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(54) **HEAT PIPE ASSEMBLY**

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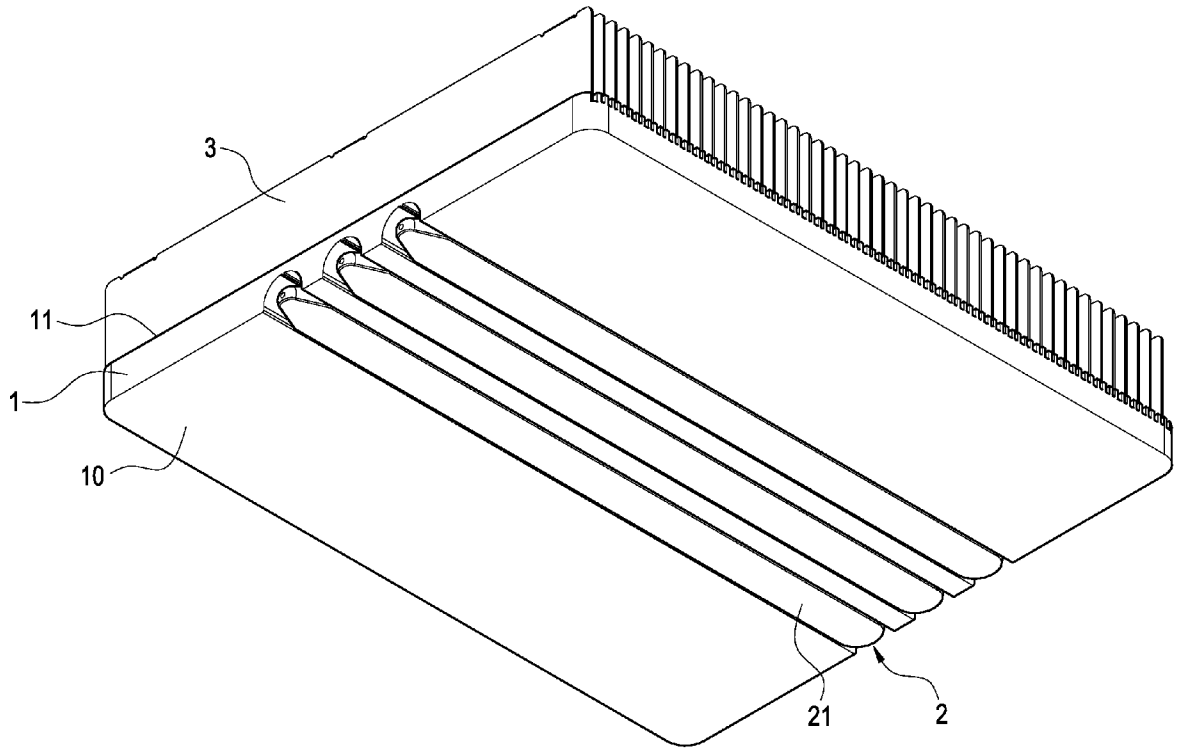
(57) **ABSTRACT**

A heat pipe assembly includes a heat-transfer block and at least one heat pipe press-fitted thereon. The heat-transfer block has a surface. A heat pipe groove is formed concavedly on the surface. A fixing rib is protruded from the heat pipe groove. The heat pipe is press-fitted to the heat pipe groove, and the fixing rib impresses into the heat pipe in forming an impression thereon. Thus, the heat pipe is tightly secured onto the heat-transfer block.



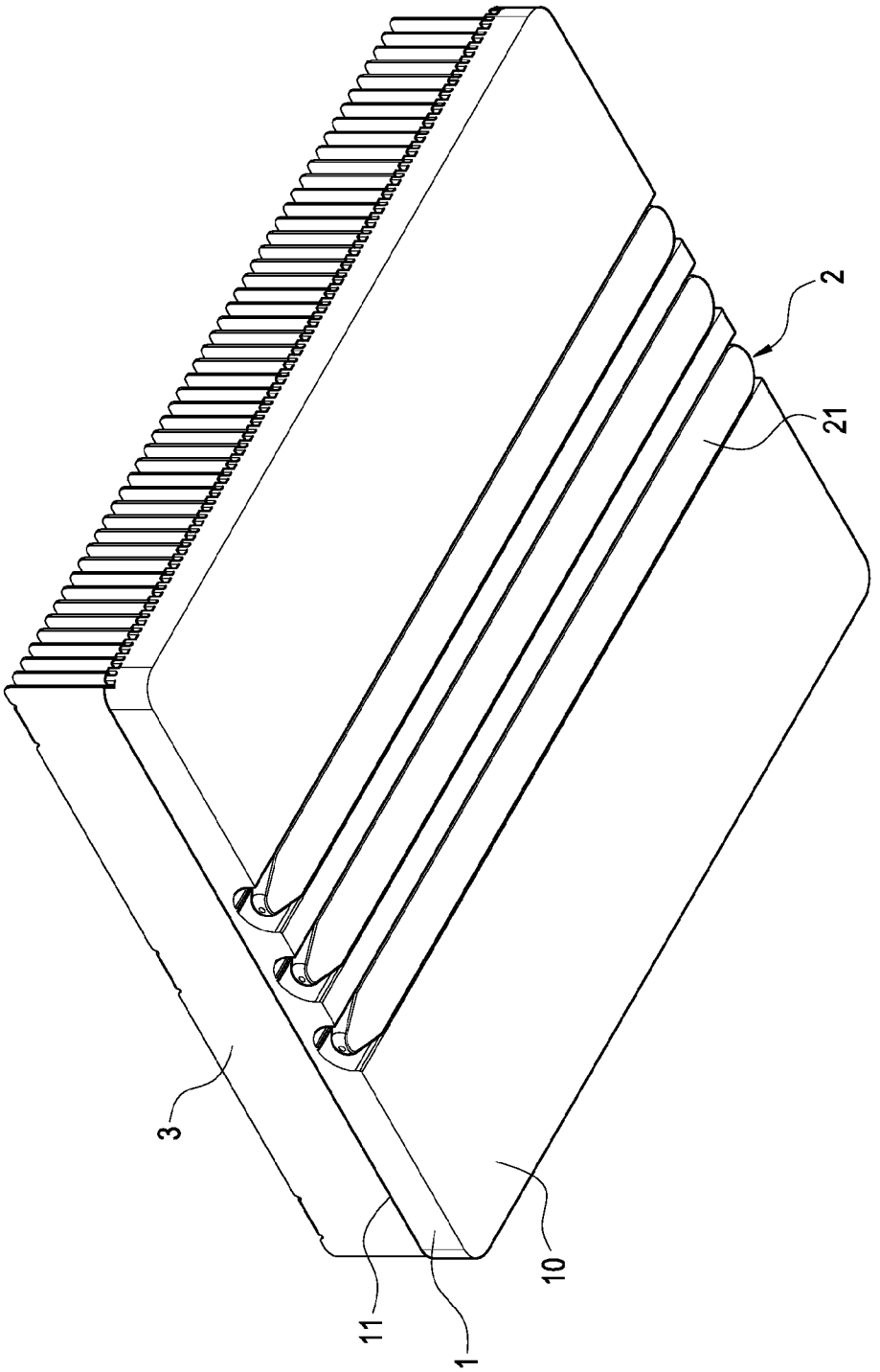


FIG. 1

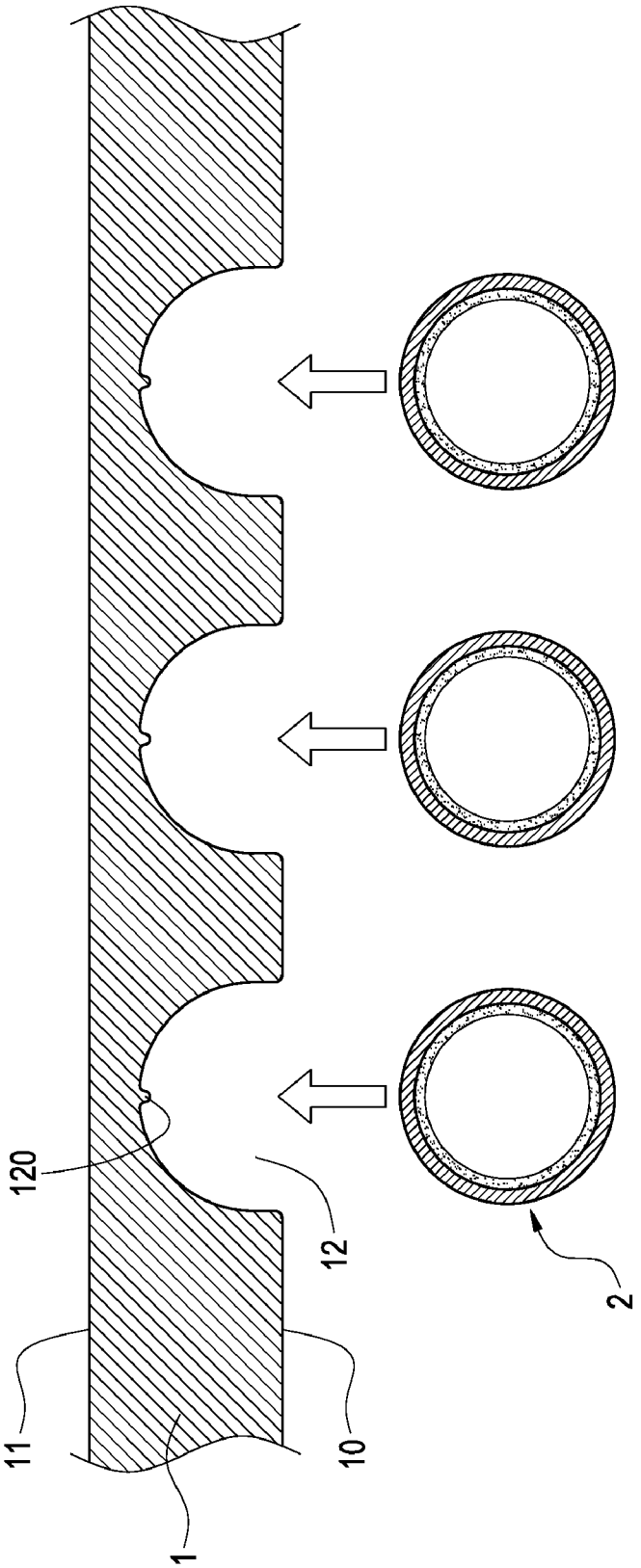


FIG. 2

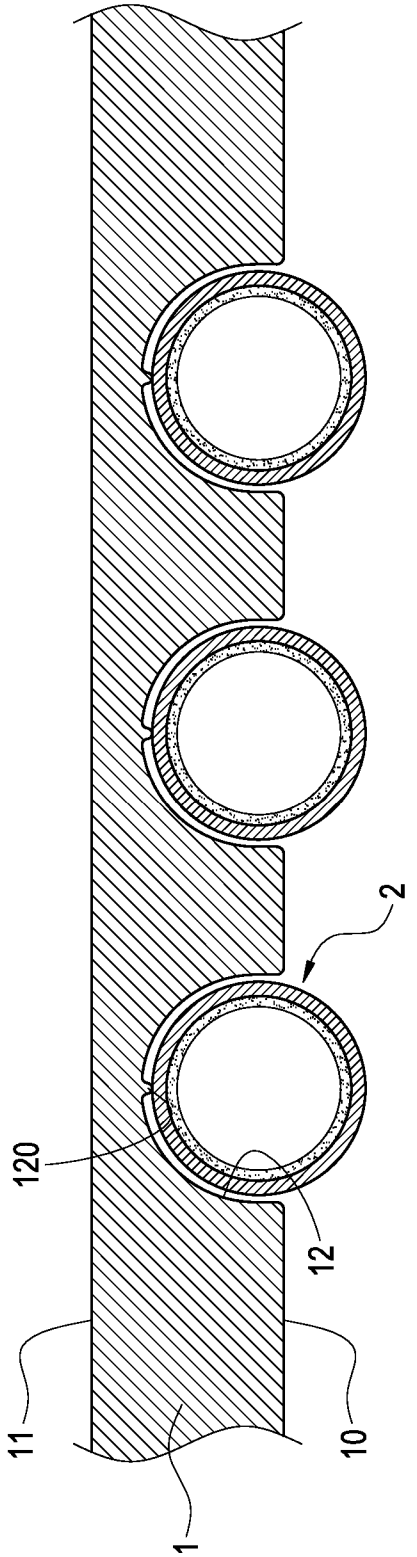


FIG. 3

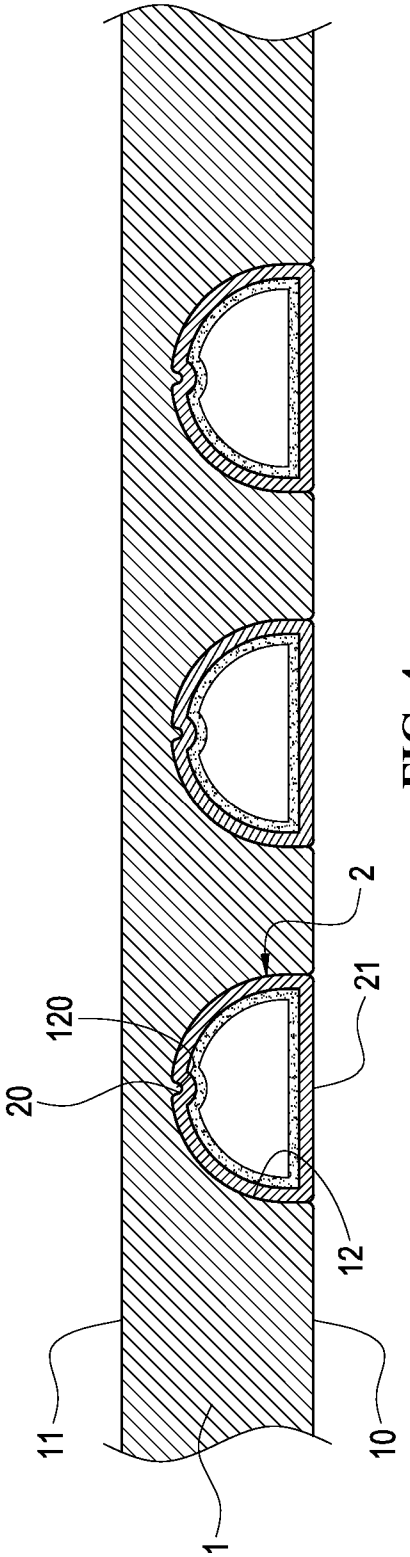


FIG. 4

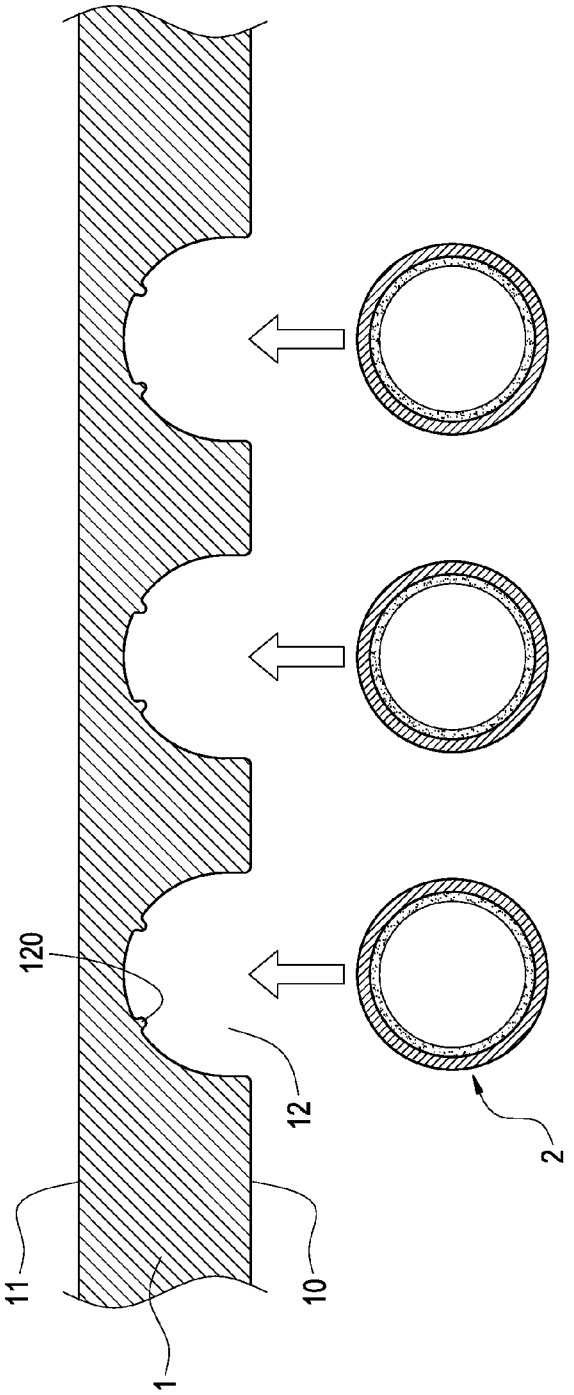


FIG. 5

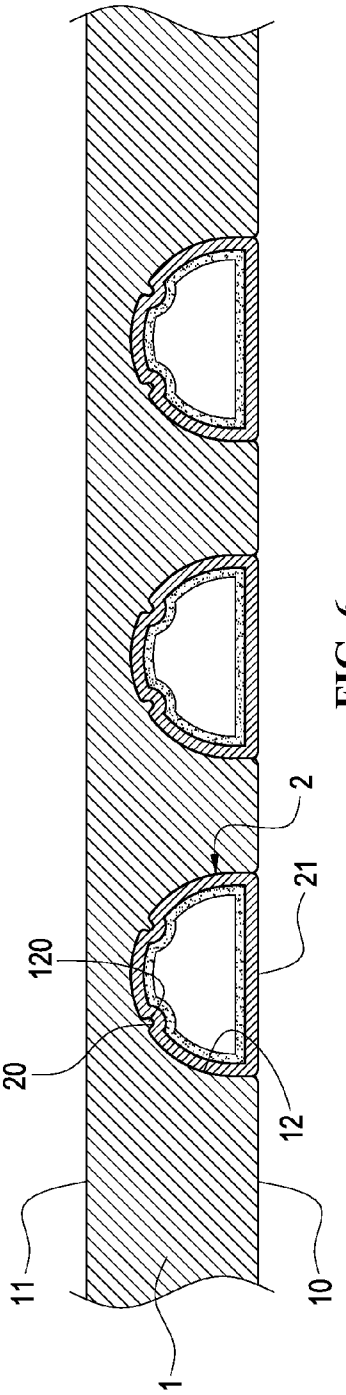


FIG. 6

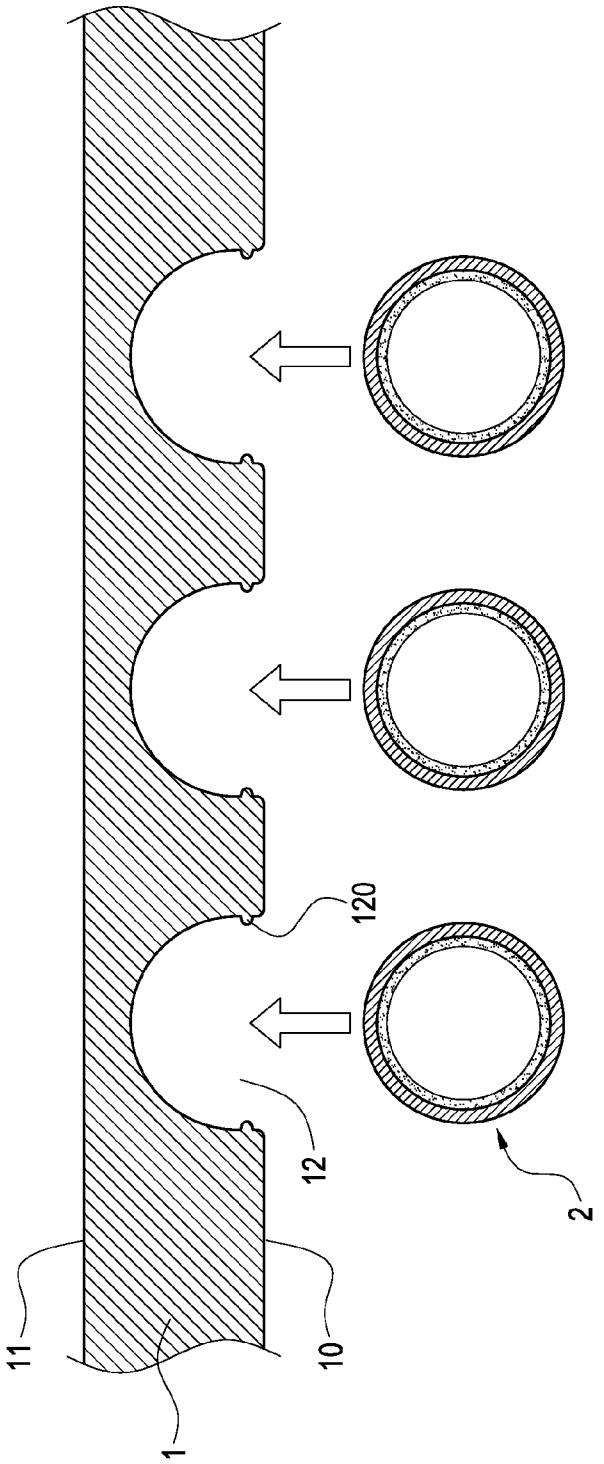


FIG. 7

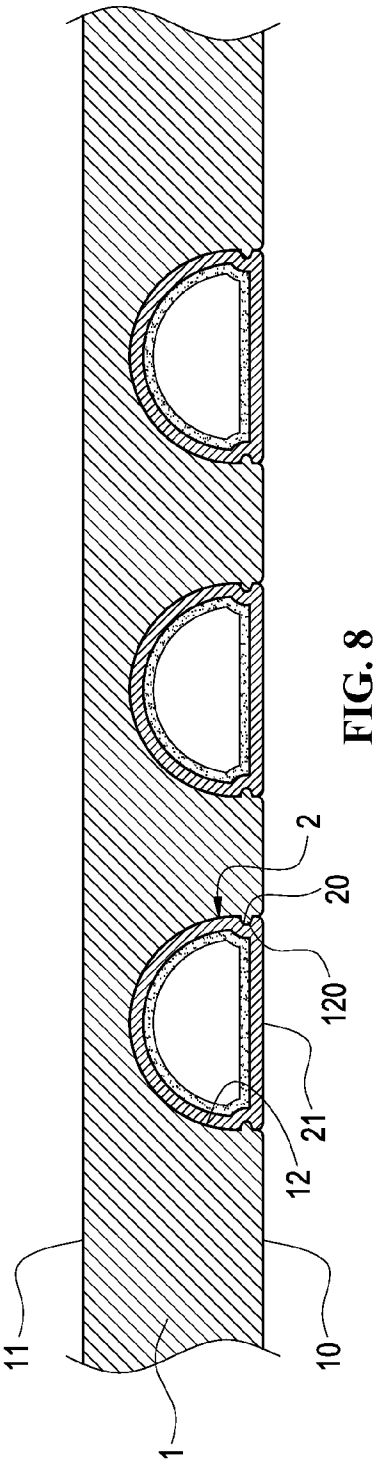


FIG. 8

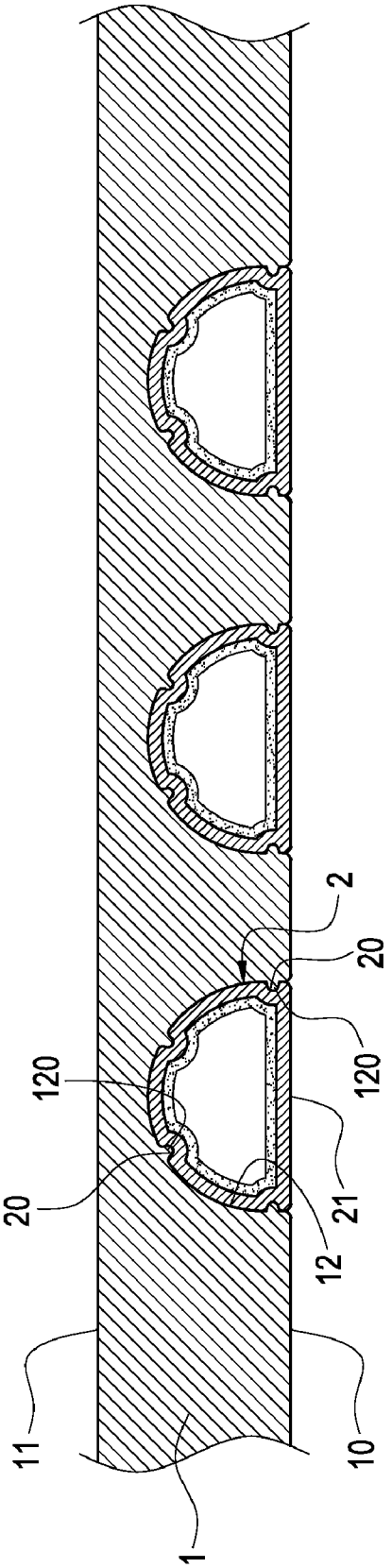


FIG. 9

HEAT PIPE ASSEMBLY

BACKGROUND OF THE INVENTION

[0001] (a) Field of the Invention

[0002] The instant disclosure relates to a heat dissipating structure; more particularly, to a heat pipe assembly.

[0003] (b) Description of the Prior Art

[0004] A heat-transfer block is often used with heat pipes to enhance heat transfer performance. When securing heat pipes to respective heat pipe grooves of the heat-transfer block, a soldering material is often employed. Alternatively, solder-less press-fit method may be employed to affix heat pipes to respective heat pipe grooves of the heat-transfer block. These heat pipe grooves may be configured to provide arched or oval cross sections. When the heat pipes are forced into respective heat pipe grooves, the heat pipes are pressed fitted to prevent accidental separation. However, because the heat pipe grooves have arched or oval cross sections, the heat pipes tend to be loosened or forced out of position accidentally in absence of the soldering or adhesive materials. Further, for more than one heat pipe, the oval-shaped heat pipe grooves force these heat pipes to be spaced further apart from one another. Due to such limitation, the heat pipes cannot be closely arranged. On the other hand, if the soldering material or paste is opted to secure the heat pipes, the following issues may occur. If not enough soldering material or paste is available, the heat pipes may be loosely attached. However, if too much soldering material or paste is applied, the excessive amount would overflow the grooves as an eyesore to the users. Other disadvantages include the increase in material and manufacturing costs.

[0005] To address the above issues, the inventor strives via industrial experience and academic research to develop the instant disclosure, which can effectively improve the limitations as described above.

SUMMARY OF THE INVENTION

[0006] The instant disclosure has been accomplished under the circumstances in view. It is one object of the instant disclosure to provide a heat pipe assembly, Without using the soldering material, heat pipes can be press-fitted into respective heat pipe grooves to prevent displacements. The heat pipe grooves can be semi-circularly arched to group the heat pipes effectively.

[0007] To achieve this and other objects of the instant disclosure, the heat pipe assembly comprises a heat-transfer block and at least one heat pipe press-fitted thereon. The heat-transfer block has a surface, wherein a heat pipe groove is concavedly formed thereon. A fixing rib protrudes from the heat pipe groove, and the heat pipe is press-fitted to the heat pipe groove. The fixing rib impresses into the surface of the heat pipe in forming an impression thereon, thus securing the heat pipe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** is an assembled view of the instant disclosure.

[0009] FIG. **2** is an assembling view of a heat pipe assembly for a first embodiment of the instant disclosure.

[0010] FIG. **3** is an assembled view of heat pipes with a heat-transfer block for the first embodiment of the instant disclosure before flattening.

[0011] FIG. **4** is an assembled view of the heat pipes with the heat-transfer block for the first embodiment of the instant disclosure after flattening.

[0012] FIG. **5** is a schematic view of heat pipes with a heat-transfer block before assembling for a second embodiment of the instant disclosure.

[0013] FIG. **6** is a schematic view of heat pipes with a heat-transfer block after assembling for the second embodiment of the instant disclosure.

[0014] FIG. **7** is a schematic view of heat pipes with a heat-transfer block before assembling for a third embodiment of the instant disclosure.

[0015] FIG. **8** is a schematic view of heat pipes with a heat-transfer block after assembling for the third embodiment of the instant disclosure.

[0016] FIG. **9** is a schematic view of heat pipes with a heat-transfer block after assembling for a fourth embodiment of the instant disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] The various objects and advantages of the instant disclosure will be more readily understood from the following detailed description when read in conjunction with the appended drawings. However, the appended drawings are for references and explanation purposes only, therefore are not used to restrict the scope of the instant disclosure.

[0018] Please refer to FIG. **1**, which shows a heat pipe assembly of the instant disclosure. The heat pipe assembly comprises a heat-transfer block **1** and at least one heat pipe **2** press-fitted thereon for improving heat transfer.

[0019] The heat-transfer block **1** can be made of copper, aluminum, or other materials with good thermal conductivity. The heat-transfer block **1**, having at least a bottom surface **10** for affixing to a heat source and a top surface **11** formed oppositely, may act as a base of a heat sink. According to this embodiment, the heat pipe **2** is secured to the bottom surface **10** of the heat-transfer block **1**, and the top surface **11** of the heat-transfer block **1** is further mounted with a plurality of heat-dissipating fins **3**, thereby forming a heat sink.

[0020] Please refer to FIG. **2** in conjunction with FIG. **1**. A plurality of heat pipe grooves **12** are formed concavedly on the bottom surface **10** of the heat-transfer block **1** in equal number to the heat pipes **2**. However, it is to be understood that the design of the heat pipe grooves **12** at the bottom surface **10** of the heat-transfer block **1** is simply an example but not a limitation. The cross section of each heat pipe groove **12** is arched in such a way of being approximately larger than a semi-circle for press-fitting the heat pipe **2**. At least one fixing rib **120** is protruded from each heat pipe groove **12**. The fixing rib **120** extends longitudinally along the length of the heat pipe groove **12**.

[0021] Please refer to FIGS. **3** and **4** and FIGS. **1** and **2** again. When the heat pipes **2** are forced into the respective heat pipe grooves **12**, the fixing rib **120** is forced to abut and impress into the corresponding heat pipe **2**, thus forming an impression **20** thereon. By virtue of the fixing rib **120**, the original contact area of each arched heat pipe groove **12** is no longer rounded, which also prevents the displacement or loosening of the heat pipes **2** from the heat pipe grooves **2**. When the soldering material is not being used, the fixing ribs **120** allow the heat pipes **2** to be disposed directly onto the heat-transfer block **1** securely in a solder-less press-fit manner. Further, the exposed portion of each heat pipe **2** is flat-

tened in forming a heat-absorbing surface **21**. The heat-absorbing surfaces **21** can be formed coplanarly with the bottom surface **10** of the heat-transfer block **1** to contact the heat source smoothly.

[0022] Please refer to FIGS. **5** and **6**, which show a second embodiment of the instant disclosure. This second embodiment is substantially similar to the aforesaid first embodiment with the exception that the second embodiment comprises a plurality of fixing ribs **120** spaced apart from each other. Based on the number of the fixing rib **120**, the fixing ribs **120** are evenly spread. By means of increasing the number of the fixing ribs **120**, connection stability between the heat pipes **2** and the heat-transfer block **1** is enhanced.

[0023] Please refer to FIGS. **7** and **8**, which illustrate a third embodiment of the instant disclosure. This third embodiment is substantially similar to the aforesaid second embodiment with the exception that the fixing ribs **120** according to this third embodiment are disposed near the corner or two opposite corners of the heat pipe grooves **12** to enhance connection stability between the heat pipes **2** and the heat-transfer block **1**, wherein the fixing ribs **120** abut inward against the heat pipes **2**.

[0024] FIG. **9** illustrates a heat pipe assembly in accordance with a fourth embodiment of the instant disclosure. This fourth embodiment is a combination of the aforesaid second and third embodiments, having the advantages of both embodiments.

[0025] Based on the preceding structures, the heat pipe assembly of the instant disclosure is obtained.

[0026] In summary, the instant disclosure is able to achieve the pre-determined objectives and resolve issues facing by conventional heat pipe assemblies. The instant disclosure has novelty and non-obviousness in conforming to the requirements for patent application. Therefore, the present patent application is submitted to obtain a patent for protecting the intellectual property right of the inventor.

[0027] The descriptions illustrated supra set forth simply the preferred embodiments of the instant disclosure; however, the characteristics of the instant disclosure are by no means restricted thereto. All changes, alternations, or modifications conveniently considered by those skilled in the art are deemed to be encompassed within the scope of the instant disclosure delineated by the following claims.

What is claimed is:

1. A heat pipe assembly, comprising:

a heat-transfer block having a surface, a heat pipe groove being formed concavedly thereon, a fixing rib being protruded from the heat pipe groove; and

a heat pipe press-fitted to the heat pipe groove, the heat pipe being impressed by the fixing rib in forming an corresponding impression.

2. The heat pipe assembly as claimed in claim **1**, wherein the surface is a bottom surface of the heat-transfer block.

3. The heat pipe assembly as claimed in claim **1**, wherein the heat pipe groove of the heat-transfer block is arched slightly larger than semi-circularly shaped.

4. The heat pipe assembly as claimed in claim **1**, wherein the heat pipe groove has more than one fixing rib formed thereon.

5. The heat pipe assembly as claimed in claim **4**, wherein the fixing ribs on the heat pipe groove are spaced apart from one another.

6. The heat pipe assembly as claimed in claim **1**, **4** or **5**, wherein the fixing rib extends longitudinally along the length of the corresponding heat pipe groove.

7. The heat pipe assembly as claimed in claim **1**, **4** or **5**, wherein the fixing rib is disposed adjacent to one corner of the corresponding heat pipe groove.

8. The heat pipe assembly as claimed in claim **4** or **5**, wherein the fixing ribs are disposed near respective corners of the heat pipe groove.

9. The heat pipe assembly as claimed in claim **1**, wherein the number of the heat pipe is increased to more than one, and wherein an equal number of the heat pipe groove is formed on the heat-transfer block.

10. The heat pipe assembly as claimed in claim **1**, wherein the heat pipe and the heat-transfer block are kept in direct contact.

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