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Nozaki

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(54) **CONNECTOR**

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H01R 13/502 (2006.01)
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CPC ***H01R 13/6315*** (2013.01); ***H01R 13/502*** (2013.01); ***H01R 13/514*** (2013.01); ***H01R 13/6272*** (2013.01); ***H01R 13/639*** (2013.01)

(58) **Field of Classification Search**
CPC H01R 13/6315; H01R 13/502; H01R 13/514; H01R 13/6272; H01R 13/639; H01R 13/64
(Continued)

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(57) **ABSTRACT**

It is aimed to enable a peak value reduction of connection resistance without hindering a connecting operation. A first housing includes an initial position holding portion for holding a movable housing at an initial position and a connection position holding portion for holding the movable housing at a connection position. A facing interval between the movable housing at the initial position and the second housing is narrower than that between a housing body and the second housing, and a facing interval between the movable housing at the connection position and the second
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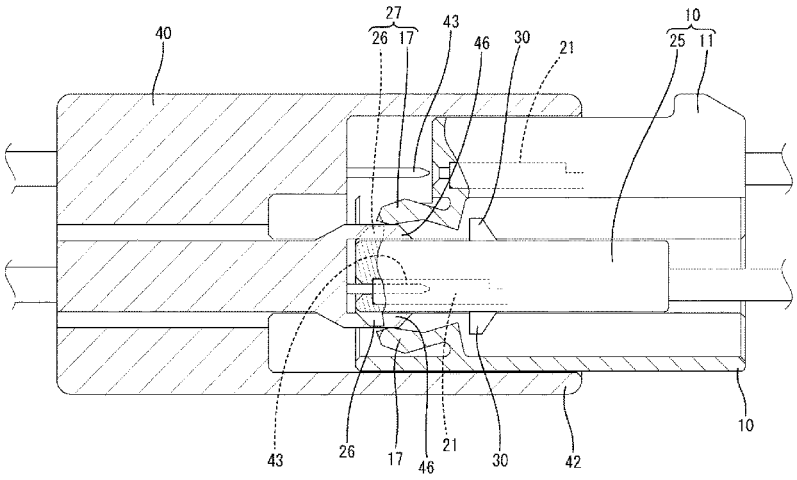

housing is equal to that between the housing body and the second housing. The second housing is provided with a holding releasing portion for releasing holding by the initial position holding portion when the movable housing reaches a position just before a proper connection position in a connection process to the first housing.

5 Claims, 10 Drawing Sheets

(51) **Int. Cl.**
H01R 13/514 (2006.01)
H01R 13/627 (2006.01)
H01R 13/639 (2006.01)

(58) **Field of Classification Search**
USPC 439/248, 924.1, 924.2
See application file for complete search history.

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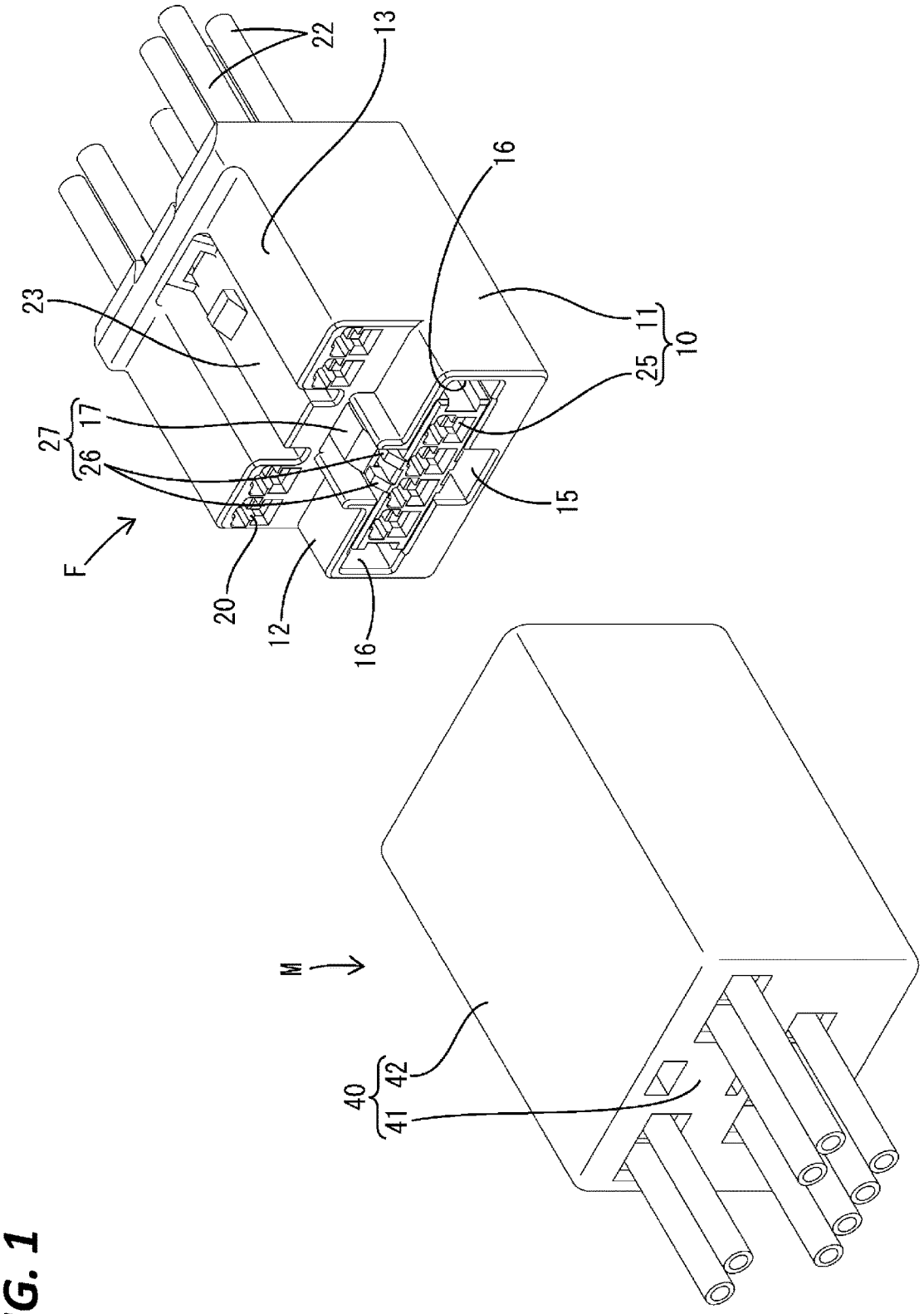
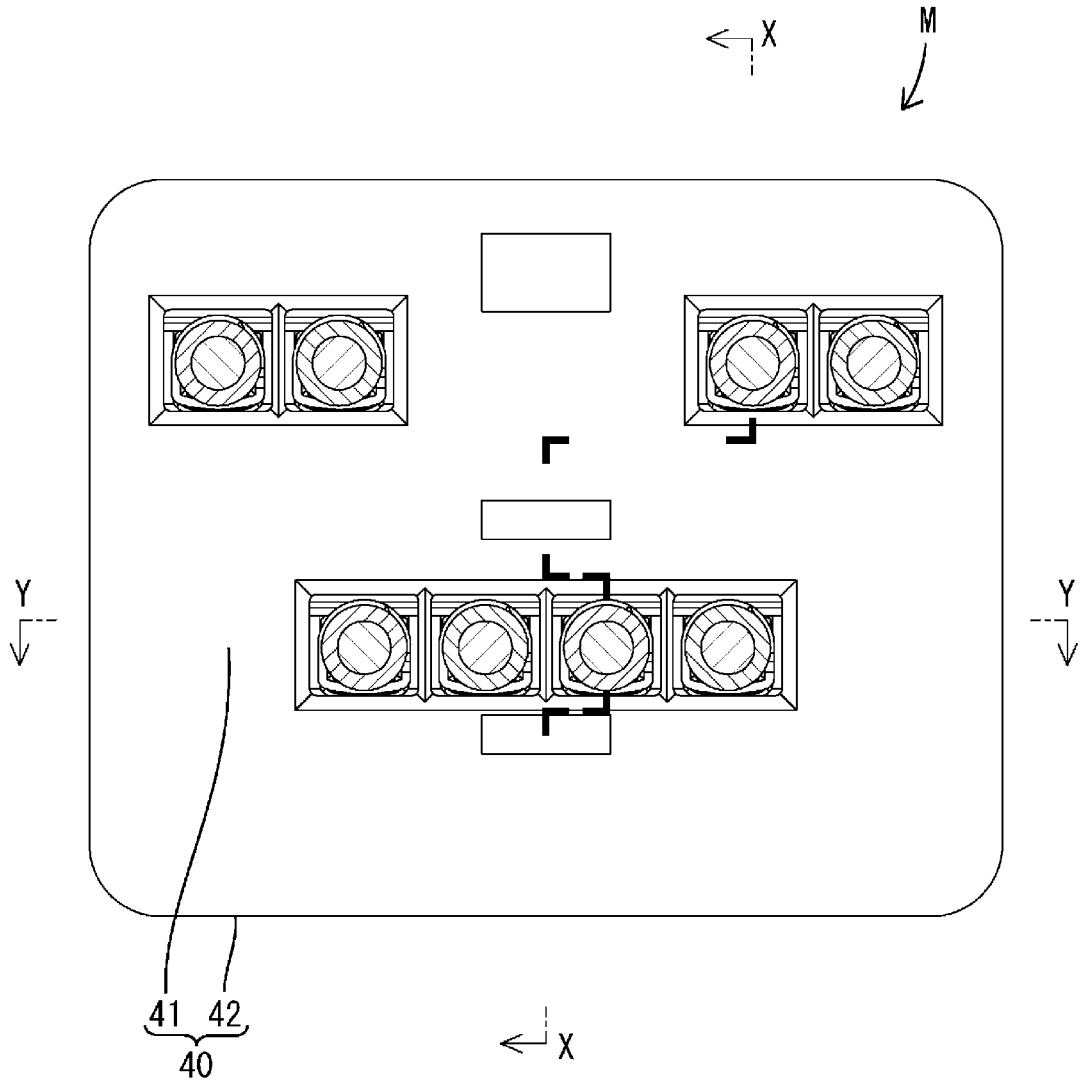


FIG. 1

FIG. 2



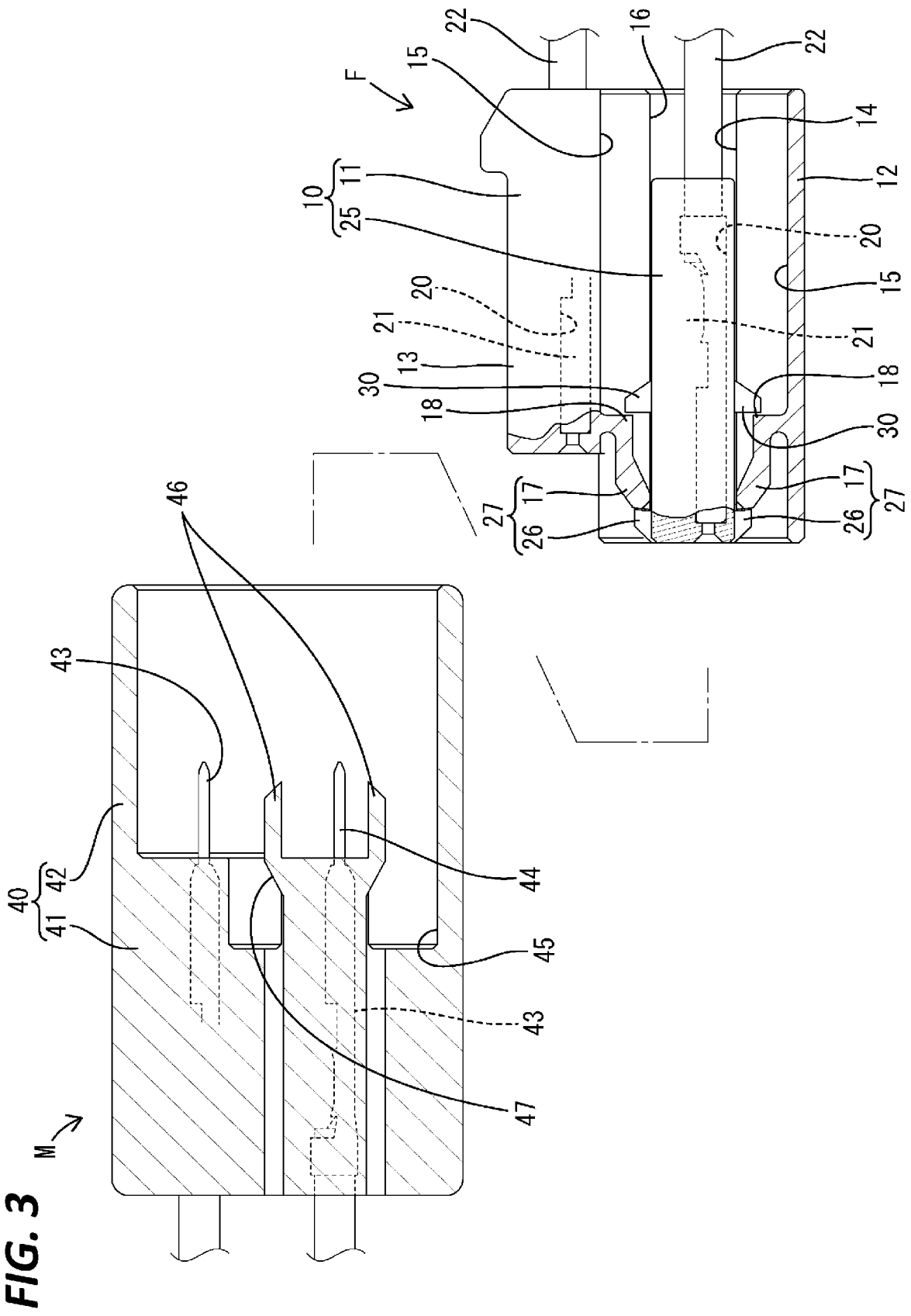

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FIG. 3

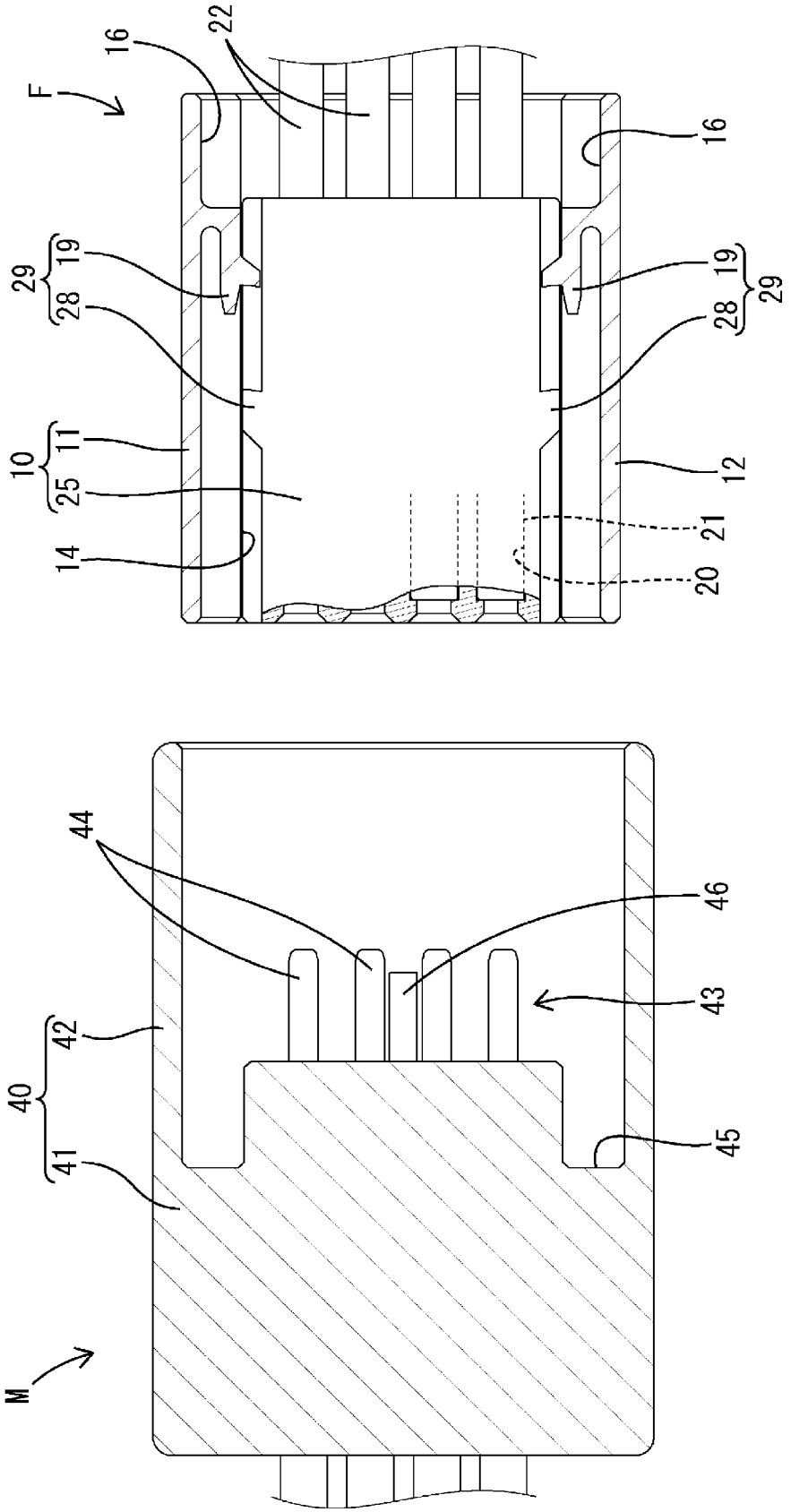

FIG. 4

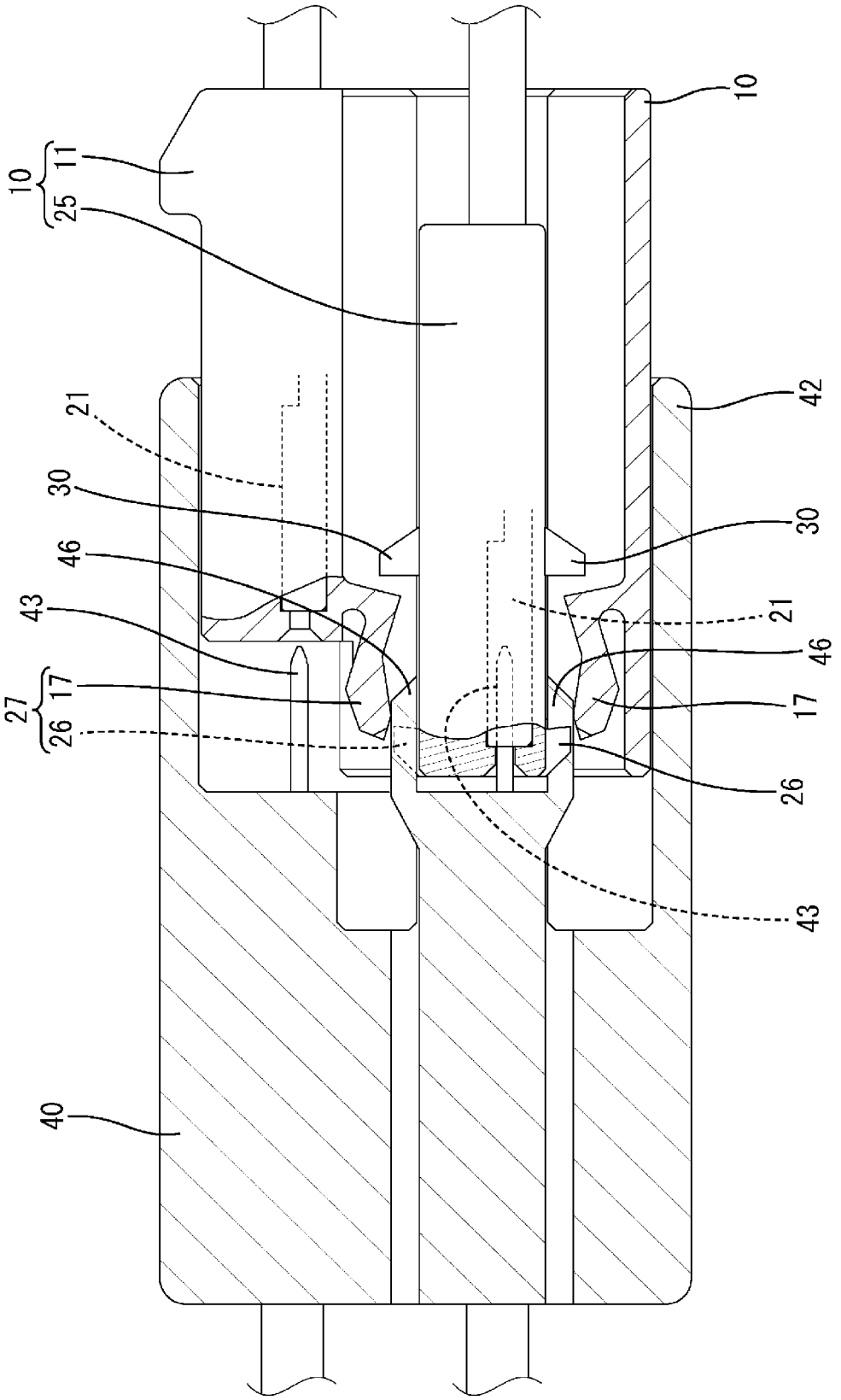

FIG. 5

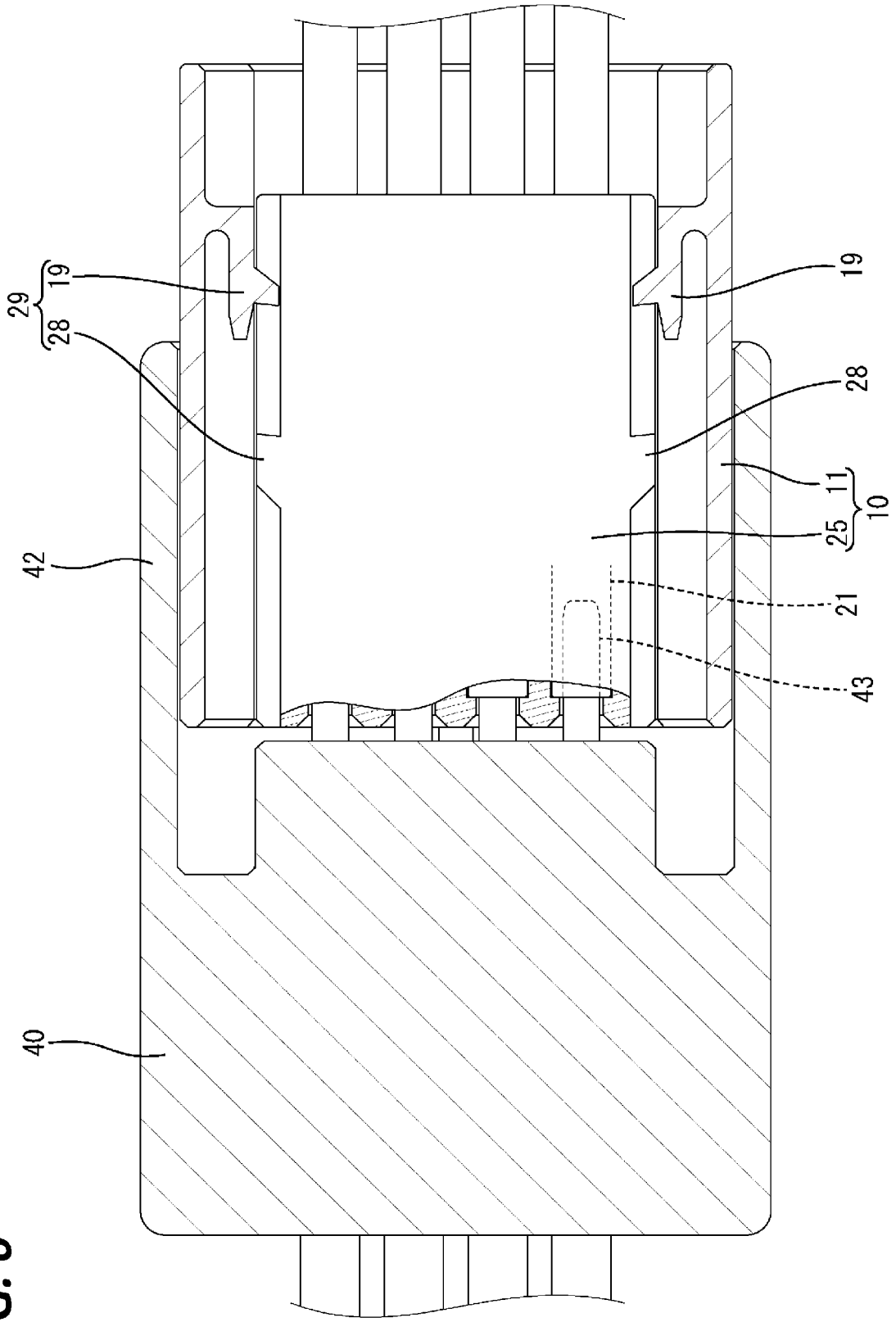

FIG. 6

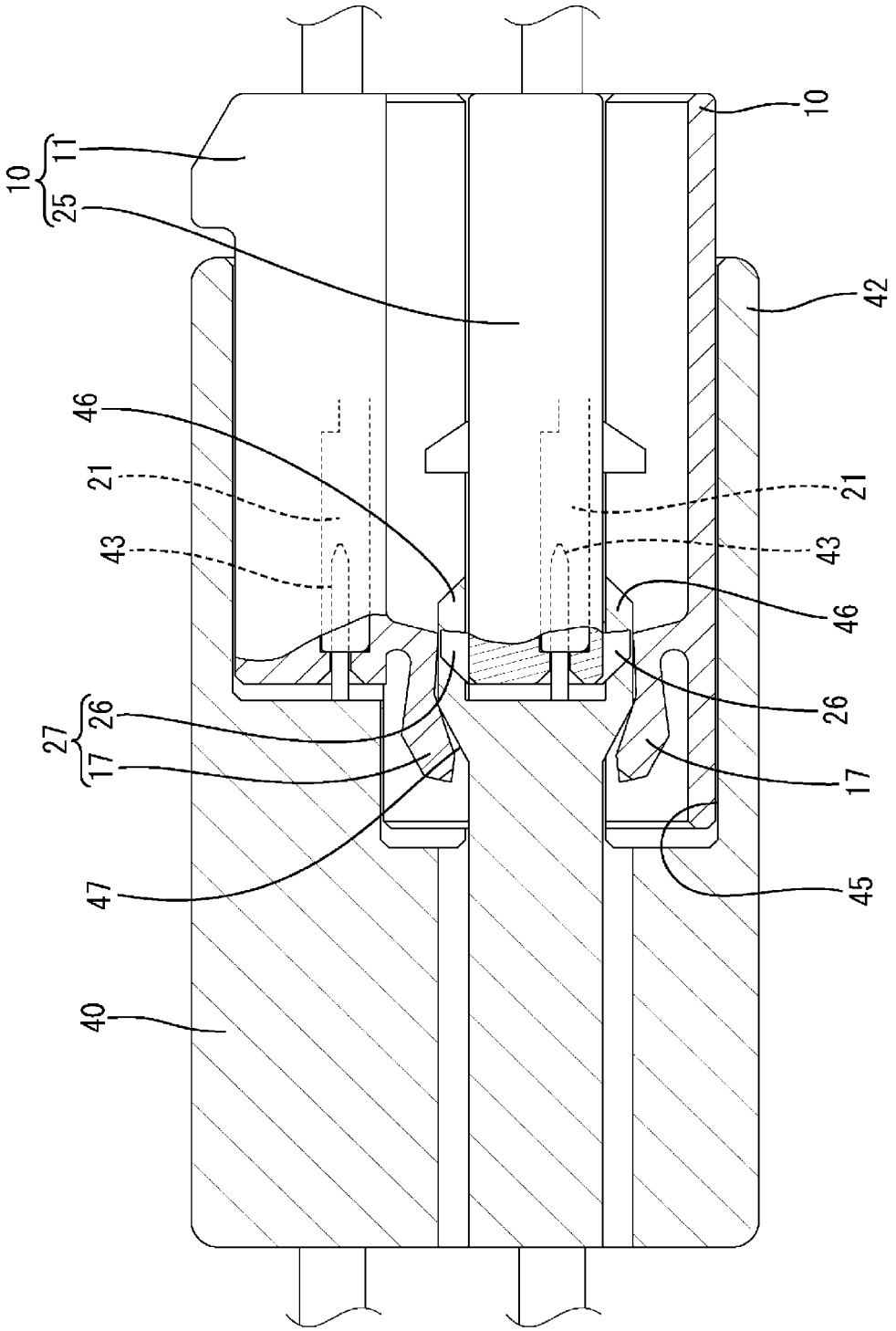

FIG. 7

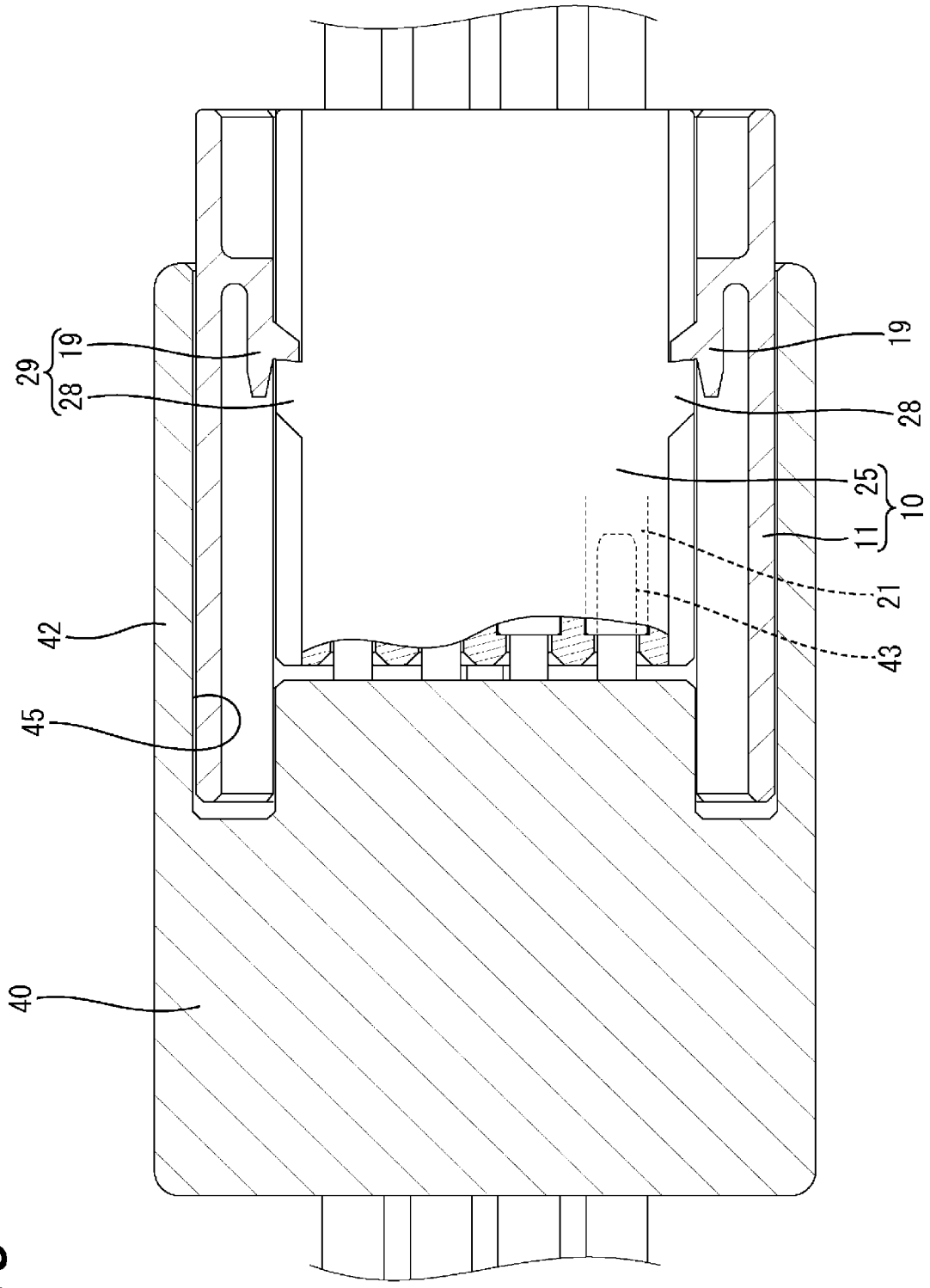

FIG. 8

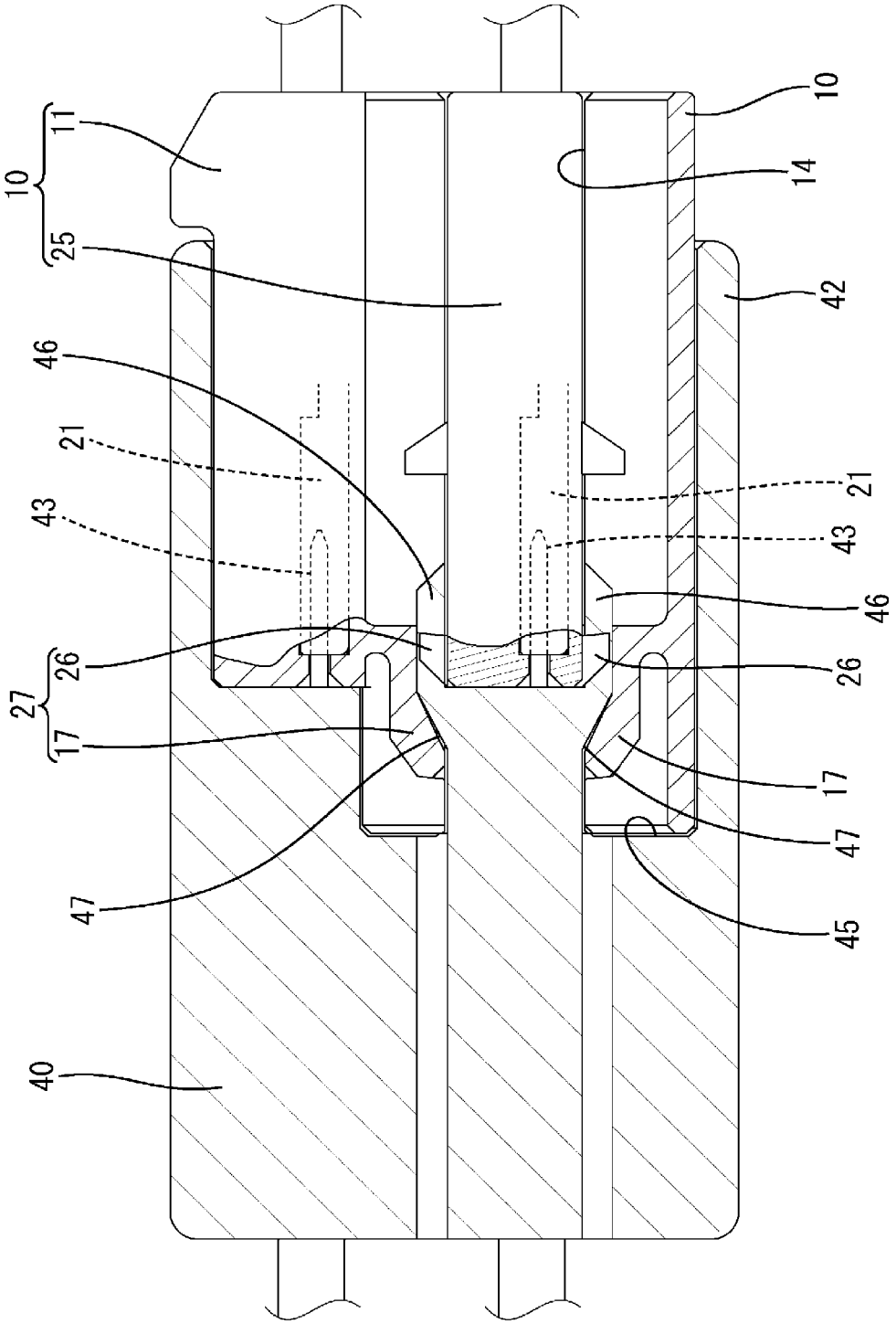

FIG. 9

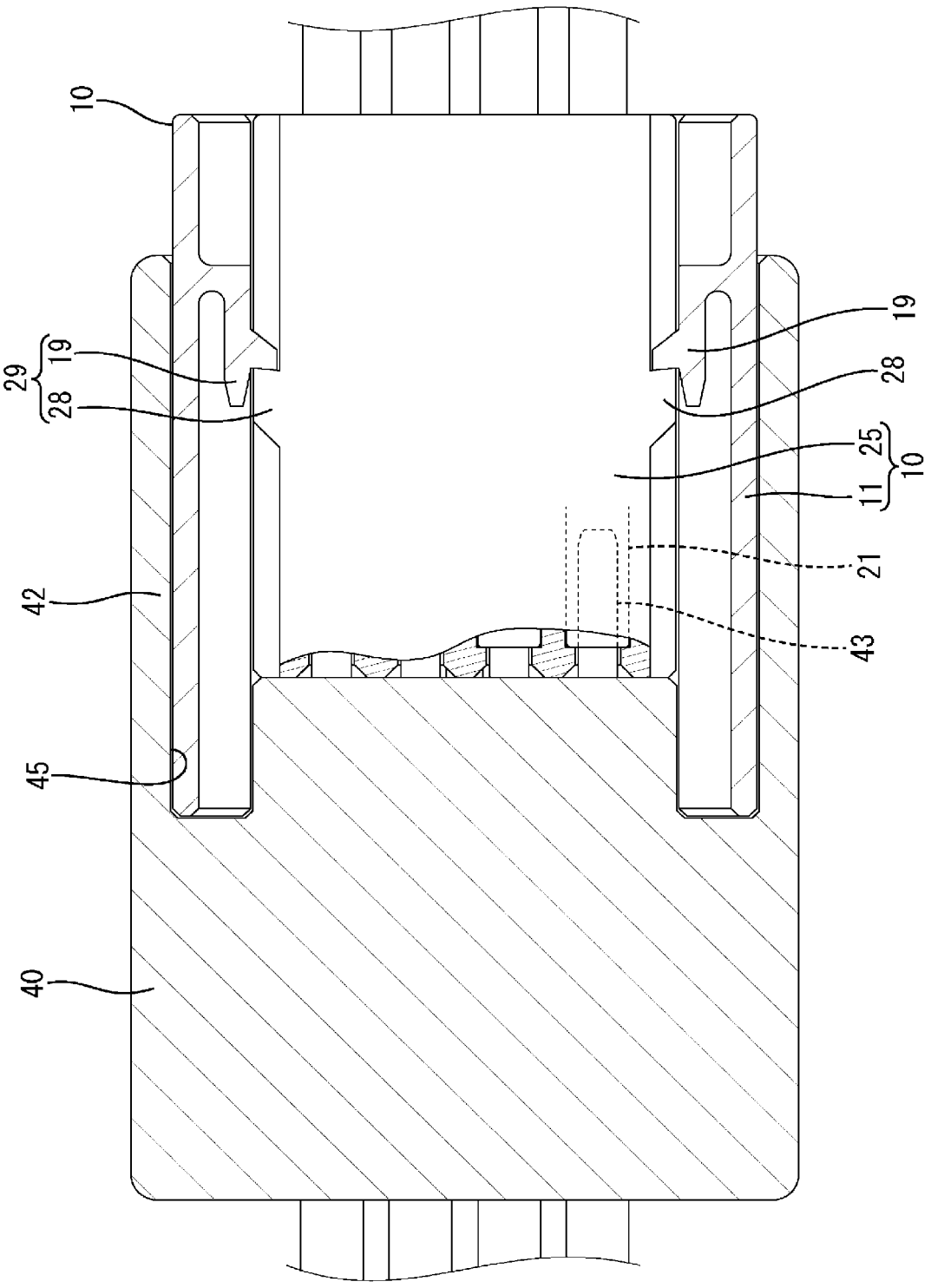

FIG. 10

CONNECTOR

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a national phase of PCT application No. PCT/JP2020/023881, filed on 18 Jun. 2020, which claims priority from Japanese patent application No. 2019-127910, filed on 9 Jul. 2019, all of which are incorporated herein by reference.

TECHNICAL FIELD

The present disclosure relates to a connector.

BACKGROUND

Patent Document 1 discloses a connector for reducing a peak value of connection resistance in a connection process of male and female connectors. In this connector, a female connector housing is composed of two members including a fixed terminal holder and a movable terminal holder. In a connection process of a male connector housing and a female connector housing, a terminal group of the movable terminal holder starts to be connected to a male terminal group of the male connector housing, and connection resistance due to friction between the both terminal groups is generated.

If the connection of the terminal group of the movable terminal holder and the male terminal group is completed, the connection of the terminal group of the fixed terminal holder and the male terminal group starts and connection resistance due to friction between the both terminal groups is generated. The connection resistance is maximized when the connection of the both terminal groups is started. Since the terminal group of the female connector housing is divided into that on a fixed side and that on a movable side and the connection to the male terminal group is started at different timings in the connector of Patent Document 1, the peak value of the connection resistance is reduced.

PRIOR ART DOCUMENT

Patent Document

Patent Document 1: JP H06-111882 A
Patent Document 2: JP H08-195255 A

SUMMARY OF THE INVENTION

Problems to be Solved

In the above conventional connector, the fixed terminal holder and the movable terminal holder are locked and a pushing force applied to the fixed terminal holder is transmitted to the movable terminal holder in an initial stage of the connection. When the connection of the movable terminal holder and the male connector housing is completed, the locking of the fixed terminal holder and the movable terminal holder is released and only the fixed terminal holder moves to start connection to the male connector housing.

The locking of the fixed terminal holder and the movable terminal holder is released by a holding releasing portion on the side of the male connector housing coming into contact with a locked part as the connection proceeds. Thus, to match a connection completion timing of the movable terminal holder and a timing of an unlocking operation by the holding releasing portion, very high dimensional accuracy is required. If the both timings are shifted, the locking of the movable terminal holder and the fixed terminal holder is not released and the connection of the fixed terminal holder cannot proceed also after the connection of the movable terminal holder is completed.

A connector of the present disclosure was completed on the basis of the above situation and aims to enable a peak value reduction of connection resistance without hindering a connecting operation.

Means to Solve the Problem

The present disclosure is directed to a connector with a first housing and a second housing to be connected to the first housing, wherein the first housing includes a housing body and a movable housing relatively displaceable between an initial position and a connection position with respect to the housing body, the first housing includes an initial position holding portion for restricting a relative displacement of the movable housing at the initial position in a direction away from the second housing and a connection position holding portion for restricting a relative displacement of the movable housing at the connection position in the direction away from the second housing, a facing interval between the movable housing and the second housing is narrower than that between the housing body and the second housing with the movable housing located at the initial position, the facing interval between the movable housing and the second housing is equal to that between the housing body and the second housing with the movable housing located at the connection position, and the second housing is provided with a holding releasing portion for releasing holding by the initial position holding portion when the movable housing reaches a position just before a proper connection position in a connection process to the first housing.

Effect of the Invention

According to the present disclosure, it is possible to reduce a peak value of connection resistance without hindering a connecting operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing a state where a first housing and a second housing are separated.

FIG. **2** is a back view of the second housing.

FIG. **3** is a section corresponding to line X-X of FIG. **2** in the state where the first and second housings are separated.

FIG. **4** is a section corresponding to line Y-Y of FIG. **2** in the state where the first and second housings are separated.

FIG. **5** is a section corresponding to line X-X showing a state where holding by initial position holding portions is released by holding releasing portions in a connection process of the first and second housings.

FIG. **6** is a section corresponding to line Y-Y showing the state where the holding by the initial position holding portions is released by the holding releasing portions in the connection process of the first and second housings.

FIG. **7** is a section corresponding to line X-X in a state where a movable housing is held at a connection position in the connection process of the first and second housings.

FIG. **8** is a section corresponding to line Y-Y in the state where the movable housing is held at the connection position in the connection process of the first and second housings.

FIG. **9** is a section corresponding to line X-X showing a state where a housing body and the movable housing are properly connected.

FIG. **10** is a section corresponding to line Y-Y showing the state where the housing body and the movable housing are properly connected.

DETAILED DESCRIPTION TO EXECUTE THE INVENTION

Description of Embodiments of Present Disclosure

First, embodiments of the present disclosure are listed and described.

(1) The connector of the present disclosure includes a first housing and a second housing to be connected to the first housing, wherein the first housing includes a housing body and a movable housing relatively displaceable between an initial position and a connection position with respect to the housing body, the first housing includes an initial position holding portion for restricting a relative displacement of the movable housing at the initial position in a direction away from the second housing and a connection position holding portion for restricting a relative displacement of the movable housing at the connection position in the direction away from the second housing, a facing interval between the movable housing and the second housing is narrower than that between the housing body and the second housing with the movable housing located at the initial position, the facing interval between the movable housing and the second housing is equal to that between the housing body and the second housing with the movable housing located at the connection position, and the second housing is provided with a holding releasing portion for releasing holding by the initial position holding portion when the movable housing reaches a position just before a proper connection position in a connection process to the first housing.

In the present disclosure, the "facing interval to the second housing" means a moving distance of the housing body/movable housing from a position facing the second housing in a state before connection to a position where the connection to the second housing is completed.

According to the configuration of the present disclosure, if the connection of the first and second housings is started with the movable housing held at the initial position, no connection resistance is generated between the housing body and the second housing in an initial stage of the connection. After the movable housing reaches the position just before the proper connection position, the holding by the initial position holding portion is released. Thus, no connection resistance is generated between the movable housing and the second housing. Since the movable housing is held at the connection position in a final stage of the connection, the movable housing and the housing body are integrally and properly connected. According to the present disclosure, a peak value of the connection resistance can be reduced without hindering a connecting operation.

(2) Preferably, the movable housing is at least partially accommodated in the housing body with the movable housing located at the initial position. According to this configuration, the interference of external matters with the movable housing can be prevented when the movable housing is at the initial position.

(3) Preferably, the initial position holding portion is exposed on an outer surface of the housing body with the movable housing located at the initial position. According to this configuration, whether or not the initial position holding portion is exhibiting a holding function can be visually confirmed.

(4) Preferably, the housing body is formed with a retaining portion, the movable housing is formed with a locking portion, and a relative displacement of the movable housing in a direction toward the second housing is restricted by the locking portion locking the retaining portion when the movable housing is at the initial position. According to this configuration, in separating the first housing from the second housing, if the housing body is pulled rearward, the locking portion locks the restricting portion, whereby the movable housing is separated from the second housing integrally with the housing body.

(5) Preferably, the retaining portion is integrally formed to the initial position holding portion. According to this configuration, the shape of the housing body can be simplified as compared to the case where the restricting portion is formed in a location different from the initial position holding portion.

DETAILS OF EMBODIMENT OF PRESENT DISCLOSURE

Embodiment

A specific embodiment of a connector of the present disclosure is described with reference to FIGS. **1** to **10**. Note that the present invention is not limited to these illustrations and is intended to be represented by claims and include all changes in the scope of claims and in the meaning and scope of equivalents. The connector of this embodiment includes a female connector F and a male connector M. In the following description, a left side in FIGS. **3** to **10** is defined as a front side concerning a front-rear direction of the female connector F, and a right side in FIGS. **3** to **10** is defined as a front side concerning a front-rear direction of the male connector M. Upper and lower sides shown in FIGS. **1** to **3**, **5**, **7** and **9** are directly defined as upper and lower sides concerning a vertical direction. Left and right sides shown in FIGS. **2**, **4**, **6** and **8** are directly defined as left and right sides concerning a lateral direction.

The female connector F includes a first housing **10** and a plurality of first terminal fittings **21**. The first housing **10** is configured by assembling a housing body **11** made of synthetic resin and a movable housing **25** made of synthetic resin. The housing body **11** includes a housing accommodating portion **12** having a rectangular parallelepiped shape and a terminal accommodating portion **13** likewise having a rectangular parallelepiped shape. As shown in FIGS. **3** and **4**, a movable chamber **14**, a pair of upper and lower first mold removal spaces **15**, and a pair of left and right second mold removal spaces **16** are formed inside the housing accommodating portion **12**. Any of the movable chamber **14**, the first mold removal spaces **15** and the second mold removal spaces **16** penetrates through the housing accommodating portion **12** and is open in the front surface and rear surface (back surface) of the housing accommodating portion **12**.

The first mold removal spaces **15** are arranged in a laterally central part of the housing accommodating portion **12** and communicate with the upper and lower surfaces of the movable chamber **14**. As shown in FIG. **3**, a pair of vertically symmetrical first arm portions **17** are formed in front end parts of the first mold removal spaces **15**. The first arm portion **17** is cantilevered forward (forward in a connecting direction of the first housing **10** to the second

housing **40**). The first arm portion **17** is resiliently deformable in the vertical direction (direction orthogonal to the connecting direction of the first and second housings **10**, **40**). A rear end part of the first arm portion **17** functions as a retaining portion **18**.

The second mold removal spaces **16** are arranged in both left and right end parts of the housing accommodating portion **12** and arranged at the same height as the movable chamber **14** in the vertical direction. The second mold removal spaces **16** communicate with both left and right end parts of the movable chamber **14**. As shown in FIG. **4**, a pair of bilaterally symmetrical second arm portions **19** are formed in rear end side regions of the second mold removal spaces **16**. The second arm portions **19** are cantilevered forward, similarly to the first arm portions **17**. The second arm portions **19** are resiliently deformable in the lateral direction (direction orthogonal to the connecting direction of the first and second housings **10**, **40** and orthogonal to resilient deforming directions of the first arm portions **17**).

The terminal accommodating portion **13** is integrated with the housing accommodating portion **12** while being stacked on the upper surface of the housing accommodating portion **12**. As shown in FIG. **3**, a plurality of terminal accommodation chambers **20** elongated in the front-rear direction are formed inside the terminal accommodating portion **13**. As shown in FIG. **3**, the female first terminal fittings **21** are inserted into the terminal accommodation chambers **20** from behind (back side) of the terminal accommodating portion **13**. Wires **22** crimped to rear end parts of the first terminal fittings **21** are drawn out rearward to the outside of the terminal accommodating portion **13**. As shown in FIG. **1**, a lock arm **23** is formed in a laterally central part on the upper surface of the terminal accommodating portion **13**.

A lateral dimension of the terminal accommodating portion **13** is equal to that of the housing accommodating portion **12**, and both left and right outer side surfaces of the housing accommodating portion **12** and those of the terminal accommodating portion **13** are continuous and flush with each other. A front-rear dimension of the terminal accommodating portion **13** is smaller than that of the housing accommodating portion **12**, and the rear surface (back surface) of the terminal accommodating portion **13** and the rear surface (back surface) of the housing accommodating portion **12** are continuous and flush with each other. Accordingly, the front surface of the terminal accommodating portion **13** is located behind that of the housing accommodating portion **12**, and a front end part of the housing accommodating portion **12** projects further forward than the terminal accommodating portion **13**. A front end part of the upper first mold removal space **15** is open in the upper surface of the housing accommodating portion **12**, and the upper first arm portion **17** is exposed to outside on the upper surface of the housing accommodating portion **12**.

The movable housing **25** is in the form of a flat rectangular parallelepiped having a lateral dimension larger than a vertical dimension. A plurality of terminal accommodation chambers **20** are formed in the movable housing **25**. Similarly to the terminal accommodating portion **13**, the female first terminal fittings **21** are inserted into the terminal accommodation chambers **20** of the movable housing **25** from behind (back side). Wires **22** crimped to rear end parts of the first terminal fittings **21** are drawn out rearward to the outside of the terminal accommodating portion **13**.

A front-rear dimension of the movable housing **25** is equal to that of the housing body **11** (terminal accommodating portion **13**). A front-rear dimension of the terminal accommodation chambers **20** of the movable housing **25** is equal to that of the terminal accommodation chambers **20** of the housing body (terminal accommodating portion **13**). Thus, the first terminal fittings **21** to be inserted into the terminal accommodation chambers **20** of the movable housing **25** and the first terminal fittings **21** to be inserted into the terminal accommodation chambers **20** of the housing body **11** are components of the same type.

Two pairs of vertically symmetrical first projections **26** are formed on a front end part of the movable housing **25**. As shown in FIG. **3**, a pair of the first projections **26** laterally spaced apart are formed in a laterally central part on the upper surface of the movable housing **25**. A pair of the first projections **26** laterally spaced apart are also formed in a laterally central part on the lower surface of the movable housing **25**. The front surfaces of the first projections **26** are inclined with respect to the front-rear direction (direction parallel to the connecting direction of the first and second housings **10**, **40**). The rear surfaces of the first projections **26** are at a right angle to the front-rear direction. The first projections **26** and the first arm portion **17** constitute an initial position holding portion **27**.

A pair of bilaterally symmetrical second projections **28** are formed in a central part in the front-rear direction of the movable housing **25** (at positions behind the first projections **26**). As shown in FIG. **4**, the second projections **28** are disposed on both left and right outer side surfaces of the movable housing **25**. The front surfaces of the second projections **28** are inclined with respect to the front-rear direction. The rear surfaces of the second projections **28** are at a right angle to the front-rear direction. The second projection **28** and the second arm portion **19** constitute a connection position holding portion **29**.

As shown in FIG. **3**, a pair of vertically symmetrical projection-like locking portions **30** are formed on both upper and lower surfaces of the movable housing **25**. The locking portion **30** disposed on the upper surface of the movable housing **25** is located between the pair of left and right first projections **26** in the lateral direction. The locking portion **30** disposed on the lower surface of the movable housing **25** is also located between the pair of left and right first projections **26** in the lateral direction. That is, the first projections **26** and the locking portions **30** are in such a positional relationship as not overlap in the lateral direction. Therefore, the movable housing **25** can be molded by a mold (not shown) which is opened in the front-rear direction.

The movable housing **25** is accommodated into the housing accommodating portion **12** (movable chamber **14**) from behind (back side) the housing body **11**. The wires **22** connected to the first terminal fittings **21** of the movable housing **25** are drawn out rearward from the back surface (rear surface) of the movable housing **25**. Therefore, the wires **22** of the movable housing **25** do not stand as an obstacle when the movable housing **25** is mounted into the housing accommodating portion **12** (housing body **11**).

In the process of assembling the movable housing **25** with the housing body **11**, the movable housing **25** reaches an initial position (see FIGS. **1** and **3**) after passing through a connection position (see FIG. **4**). When the movable housing **25** passes through the connection position, the second projections **28** pass through the second arm portions **19** by resiliently deforming the second arm portion **19** upward or downward. Since the second arm portions **19** are cantilevered in the same direction (forward) as an assembling direction of the movable housing **25** with the housing body **11**, the second projections **28** are not caught by the second arm portions **19**.

When the movable housing **25** reaches the initial position, the front surface of the movable housing **25** is disposed at the same position as that of the housing body **11** (housing accommodating portion **12**) in the front-rear direction. That is, the front surface of the movable housing **25** is exposed on the front surface of the housing body **11**. With the movable housing **25** located at the initial position, front end parts of the first arm portions **17** are in contact with the rear surfaces of the first projections **26** from behind as shown in FIG. **3**. In this way, the movable housing **25** is restricted from being relatively displaced rearward (direction away from the second housing **40** and toward the connection position) with respect to the housing body **11**. Further, the locking portions **30** come into contact with the retaining portions **18** of the first arm portions **17** from behind. In this way, the movable housing **25** is restricted from being relatively displaced forward (direction away from the second housing **40**) with respect to the housing body **11**.

By the locking action of the first arm portions **17**, the first projections **26** and the locking portions **30**, the movable housing **25** is restricted from being relatively displaced in the front-rear direction with respect to the housing body **11** and held at the initial position. Further, since the first arm portions **17** can be resiliently deformed in the vertical direction, the first projections **26** resiliently deform the first arm portions **17** to be locked to the front end parts of the first arm portions **17** in the process of assembling the movable housing **25** at the initial position. With the movable housing **25** located at the initial position, the second arm portions **19** are at positions separated rearward from the second projections **28** as shown in FIG. **4**. Therefore, the connection position holding portions **29** do not exhibit a holding function.

The male connector includes the second housing **40** and a plurality of second terminal fittings **43**. The second housing **40** includes a terminal holding portion **41** and a receptacle **42** in the form of a rectangular tube projecting forward from the outer peripheral edge of the front end of the terminal holding portion **41**. The second terminal fittings **43** are held in the terminal holding portion **41**. The second terminal fitting **43** is a male terminal formed with an elongated tab **44** in a front end part. The tab **44** is surrounded by the receptacle **42**. All the second terminal fittings **43** mounted in the second housing **40** are arranged at the same position in the front-rear direction. The receptacle **42** is formed with a lock portion (not shown) lockable to the lock arm **23**.

As shown in FIGS. **3** and **4**, the second housing **40** is formed with a rectangular frame-like escaping recess **45** by recessing a part of the front surface of the terminal holding portion **41** (back end surface of the receptacle **42**). The front end part of the housing accommodating portion **12** is accommodated into the escaping recess **45** when the first and second housings **10**, **40** are connected. As shown in FIG. **3**, a pair of upper and lower holding releasing portions **46** are formed in a region surrounded by the escaping recess **45**, out of the front surface of the terminal holding portion **41**. The holding releasing portions **46** are cantilevered forward (forward in the connecting direction of the second housing **40** to the first housing **10**). In the terminal holding portion **41**, accommodation recesses **47** are formed in base end parts of the holding releasing portions **46**.

Next, functions of this embodiment are described. In connecting the first and second housings **10**, **40**, the movable housing **25** is held at the initial position as shown in FIGS. **3** and **4**. In this state, the first terminal fittings **21** of the movable housing **25** are located forward of the first terminal fittings **21** of the housing body **11**. If the first and second housings **10**, **40** are opposed to each other with the movable housing **25** held at the initial position, a facing interval in the front-rear direction between the first terminal fittings **21** of the movable housing **25** and the second terminal fittings **43** is narrower than that between the first terminal fittings **21** of the housing body **11** and the second terminal fittings **43**.

If the first housing **10** is inserted into the receptacle **42** in this state by gripping the housing body **11**, the first arm portions **17** push the first projections **26**, whereby the movable housing **25** enters the receptacle **42** integrally with the housing body **11**. Then, the connection of the movable housing **25** and the second housing **40** is started and only the first terminal fittings **21** mounted in the movable housing **25** start to be connected to the second terminal fittings **43**. At this point of time, the first terminal fittings **21** mounted in the housing body **11** are not connected to the second terminal fittings **43**. Connection resistance generated when the first terminal fittings **21** and the second terminal fittings **43** are connected is maximized when the connection is started, and the connection resistance after the start of the connection is maintained at a relatively low value.

When the connection of the movable housing **25** proceeds and the movable housing **25** reaches a position just before proper connection (immediately before proper connection), the holding releasing portions **46** are inserted between the pairs of the first projections **26** to resiliently deform the first arm portions **17** upward or downward away from the movable housing **25**. At this time, as the connection proceeds, the first arm portions **17** are resiliently deformed more. Then, as shown in FIG. **5**, before the movable housing **25** reaches a proper connection position, the first arm portions **17** are most resiliently deformed by the holding releasing portions **46** and the first arm portions **17** are disengaged from the first projections **26**. At this point of time, as shown in FIG. **6**, the second arm portions **19** are at positions separated rearward from the second projections **28**.

When the first arm portions **17** are disengaged from the first housings **26**, holding by the initial position holding portions **27** is released and the movable housing **25** becomes relatively displaceable rearward with respect to the housing body **11**. In other words, the housing body **11** becomes relatively displaceable forward with respect to the movable housing **25**. When the holding by the initial position holding portions **27** is released, the connection of the movable housing **25** is stopped by friction resistance between the first terminal fittings **21** of the movable housing **25** and the second terminal fittings **43**.

When the holding by the initial position holding portions **27** is released, the connection of the housing body **11** and the second housing **40** is started and the connection of the first terminal fittings **21** mounted in the housing body **11** and the second terminal fittings **43** is started. The connection resistance generated between these is only due to friction between the first terminal fittings **21** of the housing body **11** and the second terminal fittings **43**, and the connection resistance due to friction between the first terminal fittings **21** of the movable housing **25** and the second terminal fittings **43** is not generated.

While the connection of the housing body **11** and the second housing **40** proceeds, the movable housing **25** is relatively displaced toward the connection position with respect to the housing body **11**. When the movable housing **25** reaches the connection position, the second arm portions **19** come into contact with the second projections **28** from behind as shown in FIG. **8**. In this way, the movable housing **25** is held at the connection position with respect to the

housing body **11**. When the movable housing **25** reaches the connection position, the housing body **11** has not reached a proper connection position yet. The first terminal fittings **21** of the housing body **11** and the first terminal fittings **21** of the movable housing **25** are arranged at the same position in the front-rear direction.

When the movable housing **25** reaches the connection position, the first arm portions **17** pass through the holding releasing portions **46** and are accommodated into the accommodation recesses **47** as shown in FIG. **7**. At this time, the first arm portions **17** resiliently return. Further, the rear surface of the movable housing **25** and that of the housing body **11** are arranged at the same position in the front-rear direction. Therefore, the rear surface of the movable housing **25** is exposed to be flush with the rear surface of the housing body **11**.

If the housing body **11** is pushed forward from the state where the movable housing **25** is at the connection position, the second arm portions **19** come into contact with the second projections **28**, whereby the movable housing **25** and the housing body **11** are integrally connected. That is, the movable housing **25** resumes the connection. In the process of integrally connecting the housing body **11** and the movable housing **25** to the second housing **40**, a peak value of the connection resistance from the start to the end of the connection is suppressed to be low since the peak of the connection resistance has been passed Immediately after the movable housing **25** resumes the connection, the movable housing **25** and the housing body **11** simultaneously reach the proper connection position as shown in FIGS. **9** and **10**. In the above way, the connection of the first and second housings **10**, **40** is completed.

When the first and second housings **10**, **40** are properly connected, the lock arm **23** of the housing body **11** is locked to the lock portion of the second housing **40**, whereby the both housings **10**, **40** are locked in a connected state. Further, since the lock arm **23** is formed on the housing body **11**, the movable housing **25** is not separated rearward from the second housing **40**.

In separating the first and second housings **10**, **40**, locking by the lock arm **23** is released and the housing body **11** is gripped and pulled rearward. Then, only the housing body **11** is first separated from the second housing **40**. During this time, since the movable housing **25** remains to be connected to the second housing **40**, the movable housing **25** is displaced relatively forward (toward the initial position) with respect to the housing body **11**. When the movable housing **25** reaches the initial position, the retaining portions **18** of the first arm portions **17** come into contact with the locking portions **30** of the movable housing **25**. Thus, thereafter, the movable housing **25** is separated from the second housing **40** integrally with the housing body **11**.

As described above, the connector of this embodiment includes the first housing **10** and the second housing **40** to be connected to the first housing **10**. The first housing **10** is configured by assembling the housing body **11** and the movable housing **25**. The movable housing **25** is relatively displaceable between the initial position and the connection position with respect to the housing body **11**. The first housing **10** includes the initial position holding portions **27** and the connection position holding portions **29**. The initial position holding portions **27** restrict a relative displacement of the movable housing **25** at the initial position in the direction away from the second housing **40**. The connection position holding portions **29** restrict a relative displacement of the movable housing **25** at the connection position in the direction away from the second housing **40**.

With the movable housing **25** located at the initial position, a facing interval between the movable housing **25** and the second housing **40** is narrower than that between the housing body **11** and the second housing **40**. With the movable housing **25** located at the connection position, the facing interval between the movable housing **25** and the second housing **40** is equal to that between the housing body **11** and the second housing **40**.

In this embodiment, the "facing interval between the housing body **11** and the second housing **40**" means a moving distance of the housing body **11** from a position facing the second housing **40** in a state before connection to a position where the connection to the second housing **40** is completed. The "facing interval between the movable housing **25** and the second housing **40**" means a moving distance of the movable housing **25** from a position facing the second housing **40** in the state before connection to a position where the connection to the second housing **40** is completed. The second housing **40** is provided with the holding releasing portions **46** for releasing the holding by the initial position holding portions **27** when the movable housing **25** reaches the position just before the proper connection position in the connection process to the first housing **10**.

According to the connector of this embodiment, if the connection of the first and second housings **10**, **40** is started with the movable housing **25** held at the initial position, no connection resistance is generated between the first terminal fittings **21** of the housing body **11** and the second terminal fittings **43** of the second housing **40** in the initial stage of the connection. Therefore, the peak value of the connection resistance is suppressed to be low as compared to the case where the housing body **11** and the movable housing **25** are simultaneously connected to the second housing **40**.

After the movable housing **25** reaches the position just before the proper connection position, the holding by the initial position holding portions **27** is released. Thus, the connection resistance is generated between the first terminal fittings **21** of the housing body **11** and the second terminal fittings **43**, but no connection resistance is generated between the first terminal fittings **21** of the movable housing **25** and the second terminal fittings **43**. Therefore, the peak value of the connection resistance is suppressed to be low in the same way as when the movable housing **25** and the second housing **40** are connected.

Since the movable housing **25** is held at the connection position in a final stage of the connection, the movable housing **25** and the housing body **11** are integrally properly connected. During this time, the connection resistance is generated in both the housing body **11** and the movable housing **25**, but the connection resistance does not exceed the peak value as a whole since the peak of the connection resistance has been passed.

If the release of holding of the initial position holding portions **27** by the holding releasing portions **46** is set at the same timing as the proper connection of the movable housing **25**, a situation where the holding by the initial position holding portions **27** cannot be released even if the movable housing **25** is properly connected possibly occurs depending on dimensional tolerances. In this case, since the movable housing **25** is stopped in front by abutting against the second housing **40**, the connection of the housing body **11** and the second housing **40** can no longer proceed. In contrast, since the release timing of holding of the initial position holding portions **27** by the holding releasing portions **46** is set to a timing before the arrival of the movable

housing **25** at the proper connection position, the holding of the initial position holding portions **27** can be reliably released.

Further, the movable housing **25** can be held at the connection position with respect to the housing body **11**. With the movable housing **25** located at the connection position, the facing interval between the movable housing **25** and the second housing **40** is equal to that between the housing body **11** and the second housing **40**. Thus, the movable housing **25** can also be properly connected by properly connecting the housing body **11**. Therefore, according to the connector of this embodiment, the peak value of the connection resistance can be reduced without hindering the connecting operation.

Further, with the movable housing **25** located at the initial position, the movable housing **25** is at least partially accommodated in the housing body **11**. In this way, the interference of external matters with the movable housing **25** can be prevented when the movable housing **25** is at the initial position. With the movable housing **25** located at the initial position, the initial position holding portions **27** (first arm portions **17** and first projections **26**) are exposed on the outer surface of the housing body **11**. In this way, whether or not the initial position holding portions **27** are exhibiting the holding function can be visually confirmed.

Further, the initial position holding portion **27** is composed of the resiliently deformable first arm portion **17** formed on the housing body **11** and the first projections **26** formed on the movable housing **25**. A movement of the movable housing **25** from the initial position toward the connection position is restricted by the first arm portions **17** butting against the first projections **26**. According to this configuration, the initial position holding portions **27** exhibit the holding function without bringing the holding releasing portions **46** into contact with the first arm portions **17**. Therefore, the movable housing **25** can be held at the initial position also with the first and second housings **10**, **40** separated.

Further, the second housing **40** is formed with the accommodation recesses **47**. In a state where the holding releasing portions **46** resiliently deform the first arm portions **17** to disengage the first arm portions **17** from the first projections **26**, the resiliently returned first arm portions **17** can be accommodated in the accommodation recesses **47**. According to this configuration, the plastic deformation of the first arm portions **17** by being kept resiliently deformed can be prevented.

Further, the connection position holding portion **29** is composed of the resiliently deformable second arm portion **19** formed on the housing body **11** and the second projection **28** formed on the movable housing **25**. The connection position holding portions **29** exhibit the holding function by the second arm portions **19** butting against the second projections **28** from the back surface side (behind). Although the wires **22** are drawn out from the back surface side of the movable housing **25**, the movable housing **25** can be assembled with the housing body **11** from the back surface side.

Further, the housing body **11** is formed with the retaining portions **18** and the movable housing **25** is formed with the locking portions **30**. When the movable housing **25** is at the initial position, the locking portions **30** are locked to the retaining portions **18**, thereby restricting a relative displacement of the movable housing **25** in a direction toward the second housing **40**. According to this configuration, in separating the first housing **10** from the second housing **40**, if the housing body **11** is pulled rearward, the locking portions **30** are locked to the retaining portions **18**, whereby the movable housing **25** is separated from the second housing **40** integrally with the housing body **11**. Further, since the retaining portions **18** are integrally formed to the initial position holding portions **27** (first arm portions **17**), the shape of the housing body **11** can be simplified as compared to the case where the retaining portions **18** are formed in locations different from the initial position holding portions **27** (first arm portions **17**).

Other Embodiments

The present invention is not limited to the above described and illustrated embodiment and is represented by claims. The present invention is intended to include all changes in the scope of claims and in the meaning and scope of equivalents and also include the following embodiments.

Although the initial position holding portion is composed of the first arm portion formed on the housing body and the first projections formed on the movable housing in the above embodiment, the initial position holding portion may be composed of projection(s) formed on the housing body and an arm portion formed on the movable housing.

Although the connection position holding portion is composed of the second arm portion formed on the housing body and the second projection formed on the movable housing in the above embodiment, the connection position holding portion may be composed of a projection formed on the housing body and an arm portion formed on the movable housing.

Although the movable housing is accommodated in the housing body in the above embodiment, the housing body may be accommodated in the movable housing.

Although the movable housing is held at the initial position without the holding releasing portions contacting the first arm portions and the holding by the initial position holding portions is released by the holding releasing portions resiliently deforming the first arm portions to separate the first arm portions from the first projections in the above embodiment, the movable housing may be held at the initial position by the holding releasing portions restricting the resilient deformation of the first arm portions and the holding by the initial position holding portions may be released by the holding releasing portions being disengaged from the first arm portions to enable the resilient deformation of the first arm portions.

Although the movable housing is partially (part except the first projections) accommodated in the housing body with the movable housing held at the initial position in the above embodiment, the movable housing may be entirely accommodated in the housing body with the movable housing held at the initial position.

Although the entire movable housing is accommodated in the housing body with the movable housing held at the connection position in the above embodiment, the movable housing may partially project to the outside of the housing body with the movable housing held at the connection position.

Although the retaining portions are integrally formed to the initial position holding portions (first arm portions) in the above embodiment, the retaining portions may be formed in locations different from the initial position holding portions (first arm portions).

LIST OF REFERENCE NUMERALS

10: first housing
11: housing body
12: housing accommodating portion
13: terminal accommodating portion
14: movable chamber
15: first mold removal space
16: second mold removal space
17: first arm portion
18: retaining portion
19: second arm portion
20: terminal accommodation chamber
21: first terminal fitting
22: wire
23: lock arm
25: movable housing
26: first projection
27: initial position holding portion
28: second projection
29: connection position holding portion
30: locking portion
40: second housing
41: terminal holding portion
42: receptacle
43: second terminal fitting
44: tab
45: escaping recess
46: holding releasing portion
47: accommodation recess
F: female connector
M: male connector

What is claimed is:

1. A connector, comprising:

a first housing; and

a second housing to be connected to the first housing, wherein:

the first housing includes a housing body and a movable housing relatively displaceable between an initial position and a connection position with respect to the housing body,

the first housing includes an initial position holding portion for restricting a relative displacement of the movable housing at the initial position in a direction away from the second housing and a connection position holding portion for restricting a relative displacement of the movable housing at the connection position in the direction away from the second housing,

a facing interval between the movable housing and the second housing is narrower than that between the housing body and the second housing with the movable housing located at the initial position,

the facing interval between the movable housing and the second housing is equal to that between the housing body and the second housing with the movable housing located at the connection position, and

the second housing is provided with a holding releasing portion for releasing holding by the initial position holding portion when the movable housing reaches a position just before a proper connection position in a connection process to the first housing.

2. The connector of claim **1**, wherein the movable housing is at least partially accommodated in the housing body with the movable housing located at the initial position.

3. The connector of claim **2**, wherein the initial position holding portion is exposed on an outer surface of the housing body with the movable housing located at the initial position.

4. The connector of claim **1**, wherein:

the housing body is formed with a retaining portion,

the movable housing is formed with a locking portion, and

a relative displacement of the movable housing in a direction toward the second housing is restricted by the locking portion locking the retaining portion when the movable housing is at the initial position.

5. The connector of claim **4**, wherein the retaining portion is integrally formed to the initial position holding portion.

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