July 19, 1932. F. BOEHM 1,868,271

HEAT EXCHANGER

Filed June 10, 1931

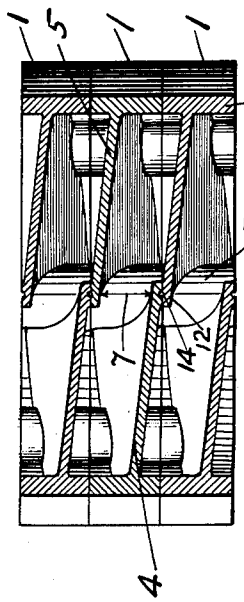


FIG. 3.

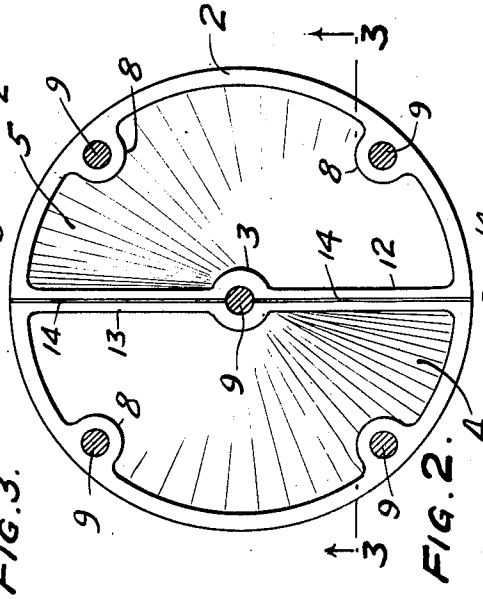


FIG. 2.

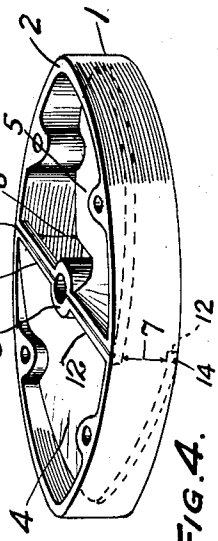


FIG. 4.

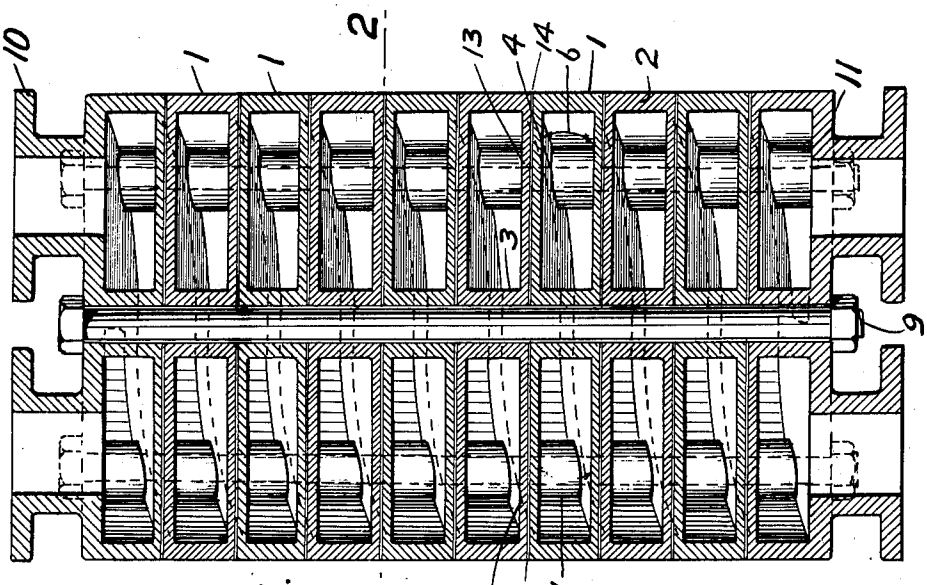


FIG. 1.

WITNESS:

Robt. R. Mitchell.

INVENTOR

Frederik Boehm

BY

Augustus B. Stoughton

ATTORNEY.

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UNITED STATES PATENT OFFICE

FREDERIK BOEHM, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SCHUTTE & KOERTING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

HEAT EXCHANGER

Application filed June 10, 1931. Serial No. 543,284.

One object of the present invention is to provide a polyplate heat exchanger which may be made of glass or porcelain or of cast metal or alloy and in which, in proportion to its size, a large area of heat exchange surface shall be presented and in which the heat exchange surface is supported not only at its rim but also at its center.

Another object of the invention is to provide an efficient heat exchanger adapted for use with liquids, fluids and gases which may be of corrosive character and which shall be of simple construction and manufacture.

Other objects of the invention will appear from the following description at the end of which the invention will be claimed.

Generally stated, the invention may be said to consist of a polyplate heat exchanger comprising a series of duplicate disks arranged in facial contact and each having a ring wall and a hub and webs in the form of segments of convolutions of at least two similarly directed spiral surfaces and providing ports disposed substantially perpendicular to the plane of the disk, stays passing through the hubs and ring walls, and end fittings having inlet and outlet connections for the spiral passages provided between the convolutions of the webs.

The invention also comprises the improvements to be presently described and finally claimed.

In the following description reference will be made to the accompanying drawing forming part hereof and in which

Figure 1 is a transverse diagrammatic central section of a heat exchanger embodying features of the invention.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1 showing the stays.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2, and

Fig. 4 is a perspective view of one of the disks.

There is a series of duplicate disks 1, and they are arranged in facial contact. Each disk comprises a ring wall 2 and a hub 3, and webs 4 and 5 in the form of segments of the convolutions of at least two similarly directed spiral surfaces, thus there are provided ports 6 and 7 disposed substantially perpendicular to the plane of the disk. The ring wall 2 is provided with enlargements 8, Fig. 2, having openings therein. Stays 9 pass through openings provided in the hubs and through the openings provided in the ring walls. The stays are shown as bolts. There are end fittings 10 and 11 having inlet and outlet connections for the spiral passages provided between the convolutions of the webs.

12 and 13 may be described as flat faced spokes having their faces flush with the surfaces of the ring wall 2, although they may also be regarded as the end portions of the webs, and when the disks are clamped together by the stays 9, tight joints may be provided between those faces, thus separating the spiral passages or channels. The surfaces of these spokes 12 and 13 are provided with grooves 14 that extend through the ring wall 2, and if there should be a leak between the streams traversing the heat exchanger, some of the leakage will flow through these grooves to the exterior of the device and thus give notice of the leakage.

It may be remarked that the various sections or disks 1 are clamped or supported both at the center and at the periphery by the stays 9, so that the heat exchanger may withstand considerable pressure. The disposition of the ports 6 and 7 at substantially right angles to the plane of the sections makes the entire area of the webs available for heat exchange.

The spiral webs may be any number in excess of two, providing a corresponding number of helical fluid passages, and the webs of the spirals may be spaced different distances apart, thus providing fluid passages of different capacities. In the embodiment of the invention shown, there are two spiral webs and they may be regarded as starting in the same diametrical line, but they may start, instead of 180 circular degrees apart, at say 60 circular degrees apart, in which case the fluid channels will be of different heights, or, in other words, the flights will not be equally spaced.

It may be remarked that in some cases by corrugating the surfaces of the webs 4 and 5,

the traversing liquids will be subjected to more agitation than in cases where the surface of the webs 4 and 5 is not corrugated or roughened.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement and matters of mere form without departing from the spirit of the invention which is not limited to such matters or otherwise than the prior art and the appended claims may require.

I claim:

1. A polyplate heat exchanger comprising a series of duplicate disks arranged in facial contact and each having a ring wall and a hub and webs in the form of segments of the convolutions of at least two similarly directed spiral surfaces and providing ports disposed substantially perpendicular to the plane of the disk, stays passing through the hubs and ring walls, and end fittings having inlet and outlet connections for the spiral passages between the convolutions of the webs.

2. A disk for a polyplate heat exchanger comprising a ring wall and a hub and spaced spokes providing between them ports disposed substantially perpendicular to the plane of the disk and webs in the form of segments of the convolutions of at least two similarly directed spiral surfaces extending between the spokes, the faces of said spokes and the faces of the hub and ring wall being substantially flush.

3. A disk for a polyplate heat exchanger comprising a ring wall and a hub and spaced spokes providing between them ports disposed substantially perpendicular to the plane of the disk and webs in the form of segments of the convolutions of at least two similarly directed spiral surfaces extending between the spokes, the faces of said spokes and the faces of the hub and ring wall being substantially flush, and there being channels provided in faces of the spokes and past the ring wall.

FREDERIK BOEHM.