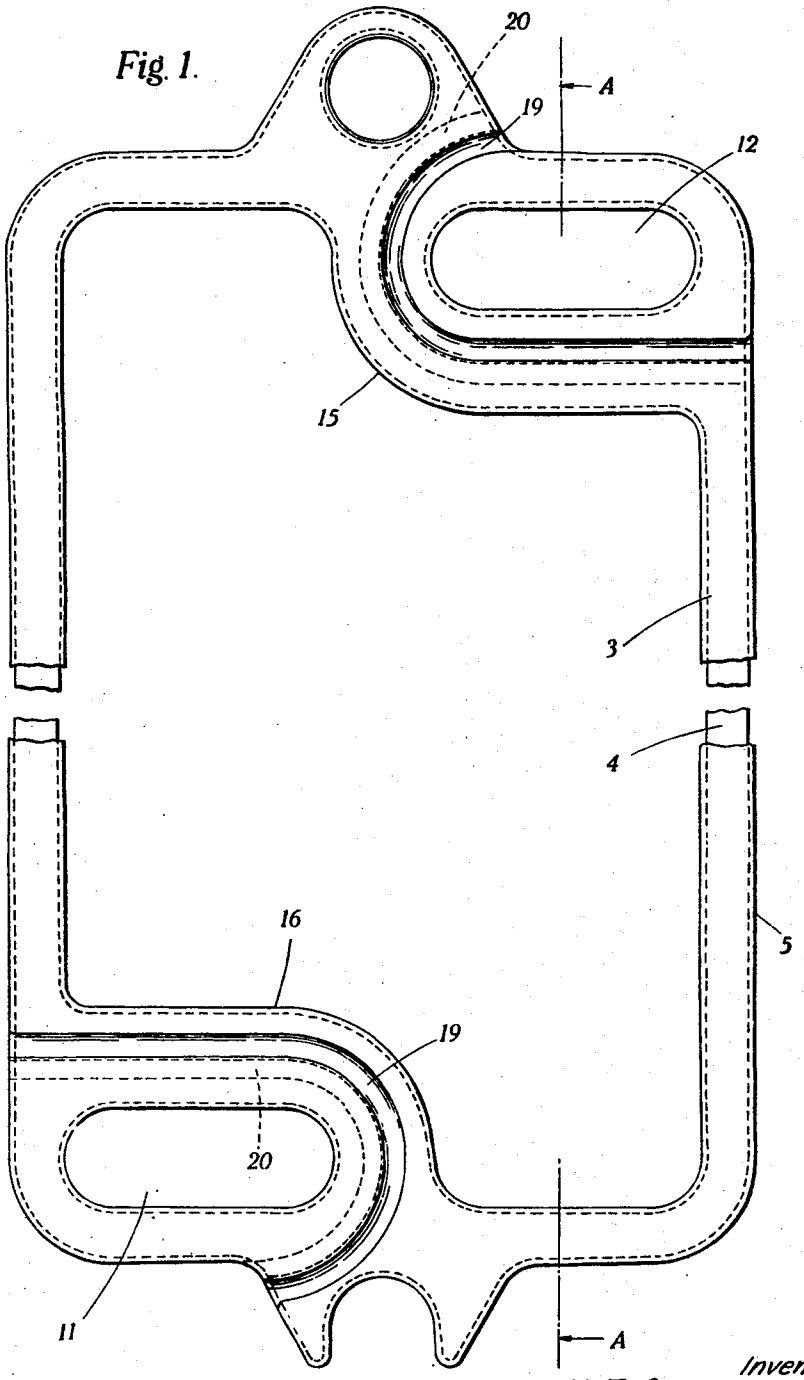
March 12, 1940. H. F. GOODMAN 2,193,405

PLATE-TYPE HEAT EXCHANGER

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Fig. 1.



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Fig. 2.

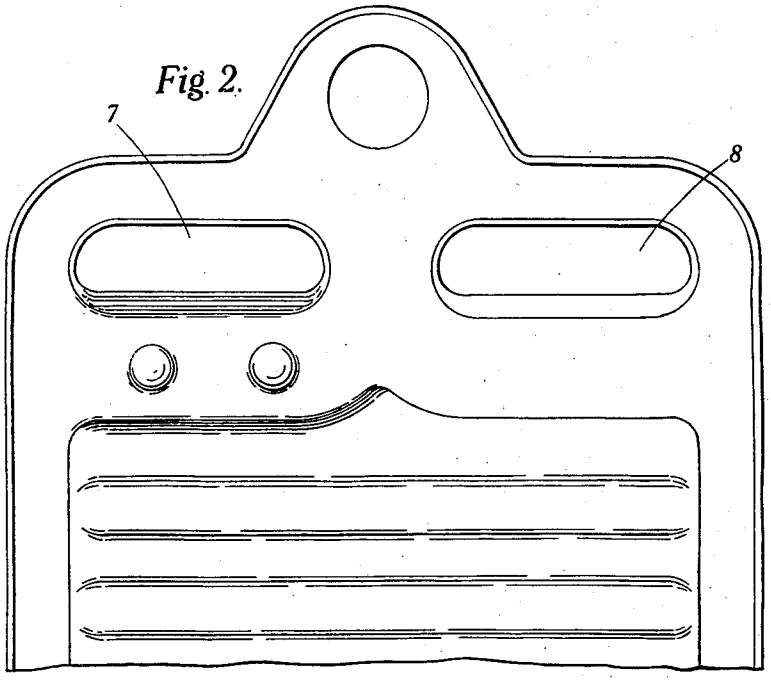
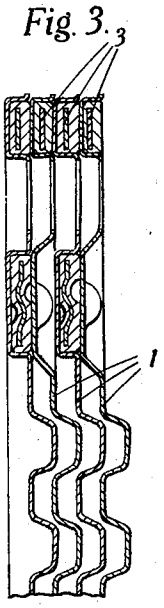
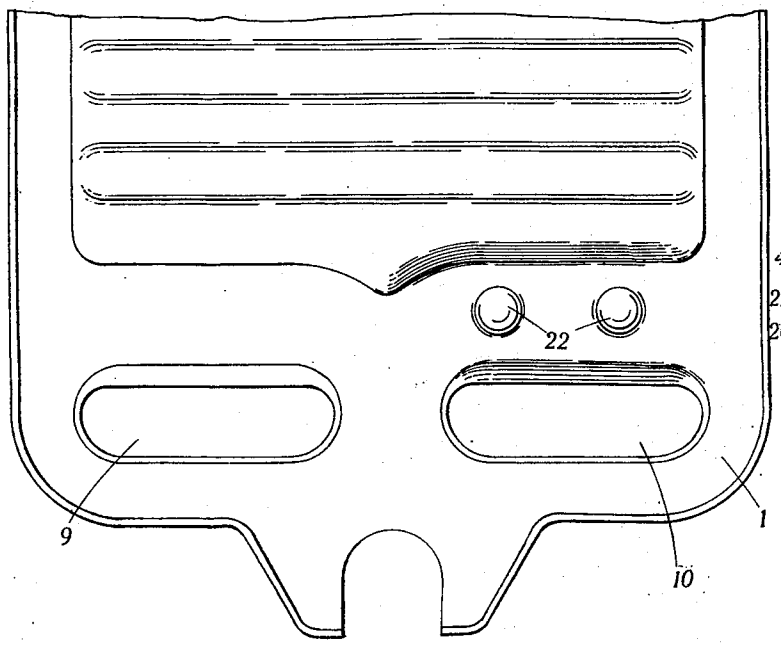
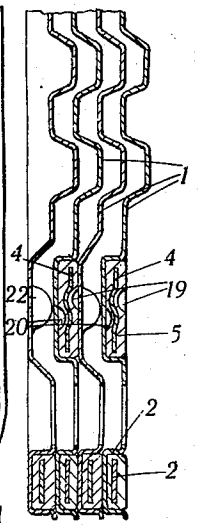


Fig. 3.







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PLATE-TYPE HEAT EXCHANGER

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Application October 16, 1939, Serial No. 299,758
In Great Britain October 12, 1938

4 Claims. (Cl. 257—245)

This invention relates to plate-type heat exchangers of the type in which the individual elements or plates are separated or spaced the required distance from one another by spacing members constituted by open frames of rectangular, annular or other formation suitably interposed between the marginal portions of the adjacent elements or plates.

It has been proposed to provide frames consisting of India rubber vulcanised round metallic skeleton frameworks.

According to the present invention there is provided an improved form of frame or spacing member which is made up of a skeleton framework encased in rubber or other resilient material and is provided with staggered leakage grooves arranged at opposite sides thereof for leading away clear of the interior of the plate assembly any liquid that may leak past the joints formed between the frame or spacing member and the adjacent heat exchange elements or plates.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to the accompanying drawings, in which—

Fig. 1 is a front elevation of one form of spacing frame produced in accordance with the invention;

Fig. 2 is a front elevation of a heat exchange element or plate intended for use with a heat exchanger made up of a plurality of such plates alternating with a plurality of spacing frames of the form shown in Fig. 1; and

Fig. 3 is a sectional view of a series of heat exchange plates and spacing frames arranged alternately, the section being taken on the line A—A of Fig. 1.

In the form of the invention illustrated, the heat exchanger is made up of a plurality of heat exchange elements or plates 1 of the form shown in Fig. 2 alternating with a plurality of spacing members or frames of the form shown in Fig. 1. The plates may consist of sheet metal pressings composed of copper, tinned copper, stainless steel or other suitable metal, according to the nature and properties of the fluids or liquids to be used. The marginal edges of the plates are preferably grooved as shown at 2, which grooves accommodate and locate the spacing frames 3 each of which consists of a skeleton framework 4 consisting, for example, of a substantially flat strip of mild steel encased in a layer 5 of rubber.

The heat exchange plates may each be provided with four ports 7, 8, 9 and 10 and the spacing frames may each have two ports 11 and 12 arranged, for example, at diagonally opposite corners for registration with the corresponding ports in the heat exchange elements. For this purpose, the frames are shaped so that each is adapted to extend around the outer edges of the ports 7, 8, 9 and 10 and is provided with two branches 15 and 16 extending inwardly around the inner edges of two of the ports in a heat exchange plate, said branches being accommodated in other suitably shaped grooves 17 formed in the heat exchange plates.

The aforesaid skeleton framework is preferably substantially flat but the transverse cross section of its branches 15 and 16 is of wave-like form or is provided with an upwardly pressed portion and a downwardly pressed portion to which the surrounding rubber conforms to provide the staggered leakage grooves shown at 19 and 20 for leading to the outer edges of the assembly any liquid that may leak past the packings, thereby preventing any mixing of the two liquids between which heat exchange is being effected.

If desired, the plates or certain of them may be formed with projections or pressed-up portions 22 for contact with adjacent plates or for maintaining the correct spacing between the plates or for preventing bending of the plates under an excess of pressure on one side.

In practice, the heat exchanger is built up of a plurality of heat exchange plates and a plurality of spacing frames, the plates and frames being arranged alternately as shown in Fig. 3 and the frames being alternately reversed, i. e., arranged back to front.

Having thus described my said invention what I claim as new and desire to secure by Letters Patent is:

1. For use with a plate-type heat exchanger, a spacing frame made up of a skeleton framework encased in resilient material, said framework being provided with staggered leakage grooves arranged at opposite sides thereof for leading away clear of the interior of the assembly any liquid that may leak past the joints formed between the frame and the adjacent heat exchange plate.

2. A plate-type heat exchanger comprising a plurality of heat exchange plates and a plurality of spacing frames, the plates and the frames being arranged alternately, the frames being accommodated in grooves formed in the marginal edges of the plates and being made up of skeleton frameworks encased in resilient material, said

frames also being formed with staggered leakage grooves arranged at opposite sides thereof.

3. A plate-type heat exchanger comprising a plurality of heat exchange plates and a plurality of spacing frames, the plates and the frames being arranged alternately, the frames being made up of skeleton framework encased in resilient material and being formed with inwardly extending branches, the plates being formed with grooves in their marginal edges for the reception of the frames and their inwardly extending branches and the said frames also being formed with staggered leakage grooves arranged at opposite sides thereof.

4. For use with a plate-type heat exchanger, a spacing frame made up of a skeleton framework encased in resilient material said framework being formed with ports and inwardly extending branches extending around the inner edges of the ports, said branches being formed with staggered leakage grooves arranged at opposite sides thereof.

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