

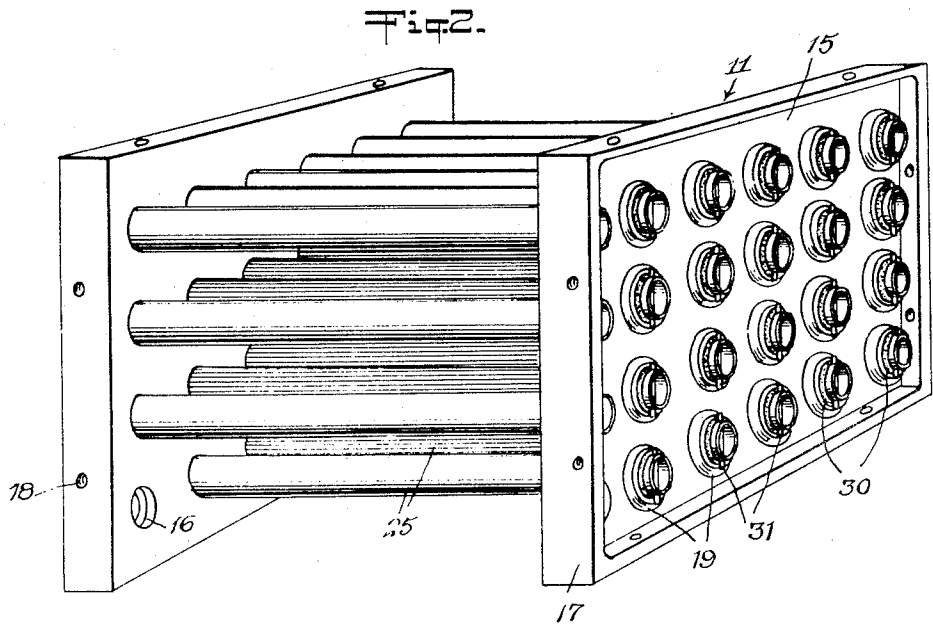
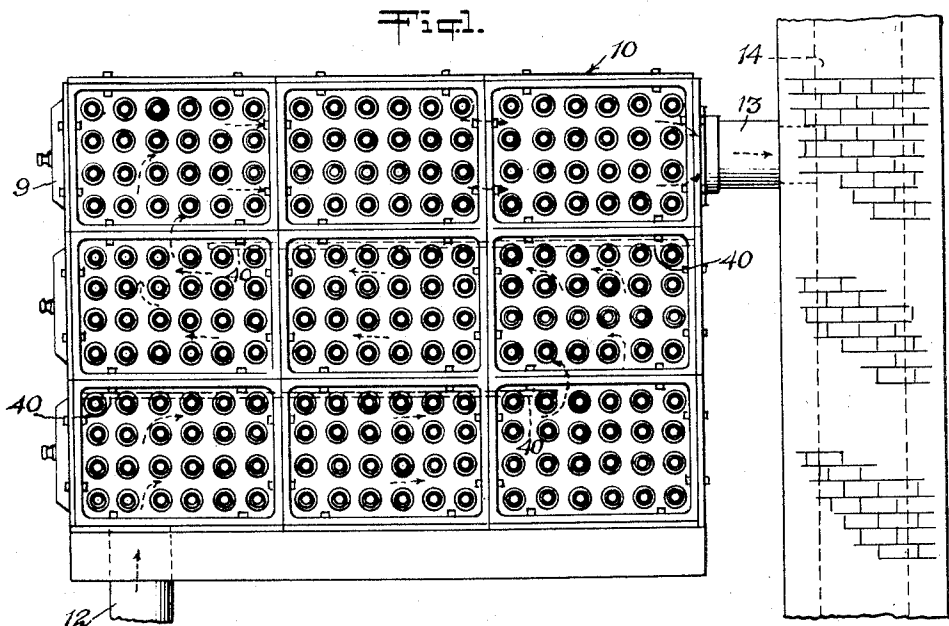
Nov. 8, 1949

R. C. WITTMAN
SECTIONAL HEATER

2,487,626

Filed April 21, 1945

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

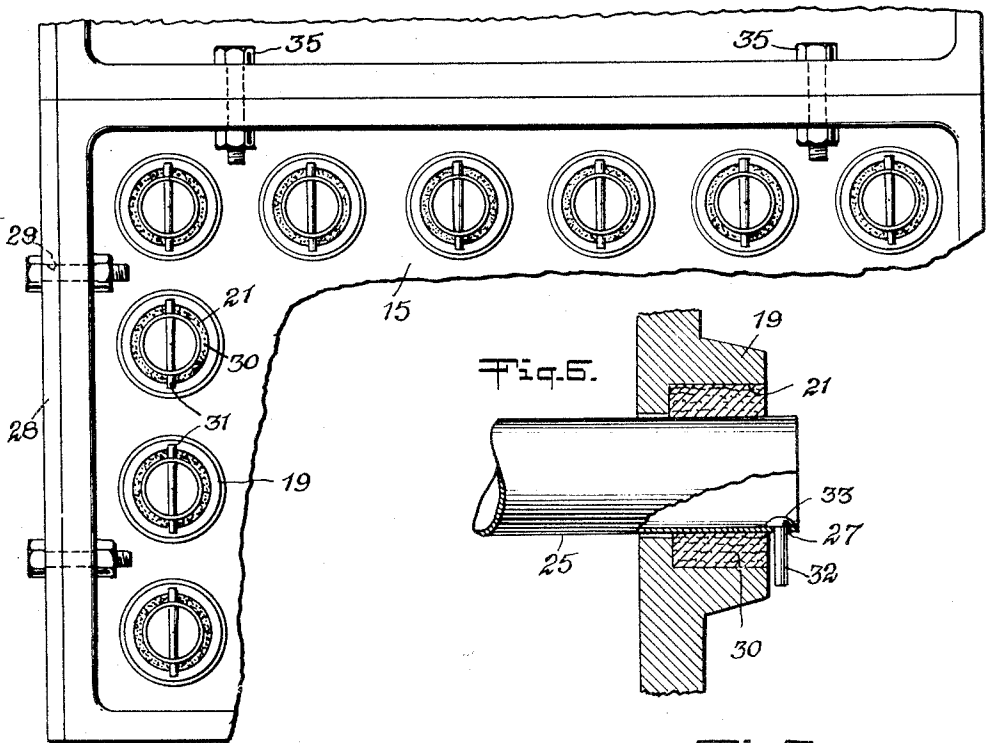


Fig. 5.

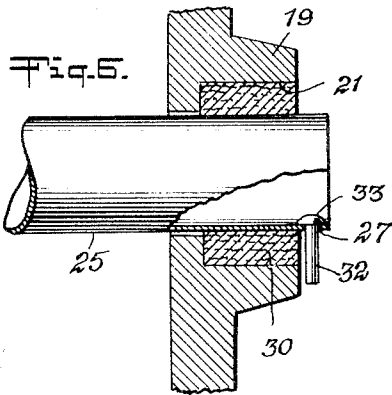


Fig. 4.

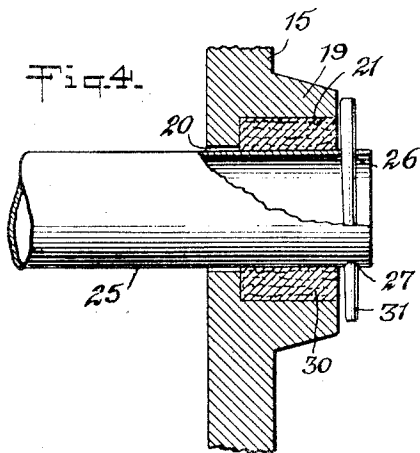


Fig. 6.

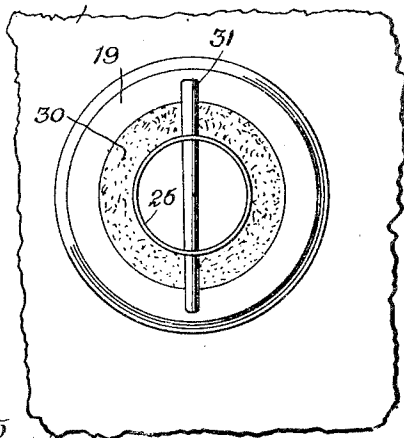
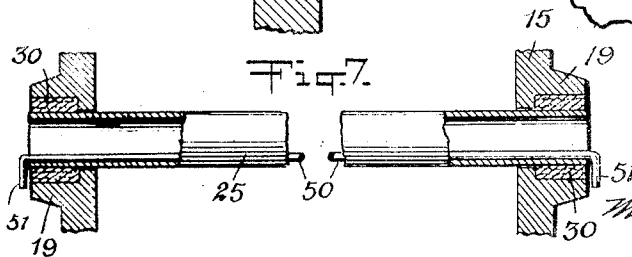


Fig. 7.



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UNITED STATES PATENT OFFICE

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SECTIONAL HEATER

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3 Claims. (Cl. 257-171)

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The present invention relates to improvements in sectional air heaters.

One of the objects of the invention is to provide a sectional air heater comprising a plurality of units which can be assembled in any desired number or arrangement to fit available space or to meet the requirements of each individual case.

Another object is to provide a sectional air heater that is completely collapsible for ease in transporting, assembling, or dismantling the same.

A further object is to provide a sectional air heater which can be expanded or contracted in size with a minimum of disturbance to the original or remaining units thereof.

Still another object is the provision of a sectional air heater that permits the removal or installation of individual heating tubes without disturbance to the other parts of the heater.

A still further object is the provision of a sectional air heater that allows unequal expansion and contraction of the different parts thereof without distortion or strain to any of the parts.

Another object still is the provision of a sectional air heater in which the direction of flow of the heated gases may be varied and changed at will.

A still further object is the provision of a sectional air heater which will serve either as a primary heater or as an auxiliary heater for use in connection with heated gases escaping from a primary heater.

Preferred embodiments of the invention are shown in the accompanying drawing in which—

Fig. 1 is a side view of an assembled sectional air heater of the type herein described and claimed;

Fig. 2 is a perspective view of one section of the sectional air heater;

Fig. 3 is a fragmentary side view of adjoining sections of said sectional air heater showing how they are joined;

Fig. 4 is a fragmentary sectional view through one of the tube sheets of one of the sections of said sectional air heater showing one system for mounting air tubes therein.

Fig. 5 is a fragmentary side view of the portion of the sectional air heater shown in Fig. 4;

Fig. 6 is a view similar to that of Fig. 4 show-

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ing another type of fastening means for the mounting of the air tubes in the apertures of the tube sheets; and

Fig. 7 is a fragmentary sectional view of another system for retaining air tubes in said sectional heater.

Referring now to Figs. 1, 2 and 3 of the drawing, the sectional air heater 10 herein described and claimed comprises either one or a plurality of sections 11 such as is clearly shown in Fig. 2. In Fig. 1 nine such sections 11 are shown joined together in three tiers of three sections each. Any number of sections disposed in any number of tiers may be used. The sectional heater 10 shown in Fig. 1 is connected at one end, generally its lower forward end, to an inlet pipe or duct 12 leading to a combustion chamber (not shown) and at another end, generally its upper rear end, to an outlet pipe or duct 13 leading to a chimney 14. Although the sectional air heater herein shown and described is an auxiliary heater, it may be used as a primary heater and in such case it would, of course, be installed immediately above a conventional fire box. Each front section of the sectional heater shown in Fig. 1 is provided with a door 9 for cleaning and other purposes.

Each section 11 comprises a pair of rectangular shaped tube sheets or plates 15 having a plurality of apertures 16 formed therein and a flange 17 extending around all four edges thereof. Apertures 18 are formed in said flange. It will be noted in Fig. 2 that when tube sheets 15 are placed in parallel planes facing one another, the apertures 16 of said sheets register, respectively, with one another. It will also be seen that apertures 18 occupy the same positions on the flanges of both tube sheets and that in no instance do they intersect the axes of said apertures 16. Referring now to Fig. 4 of the drawing, it will be seen that surrounding each aperture 16 on the outer side or surface of tube sheet 15 is a circular prominence or annular raised portion 19. It will also be seen that apertures 16 are stepped to form an inner portion 20 of relatively small diameter communicating with an outer portion 21 of relatively large diameter.

Other component parts of section 11 are open ended air tubes 25 which are provided at their end portions with transverse apertures 26 and 27,

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respectively, said apertures being in registration with each other, the upper of said apertures, namely aperture 26, being of slightly larger diameter than the lower of said apertures, namely aperture 27. Side plates 28, which are rectangular in shape and which are as wide as tube sheet 15 and as long substantially as tubes 25, are provided with apertures 29 which register with flange apertures 18 when the entire section is assembled or set up ready for assembling.

To assemble section 11, tubes 25 are inserted into apertures 16. It will be seen in Fig. 4 that there is considerable clearance between said tubes 25 and the walls of the smaller portion 20 of apertures 16 and that there is even greater clearance between said tubes 25 and the walls of the larger portions 21 of said apertures 16. It will also be noted that in this construction the ends of tubes 25 extend beyond circular prominences 19. To hold said tubes in place in tube sheets 15 and to seal the space between said tubes and the walls of said apertures 16, a cement or packing 30 is introduced into the annular space formed between said tubes 25 and the walls of the outer aperture portion 21. Said cement or packing comprises an elastic, fireproof material, to allow for unequal expansion and contraction of the tubes and the apertured walls. A tapered retaining pin 31 is inserted into apertures 26 and 27 at each end of each of said tubes 25. Its tapered form prevents it from slipping through said apertures 26 and 27.

Reference to Fig. 6 will show that a single aperture 27 at each end of each tube 25 will suffice to receive a retaining pin 32 having a head 33 of larger diameter than the pin proper. This retaining pin may be inserted into aperture 27 since its head will prevent it from falling through. It will be noted that pins 31 and 32 are spaced from circular prominences 19. The purpose of this is to allow for limited creeping of the tubes relative to the apertured walls, while at the same time preventing axial displacement of said tubes relative to said walls.

Referring now to Fig. 7, it will be seen that still another method and means of retaining the air tubes in the apertured walls is provided. In this construction, the air tubes do not project measurably beyond the outer limits of the circular prominences. Nor are the ends of the air tubes in this construction provided with apertures to receive pins, bolts or other similar retaining members. Instead, a retaining rod 50 whose ends 51 are bent at right angles, is laid in each said air tube 25, its bent ends hanging down by virtue of the attraction of gravity thereon and overlapping—at least to a slight extent—the lower portions of the circular prominences. Downwardly hanging ends 51 are spaced to a predetermined extent from the circular prominences to allow limited creeping of the air tubes relative to the apertured walls in which they are mounted. Beyond such limited creeping, however, axial displacement of said tubes relative to said walls is provided by engagement of said downwardly hanging ends 51 with the circular prominences.

It now appears that the previously described assembling operation takes advantage of flanges 17 and apertures 18 therein of tube sheets 15 and also of apertures 29 in side plates 28 above described. Each section of the air heater is assembled as shown in Fig. 2 and plates 28 are applied thereto as shown in Fig. 3. Bolts 35

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inserted through apertures 18 of flanges 17 of adjoining tube sheets 15 fasten adjoining sections of the air heater together, also as shown in Fig. 3. Baffle plates 40 may be placed upon tubes 25 in any preferred location to direct the flow of the gas. They may be dispensed with entirely, as in air heaters comprising a single section.

The present invention may not be a basic or revolutionary one but it is clear from its above described constructional features that practical and substantial improvements over air heaters now known have been provided. It is also clear that the construction above described may be changed and modified in different ways without departing from the basic principles of the invention.

I claim:

1. An airheater having a multi-sectioned chamber through which heated gases pass, each of said sections comprising a box-shaped unit having flanged walls by which adjoining sections may be fastened together to form a chamber of any desired size, comprising thickened portions formed on opposite walls of each of said sections, registering holes formed in said walls through said thickened portions, open-ended air tubes extending through said chamber and through said holes, annular enlargements formed in said holes to provide relatively large packing spaces between said tubes and said walls, asbestos cement packing in said annular spaces providing a relatively elastic seal between said tubes and said walls, a retaining member in each of said tubes, said retaining member comprising an elongated rod having downwardly extending ends, said rod being disposed within the tube, its ends extending outwardly from said tube and engaging the wall adjacent thereto.

2. An air heater having a multi-sectioned chamber through which heated gases pass, each of said sections comprising a box-shaped unit having flanged walls, said sections being adapted to be joined to each other by means of said flanges, comprising a plurality of relatively large registering apertures formed in opposite walls of said sections, a circular prominence formed on the outer face of each apertured wall concentric with each said aperture, an annular recess formed in each said circular prominence concentric with the hole around which said circular prominence is formed, a plurality of open-ended air tubes extending through said sections and through said holes, asbestos cement packing occupying the annular recesses formed between said circular prominences and said air tubes, and means for preventing said air tubes from falling out of said holes while at the same time allowing limited axial movement of said air tubes, said means comprising a plurality of rods having their opposite ends bent at right angles to themselves, said rods being disposed within said tubes, their bent ends gravitating downwardly and engaging the outer portions of said circular prominences, as well as engaging the ends of the tubes.

3. An air heater formed of multi-sectioned units, each unit comprising spaced sheets having aligned apertures therein, pipes extending between said sheets and disposed loosely in said apertures, thickened portions on the outer faces of said sheets around said apertures, said portions having recesses to receive packing material to seal the pipes in position, rods extending through the pipes and having bent ends to lie transversely of the ends of the pipes to permit

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creeping of the pipes but to prevent undue displacement thereof with respect to the sheets, peripheral flanges around the sheets to protect the pipe joints and having means thereon to permit connection to other sections and for attachment thereto of closure plates and doors.

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