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ELECTRICAL APPARATUS HAVING A HOUSING AND A WITHDRAWABLE FRAME OR LIKE SUPPORT

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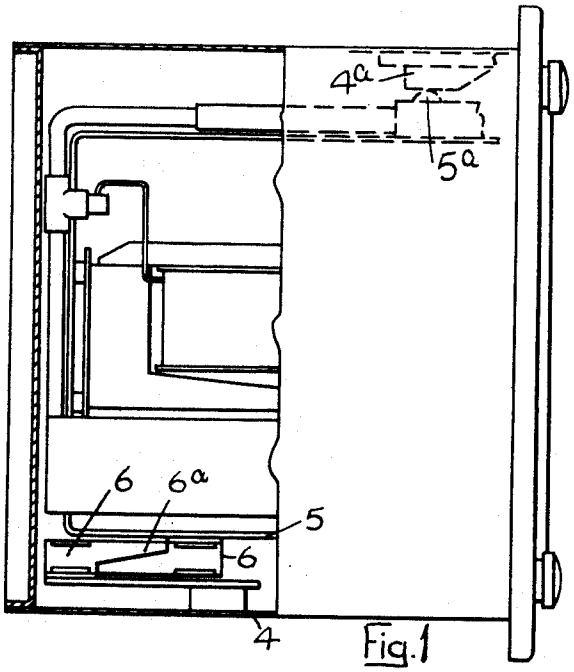

Fig. 1

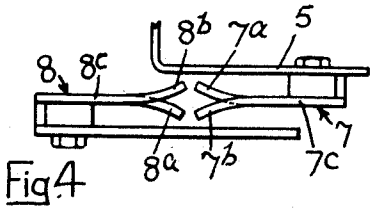

Fig. 4

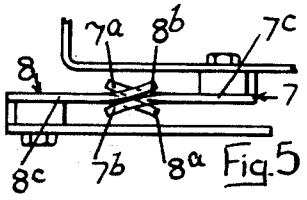

Fig. 5

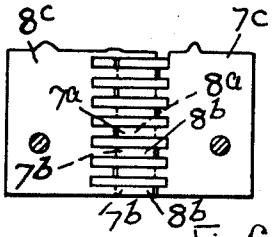

Fig. 6

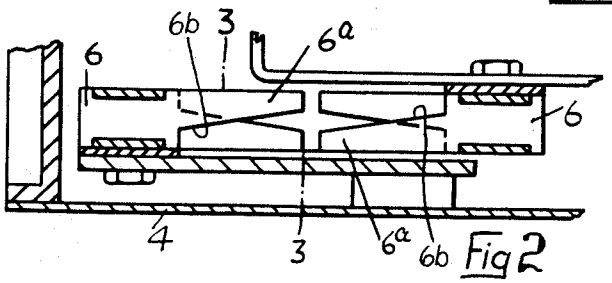

Fig 2

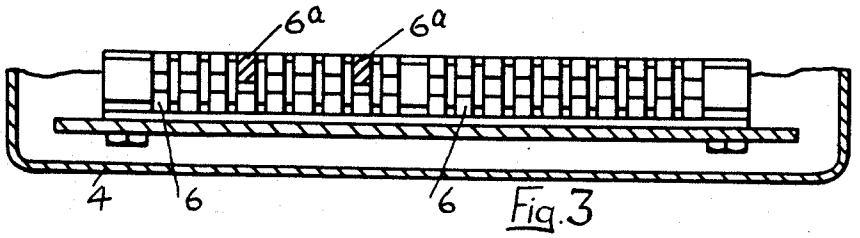

Fig. 3

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ELECTRICAL APPARATUS HAVING A HOUSING AND A WITHDRAWABLE FRAME OR LIKE SUPPORT

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5 Claims. (Cl. 200—50)

This invention relates to electrical apparatus of the kind which includes a housing together with a frame or like support (hereinafter referred to as a frame) which carries or is adapted to carry a plurality of electrical components, the frame being removably supported in the case when the apparatus is in use and being arranged to be withdrawn from the case for the purpose of inspecting, servicing or replacing any of said components or for other purposes, there being also provided a plurality of pairs of interconnectible contacts, one contact of each pair being mounted on the case and the other contact of the pair being mounted on the frame so that the two contacts of each pair can be interconnected when the frames is fully engaged with the case.

Examples of such apparatus are instruments of various kinds, meters, and relays although it is to be understood that the invention is not restricted to those examples only.

With such apparatus, the contacts mounted on the case may form a terminal adapted to be connected to an external source of supply or may be adapted to be connected to such a terminal. Furthermore, one design of case may be used to house a variety of component assemblies carried by the frame. Thus said compartments may be varied in number or position or different components may be required in different assemblies in accordance with various service requirements. With these various arrangements different assemblies of components carried by the frame may require the employment of different combinations of case contacts or different connections between such contacts and under such circumstances it is desirable to ensure any particular frame assembly can only be used with the case having the desired combination or connection of contacts.

One object of the present invention is to provide a construction in which the above-mentioned desideratum is achieved.

Further objects and advantages will become clear from the following description.

In the accompanying drawings:

FIGURE 1 is a side elevation, partly in section, of one example of electrical apparatus in accordance with the invention,

FIGURE 2 is a fragmentary sectional view similar to FIGURE 1 but showing the frame partially withdrawn from the housing,

FIGURE 3 is a fragmentary sectional view taken on the line 3—3 of FIGURE 2,

FIGURE 4 is a view similar to FIGURE 3 but showing an alternative form of identification element,

FIGURE 5 shows the identification elements of FIGURE 4 when the frame is fully inserted and

FIGURE 6 is a plan view of the elements in the position shown in FIGURE 5.

Referring to FIGURE 1 of the drawings, the apparatus is provided with a housing **4** which is adapted to receive a frame **5** on which can be mounted a plurality of electrical components. Furthermore, the housing is provided with a plurality of contacts **4***a* adapted to engage respectively with or to be otherwise connected to a plurality of

contacts **5***a* carried by the frame when the latter is fully assembled to the case.

The housing and frame are also each provided with a plurality of identification elements **6** which can be used to ensure that any particular frame assembly can only be inserted into the appropriate housing.

Each of said identification elements **6** is in the form of a flat plate of substantially L-shaped configuration and the elements associated with the case **4** are spaced apart in a straight line so that each element will be positioned opposite to a coacting element mounted on the frame **5** when the latter is assembled to the case. Thus there are provided a plurality of pairs of coacting elements **6** one element of each pair being mounted on the case and the other element on the frame.

By reason of its L-shaped configuration each element has projection **6***a* and a recess **6***b*, one limb of the element forming the projection and the space between the two limbs in the angle of the L forming the recess. The elements of each pair are arranged so that the propection of one element of the pair is directed towards the recess of the other element of the pair whereas the recess of the first mentioned element is adapted to receive the projection of said other element. In effect therefore one element of each pair is upside down with respect to the other element. The frame can thus be fully assembled to the case if each of said projections enters fully into the coacting recess. To this end all of the elements on the case can be similarly orientated and all of the elements on the frame can also be similarly orientated. Alternatively one or more of the elements on the case in various positions can be reversed by being turned upside down or by being rotated and the frame can then only be assembled to the case if the corresponding elements on the frame are similarly treated. FIGURE 4 shows by way of example a case in which two of the identifying elements have been reversed. Thus by providing a sufficiently large number of elements on the frame and the case a large number of unique arrangements can be obtained so as to cater for a large variety of possible frame assemblies.

In the example shown in FIGURES 4 to 6 the identification elements of the frame and those of the housing are integrally formed respectively on a pair of combs, **7**, **8**, the teeth of the combs forming the identification elements. A predetermined number of the teeth **7***a* of the comb associated with the frame **5** are bent in one direction relative to the back **7***c* of the comb, whilst the remainder **7***b* are bent in the opposite direction. The teeth, **8***a*, **8***b* of the comb **8** associated with the housing are bent respectively in the directions opposite to the associated teeth **7***a*, **7***b* of the frame comb **7**. Thus when the frame is fully inserted into the housing the teeth of the two combs do not interfere with each other as shown in FIGURE 5. If, however, an attempt is made to insert a frame into the wrong housing in which the teeth of the associated comb are incorrectly orientated then at least one tooth of one comb will engage the end of the associated tooth in the other comb to prevent complete insertion of the frame.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. Electrical apparatus comprising a housing, a frame removably supported in the housing, electrical components mounted on said frame, a plurality of contacts mounted on the frame and electrically connected to the electrical components, a plurality of contacts mounted on the housing and electrically connectible with the contacts mounted on the frame when the frame is fully inserted into the housing, a plurality of first identification elements, means connecting said first identification ele-

ments to the frame permitting displacement of each of said first identification elements between two alternative positions to define a first arrangement of elements, a plurality of second identification elements, means connecting said second identification elements to the housing permitting displacement of each of said second identification elements between two alternative positions to define a second arrangement of elements and at least one of said first identification elements being engageable with a co-acting one of said second identification elements to prohibit full insertion of said frame into said housing unless said first arrangement is complementary to said second arrangement.

2. Electrical apparatus comprising a housing, a frame removably supported in the housing, electrical components mounted on said frame, a plurality of contacts mounted on the frame and electrically connected to the electrical components, a plurality of contacts mounted on the housing and electrically connectible with the contacts mounted on the frame when the frame is fully inserted into the housing, a plurality of first identification elements each having an asymmetrically disposed projection and an asymmetrically disposed recess, means connecting said first identification elements to said frame permitting displacement of each of said first identification elements between two alternative positions to define a first arrangement of elements, a plurality of second identification elements each of which is identical to each of said first identification elements, means connecting said second identification elements to the housing permitting displacement of each of said second identification elements between two alternative positions to define a second arrangement of elements, the projections of said first identification elements being receivable respectively by the recesses of said second identification elements and the projections of said second identification elements being receivable by the recesses of said first identification elements when said first and second arrangements of elements are complementary, but the projection of at least one of said first identification elements being engageable with the projection of a co-acting one of said second identification elements to prevent full insertion of the frame into the housing of said first and second arrangements are not complementary.

3. Electrical apparatus comprising a housing, a frame removably supported in the housing electrical components mounted on said first frame, a plurality of contacts mounted on the frame and electrically connected to the electrical components, a plurality of contacts mounted on the housing and electrically connectible with the contacts mounted on the frame when the frame is fully inserted into the housing, a plurality of first identification elements each having an asymmetrically disposed projection and an asymmetrically disposed recess, first clamping means mounted on the frame and supporting said first identification elements each of which is disposed in one of two alternative positions relative to said first clamping means to define a first arrangement of elements, a plurality of second identification elements each of which is identical to each of the first identification elements, second clamping means mounted on the housing and supporting said second identification elements each of which is disposed in one of two alternative positions relative to said second clamping means, the projections of said first identification elements being receivable respectively by the recesses of said second identification elements and the projections of said second identification elements being receivable by the recesses of said first identification elements when said first and second arrangements of elements are complementary, but the projection of at least one of said first identification elements being engageable with the projection of a co-acting one of said second identification elements to prevent full insertion of the frame into the housing if said first and second arrangements are not complementary.

4. Electrical apparatus as claimed in claim 4 in which each of said first and second identification elements is in the form of a flat plate of L-shaped configuration having a first limb engaged by said clamping means and a second limb projecting from the clamping means to form said projection so that the space between said limbs forms said recess.

5. Electrical apparatus as claimed in claim 1, in which said first and second identification elements are in the form of prongs and said connecting means comprises first and second flat back portions to which said first and second identification elements are integrally connected respectively, said prongs each being bendable to either of two alternative positions.

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