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(54) **Resistor device with fuse function**

(57) Resistor device (10) with fuse function comprising at least a resistive element (14), at least a dissipator element (12) and at least a thermal fuse element (16), said thermal fuse element (16) being housed in a seating (17) made at least partly in the body of said dissipator element (12).

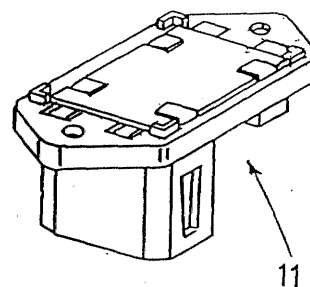
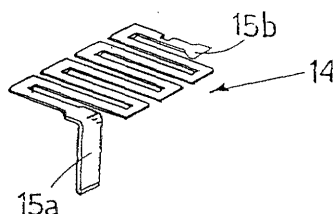
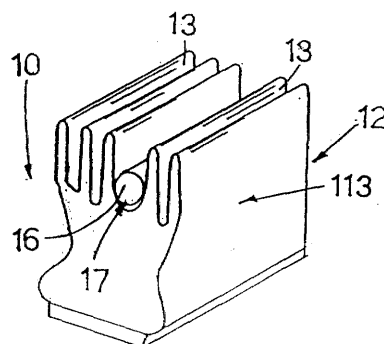


Fig.1

Description

FIELD OF THE INVENTION

[0001] This invention concerns a resistor device with a fuse function, which can be applied mainly in the field of motor vehicles to serve the function, in an electric circuit, of an electric resistor and also of a fuse to interrupt the circuit in the case of overloads.

BACKGROUND OF THE INVENTION

[0002] In the field of motor vehicles, the state of the art includes the use of resistors able to limit the current circulating in an electric circuit or to induce a fall of the voltage in an electric circuit. Among these, there are resistors employed in the feeding circuits of the electric fans to cool the engine, used to limit the tension supplied to the electric motor and to adjust the speed of rotation of the electric fans, or the resistors used in circuits which feed the air-conditioning fans of the interior of the vehicle.

[0003] The most common resistors are layer resistors, ceramic resistors or wire resistors.

[0004] The use of layer resistors is limited only to those applications where the electric currents are of low intensity and therefore only in low power electric circuits or electronic circuits.

[0005] Ceramic resistors are reasonably priced and dissipate a considerable quantity of heat but, on the other hand, they are fragile, particularly in correspondence with the joint areas, and therefore in the field of motor vehicles their use is extremely limited.

[0006] Wire resistors, on the contrary, do not have the problems which ceramic resistors have, but they are more complex and expensive and dissipate less heat.

[0007] Moreover, they have the resistive wire exposed, which limits their use especially in areas where there is a risk of water infiltration, such as for example the engine compartment of motor vehicles.

[0008] A further disadvantage of wire resistors is that if the current exceeds certain limit values, they overheat and may cause fires.

[0009] As a consequence, resistors such as are known to the state of the art are not reliable to use in the field of motor vehicles, especially from the safety point of view, and therefore they are usually associated with thermal fuse devices able to interrupt the electric circuit automatically when the thermal fuse reaches a pre-determined maximum temperature, or intervention temperature.

[0010] With this solution, however, it may happen that the intervention times of the thermal fuse are not quick enough to ensure a speedy interruption of the electric current. Moreover, the relatively distant position of the thermal fuse from the resistor where the current circulates signifies that the resistor has to reach temperatures which are extremely high and dangerous, before

the thermal fuse reaches the temperature at which it intervenes.

[0011] Conventional devices also have problems in correctly assembling the thermal fuse so that the heat propagated by the resistor determines the desired increase in temperature of said thermal fuse, in order to obtain the conditions wherein the current is interrupted.

[0012] It must be considered that small variations in assembling the thermal fuse determine great changes in the intervention time, which entails a very limited repetitiveness in behavior and hence poor reliability and low operating efficiency. Moreover, there is a problem of protection to prevent the thermal fuse from being subjected to rapid deterioration, with a risk of causing the progressive sublimation of the eutectic alloy inside the thermal fuse, causing unwanted interruptions to the electric circuit.

[0013] Another problem is that in usual circuits the thermal fuse is electrically connected to the resistive element, and is therefore subject to harmful heating, or in any case to a variability of temperature, deriving from the direct contact with the resistance which heats up due to the Joule effect as the current passes through.

[0014] The present Applicant has devised and embodied this invention to achieve a resistor suitable to overcome all these shortcomings, and to obtain further advantages.

SUMMARY OF THE INVENTION

[0015] The invention is set forth and characterized in the main claim, while the dependent claims describe other characteristics of the idea of the main embodiment.

[0016] The purpose of the invention is to provide a resistor device suitable to serve the function of a fuse, in cooperation with at least a thermal fuse device, in order to interrupt the electric current in the circuit where it is inserted, when the temperature of the thermal fuse reaches the intervention value due to overheating of the resistive element.

[0017] Another purpose of the invention is to provide a reliable, safe, inexpensive and versatile resistor, suitable to ensure high repetitiveness of the intervention times.

[0018] The resistor device according to the invention can be used safely in electric circuits which dissipate greater electric powers than those which are normally used.

[0019] The resistor device comprises at least a resistive element made of a conductor material and developing substantially on a plane according to a desired path, and at least a thermal fuse element.

[0020] At least one of the ends of the resistive element is connected with terminals connecting to the electric circuit which feeds the desired load, for example the electric fan of the radiator or the air-conditioning fan of the interior of the vehicle.

[0021] The resistor device also comprises at least a

dissipator element, preferably of the type with a plurality of surface dissipator elements such as fins, cylinders, turrets, pins or suchlike.

[0022] According to the invention, the housing seating of the thermal fuse device is at least partly made directly in the body of the dissipator element.

[0023] This solution has a plurality of advantages.

[0024] Firstly, since the thermal fuse device is in direct contact for at least part of its surface with the body of the dissipator element, it is heated mainly through direct conduction, without being in direct contact with the resistive element.

[0025] In this way, the increases in temperature due to overloads which pass through the resistive element are propagated more efficiently and uniformly to the thermal fuse device, so that the transmission of heat to the thermal fuse is less influenced by external dissipating factors which are difficult to control and repeat. This makes the intervention times of the thermal fuse extremely reliable and with a very limited variation in their values.

[0026] Moreover, the thermal fuse and the resistive element are not electrically connected by direct connection, but through the body of the dissipator element; in this way the thermal fuse element is much more sensitive to the overall temperature of the whole combination and hardly sensitive at all to that of the resistive element.

[0027] With this invention, the thermal fuse device has an assembly position which is centered, safe and constant, both with respect to the resistive element and also the dissipator, which reduces the problems of stability and mechanical hold. Furthermore, in the assembly position it is at least partly protected, so as to reduce the risks of wear, deterioration and sublimation of the eutectic alloy contained in the thermal fuse.

[0028] In a first embodiment of the invention, the seating of the thermal fuse device is made on the outer part of the dissipator element; by outer part we mean the part on which the discrete dissipator elements are made (fins, turrets, etc.).

[0029] According to this embodiment, a first solution provides that the seating of the thermal fuse is made lengthwise and parallel to the fins of the dissipator. A variant of this solution provides that the seating of the thermal fuse is made transverse to the fins of the dissipator.

[0030] In another embodiment of the invention, the seating is made on the flat side of the dissipator, that is to say, the side opposite the one where the dissipator elements are made, and directly associated with the resistive element.

[0031] In a variant of this embodiment, wherein the resistor device comprises a pair of dissipator elements coupled together with the relative flat sides, and able to enclose in a sandwich at least one relative resistive element, the seating for the thermal fuse device is made partly on the flat side of a first dissipator element and partly on the flat side of the second dissipator element.

[0032] On the one hand, this embodiment allows to have optimum containment, protection and security of assembly of the thermal fuse which is enclosed between the two dissipators; on the other hand it ensures effective transmission of the current, through contact with the surface of the dissipator, and also of the heat, through direct conduction.

[0033] This embodiment allows to position the thermal fuse precisely with respect to the resistive element, without said two elements coming into contact, and thus ensures a very high efficiency and repetitivity of intervention.

[0034] The resistive element, which develops on a plane preferably according to a fretted, spiral, coiled or similar path, is advantageously associated with at least a layer made of insulating material.

[0035] The insulating layer can be an autonomous element made of sheet, foil or varnish, or of silicone oxide, of suitable thickness, which is put between the resistive element and the face of the dissipator element facing towards the resistive element.

[0036] According to a variant, the insulation is obtained by working said face of the dissipator element, for example by anodizing or suchlike. According to another variant, the insulation is obtained by working or protecting the surface of the resistive element.

[0037] According to another variant, the insulating layer is made of at least partly deformable material, and is arranged in such a fashion as to at least partly line the walls of the seating where the thermal fuse element is housed, creating an insulation between the dissipator and the thermal fuse, while keeping at least a zone of direct contact in order to ensure electric conduction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] These and other characteristics of the invention will be clear from the following description of some preferential embodiments, given with reference to the attached Figures wherein:

Fig. 1 is a partly exploded view of a first form of embodiment of a resistor according to the invention;
Fig. 2 shows a transverse section of another embodiment of the invention;
Fig. 3 is a plane view of a dissipator element with an associated thermal fuse in one embodiment of the invention;
Fig. 4 shows a section from A to A of Fig. 3;
Fig. 5 is a plane view of an embodiment of a resistive element;
Figs. 6a, 6b show two prospective views of a dissipator element;
Figs. 6c, 6d show two views of a variant of Figs. 6a, 6b;
Figs. 7a, 7b, 7c and 7d show plane views of four possible variants of a dissipator element.

DETAILED DESCRIPTION OF SOME PREFERRED EMBODIMENTS

[0039] A resistor device 10 with fuse function, shown partly exploded in Fig. 1 in a first form of embodiment, comprises at least a resistive element 14, made of a conductor material and substantially planar in conformation.

[0040] In the embodiment shown in Fig. 1, the resistive element 14 develops in a fretted path and has at one end 15a a terminal facing towards the outside which allows rapid connection to an electric circuit which feeds a load in a motor vehicle, such as the fan in a radiator.

[0041] The variant in Fig. 5 shows an embodiment wherein the resistive element 14 is spiral in shape, where a first end 15a acts as a connection terminal to the electric circuit. The other end 15b is electrically connected in series, as will be seen better hereafter, to a thermal fuse device 16 through which the circuit is closed.

[0042] In Fig. 1, the resistive element 14 is enclosed between a dissipator element 12 and a supporting base 11. The dissipator element 12 is of the type comprising on one face a plurality of surface dissipating bodies 113, which in the case of Fig. 1 consist of fins 13.

[0043] The variants shown in Figs. 7a-7d show, as an example, other alternative embodiments, both in shape and geometric arrangement, of the surface dissipating bodies 113: with cylinders (Fig. 7a), with diagonal turrets (Figs. 7b, 7c), with turrets arranged in a matrix (Fig. 7d).

[0044] A further solution provides that the individual dissipator elements are substantially oval in section, or similar, in order to increase the dissipating capacity.

[0045] The resistor device 10 comprises at least a thermal fuse element 16 able to interrupt the electric circuit in the event that, due to overloads circulating in the resistive element 14, there is overheating with a consequent increase in temperature of the thermal fuse 16 such as to cause it to reach the intervention temperature.

[0046] The thermal fuse element 16 is substantially of a conventional type, for example with a eutectic alloy and trigger-type intervention mechanism.

[0047] According to the main characteristic of the invention, the thermal fuse 16 is housed in a seating 17 made at least partly in the body of the dissipator 12. In the first embodiment shown in Fig. 1, the thermal fuse 16 is housed between two adjacent fins 13 of the dissipator 12, which are made so as to define a space sufficient to house the thermal fuse 16.

[0048] According to a variant which is not shown here, the thermal fuse 16 is housed in a seating made transverse to the fins 13 of the dissipator 12.

[0049] In the embodiment shown in Figs. 2, 3, 4, 6b and 6d, the seating 17 to house the thermal fuse 16 is at least partly made on the flat side 12a of the dissipator element 12 on which the resistive element 14 is arranged.

[0050] In this case, which provides to couple two of said identical dissipators 12 with the respective flat sides 12a, between which at least one resistive element 14 is arranged sandwich-like, the seating 17 is made half on one of the dissipators 12 and half on the other dissipator 12.

[0051] To this end, on the flat side 12a of each dissipator 12 a semi-circular cavity 117 is made (Figs. 6b and 6d), mating in shape with that of the relative thermal fuse 16 to be housed.

[0052] By coupling two of said dissipators 12 as shown in Fig. 2, said thermal fuse 16 is positioned and contained in a protected, safe and stable assembly position, and hence less subject to deterioration, wear and damage.

[0053] To achieve this coupling, each of the two dissipators 12 has a through hole 19, substantially in the center, through which a rivet or screw 20 can be inserted, which is clamped on the opposite side by means of a nut 21. Moreover, to facilitate reciprocal assembly and centering, each dissipator 12 has a dead hole 22 and a pin 23 able to couple with mating hole 22 and pin 23 of another dissipator 12.

[0054] Since the screw or rivet 20 is in contact with the end 15b of the resistive element 14, made to this end in a semi-circular shape (Fig. 5), it also performs the function of closing the electric circuit.

[0055] The seating 17 for the thermal fuse 16 is made in a peripheral position on the surface of the flat side 12a, so as to leave space for the positioning of the resistive element so that the resistive element 14 and thermal fuse 16, although very close, are not in contact with each other.

[0056] Between the resistive element 14 and the respective flat sides 12a of the dissipator elements 12 between which it is enclosed, in this case there are respective insulating sheets 18, for example made of mica, kapton or other appropriate material.

[0057] According to a variant, the insulation between the dissipator 12 and the resistive element 14 is obtained by means of suitable surface working of one and/or the other of the surfaces in contact, for example by anodizing, lining or other suitable treatment.

[0058] Whatever solution is adopted for the electric insulation between resistive element 14 and dissipator 12, the insulating layer will have known and controllable characteristics of heat conduction, so as to ensure a precise and repetitive knowledge of the conditions in which the heat is transmitted from the resistive element 14 to the dissipator 12 and from the latter to the thermal fuse 16.

[0059] With the configuration shown in Fig. 2, the electric current is transmitted through the terminal 15a, the resistive element 14, the screw 20 in contact with the end 15b, the conductor body of the dissipator 12 and the thermal fuse 16 which, housed in the seating 17, is in direct contact with the dissipator 12.

[0060] The thermal fuse 16 has one terminal connect-

ed to an electric connector to close the circuit.

[0061] With this solution, the serial connection of the resistive element 14 and the thermal fuse 16 is achieved by contact through the body of the dissipator 12, thus avoiding a direct connection between the elements 14 and 16, and the consequent negative variability in temperature of the thermal fuse 16 in relation to the variations of current circulating in the resistive element 14.

[0062] The heat deriving from the overheating of the resistive element 14 is transmitted by direct conduction through the body of the dissipator 12, so that the increase in temperature of the thermal fuse 16 occurs in a safe, reliable, repetitive and perfectly controllable manner, since the causes of variation are reduced to a minimum.

[0063] The intervention times of the thermal fuse 16 can hence be guaranteed with minimum variation, according to the parameters of the components used, ensuring maximum reliability and efficiency of the resistor 10.

[0064] According to a variant shown in Fig. 3, the seating 17 made in the dissipator element 12 occupies only half of its length, and is still suitable to house a thermal fuse 16.

[0065] In this case, a further variant of the invention provides that the electric transmission between dissipator 12 and thermal fuse 16 is further guaranteed by means of a terminal 24 solid with the thermal fuse 16 and in contact with the body of the dissipator 12 in a position outside the seating 17.

[0066] For reasons of constructional uniformity, that is, to make all the dissipators 12 identical through molding, two of the identical seatings 17 are made on each dissipator element 12.

[0067] From the previous description, it is clear that using a thermal fuse 16 integrated into the body of a dissipator 12 allows, on the one hand, to guarantee a stable, precise and centered assembly, and on the other hand, to bring the thermal fuse element 16 near the resistive element 14, yet preventing contact between the two, thus ensuring a controlled and repetitive transmission of heat.

[0068] In this way, the intervention times of the thermal fuse 16 can be more certain and precise and hence the functioning of the resistor device 10 can be more reliable.

[0069] It is obvious that modifications or variations may be made to this invention, without departing from the field and scope thereof.

[0070] For example, one variant provides to use several resistive elements 14, separated by layers of electric insulation, arranged in a sandwich between two dissipators 12 or between a dissipator 12 and a base 11, for example in the case of an application on an air-conditioning fan of the interior of the vehicle.

[0071] Another variant may provide to use two or more thermal fuses 16 housed in respective seatings 17 made in the body of the dissipator 12.

[0072] A further variant may provide that the resistive element 14 is sub-divided into two or more parts and that the thermal fuse 16 is electrically arranged in an intermediate position between two parts of the resistive element; this allows to avoid a direct electric connection between the thermal fuse 16 and the electric circuit, and hence makes the behavior of the thermal fuse 16 even more repetitive and so more reliable and controllable.

Claims

1. Resistor device with fuse function comprising at least a resistive element (14), at least a dissipator element (12) and at least a thermal fuse element (16), the device being **characterized in that** said thermal fuse element (16) is housed in a seating (17) made at least partly in the body of said dissipator element (12).
2. Resistor device as in Claim 1, wherein said dissipator element (12) is of the type with surface dissipator elements (113) on at least one side, **characterized in that** said thermal fuse element (16) is housed in a seating (17) made, at least partly, parallel between two, or between two rows, of said adjacent elements (113) of said dissipator element (12).
3. Resistor device as in Claim 1, wherein said dissipator element (12) is of the type with surface dissipator elements (113), **characterized in that** said thermal fuse element (16) is housed in a seating (17) made, at least partly, transverse to two, or to two rows, of said elements (113) of said dissipator element (12).
4. Resistor device as in Claim 1, wherein said resistive element (14) is associated with a plane side (12a) of at least one of said dissipator elements (12), **characterized in that** said thermal fuse element (16) is housed in a seating (17) made at least partly on said plane side (12a).
5. Resistor device as in Claim 1, wherein said resistive element (14) is arranged in an intermediate position between the facing plane sides (12a) of two dissipator elements (12), **characterized in that** said thermal fuse element (16) is housed in a seating (17) made partly on the plane side (12a) of a first dissipator element (12) and partly on the plane side (12a) of a second dissipator element (12).
6. Resistor device as in Claim 4 or 5, **characterized in that** said thermal fuse element (16) is arranged in a peripheral position of the plane side (12a) of the relative dissipator element (12), at least part of the residual surface of said plane side (12a) being occupied by said resistive element (14), wherein said thermal fuse element (16) and said resistive ele-

ment (14) are not in direct contact with each other.

7. Resistor device as in any claim hereinbefore, **characterized in that** said thermal fuse element (16) has at least a zone of direct contact with said dissipator element (12) with the function at least of transmitting the electric current. 5
8. Resistor device as in Claim 7, **characterized in that** said thermal fuse element (16) has at least a terminal (24) in contact with the body of said dissipator element (12) to transmit the electric current. 10
9. Resistor device as in any claim hereinbefore, **characterized in that** it comprises at least an insulating layer arranged between said resistive element (14) and said dissipator element (12) and having known characteristics of heat conduction. 15
10. Resistor device as in Claim 9, **characterized in that** said insulating layer consists of a sheet or foil made of insulating material (18) such as kapton, mica, varnish or silicon oxide. 20
11. Resistor device as in Claim 9, **characterized in that** said insulating layer is made by surface treatment on the contact surface of the dissipator (12) and/or that of the resistive element (14). 25
12. Resistor device as in Claim 9, **characterized in that** said insulating layer is able to at least partly line said housing seating (17) for said thermal fuse element (16). 30
13. Resistor device as in any claim hereinbefore, **characterized in that** said resistive element (14) has a fretted conformation, with at least a connection terminal (15a) connected to an electric circuit. 35
14. Resistor device as in any claim from 1 to 12 inclusive, **characterized in that** said resistive element (14) is spiral in shape, with at least a connection terminal (15a) connected to an electric circuit and an opposite end (15b) connected electrically to a conductor element (20) located in contact with the body of said dissipator element (12). 40 45
15. Resistor device as in Claim 14, **characterized in that** said conductor element (20) consists of a screw or rivet to assembly said dissipator element (12). 50
16. Resistor device as in any claim hereinbefore, **characterized in that** said resistive element (14) is made in two or more parts, the thermal fuse (16) being arranged electrically, without direct contact, in an intermediate position between two of said parts of the resistive element (14). 55
17. Resistor device as in any claim hereinbefore, **characterized in that** it comprises two or more resistive elements (14) separated from each other by at least one layer of electric insulation and arranged in a sandwich between two dissipator elements (12) or between one dissipator element (12) and an assembly base (11).

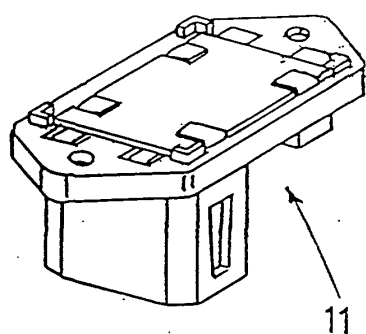
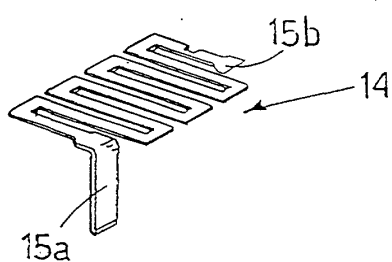
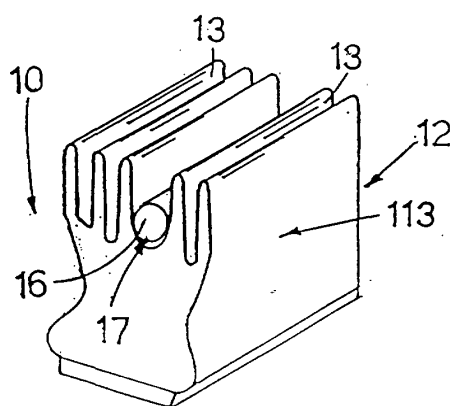


fig. 1

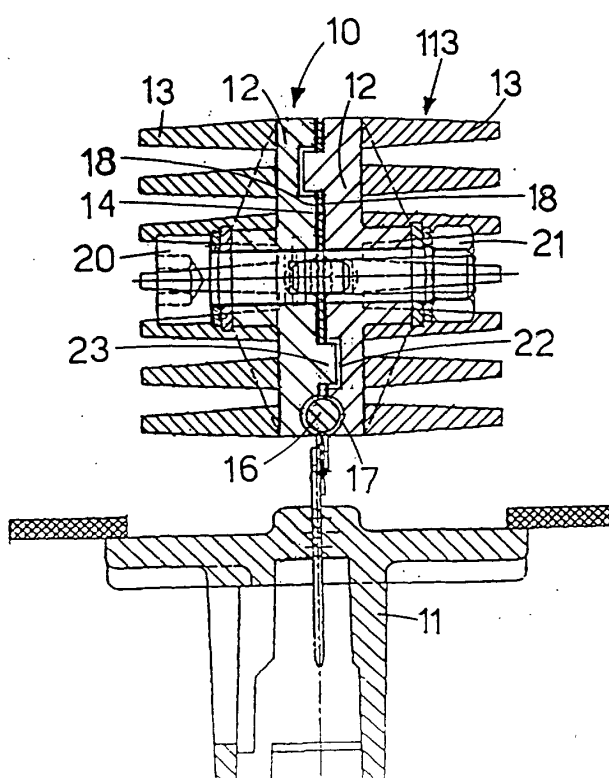


fig. 2

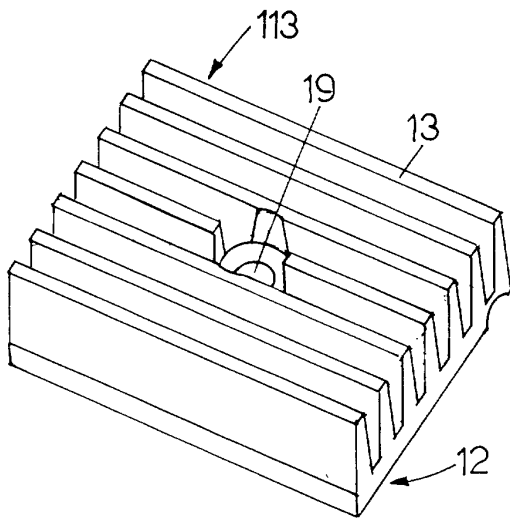


fig. 6a

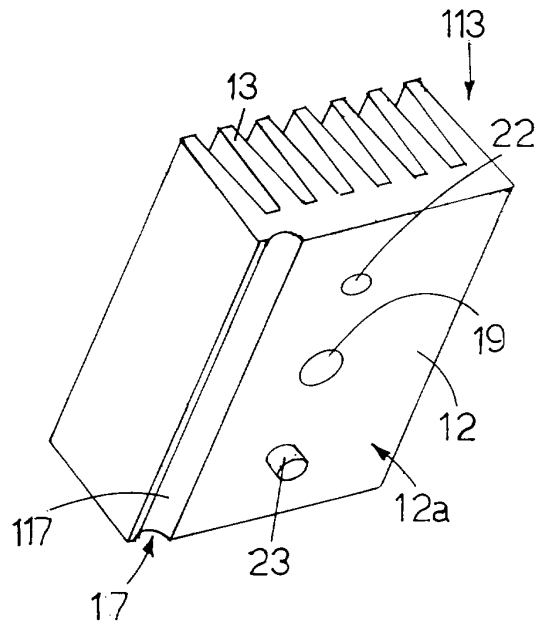


fig. 6b

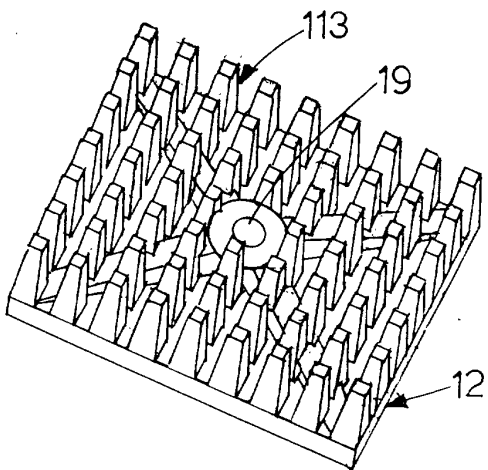


fig. 6c

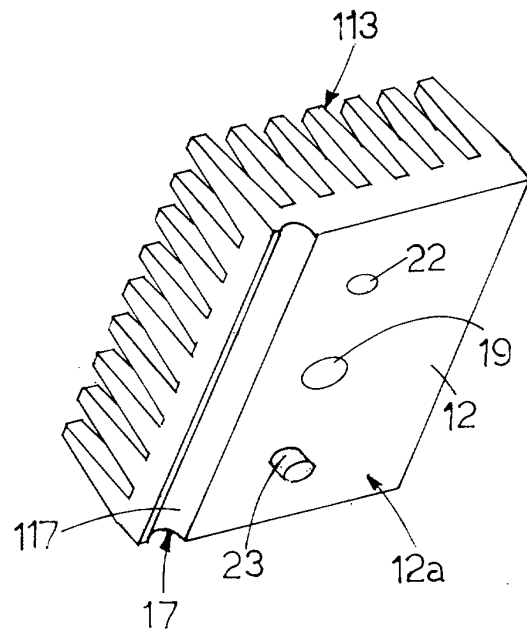
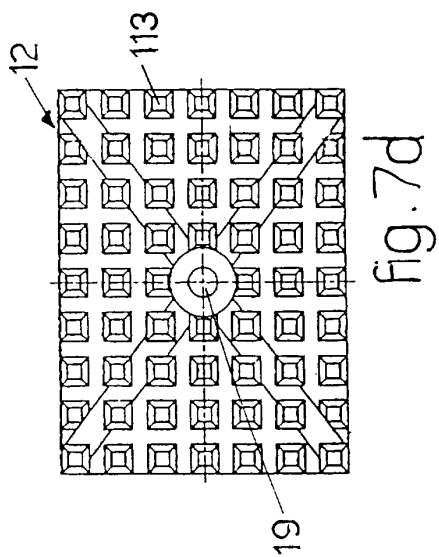
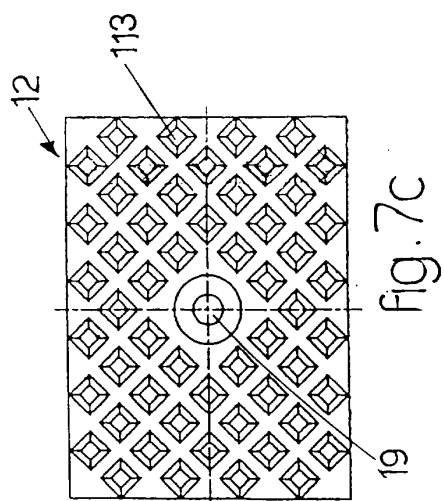
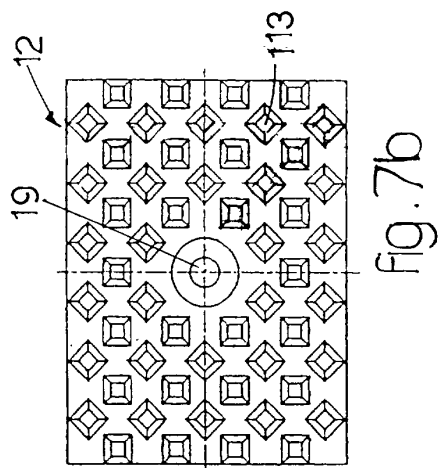
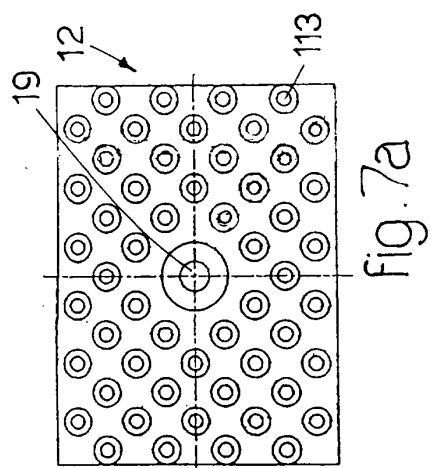


fig. 6d





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 1895

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
X	US 6 018 288 A (SMITH SCOTT D ET AL) 25 January 2000 (2000-01-25)	1,6-11, 13	H01C1/084 H01H85/048
Y	* column 6, line 13 - line 25; figure 1 * * column 13, line 26 - line 57; figures 2-5 * * column 14, line 1 - line 16 *	14,15	H01H37/76 H01C3/12
Y	US 3 955 169 A (KERFOOT CHARLES S ET AL) 4 May 1976 (1976-05-04) * column 2, line 58 - line 60; figure 1 *	14,15	
A	US 5 703 561 A (YAMAMOTO SHUKO ET AL) 30 December 1997 (1997-12-30) * abstract * * column 5, line 18 - column 6, line 37; figure 5 *	1-17	
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 09, 30 September 1997 (1997-09-30) -& JP 09 134654 A (MICRON DENKI KK), 20 May 1997 (1997-05-20) * abstract *	1-17	
A	US 5 550 527 A (LEE WOO Y) 27 August 1996 (1996-08-27) * column 3, line 17 - line 24; figure 5 *	1-17	
A	EP 0 591 537 A (FUMAKILLA LTD ;TDK CORP (JP)) 13 April 1994 (1994-04-13) * the whole document *	1-17	
A	US 4 037 082 A (TAMADA MINORU ET AL) 19 July 1977 (1977-07-19) * the whole document *	1-17	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 July 2001	Examiner Nesso, S
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 11 1895

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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20-07-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6018288 A	25-01-2000	EP 0877392 A	11-11-1998
US 3955169 A	04-05-1976	NONE	
US 5703561 A	30-12-1997	JP 9240250 A	16-09-1997
		GB 2308757 A, B	02-07-1997
		TW 417117 B	01-01-2001
JP 09134654 A	20-05-1997	NONE	
US 5550527 A	27-08-1996	NONE	
EP 0591537 A	13-04-1994	AU 659855 B	01-06-1995
		AU 2166892 A	25-01-1993
		BR 9206185 A	10-10-1995
		DE 4292013 T	09-06-1994
		ES 2100113 A	01-06-1997
		GB 2272795 A, B	25-05-1994
		GR 3022328 T	30-04-1997
		WO 9300689 A	07-01-1993
		KR 143879 B	17-08-1998
US 4037082 A	19-07-1977	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82