

Description

This invention relates to an electrical connecting device comprising a unitary housing, an adapter in the housing in the form of a multiple pin electrical plug for selectively providing electrical pins in different configurations corresponding to different electrical sockets comprising a plurality of pins selectively extendable beyond a shutter member movable between a plurality of discrete positions for selecting one of said different configurations and permitting extension of predetermined ones of said pins. Such a plug is described *inter alia* in EP—A—0,048,078. (Art within the terms of Article 54(3)). DE—A—2,414,203 describes another plug of this type.

US—A—3,880,491 describes an electrical connector including a voltage converter with a single set of inlet pins.

EP—A—0,104,279 (Art within terms of Article 54(3)) provides a plug characterised by the shutter member movable between the discrete positions by a hand operated slider, at least one pair of said pins being provided on a prismatic sliding member, said sliding member having guide rails and the shutter plate having protuberances coacting with said guide rails to permit said sliding member to be extended from or retracted into said plug when said shutter plate is in one of said discrete positions and to permit movement of said shutter plate into another discrete position, preventing retracting of said sliding member when the latter is extended.

In accordance with the present invention an electrical connecting device provides an electric outlet for receiving an electrical plug and an electrical voltage converter.

By the term voltage converter is herein meant any device for changing the electrical energy from one strength to another such as a step-up or step-down transformer or any electrical or electronic circuit that can produce the same or a similar end result to that of the said transformer; or again the converter may be a converter *per se* in which *a.c.* is changed to *d.c.* or an inverter in which *d.c.* is changed to *a.c.*

Some embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:—

Figure 1 is a view in oblique perspective of the housing of an electrical connecting device showing its base and electrical inlet,

Figure 2 is a similar view to Figure 1 showing the top with the opening for an electrical outlet.

Figures 3A to 3D are schematics showing various constructions of the converter part of the electrical connecting device,

Figure 4 is a view in oblique perspective of a metal heat sink associated with the converter,

Figures 5A, 5B, 5C1, 5C2, 5D taken seriatim are views in oblique perspective showing:—

- i) the plugging in of an electrical appliance to the device of Figures 1 to 4 completed by its electrical components
- ii) simple inlet flat pins selected with double geometry for *inter alia* U.S.A., Canada, Japan, Australia, New Zealand.
- iii) inlet pins for *inter alia* Europe and South America, inset pins not extended.
- iv) as in (iii) above with inlet pins extended.
- v) inlet pins selected for *inter alia* United Kingdom electrical outlet socket.

Figures 6—8 of the drawings show the plugs of 1 to 5 in more detail. More specifically:

Figures 6A, 6B, 6C are presented in third angle orthographic projection. Figure 6A shows an inlet voltage face of a multiple plug, Figure 6B a side elevation and Figure 6C an outlet voltage face.

Figure 7, shows the inlet face of Figure 6A with an alternative inlet configuration different from that of Figure 1 but in an intermediary condition.

Figure 7_{1A} shows to an enlarged scale in oblique perspective the configuration of Figure 7₁.

Figure 7_{1B} also in oblique perspective shows the pin configuration in its final form for one of the electrical usages.

Figure 8 is another alternative inlet configuration shown in a form similar to that of Figures 1 and 2.

Referring now to Figures 1 and 2 the unitary housing of the connecting device is shown generally at 10, it is made in two parts 11₁, 11₂ screwed together as at 11₃; the parts are preferably made from a flame resistant hard plastics material. The housing contains an adapter comprising an electrical plug with multiple pins (see Figure 5 and others). The location of the pins is represented by arrows I₁ to I₅ in the opening 12. The pins plug into a power supply. The pins are variable in their geometry to meet the various configurations and sizes of electrical voltage power outlets of the major countries of the world. This will be described later.

The voltage converter is electrically connected to the outlet 13 (Figure 5) in the housing of an adapter and louvres such as L1, L2, L3 allow any heat generated therein to be readily dissipated.

The electrical outlet socket 13 is able to accept for example a two pin outlet as shown by arrows O₁, O₂.

As shown in Figure 3A the plug voltage converter may comprise set-up transformer T₁ (say 110v input to 220v output at 65 watts).

In Figure 3B the voltage converter C₁ has a heat sink with fins F₁ a resistor R₁ and electronic components E₁ (say for 220v input to 110v output) at 1500 watts or 65 watts).

In Figure 3C the electrical inlets are electrically connected to a step-up, step-down transformer T3 selected by a switch S1.

In Figure 3D the inlets are electrically connected to a step-up transformer T1 (as in Figure 3A) and a voltage converter C1 (as in Figure 3B) selection of either T1 or C1 being controlled by switch S2.

In Figure 5A the above described unitary plug/

converter is shown with a multiple geometry outlet as described and claimed in our co-pending European application EP—A—0 104 279 filed on 4th August 1982. Any suitable appliance A1 is plugged into the plug/converter shown generally at 10 at orifices 13 using outlet pins 0₁, 0₂ (Figure 2).

In Figure 5B a flat pin pair P₁, P₂ is selected; said pins provide two geometries one as shown the other by orientation of the pins on their axes for different voltage outlets as met for example in the U.S.A., Canada, Japan, Australia and New Zealand.

In Figure 5C₁ a right cylindrical pin pair P₃, P₄ is selected non-extended and in Figure 5C₂ pin pair P₃, P₄, extended via pin slide 23 under the control of a shutter plate not shown actuated by slider 22.

In Figure 5D a three flat pin inlet is selected for say a United Kingdom standard voltage outlet, the pins being shown at P₅, P₆, P₇.

Turning now to Figures 6 to 8 in view of the more detailed description different reference numerals are used.

Referring now specifically to the figures. In Fig. 6A, 6B, 6C, an electrically connecting device shown generally at 110 has either an inlet face F with a two part case 111 a, 111 b held together by screws 111, 111₁. The case has outlet sockets 112, 112₂ and vent louvres 113.

Consider now the multiple pin plug shown generally at 120 (Figure 6A). A movable shutter plate 121 has an integral slider 122 accessible to the hand of the operator, the edge 122₁ of the slider may be brought into alignment with index marks on the inlet face such as marks A, B1, B2 and C to give four separate pin geometries.

In Figure 6A the edge 122₁ is against index mark A and the flat pin pair P1, P2 are withdrawn and each turned through an angle. Spring bias is provided to locate the pins in the turned position which is the correct position for use in accepting the electrical voltage outlets of U.S.A. and Australasia for example. This is a first pin geometry.

Consider now the position shown in Figure 7. The edge 122₁ of slider 122 is against index mark B1 and the pin pair P3 P4 may be each withdrawn and rotated on their individual pin axes to engage a screw threading and thus be locked and the pins used in this position. This is a second pin geometry.

Consider now the position shown in Figures 7₁, 7_{1A}. The edge 122₁ of slider 122 is again at index mark B₁ (Figures 7₁, 7_{1A}) and slider plate 121 allows pin-slide 123 of general rectangular prismatic form to be withdrawn out of inlet face F and to be frictionally located. The pin-slide 123 has integral side guide rails 123₁, 123₂, 123₃, 123₄ that coast with opposed plate protuberances 121A, 121B (Figure 7₁). With the pin-slide 123 extended (Figure 7_{1B}) the right cylindrical pin-pair P3, P4 is locked by rotation of each pin individually as described above and the shutter plate 121 moved so that edge 122₁ is in alignment with index mark B₂ (Figure 7_{1B}). This brings opposed plate protuberances 121A, 121B, 121C, 121D respectively

behind the pin slide rails 123₂, 123₄, 123₁, 123₃. This is shown for co-operating parts 121A, 123₂; 121C, 123₁ in Figure 7_{1B} (co-operating parts 121B, 123₄; 121D, 123₃ are not visible). The shutter plate 121 is provided with a protuberance 121E (well seen in Figure 7_{1B}) that with the plate on index B2 brings the edge of protuberance 121E against face 123₄ of pin-slide 123 and gives to it an enhanced stability in electrical usage. Clearly at index mark position B2, pin-pair P3, P4 in pin slide 123 cannot be retracted to re-enter the plug until protuberances 121A, 121B, 121C, 121D are again raised for edge 122₁ to come on to index mark B1 when the pin-slide 123 is retractable.

The pin-pair P3, P4 with pin slide 123 extended as shown in Figure 7_{1B} is for use with the recessed electrical voltage outlet sockets to be found in Germany, Belgium and other parts of Europe, for example such as the Schuko socket. In some such sockets an earth pin from the socket can enter the plug inlet over rail 123₄. This is a third pin geometry.

In Figure 8 the shutter plate 121 is with edge 122₁ at index C and the three heavy rectangular section pins P5, P6, P7 can come out beyond the inlet face F and are each rotated through a right angle to lock the pin. These pins are for use with the voltage outlets to be found *inter alia* in the United Kingdom, pin P5 being an earth pin oriented one right angle out of alignment with live and neutral pins P6, P7. This is a fourth pin geometry.

Claims

1. An electrical connecting device (110) comprising a unitary housing, an adapter in the housing in the form of a multiple pin electrical plug (120) for selectively providing electrical pins (P) in different configurations corresponding to different electrical sockets, comprising a plurality of pins (P) selectively extendable beyond a shutter member (121) movable between a plurality of discrete positions for selecting one of said different configurations and permitting extension of predetermined ones of said pins (P), the shutter member (121) being movable between the discrete positions by a hand operated slider (122) at least one pair of said pins being provided on a prismatic sliding member (123), said sliding member (123) having guide rails (123₁) (123₂) (123₃) (123₄) and said shutter member (121) having protuberances (121A) (121B) coacting with said guide rails (123₁) (123₂) (123₃) (123₄) to permit said sliding member (123) to be extended from or retracted into said plug when said shutter member (121) is in one of said discrete positions and to permit movement of said shutter member (121) into another discrete position, preventing retracting of said sliding member (123), when the latter is extended and an electric outlet for receiving an electrical plug, further characterised by an electrical voltage converter within the housing intermediate the adapter and the electrical outlet.

2. A device as in Claim 1, wherein said shutter

converter is shown with a multiple geometry outlet as described and claimed in our co-pending European application EP-A-0 104 279 filed on 4th August 1982. Any suitable appliance A1 is plugged into the plug/converter shown generally at 10 at orifices 13 using outlet pins 0₁, 0₂ (Figure 2).

In Figure 5B a flat pin pair P₁, P₂ is selected; said pins provide two geometries one as shown the other by orientation of the pins on their axes for different voltage outlets as met for example in the U.S.A., Canada, Japan, Australia and New Zealand.

In Figure 5C₁ a right cylindrical pin pair P₃, P₄ is selected non-extended and in Figure 5C₂ pin pair P₃, P₄, extended via pin slide 23 under the control of a shutter plate not shown actuated by slider 22.

In Figure 5D a three flat pin inlet is selected for say a United Kingdom standard voltage outlet, the pins being shown at P₅, P₆, P₇.

Turning now to Figures 6 to 8 in view of the more detailed description different reference numerals are used.

Referring now specifically to the figures. In Fig. 6A, 6B, 6C, an electrically connecting device shown generally at 110 has either an inlet face F with a two part case 111 a, 111 b held together by screws 111, 111_a. The case has outlet sockets 112, 112₂ and vent louvres 113.

Consider now the multiple pin plug shown generally at 120 (Figure 6A). A movable shutter plate 121 has an integral slider 122 accessible to the hand of the operator, the edge 122₁ of the slider may be brought into alignment with index marks on the inlet face such as marks A, B₁, B₂ and C to give four separate pin geometries.

In Figure 6A the edge 122₁ is against index mark A and the flat pin pair P₁, P₂ are withdrawn and each turned through an angle. Spring bias is provided to locate the pins in the turned position which is the correct position for use in accepting the electrical voltage outlets of U.S.A. and Australasia for example. This is a first pin geometry.

Consider now the position shown in Figure 7. The edge 122₁ of slider 122 is against index mark B₁ and the pin pair P₃, P₄ may be each withdrawn and rotated on their individual pin axes to engage a screw threading and thus be locked and the pins used in this position. This is a second pin geometry.

Consider now the position shown in Figures 7₁, 7_{1A}. The edge 122₁ of slider 122 is again at index mark B₁ (Figures 7₁, 7_{1A}) and slider plate 121 allows pin-slide 123 of general rectangular prismatic form to be withdrawn out of inlet face F and to be frictionally located. The pin-slide 123 has integral side guide rails 123₁, 123₂, 123₃, 123₄ that coact with opposed plate protuberances 121A, 121B (Figure 7₁). With the pin-slide 123 extended (Figure 7_{1B}) the right cylindrical pin-pair P₃, P₄ is locked by rotation of each pin individually as described above and the shutter plate 121 moved so that edge 122₁ is in alignment with index mark B₂ (Figure 7_{1B}). This brings opposed plate protuberances 121A, 121B, 121C, 121D respectively

behind the pin slide rails 123₂, 123₄, 123₁, 123₃. This is shown for co-operating parts 121A, 123₂; 121C, 123₁, in Figure 7_{1B} (co-operating parts 121B, 123₄; 121D, 123₃ are not visible). The shutter plate 121 is provided with a protuberance 121E (well seen in Figure 7_{1B}) that with the plate on index B₂ brings the edge of protuberance 121E against face 123₄ of pin-slide 123 and gives to it an enhanced stability in electrical usage. Clearly at index mark position B₂, pin-pair P₃, P₄ in pin slide 123 cannot be retracted to re-enter the plug until protuberances 121A, 121B, 121C, 121D are again raised for edge 122₁ to come on to index mark B₁ when the pin-slide 123 is retractable.

The pin-pair P₃, P₄ with pin slide 123 extended as shown in Figure 7_{1B} is for use with the recessed electrical voltage outlet sockets to be found in Germany, Belgium and other parts of Europe, for example such as the Schuko socket. In some such sockets an earth pin from the socket can enter the plug inlet over rail 123₄. This is a third pin geometry.

In Figure 8 the shutter plate 121 is with edge 122₁ at index C and the three heavy rectangular section pins P₅, P₆, P₇ can come out beyond the inlet face F and are each rotated through a right angle to lock the pin. These pins are for use with the voltage outlets to be found *inter alia* in the United Kingdom, pin P₅ being an earth pin oriented one right angle out of alignment with live and neutral pins P₆, P₇. This is a fourth pin geometry.

Claims

1. An electrical connecting device (110) comprising a unitary housing, an adapter in the housing in the form of a multiple pin electrical plug (120) for selectively providing electrical pins (P) in different configurations corresponding to different electrical sockets, comprising a plurality of pins (P) selectively extendable beyond a shutter member (121) movable between a plurality of discrete positions for selecting one of said different configurations and permitting extension of predetermined ones of said pins (P), the shutter member (121) being movable between the discrete positions by a hand operated slider (122) at least one pair of said pins being provided on a prismatic sliding member (123), said sliding member (123) having guide rails (123₁) (123₂) (123₃) (123₄) and said shutter member (121) having protuberances (121A) (121B) coacting with said guide rails (123₁) (123₂) (123₃) (123₄) to permit said sliding member (123) to be extended from or retracted into said plug when said shutter member (121) is in one of said discrete positions and to permit movement of said shutter member (121) into another discrete position, preventing retracting of said sliding member (123), when the latter is extended and an electric outlet for receiving an electrical plug, further characterised by an electrical voltage converter within the housing intermediate the adapter and the electrical outlet.
2. A device as in Claim 1, wherein said shutter



member (121) selects among four different pin configurations, a first in which said plug provides an extended flat pin pair, a second in which said plug provides an extendable and retractable cylindrical pin pair, a third in which said plug provides an extended and not retractable cylindrical pin pair, and a fourth in which said plug provides three extended flat pins.

Patentansprüche

1. Elektrische Verbindungsvorrichtung (110) mit einem einheitlichen Gehäuse, einem Adapter in dem Gehäuse in der Form eines elektrischen Steckers (120) mit mehreren Zapfen (P), die selektiv in verschiedene Konfigurationen entsprechend verschiedenen elektrischen Buchsen gebracht werden können, mit weiter einer Mehrzahl von Zapfen (P), die selektiv in eine Stellung jenseits eines Sperrgliedes (121) gebracht werden können und zwischen einer Mehrzahl diskreter Positionen verstellbar sind, um eine der vorgenannten verschiedenen Konfigurationen auswählen zu können und die Verstellung von ausgewählten der vorgenannten Zapfen (P) über das Sperrglied hinaus zu ermöglichen, wobei das Sperrglied (12) seinerseits mittels eines von Hand zu betätigenden Gleitstückes (122) zwischen den diskreten Positionen verstellbar ist, wobei weiter zumindest ein Paar der vorgenannten Zapfen einem prismatischen Gleitglied (123) mit Führungsschienen (123₁), (123₂), (123₃) und (123₄) zugeordnet sind und wobei das vorgenannte Sperrglied (121) Vorsprünge (121_A), (121_B) aufweist, die mit den vorgenannten Führungsschienen (123₁), (123₂), (123₃) und (123₄) zusammenwirken, um es dem Gleitglied (123) zu ermöglichen, in den Stecker eingeführt oder aus dem Stecker herausgenommen zu werden, wenn das vorgenannte Sperrglied (121) sich in einer der vorgenannten diskreten Positionen befindet und Bewegungen des Sperrgliedes 121 in eine andere diskrete Position zu ermöglichen, um ein Herausnehmen des Gleitgliedes (123) aus dem Stecker zu verhindern, wenn dieses Gleitglied in den Stecker eingeführt ist, und wobei schließlich ein elektrischer Ausgang zur Aufnahme eines elektrischen Steckers vorgesehen ist, weiter gekennzeichnet durch einen elektrischen Spannungsumformer in dem Gehäuse zwischen dem Adapter und dem elektrischen Ausgang.

2. Vorrichtung gemäß Anspruch 1, bei dem das genannte Sperrglied (121) zwischen vier verschiedenen Zapfenkonfigurationen auswählt, einer ersten, in der der Stecker ein flaches Zapfenpaar in einer vorderen Endstellung aufweist, einer zweiten, in der der genannte Stecker ein zwischen einer vorderen und einer hinteren Endstellung

verstellbares zylindrisches Zapfenpaar aufweist, einer dritten, in der der Stecker ein in seiner vorderen Endstellung befindliches, nicht in seine hintere Endstellung verstellbares zylindrisches Zapfenpaar aufweist und einer vierten, in der der Stecker drei flache Stecker in ihrer vorderen Endstellung aufweist.

Revendications

1. Dispositif connecteur électrique (110) comprenant un boîtier unitaire, un adaptateur prévu dans ce boîtier sous la forme d'une fiche électrique à broches multiples (120) pour présenter sélectivement des broches électriques (P) dans différentes dispositions correspondant à des prises électriques différentes, comprenant plusieurs broches (P) pouvant s'étendre sélectivement au-delà d'un élément formant volet (121) déplaçable entre plusieurs positions distinctes pour permettre le choix de l'une des dispositions différentes susdites et permettre l'extension de broches prédéterminées (P), l'élément formant volet (121) étant déplaçable entre les positions distinctes grâce à un curseur (122) commandé à la main, au moins une paire de ces broches étant prévue sur un élément coulissant prismatique (123), cet élément coulissant (123) comportant des rails de guidage (123₁), (123₂), (123₃), (123₄), l'élément formant volet (121) présentant des saillies (121_A), (121_B) coopérant avec les rails de guidage susdits (123₁), (123₂), (123₃), (123₄) pour permettre à cet élément coulissant (123) de se présenter en extension par rapport à la fiche ou d'être rétracté dans celle-ci lorsque l'élément susdit formant volet (121) se trouve dans l'une des positions distinctes susdites, et pour permettre le déplacement de cet élément formant volet (121) vers une autre position distincte, en empêchant la rétraction de cet élément formant volet (123) lorsque ce dernier est en extension, et une prise électrique destinée à recevoir une fiche électrique, caractérisé en ce qu'un convertisseur de tension électrique est prévu dans la boîte entre l'adaptateur et la prise électrique.

2. Dispositif suivant la revendication 1, caractérisé en ce que l'élément formant volet (121) choisit parmi quatre dispositions différentes de broches, une première disposition dans laquelle la fiche fournit une paire de broches plates en extension, une seconde disposition dans laquelle cette fiche permet l'extension et la rétraction d'une paire de broches cylindriques, une troisième disposition dans laquelle la fiche fournit une paire de broches cylindriques en extension et non rétractables, et une quatrième disposition suivant laquelle la fiche permet l'extension de trois broches plates.

