seat firmly in one immovable set position comprising bimetallic means engageable with said seat, and means co-operating with said bimetallic means to engage it with said seat under pressure during non-operating conditions of said trap, said bimetallic means being biased to increase its pressure on said seat under operating conditions of heat caused by steam pressure or hot condensate, and retain said seat immovable in said set position under said latter conditions.

2. A device as claimed in claim 1 in which the bimetallic means is disposed transversely to the longitudinal axis of the valve seat.

3. A device as claimed in claim 1 in which the bimetallic means is disposed substantially in the direction of the longitudinal axis of the valve seat.

4. A device as claimed in claim 1 in which the co-operating pressure applying means is initiated through a closure member for the trap when said closure member is secured in position.

5. A device as claimed in claim 1 in which the bimetallic element is in the form of a transverse element intersecting the longitudinal axis of the valve seat, and said co-operating means comprises means extending between a closure member for said trap and said bimetallic means to apply pressure on said element when said closure is secured in position.

6. A device as claimed in claim 5 in which said element is a disc and said co-operating means is an orificed cylinder.

7. A steam trap including a steam passage line comprising a body having a cavity therein having openings communicating with said steam line, a valve seat freely disposed fitted in one of said openings, and pressure means for maintaining said seat in immovable position therein during non-operating conditions of said trap, said pressure means including at least one bimetallic element, biased to increase the pressure force of said pressure means on said seat under operating conditions of heat caused by steam pressure or hot condensate, as to ensure said immovability of said seat under operating conditions.

References Cited in the file of this patent

UNITED STATES PATENTS

2,495,226 Crago ---------- Jan. 24, 1950