Sept. 8, 1931. C. R. WAYMAN 1,821,995

REFRIGERATING APPARATUS

Filed March 28, 1929 3 Sheets-Sheet 1

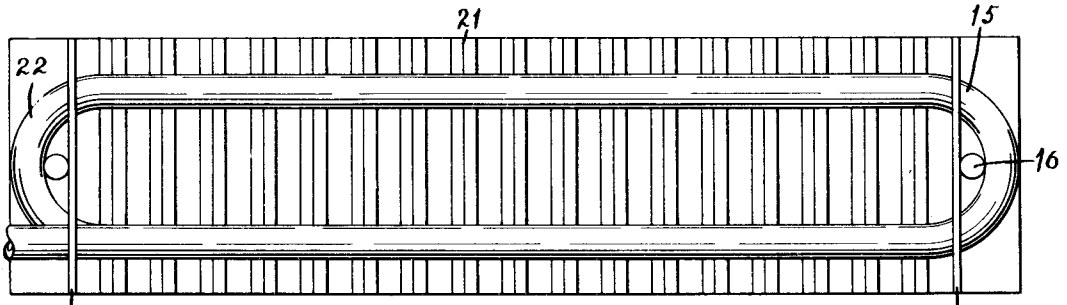


Fig. 2

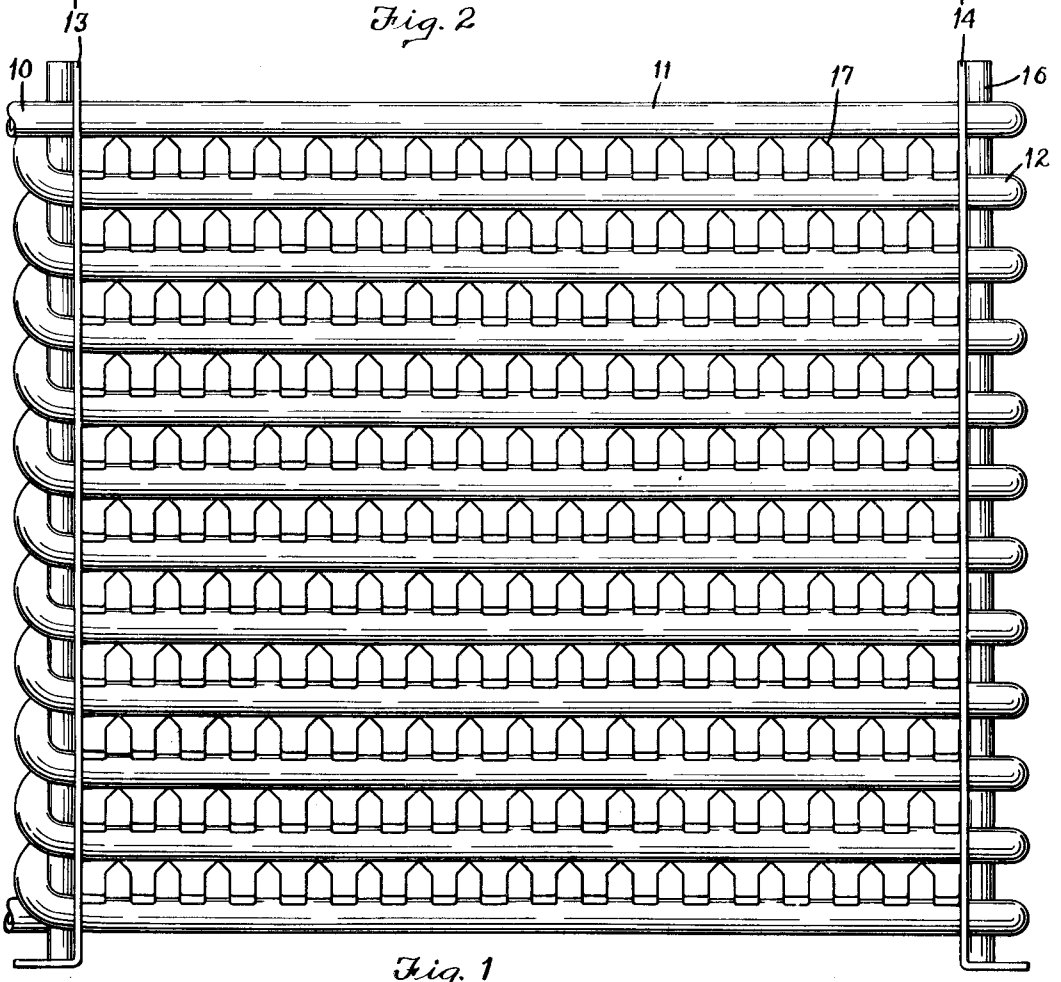


Fig. 1

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REFRIGERATING APPARATUS

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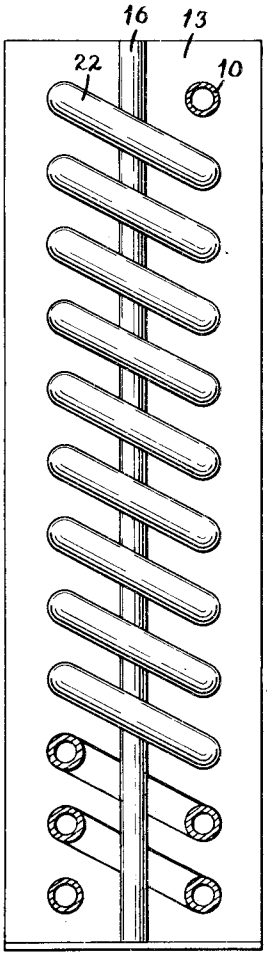


Fig. 5

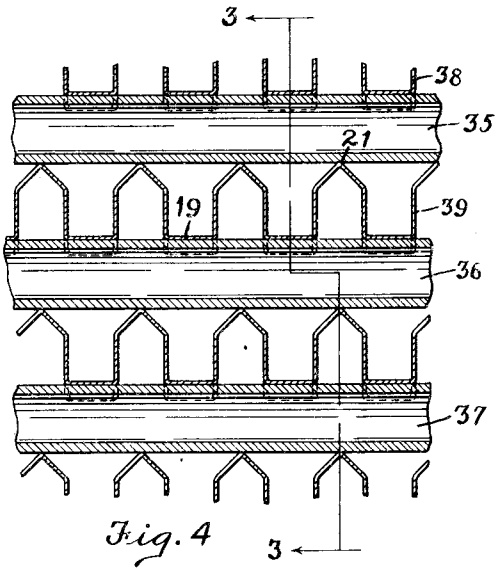


Fig. 4

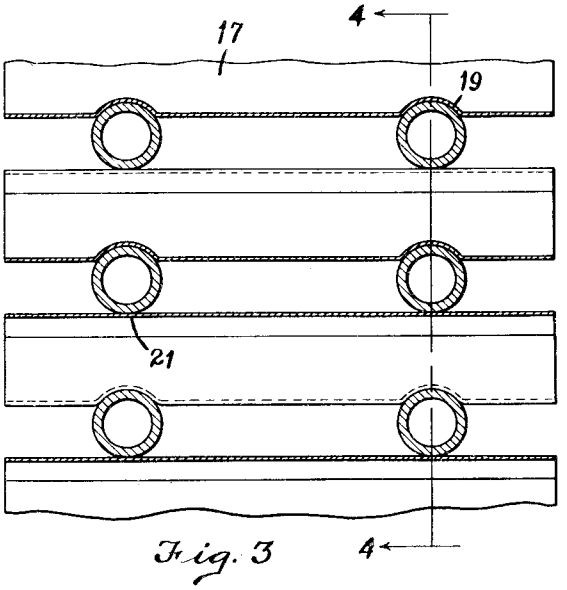


Fig. 3

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REFRIGERATING APPARATUS

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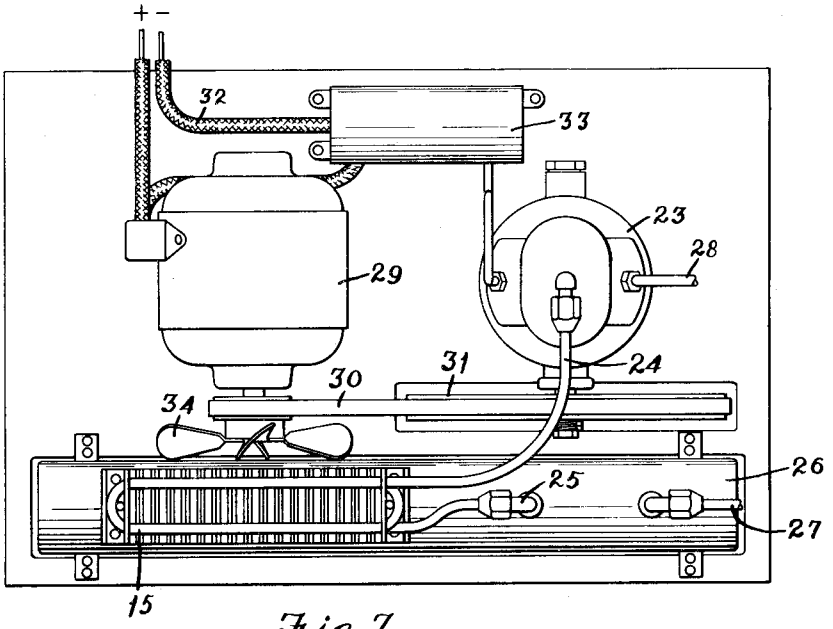


Fig. 7

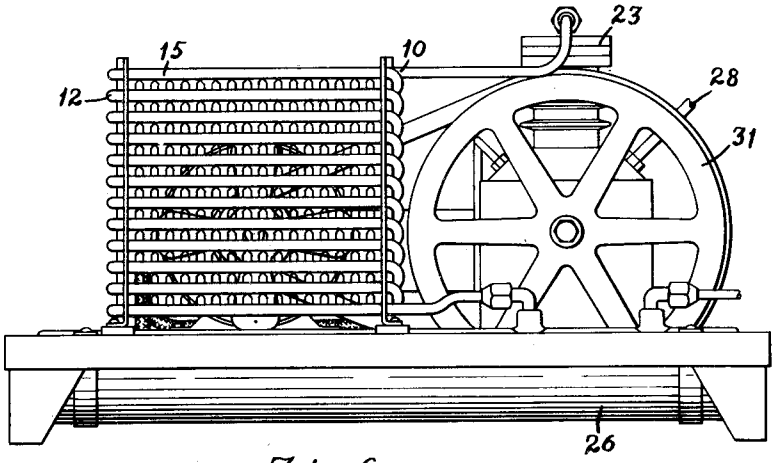


Fig. 6

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1,821,995

UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

Application filed March 28, 1929. Serial No. 350,693.

This invention relates to refrigerating apparatus and especially to the cooling means for the refrigerant in said apparatus.

An object of the invention is to efficiently cool the refrigerant in a refrigerating apparatus.

Another object of the invention is to prevent the warm refrigerant from conducting its heat to refrigerant already cooled.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front view of a condenser constructed according to the invention;

Fig. 2 is a top view of Fig. 1;

Fig. 3 is an enlarged cross-section on line 3—3 of Fig. 4;

Fig. 4 is a cross-section on lines 4—4 of Fig. 3;

Fig. 5 is an end view of Fig. 1;

Fig. 6 is a front view of a refrigerator apparatus in which is installed the refrigerating condenser of Fig. 1; and

Fig. 7 is a top view of Fig. 6.

This invention is an improvement on the copending application of Otto M. Summers, Serial No. 350,735, filed simultaneously herewith. As disclosed in Fig. 1 the condenser is preferably made of a continuous tube or conduit 10 with a top horizontal portion 11 extending through two end supports 13 and 14 and then bent into a loop 15 about a rod or stiffener 16. A fin 17 is placed under this horizontal section. This fin 17 has certain U-shaped sections with a curved base to fit the tube 10. These U-shaped sections alternate with an inverted V-shaped section having an apex or top edge 21. This fin 17 is preferably placed with the edges 21 contacting with the horizontal portions of the U-shaped section formed by two straight portions 11 and loop 15. The tube is bent at 22 downward into another horizontal portion or section 12 in contact with the curved bases 19 of the fin. The tube or conduit is then continuously formed of a plurality of horizontal sections spaced by fins of the form already described. The number of horizontal sections and fins is a matter of choice.

This condenser may be used with other refrigerating apparatus of any convenient design. In Figs. 6 and 7 the condenser is illustrated as incorporated in the design of refrigerating apparatus although it is not limited to being associated with the particular refrigerating apparatus thus disclosed. The condenser is connected by a conduit 24 to a compressor 23 and also by a conduit 25 to a receiver 26. From the receiver 26 a conduit 27 extends to a cooling unit preferably of the flooded float control type illustrated in the patent to R. G. Osborn 1,556,708, issued October 13, 1925. A conduit 28 returns the refrigerant to the compressor 23. The compressor is run by a motor connected thereto through the belt 30 and compressor pulley 31. The motor has the connections 32 extending to a valve and snap switch under the cover 33 to automatically start or stop the motor as the supply of refrigerant in the cooling unit demands. A fan 34 is utilized to send cooling breezes over the surface of the condenser. This fan as disclosed is mounted on a motor shaft although it is obvious it might be placed upon the compressor shaft and the condenser moved to an adjacent position.

It will be noted that the condenser has spacing means extending from one horizontal section to the next lower horizontal section. When refrigerant passes from the compressor 23 through the tube 24 to the conduit 10 of the condenser it is rather warm. As the refrigerant passes down through the various horizontal sections it becomes cooler until at the lower section it is in a sufficiently cooled state to be used in the evaporator of the apparatus. As the fins extend from one horizontal section of the condenser to the next horizontal section there might normally be a tendency for the heat from the portion 11 to descend directly through the fins to the lower section 12 and so on down to those sections in which the refrigerant is already cooled. To prevent such transfer of heat to the refrigerant

already cooled the fins have been designed in the peculiar shape disclosed on the drawing especially in Fig. 4. The upper horizontal section 35 of the conduit in Fig. 4 has warmer refrigerant than that in the lower horizontal sections 36 and 37 of that figure. Thus heat in section 35 will be transferred to the fin 38 through the extensive contact of the curved U-bases of the fin with the section 35. This heat will not descend to any extent to the lower fin 39 as the lower fin 39 only contacts with the tube 35 through the edges 21. Hence the conduit section 35 has good thermal contact with the fin edges above it and very poor thermal contact with the fin edges below it. Hence the heat will not be transferred downward to the lower sections of the conduit through the fins. The heat by being restricted to the upper fin of the conduit will give the fan a chance to dissipate the heat into the air before such heat can affect the refrigerant already cooled in the lower portions of the condenser. Accordingly there has been disclosed a spacing means between horizontal sections of a condenser that will prevent a transfer of heat to the refrigerant already cooled while allowing this heat to be dissipated into the open air. It will be noted that the fins are placed so that the air may be conducted through the condenser in a manner to reach the greater exposed surface of the fins and coils.

It is obvious that the preferred form of the condenser disclosed may be modified in various ways without departing from the spirit of the invention. Any form of fin having a poor thermal contact with one section and a good thermal contact with another section may be used. It is not essential that such a fin extend integrally from one side of the condenser to the other. Furthermore any desired shape of horizontal sections may be used instead of the loops as disclosed. The section 11 may be bent directly downward into section 12 if desired to make a thinner coil. Also two or more conduits may be connected in parallel and form horizontal sections. Furthermore the section may be made thicker by making more than two parallel portions to a section. The conduits do not have to be necessarily continuous but may be in sections.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A device for a refrigerating system comprising a continuous tube formed into a plurality of loops having extended portions of the tube in parallel relation, and separate fin elements between and parallel to said portions, supports for said device at the ends of the loops, said supports spacing said loops and locking said fin elements between the portions of the tube.

2. A device for a refrigerating system comprising a continuous tube formed into a plurality of loops having groups of at least four extended portions of the tube in parallel relation, and separate fin elements between and parallel to said portions and contacting said portions, supports for said device at the ends of the loops, said supports spacing said loops and locking said fin elements between the portions of the tube.

3. A device for a refrigerating system comprising a continuous tube formed into a plurality of loops having extended portions of the tube in parallel relation, and separate fin elements between and parallel to said portions, said fin elements comprising corrugated sheets of metal, supports for said device at the ends of the loops, said supports spacing said loops and locking said fin elements between the portions of the tube.

4. A device for a refrigerating system comprising a continuous tube formed into a plurality of loops having groups of at least four extended portions of the tube in parallel relation, and separate fin elements between and parallel to said portions and contacting said portions, said fin elements comprising corrugated sheets of metal, supports for said device at the ends of the loops, said supports spacing said loops and locking said fin elements between the portions of the tube.

5. A heat exchange element comprising a long continuous metal tube bent into a serpentine coil having a plurality of substantially straight portions arranged in the same vertical plane, and a plurality of fin structures, one on either side of said straight portions, each of said fin structures comprising a relatively long and continuous metal strip bent upon itself to form a zigzag strip fin having an arcuate base contacting at least one of said straight portions, the said fin structure being so proportioned as to reduce the static resistance to a minimum, whereby a maximum volume of air may pass over said heat exchange element.

6. A refrigerating condenser comprising a long continuous metal tubing bent into a serpentine coil having a plurality of substantially straight horizontal sections, said condenser having an inlet at one end and an outlet at the other end and spacing means between two of said sections, said spacing means including a fin structure having an edge contact with at least one of said sections and an arcuate base contacting with another of said sections.

In testimony whereof I hereto affix my signature.

CHARLES R. WAYMAN.