The present invention relates to a novel lockable male electrical connector plug.

The principal object of the invention is the provision of a more reliable and an easily operated device of the kind indicated, which comprises an annular cap which carries at least the minimum of two connector blades, and a rotor journaled through the cap and having cam means for spreading the connector blades apart and producing holding friction between these blades and the contacts of a female current outlet receptacle into which the device has been inserted, whereby a greater pull on the device than ordinarily encountered in service becomes necessary to separate the device from the receptacle, and more positive and full electrical engagements are obtained between the blades of the device and the outlet receptacle contacts.

The lockability of the device, and the enhanced electrical engagements of the blades of the device and the contacts of the receptacle obtained, are of especial importance in a number of ordinary electrical applications, such as portable power tools wherein pulling out of a power cord plug from a receptacle is an annoying and sometimes perilous thing, and coin-operated devices involving coin counters, wherein poor or intermittent engagements of the plug blades with outlet receptacle contacts can produce incorrect operation of the counters. Another object of the invention is the provision of a simple and economical device of the character indicated above, which is composed of a minimal number of uncomplex and easily assembled parts, which can be mass-produced at relatively low cost, for both industrial and domestic use.

Other important objects and advantageous features of the invention will be apparent from the following description and the accompanying drawings, wherein, for purposes of illustration only, a specific form of the invention is set forth in detail.

In the drawings:

FIGURE 1 is a side elevation, partly broken away and in section of a device of the present invention, showing the blades in unspread condition;

FIGURE 2 is a transverse vertical section taken on the line 2—2 of FIGURE 3, showing the blades in spread condition;

FIGURE 3 is a bottom plan view of FIGURE 2; and

FIGURE 4 is an exploded perspective view, on a reduced scale, of said device.

Referring in detail to the drawings, wherein like numerals designate like parts throughout the several views, the illustrated connector plug comprises an annular dielectric material cap 10, having a reduced diameter concentric upper end portion 12, into which the exterior surface of the cap curves, as indicated at 14, from the main full-diameter lower portion 16 of the cap.

The lower end 18 of the portion 16 of the cap is formed with a pendant annular peripheral skirt 20, and the lower end 18 which forms the top of the resultant socket on the lower end of the cap, is flat. In the case of a two-bladed device, two similar but reversed, downwardly extending, resilient blades 22 are positioned in diametrically opposed relationship within the socket, and have horizontal radially outwardly extending flat arms 24, on their upper ends, which are secured to the lower end 18, as by means of anchored assembling sleeves 26 extending therethrough. The sleeves 26 are molded into vertical bores 30, extending upwardly from the lower end 18 and have upper lateral anchoring flanges 31 confined in grooves 33, and lower lateral flanges 32 bearing against the under-surfaces of the blade arms 24. Binding post screws 34 are threaded upwardly in the sleeves 26 for securing the ends of the wires 36 of an insulated cord 38.

As shown in FIGURE 1, the main portions 40 of the blades 22 normally are in parallel relationship, in which they enter an outlet plug (not shown), but are resilient enough to permit of their being spread away from each other, as shown in FIGURE 2, sufficiently to produce heavy electrical and friction engagements of the blades with the outlet contacts, which assure good and constant electrical contact and render withdrawal of the device from an outlet difficult. The outer sides of the main blade portions 40 have therein bores 41, near their lower ends, which increase the retaining contacts of the blades with outlet contacts.

The desired spreading of the blades 22 is produced by rotation of a rotor 42 which is rotatably engaged in the opening or bore 44 of the cap 10. The rotor 42 has an axial bore 46, through which the cord 38 extends, and the lower end of the rotor around the bore 46 is rounded, as indicated at 48, for harmless engagements by the wires 36. The rotor has, at its upper end, an enlarged diameter flat collar 50, preferably of the same diameter as the upper end portion 12 of the cap, which bears rotatably upon the flat upper end 52 of the upper end portion 12.

As is apparent in FIGURES 1 and 2, the rotor 42 is longer than the main or lower portion of the cap 10, so that it extends below the lower end 18 thereof. From a point substantially level with the lower end 18 down to a point on a level spaced below the lower end 18, the rotor 42 is formed with a continuous annular groove 54 which has a downwardly tapering side wall 56, and a horizontal bottom wall 58. In effect, the presence of the groove 54 defines, at the lower end of the rotor 42, an annular cam collar 60. The main blade portions 40 have, adjacent to their upper ends, triangular cam lugs 61, which have horizontal base surfaces 63, which bear upon the bottom of the groove 54, and inwardly and downwardly angled hypotenuse cam faces 65.

The peripheral edge 63 of the collar 60 bears against the inward sides of the main portions 40 of the blades 22, in the parallel, unspread condition of the blades, as shown in FIGURE 1, and has no camming or spreading effect on the blades. For camming the blades away from each other, as the rotor 42 is rotated relative to the cap 10, the peripheral edge 62 is formed, at diametrically opposed points, with cam lobes 64, which have centered detent notches 66. The notches 66 receive the blade portions after the blade portions have been spread, as indicated in FIGURE 2, whereby the rotor 42 is releasably locked in blade spreading position.

Since the cam lobes 64 extend out from the peripheral edge of the cam collar 60, and hence span a diameter larger than the cap bore 44, insertion of the rotor 42 in the cap 10 requires clearances for the cam lobes, in the form of diametrically opposed virtual grooves 68 formed in the wall of the bore 44. As the rotor 42 is passed downwardly through the cap bore 44, the cam collar 60 engages the cam surfaces 65 of the cam lugs 61 on the blades 22, and spreads the blades 22 away from each other, so that, on further descent of the rotor, the cam lugs 61 can pass upwardly over the cam collar 60 and snap into the groove 54, whereby upward withdrawal of the rotor 42 out of the cap 10 is precluded.

For indicating visually the rotary position of the rotor 42 relatively to the cap 10, the upper rotor collar 50 is provided, on its peripheral edge, with outstanding diametrically opposed lugs 70, which are vertically aligned with the cam lobes 64.
In operation, the blades 32 of the device having been inserted in an outlet plug, in the ordinary way, with the blades unsplayed, the rotor 42 is rotated relative to the cap 10, by means of the collar 50, only far enough to align its lugs 70 with any suitable indicating means (not shown), on the exterior of the cap, so as to cause the notches 66 in the cam lobes 64 to receive the main portions 40 of the blades, wherein these main portions are spread away from each other and forcibly against the outlet contacts, so as to lock the device to the outlet. Reverse rotation of the rotor 42 unsplays the blades for easy removal of the device from the outlet.

It will be understood that the above described construction can be readily varied to accommodate three or more blades, as is the case of a ground plug.

Although there has been shown and described a preferred form of the invention, it is to be understood that the invention is not necessarily confined thereto, and that any change or changes in the structure of and in the relative arrangements of components thereof are contemplated as being within the scope of the invention as defined by the claims appended hereto.

What is claimed is:

1. A lockable electric male plug comprising an annular cap having upper and lower ends and an axial vertical bore extending therethrough, a rotor engaged through said bore, rotor rotating means on the upper end of the rotor bearing upon the upper end of the cap, a pair of opposed pendant contact blades secured to the lower end of the cap, said blades being normally parallel and being resilient so as to be capable of being spread away from each other and return to parallel relationship, and cam lobes on the rotor below the lower end of the cap for spreading the blades when the rotor is rotated to engage the cam lobes with the blades.

2. A lockable electric male plug comprising an annular cap having upper and lower ends and an axial vertical bore extending therethrough, a rotor engaged through said bore, rotor rotating means on the upper end of the rotor bearing upon the upper end of the cap, a pair of opposed pendant contact blades secured to the lower end of the cap, said blades being normally parallel and being resilient so as to be capable of being spread away from each other and return to parallel relationship, and cam lobes on the rotor below the lower end of the cap for spreading the blades when the rotor is rotated to engage the cam lobes with the blades.

3. A lockable electric male plug comprising an annular cap having upper and lower ends and an axial vertical bore extending therethrough, a rotor engaged through said bore, rotor rotating means on the upper end of the rotor bearing upon the upper end of the cap, a pair of opposed pendant contact blades secured to the lower end of the cap, said blades being normally parallel and being resilient so as to be capable of being spread away from each other and return to parallel relationship, and cam lobes on the rotor below the lower end of the cap for spreading the blades when the rotor is rotated to engage the cam lobes with the blades.

4. A lockable electric male plug comprising an annular cap having upper and lower ends and an axial vertical bore extending therethrough, a rotor engaged through said bore, rotor rotating means on the upper end of the rotor bearing upon the upper end of the cap, a pair of opposed pendant contact blades secured to the lower end of the cap, said blades being normally parallel and being resilient so as to be capable of being spread away from each other and return to parallel relationship, and cam lobes on the rotor below the lower end of the cap for spreading the blades when the rotor is rotated to engage the cam lobes with the blades.

5. A lockable electric male plug comprising an annular cap having upper and lower ends and an axial vertical bore extending therethrough, a rotor engaged through said bore, rotor rotating means on the upper end of the rotor bearing upon the upper end of the cap, a pair of opposed pendant contact blades secured to the lower end of the cap, said blades being normally parallel and being resilient so as to be capable of being spread away from each other and return to parallel relationship, and cam lobes on the rotor below the lower end of the cap for spreading the blades when the rotor is rotated to engage the cam lobes with the blades.

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