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(56) Documents Cited
GB 2233509 A US 4544219 A US 4379607 A

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Online databases:WPI

(54) Electrical socket connector

(57) A shuttered electrical socket outlet comprises at least two openings 11, 13 for the terminals of a corresponding plug, and superposed shutters 12 at each of the two openings, each resiliently biased into positions that independently close the openings, and in which the insertion of a terminal into one opening causes the outer shutter therein and the inner shutter in the other opening to move into open positions, independently of the outer shutter in said other opening and of the inner shutter in said one opening.

Fig.1a.

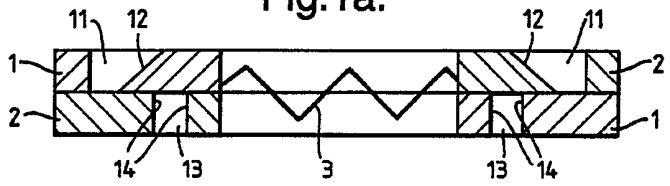


Fig.1b.

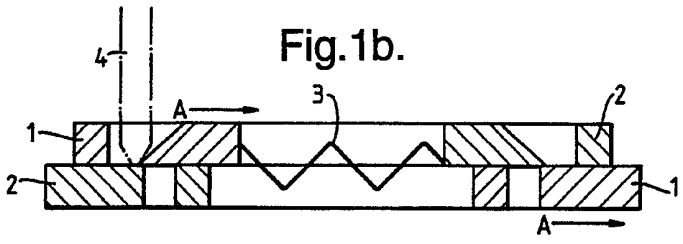
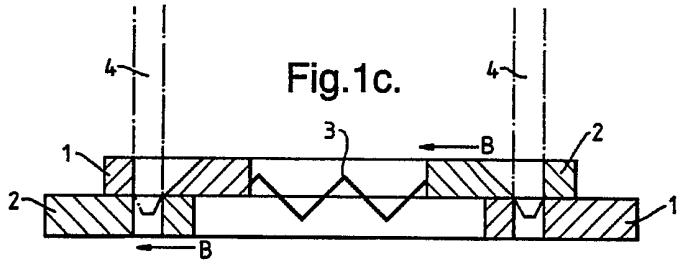


Fig.1c.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig.1a.

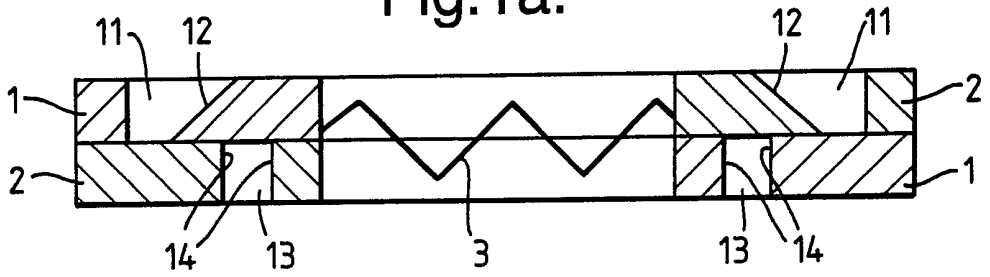


Fig.1b.

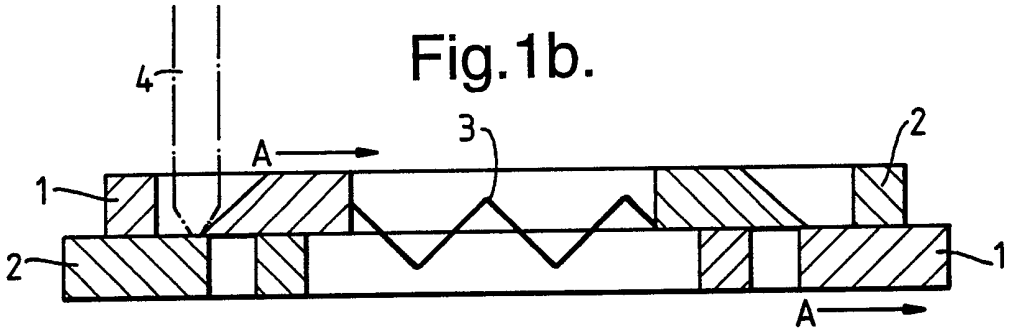
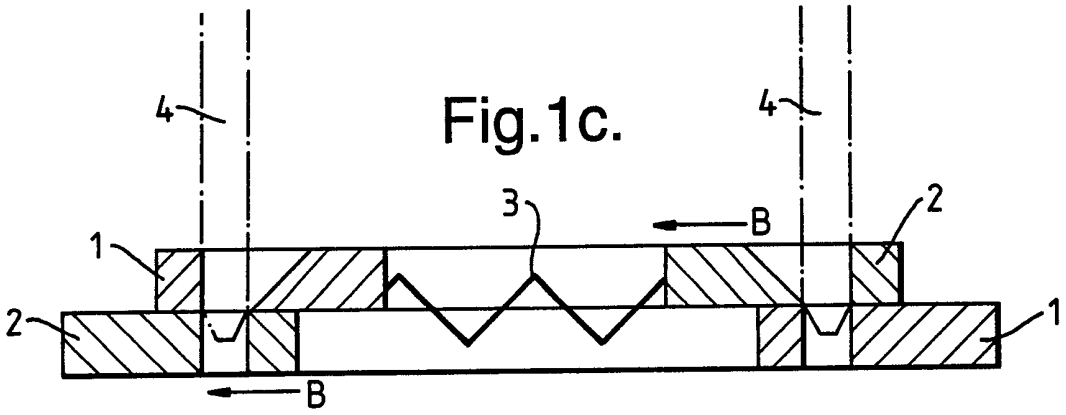


Fig.1c.



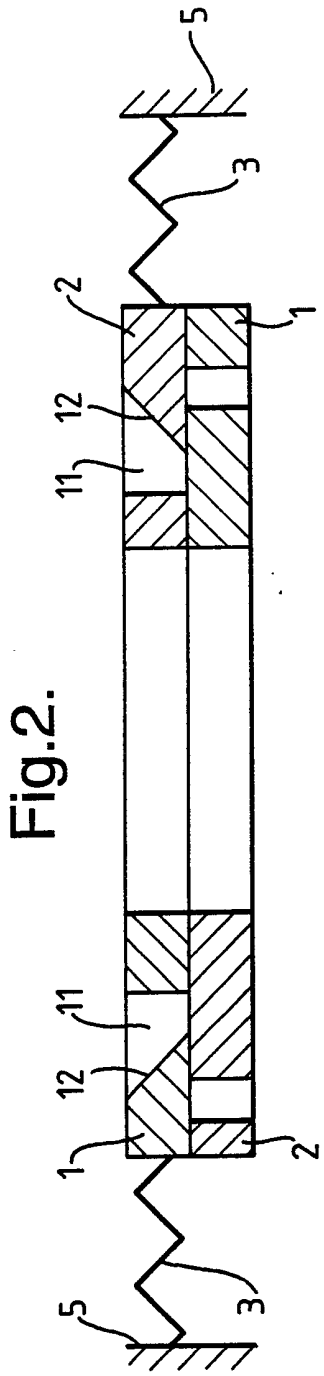


Fig.2.

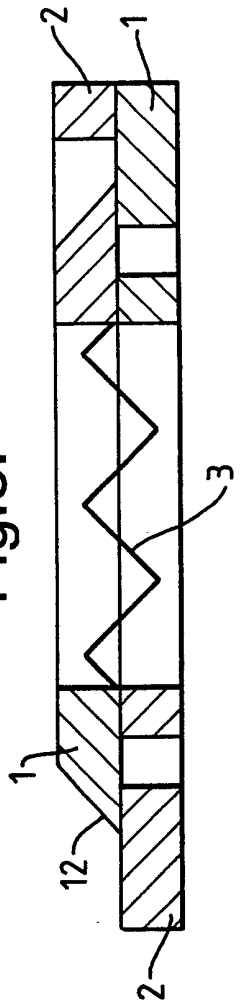


Fig.3.

Fig.4a.

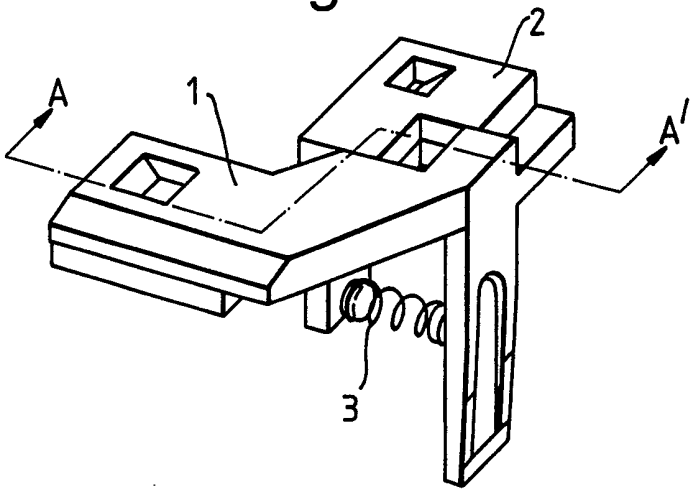
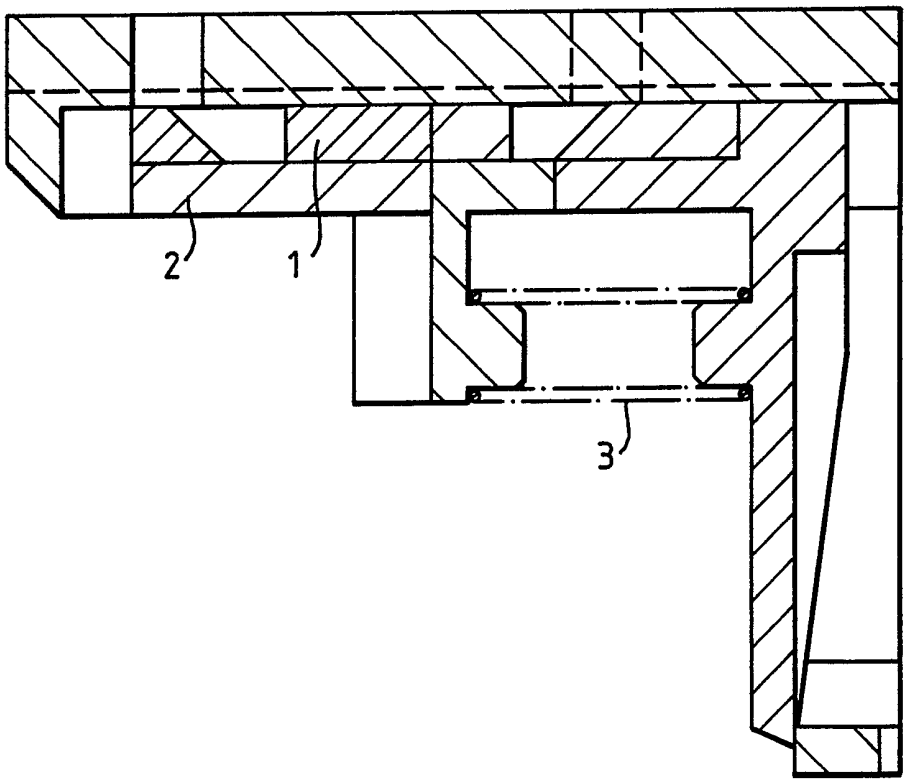


Fig.4b.



ELECTRICAL SOCKET CONNECTOR

This invention relates to a shuttered electrical socket connector.

Various electrical socket outlets are known, of the type comprising at least two openings for the terminals of a corresponding plug, and including shutters at one or more of the openings. The shutter is suitably biased into a position that closes a respective opening, to prevent an object (other than the plug) from being inserted through one opening into engagement with a live terminal in the socket.

GB-A-1438938 describes an assembly of this type. GB-A-2089146 and GB-A-2149978 describe sockets in which shutters are opened by a shroud on the plug.

The present invention is adapted to solve the problem that, in conventional shuttered sockets, the displacement of a shutter at one outlet makes other terminals in the socket available. Accordingly, in a novel shuttered electrical outlet of the type comprising at least two openings for the terminals of a corresponding plug, there are first and second superposed shutters at each of the two openings, each resiliently biased into positions that independently close the openings, and in which the insertion of a terminal into either opening causes the outer shutter therein and the inner shutter in the other opening to move into open positions, independently of the other outer and inner shutters.

According to the present invention, therefore, a conventional socket of the type having live and neutral terminals is adapted so that both pins of the plug are required to operate the complete shutter mechanism. A single pin or other object, alone, will not.

It is preferred that the shutter mechanism of the invention comprises first and second co-operating shutters, the first comprising the outer shutter at one opening and the inner shutter at the other, and the second comprising the outer shutter at the other opening and the inner

shutter at the one. It is however within the scope of the invention to use more than two shutters, as may be required for two or more socket openings. In the simplest case, however, the two shutters overlap one another such that if one pin, or other object of suitable size, is pushed into a socket opening, the outer shutter at that opening will move to a position allowing the pin to pass further into the socket opening. However, it is prevented from entering yet further by the section of the second shutter, positioned underneath it. At this stage, if the second shutter was likewise being operated by its pin, the shutter would move across to a position allowing the first pin to pass it and mate with the internal socket contact.

In a first embodiment, each of the first and second shutters have two apertures therein, one aperture in each shutter corresponding to each socket opening. In the closed position, the apertures in each shutter are displaced from their respective socket openings. When a pin is pushed into a socket opening the outer shutter at that opening will move to align its aperture with the opening, thereby allowing the pin to pass through the opening. However, the second shutter does not have an aperture in that position, so therefore the pin is prevented from entering further. When a pin operates the second shutter, the second shutter will move across to a position where a second aperture in it will coincide with the first aperture in the first shutter, thereby allowing full insertion of the pin.

In a second embodiment, at least one of the inner or outer shutters does not have an aperture therein. Instead, the at least one shutter is designed to cover its respective opening in the closed position.

In a preferred example of this embodiment, at least one of the shutters has a first aperture therein, but no second aperture.

In another example, at least one of the shutters has a second aperture therein, but no first aperture. In this

case, when a pin is inserted in a socket opening the pin engages the edge of the shutter at that opening, causing the shutter to slide across and expose the opening at that position. The edge of the shutter typically comprises an angled surface.

In yet another example, neither of the shutters has any apertures therein.

The second embodiment of the present invention is particularly advantageous when space constraints are imposed on the socket outlet.

For all possible variations, means, e.g. biassing means, for returning the shutters to their closed position is required once the mating plug has been removed. The return mechanism may be a coiled helical spring, a hair spring, or a leaf spring (of plastics or metal).

The respective centres of each first aperture and its associated second aperture may be aligned with one another. That is not essential: for example, the respective centres may be offset.

The invention will now be described by way of example only with reference to the accompanying drawings:

Figures 1a, 1b and 1c are three diagrammatic representations of a first embodiment of the present invention. They show first and second shutters of a socket (not shown) which are respectively both closed, one open and one closed, and both open.

Figure 2 is a diagrammatic representation of a first embodiment of the present invention.

Figure 3 is a diagrammatic representation of a second embodiment of the present invention.

Figure 4a is a top view of a second embodiment of the present invention, and Figure 4b is a cross-section along the line A-A′ of that.

As shown in Figures 1a, 1b and 1c, a first aperture 11 in each of the first 1 and second 2 shutters has an angled surface 12 to one of its sides such that it will move to one side when a pin 4 or a mating plug pushes against it.

A second aperture 13 in each of the first and second shutters has sides 14 which are generally parallel, although they need not be. In this embodiment, the two shutters slide towards one another (arrows A and B show the direction of motion of the first and second shutters respectively) and a coiled spring 3, which is compressed by the movement of the shutters, returns them to their closed position when the mating plug is removed. The sliding action of the two shutters can be towards one another (see Figure 2), away from one another, or both in the same direction, depending on the position of the first and second apertures in relation to each other and the positioning of the angled faces in the first apertures.

As shown in Figure 2, the return mechanism comprises two coiled compression springs 3 positioned between the outer end surface of the outer shutters and a housing 5 enclosing the socket outlet. A similar arrangement has the two springs positioned between the inner shutters and the housing.

As shown in Figure 3, the outer shutter of the first shutter 1 is shortened in length and does not have a first aperture 11. On insertion of a pin, the pin engages the edge of the first shutter which moves across and exposes the socket opening.

As shown in Figures 4a and 4b, the first apertures 11 of the first 1 and second 2 shutters are offset from one another. The second shutter does not have a second aperture therein, but instead simply covers its respective socket opening.

In the drawings, the two shutters are shown as sliding across one another in a linear motion. Alternatively, they could slide across one another in an arc around a common pivot point.

CLAIMS

1. A shuttered electrical socket outlet comprising at least two openings for the terminals of a corresponding plug, characterised by superposed shutters at each of the two openings, each resiliently biased into positions that independently close the openings, and in which the insertion of a terminal into one opening causes the outer shutter therein and the inner shutter in the other opening to move into open positions, independently of the outer shutter in said other opening and of the inner shutter in said one opening.

2. A socket outlet according to claim 1, in which a first shutter device comprises the outer shutter at one opening and the inner shutter at the other, and a second shutter device comprises the outer shutter at the other opening and the inner shutter at the one opening.

3. A socket outlet according to claim 2, wherein at least one of the outer or inner shutters has an aperture therein, the apertures at each opening being displaced from one another in the closed position and aligned with one another in the open position.

4. A socket outlet according to claim 3, wherein at least one of the inner or outer shutters has no aperture therein.

5. A socket outlet substantially as herein described with reference to the accompanying drawings.

Patents Act 1977
.aminer's report to the Comptroller under Section 17
(The Search report) -6-

Application number
GB 9413782.5

Relevant Technical Fields

(i) UK Cl (Ed.N) H2E (EDBA)

(ii) Int Cl (Ed.6) H01R (13/453)

Search Examiner
MR J L FREEMAN

Date of completion of Search
12 OCTOBER 1994

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES WPI

Documents considered relevant following a search in respect of Claims :-
1 TO 5

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2233509 A	(TAIWAN NPC LTD) Figures 1 and 2	1 and 2
X	US 4544219	(E E BARKAS) Figure 1	1 and 2
X	US 4379607	(W R BOWDEN) column 5 line 37 to column 2 line 38	1 and 2

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).