

Description

This invention relates to a receptacle and a plug for an optical connector, and an optical connector comprised of these elements connected together.

With the recent advances in optical communication technology, optical communications are very frequently transmitted not only over long distances but also over short distances. Short-distance transmission is required, for example, in wirings within an optical communication machine or between optical communication machines. Furthermore, irrespective of the transmission distances, relaying of optical communication wirings becomes necessary in order to ensure transmission of optical communications. The structure of an optical connector used in transmitting optical communications is of paramount importance for securing an accurate transmission of optical communications.

US-A-4140366 describes an optical connector composed of a plug and a receptacle adapted to engage one another with a tight fit. The plug has a protective guide member surrounding at least one ferrule containing an optical fiber, the outer surface of the ferrule being separated by a defined space from an inner surface of the ferrule. The receptacle takes the form of a housing having a space open to the receiving end which has a profile matching that of the outer surface of the guide member of the plug. The receptacle housing also has at least one supporting member within the space which surrounds and defines at least one passage extending from the receiving end to the opposite end. The outer surface of the supporting member is separated from an inner surface of the housing by the remainder of the space and the supporting member has a cross-sectional shape conforming with the defined space between said ferrule and the guide member of the plug. The plug and receptacle are held together with a locking ring which mates as a twist-lock arrangement with projections.

In contrast, the plug and receptacle of the invention are held together with a pair of spring latching arms engaging in a pair of apertures. The arms extend along opposite sides of the protective guide member of the plug and the apertures are provided in the receptacle housing on opposite sides of the space therein. The apertures have means which releasably latch with the spring arms. When the plug is inserted into the receptacle the ferrule will be received within the passage defined by said supporting member while said supporting member is received within the defined space between the ferrule and the guide member, and the guide member is received within the remainder of said one space of the housing, all respective mating surfaces between the receptacle and plug contributing to said tight fit, said plug being further retained within the receptacle by the arms releasably latched within said pair of apertures of said receptacle. Such an arrangement is particularly effective in ensuring accurate transmission of optical signals, even if unexpected

force is applied. Despite the firm latching of the components of the connector, the components can be easily brought together and separated.

In a preferred construction, there are at least two separate supporting members arranged linearly adjacent one another. A number of plugs can then be fitted into a single common receptacle. Alternatively or additionally, the or each plug can have several ferrules which fit into separate passages in a supporting member. To ensure alignment of the or each plug with respect to the receptacle, it is desirable to provide guide means in the space of the receptacle housing.

An optical data link can be disposed at the opposite end of the receptacle to the plug or plugs to enable two-way light transmission from and to the optical fiber of the or each ferrule and to convert optical information to and from electrical information.

In a modified design, a second identical receptacle can be provided at the opposite end of the receptacle to the plug or plugs. This second receptacle can be a mirror image of the first receptacle and the respective receptacle can have a common housing to form an adaptor for receiving plugs at either end.

The invention may be understood more readily and other features of the invention may become apparent from consideration of the following description.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, wherein:-

Figure 1 is a perspective view of an optical data link having the receptacle of this invention built therein;

Figure 2 is a front elevation of the receptacle portion of the optical data link shown in Figure 1;

Figure 3 is a sectional view taken on line a-a' of Figure 2;

Figure 4 is a perspective view of the optical connector plug of the invention which can be fitted into the receptacle shown in Figures 1 to 3;

Figure 5 is a sectional view of a relaying adapter in another embodiment of the receptacle of this invention;

Figures 6a to 6f, 7 and 8 are rough front elevations of various types of the receptacle of this invention;

Figure 9 is a front elevation of the optical connector plug shown in Figure 4;

Figure 10 is a perspective view of another embodiment of the optical connector plug of this invention;

Figure 11 is a front elevation of the plug shown in Figure 10;

Figure 12 is an explanatory view for illustrating the state of fitting two optical connector plugs of this invention each having one ferrule into one receptacle having two optical hollow passages;

Figure 13 is a front elevation of each of the plugs used in Figure 12; and

Figures 14 and 15 are front elevations of other embodiments of the optical connector plugs of this invention.

First, the description will be directed mainly to the optical connector receptacle of the invention.

The receptacle of this invention serves to form an optical connector when connected to the optical connector plug in tight fit. The plug has a protective guide member surrounding a ferrule containing an optical fiber therein at a position spaced from the outer circumference of the ferrule.

The receptacle of the invention at least has a first supporting member and a second supporting member. The first supporting member has a hollow passage for receiving the ferrule of the optical connector plug. The second supporting member receives and supports the protective guide member for the ferrule of the plug in the space between the first and second supporting members. In other words, the optical connector receptacle of this invention may be said to be characterized by at least having a supporting system with a dual function which when the receptacle is connected to the optical connector plug, supports the plug both at the ferrule and at the protective guide member, and surely maintains a normal tight fit connection between the receptor and the plug even when an unexpected external force is exerted thereon.

The optical connector receptacle of this invention may further include a third supporting member which supports a holding member of the plug which is different from the parts supported by the first and second supporting members. Thus, the receptacle supports the optical connector plug including the ferrule, protective guide member and holding member at three parts and further ensures a normal tight fit connection between the receptacle and the plug.

The hollow passage of the first supporting member of the receptacle of this invention should receive the ferrule of the optical connector plug, and therefore, the first supporting member is a surrounding member for forming the hollow passage.

The hollow passage has a space sufficient for receiving the entry of the ferrule of the plug, and preferably has a configuration corresponding to the outer contour of the ferrule. The cross-section of the hollow passage may have various shapes in a direction at right angles to the entering direction of the ferrule of the plug. For example, if the ferrule has a circular or rectangular shape in a direction at right angles to the entering direction of the ferrule, the hollow passage may preferably have a circular or rectangular cross-section for receiving the ferrule of such a cross-sectional shape. When the hollow passage has a substantially circular cross-section, the ferrule can enter it irrespectively of the angle of rotation in a direction at right angles to the entering direction of the ferrule. Hence, this offers the advantage that the optical connector plug can be easily inserted into the optical connector receptacle. The substantially circular cross-sectional shape includes not only a shape having a substantially smooth circumference, but also a shape which

has portions projecting from at least three points on the circumference toward the center of the circle and forms a substantial phantom circle by connecting the projecting forward ends.

The second supporting member is spaced from the first member, namely from the surrounding member of the hollow passage. The protective guide member of the ferrule of the plug is accommodated within the resulting space. The first supporting member, that is the surrounding member forming the hollow passage, is received in the space between the ferrule and the protective guide member of the optical connector plug when the ferrule of the plug is received in the hollow passage of the first supporting member and the protective guide member is received in the space between the first and second supporting members. Accordingly, the outer configuration of the first supporting member preferably has a configuration conforming to the inner circumferential surface of the protective guide member of the plug which faces the ferrule. This enables the protective guide member of the plug to be received intimately in the space between the first and second supporting members. The first supporting member can assume various outer configurations according to the form of the inner circumferential surface of the protective guide member of the plug which faces the ferrule. For example, it may have a substantially circular cross section in a direction at right angles to the entering direction of the ferrule of the optical connector plug.

In the receptacle of this invention, the second supporting member is spaced from the first supporting member. In other words, it may be said that the first supporting member is located in a space formed by the second supporting member. The level of the forward end portion of the first supporting member as viewed in the direction in which the optical connector plug advances may be substantially the same as, or different from, the level of the forward end surface of the second supporting member as viewed from the direction in which the optical connector plug advances. For example, in one preferred embodiment, the forward end portion of the first supporting member is located within the space formed by the second supporting member at a level lower than the forward end surface of the second supporting member.

The receptacle of this invention may have one or at least two hollow passages formed by at least one first supporting member in the space formed by the second supporting member. When it has two or more hollow passages, they can exist in the aforesaid space independently from each other without connection of the first supporting members forming the individual hollow passages. Alternatively, the first supporting members forming the individual hollow passages may be connected to each other, or the plurality of hollow passages may exist independently in a common first supporting member. In another embodiment including a plurality of hollow

passages, these hollow passages may be connected by a linking passage provided in a common first supporting member having these hollow passages.

The plurality of hollow passages receive a plurality of ferrules of the plug. The plurality of ferrules are provided by optical connector plugs each having one ferrule and/or an optical connector plug having a plurality of ferrules. For example, one optical connector plug or two optical connector plugs having one ferrule may be fitted into the optical connector receptacle of the invention having two hollow passages.

Likewise, in an optical connector receptacle of this invention having three or more hollow passages, at least two hollow passages out of these can exist within the space formed by the second supporting member by connecting the first supporting members to each other, or in a common first supporting member. In this case, two ferrules of one optical connector plug having the two ferrules may fill two hollow passages present in the common first supporting member or connected first supporting members, and one ferrule of one optical connector plug having the one ferrule may fill the other one hollow passage.

In the receptacle of this invention having a plurality of hollow passages, the arrangement of the hollow passages in the space formed by the second supporting member can naturally be varied according to the form of the plug to be connected thereto. For example, when the second supporting member forms a space having a cross-sectional surface extending in a direction at right angles to the entering direction of the ferrule of the plug, the plurality of hollow passages of the first supporting member may be aligned side by side in the aforesaid extending direction of the space in the second supporting member.

By virtue of the above-described structure, the receptacle of this invention, when connected to the optical connector plug, can support the plug at at least two parts, namely at least at the ferrule and the protective guide member, and fix it firmly.

A preferred optical connector receptacle of this invention further includes a third supporting member which further receives and supports a holding member of the optical connector plug to provide a firmer connection with the optical connector plug. Usually, the third supporting member is provided outwardly of the second supporting member. For example, the third supporting member forms a space outwardly of the second supporting member, and receives and supports the optical connector plug in the space. When the holding member of the optical connector plug is an outwardly open spring-type holding member which upon collision with the supporting member, develops an outwardly open spring action to press the supporting member outwardly and thus exhibits its holding action, the third supporting member advantageously has a protrusion extending into the aforesaid space at a position apart from the second supporting member. The protrusion fits into a protrusion

receiving portion of the outwardly open spring-type holding member within the space and thus receives and firmly supports the forward end portion of the holding member. When the holding member of the optical connector plug is an inwardly closing spring-type holding member which upon collision with the supporting member, develops an inwardly closing spring action to press the supporting member inwardly and thus exhibits its holding action, the third supporting member may be a fixing protrusion extending outwardly from the outside surface of the second supporting member.

The optical connector receptacle of this invention may have a direction guide determining the fitting direction of the optical connector plug. Although the fitting direction of the optical connector plug can be regulated by, for example, forming the hollow passage of the optical connector receptacle in a form directly conforming to the configuration of the ferrule of the optical connector plug, the provision of the direction guide can easily regulate this fitting direction.

For example, when the optical connector receptacle has a plurality of hollow passages in the first supporting member, the aforesaid direction guide may be provided on the first or second supporting member within the space formed by the second supporting member. The direction guide may be formed as a recess or a protrusion on the first or second supporting member.

Now, the optical connector plug of the invention suitable for connection to the optical connector receptacle of this invention will be described.

The optical connector plug of the invention at least has a ferrule including an optical fiber and a protecting guide member. The ferrule is adapted to be received in the hollow passage of the first supporting member of the optical connector, and the protecting member is adapted to be accommodated in the space between the first and second supporting members of the optical connector receptacle. In other words, the optical connector plug of this invention is structurally characterized in that when fitted into the optical connector receptacle, it is supported by the receptacle first at the ferrule and then at the protective guide member, and therefore, the normal tight fit connection between the plug and the receptacle can be surely maintained even when an unexpected external force is exerted.

The optical connector plug of the invention may further have a holding member which is supported by the third supporting member of the optical connector receptacle. This type of plug is supported at three parts, i.e. the ferrule, the protective guide member and the holding member, by the optical connector receptacle, and therefore, its normal tight fit connection to the receptacle can be maintained more surely.

The ferrule including an optical fiber in the plug of this invention should be received in the hollow passage of the first supporting member of the optical connector receptacle. Hence, the first supporting member of the receptacle is a

surrounding member forming the hollow passage, and the hollow passage has a space large enough to receive the entry of the ferrule of the plug, and preferably a straight passage conforming to the contour of the ferrule. In other words, the ferrule preferably has an outer configuration smoothly following the hollow passage. The ferrule may have various shapes in a direction at right angles to the entering direction of the ferrule. For example, when the hollow passage has a circular or rectangular cross-sectional surface in a direction at right angles to the entering direction of the ferrule, the cross section of the ferrule is preferably circular or rectangular so that it can be received in the hollow passage of such a shape. Into the hollow passage having a substantially circular cross-sectional surface, the ferrule can be advanced independently of the rotating angle in a direction at right angles to its advancing direction, and this offers an advantage of easily inserting the optical connector plug into the optical connector receptacle.

The protective guide member surrounds the ferrule in a spaced-apart relationship to the outer circumference of the ferrule, and the first supporting member of the optical connector receptacle, namely the surrounding member for the hollow passage, is received within the space formed between them. In other words, while the first supporting member of the optical connector receptacle is received in the space between the ferrule and the protective guide member of the optical connector plug, the ferrule is accommodated in the hollow passage of the first supporting member of the receptacle and the protective guide member is accommodated in the space between the first and second supporting members of the optical connector receptacle.

Preferably, therefore, the inner circumferential surface of the protective guide member of the plug which faces the ferrule has a configuration following the outer configuration of the first supporting member. This enables the protective guide member of the plug to be accommodated in tight fit in the space between the first and second supporting members of the optical connector receptacle. The inner circumferential surface of the protective guide member which faces the ferrule may assume various shapes according to the outer configuration of the first supporting member of the receptacle. For example, it may have a substantially circular shape in a direction at right angles to the entering direction of the ferrule of the plug.

In the optical connector receptacle to be connected to the optical connector plug of this invention, the second supporting member is spaced away from the first supporting member. In other words, it may be said that the first supporting member is located within the space formed by the second supporting member.

The protective guide member of the optical connector plug of this invention is accommodated in the space between the first supporting member and the second supporting member, and

therefore preferably has such a form that its outer circumferential surface follows the inner circumferential surface of the second supporting member of the receptacle. In this case, the protective guide member is accommodated in tight fit in the aforesaid space between the first and second supporting members.

The optical connector plug of this invention may have at least one ferrule. When it has a plurality of ferrules, each of the ferrules has a space formed with respect to the protective guide member, and therefore there are a plurality of such spaces. In this case, the plurality of spaces may exist independently or may be connected by a linking passage provided in the protective guide member.

The plurality of ferrules are accommodated in the plurality of hollow passages of the optical connector receptacle. In this case, the plurality of ferrules are given by optical connector plugs each having one ferrule and/or an optical connector plug including a plurality of ferrules. For example, one optical connector plug of the invention including two ferrules or two optical connector plugs of the invention each equipped with one ferrule may be fitted in an optical connector receptacle of the invention including two hollow passages.

Likewise, with respect to an optical connector receptacle having at least three hollow passages at least two of which exist in the space formed by the second supporting member while being present in a common first supporting member or first supporting members connected to each other, two ferrules of a single optical connector plug having the two ferrules may be filled in the aforesaid two hollow passages existing in the common first supporting member or the first supporting members connected to each other, and one ferrule of another optical connector plug of the invention having the one ferrule may be filled in another hollow passage.

In the optical connector plug of this invention having a plurality of ferrules, the arrangement of the ferrules in the protective guide member can naturally vary according to the form of the optical connector receptacle to be connected to the plug. For example, when the protective guide member has a cross-sectional surface having a shape extending in a direction at right angles to the entering direction of the optical connector plug, the plurality of the hollow passages of the first supporting member may be aligned side by side in the space formed by the second supporting member in the aforesaid extending direction of the space.

When the optical connector plug of this invention having the aforesaid structure is fitted into the optical connector receptacle, the receptacle can be supported and firmly fixed at least at the ferrule and the protective guide member.

In a preferred embodiment, the optical connector plug further has the aforesaid holding member which is received and supported by the third supporting member of the optical connector

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receptacle to render the connection of the plug to the receptacle firmer. Usually, the holding member is provided outwardly of the protective guide member.

The holding member of the plug may, for example, an outwardly opening spring-type holding member which upon collision with the supporting member, develops an outwardly opening spring action to press the supporting member outwardly and thus exhibits a holding action. By providing the holding member outwardly of the protective guide member, the protrusion of the third supporting member extending into the space formed by the third supporting member comes into tight fit into the protrusion receiving portion of the holding member whereby the protrusion receiving portion of the forward end part of the holding member is accommodated and firmly supported in the aforesaid space.

The optical connector plug of this invention may have a direction guide determining the direction of the plug into the optical connector receptacle. Although the fitting direction of the plug can also be regulated by forming the hollow passage of the receptacle in a form conforming directly to the ferrule of the plug, the provision of the direction guide can easily regulate the fitting direction.

The direction guide of the optical connector plug may, for example, be provided on the outer circumferential surface of the protective guide member or its inner circumferential surface facing the ferrule of the protective guide member. The direction guide can be provided as a protrusion or a recess on the outer or inner circumferential surface of the protective guide member.

Now, with reference to the accompanying drawings, the optical connector receptacle of the invention will be described more specifically.

Figure 1 is a perspective view of an optical data link having the receptacle of this invention built therein. Figure 2 is a front elevation of the receptacle of the invention shown in Figure 1, and Figure 3 is a sectional view taken along line a-a' of Figure 2.

Figures 1 to 3 show one embodiment of the receptacle of this invention. The receptacle 1 has first supporting members 3, 3' forming hollow passages 2, 2' having a circular cross section. The first supporting members 3, 3' are spaced from each other in a space 5 formed by a second supporting member 4 as shown in the drawings. The illustrated receptacle further has third supporting member 6, 6'. The third supporting members 6, 6' form spaces 7, 7', and protrusions 8, 8' projecting at positions apart from the second supporting member 4 are present in the spaces 7, 7'. A direction guide projecting into the space 5 formed by the second supporting member 4 is shown at 9.

An optical data link casing 1a having the receptacle of the invention incorporated therein is adapted for two-way light transmission and includes therein light emitting and light receiving

elements, and an output and input interface to converters for converting optical information into electrical information or vice versa.

Figure 4 is a perspective view of an optical connector plug to be fitted into the receptacle of the invention shown in Figures 1 to 3. The optical connector plug 20 includes ferrules 21, 21' accommodating optical fibers and a protective guide member 23 surrounding the ferrules with spaces 22, 22' from the ferrules 21, 21'. Outwardly opening holding members 24, 24' are provided and are open outwardly in the state shown in Figure 4. Openings 25, 25' are formed in the outwardly opening spring-type holding members 24, 24', and a groove 26 is formed in the protective guide member.

In fitting the plug shown in Figure 4 into the receptacle shown in Figures 1 to 3, the plug is stuffed into the receptacle in a direction in which the direction guide 9 of the receptacle is in alignment with the groove 26 of the plug. If the forward end of the outwardly opening spring-type holding member 24 of the plug 20 is slightly twisted inwardly as shown in Figure 4 so that the outside surface of the twisted forward end portion may contact the wall surfaces bearing the protrusions 8, 8' of the third supporting members 6, 6' of the receptacle 1, the plug can be easily and conveniently fitted into the receptacle by simply stuffing the plug into the receptacle without pressing the outwardly opening spring-type holding members with fingers.

By this fitting operation, the hollow passages 2, 2' of the first supporting members 3, 3' of the receptacle accommodate the ferrules 21, 21' of the plug and the plug 23 is accommodated in the space 5 between the second supporting member 4 and the first supporting members 3, 3' of the receptacle. Furthermore, the outwardly opening spring-type holding member 24, 24' of the plug are accommodated in the spaces 7, 7' formed by the third supporting members 6, 6' of the receptacle. The openings 25, 25' of the outwardly opening spring-type holding members 24, 24' come into engagement with the protrusions 8, 8' in the spaces 7, 7' of the receptacle, and the outwardly opening spring-type holding members are pushing outwardly the inner walls of the third supporting members having the protrusions 8, 8'.

In this state, the receptacle and the plug are stably maintained in a normal fitted condition unless the outwardly opening spring-type holding members 24, 24' are pressed by fingers to make them approach each other and the plug is pulled apart from the receptacle. Needless to say, during the above fitting operation, the first supporting members 3, 3' of the receptacle 1 are accommodated within spaces 22, 22' of the optical connector plug 20.

Figure 5 shows a sectional view of a relaying adapter as another embodiment of the receptacle of the present invention. The adapter shown in Figure 5 is symmetrical with respect to the line b-b' and each of the symmetrical portions has the structure of the receptacle of the present inven-

tion. In Figure 5, the same reference numerals as used in Figures 1 to 3 have the same meanings as in Figures 1 to 3.

When a condition is assumed in which the plug shown in Figure 4 is fitted into each of the right and left portions of the relaying adapter of Figure 5, it will be readily understood that optical communications are exchanged between the ferrules of the plugs facing each other in the hollow passages 2, 2'.

Figures 6a to 6f, 7 and 8 show rough front elevations of various embodiments of the receptacle of this invention. In Figures 6a to 6f, 7 and 8, the same reference numerals as in Figures 1 to 3 have the same meanings as in Figures 1 to 3.

The receptacle shown in Figure 6a is a receptacle for a single core and has only one hollow passage 2 provided by the first supporting member 3. In the drawings, the cross sectional shape of the hollow passage is circular, but may be otherwise. The same can be said in the following description.

The receptacle of Figure 6b includes two hollow passages 2, 2' in a common first supporting member 3.

The receptacle shown in Figure 6c includes two first supporting members 3, 3' respectively having hollow passages 2, 2', and the first supporting members 3, 3' are connected by a linking member 10. An optical connector plug having two ferrules such as the one illustrated in Figure 4, or two plugs each having one ferrule in juxtaposition may be fitted into the receptacle having two hollow passages as shown in Figures 6b and 6c.

In the receptacle of Figure 6d, two hollow passages 2, 2' are provided in a common first supporting member 3, and the two hollow passages are connected by a linking passage 11 formed in the supporting member.

The receptacles shown in Figures 6e and 6f have three hollow passages 2, 2', 2''. In the receptacle of Figure 6e, the three hollow passages are provided by three independent first supporting members 3, 3' and 3'', and in the receptacle of Figure 6f, first supporting members 3' and 3'' forming the two hollow passages 2' and 2'' are connected by a linking member 10, and another first member 3 forming another hollow passage 2 exists independently of the first supporting members 3' and 3''. An optical connector plug having three ferrules, or a combination of a plug having one ferrule and a plug having two ferrules may be fitted into the receptacles shown in Figures 6e and 6f. Or three plugs each having one ferrule may be fitted into such receptacles as shown in Figures 6e and 6f.

Since the receptacle of this invention has such as structure as can support the optical connector plug at two sites, or preferably three sites, the normal fitted condition between the receptacles and plugs can be maintained even when a plurality of optical connector plugs are fitted into a receptacle having a plurality of hollow passages.

The receptacle shown in Figure 7 has hollow

passages of such a shape that the cross section of each hollow passage has three portions on the circumference which project toward the center of the circle and a substantially circular phantom circle can be formed by connecting the forward ends of the projecting portions. The hollow passages form straight passages at the phantom circle parts to permit entry of the optical connector plug, and hold the ferrules at the projecting portions after entry.

In the receptacle shown in Figure 8, the second supporting member is cut at those parts which have the third supporting members outside. In the receptacle having the structure shown in Figure 8, the protective guide member of the optical connector plug fitted into the space 5 formed by the second supporting member 4 is kept from moving to the right or left in Figure 8 by dint of the cut portions 4' of the second supporting member 4 and the first supporting members 3, 3', and the normal fitted condition can be maintained.

Now, the optical connector plug of this invention will be more specifically described with reference to the accompanying drawings.

One embodiment of the optical connector plug of this invention is shown in Figure 4. Figure 9 shows a front elevation of the plug shown in Figure 4. The plugs shown in Figures 4 and 9 have the same structure and function as described herein above with regard to the optical connector receptacle of Figures 1 to 3.

Figure 10 shows a rough perspective view of another embodiment of the plug of this invention. Figure 11 shows a front elevation of the plug shown in Figure 10. The plug shown in Figures 10 and 11 has only one ferrule 21. A protective guide member 23 exists around the ferrule 21 with a space 21 therebetween, and spring-type holding members 24, 24' having an opening 25' are located outwardly of the protective guide member.

Figure 12 is an explanatory view for illustrating the manner of the fitting of a plug 20 of the invention having one ferrule 21 and a plug 20' of the invention having one ferrule 21' into one receptacle 1 provided with two hollow passages. Figure 13 shows a front elevation of the plug 20 or 20' of the invention. The plugs 20 and 20' of the invention shown in Figures 12 and 13 have direction guides 29, 29' each forming a recessed portion on the outer-circumferential surface of the protective guide member 23. The width of each of the direction guides 29, 29' may be about one-half of the width W of a projecting direction guide 9.

When the plug 20 is fitted into the receptacle 1, the ferrule 21 of the plug 20 is received in the hollow passage 2 of the receptacle, and the protective guide member of the plug is received in the space 5 of the receptacle. Simultaneously, the first supporting member 3 of the receptacle is received within a space 22 of the plug.

On the other hand, the plug 20' is fitted into the receptacle 1 in juxtaposition with the plug 20 as shown in Figure 12. In this state, the ferrule 21' of

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the plug 20' is received in the hollow passage 2' of the receptacle; the protective guide member 23' of the plug 20', in the space 5 of the receptacle; and simultaneously, the first support member 3' of the receptacle, in the space 22' of the plug.

Figures 14 and 15 show front elevations of other embodiments of the optical connector plug of this invention having 2 and 3 ferrules, respectively.

In the plug of Figure 14, a common space 22 exists between the ferrules 21, 21' and the protective guide member 23.

In the plug of Figure 15, a common space 22 is formed between the ferrules 21, 21' and the protective guide member 23 as in Figure 14, and a space 22' is formed between the other ferrule 21'' and the projective guide member 23.

Claims

1. An optical connector receptacle (1) adapted to receive and connect in tight fit with at least one optical connector plug (20) which has a protective guide member (23) surrounding at least one ferrule (21, 21') containing an optical fiber, the outer surface of said ferrule being separated by a defined space from an inner surface of the guide member surrounding said ferrule; said receptacle comprising:

a housing having at least one space (5) open to the receiving end of said receptacle, said one space having a profile conforming to the profile of the outer surface of the protective guide member of said plug; and

at least one supporting member (3, 3') within said one space of the housing surrounding and defining at least one passage (2, 2') extending from said receiving end of the receptacle to the opposite end, the outer surface of said supporting member being separated from an inner surface of the housing by the remainder of said one space, said supporting member having a cross-sectional shape conforming with the defined space between said ferrule and the guide member of the plug; characterised by

a pair of apertures (7, 7') formed in said housing on opposite sides of said one space, each aperture being open to the receiving end of the receptacle and adapted to receive one of a corresponding pair of spring latching arms (24, 24') extending along opposite sides of the protective guide member of said plug, each said aperture having therein means (8, 8') for releasably latching with each arm of the plug,

whereby when said plug is inserted into the receptacle, the ferrule will be received within the passage defined by said supporting member while said supporting member is received within the defined space between the ferrule and the guide member, and the guide member is received within the remainder of said one space of the housing, all respective mating surfaces between the receptacle and plug contributing to said tight fit, said plug being further retained within the

receptacle by the arms releasably latched within said pair of apertures of said receptacle.

2. An optical connector receptacle according to claim 1, wherein there are at least two separate supporting members (3, 3') arranged linearly adjacent one another.

3. An optical connector receptacle according to claim 2, wherein at least two separate plugs, each with at least one ferrule disposed within a protective guide member, are received within said one space to mate respectively with one of said separate supporting members.

4. An optical connector receptacle according to claim 2, wherein at least two ferrules are disposed within a protective guide member of one plug which is received within said one space.

5. An optical connector receptacle according to claim 2, 3 or 4, wherein one of the supporting members (3) has at least two separate passages (2, 2') for mating with respective ferrules disposed within the protective guide member of one plug and another of the support members (3') mates with a separate plug.

6. An optical connector receptacle according to any one of claim 1 to 5, and further comprising direction guide means (4, 9) in said one space for ensuring alignment of the or each said plug with the receptacle.

7. An optical connector receptacle according to any one of claims 1 to 6, further comprising an optical data link (1a) disposed at said opposite end of said receptacle housing, said data link being adapted for two-way light transmission along from and to the optical fiber of the or each ferrule, and for converting optical information to and from electrical information.

8. An optical connector receptacle according to any one of claims 1 to 7, and further comprising at the opposite end of said receptacle a second identical receptacle which is the mirror image of the first, both receptacles having a common housing to form an adaptor for receiving plugs at either end.

9. An optical connector plug adapted to be received in and connect in tight fit with an optical connector receptacle which has a housing with at least one space (5) open to the receiving end of the receptacle and at least one supporting member (3, 3') disposed in said one space, the supporting member surrounding and defining at least one passage (2, 2') extending from said receiving end to the opposite end, the outer surface of said supporting member being separated from an inner surface of the housing by the remainder of said one space, said plug comprising:

at least one ferrule (21, 21') containing an optical fiber adapted to be received within said one passage defined by the supporting member of the receptacle and a protective guide member (23) surrounding said ferrule, the outer surface of the ferrule being separated by a defined space from an inner surface of the guide member surrounding said ferrule, the outer surface of said protective guide member having a profile con-

the plug 20' is received in the hollow passage 2' of the receptacle; the protective guide member 23' of the plug 20', in the space 5 of the receptacle; and simultaneously, the first support member 3' of the receptacle, in the space 22' of the plug.

Figures 14 and 15 show front elevations of other embodiments of the optical connector plug of this invention having 2 and 3 ferrules, respectively.

In the plug of Figure 14, a common space 22 exists between the ferrules 21, 21' and the protective guide member 23.

In the plug of Figure 15, a common space 22 is formed between the ferrules 21, 21' and the protective guide member 23 as in Figure 14, and a space 22' is formed between the other ferrule 21'' and the protective guide member 23.

Claims

1. An optical connector receptacle (1) adapted to receive and connect in tight fit with at least one optical connector plug (20) which has a protective guide member (23) surrounding at least one ferrule (21, 21') containing an optical fiber, the outer surface of said ferrule being separated by a defined space from an inner surface of the guide member surrounding said ferrule; said receptacle comprising:

a housing having at least one space (5) open to the receiving end of said receptacle, said one space having a profile conforming to the profile of the outer surface of the protective guide member of said plug; and

at least one supporting member (3, 3') within said one space of the housing surrounding and defining at least one passage (2, 2') extending from said receiving end of the receptacle to the opposite end, the outer surface of said supporting member being separated from an inner surface of the housing by the remainder of said one space, said supporting member having a cross-sectional shape conforming with the defined space between said ferrule and the guide member of the plug; characterised by

a pair of apertures (7, 7') formed in said housing on opposite sides of said one space, each aperture being open to the receiving end of the receptacle and adapted to receive one of a corresponding pair of spring latching arms (24, 24') extending along opposite sides of the protective guide member of said plug, each said aperture having therein means (8, 8') for releasably latching with each arm of the plug,

whereby when said plug is inserted into the receptacle, the ferrule will be received within the passage defined by said supporting member while said supporting member is received within the defined space between the ferrule and the guide member, and the guide member is received within the remainder of said one space of the housing, all respective mating surfaces between the receptacle and plug contributing to said tight fit, said plug being further retained within the

receptacle by the arms releasably latched within said pair of apertures of said receptacle.

2. An optical connector receptacle according to claim 1, wherein there are at least two separate supporting members (3, 3') arranged linearly adjacent one another.

3. An optical connector receptacle according to claim 2, wherein at least two separate plugs, each with at least one ferrule disposed within a protective guide member, are received within said one space to mate respectively with one of said separate supporting members.

4. An optical connector receptacle according to claim 2, wherein at least two ferrules are disposed within a protective guide member of one plug which is received within said one space.

5. An optical connector receptacle according to claim 2, 3 or 4, wherein one of the supporting members (3) has at least two separate passages (2, 2') for mating with respective ferrules disposed within the protective guide member of one plug and another of the support members (3') mates with a separate plug.

6. An optical connector receptacle according to any one of claim 1 to 5, and further comprising direction guide means (4, 9) in said one space for ensuring alignment of the or each said plug with the receptacle.

7. An optical connector receptacle according to any one of claims 1 to 6, further comprising an optical data link (1a) disposed at said opposite end of said receptacle housing, said data link being adapted for two-way light transmission along from and to the optical fiber of the or each ferrule, and for converting optical information to and from electrical information.

8. An optical connector receptacle according to any one of claims 1 to 7, and further comprising at the opposite end of said receptacle a second identical receptacle which is the mirror image of the first, both receptacles having a common housing to form an adaptor for receiving plugs at either end.

9. An optical connector plug adapted to be received in and connect in tight fit with an optical connector receptacle which has a housing with at least one space (5) open to the receiving end of the receptacle and at least one supporting member (3, 3') disposed in said one space, the supporting member surrounding and defining at least one passage (2, 2') extending from said receiving end to the opposite end, the outer surface of said supporting member being separated from an inner surface of the housing by the remainder of said one space, said plug comprising:

at least one ferrule (21, 21') containing an optical fiber adapted to be received within said one passage defined by the supporting member of the receptacle and a protective guide member (23) surrounding said ferrule, the outer surface of the ferrule being separated by a defined space from an inner surface of the guide member surrounding said ferrule, the outer surface of said protective guide member having a profile con-



forming to the profile of said one space of the receptacle, said defined space between the ferrule and protective guide member conforming to the cross-sectional shape of said supporting member of the receptacle housing;

characterised by a pair of spring arms (24, 24') extending along opposite sides of the protective guide member, said spring arms being adapted to be received and releasably latched within a corresponding pair of apertures (7, 7') formed in said receptacle housing on opposite sides of said one space;

whereby when said plug is inserted into the receptacle, the ferrule will be received within the passage defined by said supporting member while said supporting member is received within the defined space between the ferrule and the guide member, and the guide member is received within the remainder of said one space of the housing, all respective mating surfaces between the receptacle and plug contributing to said tight fit, said plug being further retained within the receptacle by said pair of apertures of said spring arms being releasably latched within the receptacle.

10. An optical connector plug according claim 9, wherein the protective guide member has at least two separate ferrules disposed therein.

11. An optical connector plug according to claim 9 or 10, further comprising a direction guide means (26) provided along the outer surface of the protective guide member for ensuring proper alignment of the plug with the receptacle.

12. In combination an optical connector composed of a receptacle (1) in tight fitting releasable engagement with at least one optical connector plug (20), wherein the optical connector plug has a protective guide member (23) surrounding at least one ferrule (21, 21') containing an optical fiber, the outer surface of the ferrule being separated by a defined space from an inner surface of the guide member surrounding the ferrule and the receptacle has a housing with at least one space (5) open to the receiving end of said receptacle said one space having a profile conforming to the profile of the outer surface of the protective guide member of said plug and at least one support member (3, 3') within said one space surround and defining at least one passage (2, 2') extending from said receiving end of the receptacle to the opposite end, the outer surface of said supporting member being separated from an inner surface of the housing by the remainder of said one space, the supporting member having a cross-sectional shape conforming with the defined space between said ferrule and the guide member of the plug;

characterised in that the housing has a pair of apertures (7, 7') on opposite sides of said one space each aperture being open to the receiving end of the receptacle and the plug has a pair of spring latching arms (24, 24') disposed on opposite sides of the protective guide member of said plug and fitting into the apertures and means is provided between the apertures and the arms to releasably latch the arms in the apertures,

whereby when said plug is inserted into the

receptacle, the ferrule will be received within the passage defined by said supporting member while said supporting member is received within the defined space between the ferrule and the guide member, and the guide member is received within the remainder of said one space of the housing, all respective mating surfaces between the receptacle and plug contributing to said tight fit, said plug being further retaining within the receptacle by the arms releasably latched within said pair of apertures of said receptacle.

13. An optical connector according to claim 12, wherein two plugs each with at least one ferrule are received with the receptacle housing.

14. An optical connector according to claim 13, wherein one or both of the two plugs has two separate ferrules disposed therein.

15. An optical connector according to claim 13, wherein the plug has a plurality of ferrules and there are a corresponding plurality of separate supporting members in the space of the housing, the ferrules and supporting members being disposed in a linear array.

Patentansprüche

1. Optische Verbindersteckdose (1), die derart beschaffen ist, daß sie in dichtem Paßsitz wenigstens einen optischen Verbinderstecker (20) aufnimmt und eine Verbindung mit diesem herstellt, der ein Schutzführungsteil (23) hat, welches wenigstens einen Endring (21, 21'), der eine Lichtleitfaser enthält, umgibt, wobei die äußere Fläche des Endrings durch einen von einer inneren Fläche des den Endring umgebenden Führungsteils gebildeten Raum getrennt ist, wobei die Steckdose aufweist:

ein Gehäuse, das wenigstens einen Raum (5) hat, der zu dem Aufnahmeende der Steckdose offen ist, wobei dieser eine Raum ein Profil hat, das passend zu dem Profil der äußeren Fläche des Schutzführungsteils des Steckers gewählt ist, und

wenigstens ein Stützteil (3, 3') in dem einen Raum des Gehäuses, welches wenigstens einen Durchgang (2, 2'), der sich von dem Aufnahmeende der Steckdose zu dem gegenüberliegenden Ende erstreckt, umgibt und begrenzt, wobei die äußere Fläche des Stützteils von einer inneren Fläche des Gehäuses durch den Restteil dieses einen Raumes getrennt ist, und wobei das Stützteil eine Querschnittsgestalt hat, die passend zu dem zwischen dem Endring und dem Führungsteil des Steckers gebildeten Raum gewählt ist, gekennzeichnet durch

ein Paar von Öffnungen (7, 7'), die in dem Gehäuse auf den dem Raum gegenüberliegenden Seiten ausgebildet sind, wobei jede Öffnung zum Aufnahmeende der Steckdose offen und derart ausgebildet ist, daß ein zugeordnetes Paar von Federverriegelungsarmen (24, 24') aufgenommen werden kann, die sich längs den gegenüberliegenden Seiten des Schutzführungsteils des Steckers erstrecken, und wobei jede Öffnung darin eine Einrichtung (8, 8') zum lösaren Verriegeln mit dem jeweiligen Arm des Steckers hat,



wodurch dann, wenn der Stecker in die Steckdose eingeführt ist, der Endring in dem Durchgang aufgenommen ist, der durch das Stützteil gebildet wird, während das Stützteil in dem zwischen dem Endring und dem Führungsteil begrenzten Raum aufgenommen ist, und wobei das Führungsteil in dem Restteil des einen Raumes des Gehäuses aufgenommen hat, und wobei alle zugeordneten Paßflächen zwischen der Steckdose und dem Stecker zu diesem engen Paßsitz beitragen, und wobei der Stecker ferner in der Steckdose mittels den Armen lösbar verriegelt in dem Paar von Öffnungen der Steckdose gehalten ist.

2. Optische Verbindersteckdose nach Anspruch 1, bei der wenigstens zwei gesonderte Stützteile (3, 3') linear aneinander angrenzend angeordnet sind.

3. Optische Verbindersteckdose nach Anspruch 2, bei der wenigstens zwei gesonderte Stecker, die jeweils mit wenigstens einem Endring in dem Schutzführungsteil angeordnet sind, in dem einen Raum passend jeweils zu den gesonderten Stützteilen aufgenommen sind.

4. Optische Verbindersteckdose nach Anspruch 2, bei der wenigstens zwei Endringe in einem Schutzführungsteil des Steckers angeordnet sind, der in dem einen Raum aufgenommen ist.

5. Optische Verbindersteckdose nach Anspruch 2, 3 oder 4, bei der eines der Stützteile (3) wenigstens zwei gesonderte Durchgänge (2, 2') zur Anpassung an die zugeordneten Endringe hat, die in dem Schutzführungsteil eines Steckers angeordnet sind, und bei der die Stützteile (3') Passend zu einem gesonderten Stecker ausgelegt sind.

6. Optische Verbindersteckdose nach einem der Ansprüche 1 bis 5, die ferner eine Richtungsführungseinrichtung (4, 9) in dem einen Raum zur Sicherstellung einer Ausrichtung des oder jedes Steckers bezüglich der Steckdose aufweist.

7. Optische Verbindersteckdose nach einem der Ansprüche 1 bis 6, die ferner eine optische Datenverbindung (1a) aufweist, die am gegenüberliegenden Ende des Steckdosengehäuses angeordnet ist, die Datenverbindung für eine Zweiweglichtübertragung längs und zu der Lichtleitfaser von und zu jedem Endring und zum Umwandeln der optischen Information in eine elektrische Information und umgekehrt bestimmt ist.

8. Optische Verbindersteckdose nach einem der Ansprüche 1 bis 7, die ferner am gegenüberliegenden Ende der Steckdose eine zweite, identische Steckdose aufweist, die spiegelbildlich zu der ersten ausgelegt ist, wobei beide Steckdosen ein gemeinsames Gehäuse haben, um einen Adapter zur Aufnahme von Steckern an jedem Ende zu bilden.

9. Optischer Verbinderstecker, der zur Aufnahme und zur Verbindung mit einem festen Paßsitz mit einer optischen Verbindersteckdose bestimmt ist, die ein Gehäuse mit wenigstens einem Raum (5) hat, der zum Aufnahmeende der Steckdose offen ist, und wenigstens ein Stützteil (3, 3') in dem Raum angeordnet ist, wobei das

Stützteil wenigstens einen Durchgang (2, 2'), der sich von dem Aufnahmeende zu dem gegenüberliegenden Ende erstreckt, umgibt und begrenzt, und wobei die äußere Fläche des Stützteils von einer inneren Fläche des Gehäuses durch den Restteil dieses Raumes getrennt ist, wobei der Stecker aufweist:

wenigstens einen Endring (21, 21'), der eine Lichtleitfaser enthält, und der in einem durch das Stützteil der Steckdose gebildeten Durchgang aufgenommen werden kann, und

ein Schutzführungsteil (23), das den Endring umgibt, wobei die äußere Fläche des Endrings durch einen von einer inneren Fläche des den Endring umgebenden Führungsteils begrenzten Raums getrennt ist, die äußere Fläche des Schutzführungsteils ein Profil hat, das passend zu dem Profil des Raumes der Steckdose gewählt ist, und wobei der zwischen dem Endring und dem Schutzführungsteil gebildete Raum an die Querschnittsgestalt des Stützteils des Steckdosengehäuses angepaßt ist,

gekennzeichnet durch

ein Paar von Federarmen (24, 24'), welche sich längs gegenüberliegenden Seiten des Schutzführungsteils erstrecken, wobei die Federarme derart ausgelegt sind, daß sie in einem zugeordneten Paar von Öffnungen (7, 7'), die in dem Steckdosengehäuse auf den gegenüberliegenden Seiten des Raumes ausgebildet sind, aufgenommen und lösbar verriegelbar sind,

wobei dann, wenn der Stecker in die Steckdose eingeführt ist, der Endring in dem von dem Stützteil gebildeten Durchgang aufgenommen ist, während das Stützteil in dem zwischen dem Endring und dem Führungsteil gebildeten Raum aufgenommen ist, das Führungsteil in dem Restteil des Raumes des Gehäuses aufgenommen ist, alle entsprechenden Paßflächen zwischen der Steckdose und dem Stecker zu dem engen Paßsitz beitragen und wobei der Stecker ferner in der Steckdose mittels den beiden Öffnungen der Federarme gehalten ist, die lösbar in der Steckdose verriegelt sind.

10. Optischer Verbinderstecker nach Anspruch 9, bei dem das Schutzführungsteil wenigstens zwei gesonderte, darin angeordnete Endringe hat.

11. Optischer Verbinderstecker nach Anspruch 9 oder 10, der ferner eine Richtungsführungseinrichtung (26) aufweist, die längs der äußeren Fläche des Schutzführungsteiles vorgesehen ist, um eine geeignete Ausrichtung des Steckers zu der Steckdose sicherzustellen.

12. Kombination eines optischen Verbinders, umfassend eine Steckdose (1) in passendem, lösbarem Eingriffssitz mit wenigstens einem optischen Verbinderstecker (20), wobei der optische Verbinderstecker ein Schutzführungsteil (23) hat, das wenigstens einen Endring (21, 21'), der eine Lichtleitfaser enthält, umgibt, die äußere Fläche des Endrings durch einen von einer inneren Fläche des Führungsteils, das den Endring umgibt, gebildeten Raums getrennt ist, und die Steckdose ein Gehäuse mit wenigstens einem Raum (5) hat, der zum Aufnahmeende der Steckdose offen ist,



wobei der Raum ein Profil hat, das passend zu dem Profil der äußeren Fläche des Schutzführungsteils des Steckers gewählt ist, und wenigstens ein Stützteil (3, 3') in dem Raum wenigstens einen Durchgang (2, 2') umgibt und diesen begrenzt, der sich von dem Aufnahmeende der Steckdose zu dem gegenüberliegenden Ende erstreckt, die äußere Fläche des Stützteils von einer inneren Fläche des Gehäuses durch den Restteil des Raumes getrennt ist, und wobei das Stützteil eine Querschnittsgestalt hat, die passend zu dem zwischen dem Endring und dem Führungsteil des Steckers gebildeten Raum gewählt ist, dadurch gekennzeichnet,

daß das Gehäuse ein Paar von Öffnungen (7, 7') auf gegenüberliegenden Seiten des Raumes hat, jede Öffnung zu dem Aufnahmeende der Steckdose offen ist, und der Stecker ein Paar von Federverriegelungsarmen (24, 24') hat, die auf gegenüberliegenden Seiten des Schutzführungsteils des Steckers angeordnet sind und in Öffnungen passen, und eine Einrichtung zwischen den Öffnungen und den Armen vorgesehen ist, um die Arme in den Öffnungen lösbar zu fixieren,

wobei dann, wenn der Stecker in die Steckdose eingeführt ist, der Endring in dem durch das Stützteil gebildeten Durchgang aufgenommen ist, während das Stützteil in dem zwischen dem Endring und dem Führungsteil gebildeten Raum aufgenommen ist, und das Führungsteil in dem Restteil des Raumes des Gehäuses aufgenommen ist, wobei alle zugeordneten Paßflächen zwischen der Steckdose und dem Stecker zu dem engen Paßsitz beitragen, und wobei der Stecker ferner in der Steckdose mittels den Armen gehalten ist, die lösbar in dem Paar von Öffnungen der Steckdose fixierbar sind.

13. Optischer Verbinder nach Anspruch 12, bei dem zwei Stecker jeweils mit wenigstens einem Endring in dem Steckdosengehäuse aufgenommen sind.

14. Optischer Verbinder nach Anspruch 13, bei dem einer oder beide der beiden Stecker zwei gesonderte, darin angeordnete Endringe haben.

15. Optischer Verbinder nach Anspruch 13' bei dem der Stecker eine Mehrzahl von Endringen hat und bei dem eine entsprechende Mehrzahl von gesonderten Stützteilen in dem Raum des Gehäuses vorgesehen sind, wobei die Endringe und die Stützteile in einer linearen Reihe angeordnet sind.

Revendications

1. Une prise de connecteur optique (1) propre à recevoir, et à être reliée en ajustage serré avec au moins une fiche de connecteur optique (20) qui a un élément protecteur et de guidage (23) entourant au moins une ferrule (21, 21') contenant une fibre optique, la surface extérieure de ladite ferrule étant séparée par un espace défini d'une surface intérieure de l'élément de guidage entourant ladite ferrule; ladite prise comprenant:

un boîtier ayant au moins un espace (5) ouvert à l'extrémité réceptrice de ladite prise, ledit espace ayant un profil correspondant au profil de la

surface extérieure de l'élément protecteur et de guidage de ladite fiche; et

au moins un élément de support (3, 3') à l'intérieur dudit espace du boîtier, entourant et définissant au moins un passage (2, 2') s'étendant de ladite extrémité réceptrice de la prise à l'extrémité opposée, la surface extérieure dudit élément de support étant séparée d'une surface intérieure du boîtier par le reste dudit espace, ledit élément de support ayant une section de forme adaptée défini entre ladite ferrule et l'élément de guidage de la fiche; caractérisée par

une paire d'ouvertures (7, 7') formées dans ledit boîtier sur les côtés opposés dudit espace, chaque ouverture étant ouverte à l'extrémité réceptrice de la prise et propre à recevoir l'une d'une paire correspondante de bras de blocage élastiques (24, 24') s'étendant le long des côtés opposés de l'élément protecteur et de guidage de ladite fiche, chacune desdites ouvertures étant pourvue de moyens (8, 8') aptes à se verrouiller, de façon libérable, avec chaque bras de la fiche, de telle façon que, lorsque ladite fiche est introduite dans la prise, la ferrule est reçue dans le passage défini par ledit élément de support tandis que ledit élément de support est reçu dans l'espace défini entre la ferrule et l'élément de guidage, et l'élément de guidage est reçu dans le reste dudit espace du boîtier, toutes les surfaces en contact respectives entre la prise et la fiche contribuant audit ajustage serré, ladite fiche étant en outre retenue à l'intérieur de la prise par les bras verrouillés, de façon libérable, dans ladite paire d'ouvertures de ladite prise.

2. Une prise de connecteur optique selon la revendication 1, dans laquelle il y a au moins deux éléments de support séparés (3, 3') disposés de façon linéaire et adjacente.

3. Une prise de connecteur optique selon la revendication 2, dans laquelle au moins deux fiches séparées, ayant chacune au moins une ferrule logée à l'intérieur d'un élément protecteur de guidage, sont reçues dans ledit espace pour respectivement s'adapter à l'un desdits éléments de support séparés.

4. Une prise de connecteur optique selon la revendication 2, dans laquelle au moins deux ferrules sont logées dans un élément protecteur de guidage d'une fiche qui est reçue dans ledit espace.

5. Une prise de connecteur optique selon la revendication 2, 3 ou 4, dans laquelle l'un des éléments de support (3) a au moins deux passages séparés (2, 2') pour correspondre aux ferrules respectives logées à l'intérieur de l'élément protecteur de guidage d'une fiche, et un autre des éléments de support (3') s'adapte à une fiche séparée.

6. Une prise de connecteur optique selon l'une des revendications 1 à 5, et comprenant en outre des moyens de guidage (4, 9) dans ledit espace pour assurer l'alignement de ladite ou de chacune desdites fiches avec la prise.

7. Une prise de connecteur optique selon l'une des revendications 1 à 6, comprenant en outre un



coupleur pour données optiques (1a) disposé à ladite extrémité opposée dudit boîtier de prise, ledit coupleur de données étant adapté à une transmission optique bidirectionnelle depuis et vers la fibre optique de la ou de chaque ferrule et propre à convertir les données optiques en données électriques, et celles-ci en données optiques.

8. Une prise de connecteur optique selon l'une des revendications 1 à 7, et comprenant en outre à l'extrémité opposée de ladite prise une seconde prise identique qui a une disposition inversée par rapport à la première, les deux prises ayant un boîtier commun pour former un adaptateur pour recevoir des fiches à chaque extrémité.

9. Une fiche de connecteur optique propre à être reçue dans une prise de connecteur optique et à être en ajustage serré avec celle-ci, cette prise ayant un boîtier avec au moins un espace (5) ouvert à l'extrémité réceptrice de la prise et au moins un élément de support (3, 3') disposé dans ledit espace, l'élément de support entourant et définissant au moins un passage (2, 2') s'étendant de ladite extrémité réceptrice à l'extrémité opposée, la surface extérieure dudit élément de support étant séparée d'une surface intérieure du boîtier par le reste dudit espace, ladite fiche comprenant au moins une ferrule (21, 21') contenant une fibre optique et propre à être reçue dans ledit passage défini par l'élément de support de la prise, et un élément protecteur de guidage (23) entourant ladite ferrule, la surface extérieure de la ferrule étant séparée par un espace défini d'une surface intérieure de l'élément de guidage entourant ladite ferrule, la surface extérieure dudit élément protecteur de guidage ayant un profil adapté au profil dudit espace de la prise, ledit espace défini entre la ferrule et l'élément protecteur de guidage correspondant à la forme de la section dudit élément de support du boîtier de prise; caractérisée par une paire de bras élastiques (24, 24') s'étendant le long des côtés opposés de l'élément protecteur de guidage, lesdits bras élastiques étant propres à être reçus et bloqués, de façon libérable, dans une paire correspondante d'ouvertures (7, 7') formées dans ledit boîtier de prise sur les côtés opposés dudit espace;

de telle façon que, lorsque ladite fiche est introduite dans la prise, la ferrule est reçue dans le passage défini par ledit élément de support tandis que ledit élément de support est reçu dans l'espace défini entre la ferrule et l'élément de guidage, et l'élément de guidage est reçu dans le reste dudit espace du boîtier, toutes les surfaces en contact respectives entre la prise et la fiche contribuant audit ajustage serré, ladite fiche étant en outre retenue à l'intérieur de la prise par ladite paire d'ouvertures, lesdits bras élastiques étant bloqués, de façon libérable, dans la prise.

10. Une fiche de connecteur optique conformément à la revendication 9, dans laquelle l'élément protecteur de guidage a au moins deux ferrules séparées disposées à l'intérieur.

11. Une fiche de connecteur optique conformément à la revendication 9 ou 10, comprenant en

outre un moyen de guidage (26) prévu le long de la surface extérieure de l'élément protecteur de guidage pour assurer un alignement approprié de la fiche avec la prise.

12. En combinaison, un connecteur optique composé d'une prise (1) recevant en ajustage serré, de façon libérable, au moins une fiche de connecteur optique (20), dans lequel la fiche de connecteur optique comprend un élément protecteur et de guidage (23) entourant au moins une ferrule (21, 21') contenant une fibre optique, la surface extérieure de la ferrule étant séparée par un espace défini d'une surface intérieure de l'élément de guidage entourant la ferrule, et la prise comprend un boîtier avec au moins un espace (5) ouvert à l'extrémité réceptrice de ladite prise, ledit espace ayant un profil correspondant au profil de la surface extérieure de l'élément protecteur et de guidage de ladite fiche, et au moins un élément de support (3, 3'), à l'intérieur dudit espace, entourant et définissant au moins un passage (2, 2') s'étendant de ladite extrémité réceptrice de la prise à l'extrémité opposée, la surface extérieure dudit élément support étant séparée d'une surface intérieure du boîtier par le reste dudit espace, l'élément de support ayant une section de forme correspondant à l'espace défini entre ladite ferrule et l'élément de guidage de la fiche, caractérisé en ce que le boîtier comporte une paire d'ouvertures (7, 7') sur les côtés opposés dudit espace, chaque ouverture étant ouverte à l'extrémité réceptrice de la prise, en ce que la fiche comporte une paire de bras de verrouillage élastiques (24, 24') disposés sur les côtés opposés de l'élément protecteur de guidage de ladite fiche et s'adaptant dans les ouvertures, et en ce qu'un moyen est prévu entre les ouvertures et les bras pour verrouiller, de façon libérable, les bras dans les ouvertures, de telle façon que, lorsque ladite fiche est introduite dans la prise, la ferrule est reçue dans le passage défini par ledit élément de support tandis que ledit élément de support est reçu à l'intérieur de l'espace défini entre la ferrule et l'élément de guidage, et l'élément de guidage est reçu à l'intérieur du reste dudit espace du boîtier, toutes les surfaces en contact respectives entre la prise et la fiche contribuant audit ajustage serré, ladite fiche étant en outre retenue à l'intérieur de la prise par les bras verrouillés, de façon libérable, à l'intérieur de ladite paire d'ouvertures de ladite prise.

13. Un connecteur optique conformément à la revendication 12, dans lequel deux fiches, chacune avec au moins une ferrule, sont reçues dans le boîtier de la prise.

14. Un connecteur optique conformément à la revendication 13, dans lequel une ou les deux fiches ont deux ferrules séparées disposées à l'intérieur.

15. Un connecteur optique conformément à la revendication 13, dans lequel la fiche a une pluralité de ferrules et il y a une pluralité correspondante d'éléments de support séparés dans l'espace du boîtier, les ferrules et éléments de support étant disposés de manière linéaire.

