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(71) Applicant: DAIICHI DENSHI KOGYO KABUSHIKI KAISHA
7-12, Yoyogi 2-chome Shibuya-ku
Tokyo(JP)

(71) Applicant: HITACHI, LTD.
6, Kanda Surugadai 4-chome Chiyoda-ku
Tokyo 100(JP)

(72) Inventor: Kaneko, Shinji
1636, Nishidai
Mooka City Tochigi Pref.(JP)

(72) Inventor: Enokido, Toshio
223-14, Kameyama
Mooka City Tochigi Pref.(JP)

(72) Inventor: Kato, Matsuo
1-4-5, Satsuki
Utsunomiya City Tochigi Pref.(JP)

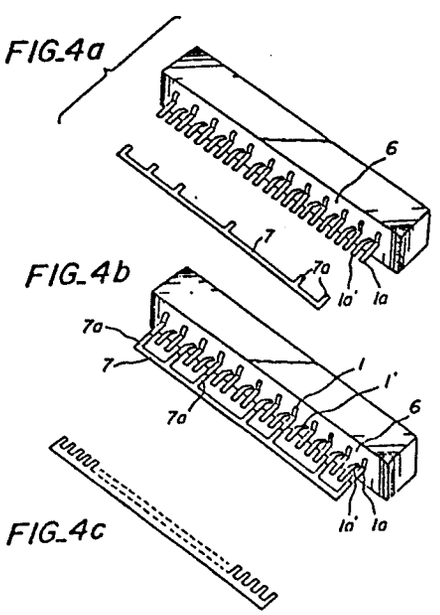
(72) Inventor: Hashimoto, Kazuya
1-16, Tsurukawa 6-Chome
Machida City Tokyo(JP)

(72) Inventor: Nakaide, Masami
528 Renshoji
Odawara City Kanagawa Pref.(JP)

(74) Representative: Phélip, Bruno et al,
c/o Cabinet Harlé & Phélip 21, rue de la Rochefoucauld
F-75009 Paris(FR)

(54) Multi contact connector having ground terminal block and method of manufacturing the same.

(57) A multi contact connector comprises a ground terminal block (7) having branched connections (7a), and a connector portion (6) having a plurality of contacts (1,1'). The branched connections (7a) of the ground terminal block (7) are connected to some of the contacts (1) of the connector portion (6) to be grounded. A method of manufacturing a multi contact connector comprises steps of producing a ground terminal block (7) having branched connections (7a) to be connected to contacts (1) to be grounded in accordance with requirement of a circuit to be connected, and connecting the branched connections (7a) with distal ends (1a) of the contacts (1) of a connector portion (6) separately produced. In a process of producing the ground terminal block (7), a ground terminal block having branched connections (7a) at different locations according to requirement of a circuit to be connected is produced every time when the contacts (1) to be grounded are changed, or a ground terminal block (7) having a great number of branched connections (7a) commonly formed for requirement of various circuits is produced and then unnecessary branched connections are removed to form a ground terminal block having the branched connections only required for requirement of a specific circuit to be connected.



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This invention relates to a multi contact connector having a ground terminal block and a method of manufacturing the same.

A multi contact connector has been used, whose a series of contacts 1 includes some contacts 1a previously determined to be grounded in accordance with a circuit to be connected and integrally formed with a ground terminal block 1b for commonly connecting the some contacts 1a as shown in a perspective view of Fig. 1.

With such a connector, however, use is limited to a particular circuit. Therefore, it is impossible to use the connector for another circuit different in position of contacts to be grounded, unless a new connector is manufactured to meet the different position of the contacts. As the result, new punching dies for contacts are needed whenever circuits to be connected are changed. It is very troublesome and tends to increase manufacturing cost. This disadvantages are particularly acute in a multi contact connector including contacts in two rows for tape wires as shown in Fig. 2a.

In a connector shown in Fig. 2a, positions of contacts to be grounded of first and second series of contacts 1 and 1' are not aligned with each other.

Moreover, it is required to arrange distal ends 1a of the first series of contacts 1 in alignment with distal ends 1a' of the second series of contacts 1' in order to facilitate the connection of the flat cables as shown in Fig. 2a. It is furthermore required to commonly connect ground terminal blocks 1b and 1b' of the first and second series of contacts 1 and 1' as by welding 2. To meet these requirements, two kinds of series of contacts 4 and 4' different in shape of ground terminals must be manufactured as shown in Fig. 2b. Moreover, the shapes of ground terminals must be changed every time when positions of the ground terminals are changed.

In addition, a further process is needed for commonly connecting the ground terminal blocks 1b and 1b' of the first and second series of the contacts 1 and 1' at several locations as by welding, so that there is a great difficulty in manufacturing in comparison with the connector having only one series of contacts as shown in Fig. 1. As shown in Fig. 2b, furthermore, extra members are necessary such as connecting pieces 3 and 3' and respective series of contacts 4 and 4' having ground terminal blocks 1b and 1b'. Accordingly, this connector cannot be manufactured by a method wherein a series of contacts 4 is inserted into contact receiving and fixing apertures 5a formed in an insulating housing 5 and fixed therein and thereafter a connecting piece 3 is removed by cutting along a broken line as in a connector having no ground

terminal block as shown in Fig. 3. Therefore, the series of contacts 4 and 4' forming the first and second series of contacts 1 and 1' are unavoidably formed by insulating resin molding.

As a result, it is necessary to position the series of the contacts with high accuracy in order to avoid damage to the contacts in connecting the connector with a mating connector, with resulting increased troublesome in production. Moreover, as the contacts are fixed to the molded resin, damaged contacts cannot be replaced or repaired.

It is a primary object of the invention to provide an improved multi contact connector having a ground terminal block and a method of manufacturing such a multi contact connector, which completely eliminate all the disadvantages of the prior art.

In order to achieve this object a multi contact connector according to the invention comprises a ground terminal block having branched connections, and a connector portion having a plurality of contacts, said branched connections of said ground terminal block being connected to some of said contacts of said connector portion to be grounded.

The method of manufacturing a multi contact connector according to the invention comprises steps of producing a ground terminal block having branched connections to be connected to contacts to be grounded in accordance with requirement of a circuit to be

connected, and connecting said branched connections with distal ends of said contacts of a connector portion separately produced.

According to a preferred embodiment of the invention, in a process of producing said ground terminal block, a ground terminal block having branched connections at different locations according to requirement of a circuit to be connected is produced every time when the contacts to be grounded are changed, or a ground terminal block having a great number of branched connections commonly formed for requirement of various circuits is produced and then unnecessary branched connections are removed to form a ground terminal block having the branched connections only required for requirement of a specific circuit to be connected.

The invention will be more fully understood by referring to the following detailed specification and claims taken in connection with the appended drawings.

Figs. 1, 2a and 2b and 3 are perspective views for explaining connectors of the prior art;

Fig.s 4a, 4b and 4c are perspective views illustrating the method according to the invention; and

Figs. 5a and 5b are side views of an application example of a connector portion of the connector according to the invention.

Figs. 4a, 4b and 4c illustrate one preferred embodiment of the invention. According to the invention,

a connector portion 6 and a ground terminal block 7 are separately made as shown in Fig. 4a. When contacts to be grounded are changed in accordance of a circuit to be connected, one ground terminal block 7 is provided, which comprises branched connections 7a to be connected to the contacts to be grounded and is common to a first and second series of contacts 1 and 1'. The ground terminal block 7 is connected to distal ends of required contacts of the connector portion as by welding as shown in Fig. 4b to form a connector having the required ground terminal block.

Every time when contacts to be grounded in series of contacts are changed according to a requirement of a circuit to be connected, a new terminal block 7 having branched connections at different locations may be made in accordance with the changed contacts to be grounded. However, this is troublesome and different dies for forming the ground terminal blocks are needed every time when the locations of the branched connections are changed. To avoid this, common ground terminal blocks 7 having a great number of branched connections are preferably made as shown in Fig. 4c. According to required locations of branched connections, required branched connections are retained and the other unnecessary branched connections are removed to obtain a ground terminal block required for a connection. In this manner only one kind of ground terminal blocks 7 may be prepared for various connectors required to

have different locations of branched connections.

According to the invention as above described, it is sufficient that ground terminal blocks 7 different in shape are made according to requirements of respective connectors and connected to the connector portions 6, even if contacts to be grounded are changed. Accordingly, connector portions 6 the same in construction can be commonly used without making connectors including two series of contacts and having ground terminal blocks different in shape to meet respective requirements as in the prior art. Moreover, according to the invention, only one ground terminal block 7 is required common to distal ends 1a and 1a' of first and second series of contacts aligned in rectilinear rows. As the result, costs of dies and materials to be used are reduced in comparison with those of the prior art and manufacturing of connectors and management of stocks are facilitated.

In addition thereto, according to the invention, as the contacts are not needed to have a ground terminal block 7, the assembling method the same as that shown in Fig. 3 for forming the connector portion 6 by inserting and fixing a series of contacts into fixing apertures 5a of an insulating housing 5 can be used. Therefore, it is possible to avoid the difficulty in manufacturing in the prior art such as the accurate positioning of two series of contacts in molding to achieve the alignment with a mating connector. At the same time, according to the invention, replacement and repairing

can be easily carried out at will.

According to the invention, moreover, as the contacts do not have a ground terminal block, the second series of contacts are inserted reversely to the first series of contacts into fixing apertures 5a to form a connector portion 6 having the first and second series of contacts having the same shape. From this viewpoint, saving of material cost, facilitating of manufacturing and reduction of the number of parts are accomplished.

According to the invention, furthermore, as the connector portion 6 and the ground terminal block 7 are independent from each other, a connector can be made as so-called "solder-dip type connector". This type connector is produced by cutting distal ends 1a and 1a' of contacts of the connector portion 6 along a broken line in Fig. 5a and then by inserting the cut distal ends into insert apertures 8a formed in current conducting portions of a print circuited board 8 to be soldered. Moreover, the invention can be applied to usual connectors including wires soldered thereto. In this manner, connector for various applications can be produced by commonly using manufacturing installations, thereby contributing rationalization of work and reduction of kinds of products. Moreover, the manufacturing method according to the invention provides inexpensive multi contact connectors.

While the invention has been particularly

shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details can be made therein without departing from the spirit and scope of the invention.

CLAIMS

1. A multi contact connector characterised in that it comprises a ground terminal block (7) having branched connections (7a) and a connector portion (6) having a plurality of contacts (1,1'), said branched connections (7a) of said ground terminal block (7) being connected to some of said contacts (1) of said connector portion (6) to be grounded.

2. A multi contact connector as set forth in claim 1, wherein said ground terminal block (7) is formed by removing unnecessary branched connections (7a) from a ground terminal block having a great number of branched connections commonly formed for requirement of various circuits.

3. A method of manuacturing a multi contact connector comprising steps of producing a ground terminal block (7) having branched connections (7a) to be connected to contacts (1) to be grounded in accordance with requirement of a circuit to be connected, and connecting said branched connections (7a) with distal ends (1a) of said contacts (1) of a connector portion (6) separately produced.

4. A method as set forth in claim 3, wherein in a process of producing said ground terminal block (7), a ground terminal block having branched connections (7a) at different locations according to requirement of a circuit to be connected is produced every time when the contacts (1,1') to be grounded are changed.

5. A method as set forth in claim 3, wherein in a process of producing said ground terminal block (7), a ground terminal block having a great number of branched connections (7a), commonly formed for requirement of various circuits is produced and then unnecessary branched connections are removed to form a ground terminal block having the branched connections only required for requirement of a specific circuit to be connected.

FIG_1
PRIOR ART

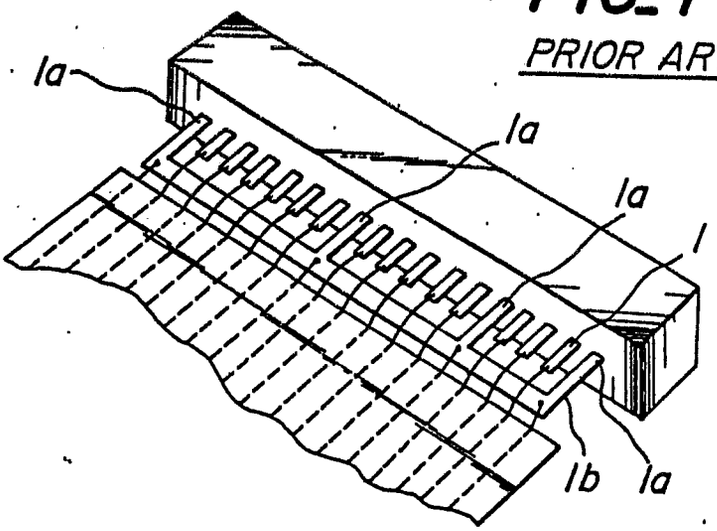

FIG_2a
PRIOR ART

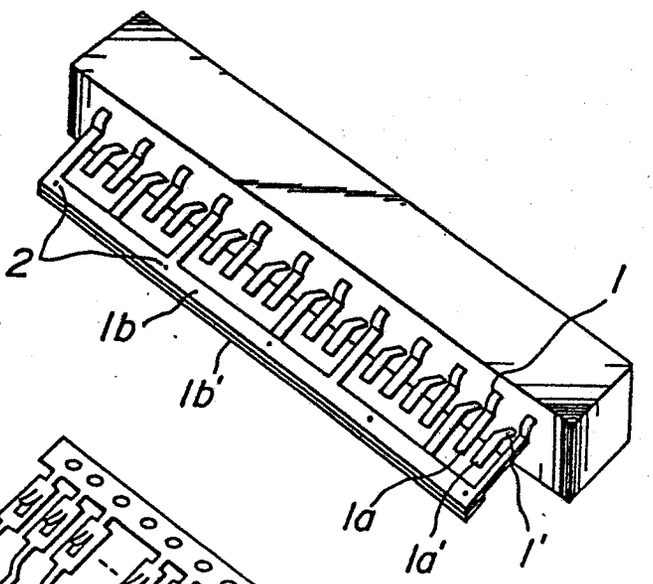

FIG_2b
PRIOR ART

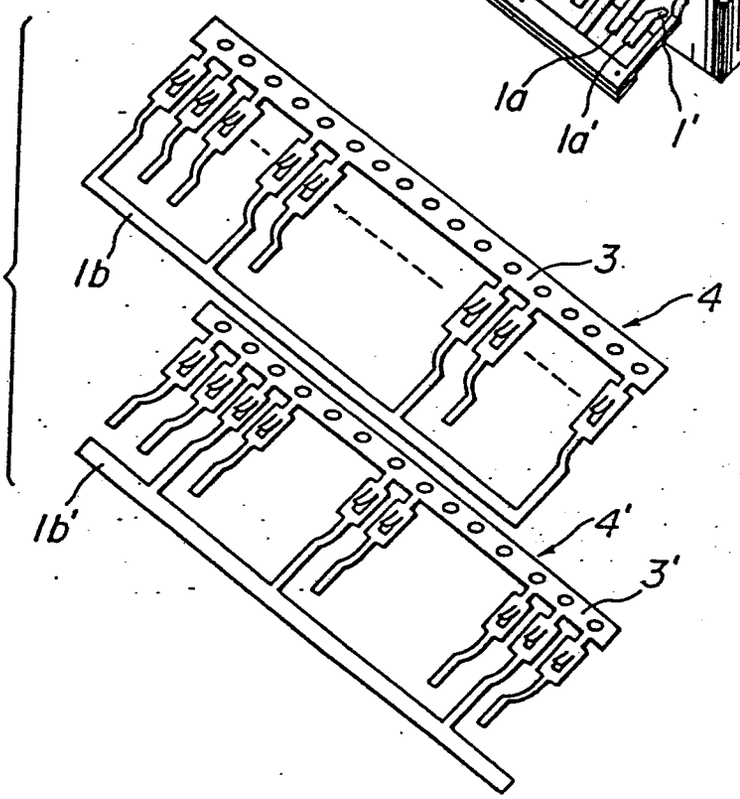

FIG_3
PRIOR ART

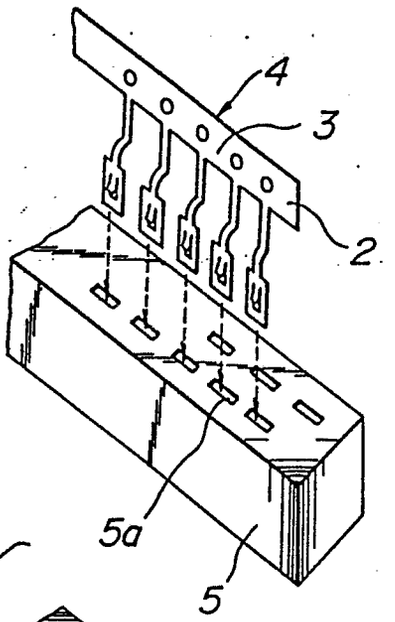

FIG_4a

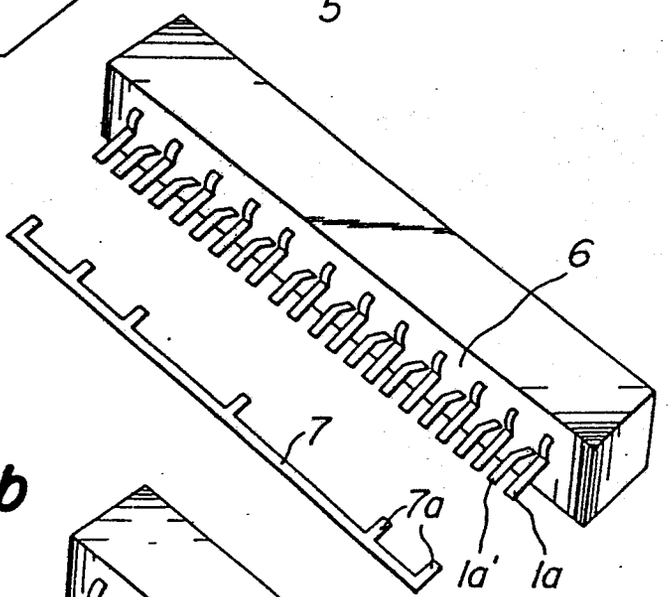

FIG_4b

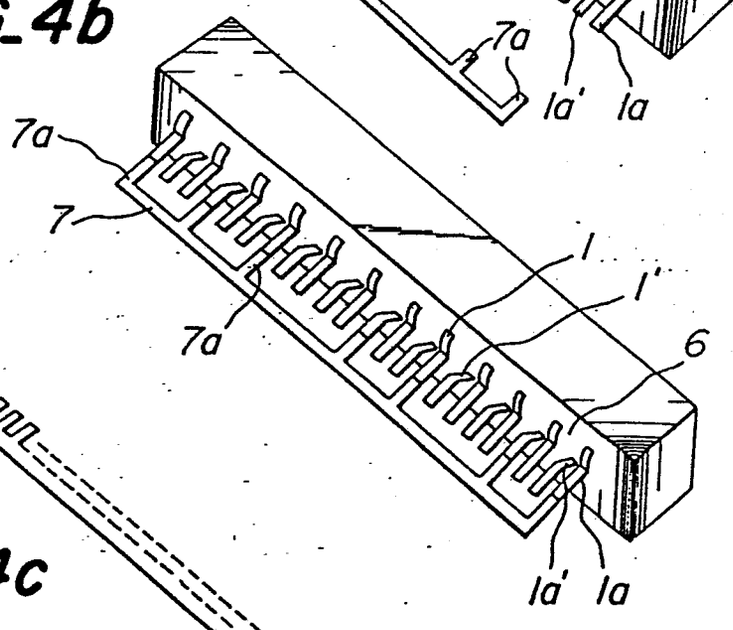

FIG_4c

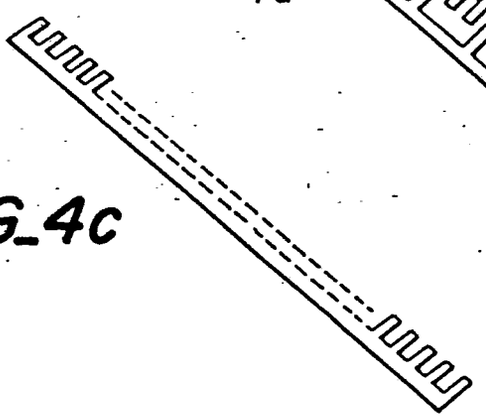

FIG_5a

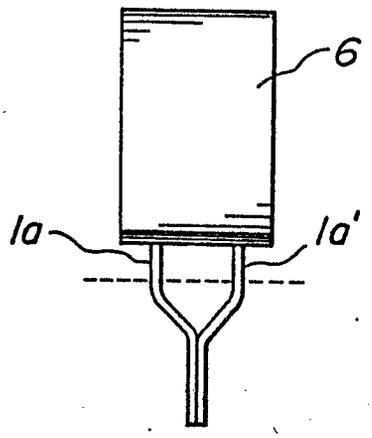

FIG_5b