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(58) Field of Search
UK CL (Edition M) H2C CEG , H2E EBX ECAGC ECSH EEKD EEKH
INT CL[5] H01R , H02B , H02G

(54) **Construction for fixing bus bar miniature fuses to electrical connection box**

(57) A bus bar (12) for miniature fuses (11) mounted in an electrical connection box in parallel with each other at a short interval (P) comprises tabs (12b) which project from a base portion (12a) of the bus bar (12) in parallel at the interval (P) for connection to respective fuses. A pair of extension portions (12c, 12e) extend from opposite ends of the base portion (12a) of the bus bar (12) beyond the positions of the tabs (12b). Engagement portions (12d) are provided on the extension portions (12c, 12d) to mate with engagement portions provided on the electrical connection box, preferably by snap engagement.

Fig. 2

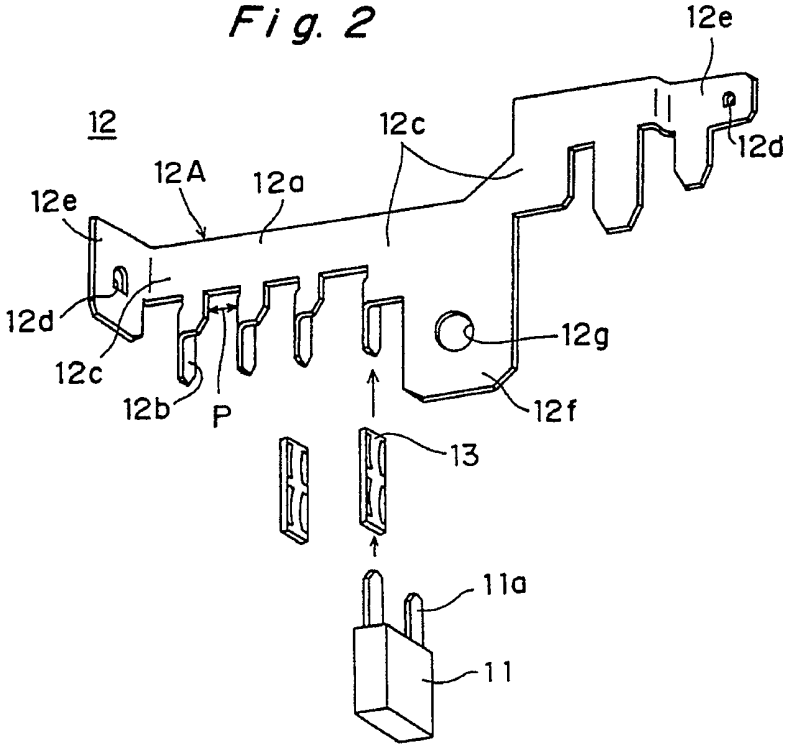

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Fig 1 PRIOR ART

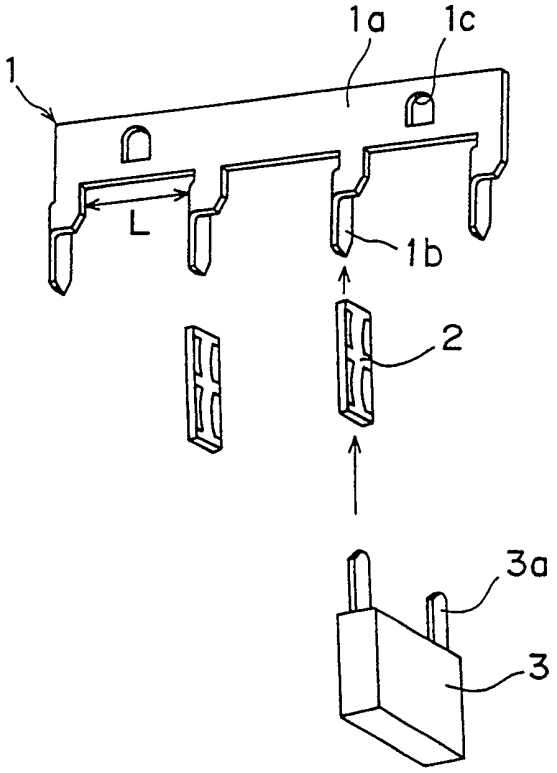


Fig. 2

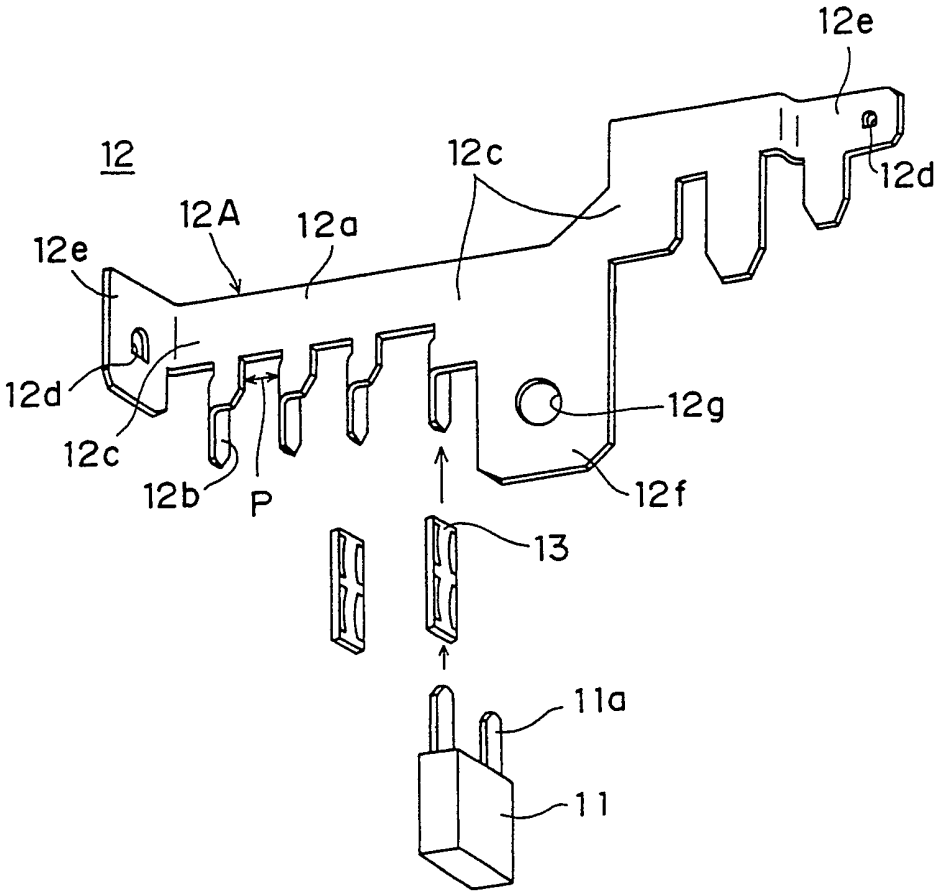
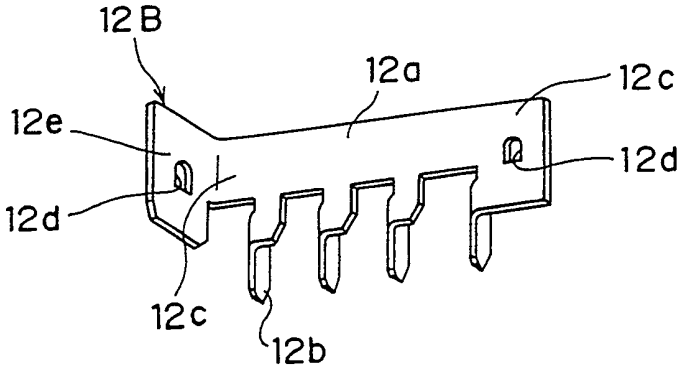

12e
12
12c
12d
12A
12a
12e
12d
12g
12c
12b
P
12f
13
11a
11

Fig. 3


12B
12a
12c
12e
12d
12d
12c
12b

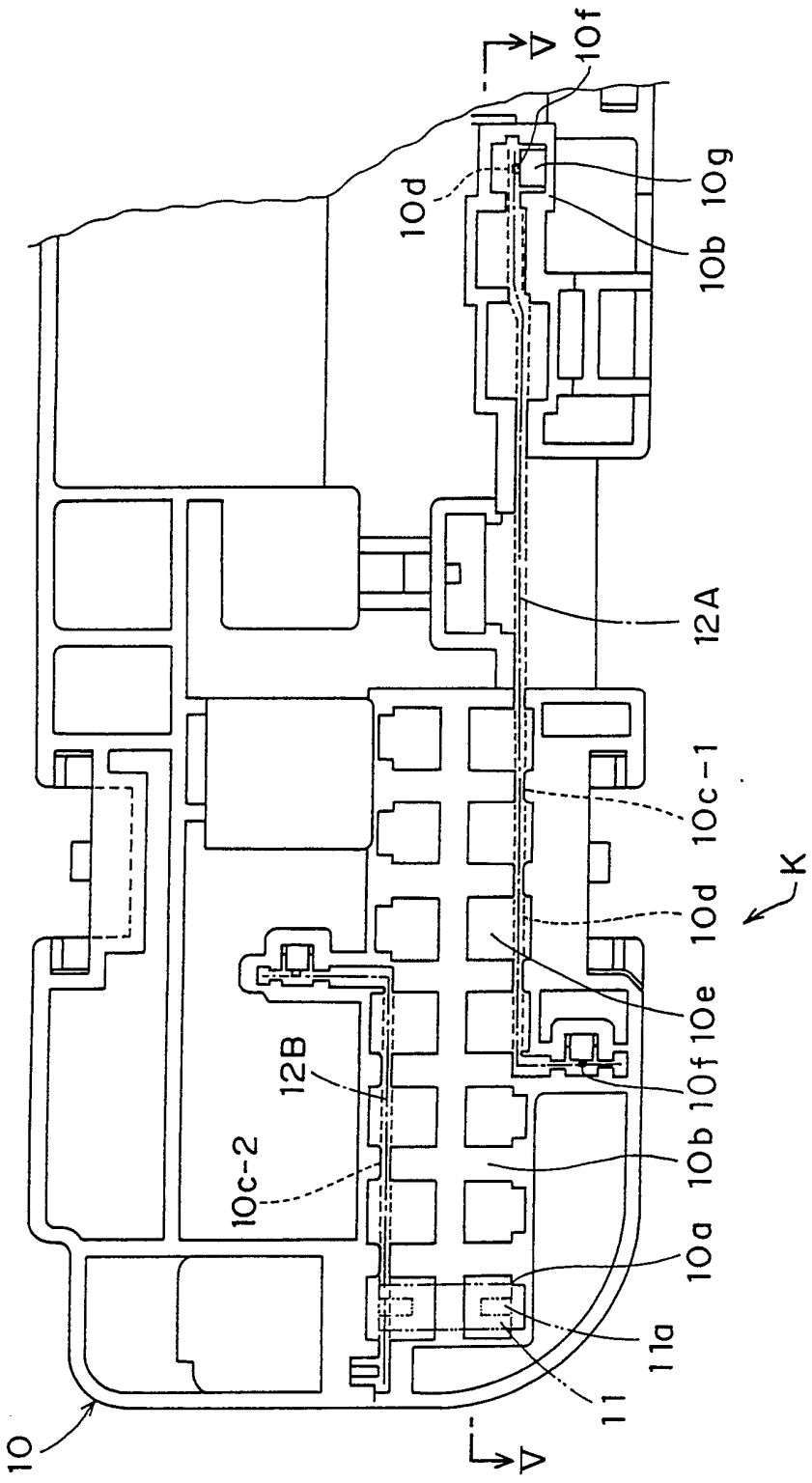

V
10f
10d
10g
10b
12A
10c-1
K
10d
10e
10f
10b
10a
11a
11
V
10
12B
10c-2

Fig. 4

Fig. 5

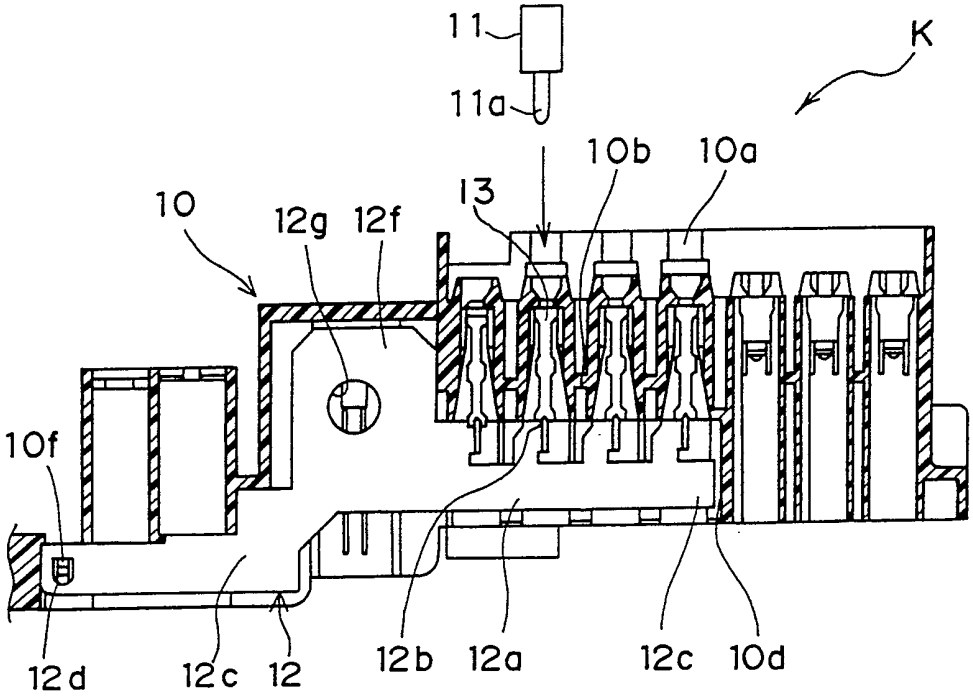


Fig. 6

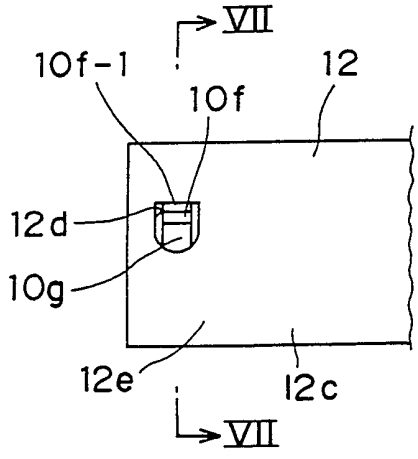
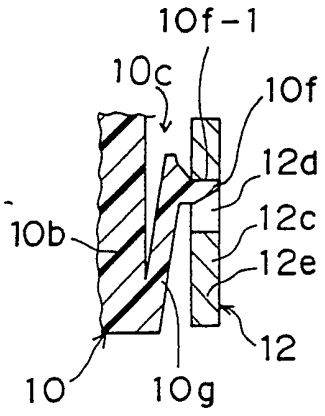


Fig. 7



CONSTRUCTION FOR FIXING BUS BAR FOR MINIATURE FUSES TO ELECTRICAL CONNECTION BOX

BACKGROUND OF THE INVENTION

The present invention generally relates to a construction in which a bus bar for miniature fuses is fixed to an electrical connection box and more particularly, to a construction in which the bus bar connected to the miniature fuses attached to the electrical connection box in parallel with each other at a short interval can be securely fixed to the electrical connection box.

Conventionally, automotive fuses have been employed as fuses which are mounted on an electrical connection box so as to be connected to a bus bar. The automotive fuses are large in size and are attached to the electrical connection box at a large interval.

In a known arrangement of Fig. 1, a bus bar 1 is accommodated in an electrical connection box (not shown) so as to be connected to an automotive fuse 3 and tabs 1b projects from a base portion 1a of the bus bar 1 at an interval identical with that for mounting the automotive fuses 3 on the electrical connection box. Thus, each tab 1b and a terminal portion 3a of each automotive fuse 3 are connected to each other through a relay terminal 2.

The bus bar 1 to be connected to the automotive fuses 3 is required to be preliminarily accommodated and fixed in the electrical connection box. To this end, a locking hole 1c is formed, between the tabs 1b, on the base portion 1a so as to receive a locking claw (not shown)

projecting from the electrical connection box such that the bus bar 1 is secured to the electrical connection box.

In response to recent demand for a more compact and lighter electrical connection box, miniature fuses obtained by making the automotive fuses more compact have been proposed in place of the automotive fuses. If the miniature fuses can be attached to the electrical connection box at a small interval, the electrical connection box can be made more compact.

However, in this case, the tabs connected to the miniature fuses also should be formed on the bus bar at a short interval. Thus, such problems arise that it is extremely difficult to form the locking hole on the base portion between the tabs spaced the short interval from each other and bring the locking claw of the electrical connection box into engagement with the locking hole of the bus bar.

Furthermore, conventionally, the miniature fuses are more likely to be heated than the large automotive fuses. Therefore, if the miniature fuses are attached to the electrical connection box in the vicinity of the tabs, the electrical connection box is readily overheated.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide, with a view to the inconveniences inherent in prior art, a construction in

which a bus bar for miniature fuses is fixed to an electrical connection box.

A construction for fixing a bus bar for miniature fuses to an electrical connection box, in which the miniature fuses attached to the electrical connection box in parallel with each other at a short interval are connected to the bus bar accommodated in the electrical connection box, according to the present invention comprises: tabs which project from a base portion of the bus bar in parallel with each other at the short interval so as to be connected to the miniature fuses, respectively; a pair of extension portions which extend from opposite ends of the base portion of the bus bar beyond positions for providing the tabs on the bus bar, respectively; a pair of engageable portions which are provided on the extension portions, respectively; and a pair of mating engageable portions which are engageable with the engageable portions, respectively and are provided on the electrical connection box.

It is preferable that each of the engageable portions of the bus bar is formed by an engageable hole and each of the mating engageable portions of the electrical connection box is formed by a boss. However, this arrangement may also be reversed, namely, each of the engageable portions of the bus bar is formed by the boss, while each

of the mating engageable portions of the electrical connection box is formed by the engageable hole.

The extension portions of the bus bar extend from opposite ends of the base portion. At this time, it is preferable that the extension portions extend up to such positions as not to interfere with other components attached to inside of the electrical connection box and a distal end portion of each of the extension portions is bent into a bent portion such that each of the engageable portions is provided on the bent portion.

In the bus bar, the engageable portions are, respectively, provided on the extension portions extending from the opposite ends of the base portion of the bus bar and the engageable portions are provided on the extension portions, respectively. Therefore, the engageable portions can be formed on the bus bar easily and it is possible to bring the bus bar and the electrical connection box into engagement with each other easily.

Meanwhile, since the extension portions extend from the opposite ends of the base portion of the bus bar, the bus bar has large area. Accordingly, a large quantity of electric current can be passed through the bus bar due to increase of area of the bus bar for allowing electric current to flow therethrough and overheat of the bus bar can be restrained.

Furthermore, in the bus bar, its positions for engagement with the electrical connection box, i.e. the extension portions are spaced away from its positions for connection to miniature fuses, i.e. the tabs. Hence, even if temperature of the miniature fuses rises, heat conduction from the miniature fuses to the electrical connection box via the bus bar can be restricted and thus, overheat of the electrical connection box can also be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

These and optional features of the present invention will become apparent from the following description taken in conjunction with the preferred embodiment thereof with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a prior art bus bar (already referred to);

Fig. 2 is a perspective view of a bus bar for miniature fuses, employed in a construction for fixing the bus bar to an electrical connection box, according to the present invention;

Fig. 3 is a perspective view of another bus bar for miniature fuses, employed in the construction of Fig. 2;

Fig. 4 is a top plan view showing a state in which the bus bars of Figs. 2 and 3 are mounted on the electrical connection box;

Fig. 5 is a sectional view taken along the line V-V in Fig. 4;

Fig. 6 is a schematic front elevational view showing a state in which the bus bars of Figs. 2 and 3 are fixed to the electrical connection box; and

Fig. 7 is a sectional view taken along the line VII-VII in Fig. 6.

Before the description of the present invention proceeds, it is to be noted that like parts are designated by like reference numerals throughout several views of the accompanying drawings.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, there is shown in Figs. 2 to 7, a construction K for fixing a bus bar 12 for miniature fuses 11 to an electrical connection box 10, according to one embodiment of the present invention. In the construction K, the miniature fuses 11 are mounted on the electrical connection box 10 so as to be arranged in parallel with each other at a short interval. The electrical connection box 10 is formed by a fusible link block. The bus bar 12 for the miniature fuses 11 is accommodated in and fixed to the electrical connection box 10 and the miniature fuses 11 are connected to the bus bar 12 so as to form a branch circuit.

The bus bar 12 is obtained by blanking an electrically conductive metal plate and includes two kinds of

bus bars 12A and 12B shown in Figs. 2 and 3, respectively. In the bus bar 12, tabs 12b project downwardly from a lower end of a base portion 12a at a short interval P such that each of the tabs 12b is connected to each of two terminal plates 11a of each of the miniature fuses 11 through a relay terminal 13. Namely, the interval P of the tabs 12b corresponds to that of fuse receivers 10a of the electrical connection box 10, which will be described later, and is smaller than an interval L of a prior art bus bar 1 of Fig. 1.

Two extension portions 12c are, respectively, extended from the opposite tabs 12b of the base portion 12a up to such positions as not to interfere with other components attached to inside of the electrical connection box 10 than the miniature fuses 11. A distal end of one of the extension portions 12c is bent into a bent portion 12e and an engageable hole 12d is formed on the bent portion 12e.

Meanwhile, in one bus bar 12A, a power source connecting portion 12f extends from the other of the extension portions 12c and a bolt hole 12g is formed on the power source connecting portion 12f. The bent portion 12e is formed at a distal end of the other of the extension portions 12c and the engageable hole 12d is formed on the bent portion 12e.

On the other hand, in the other bus bar 12B, the power source connecting portion 12f and the bent portion

12e are not provided on the other of the extension portions 12c, while the engageable hole 12d is formed on the other of the extension portions 12c.

As shown in Figs. 4 and 5, the electrical connection box 10, to which the bus bar 12 and the miniature fuses 11 are attached, has two rows of the fuse receivers 10a which are arranged in parallel with each other at a small interval so as to be separated from each other by partition walls 10b. A groove 10c-1 for receiving the bus bar 12A vertically is formed at a lower portion of each of the fuse receivers 10a of one row, while a groove 10c-2 for receiving the bus bar 12B vertically is formed at a lower portion of each of the fuse receivers 10a of the other row. In these grooves 10c-1 and 10c-2, a horizontally continuously extending receiver 10d for receiving the base portion 12a and a receiver 10e for receiving each of the tubs 12b connected to the relay terminals 13 are formed continuously. Each of the terminal plates 11a of each of the miniature fuses 11 is inserted downwardly into the relay terminal 13 such that each of the miniature fuses 11 and the bus bar 12 are connected to each other.

The receiver 10d of the grooves 10c-1 and 10c-2 is adapted to receive also the extension portion 12c and the bent portion 12e disposed at the distal end of the extension portion 12c. Thus, a portion of the receiver 10d, which receives the extension portion 12c and the bent

portion 12e, is formed so as not to interfere with other components as described above.

A pair of bosses 10f are, respectively, formed at opposite ends of each of the grooves 10c-1 and 10c-2 so as to confront the engageable holes 12d of the bus bar 12. More specifically, as shown in Fig. 7, an elastic piece 10g extends upwardly obliquely from a lower end of the partition wall 10b into the groove 10c and an upper end of the elastic piece 10g projects horizontally so as to integrally form the boss 10f having an engageable face 10f-1.

When the bus bar 12 is inserted into the electrical connection box 10 so as to be fixed to the electrical connection box 10, the bus bars 12A and 12B are inserted into the grooves 10c-1 and 10c-2 from below, respectively. Then, the bus bar 12 is further depressed into the grooves 10c-1 and 10c-2 by deflecting the elastic piece 10g towards the partition wall 10b such that the engageable hole 12d rides over the boss 10f. As a result, an upper end face of the engageable hole 12d is retained by the engageable face 10f-1 of the boss 10f such that the bus bar 12 is fixed to the electrical connection box 10.

After the bus bar 12 has been secured to the electrical connection box 10 as described above, the miniature fuse 11 is mounted in the fuse receiver 10a of the electrical connection box 10 from above. Thus, the terminal plate 11a of the miniature fuse 11 is inserted

into the relay terminal 13 so as to be connected to the tab 12b of the bus bar 12, which has preliminarily been inserted into the relay terminal 13.

By the above described arrangement of the construction K, the engageable hole 12d of the bus bar 12 is spaced away from a position where the miniature fuse 11 is connected to the bus bar 12. Furthermore, the bus bar 12 is connected to the electrical connection box 10 through the engageable holes 12d. Accordingly, even if temperature of the miniature fuses 11 rises, heat is conducted to the electrical connection box 10 through the bus bar 12 having large area, so that the bus bar 12 has great heat dissipation effect and thus, overheat of the electrical connection box 10 is prevented. Meanwhile, since the bus bar 12 has large area, the bus bar 12 is capable of allowing a large quantity of electric current to flow therethrough.

As is clear from the foregoing of the construction of the present invention, the engageable portions for fixing the bus bar to the electrical connection box are provided at the opposite ends of the base portion of the bus bar, respectively. Therefore, even when the tabs for connecting the miniature fuses to the bus bar are required to be provided at a short interval, the engageable portions for fixing the bus bar to the electrical connection box can be formed easily and can be brought into engagement with

the mating engageable portions of the electrical connection box efficiently.

Furthermore, since the engageable portions provided at the opposite ends of the base portion of the bus bar do not interfere with other components accommodated in the electrical connection box through effective utilization of space, the bus bar can be made large in size without the need for increasing size of the electrical connection box itself. By making the bus bar larger, resistance of the bus bar is reduced through increase of its area for passing electric current therethrough. As a result, since heat dissipation effect of the bus bar can be improved, the bus bar is suitable for its connection to the miniature fuses whose temperature readily rises.

CLAIMS

1. A construction for fixing a bus bar for fuses to an electrical connection box, in which the fuses are attached to the electrical connection box parallel to each other and spaced apart and are connected to the bus bar accommodated in the electrical connection box, comprising:

tabs which project from a base portion of the bus bar parallel to each other to be connected to the miniature fuses, respectively;

a pair of extension portions which extend from opposite ends of the base portion of the bus bar beyond the locations of the tabs on the bus bar, respectively;

first engagement portions which are provided on the extension portions, respectively; and

second mating engagement portions which are engageable with the engagement portions, respectively and are provided on the electrical connection box.

2. A construction as claimed in claim 1, wherein each of the first engagement portions of the bus bar is formed by a hole and each of the second mating engagement portions of the electrical connection box is formed by a boss.

3. A construction for fixing a bus bar in an electrical connection box substantially as herein described with reference to and as shown in Figs. 2 to

7 of the accompanying drawings.

4. An electrical connection box for fuses having a construction according to any one of the preceding claims.

Patents Act 1977 **Examiner's report to the Comptroller under Section 17** – 14 – **(The Search report)**	Application number GB 9412702.4
Relevant Technical Fields (i) UK Cl (Ed.M) H2E (EBX, ECAGC, EEKD, EEKH, ECSH) H2C (CEG) (ii) Int Cl (Ed.5) H02G, H02B, H01R	Search Examiner MRS J BANNISTER Date of completion of Search 8 SEPTEMBER 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- ALL

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X, Y	GB 2223630 A	(LUCAS) see bottom of Figure 1	X: 1, 4 Y: 2
X, Y	GB 2007145 A	(SOC ANONYME) see Figure 1 and Figure 6 - engagement portions 11	X: 1 Y: 2, 4
X, Y	GB 1106557	(IBM) see Figure 16, bus bar 117, engagement portions 121	X: 1 Y: 2, 4
Y	GB 1012748	(POCKERT-MONEY) see Figure 1, holes 18, bosses 19	2, 4
X, Y	GB 0696341	(MET-VICKERS) see Figure 5, engagement means 13-15	X: 1 Y: 2, 4
X	GB 0360241	(SIEMENS) see end mountings 7, 4	X: 1, 4
X, Y	EP 0097445 A1	(AMP) see engagement portions 24/25	X: 1 Y: 2, 4
X, Y	EP 0003289 A1	(KNUDSEN NORDISK) see engagement means 2	X: 1 Y: 2, 4
P, Y	WO 94/08375 A1	(SQUARE D) see bars 26, 28, holes 38, 36, bosses 32, 34	1, 2, 4
X, Y	US 5088940	(YAZAKI) see engagement portions 4d, 4g, 4e, Figure 4	X: 1, 4 Y: 2

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).