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(54) CLIPS SUPPORTING AND SPACING FLANGED SHEETS OF REFLECTIVE INSULATION

(71) We, THE BABCOCK & WILCOX COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 161 East 42nd Street, New York, NY10017, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to clips spacing and supporting flanged sheets of reflective insulation.

Reflective insulation is used to encase the main body and associated piping of nuclear reactors to minimize heat and radiation loss therefrom. Reflective insulation is formed in spaced stacks having a plurality of thin aluminum or stainless steel sheets. These spaced sheets are then encased between thicker and more structurally sound inner and outer cases. The encased stacks are custom formed to the contours of the reactor and associated piping and hence require the joining together of variously contoured encased stacks of reflective insulation of various sizes around the reactor. Understandably, these operations involve a great deal of handling. This handling occurs not only during the encasing of the stack in the inner and outer cases but also during the fitting and joining of the encased stacks to the reactor. Since the heat insulating ability of the stacks depends upon minimizing heat transfer by maintaining the spaced zones between the reflective sheets any compression of the stacks will press the individual sheets together and allow conductive heat transfer between the spaced zones impairing and insulating efficiency of the stack. Such compression usually occurs along an edge of the stack when assemblers grab the stack by the end and squeeze together the thin sheets of reflective insulation. Thus a strong spacing clip is required to maintain the structural integrity of the stack during the various handling and assembly operations. The clip also has to support the edge of the stack to prevent the shifting of individual sheets within the stack.

Known clips for maintaining such structural integrity and support include toothed sheet metal strips which are inserted through aligned longitudinal holes in the individual sheets of reflective insulation. The tooth parts of the known clips are formed at right angles to the strip to maintain a spacing between the individual sheets of the stack through line contact with the individual sheets. These clips have certain disadvantages. The number of such clips which may be used is limited by the number of preformed slots in the individual sheets. Thus, when a particularly difficult contour of the stack requires more support, such support cannot easily be provided by merely adding more support clips. Also, before the clips can be inserted through the stack, individual sheets of the stack must be aligned o have their slots adjacent each other. Then, the individual sheets have to be retained while the clip is threaded through the slots and the tooth members are bent into the space between each sheet. The foregoing steps make the assembly of the stack a difficult and expensive operation.

According to a first aspect of the invention there is provided a clip spacedly supporting a series of flanged sheets of reflective insulation, the clip comprising: an elongate strip section mounted transversely of the flanged sections of the series of sheets of reflective insulation; spacer means formed along one longitudinal edge of said elongated strip action and extending substantially perpendicularly to the plane of said elongated strip section for maintaining a space between a pair of the series of sheets of reflective insulation; and retention member means formed along the other longitudinal edge of said elongated strip section and bent from a first position, extending perpendicularly to said elongated strip section and perpendicularly to said spacer means, over the flanged section of each of the flanged sheets of reflective insulation into

a second position to capture said flanged sheets to said clip.

According to a second aspect of the invention there is provided a clip retaining in a predetermined spaced relationship a stack of reflective insulation sheets having flanged ends located at one end of the stack, the clip comprising: an elongated strip section mounted transversely along said one end of said stack of insulation sheets; a first series of tab members formed along one longitudinal edge of said elongate strip section perpendicularly to the plane thereof to have the plane of each tab extend from said elongate strip section perpendicularly into said stack of insulation sheets to maintain a predetermined spacing between each sheet of said stack; and a second series of tab members formed along the other longitudinal edge of said elongate strip section and bent from a first position, extending from said elongate strip section perpendicularly to the plane of said first series of tab members, over the flanged end of each sheet into a second position to thereby retain the stack of sheets to the clip.

Clips embodying the invention can be pressed anywhere and in any number against an end of the stack to set the stack spacing with the first series of tab members. The second series of tab members is then bent to capture the flange ends of the individual reflective sheets of the stack.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 depicts the above-outlined known clip used to space and retain stacks of reflective insulation sheets;

Fig. 1a depicts the clip of Fig. 1 mounted to a stack of reflective sheets;

Fig. 2 depicts a clip embodying the present invention used to space and retain a stack of flanged reflective insulation sheets;

Fig. 2a depicts the clip of Fig. 2 mounted on a stack of flanged reflective sheets;

Fig. 3 depicts the stack assembly of Fig. 2a mounted between inner and outer support cases; and

Fig. 4 depicts a single flanged reflective insulation sheet of the Fig. 3 assembly.

Referring now to the drawings, Figs. 1 and 1A depict a known clip 10 for retaining a plurality of reflective material insulation sheets 12 in a predetermined spaced relationship. The clip 10 is primarily a flat thin sheet of metallic material such as Aluminum or Stainless Steel having a plurality of cut-outs 14 spacedly extending along one edge of the clip 10 into the body of the clip 10. Between adjacent cut-outs 14 a series of tab members 16 are formed which are easily bent to a position 18, as shown in dotted lines on Fig. 1, wherein the tab 16 is bent to a position substantially perpendicular to the plane of the clip 10. The clip 10 is used to retain and space the reflective sheets 12 and prevent them from laterally shifting from their parallel plane positions. To facilitate the use of the clip 10 each sheet 12 is formed to have a slot 20 along an edge of each sheet 12 slightly larger than the end width of the clip 10.

In mounting the clip 10 the slots 20 of each sheet 12 are aligned and the clip 10 is then extended through the aligned slots 20 with the tabs 16 in the unbent position. The reflective sheets 12 are then spaced to have their edges aligned with the cutouts 14 of the clip 10 and the tabs 16 are then bent to their perpendicular position 18 to thereby maintain the spacing between the sheets 12. Since the bent tabs 16 now prevent the clip 10 from being pulled out through the slots 20, the reflective sheets 12 are also prevented from shifting laterally within the stack of sheets 12.

Figs. 2 to 4 show a clip 22 embodying the present invention for retaining and spacing a stack 24 of flanged reflective insulation sheets 26.

As best seen in Fig. 2, the clip 22 is formed to have a substantially elongate rectangular body 28 from which a plurality of spacer tabs 30 are formed along one longitudinal edge of the rectangular body 28. The spacer tabs 30 are formed to extend substantially perpendicular to the plane of the body 28. A plurality of locking tabs 32 are formed along the other lateral edge of the body 28 opposite the lateral edge forming the spacing tabs 30. The locking tabs 32 are formed to be substantially perpendicular to the body 28 and also to be substantially perpendicular to the plane defined by the spacing tabs 30. A clip 22 mounting tab 34 is formed at opposite short ends of the body 28 and is used to retain the clip 22 to external cases of reflective insulation stacks 24 as will be shown later.

As may be seen with particular reference to Figs. 2A and 3, the clip 22 is intended for mounting along the plane defined by the flanged edges of a stack 24 and may be mounted therealong in any number and in any position since the clip 22 is not dependent upon the presence of any slots 20 in the reflective sheets 26 forming the stack 24. Reflective sheet insulation 26, whether it is planar or semi-circular, is usually formed with a short flange 36 at opposite ends of each sheet 26 to provide some edge sealing of abutting surfaces of the stack 24 and its abutting counterpart.

As is best seen in Fig. 3, the stack 24 of reflective sheets 26 is usually mounted between an inner case 38 and an outer case 40 of rigid support material, usually a Stainless Steel material having a gauge

thickness significantly larger than the gauge of the reflective sheets 26. This is done to prevent crushing of the reflective sheets 26 unto each other. The clip 22 is mounted to the stack 24 enclosed by inner and outer case 38, 40 by placing the clip 22 along the flanges 36 of the reflective sheets 26 to have the spacing tabs 30 extend into the stack 24 between each of the individual sheets 26. Each of the locking tabs 32 is also extended into the stack 24 along an edge of a flange 36. The locking tabs 32 are then loosely bent over the flanges 36 of the desonated ends of each reflective sheet 26 to thereby capture the reflective sheet stack 24 to the clip 22 and prevent the removal of the clip 22 from the stack 24. To prevent sliding of the clip 22 along the edge of the stack 24 the mounting tabs 34 are then either spotwelded or pop-riveted to the inner and outer cases 38, 40.

To maintain the spacing between the individual sheets 26 between the flanged ends 36, a series of the known clips 10 may, as shown, be mounted along the lateral edge of the stack 24 with the bent tabs 16 extending between the individual sheets 26. To accomplish this the tabs 16 may be prebent prior to the mounting to the stack 24.

Although the clips 22 and 10 have been shown mounted to a semi-circular stack 24 of reflective sheet 26, it should be clear that the clips 22 and 10 would be equally useful in a rectangular stack 24 of flat plane sheets 26. Other improvements and modifications within the scope of the invention as defined by the appended claims will occur to those skilled in the art upon reading the foregoing specification.

WHAT WE CLAIM IS:—

1. A clip spacedly supporting a series of flanged sheets of reflective insulation, the clip comprising:

an elongate strip section mounted transversely of the flanged sections of the series of sheets of reflective insulation;

spacer means formed along one longitudinal edge of said elongate strip section and extending substantially perpendicularly to the plane of said elongate strip section for maintaining a space between a pair of the series of sheets of reflective insulation; and

retention members means formed along the other longitudinal edge of said elongate strip section and bent from a first position, extending perpendicularly to said elongate strip section and perpendicularly to said spacer means, over the flanged section of each of the flanged sheets of reflective insulation into a second position to capture said flanged sheets to said clips.

2. A clip according to claim 1, wherein said spacer means includes a series of spaced tab members formed along said one longitudinal edge of said elongate strip section to extend into the series of sheets of reflective insulation for maintaining a space between said series of sheets.

3. A clip according to claim 2, wherein said retention member means includes a second series of tab members formed along said other longitudinal edge of said elongate strip section.

4. A clip according to claim 3, wherein said second series of tab members are loosely bent over each of the flanged sections to minimise physical contact therebetween to minimise conductive heat transfer between each sheet of reflective insulation by way of the clip.

5. A clip according to any one of claims 1 to 4, including a tab member formed at one end of said elongate strip section for mounting said clip to an enclosure section for enclosing the series of sheets of reflective insulation.

6. A clip retaining in a predetermined spaced relationship a stack of reflective insulation sheets having flanged ends located at one end of the stack, the clip comprising:

an elongate strip section mounted transversely along said one end of said stack of insulation sheets;

a first series of tab members formed along one longitudinal edge of said elongate strip section perpendicularly to the plane thereof to have the plane of each tab extend from said elongate strip section perpendicularly into said stack of insulation sheets to maintain a predetermined spacing between each sheet of said stack; and

a second series of tab members formed along the other longitudinal edge of said elongate strip section and bent from a first position, extending from said elongate strip section perpendicularly to the plane of said first series of tab members, over the flanged end of each sheet into a second position to thereby retain the stack of sheets to the clip.

7. The combination of a series of flanged sheets of reflective insulation and at least one clip spacedly supporting the sheets, the combination being substantially as herein described with reference to Figures 2, 2a, 3 and 4 of the accompanying drawings.

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1563418 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

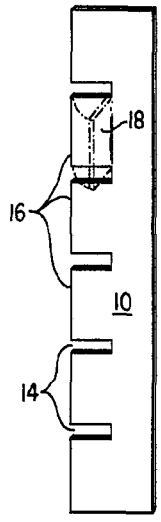

FIG. 1

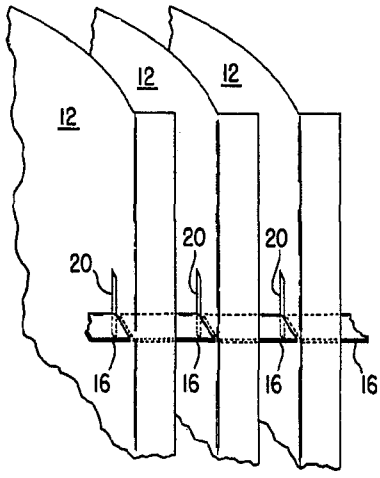

FIG. 1a

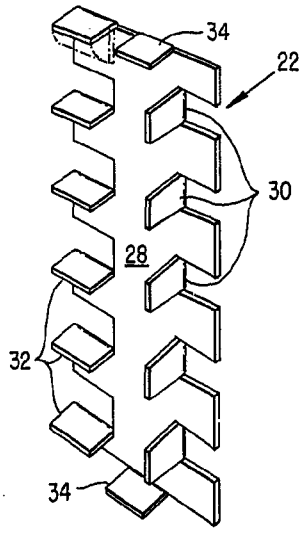

FIG. 2

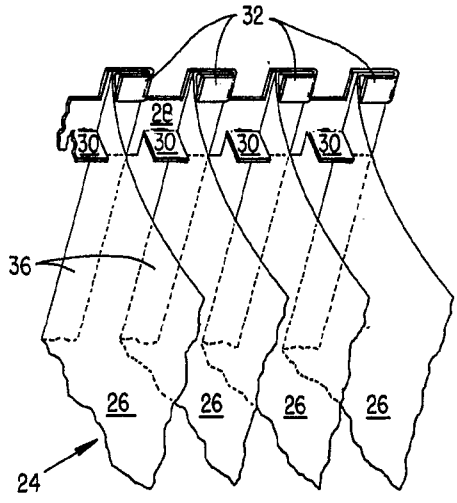

FIG. 2a

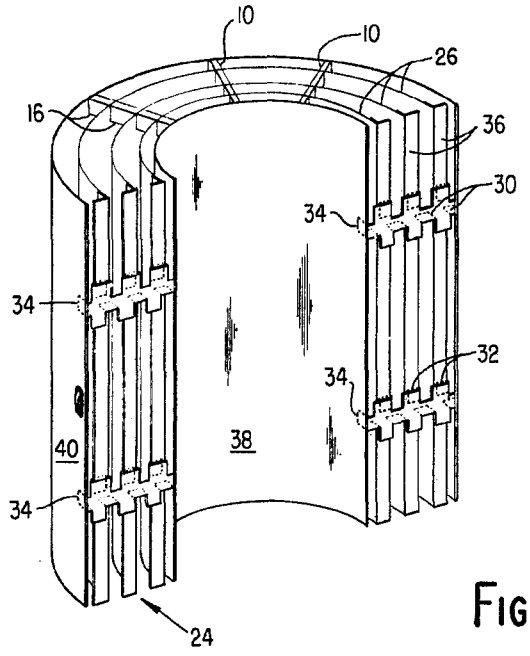

FIG. 3

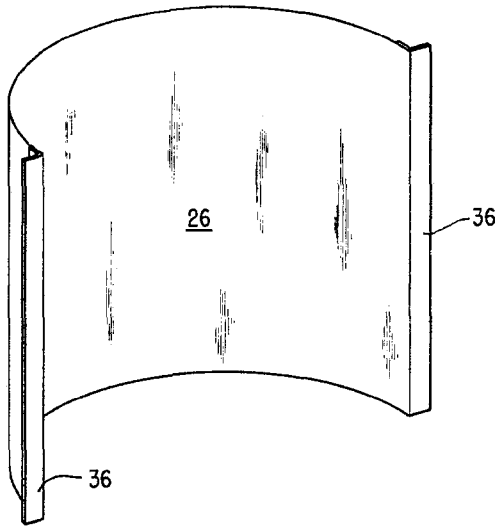

FIG. 4