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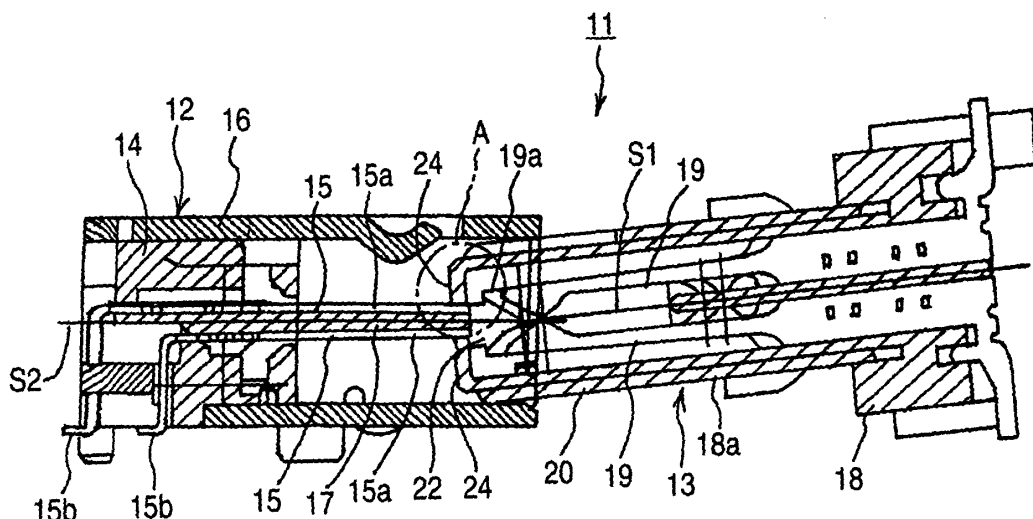
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(54) **Connector device**

(57) A connector device includes a plug housing, a pair of plug contacts, a receptacle housing, a separator, a pair of receptacle contacts and a pair of protective walls. The plug contacts are arranged in a first direction in the plug housing so as to form a slot therebetween. The receptacle housing is adapted to be engaged with the plug housing. The separator is provided in the plug housing

and adapted to be fitted into the slot, when the receptacle housing is engaged with the plug housing. The receptacle contacts are disposed on the separator and adapted to be brought into contact with the plug contacts, when the receptacle housing is engaged with the plug housing. The pair of protective walls are arranged in the first direction at a front end portion of the plug housing so as to oppose distal ends of the plug contacts.

FIG. 1



Description

BACKGROUND

1. Field of the Invention

[0001] This invention relates to a connector device used for transmitting information within an electrical equipment or between apparatuses.

2. Description of the Related Art

[0002] For example, Japanese Patent Publication No. 08-288016 discloses a connector device used for transmitting information within an electrical equipment or between apparatuses.

[0003] Further, an electric connector device having a structure as shown in Fig. 4 is used. The connector device 1 shown in Fig. 4 includes a receptacle connector 2 to be mounted on a board (not shown), and a plug connector 3 for inserting connection to the receptacle connector 2.

[0004] In this connector device 1, a plurality of receptacle contacts 4 are arranged or juxtaposed in a left-right direction on upper and lower surfaces of a plate-like separator 2a of the receptacle connector 2. On the other hand, in the plug connector 3, a plurality of plug contacts 5 juxtaposed in the left-right direction are disposed at upper and lower positions, that is, disposed in two (upper and lower) rows, and a slot 6 for receiving the separator 2a of the receptacle connector 2 is formed between the upper and lower rows of the plug contacts 5.

[0005] When connecting the receptacle connector 2 and the plug connector 3 together, the separator 2a of the receptacle connector 2 is received and fitted in the slot 6 of the plug connector 3, and the plug contacts 5 are connected respectively to the receptacle contacts 4.

[0006] However, in the connector device 1 having the structure as shown in Fig. 4, when the plug connector 3 was inserted obliquely into the receptacle connector 2, with a reference line S1 of the plug connector 3 inclined in an upward-downward direction relative to a reference line S2 of the receptacle connector 2 as shown in Fig. 4, a distal end portion 5a of the plug contact 5 which was relatively pointed was often inserted between the receptacle contact 4 and the separator 2a, and raised the receptacle contact 4 as shown in Fig. 5 (which is an enlarged view of a portion B of Fig. 4), and buckled the receptacle contact 4.

SUMMARY

[0007] It is therefore one advantageous aspect of the invention to provide a connector device capable of preventing the distal end of the plug contact from being inserted between the separator and the receptacle contact when fitting the separator of the receptacle connector into the slot of the plug connector.

[0008] According to one aspect of the invention, there

is provided a connector device, including a plug housing, a pair of plug contacts, arranged in a first direction in the plug housing so as to form a slot therebetween, a receptacle housing, adapted to be engaged with the plug housing, a separator, provided in the plug housing and adapted to be fitted into the slot, when the receptacle housing is engaged with the plug housing, a pair of receptacle contacts, disposed on the separator and adapted to be brought into contact with the plug contacts, when the receptacle housing is engaged with the plug housing, and a pair of protective walls, arranged in the first direction at a front end portion of the plug housing so as to oppose distal ends of the plug contacts.

[0009] In this construction, when the separator of the receptacle connector is to be received and fitted in the slot of the plug connector, the direction of the separator and the direction of the plug contacts are caused to coincide with each other by the protective walls provided in covering relation to the distal end portions of the plug contacts, thereby preventing the distal end of each plug contact from being inserted between the separator and the corresponding receptacle contact. Further, when the separator of the receptacle connector is to be received and fitted in the slot of the plug connector, the direction of the plug connector relative to the separator is corrected by the protective walls, and the connector connecting operation is effected in a condition in which the directions of the two connectors coincide with each other. Therefore, the distal end portion of each plug contact will not be inserted between the corresponding receptacle contact and the separator, and the receptacle contact can be positively prevented from being raised and buckled.

[0010] According to the invention, guide surfaces, adapted to guide the separator toward the slot and being adjacent to both sides of each of the plug contacts in a second direction perpendicular to the first direction, may be provided.

[0011] In this construction, if the positions of the separator and the slot are slightly offset from each other when the plug connector is to be connected to the receptacle connector, the separator impinges on the guide surface formed at the inner end portion of the front surface of the plug connector. Then, the separator is displaced toward the center of the slot by guidance of the guide surface, and is smoothly received in the slot. Further, the separator can be smoothly received in the slot by the guidance of the guide surface formed at the inner end portion of the front surface of the plug connector. Therefore, the efficiency of the operation for connecting the receptacle connector and the plug connector together can be enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Embodiment may be described in detail with reference to the accompanying drawings, in which:

Fig. 1 is a longitudinal cross-sectional view of one

embodiment of a connector device of the present invention;

Fig. 2 is an enlarged view of a portion A of Fig. 1;

Fig. 3 is an enlarged perspective view of an important portion of a plug connector of the connector device of the above embodiment;

Fig. 4 is a longitudinal cross-sectional view of a conventional connector device; and

Fig. 5 is an enlarged view of a portion B of Fig. 4.

DETAILED DESCRIPTION OF THE INVENTION

[0013] In order to prevent a distal end of each plug contact from being inserted between a separator and a receptacle contact when fitting the separator of a receptacle connector into a slot of a plug connector, there is provided a connector device including the plug connector including a plug housing of a generally square shape having an opening at its front surface, and the plurality of plug contacts which are provided at a generally central portion of the plug housing, and extend in a forward-rearward direction, and are arranged in a pair of upper and lower rows such that the slot is formed between the upper and lower rows, each row of plug contacts being juxtaposed in a left-right direction; and the receptacle connector including a receptacle housing having the plate-like separator extending in the forward-rearward direction, and the plurality of receptacle contacts which are provided on the separator, and extend in the forward-rearward direction in corresponding relation to the plug contacts, and are juxtaposed in the left-right direction; wherein the separator is received and fitted in the slot, so that the plug contacts are connected respectively to the receptacle contacts, and wherein resin-made protective walls for preventing the distal end of each of the plug contacts from being inserted between the separator and the corresponding receptacle contact when the separator is to be received and fitted in the slot are provided to cover distal end portions of the plug contacts.

[0014] One embodiment of a connector device of the present invention will now be described. Fig. 1 is a longitudinal cross-sectional view of one embodiment of the connector device 11 of the invention, showing its half-connected condition, and Fig. 2 is an enlarged view of a portion A of Fig. 1. In Figs. 1 and 2, the connector device 11 includes a receptacle connector 12 and a plug connector 13 which can be releasably fitted together.

[0015] The receptacle connector 12 includes a receptacle housing 14, a plurality of receptacle contacts 15 and a shield case 16

[0016] The receptacle housing 14 has a rectangular (or square) shape, and is made of a resin. A forwardly-extending plate-like separator 17 is formed integrally on a generally central portion of a front surface of the receptacle housing 14 which is to be opposed to the plug connector 13.

[0017] When the receptacle housing 14 is to be molded, the plurality of receptacle contacts 15 are disposed

in two (upper and lower) rows (each row of receptacle contacts are arranged at equal intervals in a left-right direction) in a mold so that the upper and lower rows of receptacle contacts 15 can be affixed respectively to upper and lower surfaces of the separator 17. Proximal end portions 15b of the receptacle contacts 15 are led out to a lower surface of the receptacle housing 14 so as to be connected respectively to contacts on a board (not shown).

[0018] The shield case 16 has a rectangular tubular shape, and is formed by an electrically-conductive metal sheet. One end portion of the shield case 16 is fixedly mounted on the receptacle housing 14, and the other end portion thereof extends forwardly from the front surface of the receptacle housing 14 beyond the separator 17 in surrounding relation thereto, and the shield case 16 is open at its front side.

[0019] The plug connector 13 includes a plug housing 18, a plurality of plug contacts 19 and a shield case 20.

[0020] The plug housing 18 has a rectangular (or square) shape, and is made of a resin, and a forwardly-extending rectangular tubular portion 18a is formed integrally on a front surface of the plug housing 18 which is to be opposed to the receptacle connector 12, as shown in Fig. 3 which is an enlarged perspective view of an important portion of the plug connector 13. The rectangular tubular portion 18a has an opening in its front side.

[0021] When the plug housing 18 is to be molded, the plurality of plug contacts 19 are set in a mold so that these plug contacts 19 can be disposed at a generally central portion of the rectangular tubular portion 18a, and when a molding operation is thereafter effected, part of each plug contact 19 is insert molded in the plug housing 18, and therefore is formed integrally with the plug housing 18. The plurality of plug contacts 19 extend in the forward-rearward, and are arranged in two (upper and lower) rows (each row of plug contacts 19 are arranged or juxtaposed in the left-right direction) in corresponding relation to the receptacle contacts 15, and a slot 22 for receiving the separator 17 of the receptacle connector 12 is formed between, that is, defined by the upper and lower rows of plug contacts 19.

[0022] An end portion 19a of each plug contact 19 has a slanting surface 23 slanting from the outer side toward the inner side, and therefore is formed into a tapering shape. Although a clearance between the upper and lower rows of plug contacts 19 is sufficiently smaller than a plate thickness of the separator 17, a gap between each pair of opposed slanting surfaces 23 and 23 is sufficiently larger than the plate thickness of the separator 17 because of their slanting configuration, and this facilitates the insertion of the separator 17 into the slot 22.

[0023] The end portions 19a of the plug contacts 19 terminate short of the distal end of the rectangular tubular portion 18a of the plug housing 18, and therefore the plug contacts 19 are disposed within the rectangular tubular portion 18a (which is part of the plug housing 18), and are surrounded by this rectangular tubular portion 18a.

Protective walls 24 and 24 extend inwardly generally perpendicularly respectively from upper and lower walls of the rectangular tubular portion 18a at the distal end thereof.

[0024] The protective walls 24 and 24 are formed to cover the front sides of distal end portions 19b of the plug contacts 19. A gap between the upper protective wall 24 (extending downwardly from the upper wall) and the lower protective wall 24 (extending upwardly from the lower wall) is slightly larger than the plate thickness of the separator 17. When the separator 17 is to be inserted into the slot 22, the protective walls 24 controls this insertion, and therefore perform the function of making a correction so that a reference line S1 of the plug connector 13. can coincide with a reference line S2 of the receptacle connector 12. Therefore, when the separator 17 is to be inserted into the slot 22 formed or defined by the upper and lower rows of plug contacts 19, the distal end portion 19b of each plug contact 19 is prevented from being inserted between the separator 17 and the corresponding receptacle contact 15. Guide surfaces (slanting surfaces) 21 for guiding the separator 17 toward the center of the slot 22 are formed respectively at inner end portions of the front surfaces of the protective walls 24.

[0025] The shield case 20 has a rectangular tubular shape, -and is formed by an electrically-conductive metal sheet. The shield case 20 covers the outer surface of the rectangular tubular portion 18a of the plug housing 18, and is fixedly mounted on this rectangular tubular portion 18a. An outside shape of the rectangular tubular portion 18a is generally equal to an inside shape of the shield case 16 for the receptacle contacts 15, and the rectangular tubular portion 18a covered at its outer surface with the shield case 20 can be received and fitted in the shield case 16 in such a manner that the shield case 20 is electrically conductively connected to the shield case 16.

[0026] Next, the operation of the connector device 11 will be described. For connecting the plug connector 13 to the receptacle connector 12 mounted on the board (not shown), the front surface of the receptacle connector 12 and the front surface of the plug connector 13 are opposed to each other, and then the rectangular tubular portion 18a of the plug connector 13 is inserted into the shield case 16 of the receptacle connector 12, as shown in Fig. 1.

[0027] If the positions of the slot 22 (of the plug connector 13) and the separator 17 are slightly offset from each other in the upward-downward direction when the rectangular tubular portion 18a of the plug connector 13. is inserted in a predetermined amount, the separator 17 impinges on the guide surface 21 of the protective wall 24 of the rectangular tubular portion 18a, and is guided toward the center of the slot 22 by the guide surface 21 so as to be inserted into the slot 22. When the separator 17 passes between the upper and lower protective walls 24 and 24, the reference line S1 of the plug connector 13 is brought generally into agreement with the reference line S2 of the receptacle connector 12, and the separator

17 is smoothly inserted straight toward the slot 22. Then, when the separator 17 is received in the slot 22, the plug connector 13 is connected to the receptacle connector 12, with the plug contacts 19 connected respectively to the receptacle contacts 15 and also with the shield case 20 of the plug connector 13 conductively connected to the shield case 16 of the receptacle case 12.

[0028] Therefore, in the connector device 11 of this embodiment, the protective walls 24 and 24 for preventing the distal end portion 19b of each plug contact 19 from being inserted between the separator 17 and the corresponding receptacle contact 15 are formed at the front surface of the rectangular tubular portion 18a, and therefore when the receptacle connector 12 and the plug connector 13 are to be connected together, the distal end portion 19b of each plug contact 19 will not be inserted between the separator 17 and the corresponding receptacle contact 15, and each receptacle contact 15 is positively prevented from being raised and buckled.

[0029] In the present invention, various modifications can be made without departing from the spirits of the invention, and such modifications, of course, fall within the scope of the invention.

Claims

1. A connector device, comprising:

a plug housing;
a pair of plug contacts, arranged in a first direction in the plug housing so as to form a slot therebetween;
a receptacle housing, adapted to be engaged with the plug housing;
a separator, provided in the plug housing and adapted to be fitted into the slot, when the receptacle housing is engaged with the plug housing;
a pair of receptacle contacts, disposed on the separator and adapted to be brought into contact with the plug contacts, when the receptacle housing is engaged with the plug housing; and
a pair of protective walls, arranged in the first direction at a front end portion of the plug housing so as to oppose distal ends of the plug contacts.

2. The connector device according to claim 1, further comprising guide surfaces, adapted to guide the separator toward the slot and being adjacent to both sides of each of the plug contacts in a second direction perpendicular to the first direction.

3. A plug connector, adapted to be engaged with a receptacle connector, the plug connector comprising:

a plug housing:

a pair of plug contacts, arranged in a first direction in the plug housing and adapted to receive a separator of the receptacle connector therebetween when the plug connector is engaged with the receptacle connector so that receptacle contacts of the receptacle connector are brought into contact with the plug contacts;
a pair of protective walls, arranged in the first direction at a front end portion of the plug housing so as to project inward; and
guide surfaces, adapted to guide the separator of the receptacle connector toward a portion between the plug contacts and being adjacent to both sides of each of the protective walls in a second direction perpendicular to the first direction.

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FIG. 1

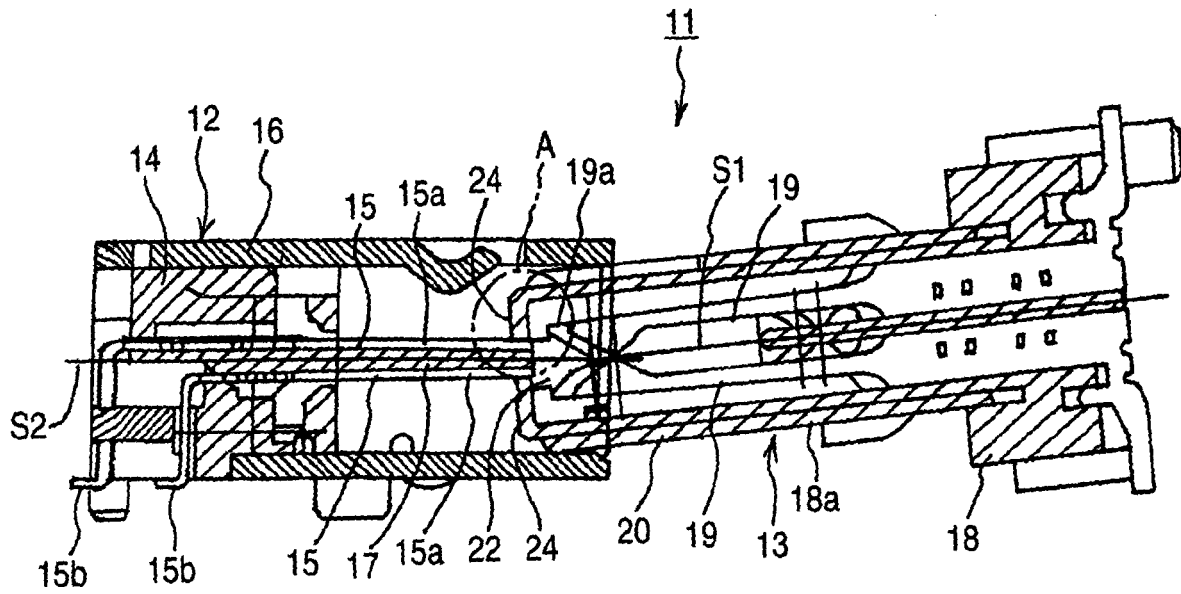


FIG. 2

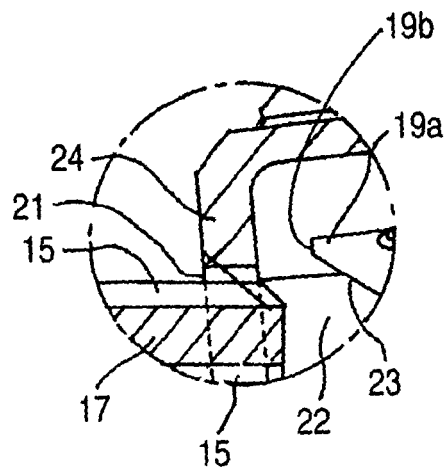


FIG. 3

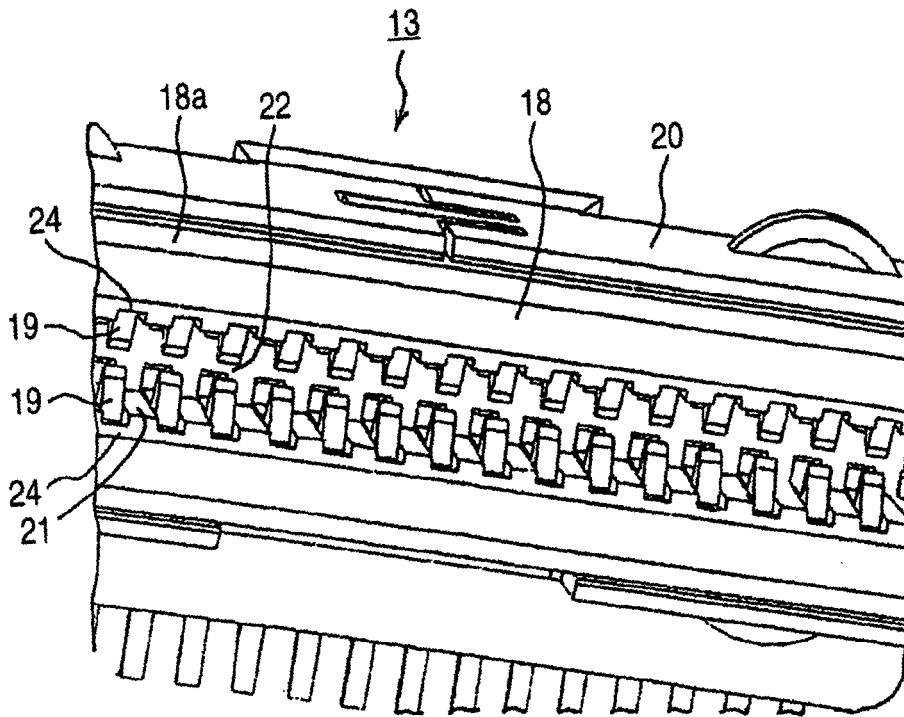


FIG. 4

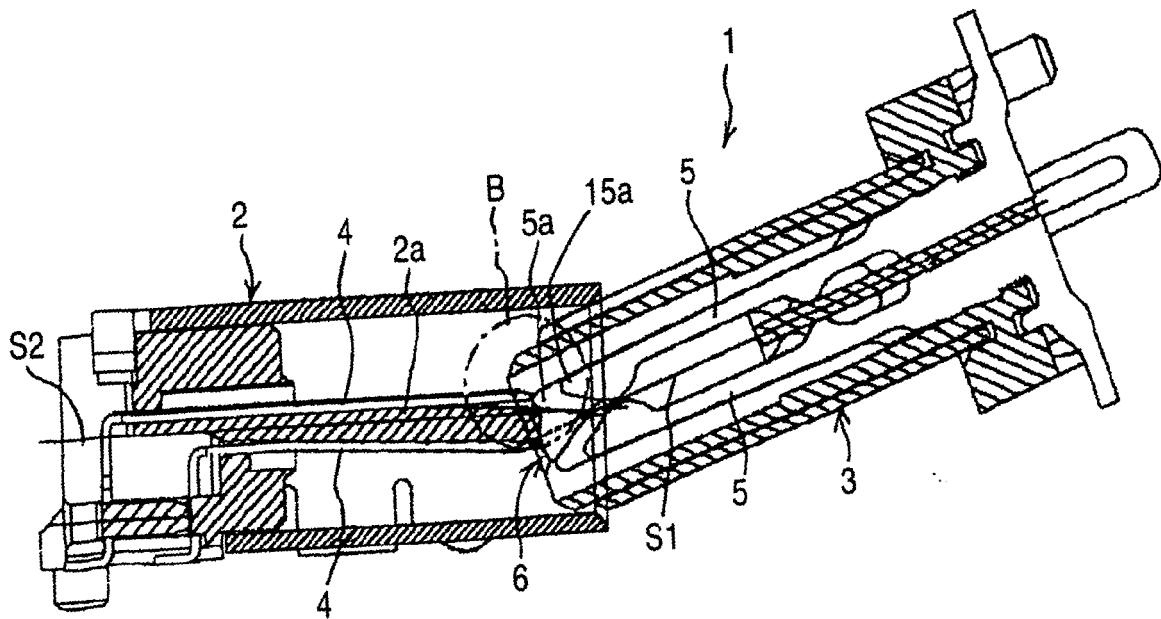
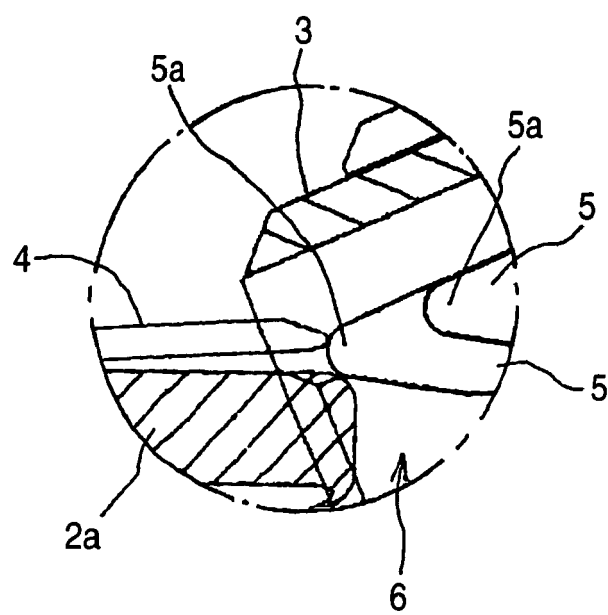


FIG. 5



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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