May 1, 1951 N. H. SCHULTZ 2,550,725

CONDUIT CONSTRUCTION

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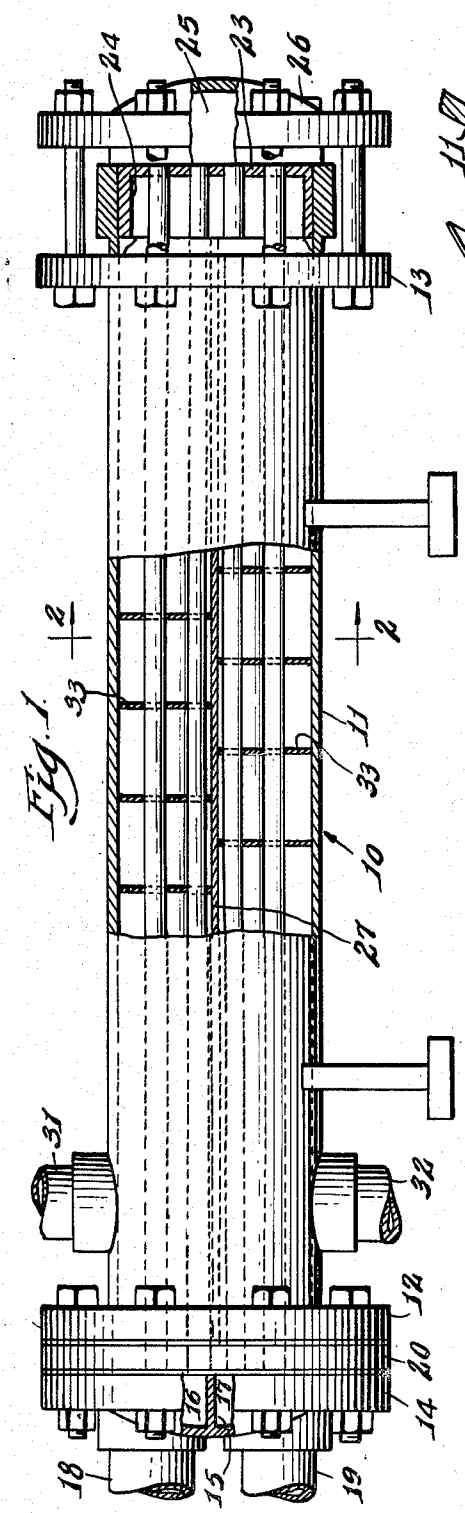


Fig. 1.

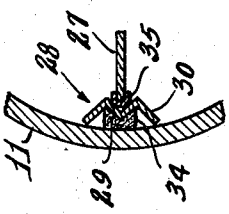


Fig. 5.

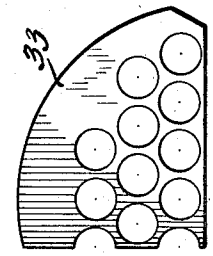


Fig. 4.

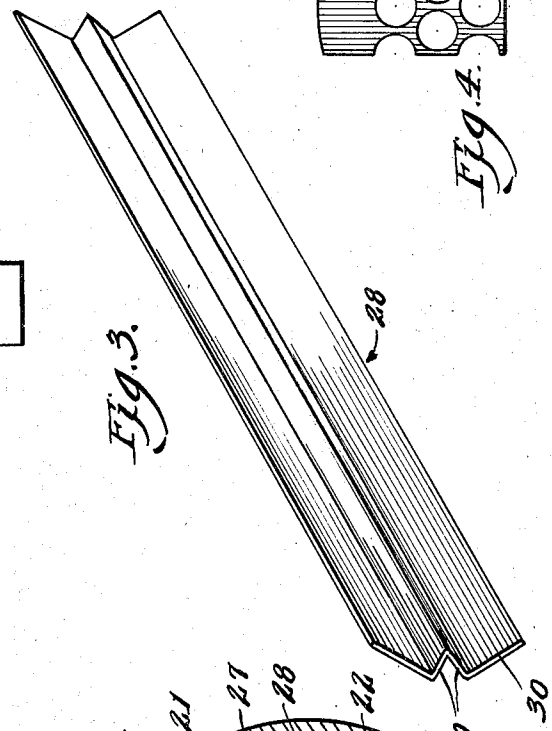


Fig. 3.

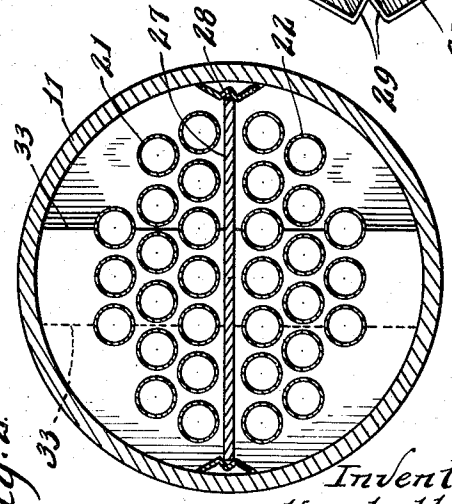


Fig. 2.

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CONDUIT CONSTRUCTION

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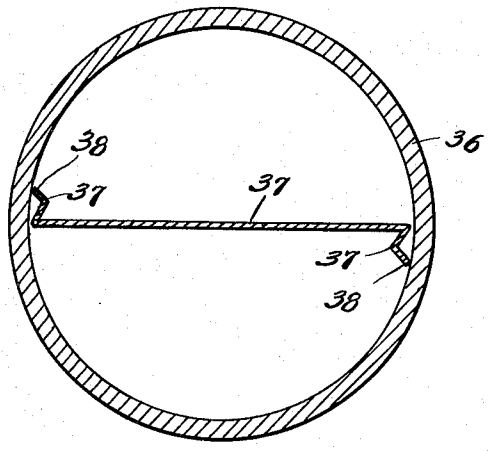


Fig. 6.

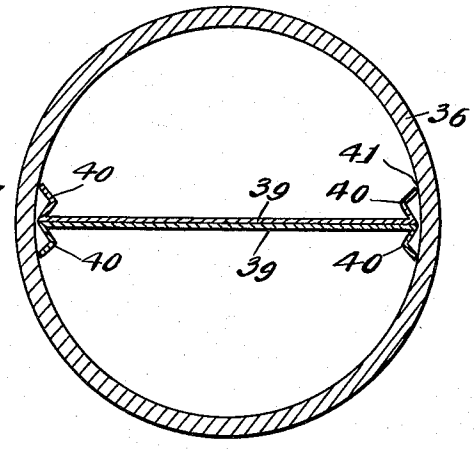


Fig. 7.

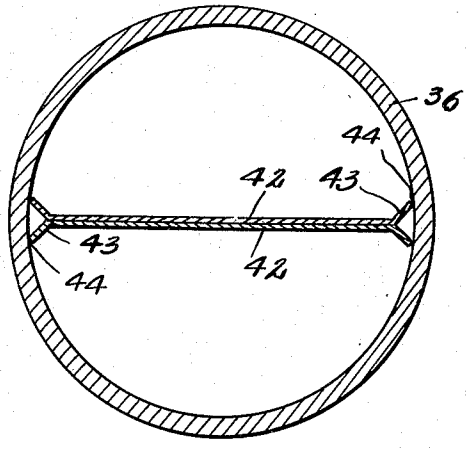


Fig. 8.

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CONDUIT CONSTRUCTION

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6 Claims. (Cl. 138—87)

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My invention relates to conduit construction and more particularly to a simple and inexpensive arrangement for dividing the interior of pipes, conduits and tubular structures generally to form a plurality of passages therethrough.

The characteristic manner of dividing a pipe to provide two or more passages lengthwise thereof is to bridge a number of plates across the interior of the pipe and weld, rivet, bolt or otherwise rigidly attach the long edges of the plates to the inner surface of the pipe, thus providing separating walls within the pipe. This procedure is obviously costly in time and money and precludes subsequent easy and quick removal of the wall.

It is therefore one object of my invention to provide a conduit construction having a plurality of passages therethrough formed by a plate that is bridged across the interior of the conduit and is positively supported on the wall of the conduit by means that is not fastened to the conduit wall.

A further object is to devise a conduit construction of the character indicated in which the separating plate is frictionally held in position across the interior of the conduit.

A further object is to devise an interior separating plate structure in which the positioning means therefor provide a leak proof connection with the inner surface of the conduit and the surfaces of the plate, thus maintaining separation of the liquids or gases flowing on opposite sides of the plate.

These and further objects of the invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:

Fig. 1 is an elevation of a typical heat exchanger, partly in section, embodying my improved construction.

Fig. 2 is a section along the line 2—2 in Fig. 1.

Fig. 3 is a perspective view of the positioning strip for the separating plate.

Fig. 4 is an elevation of one of the baffles.

Fig. 5 is a fragmentary section showing my improved construction modified to provide a gas tight connection between the outer casing and the separating plate.

Figs. 6, 7 and 8 are transverse sections, similar to Fig. 2, showing modified arrangements for supporting the separating plate, the tubes being omitted.

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Referring to the drawings, the numeral 10 designates a characteristic type of heat exchanger which has been selected as conveniently exemplifying one use of the improved construction. The exchanger comprises a casing 11 which is to be regarded generally as a conduit, pipe or tube whose interior is to be divided into a plurality of flow passages. The left end of the casing 11 carries an attaching flange 12 and adjacent the opposite end a similar flange 13 is provided. A front header 14 of usual construction is bolted to the flange 12 and is provided interiorly with a wall 15 which divides the header into chambers 16 and 17 which are in communication, respectively, with pipes 18 and 19 which may be inlet and outlet pipes, respectively, or vice versa, for one of the liquids or gases that are to be conditioned in the exchanger.

A front tube ring 20 is clamped between the flange 12 and header 14 and secured thereto are the forward ends of upper and lower banks of tubes 21 and 22 which communicate with the chambers 16 and 17, all respectively. The opposite ends of the tube banks are carried by a rear tube ring 23 which is flanged at 24 for support by the adjacent end of the casing 11. The rear ends of the tube banks communicate with a common chamber 25 provided in a characteristic rear header 26 which is bolted to the flange 13. So far as described, the heat exchanger is of substantially standard construction, one fluid being conditioned entering the exchanger by way of the pipe 19, for example, making two traverses of the exchanger by way of the tube banks and leaving the exchanger through the pipe 18.

The manner of dividing the interior of the casing 11 into two passages, one for each tube bank, to insure separate flow thereover of the other liquid being conditioned is an important feature of the invention. It is achieved by means of a separating plate 27 whose edges lengthwise of the casing 11 are embraced by a suitably formed strip 28. Specifically, this strip is composed of a material having a resilient characteristic and is bent throughout its length so that its cross section is substantially that of the letter W, thus forming jaw pieces 29—29 and resilient wings 30 extending therefrom. Prior to insertion of the tube banks within the casing 11, the plate 27 is positioned between the banks and a strip 28 is located along each longitudinal edge of the plate with the jaw pieces 29—29 in embracing relation thereto. The assembly of tube banks 21 and 22, separating plate 27 and strips 28 is then inserted in the casing 11, the plate in the particular construction

shown occupying a diametral position within the casing. The free radial distance of the outer edges of the wings 30 from the center of the plate is greater than the internal diameter of the casing 11 so that when the foregoing assembly is positioned in the casing as indicated, the wings 30 are sprung inwardly of the casing by contact therewith, thus causing the jaw pieces 29—29 to grip the adjacent edges of the plate 27. The plate is then frictionally supported within the casing by an arrangement which does not require any extraneous means for this purpose, such as bolts, rivets, or welding, and which permits easy withdrawal of the plate at any time.

The ends of the strips 28 abut the flanges 12 and 24 and the length of the plate 27 is coextensive with the strips. Where the inner wall of the casing 11, and the surfaces of the plate 27 and strip 28 are smooth, this construction provides, in addition to a positive support for the plate 27, a substantially leak proof connection therebetween and the surface of the casing.

The other liquid being conditioned in the exchanger may enter at the top through a pipe 31 adjacent the flange 12 and then flows towards the right above the plate 27 until directed downwardly by the tube ring 23 and then towards the left below the plate for discharge through a pipe 32 also positioned adjacent the flange 12, or the indicated flow may be reversed depending upon the conditions of operation. In accordance with the usual practice in such units, the liquid flow through the casing 11 on opposite sides of the plate 27 may be caused to pursue a sinuous course to facilitate heat exchange with the liquid in the tubes by means of baffles 33 which are spaced lengthwise of the casing 11 above and below the plate 27 and are pierced by the tubes. As indicated in Figs. 2 and 4, each baffle 33 is shaped to occupy slightly more than a transverse quadrant interiorly of the casing 11 above and below the plate 27, the baffles being alternated in position to provide a sinuous path for the liquid. The clearance shown between the edges of the baffles 33 and the surfaces of the plate 27 and the interior surface of the casing 11 in Fig. 2 is only that necessary to insure free positioning within the casing.

In Fig. 5 is illustrated a modification of the construction which provides a gas tight connection between the plate 27 and casing 11 while retaining the plate supporting capacity of the arrangement shown in Fig. 2. Like parts are correspondingly numbered and the gas sealing function is performed by a packing strip 34 which extends lengthwise of the outer surfaces of the jaw pieces 29 and is disposed therebetween and the adjacent surface of the casing 11, and by a second packing strip 35 which is interposed between the longitudinal edge of the plate 27 and the inner surfaces of the jaw pieces 29 and in embracing relation to limited portions of the upper and lower surfaces of the plate 27. The packing strips 34 and 35 are placed under compression during insertion of the plate 27 and supporting strips 28 within the casing 11 to insure that the strips 34 and 35 will sealingly contact the cooperating surfaces. Due to the relatively soft nature of the packing strips 34 and 35 and the fact that the former does not contact the wings 30, the latter are free to exert full frictional contact on the surface of the casing 11. Moreover, the action of the wings 30 in causing a partial closing of the jaw pieces 29 assists in compressing the packing strip 35.

In Figs. 6, 7 and 8 are illustrated variations in the manner of supporting the separating plate wherein the resilient, conduit engaging members are integrally formed with the plate, the numeral 36 designating the conduit in all figures.

In Fig. 6, the separating plate 37 extends across the interior of the conduit 36 and along one edge which lies adjacent the conduit wall, the plate is bent upwardly and along the opposite edge is bent downwardly to form identical V-wings 37—37. The wings are characterized by resiliency and are retracted to permit insertion of the plate within the conduit. When in position, the terminal edges 38 of the wings frictionally engage the conduit wall with a substantially liquid tight contact and maintain the plate 37 in the desired location.

In Fig. 7, the separating member comprises a pair of walls 39—39 of identical shape. Each wall is provided along the edges which are to lie adjacent the conduit wall with resilient V-wings 40 which project from the same side of the wall and which are similar to the wings 37. In operative position, the walls 39 are preferably in abutting relation with the respective pairs of wings extending in opposite directions from the walls. As in Fig. 6, the terminal edges 41 of the wings frictionally engage the conduit wall with a substantially liquid tight contact.

The construction shown in Fig. 8 also employs a pair of abutting walls 42—42 and differs from that shown in Fig. 7 in that the resilient wings 43 are simple flat portions whose terminal edges 44 engage the conduit wall for the same purposes as the comparable edges in Figs. 6 and 7.

The resilient wings shown in Figs. 6, 7 and 8 may be arranged to provide a gas tight contact with the conduit wall by interposing packing strips along their respective terminal edges comparable to the packing strip 35 in Fig. 5.

Instead of placing the walls 39 in Fig. 7 and the walls 42 in Fig. 8 in abutting relation, respectively, three passages through the conduit may be provided by simply spacing these walls and interposing between the walls, respectively, stays or spacing members of suitable construction.

None of the above constructions restrict the separating plate to a diametral position within the conduit. For example, in Fig. 2, by suitably modifying the sectional shape of the strips 28, the plate 27 may be located in any desired chordal position. In such a case, the section of the strip 28 would be non-symmetrical due to the curvature of the conduit wall and the position relation of the plate 27 thereto. Comparable changes for the same purpose can be made in the arrangements shown in Figs. 6, 7 and 8.

I claim:

1. In a conduit, the combination of a plate bridged interiorly thereof for dividing the conduit into a plurality of passages, jaw pieces engaging the opposite edges of the plate lengthwise of the conduit, and means connected to the jaw pieces and frictionally contacting the wall of the conduit for supporting the plate.

2. In a conduit, the combination of a plate bridged interiorly thereof for dividing the conduit into a plurality of passages, jaw pieces engaging and coextensive with the opposite edges of the plate lengthwise of the conduit, and means coextensive with and connected to the jaw pieces, the means frictionally contacting the wall of the conduit for supporting the plate.

3. In a conduit, the combination of a plate bridge interiorly thereof for dividing the conduit into a plurality of passages, resilient jaw pieces

engaging and coextensive with the opposite edges of the plate lengthwise of the conduit, and resilient means coextensive with and connected to the jaw pieces, the means frictionally contacting the wall of the conduit for supporting the plate.

4. In a conduit, the combination of a plate bridged interiorly thereof for dividing the conduit into a plurality of passages, resilient wing members frictionally contacting the wall of the conduit, and jaw pieces actuated by the members to grippingly engage the opposite edges of the plate lengthwise of the conduit, the wing members being sprung inwardly of the conduit by contact with the wall thereof.

5. In a conduit, the combination of a plate extending across the interior thereof to divide the conduit into a plurality of passages, and means for supporting the plate comprising a strip coextensive with and extending along each edge of the plate lengthwise of the conduit, each strip being shaped to form an intermediate groove extending lengthwise thereof which is defined by a pair of connected jaw pieces between which the adjacent edge of the plate is received and a resilient wing member projecting from each jaw piece, the members being sprung inwardly of the conduit by contact therewith to thereby grip the jaw pieces against the strip and frictionally support the latter on the wall of the conduit.

6. In a conduit, the combination of a plate extending across the interior thereof to divide the conduit into a plurality of passages, and means

for supporting the plate comprising a strip coextensive with and extending along each edge of the plate lengthwise of the conduit, each strip being shaped to form an intermediate groove extending lengthwise thereof which is defined by a pair of connected jaw pieces between which the adjacent edge of the plate is received and a resilient wing member projecting from each jaw piece, the members being sprung inwardly of the conduit by contact therewith to thereby grip the jaw pieces against the strip and frictionally support the latter on the wall of the conduit, and packing between the jaw pieces and the adjacent edges of the plate and the conduit wall, respectively.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,141,067	Lloyd	May 25, 1915
2,062,246	Atkinson	Nov. 24, 1936
2,091,003	Marshall	Aug. 24, 1937
2,292,750	Fields	Aug. 11, 1942

FOREIGN PATENTS

Number	Country	Date
22,568	Great Britain	Oct. 7, 1913