

March 4, 1941.

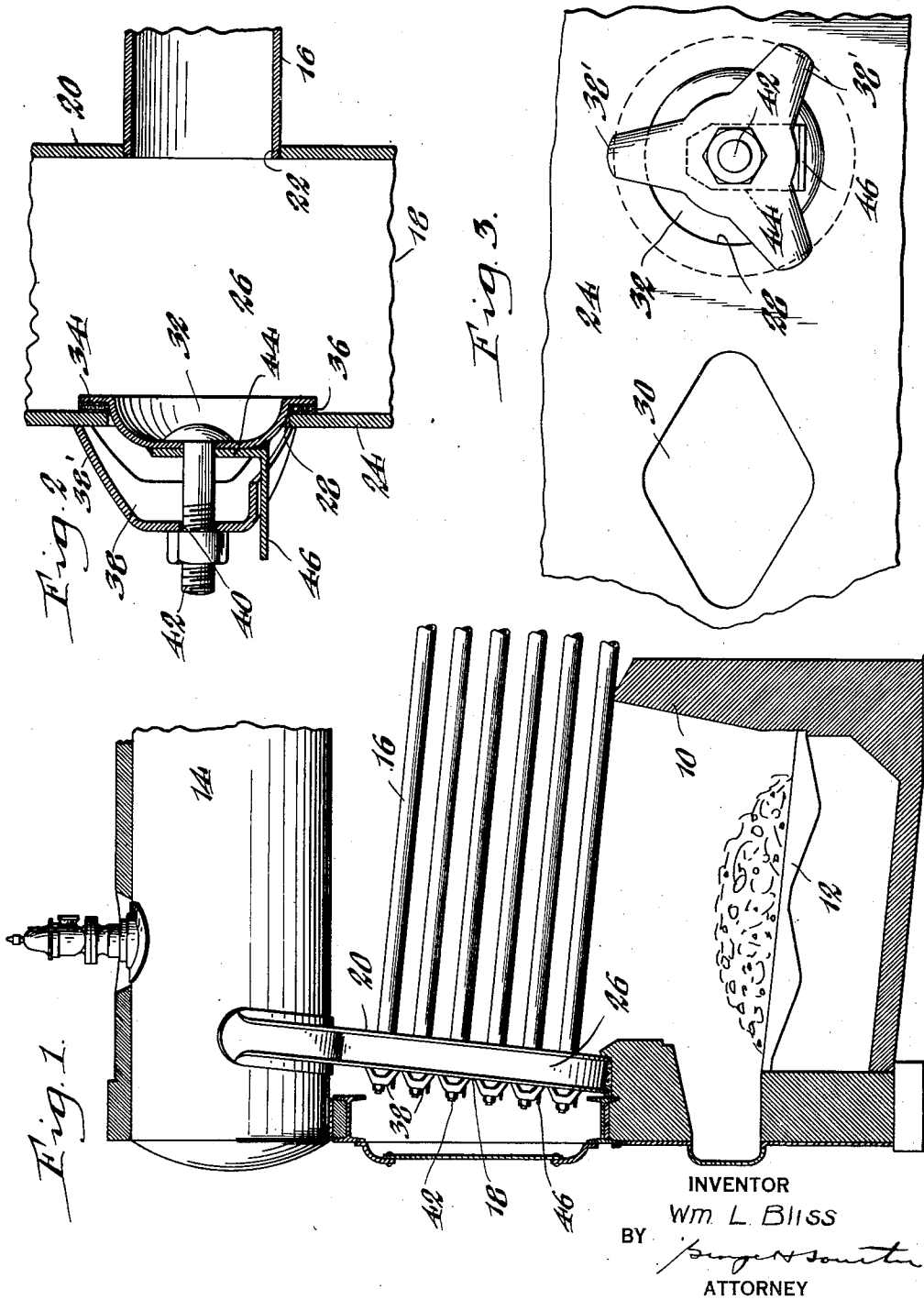
W. L. BLISS

2,234,154

BOILER TUBE CAP

Filed Aug. 10, 1935

2 Sheets-Sheet 1



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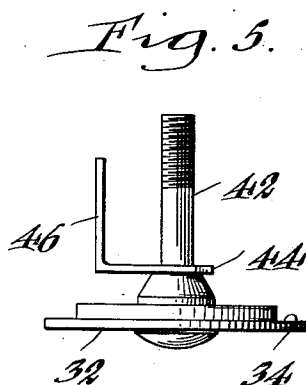
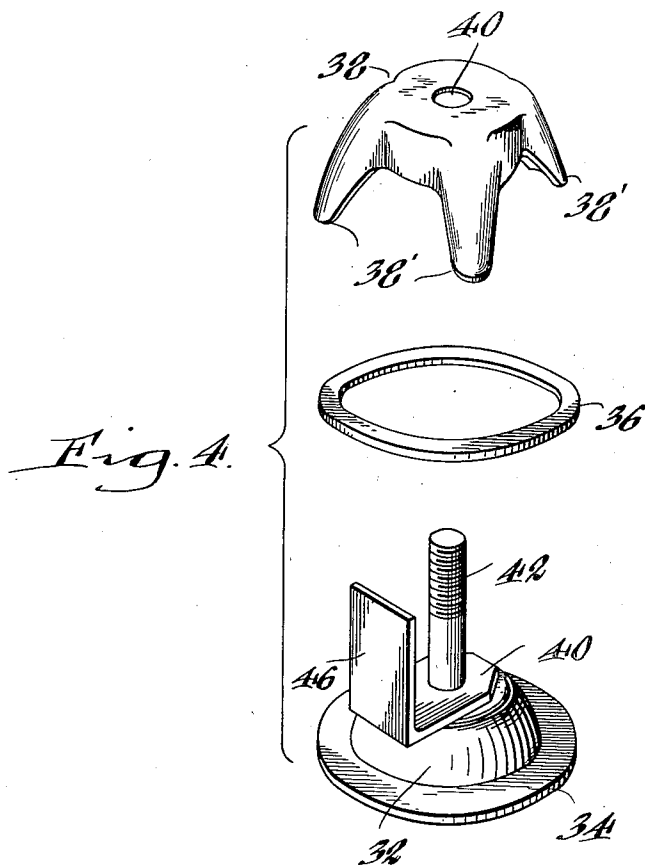
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2 Sheets-Sheet 2



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BOILER TUBE CAP

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Application August 10, 1935, Serial No. 35,658

1 Claim. (Cl. 220—25)

This invention relates to improvements in fluid heaters and vaporizers, and particularly in heaters of this sort in which the fluid circulates through tubes while being heated, and in which the tubes are connected at their ends by headers or the like, the openings of which are sealed by means of closure plugs or caps.

It is a primary object of the invention to provide plugs for hand holes in boiler headers which may be readily attached and removed from the header.

It is a further object of the invention to provide plugs for hand holes in boiler headers which may be locked against rotary movement during the operation of tightening or loosening the securing means thereof.

Heretofore considerable difficulty has been experienced in conveniently sealing the hand hole openings in boiler headers and this difficulty has arisen after a short period of use by virtue of the fact that the various plug parts are locked together by corrosion so that it becomes virtually impossible to remove the plugs without a great deal of effort. This annoyance is experienced principally with circular plugs which fit into circular openings. Such plugs turn with the clamping bolt and make the seating and disassembly thereof extremely difficult.

In order to overcome this difficulty, elliptical, pear-shaped, and other irregularly shaped openings have been provided, but such openings are objectionable in that they require the cutting away of a great portion of the metal in the rear wall of the header. Circular openings substantially the size of the tube holes are the most desirable in that they afford adequate working space during the expanding operation of the tube and at the same time such circular openings permit the strength of the rear wall of the header to be maintained because they require the removal of only a minimum amount of metal in their formation and permit of simpler and cheaper machining operations.

To the end that circular openings may be utilized and at the same time the objections thereto may be overcome, this invention provides a hand hole closure plug which may be locked against turning, both during the seating and removal of the plug.

To accomplish these objects, the invention consists in the features and the combination or arrangement of parts hereinafter described and claimed, reference being had to the accompanying drawings in which like reference numerals indicate like parts, and in which:

Fig. 1 is a view of a portion of a liquid heater partly in section and partly in full line;

Fig. 2 is a sectional view through a portion of a header showing the improved closure plug attached thereto;

Fig. 3 is an elevational view of a fragment of one of the headers;

Fig. 4 is an assembly view of one form of closure plug; and

Fig. 5 is a view of a slightly modified form of plug.

With detailed reference to the drawings, 10 indicates a furnace structure having as a part thereof a fire box in which is positioned a fire grate 12. The boiler drum 14 is supported on the top of the furnace structure in a horizontal position as in the conventional construction. Water tubes 16 are inclined over the fire box and over the flue portion of the furnace in the rear of the fire box, and these tubes are joined to a header 18 at their extremities.

The header 18 comprises a front wall 20 having therein tube holes 22 through which the tubes 16 are passed and into which these tubes are expanded. A rear wall 24 is joined to the front wall 20 by means of side walls 26. In the rear wall 24 at spaced intervals and in alignment with the tube holes 22, are hand hole openings 28 which are provided for the purpose, in the usual construction, of giving access to the interior of the header during the operation of expanding the tubes 16 into the tube holes 22 and for the purpose of permitting subsequent tube cleaning.

The rear wall 24 of the header 18 is provided at spaced intervals with diamond-shaped openings 30 (see Fig. 3) which have a dimension over their longest part greater than the diameter of the hand hole closure plugs. Through these openings the closure plugs for a given header area may be passed so that they may be positioned from the inside to obtain the best joint for high pressure conditions within the boiler under operation.

The hand hole closure plug which constitutes this invention comprises a body portion 32 which is adapted to pass through a hand hole opening 28 from the inside. The plug 32 is formed with a peripheral seat 34 which is adapted to lie against the inside of the rear wall 24 adjacent the opening 28. In most instances a gasket 36 may be provided between the seat 34 and the inner surface of the rear wall 24. A spider or crow-foot 38 having a plurality of legs 38' and having a centrally located aperture 40 is adapted

to overlie a hand hole opening 28, and the legs 38' are adapted to contact the rear wall 24 at points surrounding a hand hole opening 28. A bolt 42 is secured to the plug body portion 32 and passed through the aperture 40 in the spider 38. This assembly is adapted to be drawn into close relation by threading a nut on the bolt 42 so that the seat 34 of the plug body 32 is drawn into tight relation with the rear wall 24 of the header. The parts as thus far disclosed are more or less conventional.

In order to prevent the body 32 of the plug from turning either during the seating operation or during the removal thereof, this invention contemplates a locking means between the body portion 32 and the spider 38. In the form shown in Fig. 2 of the drawings this locking member constitutes a key having a portion 44 parallel to the face of the body portion of the plug and rigidly attached thereto, and a leg portion 46 at right angles to the body portion 44. The leg portion 46 is substantially parallel to the bolt 42 and protrudes sufficiently far from the body portion 32 of the plug to extend between two adjacent legs 38' of the spider 38.

In the modified form of the invention shown in Fig. 5 the key is not attached to the body portion of the plug, but is associated with the same through the bolt 42. In this form of the invention the bolt 42 is locked to the body of the plug 32 in non-rotative relation and the key 44 is affixed to the bolt.

In either the operation of seating or remov-

ing the plug the body portion thereof is effectively prevented from rotating with respect to the spider by contact of the legs 46 of the key 44 with either one of the adjacent spider legs 38'. In use it may be desirable to manually hold the locking key by means of a tool, as for example, a heavy bar of metal, one end of which may be inserted against two of the legs of the spider.

It is obvious that the principles herein disclosed may be capable of various modifications in their application, and it is therefore desired to limit this invention in no manner except as the exercise of the same may be limited by the scope of the subjoined claim.

What I claim is:

A circular plug for use in a boiler header having a circular opening to be closed, said plug comprising a body portion adapted to pass into the opening, a peripheral seat on said body portion adapted to contact the inner side of the header adjacent the opening, a spider having a plurality of legs adapted to contact the header at the rear side of the opening, a bolt affixed to said body portion and extending through said spider for drawing said seat into tight contact with the header, and a key having a portion parallel to said bolt fixed to said bolt and extending within its parallel portion between two adjacent legs of said spider to prevent the turning of the plug with respect to said spider during the setting or removal thereof.

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