Aug. 5, 1969 M. R. WAGNER 3,459,258

HEAT EXCHANGER SUPPORTS

Filed July 21, 1966 2 Sheets-Sheet 1

Fig. 1.

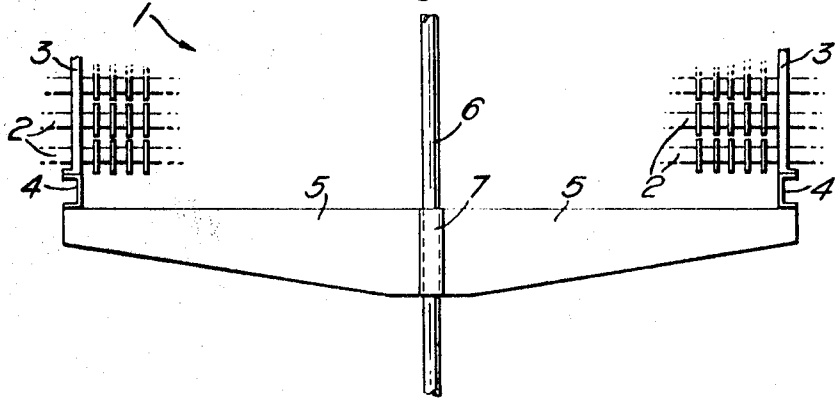



Fig. 2.

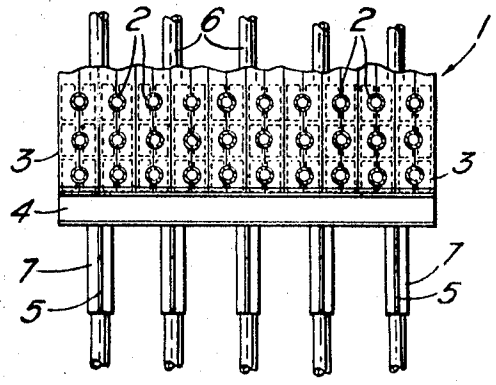
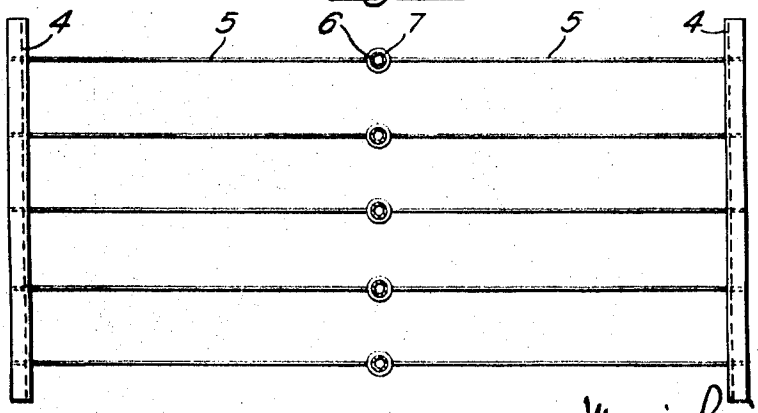



Fig. 3.




Inventor
Maurice Reginald Wagner
By Dowell Howard
Attorneys

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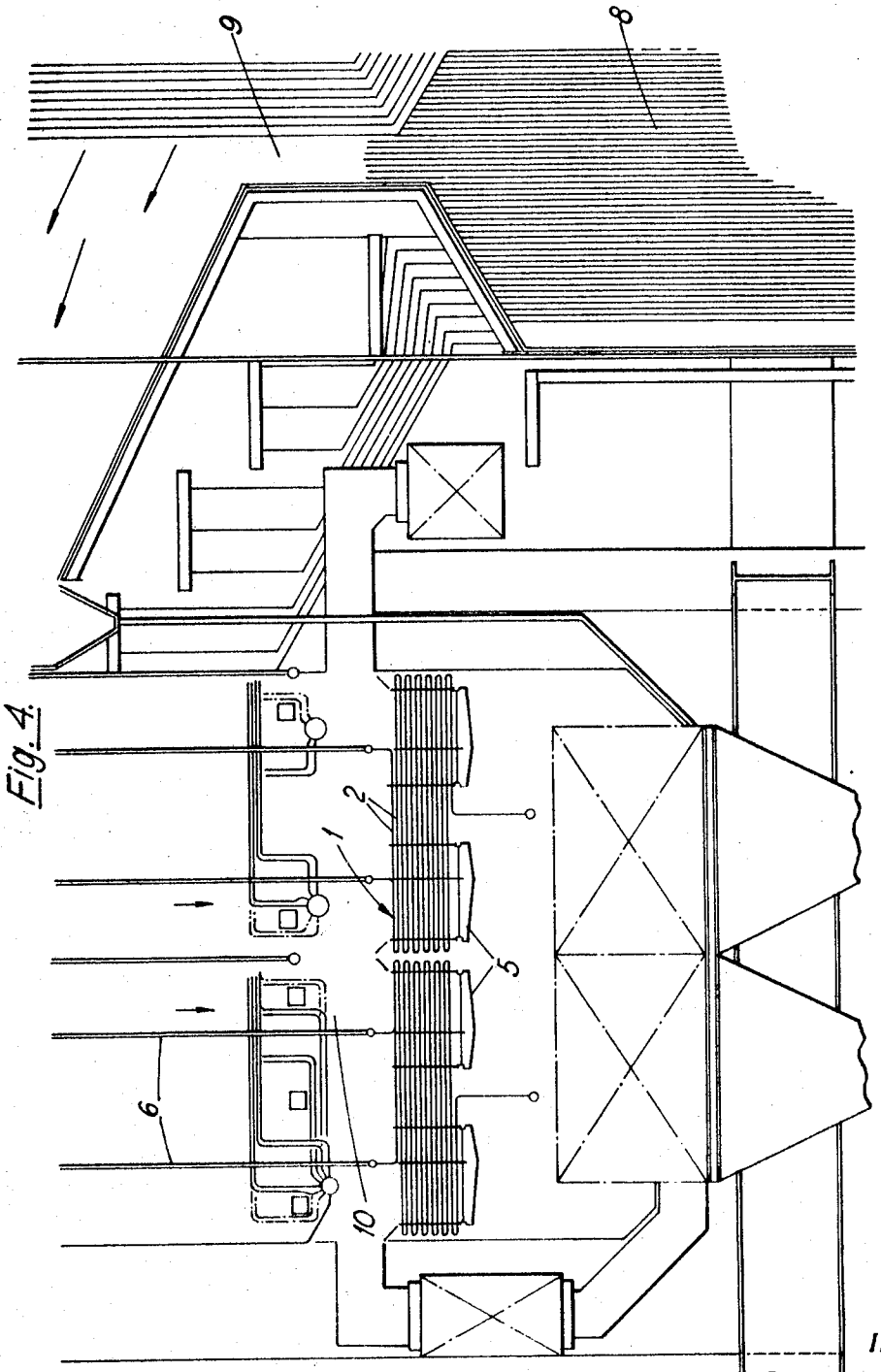



Fig. 4

Inventor
Maurice Reginald Wagner
By
Darrell H Dowell
Attorneys

United States Patent Office

3,459,258

Patented Aug. 5, 1969



3,459,258

# HEAT EXCHANGER SUPPORTS

Maurice Reginald Wagner, London, England, assignor to E. Green and Son Limited, Wakefield, Yorkshire, England, a British company

Filed July 21, 1966, Ser. No. 567,002
Claims priority, application Great Britain, July 26, 1965, 31,901/65
Int. Cl. F28f 9/00; F22b 37/24
U.S. Cl. 165—67 4 Claims

## ABSTRACT OF THE DISCLOSURE

A heat exchanger comprising a bank of heat exchanger tubes supported in a heating chamber by vertical supports suspended from above, wherein the heat exchanger tubes are supported at points spaced along their length by cantilevers attached to the vertical supports.

This invention relates to the supporting of tubular heat exchangers such as economisers in which plain gilled or finned tubes are connected together by bends in order to form an element in which water flowing inside the tube is heated by hot gases flowing over the external surface of the tube.

For the purpose of illustration one such element may comprise a series of straight tubes say 12 in number which are connected by bends into a flat serpentine coil erected with the tubes horizontal and in line vertically. Each unit or heat exchanger bank would comprise a number of elements as described arranged side by side.

The invention relates particularly to a construction for supporting such heat exchangers on vertical tubes or bars suspended from above as is required for instance to enable the heat exchanger to be supported in a chamber surrounded by water walls.

According to the invention, cantilevers are used to distribute the weight of the heat exchanger elements evenly to the vertical supports. These cantilevers enable the heat exchanger elements to be supported at a greater number of more closely spaced points than would be possible if the elements were attached directly to the vertical support tubes. The cantilever support is arranged in such a way that it can carry a number of elements without interfering wih the flow of gases over the exterior of the tube. A convenient number of six elements may be arranged in one group as an example, and for illustration purposes, this group of elements may be connected to three vertical supports.

The invention will be fully understood from the following more detailed description by way of example of one embodiment thereof, reference being made to the accompanying drawing in which:

FIGURE 1 is a fragmentary elevation showing the essential elements of a support constructed according to the invention,

FIGURE 2 is a sectional elevation taken at right-angles to FIGURE 1,

FIGURE 3 is a sectional plan, and

FIGURE 4 is a diagrammatic view showing a steam generator having a chamber with water walls and with



an economiser located therein which is supported by supporting elements according to my invention.

In the drawing the reference numeral **1** is applied to a heat exchanger bank consisting of a number of elements disposed side by side. Only the lowermost tubes **2** of the elements are shown in FIGURES 1 and 2 but it is to be understood that each element consists of a serpentine coil composed of a considerable number of horizontal lengths of tubing **2** disposed one above the other. The complete bank thus consists of a dense array of parallel lengths of tubing.

Each element of the bank is supported at points spread along the lengths of the tubes by supporting posts **3** each composed of two halves clamped together so as to trap the tubes **2** between them. Each half of the post **3** is formed with semi-circular recesses designed to receive the tubes **2** and of such dimensions as to leave the tubes free to move longitudinally to allow for thermal expansion and contraction.

The posts **3** are supported at their lower ends on cross-beams **4** which in turn are supported on the ends of the cantilevers **5** each of which is carried by a vertical support **6** suspended from above. In the construction shown, each cantilever is made in two halves so as to form a sleeve **7** surrounding the support **6**, the sleeve being welded to the support.

The support arrangement is particularly effective when used in conjunction with tubes **2** having extended heating surfaces such as the gills or fins shown in the drawing. Due to the location of the vertical supports **6** between the elements, the horizontal spacing of the tubes **2** is greater than is required to obtain the most efficient heat exchanger with plain tubes. The fins or gills take full advantage of this spacing.

The supports **6** may be tubes forming part of the water circulation system or they may be solid bars or rods suspended from suitable supports at the upper end of the boiler casing.

Although only one set of vertical supports **6** and cantilevers **5** are visible in the drawings, it is to be understood that there are two or more sets of supports and cantilevers spaced apart in the direction of the lengths of the tubes **2**. The number of sets required depends on the length of each element. A feature of the invention is the design and positioning of the elements so that the ends of each cantilever are equally loaded. This ensures that the loads transferred to the supports **2** are balanced and distortion of the supports is thus avoided.

In FIGURE 4, a steam generator is disclosed wherein an economiser **10** is supported by the structure set forth in FIGURES 1–3. Elements **8** and **9** set forth the membrane wall structure which is quite common to steam generator structure.

I claim:

**1.** In a steam generator, the combination of heating chamber, water walls surrounding said heating chamber, a plurality of horizontally disposed heat exchanger tubes extending across said chamber, a plurality of vertical supports suspended within said chamber, said vertical supports being arranged in groups extending in a direction transverse to said tubes and spaced apart in the direction of the lengths of said tubes, a cantilever attached to each of said vertical supports and extending in the direction of

the lengths of said tubes, and means for supporting said tubes on the ends of said cantilevers.

2. A heat exchanger as claimed in claim 1 wherein the heat exchanger tubes are carried by vertical support posts which stand on cross beams which in turn are supported on the ends of the cantilevers.

3. A heat exchanger as claimed in claim 1 wherein the heat exchanger tubes have gills or fins.

4. In a heat exchanger having a chamber containing heat exchanger tubes, a plurality of vertical supports suspended within said chamber, said vertical supports being arranged in groups extending in a direction transverse to said tubes and spaced apart in the direction of the lengths of said tubes, a cantilever attached to each of said vertical supports and extending in the direction of the lengths of said tubes, and means for supporting said tubes on the ends of said cantilevers.



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FRED C. MATTERN, JR., Primary Examiner

MANUEL ANTONAKAS, Assistant Examiner

U.S. Cl. X.R.

122—510; 165—162