

Candidate's examination paper  
(Examination paper A/1992 Electricity/Mechanics)

Modular electrical fittings

The invention relates to a modular electrical fitting of the type comprising a suspendible central support member carrying an electrical connector and at least one arm carrying a cooperating connector removably mountable to the central support member so as to maintain electrical contact between the cooperating contacts.

One type of electrical fitting of this type is a chandelier.

A problem with chandeliers is that they occupy a lot of space when assembled, which makes their packaging, storage and shipment in the assembled condition expensive. To solve this problem we developed earlier and have been selling modular chandeliers as described in document I. The arms of these modular chandeliers are releasably (i.e. removably) mountable to the central support structure. This makes it possible to pack the chandeliers in a disassembled condition and thereby to reduce the storage and shipping costs. Such chandeliers are assembled by first suspending the support structure from the ceiling of the room and thereafter mounting the arms on the already suspended support structure. Since the arms are releasably mountable on the support structure, it is even possible to remove them when the chandelier is in place, thereby facilitating cleaning of the chandelier.

In the known chandeliers the central support structure has a plurality of electrical connectors with female electrical contacts which cooperate with the male contacts of corresponding electrical connectors provided on each of the arms. The female contacts are so disposed on the central support structure that, when the support structure is suspended from the ceiling of a room, the male contacts of an arm have to be inserted vertically. This is difficult because the female contacts are not readily accessible to the person mounting the arms.

Furthermore, in the case of the chandelier shown in Figure 1 of document I with large and heavy arms which are releasably attached to the support structure at two vertically displaced positions, it is necessary to lower the arm vertically so that both mechanical and electrical engagement can occur simultaneously at the vertically displaced positions.

It is accordingly our aim to provide an improved modular electrical fitting which enables easier mounting of the arms onto the suspended central support structure.

In accordance with a first aspect of this invention there is provided a modular electrical fitting of the type described above characterised in that electrical contact is established by movement of the arm relative to the central support member in a direction substantially transverse to the suspension axis of the central support.

In this arrangement by effecting contact by transverse movement visual accessibility to the connectors is assured.

By placing the connection axis transverse to the axis of suspension the arm must be moved transversely for connection and insertion can easily be effected.

One type of connector particularly suitable in this arrangement and useful in alternative arrangements is a connector having first and second electrically conductive plates separated by an insulating spacer and each mounted to allow movement relative to the spacer in a direction transverse to the plane of the plate between first and second positions.

This arrangement allows for connection to be made by insertion of the pins of the plug either between the spacer and respective plates, outside the plates or a combination of both so that the plates press against respective pins of the inserted plug on the arm to ensure contact therebetween.

Flat pin plugs are preferably provided on the cooperating connectors of the arms in order to allow a large area of contact with the plates as they are slid into contact therewith. The relative movement between the spacer and the plates ensures the smooth making and breaking of electrical contact.

The plates are preferably mounted in a housing that prevents excessive movement of the plates and thereby ensures good electrical contact with inserted plugs.

The spacer is preferably resilient in order to improve the connection achieved between the connectors.

The connector is preferably arranged so that the arm is supported by contact between the connectors and plates and by the arm resting on the bottom of the housing when inserted into an aperture to effect contact. The plates are preferably copper as it is a good insulator.

The spacer preferably comprises a central aperture to allow the electrical connectors to be passed therethrough for contact with one of the plates.

A locking member may be provided to secure the arms in position relative to the connector. This is preferably a resilient member that is deformed by the arm on electrical connection being made and snaps back over an abutment on the arm to prevent its withdrawal.

When heavy arms are required to be attached to a central support it is desirable for attachment to be made at two vertically displaced positions. In order to allow transverse motion to effect electrical contact, it is necessary for the connection to the support displaced from the electrical connector to be rotatable about a transverse axis. This may be achieved by a hook attached to the arm at a position remote from the cooperating connector. This hook may be adapted to fit within a notch in a second support member. A vertical slot of greater width at the top than the bottom allowing the hook to sit over a wall of the second support member. This

allows some pivotal motion to be achieved about the wall with the danger of detachment.

The second support member could be the upper or lower of the support members depending on whether the arm is adapted to withstand tension or compression.

### Claims

1. A modular electrical fitting (1) comprising a suspendible central support member (12, 13, 14) carrying an electrical connector (14), and at least one arm (2) carrying a cooperating connector (22) removably mountable to the central support member (12, 13, 14) so as to maintain electrical contact between the cooperating contacts (18) characterised in that electrical contact is established by movement of the arm relative to the central support member in a direction substantially transverse to the suspension axis of the central support member.
2. A modular electrical fitting according to claim 1 wherein the electrical connector carried (14) by the central support member comprises first and second electrically conductive plates (30, 31) separated by an insulating spacer (32) each mounted for movement relative to the spacer along the direction of the suspension axis between first and second positions.
3. A modular electrical fitting according to claim 2 wherein the insulating spacer (32) is resilient.
4. A modular electrical fitting according to claim 2 or 3 wherein the plates (30, 31) are accommodated within a housing (38, 39) comprising a plurality of apertures (8) for receiving two contact pins (23) of the cooperating connector (22) on the arm (2) for contact with respective plates, and wherein contact between the contact pins (23) and the plates (30, 31) provides electrical connection between the arm and central support member and mechanical support.
5. A modular electrical fitting according to claim 4 wherein the housing is adapted to provide support for the arm.
6. A modular electrical fitting according to any one of claims 2 to 5 wherein the plates are copper.
7. A modular electrical fitting according to any one of the preceding claims further comprising a locking member (64) cooperating with the arms to secure them in position.
8. A modular electrical fitting according to claim 7 wherein the locking member (54) comprises a resilient flange (55) automatically engaging with a corresponding abutment (61) on the arm (2) on effecting contact between the cooperating electrical contacts for releasably securing the arms in position.

9. A modular electrical fitting according to any one of the preceding claims further comprising a support structure (1) displaced along the suspension axis relative to the connector (14) and wherein the arm comprises a hook for a mounting thereto allowing the arm to be pivoted relative to the support structure (2) about an axis transverse to the suspension axis to allow electrical contact to be effected.
10. A modular electrical fitting according to any one of the preceding claims wherein the electrical fitting comprises a chandelier (1) comprising a plurality of arms (2).
11. An electrical connector (14) comprising first and second electrically conductive plates (30, 31) separated by an insulating spacer (32) each mounted for movement relative to the spacer along a direction transverse to the plane of the plates between first and second positions.
12. A modular electrical fitting according to claim 1 wherein the electrical connector carried by the support member is exposed to view from the side.
13. A modular electrical fitting according to claim 1 wherein the electrical connector carried by the suspendable central support is visibly disposed with its axis of connection extending transverse to the suspension axis.
14. A modular electrical fitting according to claim 9 wherein the support structure comprises a housing having at least one notch corresponding to each arm and wherein the hook comprises a slot of greater width at its innermost extremity for fitting over the lower edge of the notch to allow relative rotation between the support structure and arm without disengagement occurring.

Note to examiner

1. Claims fee will be payable, if not wanted I would drop claim 6.
2. Claim 11 may form basis of a divisional application.