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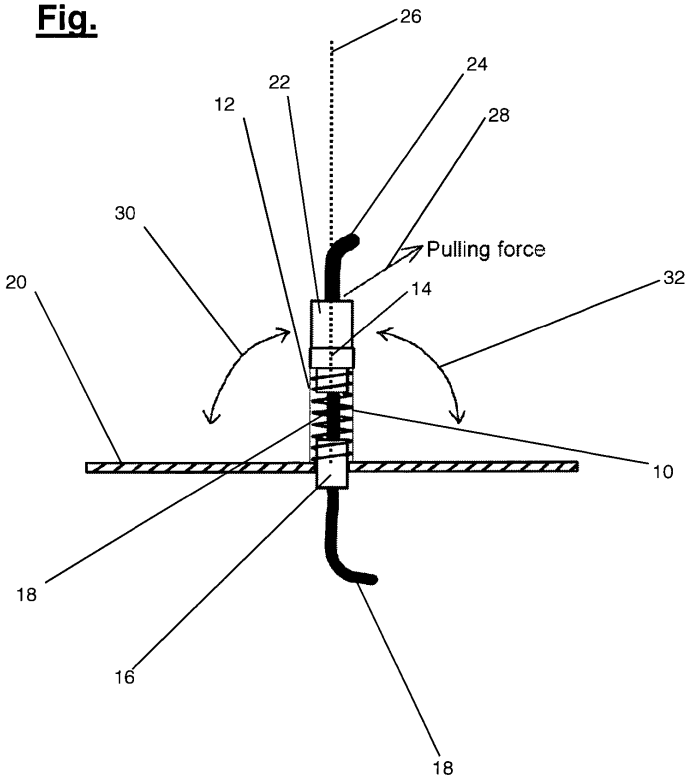
(54) Socket assembly

(57) A socket assembly comprises a socket element (14) retained within one end of a coiled spring (10), and a spigot (16) partly retained within the other end of the coiled spring, the spigot serving as a means to attach the socket assembly to a surface (20). When a plug (22) which terminates a cable (24) is coupled to the socket element of the socket assembly, tension in the cable causes the socket element to deflect (30, 32) so that the longitudinal axis (26) of the coupled plug and socket elements becomes substantially parallel to the cable, thus preventing damage to the cable. If the tension in the cable is sufficiently large, the plug disengages from the socket element, thus preventing the cable from breaking or becoming detached from the plug.

Fig.



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Description

[0001] The invention relates to a socket assembly for receiving a plug in order to make a connection for the purpose of transmitting, for example, fluid, or electricity, or light through optical fibres.

[0002] The use of plug and socket arrangements is well-known for making connections between pairs of electrical cables, fluid lines, fibre-optic cables etc. Typically, a first cable or fluid line terminates with a plug and a second cable or fluid line terminates with a socket element having a socket aperture at one end for receiving the plug. To connect the first and second cables or fluid lines, a first end of the plug is introduced into the socket aperture so that electricity, fluid, light etc can flow from one cable or line to the other. Generally, the first cable or line exits the plug at an end thereof remote to the end which is introduced into the socket element in order to make a connection. Similarly, the second cable or line exits the interior of the socket element via the end thereof remote to the socket aperture. While some types of plugs and sockets are designed for requiring manual operation for opening, e.g. by rotating or screwing one part against the other, this invention is related to so called breakaway connections where the plug and socket elements are designed in a way that just a defined amount of pulling force is required to disengage them; this ensures that the plug does not unintentionally fall out of the socket element thus disconnecting the first and second cables or lines.

[0003] In certain situations, there may be a tendency for the cable or line terminating in the plug to come under tension, either intentionally or unintentionally. In a general case this will result in the first cable or line being pulled taught to form a straight line which makes a finite angle with the longitudinal axis of the coupled plug and socket element. If the angle is sufficiently small, the component of the tension along the longitudinal axis may be sufficient to disengage the plug from the socket element. However, more typically the tension will result in damage to the first cable or line and/or the plug, without disengaging the plug unless and until the first cable or line subsequently moves so that the angle is sufficiently small for disengagement. In extreme cases the line or cable may break, or become detached from the plug. One example of such a situation is where a patient receiving medical treatment is connected to medical equipment such that a line or cable from the patient's body is plugged into a wall or some immovable or heavy equipment. If the patient moves away from the wall or unit, the line connecting him to the wall or unit will come under tension. Another example is where a pilot of an aircraft is connected to the interior of an aircraft so that a line or cable from the pilot's body is plugged into the interior of the aircraft. If the pilot forgets to unplug the line or cable on exiting the aircraft, the line or cable and its plug may become damaged due to the pilot pulling on the cable or line on exiting the aircraft.

[0004] The present invention provides a socket assembly comprising a socket element having an aperture for receiving a plug, characterised in that the socket assembly further comprises a flexible, resilient member, the socket element being fixed at a first end thereof such that said aperture is accessible.

[0005] The end of the flexible, resilient member remote from the socket element may be attached to a wall or a surface of an item of equipment. When a plug is coupled to the socket element of the socket assembly, and a force applied to an electrical cable or fluid line which terminates with the plug, the flexible, resilient member deflects so that the longitudinal axis of the coupled plug and socket element aligns with the cable or line, thus preventing damage to the cable or line, and/or the plug, and providing for the plug to be withdrawn from the socket element if the force is sufficiently high. When the force on the cable or line connected to the plug is removed, the resilient element returns to its normal position (which may be normal to the wall or surface).

[0006] Preferably the flexible, resilient member has the form of an elongate cylinder so that it may deflect easily when a relatively low force is applied to a cable or line terminating in a plug engaged in the socket assembly. This provides greater protection for the cable or line, and for the plug.

[0007] Conveniently, the elongate cylinder is hollow at a first end thereof and the socket element is retained within the first end.

[0008] The socket assembly preferably further comprises a spigot, the second end of the elongate cylinder being hollow and arranged to fit over and to be retained by the spigot. This allows for the socket assembly to be fixed to a surface: the spigot may be attached to or partially driven into the surface and the second end of the elongate cylinder may then be pushed over the spigot.

[0009] Preferably an electrical cable or fluid line exiting the socket element via an end thereof remote from the aperture of the socket element passes through the interior of the elongate cylinder and exits the socket assembly via the interior of the spigot. This provides for the cable or line to be contained within the socket assembly, and for it to pass to the side of a surface to which the spigot is attached, the side being remote from the socket assembly. Such side could for example be in the interior of an equipment unit, the socket assembly being mounted by the spigot on the exterior of the equipment unit.

[0010] Conveniently, the elongate cylinder may be formed by a coiled spring. In order to reduce ingress of dirt into the interior of the coiled spring, preferably it is enclosed along its length dimension by sleeve, for example a rubber hose.

[0011] Preferably a substantially inextensible strengthening fibre, within the elongate cylinder formed by the coiled spring, connects the socket element to the spigot. This prevents the coiled spring being deformed or overstretched when a very high force is applied to a cable or line terminating in a plug which is engaged with the socket element of the socket assembly.

[0012] Embodiments of the invention are described below by way of example only and with reference to the accompanying drawing in which shows an example socket assembly of the invention, and a plug engaged with the socket assembly.

[0013] Referring to the Figure, a socket assembly of the invention comprises a coiled spring 10 in the form of an elongate cylinder, a protective rubber hose 12 extending along the length of the coiled spring 10, a spigot 16 and a socket element 14. The protective rubber hose 12 reduces or eliminates entry of dirt and dust into the interior of the coiled spring 10. The socket element 14 is retained within the coiled spring 10 at a first end thereof so that its socket aperture is accessible to a plug 22. The coiled spring 10 and rubber hose 22 are fitted over and retained on a spigot 16 which is mounted in a surface 20. (The surface 20 could be a wall, or part of the external surface of an item of equipment for example.) A first electrical cable 24 terminates in the plug 22 and a second electrical cable 18 terminates with the socket element 22. Insertion of the plug 22 into the socket aperture of the socket element 22 establishes an electrical connection between the first 24 and second 18 electrical cables, as illustrated in the Figure.

[0014] In the absence of (mechanical) tension in the first electrical cable 24, the longitudinal axis 26 of the socket unit 14 and plug 22 is substantially normal to the surface 20. If tension is applied to the first electrical cable 24 by a pulling force in the direction 28, the coiled spring 10 and the rubber sleeve 12 will deflect so that the axis 26 aligns with the direction of the pulling force. This prevents damage to the cable 24 and the plug 22, and provides for the plug 22 to be disengaged from the socket element 14 to prevent breakage of the cable 24 or its detachment form the plug 22, given sufficient tension in the cable 24. The socket assembly can deflect in any direction as indicated by arrows 30, 32.

[0015] If tension is subsequently removed from the cable 24, the coiled spring 10 resumes a position substantially normal to the surface 20, i.e. the socket assembly has a resilient character so that it can assume its original position.

[0016] The second cable 18 may or may not be fixed to the spigot 18 where it exits the spigot 18. If the cable 18 is fixed at this point, then the length of the cable 18 between that point and the socket element 14 should be sufficient to prevent that portion of the cable 18 coming under tension when the socket assembly is deflected.

[0017] A strengthening fibre (not shown) within the coiled spring 10 connects the socket element 14 to the spigot 16. In the event of a very high force being applied to the cable 24, the strengthening fibre prevents the coiled spring from being permanently deformed or over-stretched. The length of the strengthening fibre is such that the socket assembly is free able to deflect easily, for example as indicated by arrows 30, 32 whilst also protecting against over-stretching and permanent deformation of the coiled spring 10.

Claims

1. A socket assembly comprising a socket element having an aperture for receiving a plug, **characterised in that** the socket assembly further comprises a flexible, resilient member, the socket element being fixed at a first end thereof such that said aperture is accessible.

2. A socket assembly according to claim 1 wherein the flexible, resilient member has the form of an elongate cylinder.

3. A socket assembly according to claim 2 wherein the elongate cylinder is hollow at the first end thereof, and wherein the socket element is retained within said first end.

4. A socket assembly according to claim 3 further comprising a spigot, and wherein the second end of the elongate cylinder is hollow and arranged to fit over and to be retained by the spigot.

5. A socket assembly according to claim 4 wherein an electrical or fibre-optic cable or a fluid line exits the socket element via an end thereof remote from the aperture of the socket element and passes through the interior of the elongate cylinder, and exits the socket assembly via the interior of the spigot.

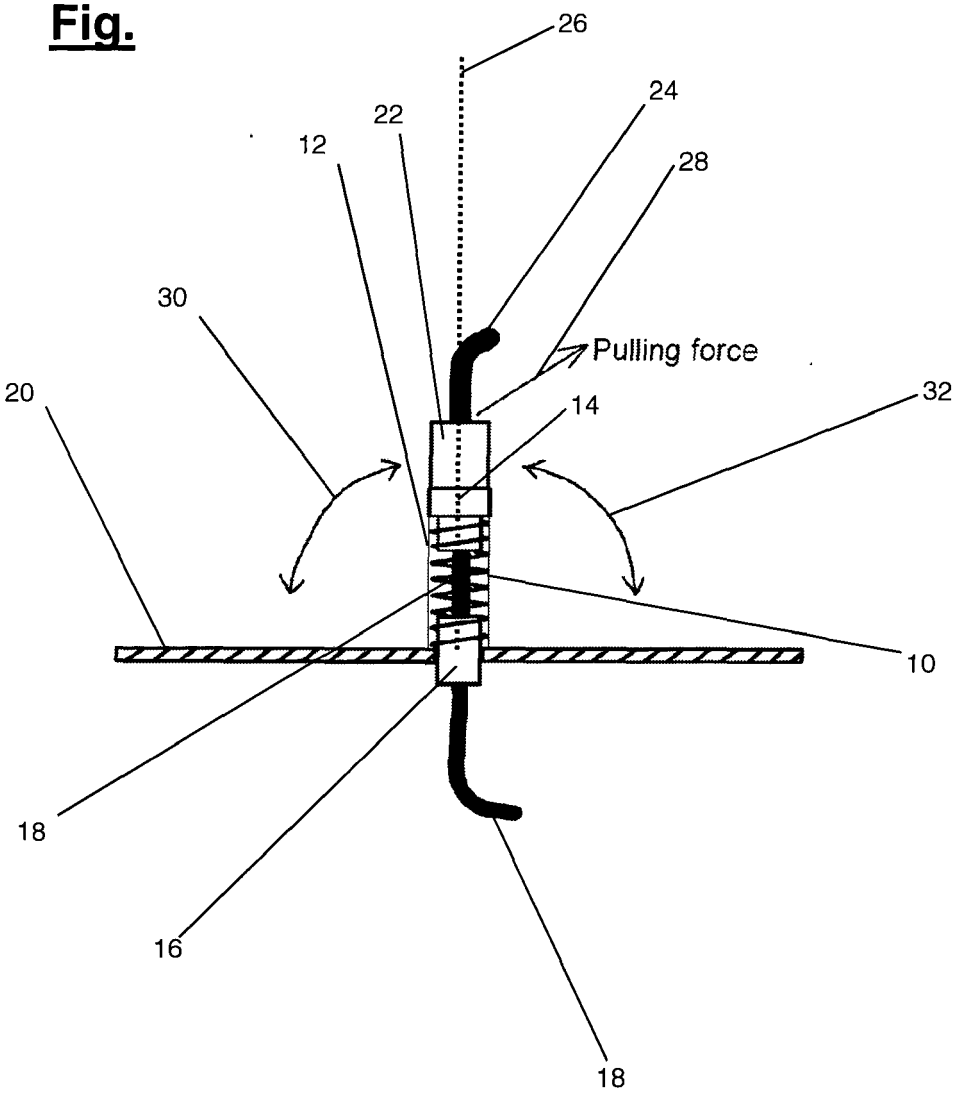
6. A socket assembly according to claim 5 wherein the elongate cylinder is formed by a coiled spring.

7. A socket assembly according to claim 6 wherein the coiled spring is enclosed along its length dimension by a sleeve.

8. A socket assembly according to claim 7 wherein the sleeve is a length of rubber hose.

9. A socket assembly according to any of claims to 6 to 8 further comprising a substantially inextensible strengthening fibre within the elongate, hollow cylinder defined by the coiled spring, the strengthening fibre connecting the socket element to the spigot.

Fig.



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EUROPEAN SEARCH REPORT

Application Number
EP 14 00 0619

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)
H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 June 2014	Oliveira Braga K., A

CATEGORY OF CITED DOCUMENTS

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26-06-2014

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