

PATENTS ACT 1977

Agents' Reference: P3114GB-H/JCC/ac

DESCRIPTION OF INVENTION

Title: "Improvements in or relating to electrical connectors"

THIS INVENTION relates to electrical connectors, and more particularly to electrical connectors having means whereby the electrical contacts are shielded to reduce the risk of electrical shock.

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An aim of the present invention is to provide an electrical connector which provides electrical contact between a device, such as an electric iron, and a power supply, allowing simple connection and disconnection of a device from a power supply, while shielding the live contacts. The electrical connector is generally of the plug and socket type.

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According to one aspect, the invention provides a plug and socket electrical connector, comprising:

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(a) a plug having an electrically conductive plug prong;
(b) a socket engagable with said plug, having a passage comprising one or more apertures and an electrically conductive socket contact proximate said passage, said passage being adapted to receive at least a portion of said plug prong in a position of engagement with said socket contact,

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(c) a movable baffle supported by said socket, rotatable about an axis generally transverse to said passage, having a shield movable to a closed position intermediate said passage and said socket contact and movable to an open position in which said socket contact is exposed to said passage,

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(d) a baffle control arm rotatably supported by said

- 5 socket and cooperative with said baffle, movable to a first position corresponding to said closed position of said shield, and having an engagement surface separate from said shield engagable to move said baffle control arm from said first position to a second position corresponding to said open position of said shield,
- 10 (e) means for moving said shield from said open position to said closed position when said baffle control arm is disengaged,
- (f) means for moving said baffle control arm from said second position to said first position when said baffle control arm is disengaged, and
- 15 (g) a projection carried by said plug separate from said plug prong in a position of alignment with said engagement surface when said plug prong is in alignment with said passage, said projection being adapted to engage said engagement surface and to move said baffle control arm from said first position to said second position as said plug prong is moved from said position of alignment toward said position of engagement with said socket contact, whereby said shield is moved to said open position and said socket contact is exposed to said plug prong for engagement there
- 20 to establish an electrical connection between said socket and said plug, and
- 25 (h) an electric switch between said socket contact and a power supply conducted, whereby an electrical connection can be established between said socket contact and the power supply conductor, said switch being biased towards an open position, the connector including means operable by engagement of said plug with said socket, for closing said switch.

35 The said baffle may comprise a slide assembly movable along a first line generally transverse to a second line along said direction of movement of said plug prong from

said position of alignment to said position of engagement, and wherein said engagement surface is angularly offset from said lines.

Alternatively, the said baffle may comprise a rotor.
5 In this case, the rotor desirably has an axis of rotation generally transverse to the direction of movement of said plug prong between said position of alignment and said position of engagement, and said shield is formed by a portion of the wall of the rotor, which portion is movable
10 into a position between said engagement surface and said socket contact.

Conveniently, said socket contact is supported on a yieldable support means.

In a preferred arrangement, the plug prong is
15 positioned at least partly within a skirt portion of the plug, and the socket is shaped to correspond with the shape of the plug, the arrangement being such that as the plug is moved into engagement with the socket, the skirt acts to prevent inadvertent contact with the prong.

20 In a second aspect, the invention provides an electrical connector comprising: a plug having at least one plug prong and a socket having at least one passage adapted to receive said plug prong and at least one socket contact aligned with said passage arranged to electrically
25 engage said plug prong, said plug prong being locatable in a first, a second, and a third position of alignment with said passage, said positions being progressively more proximate said socket contact, and a fourth position of engagement with said socket contact, a shield carried by
30 said socket and pivotable about an axis generally transverse to said passage, said shield being movable to a closed position in alignment between said passage and said socket contact and movable to an open position out of alignment between said passage and said socket contact, a
35 shield control arm supported by said socket operative on said shield, located at a position offset from said shield, movable to an initial position corresponding to said closed

position and to a final position corresponding to said open position, a projection carried by said plug at a location offset from said plug prong in alignment with said shield control arm when said plug prong is in said first position, said projection being in engagement with said shield control arm when said shield control arm is in said initial position and said plug prong is in said second position, and in engagement with said shield control arm when said shield control arm is in said final position and said plug prong is in said third position, and means to move said shield to said closed position when said projection is in engagement with said shield control arm, whereby as said plug is engaged with said socket and said plug prong is moved toward said socket contact, said projection moves said shield to said open position exposing said socket contact to said plug prong to allow engagement of said plug prong with said socket contact, and wherein said socket contact is connected to a power supply conductor through a switch biased open, said switch having a switch control aligned with said projection when said plug prong is in said fourth position, said socket contact being yieldable to allow said plug prong to move to a fifth position in engagement with said socket contact wherein said projection is in engagement with said switch control, and thereby holds said switch closed.

An electrical connector of the invention may conveniently be incorporated in an electric iron assembly.

According to a further aspect, the invention provides an electric iron assembly, comprising: an iron having an electric heating element, a first pair of electrical contacts carried by said iron and connected to said heating element, a stand adapted to removably support said iron, having at least one aperture to receive said first pair of contacts when said iron is supported by said stand, a second pair of electrical contacts carried by said stand

proximate said aperture, which engage said first pair of contacts when said iron is supported by said stand, means for connecting said second pair of contacts to an electric power supply and including a switch connected between one of said contacts of said second pair and a power supply conductor, a movable baffle supported by said stand in a closed position between said second pair of contacts and said aperture, and movable to an open position offset from between said second pair of contacts and said aperture, a baffle control arm supported by said stand operative on said baffle to move said baffle from said closed position to said open position, said baffle control arm being located at a position offset from said baffle, a projection supported by said iron at a location offset from said first pair of contacts, in alignment with said baffle control arm when said first pair of contacts is in alignment with said second pair of contacts, and adapted to engage said baffle control arm, whereby as said iron is lowered onto said stand said projection engages said baffle control arm to move said baffle to said open position to allow said first pair of contacts and said second pair of contacts to engage, said switch being biased open and having switch control aligned with said projection when said first pair of contacts is in alignment with said second pair of contacts, whereby, as said iron is lowered onto said stand said projection, subsequent to its engagement with said baffle control arm, engages said switch control to move said switch into a closed position.

30 An important feature of the invention is the provision of the baffle which, when closed, is preferably locked into place to provide substantial resistance to physical access to the socket contact. In a preferred embodiment in which the baffle is in the form of a rotor, a
35 force applied through the passage to the rotor in the direction of travel of the plug prong as the plug prong moves towards the socket contact will not cause the rotor

to rotate to an open position. The rotor, in this embodiment, has cut-outs such that, in one rotational position access to the socket contact is blocked, and in another rotational position access to the socket contact is permitted.

Because the baffle is opened by moving the baffle control arm, thus exposing the socket contact, it is desirable to provide a means to minimise the risk of inadvertent contact with the socket contact when the baffle is in its open position. For this reason the engagement surface of the baffle control arm is preferably separate from the surface of the baffle exposed to the passage when the baffle is in its closed position. The engagement surface is also preferably isolated from the socket contact. Any object inserted into the socket to engage the baffle control arm and open the baffle is thus separated from the socket contact by a separating means. For example a wall may be provided between the engagement surface and the socket contact. Alternatively an opening in the socket distinct from the passage, proximate the baffle control arm may be provided.

On disengagement of the plug from the socket, the plug prong is moved away from the socket contact, the projection is disengaged from the baffle control arm and the baffle is moved to its normal closed position by biasing means such as a coil spring.

Where an electrical connector of the invention is incorporated in a cordless electric iron, an iron support is provided in which the socket contacts are shielded when the iron is disengaged from the support.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, embodiments of an electrical connector of the

invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a rear perspective view of one embodiment
5 of an electrical connector assembly of this invention,
showing the plug and socket _____

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disengaged and the baffle closed:

FIGURE 2 is a front cross-sectional view of the assembly of Figure 1, taken along the line 2-2:

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FIGURE 3 is a top partly sectional view of the socket of the assembly shown in Figure 1, showing the baffle, unsectioned, in its closed position:

FIGURE 4 is a top view of part of the socket shown in Figure 3, with the baffle rotated to an open position:

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FIGURE 5 is a side cross-sectional view of the assembly shown in Figure 2, taken along the line 5-5:

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FIGURE 6 is a side cross-sectional view of the assembly shown in Figure 2, taken along the line 6-6:

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FIGURE 7 is a bottom sectional view of the assembly shown in Figure 5, taken along the line 7-7:

FIGURE 8 is a front cross-sectional view of the assembly shown in Figure 2, in its engaged position with the baffle open:

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FIGURE 9 is a side cross-sectional view of the assembly shown in Figure 8, taken along the line 9-9:

FIGURE 10 is a side cross-sectional view of the assembly shown in Figure 8, taken along the line 10-10:

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FIGURE 11 is a side cross-sectional view of another embodiment of an assembly of this invention:

FIGURE 12 is a side cross-sectional view of yet another embodiment of an assembly of this invention:

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FIGURE 13 is a front perspective view of a cordless iron and support, incorporating an electrical connector of this invention:

FIGURE 14 is a partial front cross-sectional view of the iron and support of Figure 13, in an engaged position; and

FIGURE 15 is a side view, partly in cross-section, of the iron and support of Figure 14, taken along the line 15-15.

In the embodiment of the invention shown in Figures 1 to 10, an electrical connector assembly of this invention comprises a socket 1 and a plug 2. The socket 1 comprises a housing 3, an electrical socket contact 4, means for establishing electrical union between the socket contact 4 and a power supply, and a baffle 5. The socket contact 4 is mounted in the housing 3 adjacent a passage 6, which passage opens at an aperture through which the socket contact 4 can be reached.

The embodiment illustrated in Figures 1 to 10 is preferred for use in connection with dual wire electrical leads, such as commonly used to transmit alternating current to electrical devices. Accordingly, a second socket contact 7 is provided, along with a corresponding second aperture 8. The pair of apertures 6, 8 are located such that they can receive a pair of corresponding electrically conductive plug prongs 9, 10, carried by the plug 2, in a position for engagement with the socket contacts 4, 7. In a preferred embodiment, the socket contacts 4, 7 comprise, respectively, contact surfaces 15, 16 and contact supports 17, 18. The contact supports 17, 18 comprise flexible members such as brass springs, to allow movement of the contact surfaces 15, 16.

The socket contacts 4, 7 are shieldable from access through the apertures 6, 8 by the baffle 5. The baffle 5 is normally in a closed position, in which the socket contacts 4, 7 are not exposed to the apertures 6, 8, but is movable to an open position, in which the socket contacts 4, 7 are exposed to enable access via the apertures 6, 8. The purpose of the baffle 5 is to prevent inadvertent contact with the socket contacts 4, 7.

Preferably, means are provided to prevent inadvertent movement of the baffle 5 to its open position. Thus, if a foreign object, such as a knife

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or screwdriver, is used to probe apertures 6, 8 when the plug 2 is disengaged from the socket 1, access to the socket contacts 4, 7 should be resisted. For this purpose, the socket 1 incorporates means to prevent movement of the baffle 5 to the open position by application of a force at

5 any point on baffle 5 which is exposed to the apertures 6, 8 when the baffle 5 is in the closed position.

In one preferred embodiment of this invention, the baffle 5 comprises a generally cylindrical rotor which can be rotated to an open position, allowing
10 access to the socket contacts 4, 7. The baffle 5 is rotatably supported at its ends 11, 12, in the housing 3. The baffle 5 is biased to a closed position, in which baffle surfaces 21, 22 are interposed intermediate the socket contacts 4, 7 and the apertures 6, 8, thus serving as a shield to block access to the socket contacts 4, 7, by a biasing element such as a spring 20. The
15 baffle 5 is movable to an open position, in which the baffle surfaces 21, 22 are offset out of alignment between the apertures 6, 8 and the socket contacts 4, 7, so that the socket contacts 4, 7 are exposed to the apertures 6, 8.

20 The closed position of the baffle 5 is best shown in Figures 2 and 3. In this position, the baffle 5 is located such that it will tend to resist rotation to an open position by force applied to the surfaces 21, 22 through one or both of the apertures 6, 8. To accomplish such resistance, the baffle 5 is
25 located such that substantially all of the motion of the baffle 5 adjacent to the apertures 6, 8 is in a direction substantially different than the direction of travel of the plug prongs 9, 10 as they pass through apertures 6, 8 towards the socket contacts 4, 7. In a preferred embodiment the direction of motion of the baffle 5 proximate the apertures 6, 8 is in a direction at an angle of greater than about 45 degrees from the direction of travel of the plug
30 prongs 9, 10 through the apertures 6, 8. In a presently preferred embodiment, the direction of travel of the baffle 5 proximate the apertures 6, 8 is generally transverse to the direction of travel of plug prongs 9, 10 through the apertures 6, 8.

35 To provide the desired direction of travel in a rotating baffle, the baffle 5 is preferably located with its axis of rotation generally transverse of the direction of travel of the plug prongs 9, 10 through the apertures 6, 8 towards

the socket contacts 4, 7. Preferably the axis of rotation of the baffle 5 is in a plane passing generally through the apertures 6, 8 and the socket contacts 4, 7. With the axis of rotation of the baffle 5 in such a position, a line of force exerted on baffle 5 through apertures 6, 8 will tend to intersect the axis of baffle 5, and will be resisted by the housing 3 supporting the ends 11, 12 of baffle.

The baffle 5 is provided with cut-out regions 13, 14 which accommodate the contact surfaces 15, 16 and portions of the socket contacts 4, 7 adjacent thereto when the baffle 5 is in the closed position. The cut-out regions 13, 14 are positioned to receive plug prongs 9, 10 when the baffle 5 is in its open position exposing the socket contacts 4, 7. The baffle 5 is also provided with a cut-out region 19 which accommodates a portion of the biasing spring 20, which is, preferably, a coil spring. As explained, the spring 20 biases the baffle 5 towards a closed position whilst permitting limited movement of the baffle 5, in a counter-clockwise direction as shown in Figure 6. An arm 32 of the spring 20 engages a cut-out wall 33 as baffle 5 is moved in a counter-clockwise direction, thus biasing the baffle 5 to the closed position.

A baffle control arm 23 cooperates with the baffle 5 to allow the baffle to be moved from its closed position to its open position by overcoming the biasing of the spring 20. The baffle control arm 23 has an engagement surface 24, to which force can be applied to move the baffle 5 to its open position. The engagement surface 24 is spaced apart from the baffle surfaces 21, 22, and offset in such a manner that the engagement surface 24 is not readily engagable through the apertures 6, 8. Thus, the baffle 5 will resist opening if force is applied through apertures 6, 8 to the baffle surfaces 21, 22 but will readily open if force is applied to the engagement surface 24.

As presently preferred, the baffle control arm 23 is formed as an integral part of the baffle 5, and comprises a lever which projects transversely relative to the rotary axis of baffle 5 to provide the engagement surface 24 at a location removed from the baffle surfaces 21, 22. The baffle control arm 23 extends transversely a sufficiently great distance to provide an acceptable engagement surface 24, and to provide sufficient leverage so that the force required to rotate the baffle 5 is within acceptable limits.



The plug 2 carries a projection 25 which is adapted to engage the baffle control arm 23 when the plug prongs 9, 10 are correctly aligned with the socket contacts 4, 7. As the plug prongs 9, 10 are moved towards socket contacts 4, 7, in alignment with the apertures 6, 8, the projection 25 engages the engagement surface 24 of the baffle control arm 23. Subsequently, as the plug prongs 9, 10 continue to move towards engagement with the socket contacts 4, 7, the projection 25 maintains engagement with baffle control arm 23 and moves the baffle control arm 23 from a first position, corresponding to the closed position the baffle 5, to a second position, corresponding to the open position of baffle 5. The baffle control arm operates the baffle 5 by translating the generally linear motion of the projection 25 to a rotational motion to move the baffle 5 from its closed position to its open position.

As the plug 2 is moved towards the socket 1, with plug prongs 9, 10 in alignment with apertures 6, 8, the projection 25 may engage the baffle control arm 23 either before or after the plug prongs 9, 10 are received in the apertures 6, 8, depending upon the relative lengths of projection 25 and plug prongs 9, 10. It is preferred that baffle 5 remain closed until plug prongs 9, 10 are immediately adjacent the baffle 5. However, it is also preferred that the plug prongs 9, 10 do not in fact come into engagement with the baffle 5, since such engagement would tend to retard the movement of baffle 5.

In the embodiments shown in Figures 1 to 12, the baffle control arm 23 is a lever arm projecting radially from the baffle 5. The distance between the baffle 5 and the plug prongs 9, 10 when the projection 25 is in initial engagement with the baffle control arm 23 in its first position must be at least as great as the distance that the projection 25 must travel to move the baffle control arm 23 from its first position to its second position. Preferably, the baffle 5 is located immediately adjacent the apertures 6, 8. As the plug 2 is moved towards engagement with the socket 1, the projection 25 engages the baffle control arm 23 before the plug prongs 9, 10 are received within apertures 6, 8.

In this manner, a plug and socket arrangement is provided in which the socket contacts 4, 7 are shielded by the baffle 5, and in which the plug 2

cooperates with the socket 1 to move the baffle 5 to an open position as plug contacts 9, 10 are moved towards the socket contacts 4, 7 for electrical engagement.

5 Means are provided to prevent movement of a foreign object into the apertures 6, 8 engaging the baffle control arm 23 to move this to enable engagement with the socket contacts 4, 7. In one embodiment the baffle control arm 23 is physically separated from the socket contacts 4, 7 by a wall of the socket 1. In a presently preferred embodiment, the separating
10 means comprises a baffle wall 26 that is positioned adjacent the baffle control arm 23, and is formed by three sides of a cut-out region of the baffle 5 opposite to the cut-out regions 13, 14. Any object engaging the engagement surface 24 of the baffle control arm 23 is prevented from moving to engage the socket contacts 4, 7 by the baffle wall 26. Thus, the wall 26 physically
15 separates the engagement surface 24 from the socket contacts 4, 7 in all positions of the baffle 5 between its closed position and its open position. If the foreign object is removed from the baffle control arm 23, the biasing means 20 moves the baffle 5 to its closed position.

20 The separating means also comprises a housing wall 27, which defines an opening 28 through which the baffle control arm 23 is accessible. To minimize the risk of inadvertent contact, the baffle control arm 23 is recessed within the opening 28 which is formed in the shape of a slot that is adapted to receive the plug projection 25. As the plug 2 is moved into engagement
25 with the socket 1, the projection 25 is received by the opening 28. When the plug 2 is fully engaged with the socket 1, and thus the plug prongs 9, 10 are in their final position to engage, for electrical conduction, with socket contacts 4, 7, at least a portion of the plug projection 25 resides within the opening 28. A foreign object inserted into the opening 28 to engage
30 with the engagement surface 24 is blocked from moving into contact with the socket contacts 4, 7 by the housing wall 27. Movement of such object from the opening 28 into one of the apertures 6, 8 disengages the object from baffle control arm 23 and thus the spring 20 moves the baffle 5 into its closed position.

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Preferably, an additional means is provided to prevent inadvertent contact with the live electrical contacts. Such means comprises a switch 29 connected



between a power supply and one of the socket contacts 4, 7. When the plug 2 and socket 1 are disengaged, the switch 29 is in the "off" position, and the socket contacts 4, 7 are electrically dead. When plug 2 and socket 1 are fully engaged, so that plug prongs 9, 10 are engaged with socket contacts 4, 7, switch 29 is in the "on" position, and socket contacts 4, 7 are electrically live. Thus, the switch 29 isolates the socket contacts 4, 7 from the electrical power source until the socket contacts 4, 7 are themselves isolated from inadvertent contact by engagement of the plug 2 with the socket 1.

10 The switch 29 is activated by a button 30, which is depressed to close the switch 29 by means provided on the plug 2 as the plug is engaged with the socket 1. In a preferred embodiment, such means comprises a slide 31 that is positioned to cooperate with the plug projection 25. As the plug 2 and socket 1 are engaged, the plug projection 25 engages the slide 31, which 15 is thereby moved to depress the button 30, thus closing the switch 29. Preferably, the switch 29 is closed only after the plug prongs 9, 10 have engaged the socket contacts 4, 7, to eliminate electrical sparking between plug prongs 9, 10 and socket contacts 4, 7. The flexible nature of the contact supports 17, 18 allows the necessary movement of the plug 2 towards the 20 switch 29 to close the switch 29 after the socket contacts 4, 7 have been engaged.

Further means may be provided to prevent accidental contact with the live electrical contacts. The plug 2 and socket 11 are adapted to interfit 25 in such a manner that the socket contacts 4, 7 are hidden from user access when the baffle 5 is open. For this purpose, the plug prongs 9, 10 are carried by a wall 75 surrounded by a skirt 34. The wall 75 and skirt 34 define a recess into which the plug prongs 9, 10 extend. The socket 1 has a raised portion 76, the external dimension of which generally correspond to the 30 internal dimensions of the recess, and the plug prongs 9, 10 and apertures 6, 8 are located such that the plug 2 and socket 1 can be mated. As the plug 2 and socket 1 are mated, the projection 25 opens the baffle 5 only after the skirt 34 is in a position to shield the apertures 6, 8 from external access.

35 The sequence of events as the plug 2 is moved towards the socket 1 is as follows: Plug 2 and socket 1 are generally aligned. As the plug 2 is moved towards the socket 1, the recess formed by the skirt 34 and wall 75

on the plug 2 receives the raised portion 76 of the socket 1, orienting the plug prongs 9, 10 into alignment with apertures 6, 8 and also orienting the projection 25 into alignment with the opening 28. Subsequently, the opening 28 receives the projection 25, to further align the plug prongs 9, 10 with apertures 6, 8. As the plug is moved into further engagement with the socket 1, the skirt 34 conceals the apertures 6, 8 and the projection 25 engages the baffle control arm engagement surface 24. As the plug 2 continues to be moved into further engagement with the socket 1 the projection 25 depresses the baffle control arm 23, moving this from its first position, causing baffle 5 to move. On continued movement of the plug into the socket 1, the projection 25 continues to cause the baffle surfaces 21, 22 to move out of interposition between plug prongs 9, 10 and socket contacts 4, 7, allowing the plug prongs 9, 10 to move into the volume previously concealed by baffle surfaces 21, 22, and to engage the contact surfaces 15, 16 on socket contacts 4, 7. As plug 2 continues to move towards complete engagement, the plug prongs 9, 10 move the contact surfaces 15, 16, and projection 25 engages the button 30, through the slide 31, to open the switch 29 and provide electrical power through socket contacts 4, 7 to the plug projections 9, 10.

Figure 11 illustrates, in cross-section, a second embodiment of a connector of this invention, in which the baffle 35 comprises a paddle or door, that is pivoted on an axis 36 generally transverse to the direction of travel of a plug 77 as it engages a socket 37. The baffle 35 is prevented from rotating in a counter-clockwise direction, towards a socket contact 38, by a stop 39. The baffle 35 is biased against the stop 39 by an axial spring 40, and is rotatable in a clockwise direction by a force exerted through an opening 41 against a baffle control arm 42. The electrical connector of this second embodiment operates in substantially the same manner as described above. As the plug 77 is directed towards socket 37, the plug 77 is aligned by housing 43 to orient the plug prong 78 towards the aperture 44, and a plug projection 79 through the opening 41 towards the baffle control arm 42. As the plug 77 is moved into engagement with the socket 37, the plug projection 79 engages the baffle control arm 42 and moves the baffle 35 towards the plug prong 78 and out of alignment between the plug prong 78 and the socket contact 38. As in the previous embodiment, it is preferred that a switch be provided which energises the socket contact 38 after the plug prong 78 is engaged with socket contact 38.



A third embodiment of the socket of this invention is shown in side cross-section in Figure 12. In this embodiment, a baffle 45 is slidable rather than rotatable. The baffle 45 is biased by a spring 46 in a closed position, in which position the baffle surface 47 conceals a socket contact 48. The socket 49 is provided with a baffle control arm 50, in engagement with the baffle 45. The baffle control arm 50 has an engagement surface 51 which is oriented at an angle with respect to the direction of an opening 52 and the direction of movement of a plug prong 80. As a plug 81 is engaged with the socket 49, the plug projection 82 enters the opening 52 and engages engagement surface 51, moving the baffle control arm 50, and thus the baffle 45, to the left (as shown in the drawings). The baffle 45 is moved to the left, the baffle surface 47 is removed from interposition between the plug prong 80 and socket contact 48, and an orifice 53 is moved into alignment with the aperture 54, allowing the plug prong 80 to pass through the orifice 53 and into engagement with the socket contact 48. As in the previously described embodiments, it is preferred to provide a switch which prevents the socket contact 48 from being electrically active until the plug prong 80 is in engagement with the socket contact 48.

As is evident from the above disclosure, other embodiments fall within the scope of the claims of this invention. For example, the socket may incorporate a baffle which rotates about an axis generally parallel to the direction of travel of the plug prongs. In a preferred embodiment of such a socket, the baffle is generally planar and moves in a direction generally transverse of the direction of the plug prongs. In side view, such a plug and socket assembly would appear similar to that shown in Figure 12. However, instead of sliding along a generally straight transverse line, the baffle movement in this embodiment describes a transverse arc.

In another embodiment, a single passage is provided through which a pair of socket contacts is accessible. In another embodiment, the baffle control arm and the baffle are separate elements, rather than integral.

In another embodiment, the direction of travel of the plug prong towards the socket contact is substantially different than the direction of travel of the plug prong from the point of engagement with the socket contact to the point at which the switch is closed to provide electrical power to

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the socket contact. In this embodiment, the plug prong is aligned with the passage, is moved into the passage in a generally straight line to engage the socket contact, and then is rotated in engagement with the socket contact to energize the socket contact. In cross-section, such an embodiment resembles Figures 1 to 12, except that the means for engaging the switch requires a force directed transverse to the direction of travel of the plug prong as it engages the socket contact. The switch is provided with a button on its side, rather than on its top as shown in Figure 6, which is engaged by the projection as the plug is rotated in the socket.

Another embodiment of this invention, incorporated in a cordless iron 55, is shown in Figures 13 to 15. The iron 55 incorporates a plug 56 electrically connected to an iron heating element 57. An iron temperature control 58 operates conventionally to modulate the heat produced by heating element 57. The plug 56 is adapted to be received by socket 59 carried by an iron support 60, which supports the iron 55 when it is not in use, provides electrical power to iron 55. The socket 59 is connectable via a cord 61 and a cord plug 62, to a power supply.

The socket 59 comprises a baffle 63, in the shape described above with respect to baffle 5 of the embodiment of Figures 1 to 10, which baffle is biased closed by a coil spring 64 when the plug 56 is not in engagement with the socket 59. A projection 65 carried by the plug 56 cooperates with a baffle control arm 66 to open the baffle 63 when the plug 56 engages the socket 59, exposing socket contacts 67 to plug prongs 68. As the iron 55 is placed on the support 60, the plug 56 engages the socket 59 the plug prongs 68 enter the apertures 69 in the socket 59, and the projection 65 engages the baffle control arm 66. As the iron 55 is lowered further into place on the support 60, the projection 65 cooperates with the baffle control arm 66 to open the baffle 63, allowing the plug prongs 68 to engage the socket contacts 67. As described above the socket contacts 67, which incorporate springs 70, are deflected slightly downwardly, by the weight of iron 55, allowing the projection 65 to engage a slide 71 which in turn engages a button 72 of a switch 73. The switch 73 is electrically connected between the cord 61 and one of the socket contacts 67. When switch 73 is turned on by depressing the button 72, electrical power can be provided to socket contacts 67 via the cord plug 62 and the cord 61. A skirt 74 shields



the socket contacts 67 from user access when baffle 63 is in its open position as iron 55 is being lowered into place on support 60 and as it is being lifted from the support 60.

5 The cordless iron may have a rotary table 83 incorporated into the support 60. A screw 84 holds the table 83 and platform 85 together, and provides an axis about which the table 83 can rotate. The table 83 is supported proximate the screw 84 by a ledge 86, which slides against an edge 87 when the table 83 is rotated on platform 85.

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As is apparent from the above description, many other embodiments and features of this invention are included within the intent and scope of this invention.

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CLAIMS

1. A plug and socket electrical connector, comprising:
- 5 (a) a plug having an electrically conductive plug prong;
- (b) a socket engagable with said plug, having a passage comprising one or more apertures and an electrically conductive socket contact proximate said passage, said passage being adapted to receive at least a
- 10 portion of said plug prong in a position of engagement with said socket contact,
- (c) a movable baffle supported by said socket, rotatable about an axis generally transverse to said passage, having a shield movable to a closed position intermediate said passage and said socket contact and movable to an open position in which said socket contact is exposed to said passage,
- 15 (d) a baffle control arm rotatably supported by said socket and cooperative with said baffle, movable to a first position corresponding to said closed position of said shield, and having an engagement surface separate from said shield engagable to move said baffle control arm from said first position to a second position corresponding to said open position of said shield,
- 20 (e) means for moving said shield from said open position to said closed position when said baffle control arm is disengaged,
- (f) means for moving said baffle control arm from said
- 30 second position to said first position when said baffle control arm is disengaged, and
- (g) a projection carried by said plug separate from said plug prong in a position of alignment with said engagement surface when said plug prong is in alignment with said passage, said projection being adapted to engage said engagement surface and to move said baffle control arm from said first position to said
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second position as said plug prong is moved from said position of alignment toward said position of engagement with said socket contact, whereby said shield is moved to said open position and said socket contact is exposed to said plug prong for engagement thereby to establish an electrical connection between said socket and said plug, and

(h) an electric switch between said socket contact and a power supply conducted, whereby an electrical connection can be established between said socket contact and the power supply conductor, said switch being biased towards an open position, the connector including means operable by engagement of said plug with said socket, for closing said switch.

2. An electrical connector according to claim 1, wherein when said plug and said socket are out of engagement and said plug prong is in alignment with said passage and said projection is in alignment with said engagement surface, the distance between said plug prong and said passage is less than the distance between said projection and said engagement surface, such that as said plug prong is moved toward said passage in alignment therewith, said projection engages said baffle control arm after said passage receives said plug prong.

3. An electrical connector according to claim 1 or claim 2, wherein said baffle comprises a generally cylindrical rotor which pivots about an axis generally transverse to said direction of movement of said plug prong from said position of alignment to said position of engagement.

4. An electrical connector according to any preceding claim, wherein said means for closing said switch comprises a leg carried by said plug and a switch control carried by said switch which cooperate to close said switch as said plug is engaged with said socket.



5. An electrical connector according to claim 4, wherein said leg comprises said projection.

5 6. An electrical connector according to claim 5, wherein said position of engagement comprises a first position in which said switch is open, and a second position in which said switch is closed, whereby as said plug and said socket are engaged, said plug prong engages said socket contact before said switch is closed.

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7. An electrical connector according to claim 6, wherein said socket contact yieldably engages said plug prong between a first position in which said switch is open and a second position in which said switch is closed, said first position, said second position, and said position of alignment being along a generally straight line.

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8. An electrical connector according to any preceding claim, wherein said baffle pivots about an axis generally transverse to said direction of movement of said plug prong through said passage, and wherein said baffle moves in a direction at an angle greater than about 45° from said direction of movement of said plug prong.

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25 9. An electrical connector according to claim 8, wherein said direction of movement of said shield is generally transverse to said direction of movement of said plug prong.

30 10. An electrical connector according to claim 9, wherein said baffle and said baffle control arm comprise a unitary structure, and said baffle control arm is offset from said axis.

35 11. An electrical connector according to claim 10, wherein said means for moving said shield and said means for moving said baffle control arm comprise a spring.



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12. An electrical connector according to claim 11,
wherein said baffle has a contact cut-out which receives
said socket contact when said baffle is in said closed
position and through which said plug prong projects when
5 said plug prong is in said position of engagement with said
socket contact.

13. An electrical connector according to claim 12,
wherein said socket carries a wall between said engagement
10 surface and said socket contact.

14. An electrical connector according to claim 13,
wherein said wall comprises a baffle cut-out separate from
said socket cut-out and adjacent to said engagement
15 surface.

15. An electrical connector according to claim 14,
wherein said wall comprises a surface defining an opening
separate from said passage proximate said baffle control
arm, adapted to receive at least a portion of said pro-
20 jection in a position of engagement with said baffle
control arm.

16. An electrical connector according to claim 15,
25 wherein said baffle comprises a generally cylindrical rotor
having a longitudinal axis about which it rotates.

17. An electrical connector comprising: a plug having at
least one plug prong and a socket having at least one
30 passage adapted to receive said plug prong and at least one
socket contact aligned with said passage arranged to
electrically engage said plug prong, said plug prong being
locatable in a first, a second, and a third position of
alignment with said passage, said positions being pro-
35 gressively more proximate said socket contact, and a fourth
position of engagement with said socket contact, a shield
carried by said socket and pivotable about an axis



generally transverse to said passage, said shield being movable to a closed position in alignment between said passage and said socket contact and movable to an open position out of alignment between said passage and said socket contact, a shield control arm supported by said socket operative on said shield, located at a position offset from said shield, movable to an initial position corresponding to said closed position and to a final position corresponding to said open position, a projection carried by said plug at a location offset from said plug prong in alignment with said shield control arm when said plug prong is in said first position, said projection being in engagement with said shield control arm when said shield control arm is in said initial position and said plug prong is in said second position, and in engagement with said shield control arm when said shield control arm is in said final position and said plug prong is in said third position, and means to move said shield to said closed position when said projection is not in engagement with said shield control arm, whereby as said plug is engaged with said socket and said plug prong is moved toward said socket contact, said projection moves said shield to said open position exposing said socket contact to said plug prong to allow engagement of said plug prong with said socket contact, and wherein said socket contact is connected to a power supply conductor through a switch biased open, said switch having a switch control aligned with said projection when said plug prong is in said fourth position, said socket contact being yieldable to allow said plug prong to move to a fifth position in engagement with said socket contact wherein said projection is in engagement with said switch control, and thereby holds said switch closed.

18. An electrical connector according to claim 17, wherein said plug comprises a wall surrounded by a skirt defining a recess, said plug prong being located on said



- 5 wall and extending into said recess, said socket comprising a raised portion having a top surface in which said passage is located, the external dimensions of said raised portion generally corresponding to the internal dimensions of said recess, and the location of said plug prong on said wall generally corresponding to the location of said passage in said top surface, such that said recess and said raised portion are generally engagable in mating relationship.
- 10 19. An electrical connector according to claim 17 or 18, wherein said socket comprises a wall surrounded by a skirt defining a recess, said passage being located in said wall, said plug comprising a raised portion having a top surface carrying said plug prong, the external dimensions of said raised portion generally corresponding to the internal dimensions of said recess, and the location of said plug prong on said top surface generally corresponding to the location of said passage in said wall, such that said recess and said raised portion are generally engagable in mating relationship.
- 15 20. An electrical connector according to any of claims 17 to 19, wherein said shield comprises a rotor having an axis of rotation generally transverse to the direction of movement of said plug prong between said second position and said third position, said shield having a cut-out which receives said socket contact when said shield is in said closed position and through which said plug prong projects when said plug prong is in said fourth position.
- 20 21. An electric iron assembly incorporating a plug and socket electrical connector, comprising: a plug having at least one electrically conductive plug prong, a socket engageable with said plug, having a passage comprising one or more apertures and an electrically conductive socket contact proximate said passage, said passage being adapted to receive at least a portion of said plug prong in a
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position of engagement with said socket contact; a movable
baffle supported by said socket, having a shield movable to
a closed position intermediate said passage and said socket
contact and movable to an open position in which said
5 socket contact is exposed to said passage; a baffle control
arm supported by said socket and cooperative with said
baffle, movable to a first position corresponding to said
closed position of said shield, and having an engagement
surface separate from said shield engagable to move said
10 baffle control arm from said first position to a second
position corresponding to said open position of said
shield, means for moving said shield from said open
position to said closed position when said baffle control
arm is disengaged, means for moving said baffle control arm
15 from said second position to said first position when said
baffle control arm is disengaged, and a projection carried
by said plug separate from said plug prong in a position of
alignment with said engagement surface when said plug prong
is in alignment with said passage, said projection being
20 adapted to engage said engagement surface and to move said
baffle control arm from said first position to said second
position as said plug prong is moved from said position of
alignment towards said position of engagement with said
socket contact, whereby said shield is moved to said open
25 position and said socket contact is exposed to said plug
prong to enable engagement to establish an electrical
connection between said socket and said plug and an
electric switch between said socket contact and a power
supply conducted, whereby an electrical connection can be
30 established between said socket contact and the power
supply conductor, said switch being biased towards an open
position, the connector including means operable by engage-
ment of said plug with said socket, for closing said
switch.

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22. An electric iron assembly, comprising: an iron having
an electric heating element, a first pair of electrical



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contacts carried by said iron and connected to said heating element, a stand adapted to removably support said iron, having at least one aperture to receive said first pair of contacts when said iron is supported by said stand, a
5 second pair of electrical contacts carried by said stand proximate said aperture, which engage said first pair of contacts when said iron is supported by said stand, means for connecting said second pair of contacts to an electric power supply and including a switch connected between one
10 of said contacts of said second pair and a power supply conductor, a movable baffle supported by said stand in closed position between said second pair of contacts and said aperture, and movable to an open position offset from between said second pair of contacts and said aperture, a
15 baffle control arm supported by said stand operative on said baffle to move said baffle from said closed position to said open position, said baffle control arm being located at a position offset from said baffle, a projection supported by said iron at a location offset from said first
20 pair of contacts, in alignment with said baffle control arm when said first pair of contacts is in alignment with said second pair of contacts, and adapted to engage said baffle control arm, whereby as said iron is lowered onto said
25 stand said projection engages said baffle control arm to move said baffle to said open position to allow said first pair of contacts and said second pair of contacts to engage, said switch being biased open and having switch control aligned with said projection when said first pair
30 of contacts is in alignment with said second pair of contacts, whereby, as said iron is lowered onto said stand said projection, subsequent to its engagement with said baffle control arm, engages said switch control to move said switch into a closed position.

35 23. An electrical connector substantially as herein described with reference to, and as shown in, Figures 1 to 10 of the accompanying drawings.



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24. An electrical connector substantially as herein described with reference to, and as shown in Figure 11 of the accompanying drawings.

5 25. An electrical connector substantially as herein described with reference to, and as shown in, Figure 12 of the accompanying drawings.

10 26. An electric iron assembly substantially as herein described with reference to, and as shown in, Figures 13 to 15 of the accompanying drawings.
