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**G2J**
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# (54) Plug connector for light conductors

(57) A plug housing (10) has a receiving bore (11) formed therein for receiving the plug pin in a fixing arrangement which includes two longitudinal grooves (11a, 11b) formed in the wall of the receiving bore (11) so as to be disposed one behind the other and spaced a predetermined distance from each other. Two press pins (13a, 13b) are movably mounted in the housing (10) so as to lie opposite the approximate centers of corresponding ones of the grooves (11a, 11b). A latching member (16) and the housing (10) conjointly define a space for accommodating an intermediate piece (14) for imparting a force to the two press pins (13a, 13b) thereby clamping the plug pin against the grooves (11a, 11b). The plug connector ensures a permanent constancy of the axis of the conductor even when the light conductor is mechanically stressed externally of the plug connector.

Fig.1

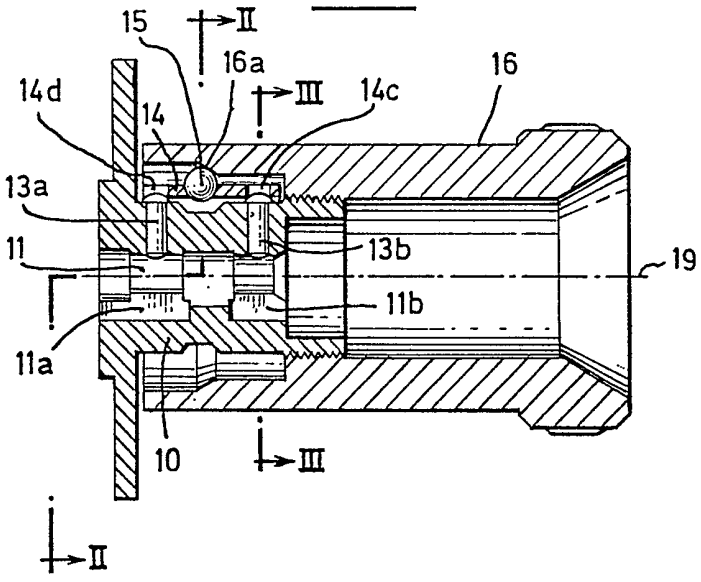


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Fig.1

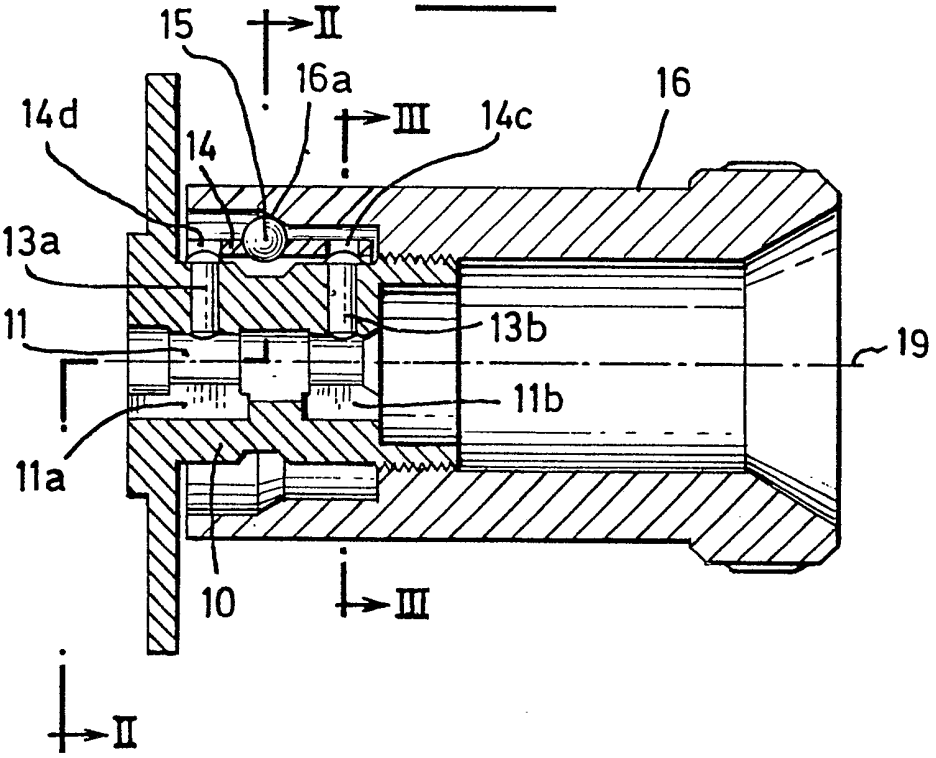



Fig.2

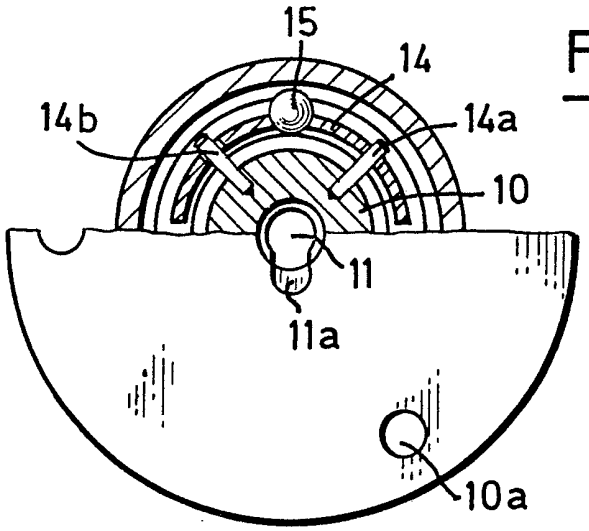


Fig. 3

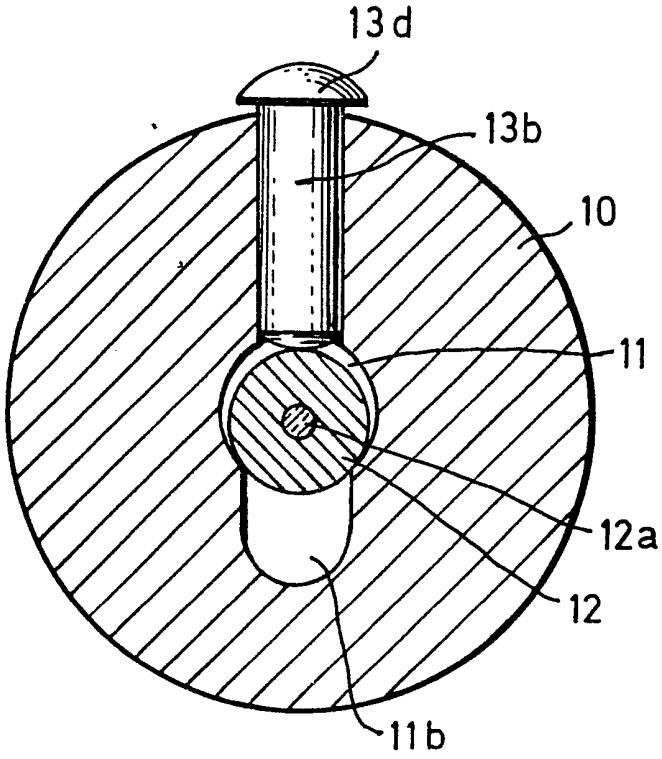
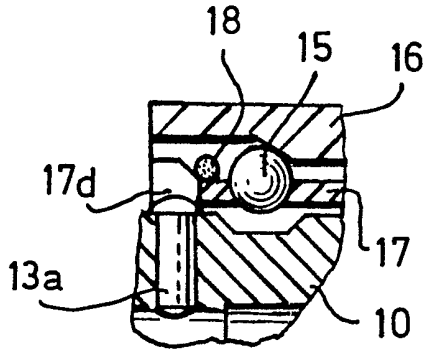



Fig. 4



SPECIFICATION

**Plug connector for light conductors**

The present invention relates to a plug connector for a light conductor having a plug pin attached centrally to the end of the light conductor.

A great many apparatus are known for optically connecting two light conductors. In such apparatus, it is always decisive that the axial displacement or offset of both light conductors with respect to each other be as little as possible.

With measuring apparatus, it has become increasingly important to be able to connect a light conductor to the housing of the measuring apparatus. For this purpose, it is not only important that a good reproducibility of the positioning of the end of the light conductor be provided; however, it is also important that the spatial alignment of the axis of the light conductor be precise.

It is common that the ends of the light conductors be held in plug pins which are produced with high precision.

German patent 29 31 018 discloses a plug connector for connecting two light conductors wherein the plug pin is inserted into a receiving bore of a plug housing and is fixed therein. A longitudinal groove is machined into the wall of the receiving bore and a pressure piece is mounted on the opposite side for each plug pin. The pressure piece is pressed against the inserted plug pin by a sleeve nut threadably engaging the plug housing. The sleeve nut presses the pressure piece against the plug pin by means of a resiliently journalled pin and in this way fixes the plug pin against the edges of the longitudinal groove.

This known device makes possible a sufficiently precise fixation of two light conductors with respect to each other. However, it does not make possible a satisfactorily precise fixation of the axis of a light conductor which is connected to a measuring apparatus such as a diode-array spectrometer. This is especially the case when the light conductor is mechanically stressed outside of the plug connector.

The present invention presents a solution to the problem of providing a plug connector for a light conductor which makes possible a very good reproducibility of the fixation of the axis of the light conductor and guarantees a permanent constancy of the axis of the conductor even when the light conductor is mechanically stressed externally of the plug connector.

The problem posed is solved according to the invention in that two longitudinal grooves are machined into the wall of a receiving bore and are separated from each other by a predetermined distance; and a press piece is provided for each longitudinal groove and is mounted opposite approximately the center of the groove; and the press pieces are pressed against the inserted plug pin at their outer end faces facing away from the plug pin by means of a yoke-shaped intermediate piece and a ball via a conical surface on the sleeve nut.

In an advantageous embodiment of the invention, the width of the longitudinal groove is so selected that the connecting planes between the edges of the longitudinal groove and the center axis of the inserted plug pin conjointly define an angle of approximately 90°.

A further advantageous embodiment of the invention includes providing a rubber ring for pressing the yoke-shaped intermediate piece against the press pieces.

The invention will be described in the following with reference to the embodiments explained by Figures 1 to 4 wherein:

*Figure 1* is a section view of a plug connector at a scale of 2:1;

*Figure 2* is a section view taken along line II of Figure 1;

*Figure 3* is a partial section view at a scale 6:1 taken along line III of Figure 1; and,

*Figure 4* is a portion taken out of Figure 1 with another embodiment of the yoke-shaped intermediate piece and a rubber ring.

In all of the figures, the connector housing (10) is shown which has a receiving bore (11) into which the plug pin (12) with the light conductor (12a) is inserted. Two longitudinal grooves (11a, 11b) are milled into the wall of the receiving bore (11) with an end mill so as to be precisely aligned with respect to each other and precisely opposite these grooves respective bores are arranged so that they are each approximately at the middle of the grooves. Press pins (13a, 13b) are seated in corresponding ones of the bores. These press pieces have rounded heads (13d) with the largest cross section of the latter being larger than the cross section of the bores so that the press pieces (13a, 13b) cannot fall into the receiving bore 11 when the plug pin (12) is withdrawn.

A yoke-shaped intermediate piece (14) lies atop the rounded heads of the press piece (13a, 13b). The intermediate piece (14) is in the form of a longitudinal section of a cylinder and is loosely connected to the plug housing (10) by means of pins (14a, 14b) which are seated tightly in the housing (10). The yoke-shaped intermediate piece (14) has a bore (14c) and a slot (14d) into which the rounded heads of the press pieces (13a, 13b) engage. Approximately in the center between bore (14c) and slot (14d), a ball (15) is seated in the yoke-shaped intermediate piece (14). A force component in the direction of the center axis (19) is imparted to the ball (15) by the conical surface (16a) of the sleeve nut (16) when the latter is tightened. This force component is transmitted approximately evenly onto both press pieces (13a, 13b) by means of the yoke-shaped intermediate piece (14) so that the plug pin (12) is at least approximately uniformly pressed into both grooves (11a, 11b) and thereby effects a good reproducible alignment of the axis of the plug pin (12) with the light conductor (12a).

Figure 4 shows an advantageous further embodiment of the invention. In this embodiment, the yoke-shaped intermediate piece (17) is enlarged with respect to its diameter at its end (17d) and between this enlargement and the ball (15), a rubber ring (18) is mounted which is placed around the housing (10) and therefore pulls the yoke-shaped intermediate piece (17) against the housing 10 so that the two

press pieces (13a, 13b) are pressed into the receiving bore (11) as far as their larger diameter heads (13d) permit.

With this embodiment, when one inserts the plug pin (12) into the receiving bore (11), one then senses a resistance at each press piece which, since it is caused by the rubber ring (18), can, however, be easily overcome. In this manner, one obtains information as to how far the plug pin is inserted each time and that the press pieces (13a, 13b) are functioning correctly. It is understood that also in this embodiment, the plug pin will be correctly fixed when it is completely inserted by tightening the sleeve nut (16).

The precise positioning of the end face of the plug pin is effected by means of a mechanical abutment on that part (not shown) on which the plug housing (10) is attached with its openings (10a) for example on a measuring apparatus. The positioning of the end face of the plug pin can also be achieved by means of an abutment in a correspondingly configured plug housing. The light conductor (12a) can be made of a single light-conducting fiber or out of several or a multiplicity of light-conducting fibers.

An advantage of the above-described plug connector is that the fixation of the plug pin is achieved with a single rotational movement so that a one hand use thereof is possible.

CLAIMS

1. Plug connector for light conductors with a plug pin (12) attached centrally to the end of the light conductor, which is insertable into a receiving bore (11) of a plug housing (10) and fixable therein with a longitudinal groove (11a) being machined into the wall of the receiving bore (11) and with press piece (13a) being mounted in the part of the wall lying opposite the longitudinal groove (11a), which is pressable against the inserted plug pin (12) by sleeve nut (16) threadably mounted on the housing (10), characterized in, that two longitudinal grooves (11a, 11b) are machined into the wall of the receiving bore one behind the other and are separated from each other by a distance, that a press piece (13a, 13b) is provided for each longitudinal groove (11a, 11b), which is mounted approximately opposite the center of the longitudinal groove and that the press pieces (13a, 13b) are pressable against the inserted plug pin (12) at their ends (13d) facing away from the plug pin by a yoke-shaped intermediate piece (14) and a ball (15) by a conical surface (16a) of the sleeve nut (16).

2. Plug connector according to claim 1, characterized in, that the width of the longitudinal grooves (11a, 11b) is so selected, that the connecting planes between the edges of the longitudinal groove and the center axis of the connector pin (12) define approximately an angle of 90°.

3. Plug connector according to claim 1 or 2, characterized in, that yoke-shaped intermediate piece (17) is pressed against the press pieces (13a, 13b) by a rubber ring (18).

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