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(54) **A MANIFOLD, IN PARTICULAR FOR USE IN A COOLER OF A COOLING SYSTEM**

(57) A manifold (1), in particular for use in a cooler (16) of a cooling system, comprises a cover (10) having at least one longitudinal channel (11) defined therein and also a covering profile (2) at least partially overlaid on the cover (10), which is fixedly connected to and sealed against the cover (10). The manifold (1) further comprises an internal plate (6) and a brazing plate (8) arranged between the covering profile (2) and the cover (10). The covering profile (2), the internal plate (6) and the brazing

plate (8) have a plurality of through slots (3, 7, 9) at corresponding positions, said slots (3, 7, 9) are in fluid communication with each other and with at least one longitudinal channel (11) of the cover (10). The covering profile (2) is further provided on each of its ends with at least one lock strip (4), which is integral with the covering profile (2). The at least one lock strip (4) is folded over and fixedly attached to the end of the manifold (1) so as to close and seal that end of the manifold (1).

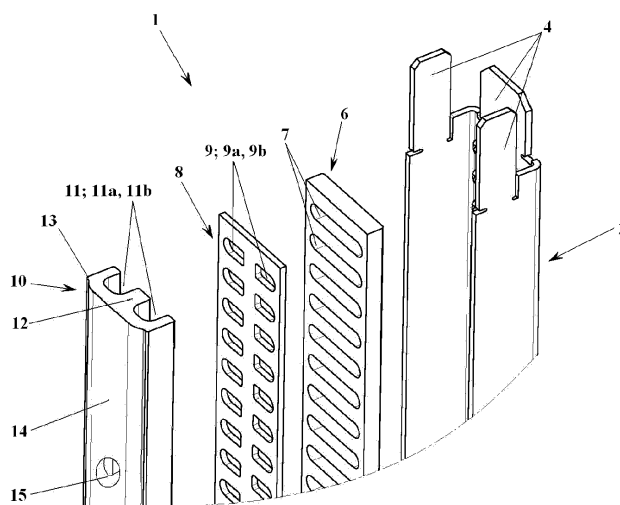


Fig. 1

Description

Technical Field

[0001] The present invention relates to a manifold, in particular for use in a cooler of a cooling system, in which a partition function of ends of the manifold is integrated with one of components of the manifold itself.

Background Art

[0002] Manifolds comprising a covering profile are known from the prior art. An internal plate, a brazing plate and a cover having a longitudinal channel are sequentially arranged in the covering profile. The covering profile is folded over the cover and fixed to it. The covering profile, the internal plate and the brazing plate have many slots in corresponding positions, being in fluid communication with each other and with the longitudinal channel of the cover, designed to introduce tubes of the cooling system. The ends of the manifold are closed by a separate baffle soldered at its periphery to other components of the manifold.

[0003] Due to high operating pressures and safety considerations the baffles must be well soldered to prevent the situation, in which the baffle would be able to detach from the manifold and cause damages/injuries. Furthermore, the baffles are very thin parts, making assembly even more difficult.

Object of the invention

[0004] The aim of the present invention is to provide a manifold in which disadvantages associated with use of separate baffles are overcome, and the application security of which is significantly improved, while maintaining a simple design and simultaneously increasing its strength.

Disclosure of the Invention

[0005] The above object is achieved by a manifold according to Claim 1 and the following dependent claims.

[0006] A manifold, in particular for use in a cooler of a cooling system, comprises a cover having at least one longitudinal channel defined therein and also a covering profile at least partially overlaid on the cover, wherein the covering profile is fixedly connected to and sealed against the cover. The manifold further comprises an internal plate and a brazing plate disposed between the covering profile and the cover such that all components of the manifold tightly adhere to each other. The covering profile, the internal plate and the brazing plate have a plurality of through slots in corresponding positions. The slots are in fluid communication with each other and with at least one longitudinal channel of the cover. The covering profile is provided on each of its end with at least one lock strip, which is integral with the covering profile. The at least one lock strip is folded over and fixedly at-

tached to the end of the manifold so as to close and seal that end of the manifold.

[0007] The manifold developed in such way is very resistant to high operating pressures. The partition function obtained by the integral lock strips significantly increases the application safety, because, even if the ends of the manifold become open, that does not produce any loose parts that could hit a user with great force and hurt him. Thanks to the application of the integral lock strips the need for using of separate baffles is avoided, whereby the manifold structure becomes simpler. Furthermore, a production of the integral lock strips does not result in complication of a manufacturing process because already existing equipment and processes are used.

Brief description of the drawings

[0008] The present invention is shown in its non-limiting embodiments in the drawings, in which:

Fig. 1 is an exploded perspective view of the manifold according to the present invention.

Fig. 2 is an exploded perspective view of the covering profile of the manifold according to the invention.

Fig. 3 is a perspective view of the assembled manifold with unfolded lock strips.

Fig. 4 is a perspective view of the assembled manifold with the folded lock strips.

Fig. 5 is a cross section view of the manifold with introduced tubes of a cooler assembly.

Fig. 6 is a perspective cross section view of the cooler assembly with the manifolds according to the invention.

Embodiments of the invention

[0009] In the drawings, since the manifold 1 according to the invention, and thus its components, is symmetrical, only one end of the manifold 1 is shown for clarity purposes. It means that the other end of the manifold 1, not shown in the drawings, has the same or similar configuration.

[0010] As shown in figure 1, the manifold 1 according to the present invention comprises an overlap or a covering profile 2. The covering profile 2 is manufactured from a plate, preferably of aluminium and/or its alloys, of a thickness between 0.8 mm and 2 mm, preferably 1 mm, by means of a pressing process. The manifold 1 further comprises, in order, an internal plate 6, a brazing plate 8 and a cover 10, which elements are also made of aluminium and/or its alloys and are arranged in the covering profile 2. End edges of the covering profile 2 overlap over corners 13 of the cover 10 and are folded over them. This results in immobilization of all components of the manifold 1 before brazing process and their tight adherence to one another so that there are substantially no voids there between. In the assembled manifold 1 the covering profile 2 is at least partially overlaid on the cover 10 and

is fixedly connected to and sealed against the cover 10. Both the internal plate 6 and the brazing plate 8 are completely covered by the covering profile 2 and the cover 10, i.e. they are located inside the covering profile 2, while the cover 10 is at least partially covered and enclosed by the covering profile 2. The internal plate 6 is arranged on a side of the covering profile 2, while the brazing plate 8 is arranged on a side of the cover 10. The brazing plate 8 has a function of the binder/solder joining the cover 10 and the internal plate 6, while the internal plate 6 has preferably a thickness of 3 mm and is intended to strengthen the structure of the manifold 1.

[0011] The covering profile 2, the internal plate 6 and the brazing plate 8 have a number of through slots 3, 7 and 9, respectively, positioned at corresponding positions (after assembling of the manifold 1 they are connected in groups, each of which has one slot 3, one slot 7 and one slot 9) and being in fluid communication with each other. The cover 10 has over its entire length a longitudinal open channel 11 defined therein, which is also in fluid communication with respective groups of slots 3, 7, 9. In this embodiment, the longitudinal channel 11 is in the form of two separate channels 11a, 11b separated by a reinforcing arc 12, the purpose of which is to strengthen the construction of the cover 10, and, therefore, each of the slots 9 of the brazing plate 8 is in the form of two separate corresponding slots 9a, 9b. However, the cover 10 can be provided with only one and, thus, a greater longitudinal channel 11, and then the slots 9 of the brazing plate 8 may not be divided into two separate slots 9a, 9b and they resemble the slots 3 or 7 by their shape. In addition, the longitudinal channel 11; 11a, 11b need not be an open channel, i.e. it can be completely closed by the profile of the cover 10. In this case, the cover 10 also includes a plurality of slots, which are in fluid communication with both the slots 3, 7, 9 as well as with the longitudinal channel 11; 11a, 11b, regardless of its form. The cover 10 may have on its exposed surface 14, uncovered by the covering profile 2, a port 15 being in fluid communication with the longitudinal channel 11; 11a, 11b, and thus with the slots 3, 7, 9.

[0012] The covering profile 2 has at each of its ends three additional lock strips 4, which extend beyond other components of the manifold 1. The lock strips 4 are an integral part of the covering profile 2 and are manufactured together with the covering profile 2 in a single stamping operation, so that the whole manufacturing process remains unchanged. During the assembly of the manifold 1 the lock strips 4 are bent (see fig. 4) over the other parts of the manifold 1 and over themselves such that they tightly close the longitudinal channel 11 of the cover 10, and thus the ends of the manifold 1. The lock strips 4 are soldered/fixed to each other and to other components of the manifold 1 (to the end of the manifold 1) in a single brazing operation. Thus, the lock strips 4 function as a baffle tightly closing the ends of the manifold 1, and the use of a separate baffle is unnecessary. With this construction the manifold 1 is significantly more re-

sistant to high internal operational pressure. Of course, between the lock strips 4 of the covering profile 2 and the internal plate 6, the brazing plate 8 and the cover 10 an additional separate baffle can be provided, although this is not required. In this case, the lock strips 4 fulfil an additional closing function to ensure that in the event of detachment of the separate baffle, it will be still attached to the manifold 1. The lock strips 4 can further comprise undercuts 5, on their end facing the covering profile 2, facilitating the operation of folding of the lock strips 4 at the ends of the manifold 1, i.e. undercuts 5 initiate a folding line.

[0013] The manifold 1 according to the invention is manufactured in such a way that the internal plate 6, the brazing plate 8 and the cover 10 are placed in a pre-bent covering profile 2. Then the covering profile is crimped on other components of the manifold 1 by bending its end edges at the corners 13 of the cover 10, and then the lock strips 4 are folded on the ends of the manifold 1 and each other. The manifold 1 obtained in this way is then soldered in a single step in a soldering furnace. If three lock strips 4 are used then a first lock strip 4 is soldered from its bottom side of the cover 10 and forms from its inner side, through the brazing plate 8, a connection with the internal plate 6 and the covering profile 2. A second folded lock strip 4 is soldered to the bottom lock strip 4 and also forms from its inner side a connection with the internal plate 6 and the covering profile 2 through the brazing plate 8. A third folded lock strip 4 is soldered to the underlying lock strip 4 and forms a closed connection with the covering profile 2.

[0014] In some applications it is not necessary to use as many as three lock strips 4 on each end of the manifold 1. In embodiments (not shown in the drawing) of the manifold 1, which can be used at lower operating pressures, each end of the covering profile 2 is provided with two or even just one lock strip 4. Furthermore, as mentioned above, in the case of using an additional separate baffle at each end of the manifold 1 it can be held by means of only one or two lock strips 4.

[0015] When using the manifold 1 according to the invention in a gas cooler 16 assembly of a cooling system, flat tubes 17, between which extend ribs 18 (shown only schematically in figs. 5 and 6) are introduced into the slots 3, 7 of the covering profile 2 and the internal plate 6. Each of the tubes 17 is provided with a series of channels for a cooling medium flow. In the assembly of the gas cooler 16 shown in figure 6 three manifolds 1 are used. Two manifolds 1 arranged on the left side of the gas cooler 16 are a inlet manifold and a outlet manifold, respectively. These manifolds 1 are provided a port 15 on their exposed surface 14, to which a connector 19 serving for connection to an external circuit of the cooling medium is attached. The manifold 1 on the right side of the gas cooler 16 is, however, an intermediate manifold and has no port 15 since it is only indirectly involved in the flow of the cooling medium between the tubes 17 of the gas cooler 16. The manifold 1 may also have brackets

20 for attaching the entire assembly to a supporting structure, for example a frame of a vehicle.

Claims

1. A manifold (1), in particular for use in a cooler (16) of a cooling system, comprising:

a cover (10) having at least one longitudinal channel (11) defined therein;
a covering profile (2) at least partially overlaid on said cover (10), which is fixedly connected to and sealed against said cover (10);
wherein said manifold (1) further comprises an internal plate (6) and a brazing plate (8) disposed between said covering profile (2) and said cover (10) so that all components of said manifold (1) closely adjoin to each other, and wherein said covering profile (2), said internal plate (6) and said brazing plate (8) have a plurality of through slots (3, 7, 9) at corresponding positions, said slots (3, 7, 9) being in fluid communication with each other and with said at least one longitudinal channel (11) of said cover (10);
characterized in that:

said covering profile (2) is provided at each of its ends with at least one lock strip (4), which is integral with said covering profile (2), said at least one lock strip (4) being bent over and fixedly attached to said end of said manifold (1) so as to close and seal this end of said manifold (1).

2. The manifold according to Claim 1, **characterized in that** said covering profile (2) is provided at each of its ends with three lock strips (4).

3. The manifold according to Claim 1 or 2, **characterized in that** each of said lock strips (4) is provided at its end, on the side of said covering profile (2), with undercuts (5) to facilitate bending.

4. The manifold according to any one of the preceding Claims, **characterized in that** it further comprises at its ends additional baffles, which close said ends of said manifold (1) and onto which said lock strips (4) are bent.

5. The manifold according to any one of the preceding Claims, **characterized in that** all components of said manifold (1) are made of aluminium and/or its alloys and are connected to each other by means of brazing.

6. The manifold according to any one of the preceding Claims, **characterized in that** said at least one longitudinal channel (11) of said cover (10) includes two longitudinal channels (11a, 11b) separated by a reinforcing arc (12), said two longitudinal channels (11a, 11b) being in fluid communication with said slots (3, 7, 9).

7. The manifold according to any one of the preceding Claims, **characterized in that** said cover (10) comprises on its surface (14), not covered by said covering profile (2), a port (15) being in fluid communication with said at least one longitudinal channel (11).

8. A cooler (16) comprising a manifold (1) according to any one of Claims 1-7.

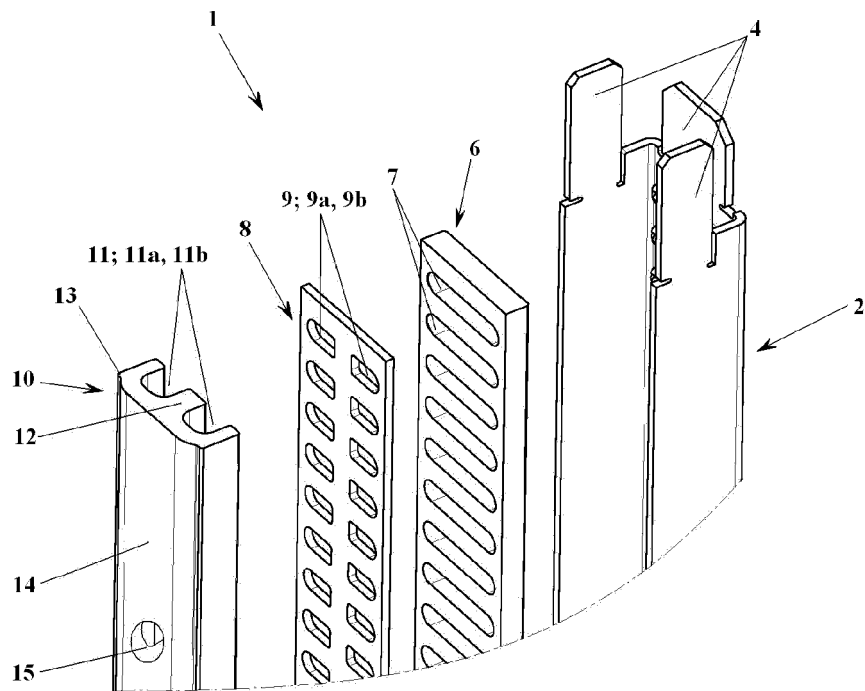


Fig. 1

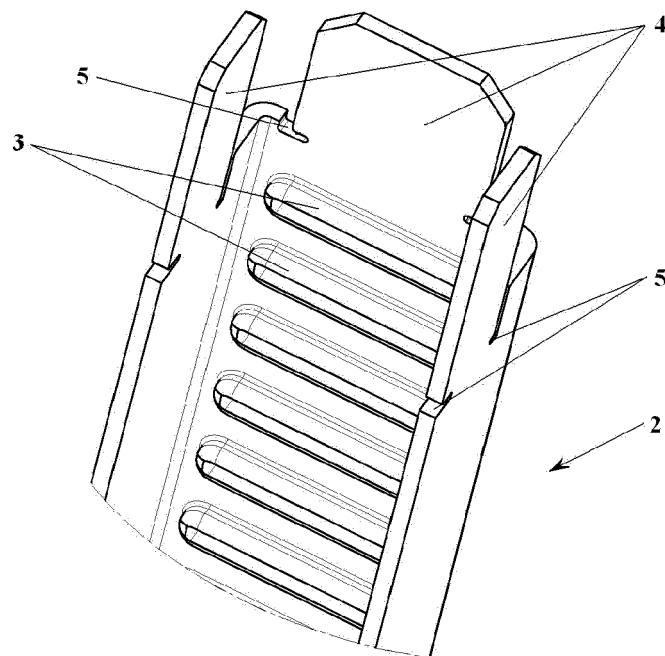


Fig. 2

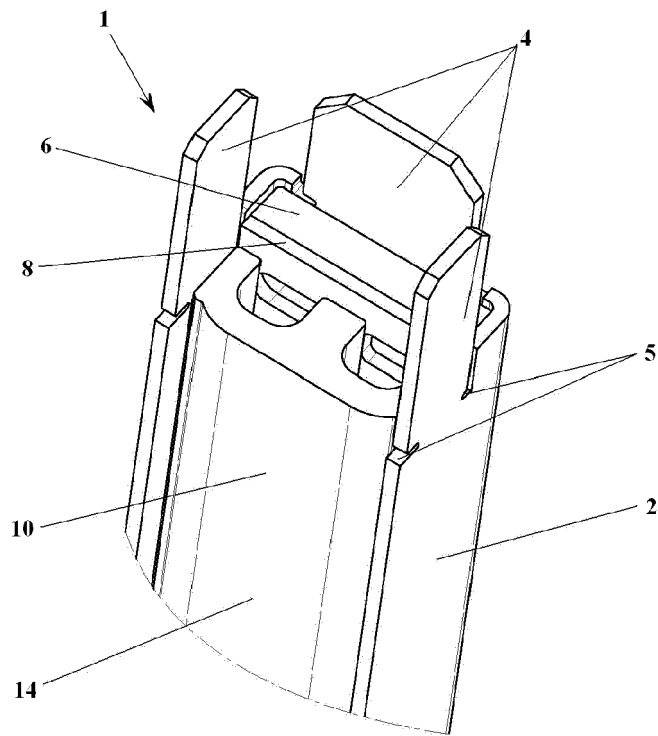


Fig. 3

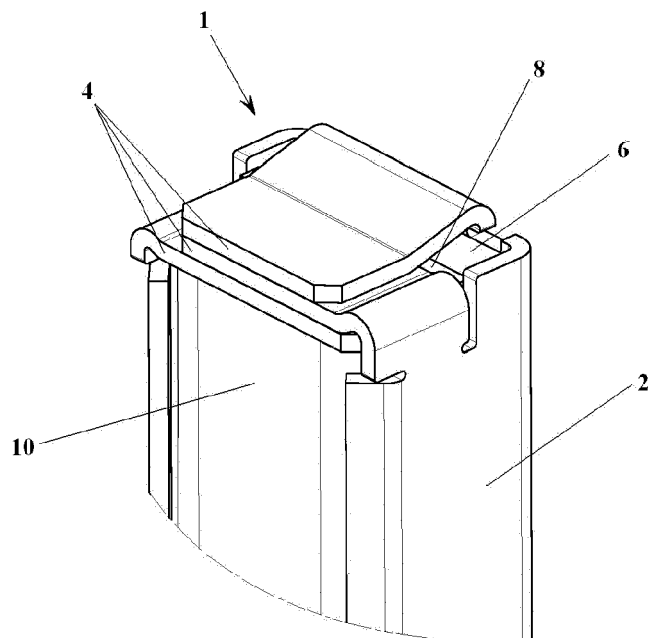


Fig. 4

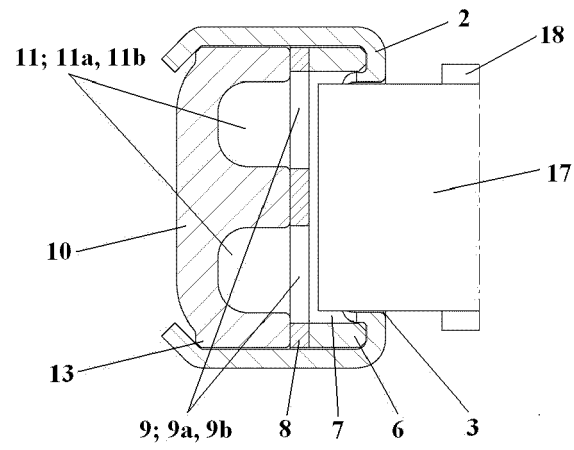


Fig. 5

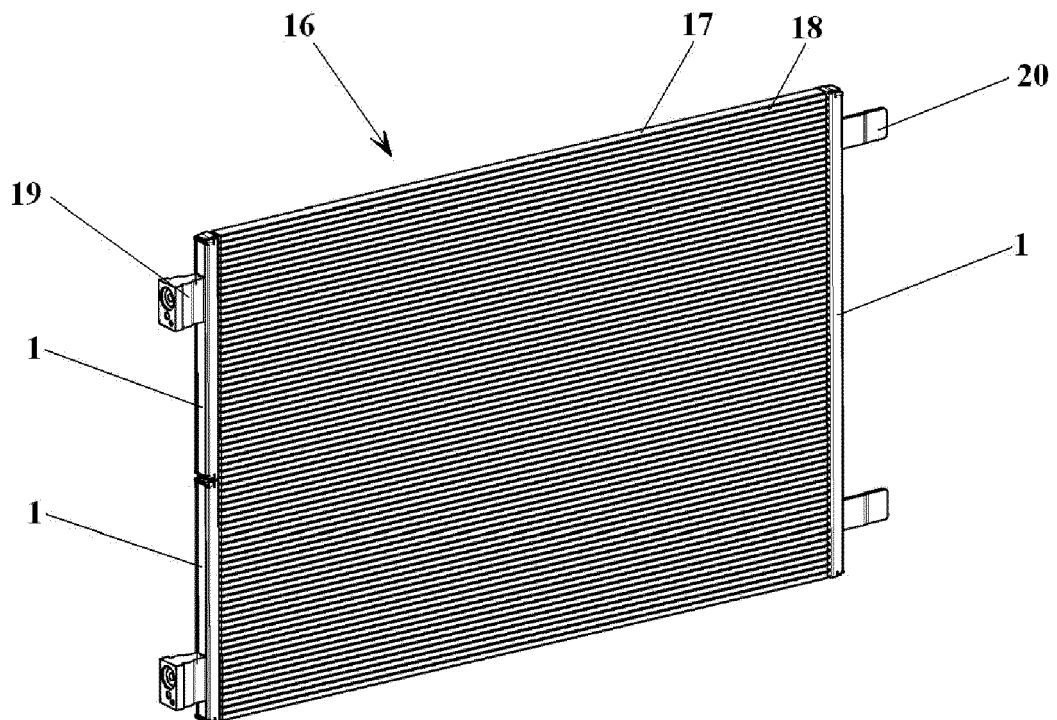


Fig. 6



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Application Number
EP 16 17 7274

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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