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LINER SUPPORT IN HOT-AIR FURNACE

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This invention relates to a heater structure. The invention is particularly useful in floor furnaces and other types of furnaces in which inner casings or liners are employed about heating units, etc.

One of the unsatisfactory features of heating furnaces employing liners or inner casings, etc., about heating units, is that the sheets of metal, when heated and cooled, tend to flex back and forth over one another producing a cracking or popping noise. For example, a box-like casing or liner, when heated by the heating unit on its inner side, tends to expand or elongate, and the side walls or end walls thereof produce the cracking noise commonly associated with the flexing of an “oil-can” wall. This “oil-can” effect is irritating and it often gives the impression that the furnace has been damaged or is defective. The problem of providing a furnace or heater with casing walls which do not produce this undesirable effect, has not been solved up to the present time.

An object of the present invention is to provide a heater structure in which the casing or liner sheets are so formed as to prevent the flexing of the sheets over center when caused to expand by temperature increases, etc. Another object is to provide preformed casing or liner structures for heaters or furnaces which, when allowed to expand normally under rising temperatures, will not carry the contour of the casing past a straight line, thus eliminating the “oil-can” effect. Yet another object is to provide a means for attaching the central portion of liner or casing sheets to permit the free expansion of the sheets in any direction without deforming the other sheets due to a variation in temperature between the sheets.

A further object is to provide a casing structure of a preformed or bowed construction, permitting expansion in a manner which tends to straighten the casing while preventing the temperature expansion from carrying the contour of the casing past a straight line. Other specific objects and advantages will appear as the specification proceeds.

The invention is illustrated, in a single embodiment, by the accompanying drawings, in which—

Figure 1 is a top plan view, shown partly in section, of a heater structure embodying my invention; Fig. 2, an end view in elevation, a portion of the apparatus being broken away and shown in vertical section; Fig. 3, a perspective view of the inner casing; Fig. 4, a perspective view of the inner liner; and Fig. 5, an enlarged sec-
end wall is supported by posts 27 carried by the bracket member 28 fixed to the outer casing 10. The posts 25 and 27 are welded or otherwise permanently anchored to the inner casing 11 and may, if desired, terminate at the liner 11. In the illustration given, however, the posts extend through the sheets 25 to permit free movement of the sheets 30 relative to the posts 25 and 27. The posts 27 are preferably reduced in diameter where they extend through the sheets 30 so as to permit free play of the sheet 30 relative thereto.

The sheets 25 and 30, when fixed, are carried by the bracket member 28 fixed to the outer casing 0. The ends of the sheets 25 and 30 are secured together by clinching or interlocking of their end portions, as shown more clearly in Fig. 1. The sheets 25 and 30, however, are characterized by the fact that the sheets are bowed outwardly substantially throughout their width, while their end portions are inclined slightly in an inner direction. The purpose of this preformed or bowed effect is to compensate for thermal expansion of the sheets which tends to straighten the sheets. The pre-formed 25 and 30, when unheated, present the bowed appearance illustrated in Fig. 1, and when heated, tend to assume a straight line position. The curvature of the sheets is such, however, that under the highest expansion, the sheets never quite reach the straight position and do not carry their contour past a straight line. Thus, there is no cracking or popping noise and the "oil-can" effect is avoided. By supporting the inner liner sheets 25 and 30 along their central portions, there is permitted the free expansion of the sheets in any direction without the probability of deforming one or the other sheets due to a variation in temperature between the sheets.

In addition to giving the sheets 25 and 30 the bowed shape illustrated, I prefer also to form the casing 10 of the central heating unit with slightly bowed side walls 31 and 32, so that, under temperature expansion, these walls will also tend to approach a straight line but will never pass beyond a straight line.

Operation

In the operation of the structure, the heater is operated in the usual manner by the supplying of oil or other fuel through pipe 12 to the heater, and the products of combustion pass upwardly through casing 18, pipe 19, and radiator 17 and out through flue outlets 33. Since the operation of the heater is well known, a detailed description is believed to be unnecessary. Air from the room above passes downwardly through the side passages 18 to a point below the liner 12; and then passes upwardly about the heater unit through passage 20. Air is discharged into the room through the central outlet 21 of the inner casing 11. As the temperature rises, the liner sheets 25 and 30 tend to straighten and approach the straight-line position. The curvature of the sheets, however, is such that the straight-line position is not quite reached and is never passed, so that a flexing of the sheets does not occur. Should one of the sheets 25 be heated more than one of the end sheets 30, then free attachment of the sheets at their ends permits one to move farther than the other and without deforming the other, and, in any event, the movement of one sheet never forces the other to a position past a straight line.

The bowing of the sheets may be outwardly, as described, or inwardly as 'desired,' the pre-set curvature being such that the straight-line position will not be reached.

The invention herein has been described in connection with a floor furnace for the purpose of illustrating the invention. It will be understood that the invention is applicable to any type of heating furnace in which casing members are employed adjacent sources of heat and where the flexing of the casing parts would otherwise produce the "oil-can" effect. It will be understood that in other types of furnaces, the casing in question may be supported directly upon an outer casing or frame and may, if desired, form the casing about any type of heat source.

While, in the foregoing specification, I have set forth a description of one embodiment of the invention in considerable detail for the purpose of illustrating the invention, it will be understood that the details of structure, as well as the arrangement of the casing parts, may be modified widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In a heater structure, an outer casing, an inner casing, a heater within said inner casing, a box-shaped liner between said heater and inner casing and comprising side and end sheets secured together at their ends, said sheets being bowed outwardly substantially throughout their width whereby the central portions of said sheets are brought adjacent the inner casing; said inner casing and said sheets being provided with embossed portions extending toward each other on the central portion of the sheet to bring the web portions thereof into engagement; and means for securing said web portions together.

2. In a heater structure, an outer casing, an inner casing, a heater within said inner casing, a box-shaped liner between said heater and inner casing and comprising side and end sheets secured together at their ends, said sheets being bowed outwardly substantially throughout their width to bring the central portions thereof adjacent said inner casing, said sheets at their central portions and the adjacent portions of said inner casing being provided with integral web portions extending toward each other and in contact with each other, and means securing said flat web portions together.

3. In a heater structure, an outer casing, an inner casing, a heater within said inner casing, a box-shaped liner between said heater and inner casing and comprising side and end sheets secured together at their ends, said sheets being bowed outwardly substantially throughout their width whereby the central portions of said sheets are brought adjacent the inner casing; said sheets at their central portions and the adjacent portions of said inner casing being provided with integral web portions extending toward and in contact with each other, and means securing said web portions together.

4. In a heater structure, an outer casing, an inner casing suspended from said outer casing, a heater within said inner casing; a box-shaped liner between said heater and inner casing; said liner comprising side and end sheets secured together at their ends; said sheets being bowed outwardly substantially throughout their width to bring the central portions thereof adjacent said inner casing, said sheets at their central portions and the adjacent portions of said inner casing being provided with integral web portions extending toward and in contact with each other, and means securing said web portions together.
casing being provided with integral web portions extending toward and abutting each other, means securing the abutting portions of said webs together, and means carried by said inner casing for supporting at least an opposed pair of walls of said inner casing upon said outer casing.

HARRY L. GIWOSKY.

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