April 23, 1968 G. GAU 3,379,241

REFRIGERATOR CONDENSER APPARATUS WITH FUNNEL SHAPED FLUE

Filed Feb. 21, 1966

Fig. 1.

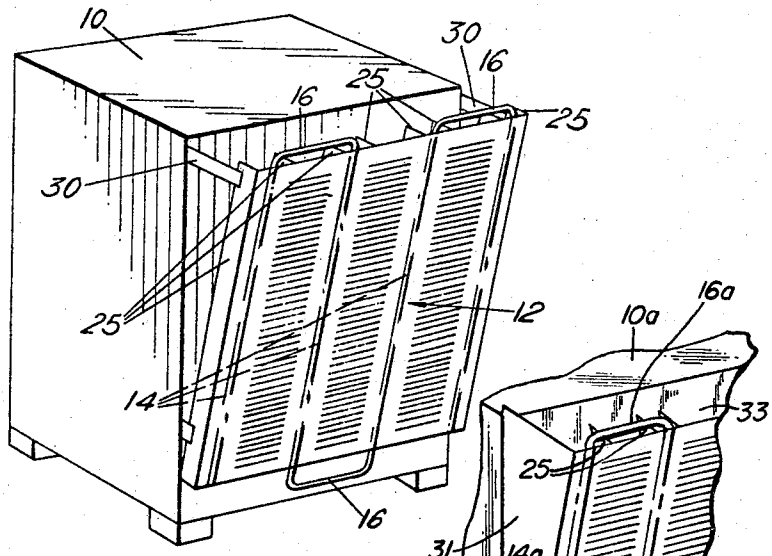


Fig. 6.

Fig. 2.

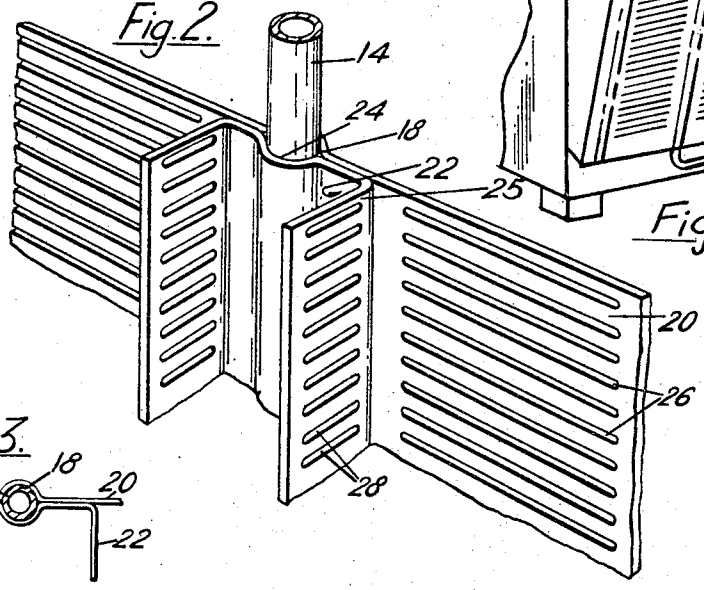


Fig. 3.

Fig. 4.

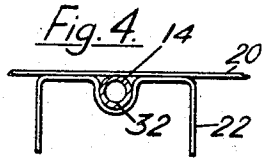
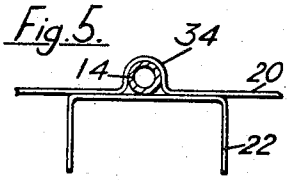


Fig. 5.



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REFRIGERATOR CONDENSER APPARATUS WITH FUNNEL SHAPED FLUE

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Claims priority, application Great Britain, Apr. 15, 1965, 16,185/65
1 Claim. (Cl. 165—53)

In preferred form, a refrigerator condenser apparatus including a plate located rearwardly and obliquely to the rear wall of a refrigerator, the plate including side flanges connecting it to the rear wall of the refrigerator and forming with the rear wall of the refrigerator and the condenser plate a funnel shaped flue, a refrigerant tubing of sinusoidal form secured on the condenser plate of a plurality of U-shaped channel members each including louvred side flanges disposed within the funnel shaped flue space, said plate being louvred between each of the U-shaped channels to provide interchange between the draft in the funnel shaped flue and convective currents exteriorly of the plate side of the flue.

This invention relates to heat exchangers, such as are used as condensers in refrigerator cooling units.

A heat exchanger according to the invention comprises a series of interconnected tubes secured in grooves of a common plate and a series of U-shaped channel members secured to the plate along their webs which envelop the exposed surfaces of the tubes, the parts of the plate intermediate adjacent channel members being louvred for airflow.

The tubes can be located in grooves either in the plate, or in the webs, or partly in both plate and webs.

Preferably, the flanges of the U-shaped channel members are also louvred for airflow. The outermost flanges of the end channel members may be extended to form mountings for attaching the heat exchanger to an apparatus. The common plate may be of a metal or plastics.

Advantageously, the series of interconnected tubes is formed from one continuous tube.

The scope of the monopoly is defined by the appended claim; the invention and how it may be performed are hereinafter particularly described with reference to the accompanying drawings in which:

FIGURE 1 is a perspective rear view of a refrigerator cabinet showing a condenser according to the invention mounted on it;

FIGURE 2 is a perspective front view, on a larger scale, of the top part of the condenser showing the common plate and a channel member with louvres;

FIGURE 3 is a plan view of one unit of the condenser, with the tube located partly in a groove in the common plate and partly in a groove in a channel member;

FIGURE 4 is a similar plan of a modification, with the tube located almost wholly in a groove in a channel member;

FIGURE 5 is a similar plan of a further modification, with the tube located almost wholly in a groove in the common plate; and

FIGURE 6 is a fragmentary perspective view of a refrigerator cabinet rear showing a condenser according to another embodiment of the invention.

The application of the invention to the condenser of a refrigerator will now be described in detail. The refrigerator **10**, has a conventional cabinet and compression refrigeration system, and needs no further description.

In the construction shown in FIGURES 2 and 3 the condenser **12** comprises a single continuous length of tubing **14** formed into a series of equal parallel straight lengths, lying in the same plane, and interconnected by

reverse bends **16**. These parallel straight lengths are first fitted into similarly spaced part-circular grooves **18** formed in a thin sheet metal plate **20**. The grooves extend the full length of the plate, which is substantially the same length as the parallel straight lengths of tubing. A series of U-shaped channel members **22**, each having a part-circular groove **24** extending along the length of its web is then spot-welded to the plate. Thus, as each channel member is spot-welded to the plate its own groove encloses the exposed surface of the tubing fitted in the part-circular groove of the plate; and the interfitting of the groove of the channel member with the tubing locates each channel member on the metal plate. The plate **20** and the flanges **25** of the channel members **22** have louvres **26**, **28** (FIGURE 2), respectively. By virtue of this construction the area of metal in contact with the tubing is increased, and this enhances the heat transfer efficiency of the unit. The condenser is attached to and spaced from the rear wall of the refrigerator by brackets **30**.

In a modified form of the invention as seen in FIGURE 6, elements like those in FIGURE 1 are shown with like reference numerals including a subscript "*a*." In this arrangement, the condenser is secured to the refrigerator rear wall by extension of the outer side flanges **31** of the end channel members. These extended flanges thus form side walls between the refrigerator rear wall and the condenser so that airflow upwardly over the condenser is funnelled upwardly through the enclosed flue space **33** so formed.

The condenser is mounted obliquely, with its bottom end closer to the refrigerator rear wall than its top end as shown in FIGURE 1. By this arrangement an enhanced airflow over the condenser is achieved, and the position of the condenser top ensures that there is always adequate space for airflow over the condenser even though the refrigerator may be placed against a wall.

In one modification, shown in FIGURE 4, of the condenser construction the tubing **14** is located almost wholly within a semi-circular groove **32** in channel member **22** which is spot-welded to the plate **20** which in this case is flat.

In a further modification, shown in FIGURE 5, the tubing **14** is located almost wholly within a semi-circular groove **34** in the plate **20** and the channel member **22** has a flat web which is spot-welded to the plate and overlies the tubing.

I claim:

1. A refrigerant condensing apparatus comprising a refrigerator cabinet having a flat vertically extending rear wall, a condenser plate having flanges on either side thereof forming side walls connecting said rear wall and said condenser plate, said side walls each having a width at its top greater than the width at its bottom to support said condenser plate at an inclination with respect to the rear wall, said rear wall, side walls, and said plate enclosing an upwardly directed funnel shaped flue space open at the bottom of said plate and at the top thereof, a plurality of interconnecting tubes contacting said plate, a plurality of U-shaped channel members having a web portion thereon in juxtaposition with said plate and secured thereto to clamp said tube between said flange and said plate at the inside surface thereof, each of said pluralities of U-shaped channels extending throughout substantially the full height of said plate and including spaced apart flanges therein disposed interiorly of said flue space, each of said flanges of the channel members having louvers therein for passage of air flow produced by upward drafts in said flue space, said plate having portions thereon intermediate said channel members with a second plurality of louvers therein for directing convective air currents exteriorly of said flue space into mixed air flow relationship

with the upward draft through said flue for removing heat from refrigerant passing through said series of interconnected tubes.

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