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RADIATOR ASSEMBLY

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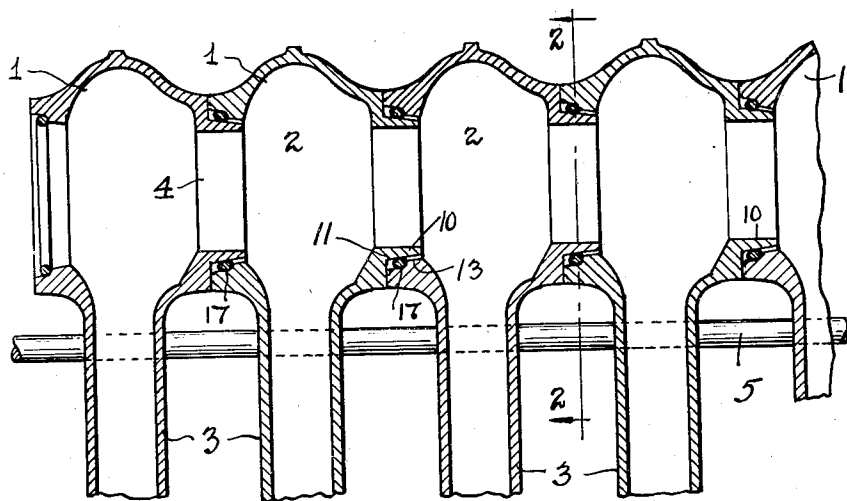


FIG. 1

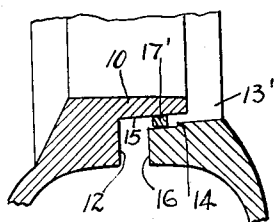


FIG. 3

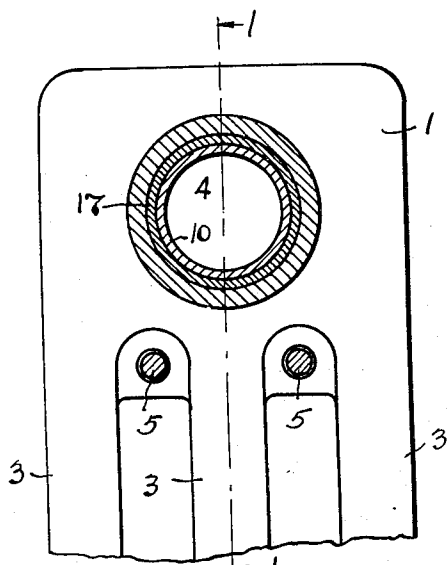


FIG. 2

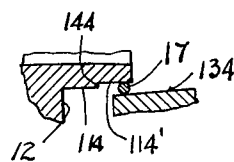


FIG. 4

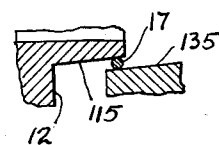


FIG. 5.

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UNITED STATES PATENT OFFICE

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RADIATOR ASSEMBLY

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2 Claims. (Cl. 257—161)

This invention relates to a method for fastening together cast iron sections, the joints of which are to be subjected to hot water pressure, steam pressure, or the like, and is particularly adapted for fitting together the sections of cast iron radiators or sectional boilers. The purpose of the invention is to provide a joint of this sort, the construction of which can be integral with that of the section to which it pertains, which can be assembled by a simple forced sliding fit process without it being necessary to form the adjoining faces with any high degree of accuracy, and which will be tight against the passage of the fluid under pressure. At the same time it is one of the purposes of the invention to enable assemblies such as radiators, sectional boilers and the like, having a succession of such joints, to be assembled with accurate overall dimensions.

More in detail, this joint is for the purpose of replacing the present threaded nipples or slip nipples which are used for such joints. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various structural forms in which the principle of the invention may be used.

In the accompanying drawing Fig. 1 is a longitudinal vertical section through the sectional opening area of a radiator, taken on the plane represented by the line 1—1 of Fig. 2 looking in the direction of the arrows; Fig. 2 is a transverse vertical section through one of the joints shown in Fig. 1, being taken on the plane represented by the line 2—2 of Fig. 1 looking in the direction of the arrows; Fig. 3 is an enlarged detail of a joint before the elements have been forced together, taken on the same plane as Fig. 1; Figs. 4 and 5 diagrammatically illustrate alternative constructions and correspond to Fig. 3.

It is to be understood that although the invention is here shown as applied to a radiator, it is equally applicable to sectional boilers and other suitable uses, as already mentioned.

In Fig. 1 a number of radiator sections, each indicated by the reference character 1, are shown. As shown in Figs. 1 and 2 each of these sections has sectional opening areas 2 and a plurality of columns 3, the sectional openings being in communication by means of the usual

passages 4 through the joints. The sections are held together by the frictional engagement of the joints, and the usual longitudinal tie rods 5 are used to maintain the assembly against stresses which might separate the joints, as in shipping and handling.

Each joint comprises a flange 10 slightly tapered externally as at 11 and ending in a face 12 which is preferably substantially vertical, which flange enters an opening 13 in the opposite side of the next section. In the preferred form shown in Figs. 1 and 3, the opening 13 comprises a flared surface 13', enlarged by an offset 14 into another flared surface 15 of greater diameter, ending in a vertical face 16. A ring 17 of suitable non-corrosive malleable material, for example, copper, is used as a closure seal in making up the joint. The size and cross sectional shape of the ring may vary, a round form 17 and a square form 17' being shown herein by way of illustration but not limitation. Using copper, a ring thickness on the order of $\frac{1}{8}$ inch for a joint of $1\frac{1}{2}$ inches inside diameter, has been found suitable. This ring is preferably made of round cross section about $\frac{1}{8}$ inch in thickness. The ring is forced down tightly and distorted between the opposite surfaces of the flange and opening when the flange 10 is forced home.

In forming the joint the sections, with the rings 17 at each joint, are forced up until the faces 12 and 16 abut, by which time the copper rings 17, which in the initial assembly, Fig. 3, preferably fit just inside the opening 13, will have been deformed into a tight contact with both the inner and the outer element of the joint, Fig. 1. In general, any form of joint elements may be used which will effectively insure a compression of the deformable ring by what is essentially a wedging action forcing the material of the ring into a contact under heavy pressure with the joint material on both sides. By this wedging effect the compression at right angles to the line of movement in setting up the joint elements is accomplished far beyond the pressure directly applied to the joint. On account of the relation of the joints to the other parts in radiators and sectional boilers, and in order that the present joint may be made on existing machinery, it is necessary to make the joint entirely by direct thrust without any twisting or screwing movement. In practice, in setting up radiators, the amount of lateral compressive movement will be on the order of $\frac{1}{2}$ inch and in the larger joints, such as used in sectional boilers, it will be on the order of 1 inch. It is of course understood

that these dimensions are simply those which have proved most satisfactory in practice for the purposes and they are mentioned here merely as part of the background of the art and not as any part of the essence of the invention. The surfaces 11 and 13' do not engage even in the fully closed position of Fig. 1.

The exact form of the surfaces 11 and 13 is capable of considerable variation according to the size of the joint, and more particularly according to the materials used. The results so far obtained with this invention, using copper rings, indicate that the maximum angle of taper with which satisfactory results can be obtained, is about 8° and in practice it has been found advisable to use flanges and openings in which the opposing surfaces are from cylindrical to a taper of about the amount indicated. In the prior art, it has been the custom in assembling radiators to rely upon the strength of the joints to hold the assembly together, and although tie rods are used as a matter of regular practice, they are for the purpose of supporting the assembly against such extraordinary stresses as would pull the joints apart. It is the intention that the same practice will be followed in the use of this joint and therefore the angle of taper and/or flare must be such that the ring will engage with each surface within the limits of what may be termed the angle of frictional repose when the joint is completed. The value of this angle will of course be governed by such factors as the characteristics of the materials used, the amount of distortion which results from forcing the joint into assembly, and other factors.

In the assembly of an alternative form illustrated in Fig. 4, the opening surface, there designated as 134, is shown as flared at an angle of 5° and the flange, there designated as 104, has two cylindrical surfaces 114 and 114', the latter, at the outer end of 104, being of less diameter, with an offset 144 between them. In Fig. 5 the flared surface of the opening is conical without offset and is indicated as 135 while the flange 105 has a tapered surface 115 without offset.

It will be seen from the foregoing that I have invented a joint for the purposes described which is easily formed and easily assembled and which avoids the necessity of using the threaded nipples or slip nipples which have always been re-

garded as essential in previous assemblies of this sort and which add to the expense both for labor and material. With my improved construction the joint members can be cast and require but slight machining. Another advantage over either the threaded or slip nipple construction is that the nipples are usually made of malleable iron, which, as is well known, disintegrates much faster than cast iron so that the nipples disintegrate faster than the radiator sections, which are made of cast iron. The non-corrosive rings, on the other hand, have a greater life than the cast iron and their cost is slight for the reason that they are very small.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A radiator comprising a plurality of sections, said sections being connected by joints which consist of spaced male and female portions, said male portion having a tapering flange terminating at its inner end in a face perpendicular to the axis of the joint, said female portion having an opening with an internal flared surface terminating at its outer end in a face perpendicular to the axis of the joint, and abutting said first-named face, and a ring of tough compressible material, deformed between said male and female portions by relative sliding action therebetween, said sections being held together mainly by the strength of said joints.

2. A radiator comprising a plurality of sections, said sections being connected by joints which consist of tapered male and female elements, faces at the end of each of said elements adapted to abut and thus determine the length of the joint while maintaining said male and female elements out of contact, a packing ring of tough metal so proportioned as to be deformed by the closing of said joint, the angle of inclination of said elements being substantially less than the angle of repose of the packing material whereby when said ring is so deformed it will exert a greater radial than longitudinal binding effect.

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