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GB 2079052 A US 5038858 A US 5020586 A
US 4897712 A

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(54) Abstract Title
Heat dissipating device

(57) A heat dissipating device (A) includes a stack portion and a fin portion. The stack portion includes a plurality of alternately disposed first and second stack plates (32, 42) which are mounted to one another. The first and second stack plates are disposed side by side and are in close contact with one another. The fin portion includes a plurality fin plates (31) that extend integrally and respectively from the second stack plates (42) such that a space is formed between two adjacent ones of the fin plates.

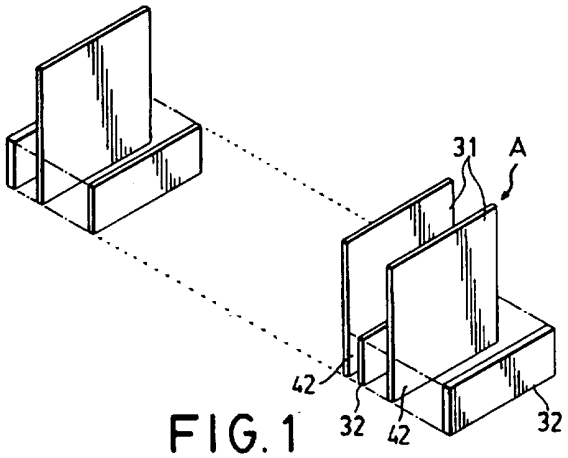

FIG. 1

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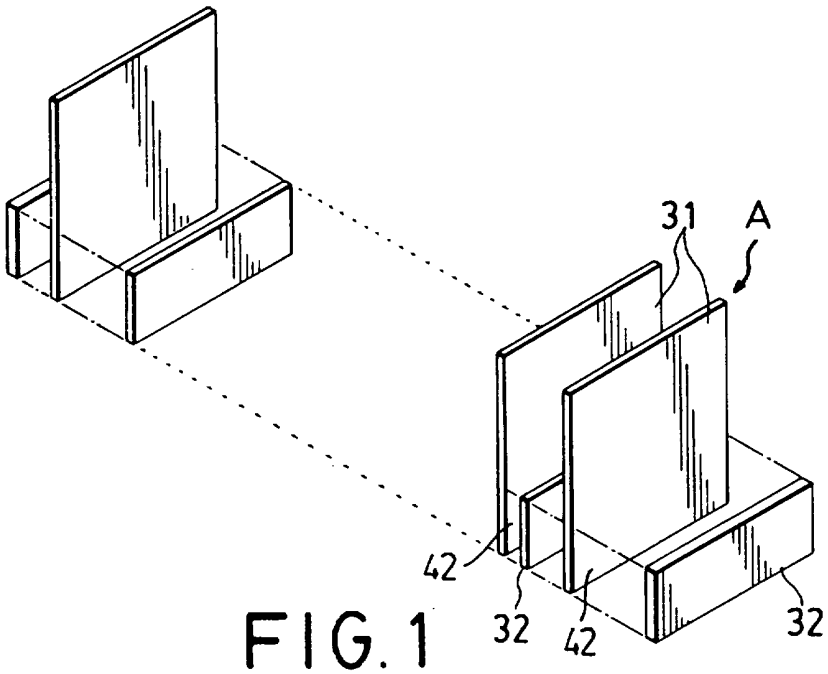

FIG. 1

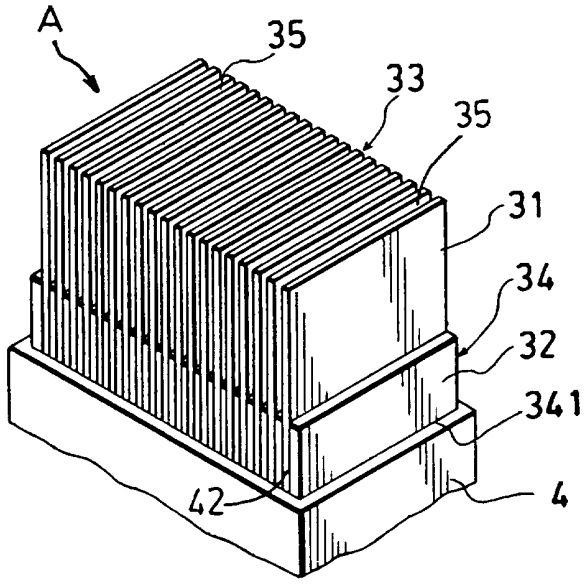

FIG. 2

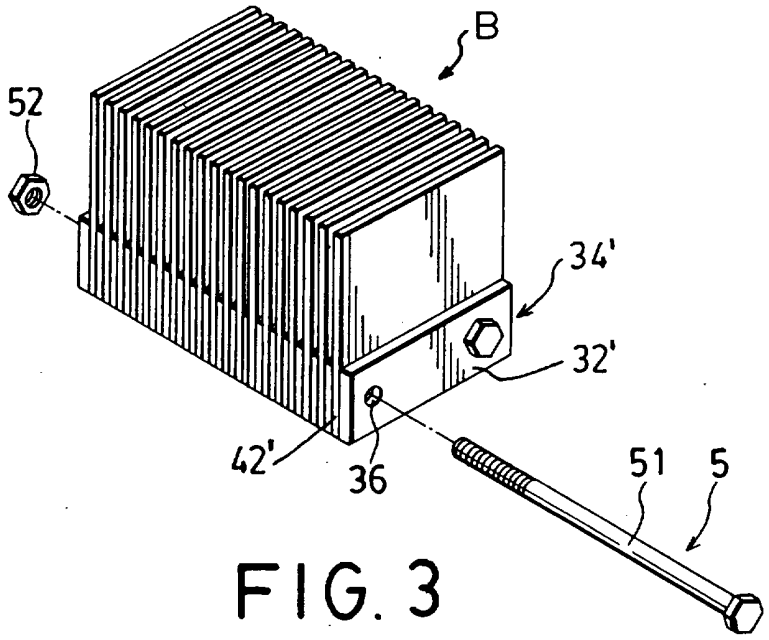

FIG. 3

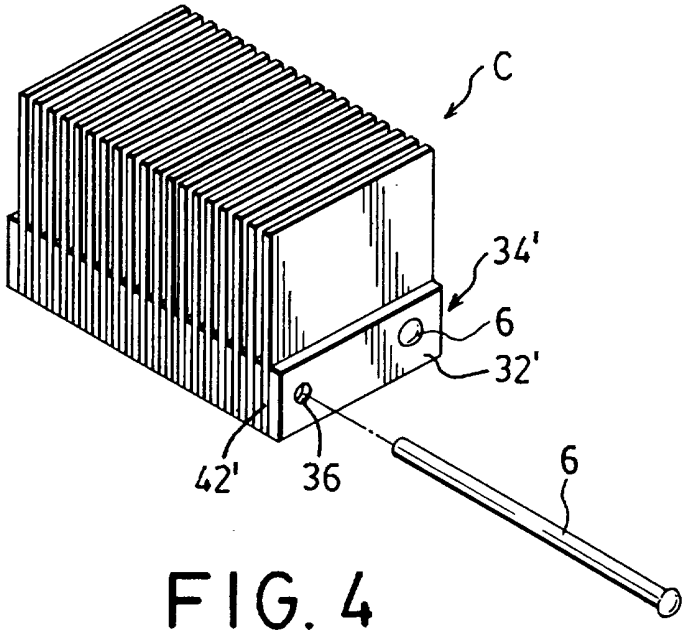

FIG. 4

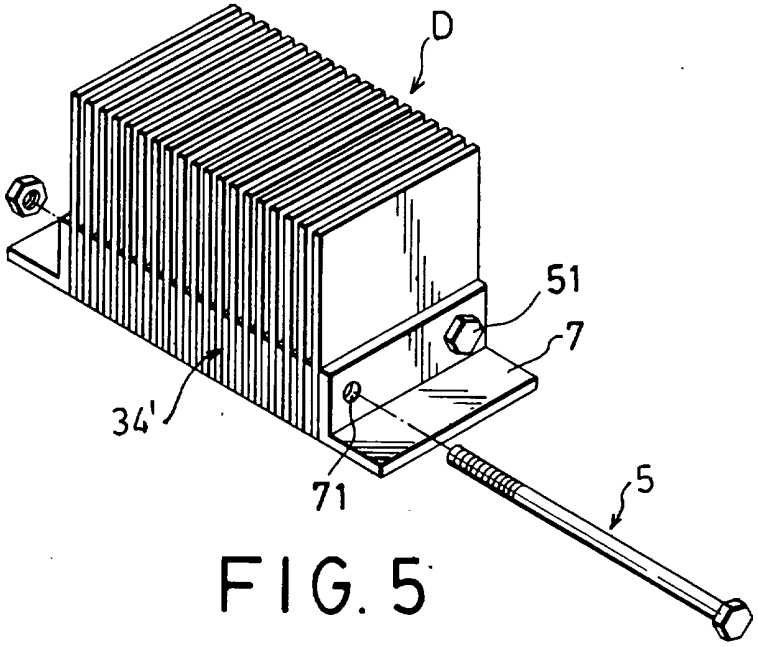

FIG. 5

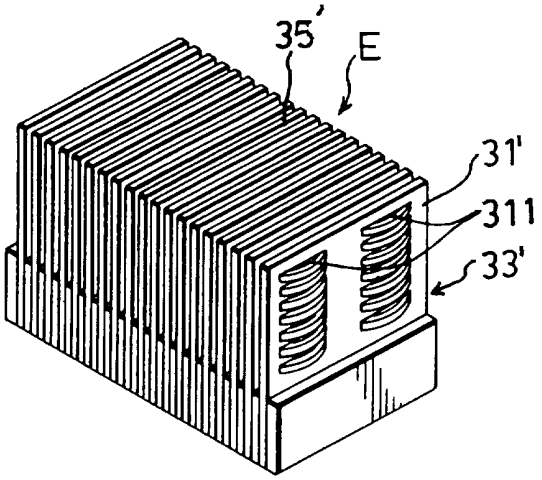

FIG. 6

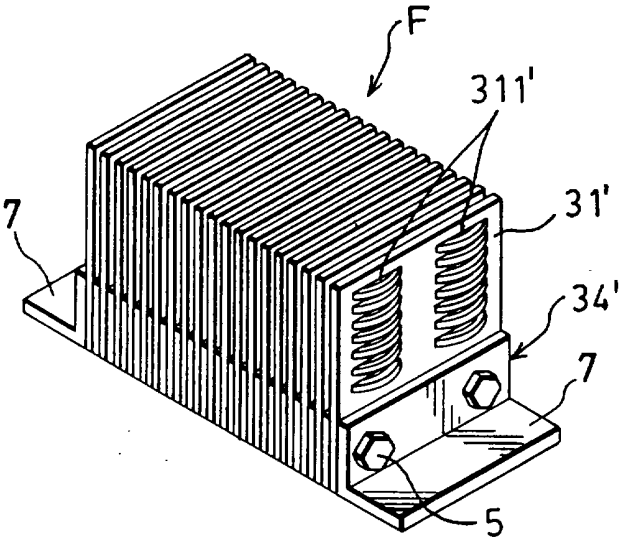

FIG. 7

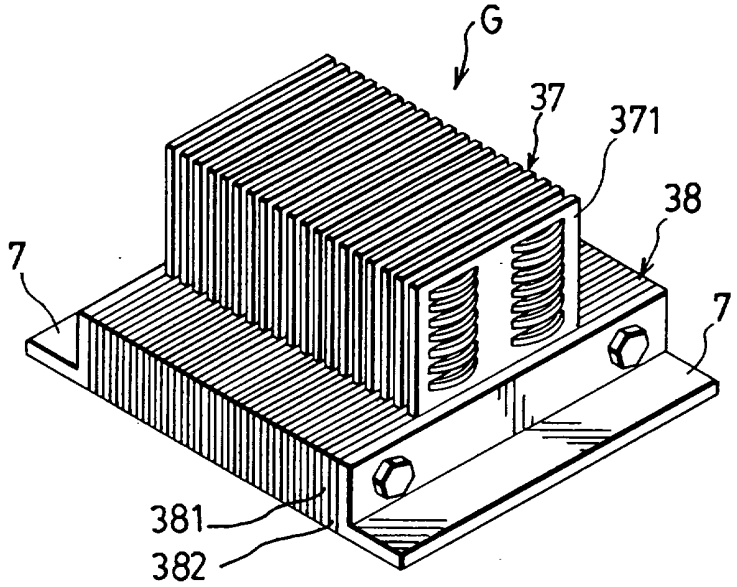

FIG. 8

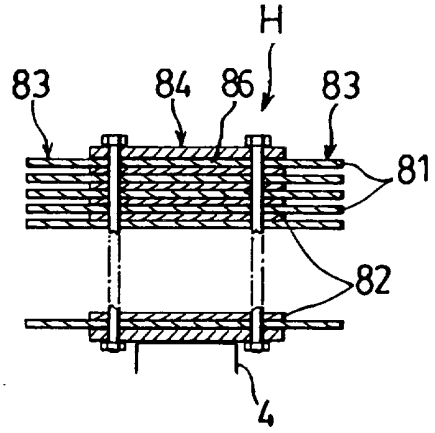

FIG. 9

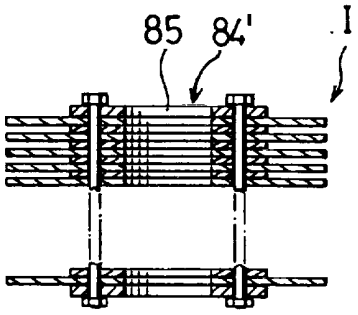

FIG. 10

HEAT DISSIPATING DEVICE

The present invention relates to a heat dissipating device, more particularly to a heat dissipating device having a stack portion that includes a plurality of stack plates in close contact with one another and a fin portion that includes a plurality of fin plates which extend integrally from alternate ones of the stack plates.

A conventional heat dissipating device, which is formed of extruded aluminum, includes a base plate and a plurality of fin plates that extend integrally and transversely from the base plate. In general, the heat dissipating effect of a heat dissipating device depends primarily on the heat dissipating area provided by the device. In other words, a larger heat dissipating area will result in a greater heat dissipating effect.

In order to provide a larger heat dissipating area, a heat dissipating device made by casting or cutting has been developed. However, since the heat dissipating devices of the aforementioned types are formed integrally, the heat dissipating area provided thereby is limited. It is impossible to increase the heat dissipating area of the aforementioned heat dissipating devices. As such, a conventional heat dissipating device is usually equipped with a fan thereon to result in an increased heat dissipating effect. This, however, results in added costs and increased size. Moreover,

electrical power is needed to activate the fan, and additional fees for maintaining the fan might be incurred.

The main object of the present invention is to provide a heat dissipating device which can be arranged to increase the heat dissipating effect as required, thereby obviating the need for an additional fan.

Accordingly, the heat dissipating device of the present invention includes a stack portion and a fin portion. The stack portion includes a plurality of alternately disposed first and second stack plates which are mounted to one another. The first and second stack plates are disposed side by side and are in close contact with one another. The fin portion includes a plurality fin plates that extend integrally and respectively from the second stack plates such that a space is formed between two adjacent ones of the fin plates.

Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is an exploded perspective view of a first preferred embodiment of the present invention;

Figure 2 is a perspective view of the first preferred embodiment when applied to a heat generating article;

Figure 3 is a perspective view of a second preferred embodiment of the present invention;

Figure 4 is a perspective view of a third preferred embodiment of the present invention;

Figure 5 is a perspective view of a fourth preferred embodiment of the present invention;

Figure 6 is a perspective view of a fifth preferred embodiment of the present invention;

Figure 7 is a perspective view of a sixth preferred embodiment of the present invention;

Figure 8 is a perspective view of a seventh preferred embodiment of the present invention;

Figure 9 is a perspective view of an eighth preferred embodiment of the present invention; and

Figure 10 is a perspective view of a ninth preferred embodiment of the present invention.

Referring to Figures 1 and 2, the heat dissipating device (A) according to a first preferred embodiment of the present invention is shown to have a stack portion 34 and a fin portion 33.

The stack portion 34 includes a plurality of alternately disposed first and second stack plates 32, 42. The first and second stack plates 32, 42 are disposed side by side and are in close contact with one another.

The fin portion 33 includes a plurality of fin plates 31 that extend integrally and respectively from

the second stack plates 42 such that a space 35 is formed between two adjacent ones of the fin plates 31.

In the present embodiment, the first and second stack plates 32, 42 are upright and cooperatively form a flat bottom face 341 that is adapted to be placed in contact with a heat generating article 4 so that heat can be transferred from the heat generating article 4 to the heat dissipating device (A). The first and second stack plates 32, 42 are bonded together by a known brazing technique.

It is noted that the thickness of the first and second stack plates 32, 42 are variable to change the required numbers of the first and second stack plates 32, 42, thereby changing the number of the fin plates 31. When the number of the fin plates 31 is increased, the heat dissipating area provided by the fin plates 31 increases correspondingly. Accordingly, in a heat dissipating device with a predetermined dimension, when the first and second stack plates 32, 42 are made thinner, the heat dissipating area will become larger to increase the heat dissipating effect.

Referring to Figures 3 and 4, the heat dissipating device (B) according to the second preferred embodiment and the heat dissipating device (C) according to the third preferred embodiment of the present invention are modified from the heat dissipating device (A). In the heat dissipating devices (B) and (C), the first and

second stack plates 32', 42' of the stack portion 34' are fastened together by fasteners instead of being bonded together by brazing. The first and second stack plates 32', 42' of the stack portion 34' of the heat dissipating devices (B) and (C) are formed with aligned fastener holes 36. In the heat dissipating device (B), the stack portion 34' further has two screw fasteners 5 which include screw rods 51 extending through the fastener holes 36, and nuts 52 threaded onto the screw rods 51 for fastening together the first and second stack plates 32', 42'. In the heat dissipating device (C), two rivets 6 extend through the aligned fastener holes 36 for fastening together the first and second stack plates 32', 42'.

Referring to Figure 5, the heat dissipating device (D) according to the fourth preferred embodiment is modified from the heat dissipating device (B) of Figure 3. The heat dissipating device (D) further includes a pair of L-shaped mounting plates 7 disposed on two opposite sides of the stack portion 34' and formed with through holes 71 that are aligned with the fastener holes formed in the stack portion 34' to permit extension of the screw fasteners 5 therethrough for fastening the mounting plates 7 to stack portion 34'. Likewise, the screw fasteners 5 may be replaced by rivets 6, such as those shown in Figure 4.

Referring to Figure 6, the heat dissipating device (E) according to the fifth preferred embodiment is modified from the heat dissipating device (A) shown in Figure 2. Each of the fin plates 31' in the fin portion 33' of the heat dissipating device (E) is formed with two rows of heat dissipating holes 311 in communication with the spaces 35' between the fin plates 31'. The heat dissipating holes 311 result in increased heat dissipating area provided by the fin plates 31' and in an enhanced air flowability in the fin portion 33' to result in an improved heat dissipating effect.

Referring to Figure 7, the heat dissipating device (F) according to the sixth preferred embodiment is modified from the heat dissipating device (D). Each of the fin plates 31' in the fin portion 33' of the heat dissipating device (F) is formed with two rows of heat dissipating holes 311', such as those found in the device (E) of Figure 6.

Referring to Figure 8, the heat dissipating device (G) according to the seventh preferred embodiment is shown to have a stack portion 38 and a fin portion 37 narrower than the stack portion 38. The stack portion 38 includes a plurality of alternately arranged first and second stack plates 381, 382. The fin portion 37 includes a plurality of fin plates 371 that extend integrally and respectively from the second stack plates 382 and that are narrower than the second stack

plates 382.

Referring to Figure 9, the heat dissipating device (H) according to the eighth preferred embodiment includes a stack portion 84 and two fin portions 83 on opposite sides of the stack portion 84. The stack portion 84 includes horizontally disposed first and second stack plates 82, 86. Each of the fin portions 83 includes a plurality of fin plates 81 that extend integrally from the second stack plates 86 in a horizontal direction. As shown, a lowermost one of the first and second stack plates 82, 86 has a bottom side that is adapted to be placed in contact with the heat generating article 4.

Referring to Figure 10, the heat dissipating device (I) according to the ninth preferred embodiment is modified from the heat dissipating device (H). The stack portion 84' of the heat dissipating device (H) is formed with a receiving hole 85 adapted for receiving another heat generating article (not shown) therein.

In the aforementioned embodiments, the stack plates and the fin plates are preferably made from thin aluminum plates. In addition, in the heat dissipating devices (I) and (H), the fin plates 81 and the first and second stack plates 82, 86 may be designed to have circular or oval-shaped peripheries.

Accordingly, the heat dissipating device of the present invention provides the following advantages:

(1) By making the stack plates and fin plates thinner, the heat dissipating area provided by the fin plates can be increased as desired to increase the heat dissipating area and thus the heat dissipating effect.

(2) Since the heat dissipating device includes a plurality of stack plates and fin plates, the manufacturing thereof is simplified, and the manufacturing cost is lowered.

(3) Since the heat dissipating device of the present invention includes a plurality of first and second stack plates and a plurality of fin plates, the shape of the device can be easily modified as required.

(4) Since the heat dissipating effect of the heat dissipating device of the present invention can be enhanced by varying the thickness of the stack plates and the fin plates and by increasing the number of the fin plates, the need for installing a fan can be obviated.

CLAIMS:

1. A heat dissipating device for use with a heat-generating article, comprising:

a stack portion which includes a plurality of alternately disposed first and second stack plates that are mounted to one another, the first and second stack plates being disposed side by side and being in close contact with one another; and

a fin portion which includes a plurality fin plates that extend integrally and respectively from the second stack plates such that a space is formed between two adjacent ones of the fin plates.

2. The heat dissipating device according to Claim 1, wherein the first and second stack plates cooperatively form a flat bottom face that is adapted to be placed in contact with the article.

3. The heat dissipating device according to Claim 1, wherein an outermost one of the first and second stack plates is adapted to be placed in contact with the article.

4. The heat dissipating device according to Claim 1, wherein each of the fin plates is formed with at least one row of heat dissipating holes.

5. The heat dissipating device according to Claim 1, wherein the stack portion further includes a screw fastener extending through the first and second stack plates for fastening together the first and second

stack plates.

6. The heat dissipating device according to Claim 1, wherein the stack portion further includes a rivet extending through the first and second stack plates for fastening together the first and second stack plates.

7. The heat dissipating device according to Claim 1, wherein the first and second stack plates of the stack portion are bonded together by brazing.

8. The heat dissipating device according to Claim 1, further comprising a pair of mounting plates disposed on two opposite sides of the stack portion and fastened to the stack portion.

9. The heat dissipating device substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

The Patent Office

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Application No: GB 9800969.9 **Examiner:** M C Monk
Claims searched: All **Date of search:** 12 May 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): F4U (U23, U29); H1K (KPDC); H1R (RBK)

Int Cl (Ed.6): F28F (3/08); H01L (23/36, 23/367, 23/40); H05K (7/20)

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2079052 A	SWISS ALUMINIUM LTD See Fig.1.	1
A	US 5038858	THERMALLOY INC Consider whole document.	1
A	US 5020586	HEWLETT-PACKARD Consider whole document	1
X	US 4897712	SUDDEUTSCHE KUHLERFABRIK JULIUS FR. BEHR See especially Fig.1 where intermediate sheets (8) are arranged between cooling fin sheets (6).	1-3 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.