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FLEXIBLE CIRCUIT CONNECTORFIELD OF THE INVENTION

The present invention concerns a flexible circuit connector that is electrically connectable to a flexible circuit.

BACKGROUND OF THE INVENTION

One example of a flexible circuit connector of this type is disclosed in Japanese Utility Model Application Kokai No. 6-77186. Figure 4 shows a sectional view of the flexible circuit connector disclosed in the abovementioned application. Flexible circuit connector 200 receives a flexible circuit F from one side of a housing 201; afterward, a pressing member 107 which can pivot relative to the housing is caused to pivot in the direction indicated by arrow Q, i.e., in the direction of engagement, and thus acts to press the flexible circuit F against contacts 103. As a result, an electrical connection is established between the flexible circuit F and the contacts 103. The pressing member 107 is held in the position of completed pivoting by the joint action of the pressing member 107 and the contacts 103. As is shown in Figure 4, the side of the housing 201 which receives the flexible circuit F is also open at the top so that a space S is formed, and is constructed so that the pressing member 107 pivots through this space S.

However, in the flexible circuit connector 200 described above, if an external force is applied to the circuit F (especially in the direction indicated by arrow R) when the flexible circuit F and contacts 103 are in a connected state, there is a concern that even a relatively small external force will cause the pressing member 107 to rise upward so that the connection is broken.

Furthermore, in the flexible circuit connector 200 described above, it is necessary to lift and hold the pressing member 107 with the fingers while inserting the flexible circuit F. As a result, insertion of the

flexible circuit F is difficult. In particular, the fact that flexible circuit connectors of this type are relatively small, and the fact that the pressing member 107 is caused to retract in the engagement direction (i.e., the direction indicated by arrow T) when the flexible circuit F contacts the pressing member 107 during the insertion of the flexible circuit F, make it difficult to insert the flexible circuit. As a result of the latter problem, there is a danger than the flexible circuit will not be appropriately positioned.

Accordingly, one object of the present invention is to provide a flexible circuit connector in which the connection with the flexible circuit is stably maintained even in cases where an external force is applied to the flexible circuit. Furthermore, another object of the present invention is to provide a connector that allows smooth and easy insertion of the flexible circuit even though the connector is relatively small.

SUMMARY OF THE INVENTION

The present invention is characterized by the fact that in a flexible circuit connector which is electrically connected to a flexible circuit that is received from one side of a housing, a fixed frame-form circuit receiving port is formed in the side of the housing, and a pressing member that is attached in a position separated from the circuit receiving port so that said pressing member is free to pivot, is constructed so that said pressing member presses the flexible circuit against contacts.

Preferably, the direction in which the flexible circuit is received is a direction that allows the received flexible circuit to push the pressing member back in the opposite direction from the direction of engagement.

It is also preferable that the portion of the housing located in the vicinity of the circuit receiving port be reinforced by means of a metal member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 illustrates a flexible circuit connector constituting a preferred working configuration of the present invention. Figure 1(a) is a plan view, Figure 1(b) is a front view, Figure 1(c) is a back view, and Figure 1(d) is a right-side view.

FIGURE 2 shows sectional views which illustrate the pivoting action of the pressing member of the flexible circuit connector shown in Figure 1. Figure 2(a) shows the state prior to pivoting, and Figure 2(b) shows the state following the completion of pivoting.

FIGURE 3 is an enlarged sectional view of a portion of Figure 2, and also shows a flexible circuit.

FIGURE 4 is a sectional view which illustrates the construction of a PRIOR ART flexible circuit connector.

DETAILED DESCRIPTION

Below, a flexible circuit connector constituting a preferred working configuration of the present invention will be described in detail with reference to the attached figures. Figures 1(a) through 1(d) show the external appearance of the flexible circuit connector with the pressing member in a completely pivoted state. Figure 1(a) is an inverted plan view, Figure 1(b) is a front view, Figure 1(c) is a back view, and Figure 1(d) is a right-side view. Figure 2 shows sectional views which illustrate the pivoting action of the pressing member; Figure 2(a) shows the state prior to pivoting, while Figure 2(b) shows the state following the completion of pivoting.

As is shown in Figure 1, the flexible circuit connector 10 has a plastic housing 20, contacts 40a and 40b which are disposed in alternating rows on the front and back inside the housing 20 (see Figure 2), and a pressing member 70 which is attached so that this pressing member 70 can be pivoted relative to the housing 20. As is shown in Figures 1(a) and 1(d), the pressing member 70

has a substantially cylindrical pivoting shaft 71 that extends to the sides. Supporting parts 21a and 21b are formed in the housing 20, support the pivoting shaft 71 from the top of the housing 20, and hold the pivoting shaft 71 so that the pivoting shaft can pivot. As a result, the pressing member 70 pivots between the positions shown in Figures 2(a) and 2(b). The center of pivoting is indicated by P in the figures. Furthermore, as is shown in Figure 1(a), the supporting parts 21a and 21b are formed in positions which are shifted in the direction of the axial line with respect to the pivoting shaft 71; this is done in order to facilitate molding of the housing 20.

As is shown in Figure 1(b), the front portion of the housing 20 is formed as a fixed frame; in this way, a circuit receiving port 22 is formed. In order to facilitate receipt of the flexible circuit, the end portions 23 of the circuit receiving port 22 are formed so that the width of these end portions 23 is substantially the same as the thickness of the flexible circuit, while the remainder of the circuit port 22 is formed with a width that is greater than the thickness of the flexible circuit. The end portions 23 act to align the flexible circuit with respect to the direction of height. Furthermore, a metal reinforcing member 50 is disposed at the top of the front portion of the housing 20 which is formed in the shape of a fixed frame. As is shown in Figures 1(b) and 1(d), fastening parts 51 which are positioned at the ends of the reinforcing member 50 are fastened by being press-fitted in the side walls of the housing 20. The action of the reinforcing member 50 will be described later.

The flexible circuit is received inside the circuit receiving port 22 from the direction indicated by arrow A in Figure 2(a). The flexible circuit (Figure 3) is inserted through a receiving space 24 until the tip end of the flexible circuit contacts a stopping surface 25. Preferably, the flexible circuit is inserted after the

pressing member 70 has been lifted into an upright position beforehand as shown in Figure 2(a); however, even in cases where the pressing member 70 is in a somewhat inclined position, the flexible circuit being received in the direction indicated by arrow A acts to push the pressing member 70 upward, thus causing the pressing member 70 to pivot in the opposite direction from the direction of engagement (i. e., in the direction indicated by arrow B in Figure 2(a)) so that the pressing member 70 is pushed back into an upright position. Accordingly, the flexible circuit can be received relatively easily. Furthermore, when the pressing member is in this upright position, the surface 72 of the pressing member contacts the reinforcing member 50 which forms the top surface of the housing; as a result, pivoting of the pressing member 70 in the opposite direction from the direction of engagement is prevented.

After the flexible circuit has been received, the pressing member 70 is pivoted in the direction of engagement (the direction indicated by arrow C in Figure 2(a)) until the state of completed pivoting shown in Figure 2(b) is reached. In this state of completed pivoting, the pressing member 70 presses the flexible circuit received inside the receiving space 24 against the contacts 40a and 40b from above; as a result, the contacts 40a and 40b and the flexible circuit are electrically connected. As is shown in Figure 2(b), the pressing member 70 engages with a main engaging part 26 located in the vicinity of the rear end of the housing 20 by means of a first engaging part 73; furthermore, as is shown in Figure 1(c), the pressing member 70 engages with auxiliary engaging parts 27 by means of second engaging parts 74 positioned on the edges of the pressing member 70. As a result, a connected state in which the pressing member 70 presses against the flexible circuit is maintained.

As is shown in Figures 2(a) and 2(b), the pressing member 70 has a tongue-form part 75 which protrudes forward, so that a flat pressing surface 76 with a

relatively large area is formed on the underside of the pressing member 70. In the state of completed pivoting, as is shown in Figure 2(b), the pressing surface 76 of the pressing member 70 straddles the contact parts 41a and 41b of the contacts 40a and 40b. Furthermore, as is shown in Figure 2(b), the tongue-form part 75 is constructed so that it can contact the undersurface of the upper wall 28. Accordingly, the pressing surface 76 can be stably positioned so that the pressing surface 76 is substantially parallel to the contact parts 41a and 41b, thus causing a substantially uniform contact pressing force to be applied to the contact parts 41a and 41b located in different positions.

Figure 3 is a partial enlarged sectional view illustrating a case in which an external force is applied to the flexible circuit in a state in which the connector is connected with the flexible circuit. When an external force oriented in the direction indicated by arrow D is applied to the flexible circuit F after the flexible circuit F has been received via the circuit receiving port 22 and electrically connected, the flexible circuit F contacts the front end 29 of the upper wall 28 as shown in Figure 3. The front end 29 alleviates the external force so that there is no direct effect on the contact parts 41a and 41b (Figure 2(b)). Furthermore, since the pressing member 70 is supported on the fixed upper wall 28 as was described above, the pressing member 70 presses the flexible circuit firmly against the contacts 40a and 40b (Figure 2b) in the connected state. Accordingly, electrical contact between the contacts 40a and 40b and the flexible circuit F is stably maintained even when an external force such as that described above is applied. As is shown in the figures, the metal reinforcing member 50 is mounted on the upper side of the upper wall 28, and acts to alleviate external forces and to provide mechanical reinforcement of the upper wall 28 that supports the pressing member 70.

Furthermore, as is shown in Figure 2(a) and 2(b), the

axial center of the pivoting shaft 71, i.e., center of pivoting P, and the contact parts 41a are in substantially the same position with respect to the direction of length of the received flexible circuit. As a result, a flexible
5 circuit connector which has a relatively simple shape can be obtained.

A flexible circuit connector constituting a preferred working configuration of the present invention was described above. However, this working configuration does
10 not limit the present invention; various modifications and alterations may be made by a person skilled in the art. For example, the means used to hold the pressing member 70 in the position of completed pivoting may be the joint action of the pressing member 107 and contacts 103
15 as disclosed in Japanese Utility Model Application Kokai No. 6-77186 mentioned above.

The flexible circuit connector of the present invention has a fixed frame-form circuit receiving port, and is constructed so that a pressing member which is
20 located in a position separated from the circuit receiving port, presses the flexible circuit against the contacts of the connector. Accordingly, even in cases where an external force is applied to the flexible circuit, the electrical connection can be stably maintained in a
25 position removed from the circuit receiving port. In particular, the conventional problem of the pressing member rising upward when subjected to an external force is solved by the present invention.

Furthermore, in the flexible circuit connector of the present invention, the direction of receipt of the
30 flexible circuit is a direction which allows the flexible circuit to push the pressing member back in the opposite direction from the direction of engagement; accordingly, there is no need to hold the pressing member so that the
35 pressing member does not pivot while the flexible circuit is being received. As a result, receipt of the flexible circuit can be accomplished smoothly and easily.

WHAT IS CLAIMED IS:

1. A flexible circuit connector which is characterized by the fact that in a flexible circuit connector which is electrically connected to a flexible circuit that is received from one side of a housing,

a fixed frame-form circuit receiving port is formed in said one side of said housing, and

a pressing member which is attached in a position separated from the circuit receiving port so that said pressing member is free to pivot is constructed so that said pressing member presses the received flexible circuit against contacts.

2. The flexible circuit connector claimed in Claim 1, which is characterized by the fact that the direction in which the a flexible circuit is received is a direction which allows the received flexible circuit to push the pressing member back in the opposite direction from the direction of engagement.



FLEXIBLE CIRCUIT CONNECTOR

ABSTRACT OF THE DISCLOSURE

The object of the present invention is to provide a flexible circuit connector in which the connection with the flexible circuit is stably maintained even in cases
5 where an external force is applied to the flexible circuit.

The flexible circuit connector 10 has a housing 20 in which contacts 40a and 40b are accommodated, and a pressing member 70 which is attached so that this pressing
10 member 70 can pivot. The flexible circuit is received via a fixed frame-form circuit receiving port 22, and is pressed against the contacts 40a and 40b by the pressing member 70 in a position separated from the circuit receiving port 22.

15

Figure 2

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

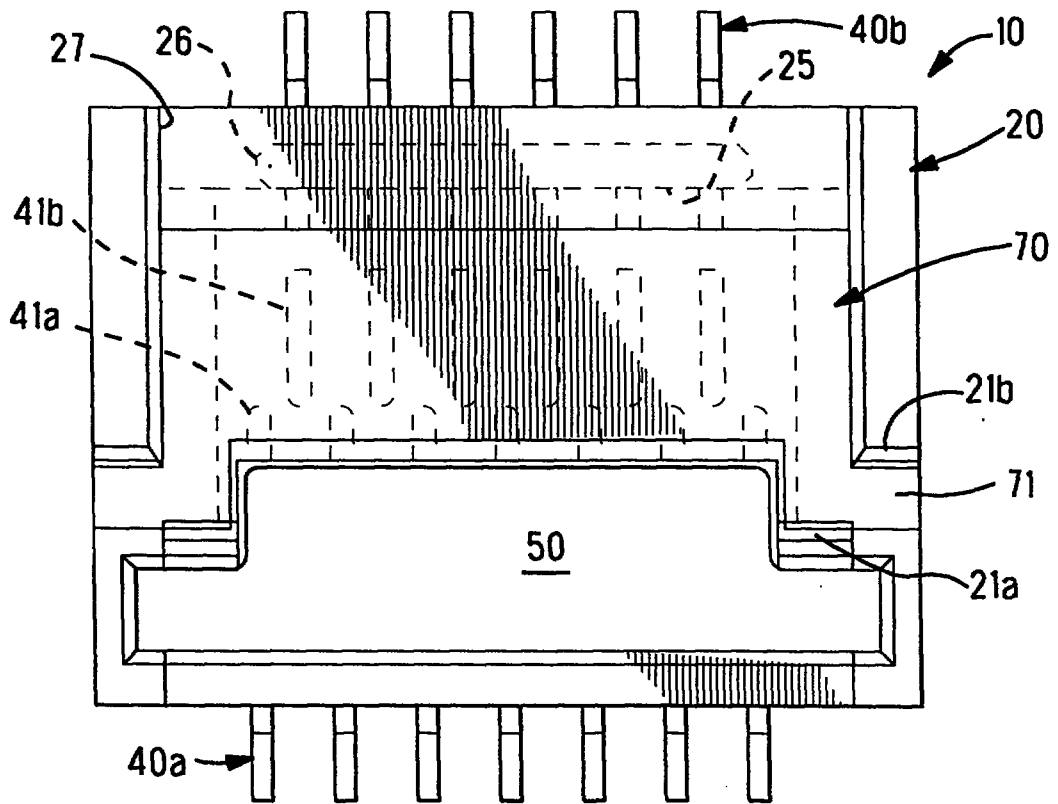


Fig. 1a

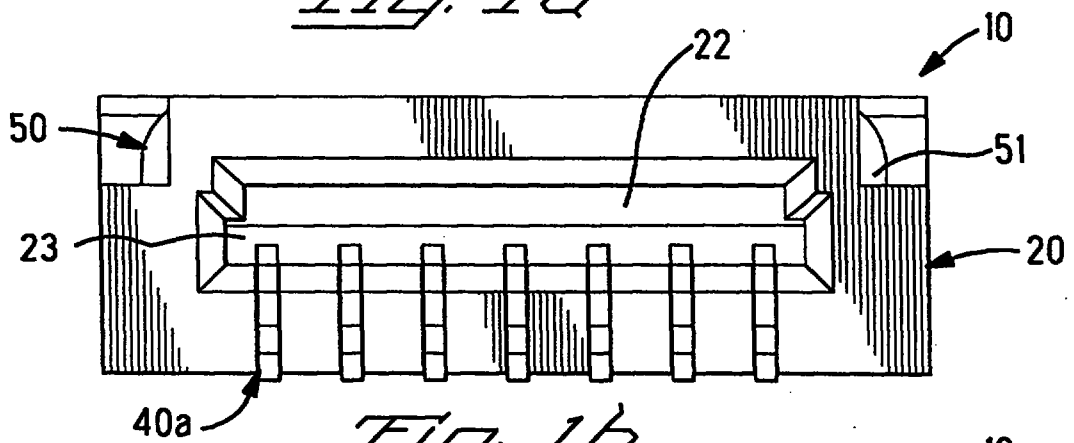


Fig. 1b

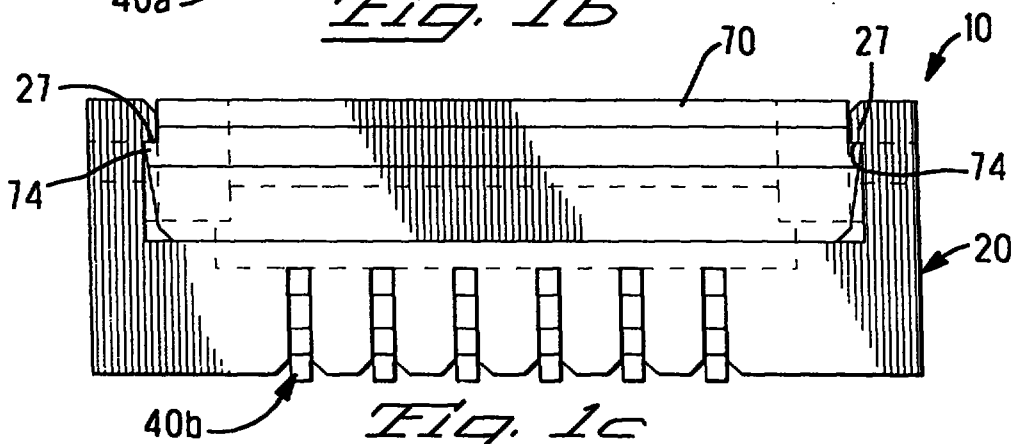
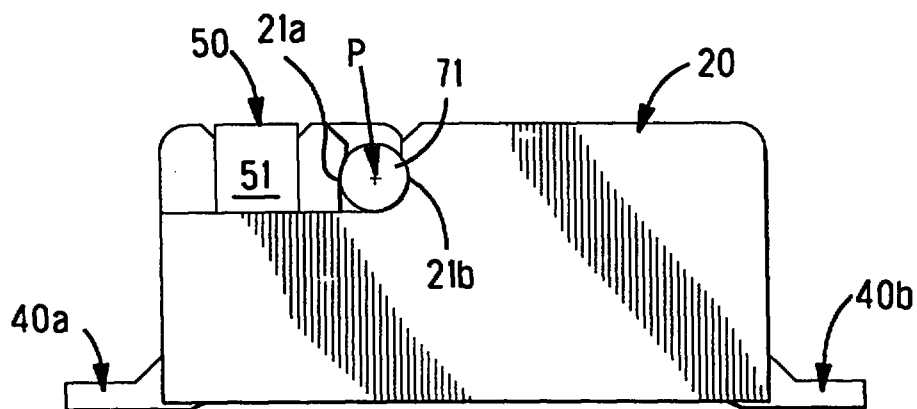
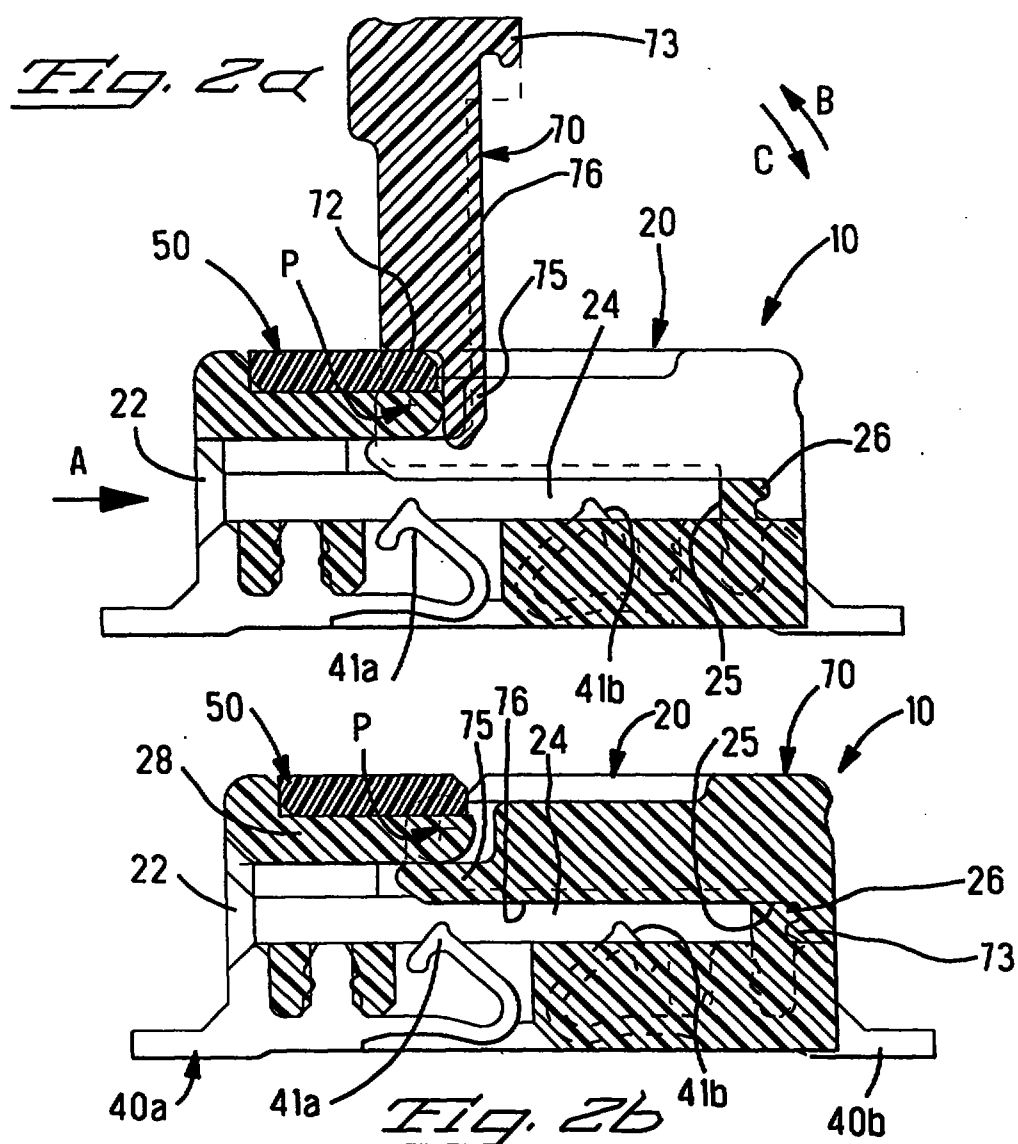


Fig. 1c

*Fig. 1d**Fig. 2b*

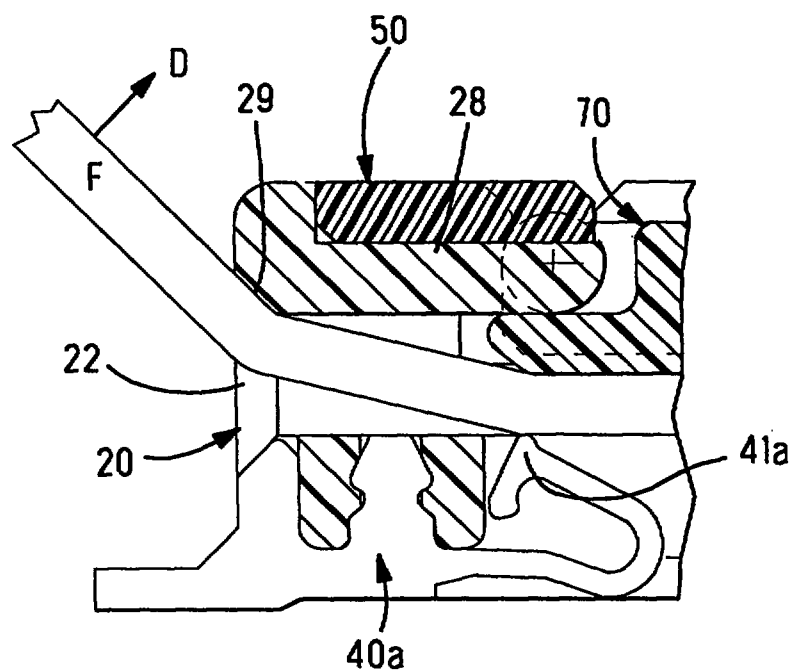


Fig. 3

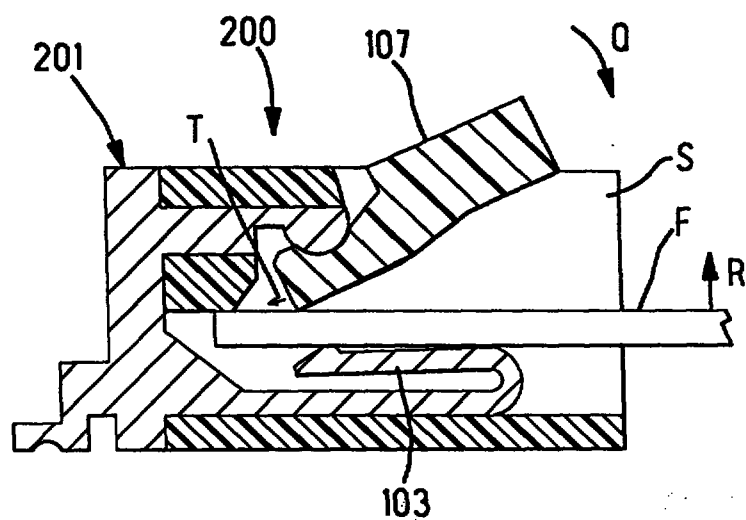


Fig. 4

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