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(54) Finned pack heat exchanger provided with side stiffening and reinforcing section members for refrigerating, conditioning and heating apparatus

(57) A finned pack heat exchanger (1) comprises a plurality of longitudinal parallel pipes (3) and cross fins (4), provided with holes therein are engaged the pack forming pipes, the pipe pack being stiffened by side reinforcing section members (9) having a C-shape bearing on side supporting and guiding section members (8), applied to the apparatus the heat exchanger is associated with.

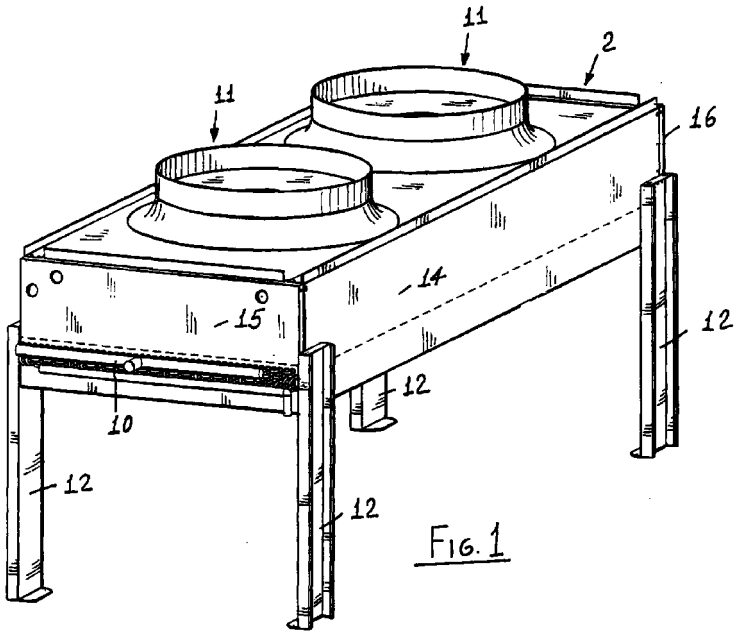

FIG. 1

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Description

[0001] The present invention relates to a finned pack heat exchanger, including side stiffening and reinforcing section members.

[0002] The side stiffening and reinforcing section members, in particular, are supported and held in their set positions by lateral guides applied to refrigerating, conditioning and heating apparatus.

[0003] The subject finned pack heat exchanger has been provided for overcoming the great drawbacks affecting prior available heat exchangers.

[0004] Actually, the latter are conventionally made by using pipes, fins, manifolds and a containment frame.

[0005] As is known, through the pipes a fluid flows which, depending on the use of the heat exchanger, can comprise hot water, cool water or a vaporizing or condensing fluid, such as in the case of the so-called ventilated condensers.

[0006] Air is conventionally caused to pass through the mentioned fins.

[0007] The mentioned manifolds operate to evenly distribute the operating fluid through the pipes or tubes of the heat exchanger.

[0008] The frame is made of side and middle supporting plates, which are provided with calibrated holes therethrough the heat exchanger pipes pass.

[0009] Covering elements for the finned packs can be moreover provided.

[0010] The finned pack of conventional heat exchangers is essentially supported by the tubes or pipes passing through the side and middle plates of the frame.

[0011] The latter also operates to allow the heat exchanger to be assembled or mounted in a more complex apparatus, conventionally also provided with ventilating assemblies.

[0012] Depending on their intended use, the mentioned apparatus are called air conditioners, air vaporizers, condensers, as ventilated and cooled by a liquid.

[0013] A very critical aspect of the above mentioned apparatus and, in particular, of the ventilated condensers, is the possibility of breaking of the pipes or tubes.

[0014] This drawback frequently occurs at the contacting points of the frame plates, because of the mechanical stress occurring during the shipment, assembling or normal operation, and because of thermal expansions and vibrations.

[0015] The above breaking drawbacks are very dangerous in the case of hyper-stores and store installations in general, in which the ventilated condensers supply refrigerating systems for refrigerating food or other materials, to be preserved under low temperature conditions.

[0016] In the above mentioned systems, said ventilated condensers are also used for air conditioning purposes.

[0017] In the case in which the ventilated condensers are used for refrigerating food products, a possible breaking or malfunction of a system would be very dangerous, and the overall system would be inoperative for a comparatively long time.

[0018] Moreover, in a breaking event, the refrigerating fluid leaks to the atmosphere, with a great economic and environmental damage and with the impelling requirement of quickly operating for recovering the system.

[0019] Furthermore, if the system has a large size, it is necessary a lot of time for performing the recovering operations, and the food products to be preserved under low temperature conditions, can be seriously spoiled.

[0020] This, for example, occurs in the case of the sur-frozen food products, which, as are defrozen, cannot be frozen again and must be necessarily discarded.

[0021] In order to prevent the above mentioned drawbacks from occurring, a novel finned pack heat exchanger has been designed, the construction of which comprises side stiffening section members and in which the finned pack is laterally suspended, thereby it is supported so as to fully prevent the tubes and side and middle plates of the frame from contacting one another.

[0022] The subject finned pack heat exchanger construction provides to use exchanger pipes or tubes arranged parallel to one another, as well as cross arranged fins having standard size and features conventionally characterizing heat exchangers for air conditioning, refrigerating and industrial applications.

[0023] This novel system is constructed by assembling on the side edges of the fins, in the tube direction, a plurality of specifically designed section members operating to stiffen the finned pack.

SUMMARY OF THE INVENTION

[0024] Thus, the main object of the present invention is to provide a strong bearing and assembling system for the mentioned types of heat exchangers.

[0025] Another object of the present invention is to provide reinforcing side section members also designed for allowing the finned pack to thermally expand and being coupled to the fins by an adhesive material or similar anchoring systems.

[0026] Another object of the present invention is to provide a construction including reinforcing section members, for finned pack heat exchangers, which are adapted to be suitably supported by other supporting and guiding section members, as affixed to side panels of refrigerating, conditioning and heating apparatus.

[0027] Yet another object of the present invention is to provide supporting section members having any desired shape and size to properly support the heat exchanger while allowing it to easily slide.

[0028] According to one aspect of the present invention, the above mentioned objects and advantages

of the present invention, and yet other objects which will become more apparent hereinafter, are achieved by a finned pack heat exchanger, characterized in that said finned pack heat exchanger comprises a plurality of parallel longitudinal tubes and cross fins having holes therein said pack forming tubes or pipes are housed.

[0029] The pipe or tube pack, in particular, is stiffened by side reinforcing section member of C-cross section which bear on supporting side section members or other similar supporting and sliding systems, applied to the apparatus the heat exchanger is assembled to.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The above and other features of the finned pack heat exchanger according to the present invention will become more apparent hereinafter with reference to the figures of the accompanying drawings, where:

Figure 1 is a top side perspective view illustrating a refrigerating apparatus to which a conventional type of heat exchanger has been applied;

Figure 2 is a further side perspective view, partially opened, illustrating a refrigerating device to which has been applied a finned pack heat exchanger according to the present invention;

Figure 3 is a cross-sectioned front view illustrating a portion of a sidewall supporting a plurality of supporting and guiding section members of the finned pack heat exchanger according to the present invention;

Figure 4 is a detail view illustrating a cross section of a finned pack having upturned fins and the tubes or pipes housed in holes formed through said fins;

Figure 5 is an open front side perspective view illustrating a detail of a side wall of a refrigerating apparatus, to which are applied a L-shape supporting section member, a finned pack including C-shape reinforcing side section members and a top L-shape guiding section member;

Figure 6 is a cross-sectioned side view illustrating a portion of a finned pack heat exchanger according to the present invention; and

Figure 7 is a further top side perspective view illustrating the construction of the finned pack heat exchanger according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0031] With reference to the number references of the figures of the accompanying drawings, the finned pack heat exchanger according to the present invention, which has been generally indicated by the reference number 1, is made starting from a plurality of longitudinal parallel pipes or tubes 3, therethrough a fluid is caused to flow, and a plurality of cooling cross fins 4, having a plurality of holes 18 therein said pack forming pipes or tubes 3 are engaged.

[0032] The tube pack, in particular, is stiffened, according to one aspect of the present invention, by side reinforcing section members 9, bearing on side supporting section members 8 and guiding section members 7, applied to the side walls 14 of the apparatus 2 the subject construction 1 is assembled to.

[0033] In the case of the finned pack heat exchanger 1 according to the present invention, the reinforcing and supporting section members 9 are coupled to the cross fins 4 by an adhesive material or other suitable anchoring means.

[0034] In particular, the mentioned side reinforcing and supporting section members 9 have a C-shape cross section.

[0035] One of the main features of the present invention is that the mentioned reinforcing and supporting section members 9 are provided with gaps or interruptions for allowing the tubes 3 to thermally expand and, accordingly, for allowing the thermal expansion of the several portions forming the finned pack, without imposing any mechanical stress on the tubes or pipes 3 forming the heat exchanger 1.

[0036] In operation, the heat exchanger 1 is assembled on the body of the apparatus 2 and, more specifically, on its ventilated condensers, so as to cause the C-shape reinforcement side section members 9 to bear on the supporting 8 and guiding 7 section members as preliminarily coupled to the side walls 14 of the panels forming the framework for holding a heat exchanger 1.

[0037] In particular, the side and frontal plates 14 and 15 of the heat exchanger 1 according to the invention, providing a suitable mechanical strength to the apparatus 2 structures thereon they are assembled, are provided with openings 6' or holes 6 for allowing tubes 3 having a diameter larger than that of the latter to pass therethrough, so as to prevent any contacts of the tubes or pipes 3 and plates 15.

[0038] In this connection it should be pointed out that the subject heat exchanger 1 is made so that the tubes 3 of the heat exchanger and the other components of the apparatus do not contact one another.

[0039] In other words, said finned pack heat exchanger 1 is supported by the apparatus 2 to which it is applied at the side reinforcing section members 9 bearing on the side supporting section members 8 which are in turn applied to the side walls 14 in parallel to the laying direction of the tubes or pipes 3.

[0040] As is clearly shown in Figure 3, the subject finned pack heat exchanger 1 is moreover provided with holes 18 formed through the fins 4, which are delimited by upturned portions 5 defining the holes having the

diameter of the pipes or tubes 3.

[0041] The L-shape side supporting 8 and guiding 7 section members are coupled to the side walls 14 of the apparatus to which the subject finned pack heat exchanger 1 is applied.

[0042] On the contrary, the C-shape reinforcing section member 9 is glued or made rigid in any other suitable manners to the subject finned pack heat exchanger, which will be free of sliding on the guiding 7 and supporting 8 section members, respectively.

[0043] Said section members 7 and 8 will both operate as guides in the case in which the apparatus is vertically installed.

[0044] While the invention has been disclosed with reference to preferred embodiments thereof, it should be apparent that the disclosed embodiments are susceptible to several modifications and variations all of which will come within the scope of the appended claims.

Claims

1. A finned pack heat exchanger, characterized in that said finned pack heat exchanger comprises a plurality of longitudinal parallel tubes and cross fins, provided with holes therein said pack forming tubes are engaged, said tube pack being stiffened by side reinforcing section members bearing on side supporting and guiding section members applied to an apparatus to which the heat exchanger is assembled.

2. A finned pack heat exchanger according to Claim 1, characterized in that said reinforcing section member are coupled to said cross fins by an adhesive or other anchoring means.

3. A finned pack heat exchanger according to the preceding claims, characterized in that said reinforcing section members have a C-shape cross section.

4. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that said reinforcing side section members are provided with gaps for allowing said tubes to thermally expand and for consequently allowing the portions forming said finned pack to thermally expand.

5. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that said reinforcing side section members are designed for sliding between side guiding section members and side supporting section members of L-shape.

6. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that said finned pack heat exchanger comprises supporting section members for housing therein and slidably supporting the heat exchanger, as the latter is vertically assembled.

7. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that said heat exchanger is assembled on a body of an apparatus, in particular a ventilated condenser, by causing said side reinforcing section member to bear and slide on the supporting and guiding section members respectively as preliminarily coupled to side panels of said apparatus.

8. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that the side and middle plates mechanically stiffening said apparatus are provided with openings or holes for allowing said tubes to pass therethrough, said opening or holes having a diameter greater than that of said tubes in order to prevent any contacts of said tubes and the walls of the frame provided for containing the heat exchanger.

9. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that said heat exchanger is supported by the apparatus to which it is applied at said side reinforcing section members bearing on side supporting elements laterally applied to the walls of said apparatus and in parallel to said tubes therethrough heating or refrigerating fluids are caused to flow.

10. A finned pack heat exchanger according to one or more of the preceding claims, characterized in that said finned pack heat exchanger is provided with a specifically designed configuration and construction and as broadly disclosed and illustrated and for the intended objects.

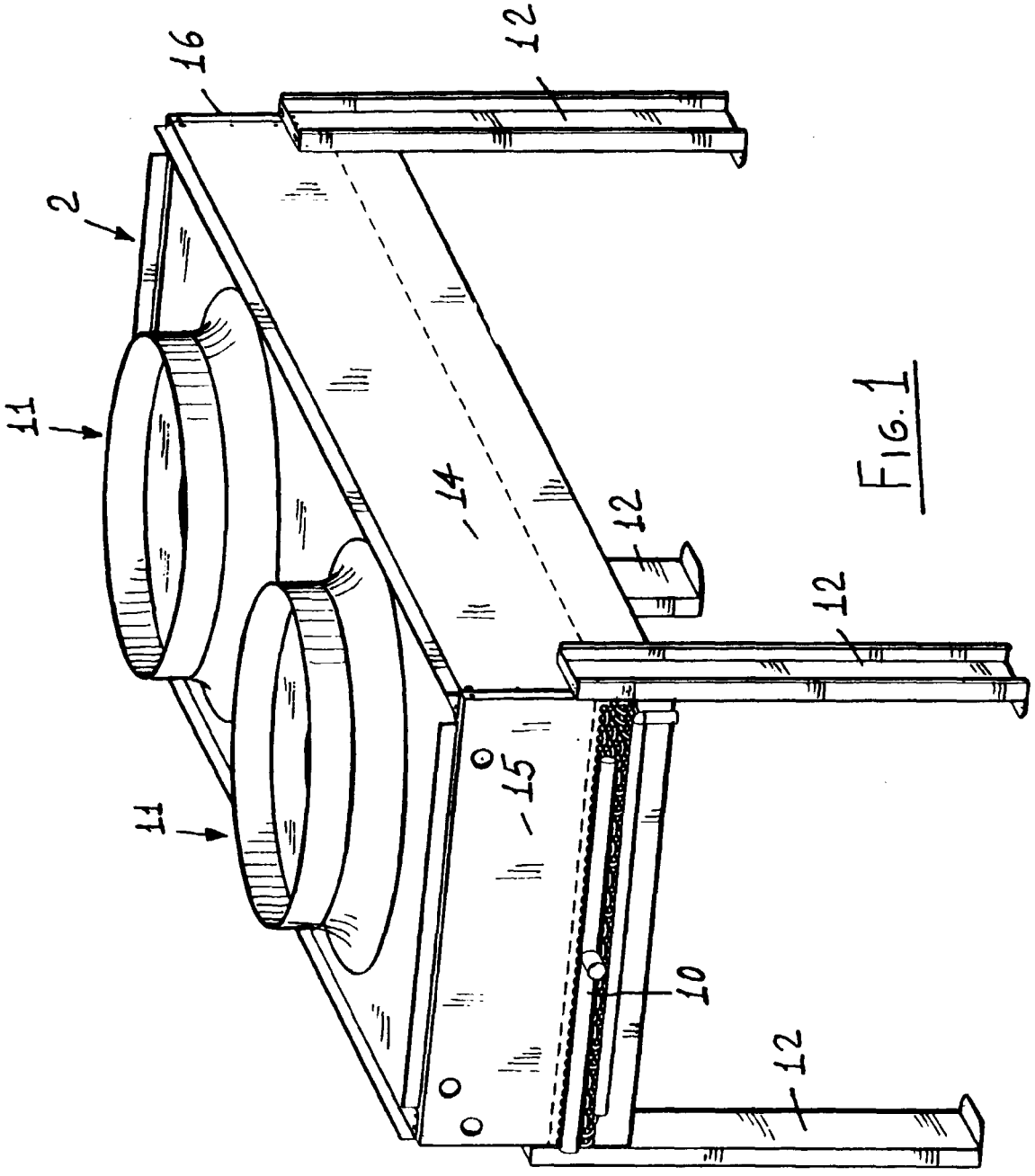

FIG. 1

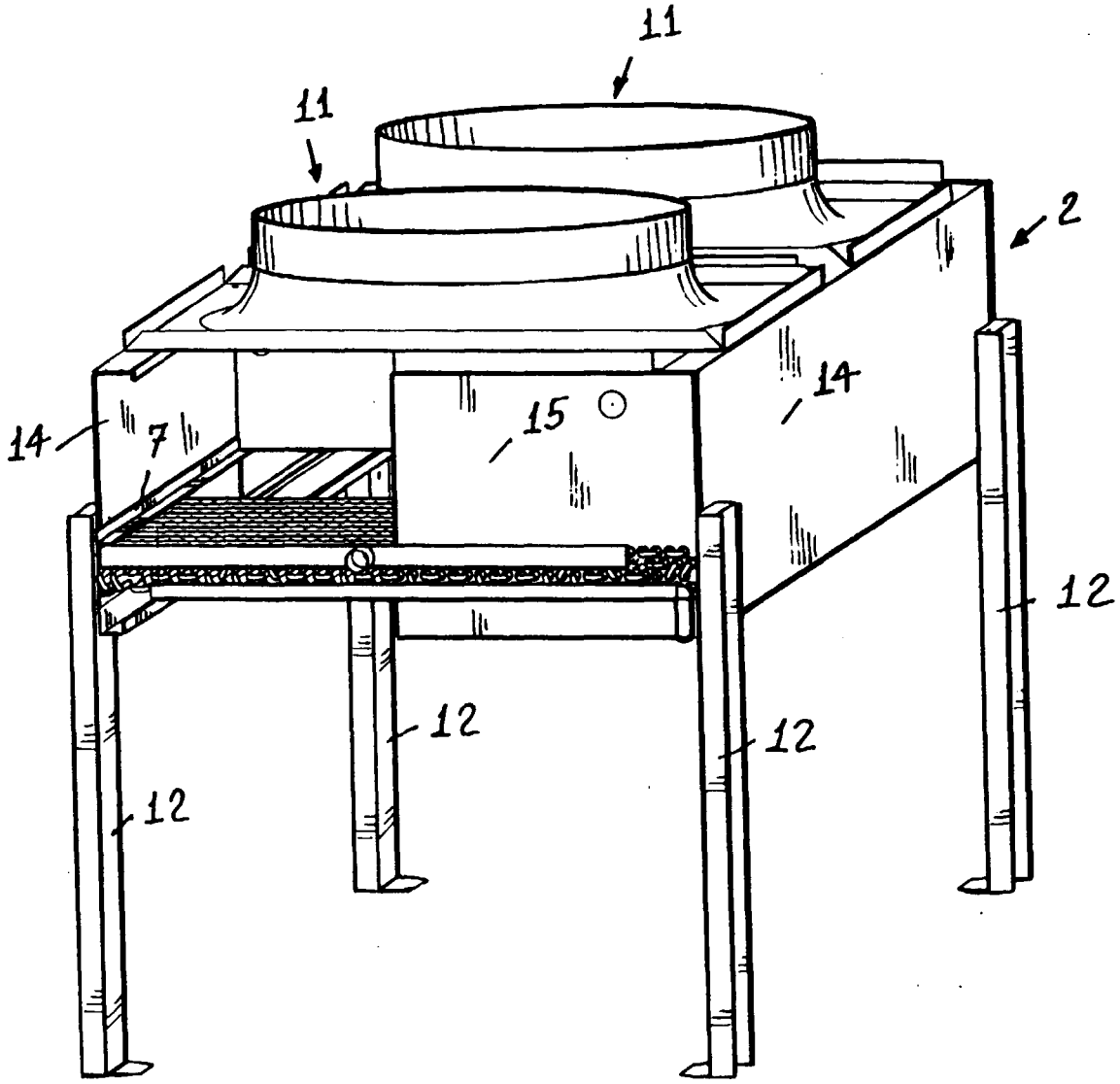

FIG. 2

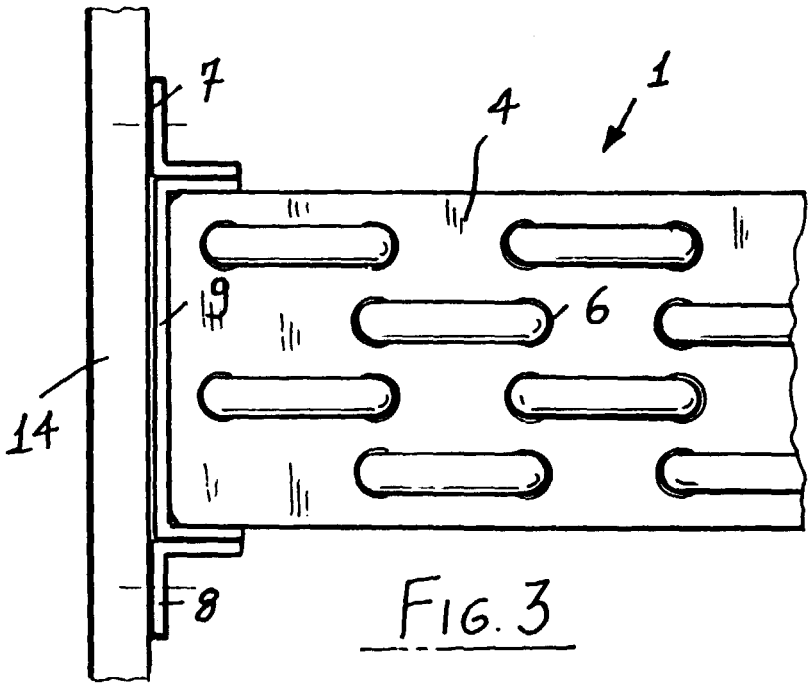

FIG. 3

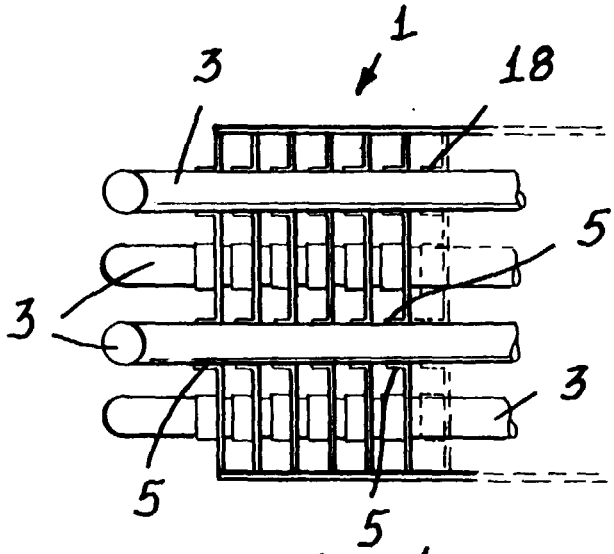

FIG. 4

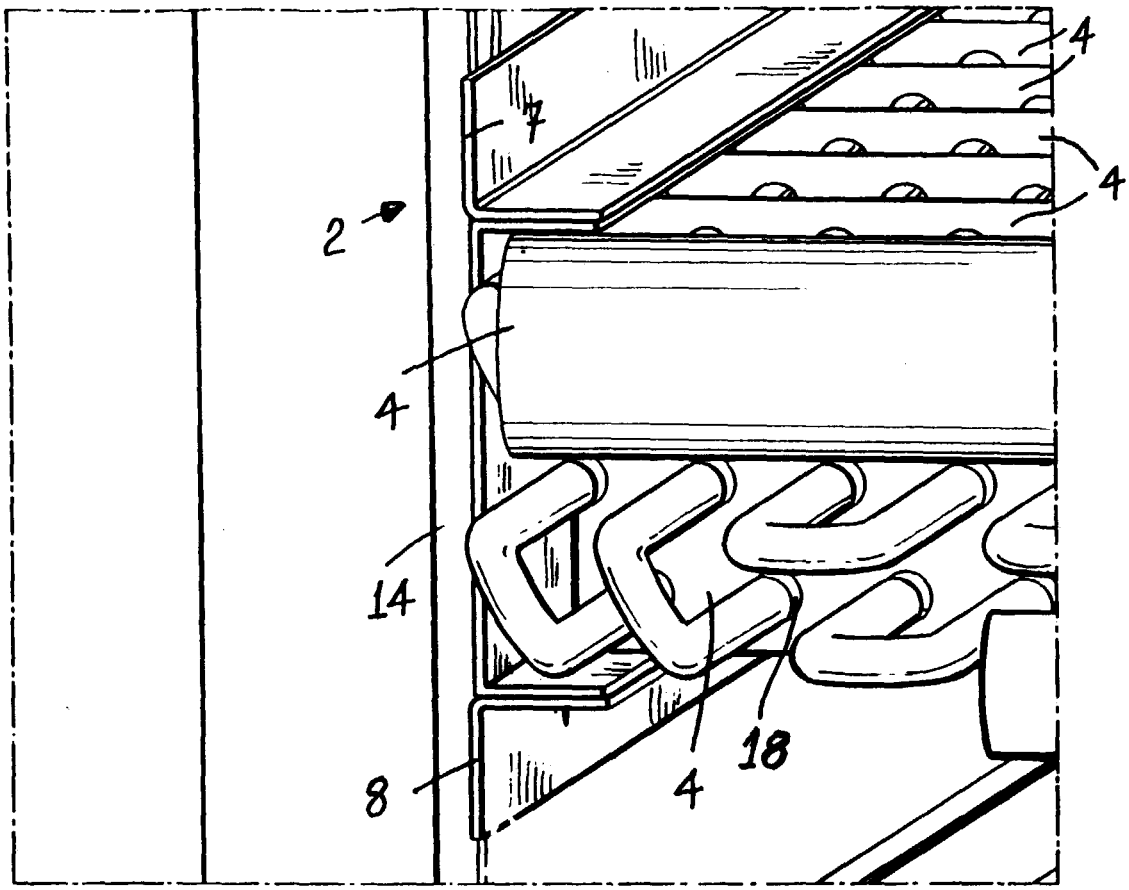

FIG. 5

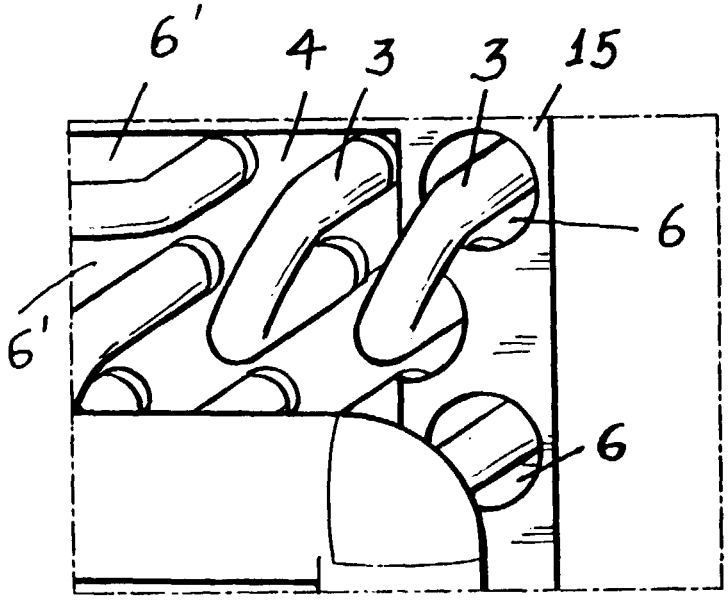

FIG. 6

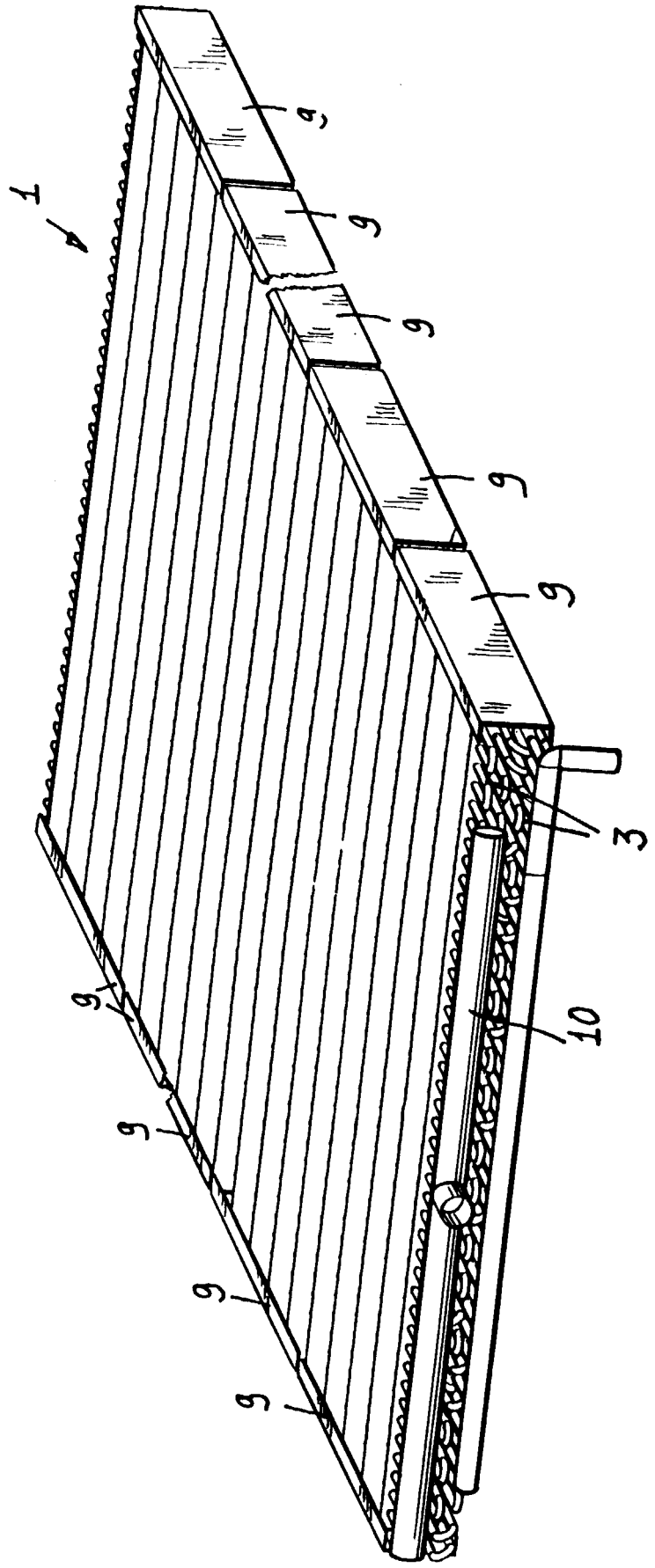

FIG. 7