June 29, 1965 W. C. JONES 3,191,670

FINNED HEAT EXCHANGERS

Filed July 24, 1961

Fig. 1.

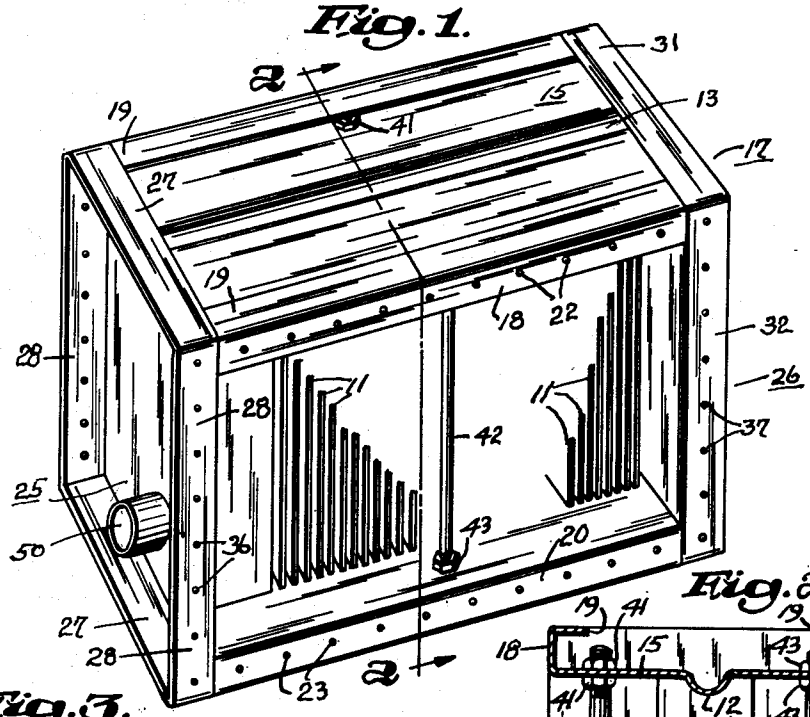



Fig. 2.

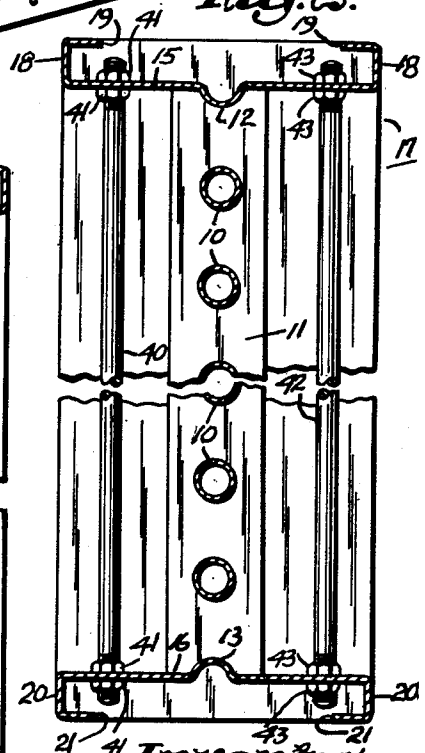
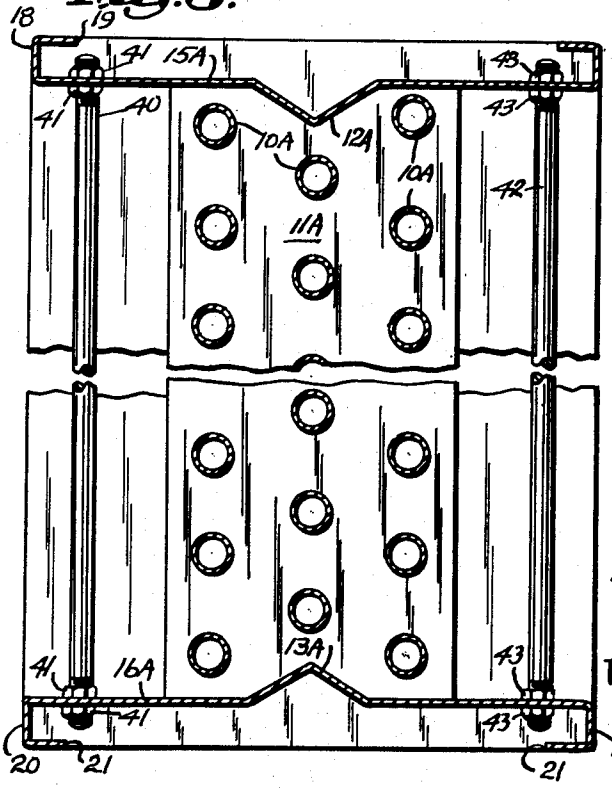



Fig. 3.




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# FINNED HEAT EXCHANGERS

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1 Claim. (Cl. 165—76)

This invention relates to heat exchangers having finned tubes in metal casings.

Many heat exchangers used for the cooling and heating of air, consist of spaced-apart, hollow tubes having closely spaced, plate-type fins common to all tubes, supported in protective casings having air inlets and outlets, and having headers at the ends of the tubes. In prior heat exchangers of this type, the casings have had sheet metal, top and bottom walls in contact with the tops and bottoms respectively, of the fins, and the finned tube cores have been held in the casings by structural angles attached to the top and bottom walls, and contacting opposite edges of the fins.

This invention forms internally bulging ribs in the longitudinal centers of the top and bottom walls of a casing, and forms complemental-shaped notches in the centers of the tops and bottoms of the fins, with the ribs fitting snugly in the noches. Advantages of this construction are that the ribs stiffen the sheet metal top and bottom of a casing; the ribs in the notches in the fins locate and hold the core in the casing, and the ribs in the notches prevent air from by-passing the core by flowing between the top and bottom walls and the core.

An object of this invention is to stiffen the sheet metal top and bottom walls of a casing of a heat exchanger by forming ribs in the longitudinal centers of the walls.

Another object of this invention is to use ribs in the longitudinal centers of the top and bottom walls of the casing of a heat exchanger having plate-type fins, and notches in the centers of the tops and bottoms respectively, of the fins for locating and holding the finned tube core within the casing.

Another object of this invention is to use ribs in the top and bottom walls of a casing of a heat exchanger having plate-type fins, and notches in the centers of the tops and bottoms respectively, of the fins for preventing the by-passing of air around such ends.

This invention will now be described with reference to the annexed drawings, of which:

FIG. 1 is a perspective view of a heat exchanger embodying this invention;

FIG. 2 is a section along the lines 2—2 of FIG. 1, and

FIG. 2 is a section similar to FIG. 2, but showing a wider heat exchanger having differently shaped ribs and notches.

Referring first to FIGS. 1 and 2, a row of vertically aligned, parallel, spaced-apart, hollow tubes **10**, has vertically-extending, closely-spaced, plate-type fins **11** of sheet metal around and in contact with all of the tubes **10**. The tops and bottoms of the fins **11** have semi-circular notches formed in the centers, and in which are fitted semi-circular ribs **12** and **13** respectively, in the longitudinal centers of the sheet metal top wall **15**, and bottom wall **16** respectively, of casing **17**.

The top wall **15** has end portions **18** which extend normal thereto, and has inturned portions **19** at the upper ends of the portions **18**, which extend parallel to the wall **15**. The bottom wall **16** has end portions **20** which extend normal thereto, and has inturned portions **21** at the lower ends of the portions **20**, which extend parallel to the wall **16**. The wall portions **18** and **20** have perforations **22** and **23** respectively, for receiving rivets or bolts for securing a duct to the casing **17**.



A flanged end plate **25** has outwardly-turned portions **27** which extend across and are attached to the ends of the wall portions **19** and **21**, and has outwardly-turned portions **28** which extend across and are attached to the ends of the wall portions **18** and **20**, at one end of the casing **17**. A similar, flanged end plate **30** has outwardly-turned portions **31** which extend across and are attached to the ends of the wall portions **19** and **21**, and has outwardly-turned portions **32** which extend across and are attached to the ends of the wall portions **18** and **20** at the other end of the casing **17**.

A tie rod **40** extends through the walls **15** and **16** midway between the end plates **25** and **30** and to one side of the fins **11**, and has threaded ends with nuts **41** thereon above and below the walls **15** and **16**. A similar tie rod **42** extends through the walls **15** and **16** opposite the tie rod **40** on the other side of the fins **11**, and has threaded ends with nuts **43** thereon above and below the walls **15** and **16**. The nuts **41** and **43** are adjustable on the tie rods **40** and **42** respectively, for moving the walls **15** and **16** towards each other until the ribs **12** and **13** fit snugly into the notches provided therefor in the tops and bottoms respectively, of the fins **11**.

The end fins **11** are spaced from the end plates **25** and **30** for providing spaces for headers which are not shown. A typical tube connection **50** to one header is shown on FIG. 1.

FIG. 3 of the drawings shows another embodiment of this invention in which the heat exchanger core has three vertical rows of tubes **10A**, and in which the fins **11A** are wider than the fins **11** of FIG. 2 for contacting the additional tubes. Also, the fins **11A** of FIG. 3 have triangular notches in their tops and bottoms in which are fitted triangular ribs **12A** and **13A** respectively, in the longitudinal centers of the top and bottom walls **15A** and **16A** respectively. The remainder of the structure of FIG. 3 is similar except as to size, as corresponding structure of FIG. 2, and so has been given the same reference characters.

The ribs in the top and bottom plates by being drawn tightly into the notches in the tops and bottoms of the fins, locates the finned core and holds it against displacement. By-passing of the air being conditioned around the tops and bottoms of the fins is also prevented. The ribs also stiffen the sheet metal top and bottom plates.

What is claimed is:

A heat exchanger comprising a plurality of spaced-apart, hollow tubes having parallel axes, a plurality of spaced-apart, parallel, plate-type fins around and in contact with said tubes, said fins having notches in the centers of their ends, casing walls of sheet metal in contact with said ends of said fins and having ribs in their centers shaped complemental to the shape of said notches in said notches, and tie rods extending through said walls on opposite sides of said fins, the ends of said rods being threaded, and nuts on said threaded ends on opposite sides of said walls.

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