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(54) CONNECTOR FOR FLAT CABLE

VERBINDER FÜR EIN FLACHKABEL

CONNECTEUR POUR CABLE PLAT

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Description

Technical Field

[0001] The present invention relates to a connector used for connecting a flat cable and, in particular, relates to a structure for retaining the flat cable by the connector.

Background Art

[0002] A connector used for connecting a flat cable is disclosed in, for example, EP1003245. This connector comprises a contact-side insulator retaining conductive contacts, and a cable-side insulator retaining a flat cable. The cable-side insulator is attachable/detachable relative to the contact-side insulator. When the cable-side insulator is attached to the contact-side insulator, wires of the flat cable are brought into pressure contact with the contacts. In this manner, the flat cable is connected to the connector.

[0003] In the connector of this type, it is necessary that the contacts and the flat cable are securely fixed/retained relative to the contact-side insulator and the cable-side insulator, respectively. The contacts can be retained relatively easily by providing mutual engagement structures between the contact-side insulator and the contacts. For example, by optionally contriving a shape of contacts, it is possible to engage the contacts with the contact-side insulator.

[0004] On the other hand, since the flat cable has a standardized simple shape as is well known, it is relatively difficult to retain it relative to the cable-side insulator. Movement of the flat cable relative to the cable-side insulator impedes the pressure-contact contention between the wires of the flat cable and the contacts, and thus should be avoided. EP1003245 disloses upper and lower cover insulators clamping upper and lower coaxial cables in recesses of the upper and lower cover insulators by a spacer.

[0005] According to those conventional techniques, however, the retention of the flat cable relative to the cable-side insulator is insufficient. Further, complicated facilities are required for automating assembly of the connector, which thus raises a problem also in terms of economics.

[0006] It is therefore an object of the present invention to provide a connector for a flat cable, which can securely retain the flat cable and economically cope with automation of assembly.

Disclosure of the Invention

[0007] According to the present invention, there is obtained a system for forming a flat cable connector capable of connecting one or two flat cables according to claim 1,

[0008] The first insulator may have a guide groove for guiding the cable-side insulator to be attached/detached, and the second and third insulators may have convex portions, respectively, which are inserted into the guide groove.

[0009] The second insulator may have a concave portion confronting the clamp, and the flat cable may be pushed into the concave portion by the clamp.

[0010] The flat cable may comprise a plurality of cable elements, and the second insulator and the clamp may have a function of conjointly arraying the cable elements.

[0011] The third insulator may be an integral body.

[0012] The flat cable may be formed with a generally crank-shaped convex portion, and the convex portion may be received in the concave portion of the second insulator.

Brief Description of the Drawings

[0013]

Fig. 1 shows a connector according to a first embodiment of the present invention, wherein (a) shows a bottom view, (b) shows a left side view (a diagram seen from a fitting side with a counterpart connector), (c) shows a front view, (d) shows a right side view, and (e) shows a rear view, respectively.

Fig. 2 is a sectional view taken along line II-II in Fig. 1(c).

Fig. 3 is a sectional view taken along line III-III in Fig. 2.

Fig. 4 is a sectional view, like Fig. 2, of a connector according to a second embodiment of the present invention.

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

Best Mode for Embodying the Invention

[0014] Referring to Figs. 1 to 3, description will be made of a connector according to a first embodiment of the present invention.

[0015] The connector of Figs. 1 to 3 is used for connecting one flat cable 6 such as a flat ribbon cable, and comprises a first insulator 1, a second insulator 2, and a third insulator 3. In Figs. 1 (a) and 2, the first insulator 1 is disposed on the left side, the second insulator 2 is disposed roughly on the lower right side, and the third insulator 3 is disposed roughly on the upper right side. These insulators 1, 2, and 3 are fitted together according to a later-described structure to form an insulator portion of the connector.

[0016] The first insulator 1 fixedly retains first conductive contacts 4 divided into an upper side and a lower side and confronting each other in a vertical direction. The first contacts 4 are arrayed in large numbers on the upper side and the lower side, respectively.

[0017] Each of the first contacts 4 comprises a contact portion 4a for obtaining electrical connection to a counterpart connector, and a generally U-shaped tuning fork portion 4b. Inside the tuning fork portion 4b, connecting portions 4c are projectingly formed. The contact portions

4a of the first contacts 4 are arranged in an opening portion 1a of the first insulator 1 so as to confront each other in the vertical direction. The first insulator 1 forms a contact-side insulator.

[0018] The second insulator 2 fixedly retains second conductive contacts 5. The second contacts 5 are arrayed corresponding to the first contacts 4 on the lower side. The second insulator 2 is formed with a concave portion 2a having a generally trapezoidal shape in section and confronting the third insulator 3. The concave portion 2a is formed with two confronting portions 8.

[0019] The flat cable 6 is disposed between the second and third insulators 2 and 3. Thereupon, a generally crank-shaped portion defined by a convex portion 6a and a concave portion 6b formed in the flat cable 6 is disposed in the concave portion 2a of the second insulator 2.

[0020] The connector of Figs. 1 to 3 further comprises an insulating clamp 7 interposed between the third insulator 3 and the flat cable 6. The clamp 7 has a portion 7a having a generally trapezoidal shape in section and confronting the concave portion 2a of the second insulator 2. The generally crank-shaped portion of the flat cable 6 is sandwiched between the portion 7a having the generally trapezoidal shape in section and the confronting portions 8. The second and third insulators 2 and 3 conjointly form a cable-side insulator.

[0021] Projecting portions 7c are formed on both left and right sides of the clamp 7. Holes 2b are formed at both left and right side portions of the second insulator 2. Rails 2c are formed on both left and right side surfaces of the second insulator 2. The third insulator 3 is formed with several ribs 3a. Rails 3b are formed on both left and right side surfaces of the third insulator 3. The first insulator 1 is formed with grooves 1 b. Incidentally, wires 6c are each bent into a shape approximate to a predetermined U-shape in advance.

[0022] The projecting portions 7c of the clamp 7 are inserted into the holes 2b of the second insulator 2 in the state where the flat cable 6 is sandwiched as described above. The ribs 3a of the third insulator 3 and the rails 3b of the third insulator 3 are mounted on an upper surface of the clamp 7 and upper surfaces of the rails 2c of the second insulator 2.

[0023] Further, each rail 2c of the second insulator 2 and each rail 3b of the third insulator 3 are fitted into the groove 1b of the first insulator 1, then the first insulator 1 is slided relative to the second and third insulators 2 and 3. Then, by fitting between the rails 2c and 3b and the grooves 1b, the second and third insulators 2 and 3 are engaged with the first insulator 1 in the vertical direction so as to approach each other. As a result, the flat cable 6 is firmly sandwiched between the second insulator 2 and the clamp 7.

[0024] Further, when the first insulator 1 is slided relative to the second and third insulators 2 and 3, the wires 6c at the tip of the flat cable 6 are each sandwiched between the tuning fork portion 4b and a tip portion 5a of the second contact 5 so as to be reformed into the predetermined U-shape. As a result, the wires 6c of the flat cable 6 and the connecting portions 4c of the first contacts 4 suitably contact with each other to be electrically connected. Incidentally, as shown in Fig. 1, the first insulator 1, the second insulator 2, and the third insulator 3 are fixed together by inserting anti-release pins 9 into through holes that are formed at upper and lower two portions, respectively.

[0025] In Fig. 2, when the flat cable 6 is pulled rightward, the clamp 7 is pushed by the concave portion 6b of the flat cable 6 so as to attempt to move upward. However, as shown in Fig. 3, the several ribs 3a of the third insulator 3 prevent upward movement (rise) of the clamp 7. Therefore, the flat cable 6 is firmly retained by the connector so that pulling-out thereof is prevented.

[0026] Referring to Figs. 4, and 5, description will be made of a connector according to a second embodiment of the present invention. Like portions are assigned the same reference symbols so that description thereof may be omitted. Those portions of which description is omitted have the same structures as the connector of Figs. 1 to 3.

[0027] The connector of Figs. 4 and 5 is used when connecting two flat cables 6 one over the other. In this case, use is made of an insulating additional clamp 7" having the same shape and size as the clamp 7 in the connector of Figs. 1 to 3. That is, use is made of two insulators and two clamps that are the same as the second insulator 2 and the clamp 7 in the connector of Figs. 1 to 3. Therefore, the additional clamp 7" also has a portion 7a" having a generally trapezoidal shape in section and fitted in a concave portion 2a' of an additional insulator 2'.

[0028] The additional insulator 2' also fixedly retains second contacts 5. The second contacts 5 of the additional insulator 2' are arrayed corresponding to the first contacts 4 on the upper side. The additional insulator 2' is formed with the concave portion 2a' having a generally trapezoidal shape in section. The concave portion 2a' is formed with confronting portions 8'.

[0029] Projecting portions 7c" are formed on both left and right sides of the additional clamp 7". Holes 2b' are formed at both left and right side portions of the additional insulator 2'. Rails 2c' are formed on both left and right side surfaces of the additional insulator 2'.

[0030] The flat cable is disposed between the second insulator 2 and the clamp 7, and besides, the flat cable 6 is disposed also between the additional insulator 2' and the additional clamp 7". Thereupon, a generally crank-shaped portion defined by a convex portion 6a and a concave portion 6b formed in the flat cable 6 is disposed in the concave portion 2a' of the additional insulator 2'.

[0031] When the second insulator 2 and the additional insulator 2' are mounted to the first insulator 1 following fitting between the rails 2c and 2c' and the grooves 1b, the additional insulator 2' along with the second insulator 2 is engaged with the first insulator 1 in the vertical direction to approach each other, according to the structure like the connector of Figs. 1 to 3. As a result, the flat cable

6 is firmly sandwiched between the second insulator 2 and the clamp 7, and besides, the flat cable 6 is firmly sandwiched also between the additional insulator 2' and the additional clamp 7".

[0032] Incidentally, when connecting one flat cable in the connector of Figs. 4 and 5, the additional insulator 2' and the additional clamp 7" may be replaced with the third insulator 3 in the connector of Figs. 1 to 3. In this manner, it is possible to easily carry out connection of one flat cable or connection of two flat cables by exchanging the components.

Industrial Applicability

[0033] The connector for a flat cable of the present invention is suitable as a connection device for a flat cable used in a computer, a portable telephone, or the like.

Claims

1. A system for forming a flat cable connector capable of connecting one or two flat cables (6), said system comprising:

   - contacts (4) to be connected with wires (6c) of said flat cable,
   - a first insulator (1) retaining said contacts (4),
   - two second insulators (2, 2') each for arraying the wires (6c) of said flat cable (6) and formed with a concave portion (2a, 2a') for receiving said flat cable (6),
   - two clamps (7, 7") each for sandwiching said flat cable (6) conjointly with said second insulator (2, 2'), and
   - a third insulator (3) formed with a rib (3a) to be brought into contact with said clamp (7),

   wherein a flat cable connector for connecting said two flat cables (6) comprises two second insulators (2, 2") and two clamps (7, 7"), wherein said two clamps (7, 7") are caused to confront each other, and said first insulator (1) and said two second insulators (2, 2") are fixed together, and
   wherein a flat cable connector for connecting said one flat cable (6) comprises one second insulator (2), one clamp (7), and said third insulator (3), wherein said clamp (7) and said rib (3a) of the third insulator (3) are brought into contact with each other, and said first insulator (1), said second insulator (2), and said third insulator (3) are fixed together.

2. A system according to claim 1, **characterized in that** said flat cable (6) is formed with a generally crank-shaped convex portion (6a), and said convex portion (6a) is received in said concave portion (2a, 2a') of the second insulator (2, 2").

3. A system according to claim 1 or 2, wherein said concave portion (2a, 2a') of the second insulator (2, 2") is formed with two confronting portions (8).

4. A system according to claim 1, wherein said first insulator (1) has a guide groove (1 b), and said second and third insulators have convex portions (2c, 3b), respectively, which are inserted into said guide groove (1b).

5. A system according to claim 1, wherein said flat cable (6) is pushed into said concave portion (2a, 2a') by said clamp (7, 7").

6. A system according to claim 1, wherein said flat cable (6) comprises a plurality of cable elements, and said second insulator (2, 2") and said clamp (7, 7") have a function of conjointly arraying said cable elements.

7. A system according to claim 1, wherein said third insulator (3) is an integral body.

Patentansprüche

1. System zum Ausbilden eines Flachkabelverbinders, der in der Lage ist, ein oder zwei Flachkabel (6) zu verbinden, wobei das System aufweist:

   - Kontakte (4), die mit Drähten (6c) des Flachkabels verbindbar sind,
   - einen ersten Isolator (1), der die Kontakte (4) hält,
   - zwei zweite Isolatoren (2, 2'), jeweils zum Anordnen der Drähten (6c) des Flachkabels (6) und die mit einem konkaven Abschnitt (2a, 2a') zum Aufnehmen des Flachkabels (6) ausgebildet sind,
   - zwei Klammern (7, 7"), jeweils zum Zwischenlegen des Flachkabels (6) gemeinsam mit dem zweiten Isolator (2, 2'), und
   - einen dritten Isolator (3), der mit einer Rippe (3a) ausgebildet ist, um in Kontakt mit der Klammer (7) bringbar zu sein,

   wobei ein Flachkabelverbinder zum Verbinden der beiden Flachkabel (6) zwei zweite Isolatoren (2, 2") und zwei Klammern (7, 7") aufweist, wobei bewirkt ist, dass sich die zwei Klammern (7, 7") einander gegenüberstehen und der erste Isolator (1) und die beiden zweiten Isolatoren (2, 2") zusammen fixiert sind, und
   wobei ein Flachkabelverbinder zum Verbinden des einen Flachkabels (6) einen zweiten Isolator (2), eine Klammer (7) und den dritten Isolator (3) aufweist, wobei die Klammer (7) und die Rippe (3a) des dritten Isolators (3) in Kontakt miteinander gebracht sind und der erste Isolator (1), der zweite Isolator (2) und

der dritte Isolator (3) zusammen fixiert sind.

2. System gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Flachkabel (6) mit einem grundsätzlich gekröpften, konvexen Abschnitt (6a) ausgebildet ist und der konvexe Abschnitt (6a) in dem konkaven Abschnitt (2a, 2a') des zweiten Isolators (2, 2") aufgenommen ist.

3. System gemäß Anspruch 1 oder 2, wobei der konkave Abschnitt (2a, 2a') des zweiten Isolators (2, 2") mit zwei gegenüberstehenden Abschnitten (8) ausgebildet ist.

4. System gemäß Anspruch 1, wobei der erste Isolator (1) eine Leitnut (1b) hat und der zweite bzw. dritte Isolator konvexe Abschnitte (2c, 3b) haben, die in die Leitnut (1b) eingeführt sind.

5. System gemäß Anspruch 1, wobei das Flachkabel (6) mittels der Klammer (7, 7") in den konkaven Abschnitt (2a, 2a') gedrückt ist.

6. System gemäß Anspruch 1, wobei das Flachkabel (6) eine Mehrzahl an Kabelelementen aufweist und der zweite Isolator (2, 2") und die Klammer (7, 7") eine Funktion zum gemeinsamen Anordnen der Kabelelemente haben.

7. System gemäß Anspruch 1, wobei der dritte Isolator (3) ein einstückiger Körper ist.

Revendications

1. Système d'obtention d'un connecteur pour câble plat permettant la connexion d'un ou de deux câbles plats (6), ce système comprenant :

   - des contacts (4) destinés à être connectés à des fils (6c) du câble plat,
   - un premier isolant (1) qui maintient les contacts (4),
   - deux seconds isolants (2, 2') destinés chacun à aligner les fils (6c) du câble plat (6) et comportant une partie concave (2a, 2a') pour recevoir le câble plat (6),
   - deux griffes de serrage (7, 7") coopérant respectivement avec le second isolant (2, 2') pour prendre le câble plat (6) en sandwich, et
   - un troisième isolant (3) muni d'une nervure (3a) destinée à être mise en contact avec la griffe de serrage (7),

   dans lequel un connecteur pour câble plat permettant la connexion de deux câbles plats (6) comportant deux seconds isolants (2, 2") et deux griffes de serrage (7, 7"), ces deux griffes de serrage (7, 7") étant destinées à être mises en regard et le premier isolant (1) et les deux seconds isolants (2, 2") étant fixés les uns aux autres, et
   dans lequel un connecteur pour câble plat permettant la connexion d'un câble plat (6) comprenant un second isolant (2), une griffe de serrage (7) et le troisième isolant (3), la griffe de serrage (7) et la nervure (3a) du troisième isolant (3) étant mises en contact l'une avec l'autre, et le premier isolant (1), le second isolant (2) et le troisième isolant (3) étant fixés les uns au autres.

2. Système conforme à la revendication 1, **caractérisé en ce que** le câble plat (6) comporte une partie convexe (6a) essentiellement en forme de manivelle et la partie convexe (6a) est logée dans la partie concave (2a, 2a') du second isolant (2, 2").

3. Système conforme à la revendication 1 ou 2, dans lequel la partie concave (2a, 2a') du second isolant (2, 2") comporte deux parties (8) situées en regard.

4. Système conforme à la revendication 1, dans lequel le premier isolant (1) comporte une rainure de guidage (1b) et le second et le troisième isolant comportent respectivement des parties convexes (2c, 3b) qui sont insérées dans la rainure de guidage (1b).

5. Système conforme à la revendication 1, dans lequel le câble plat (6) est poussé dans la partie concave (2a, 2a') par la griffe de serrage (7, 7").

6. Système conforme à la revendication 1, dans lequel le câble plat (6) comporte plusieurs éléments de câble et le second isolant (2, 2") et la griffe de serrage (7, 7") ont pour fonction d'aligner conjointement ces éléments de câble.

7. Système conforme à la revendication 1, dans lequel le troisième isolant (3) est un corps intégré.

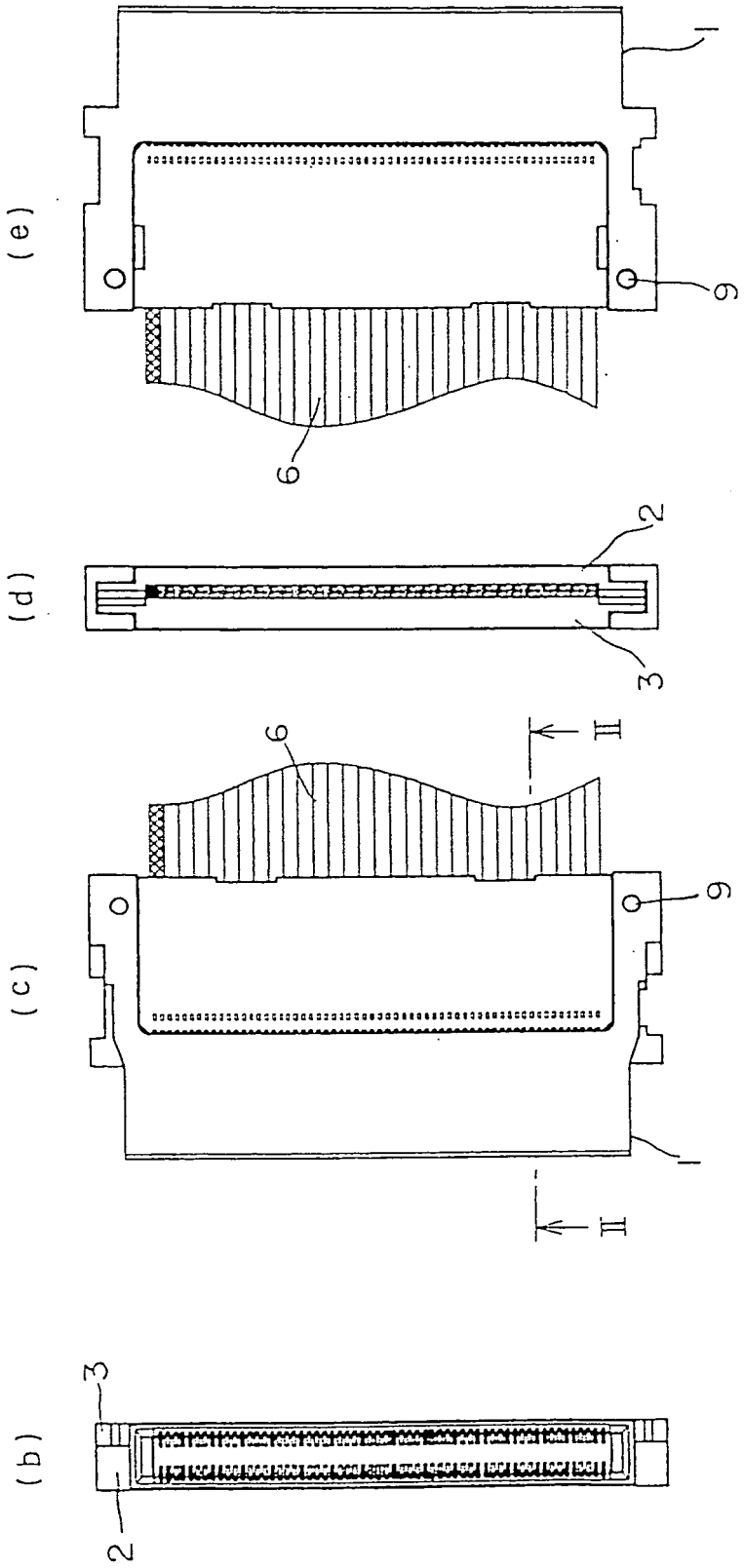


FIG. 1

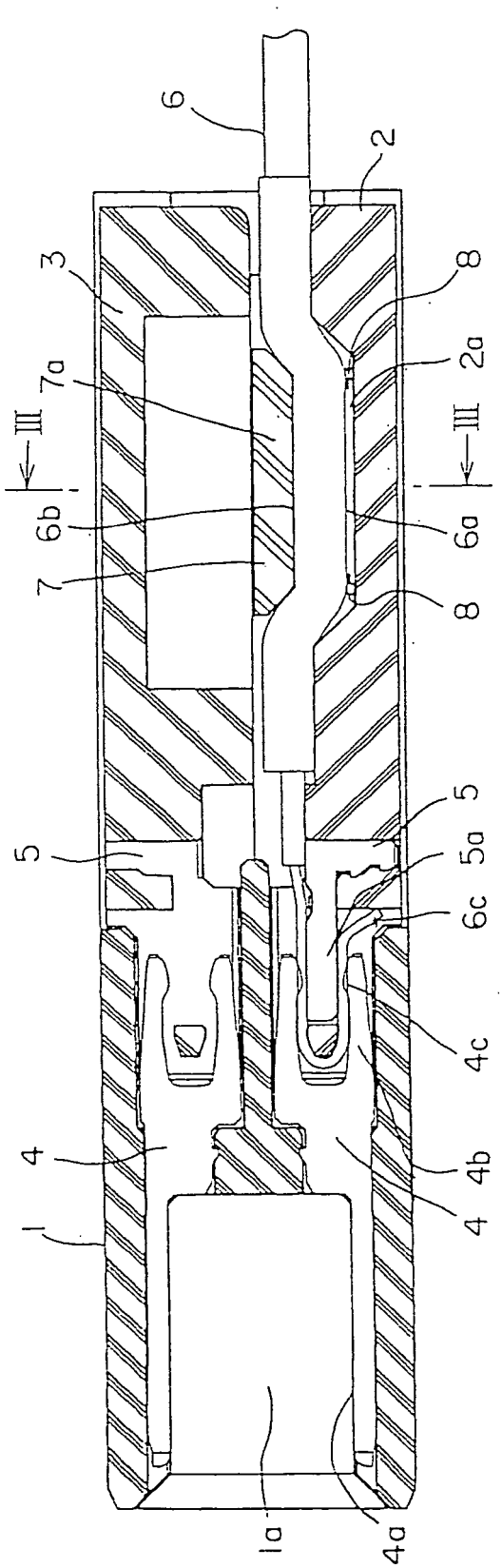


FIG. 2

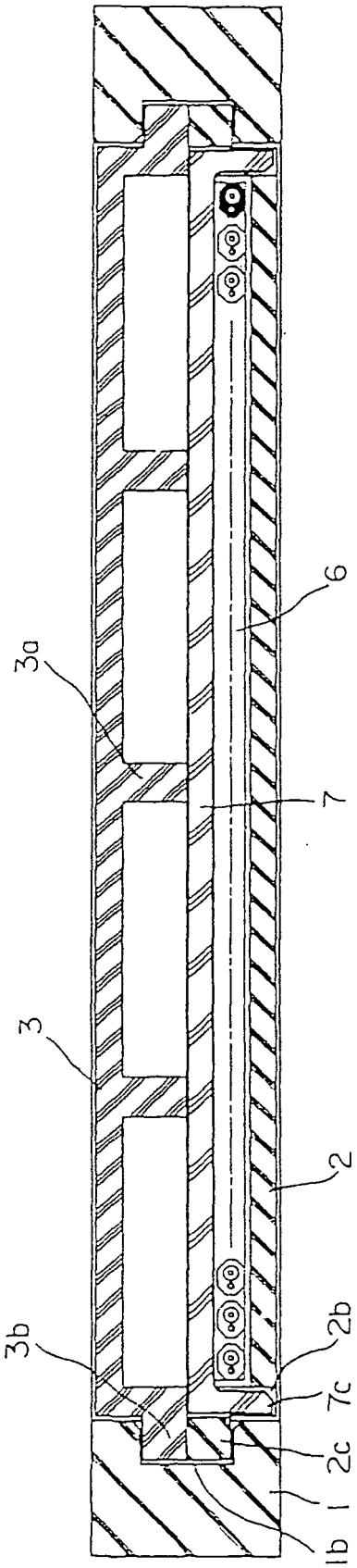


FIG. 3

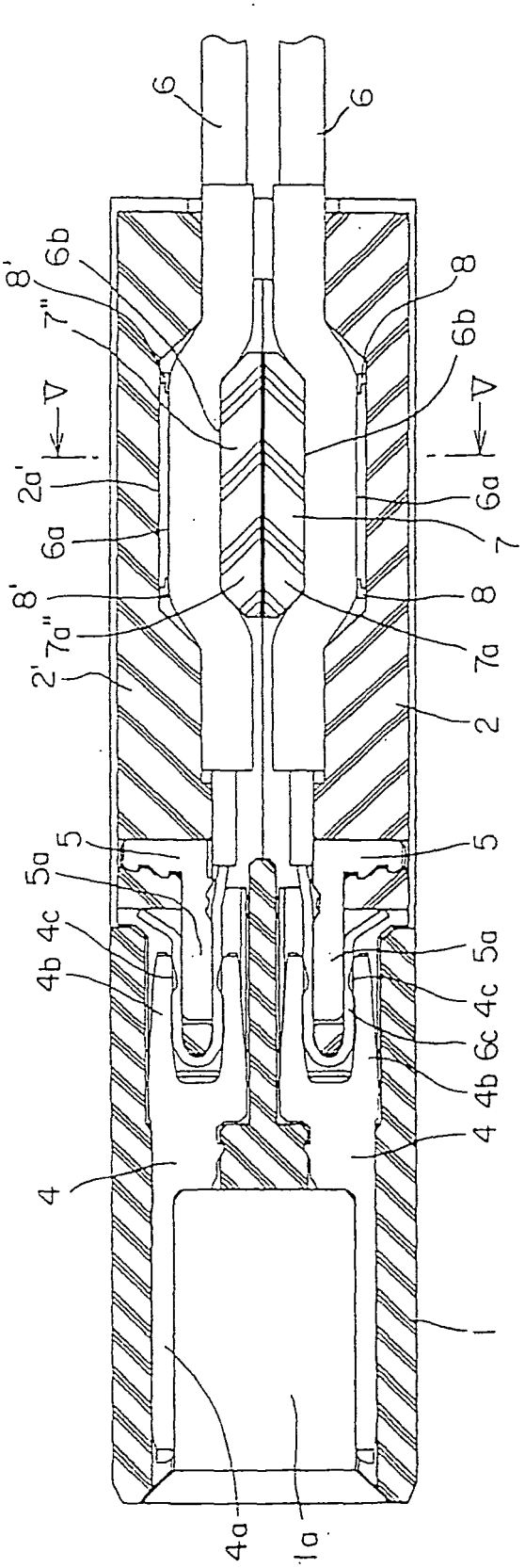


FIG. 4

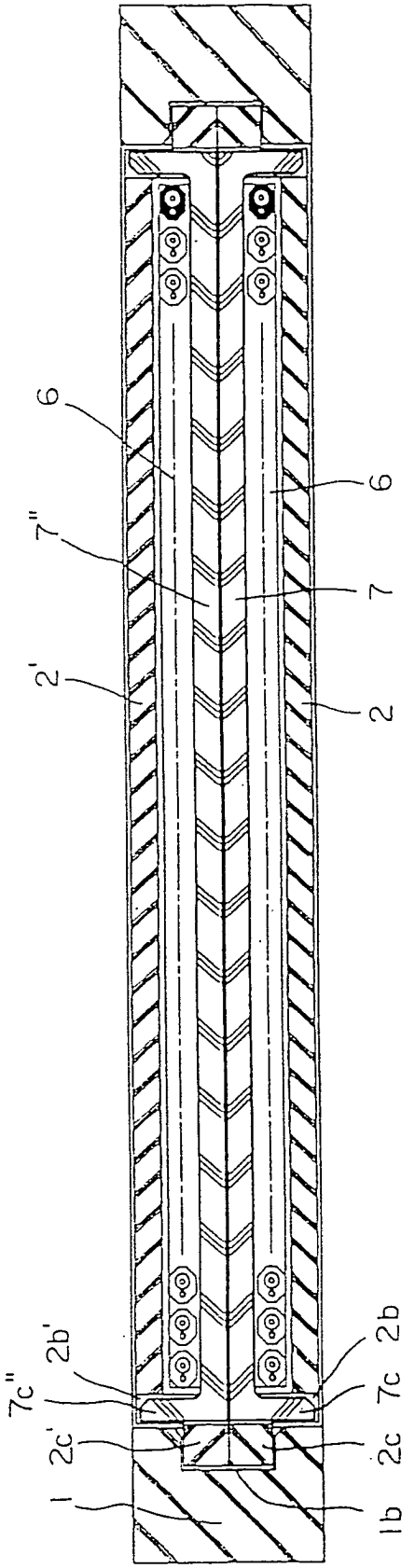


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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