

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 555 716 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
08.05.1996 Bulletin 1996/19

(51) Int Cl. 6: **H01R 13/115, H01R 4/18**

(21) Application number: **93101496.3**

(22) Date of filing: **01.02.1993**

(54) Insulated electrical terminal and method of fabricating same

Isolierter elektrischer Endverbinder und Herstellungsverfahren

Terminal électrique isolé et sa méthode de fabrication

(84) Designated Contracting States:
DE FR GB IT

(72) Inventor: **Quinn, Robert L.**
St. Petersburg, Florida 33710 (US)

(30) Priority: **11.02.1992 US 834019**

(74) Representative: **Blumbach, Kramer & Partner**

(43) Date of publication of application:
18.08.1993 Bulletin 1993/33

Patentanwälte,
Sonnenberger Strasse 100

D-65193 Wiesbaden (DE)

(73) Proprietor: **MOLEX INCORPORATED**
Lisle Illinois 60532 (US)

(56) References cited:

EP-A- 0 006 297

EP-A- 0 090 538

FR-E- 86 790

EP 0 555 716 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description**Field of the Invention**

This invention generally relates to the art of electrical connectors and, particularly, to insulated electrical terminals of the type having a terminal for connection to the end of an insulated electrical wire and an angled insulating housing which contains the terminal and a portion of the wire.

Background of the Invention

Insulated electrical terminals of the type described generally above, and in detail herein, include a tubular end portion, commonly referred to as a ferrule, which may be placed over the stripped end of an insulated electrical wire containing a solid or stranded conductor core therein. The ferrule may be crimped mechanically and electrically to the stripped core end of the wire. The other end of the terminal typically includes a terminal tongue. The tongue may be formed as a receptacle having a generally planar portion and curled flanges extending from the edges of the planar portion. The tongue receives a flat blade-type terminal of a complementary mating connecting device. Such insulated terminals originally attained wide use in the appliance and automotive industries which often had generally standard blade or tab terminals. However, the terminals now have been used in a wide variety of other applications.

Originally, insulated terminals of the character described above were used primarily in a straight line configuration between the electrical wire and the electrical device to which it is terminated. The ferrule was at one end of an elongated member and the terminal end at the other. However, various industries have found a need to make connections to termination portions on an electrical device, with the wire being introduced at some angle to the electrical device, typically at a 90° angle. Although the electrical wire, itself, can be bent in order to make such connections, the total length consisting of the tongue configuration plus the length of the ferrule, plus the length of the bend of wire can in many applications be too long. Consequently, such insulated terminals have been designed in an angled configuration with the ferrule width, not length, being added to the tongue configuration, i.e. the exposed conductor is inserted into the ferrule at approximately a 90°, rather than a 180° offset from the mating blade-type terminal. This reduces the overall length of the connector by the bend of wire and the difference between the length and width of the crimp ferrule. Such insulated terminals commonly are called "flag" terminals.

One of the problems with such insulated terminals, particularly flag-type terminals, involves the provision of strain relief on the insulated electrical wire itself. In other words, although the conductor core of the wire is crimped to the terminal inside the insulating housing, in

certain environments the conductor core may flex and possibly break if the movement is not restrained. This condition may be particularly prevalent in high vibration environments such as automotive applications. Other applications where these problems are encountered may include aircraft, railroad, appliance and environments involving electric motors.

In high vibration environments such as those described above, crimping means have been provided to crimp or clamp onto the outer insulation of the insulated electrical wire to relieve the strain on the conductor core of the electrical wire. In a right angle or "flag" terminal, heretofore it has been common to leave one side of the insulating housing open for insertion of the terminated wire after the crimping operation. However, in high vibration environments, an open side of the insulated terminal is undesirable due to the possibility of shock or shorts or other dangers caused by uninsulated terminals with an exposed voltage potential.

Another type of crimping operation involves the use of a crimped ferrule for the conductor core of the insulated wire, with the ferrule preassembled into the insulated housing before crimping. Such a flag-type electrical terminal is described in document EP-A-0006297. That terminal is pre-insulated by means of a housing which receives the ferrule. The inserted ferrule can be crimped to a wire whereby the stripped end of the wire is inserted thereinto through a wire-receiving opening. However, if strain relief on the insulated wire, itself, is desired in an electrical terminal of the type described, a second crimp ferrule for the wire insulation should be added, but without full insulation protection of the housing. The second insulation crimping ferrule also may contribute to a larger overall connector, and space often is at a premium to the user of insulated terminals of the flag configuration.

This invention is directed to solving the problems discussed above by providing a low profile angled or flag terminal which is fully insulated and which includes an insulation gripping strain relief means to prevent breakage of the conductor core of an insulated electrical wire in a high vibration environment.

Summary of the Invention

An object, therefore, of the invention is to provide a new and improved insulated terminal of the character described, particularly a flag-type terminal, and particularly including strain relief means on the insulated portion of an insulated electrical wire.

Another object of the invention is to provide a method of fabricating an insulated terminal of the character described.

The invention is disclosed in an insulated terminal for connection to the end of an insulated electrical wire having a stripped or exposed end of the conductor core projecting from the wire insulation. An angled insulating housing has a through passage with a first passage por-

tion communicating with and at an angle to a second passage portion. The first passage portion includes an open end for receiving a complementary mating terminal, and the second passage portion includes an open end for receiving the insulated electrical wire. A terminal is positioned into the first passage portion through the open end thereof. The terminal includes an outward contact section for connection to the mating blade terminal and an inward crimp section for crimping onto the conductor core of the insulated electrical wire inserted into the second passage portion. The invention contemplates a crimp ferrule positioned into the second passage portion for crimping onto the insulation of the insulated electrical wire.

In the exemplary embodiment of the invention, generally, complementary interengaging means are provided between the crimp ferrule for the wire insulation and the crimp section of the terminal for the conductor core, to fix the crimp ferrule to the crimp section and maintain them in a fixed condition in response to crimping at least one of the crimp ferrule or the crimp section. More specifically, the complementary interengaging means are provided in the form of telescoped portions of the crimp ferrule and the crimp section. The crimp ferrule and the crimp section are disclosed as being generally tubular.

Other objects, advantageous features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a perspective view of the terminal according to the invention partly in section to show the insulation grip ferrule.

FIGURE 2 is a central sectional view through an insulated terminal embodying the concepts of the invention;

FIGURE 3 is a section through the angled insulating housing of the terminal;

FIGURE 4 is an end elevational view looking toward the front of Figure 3;

FIGURE 5 is a section through the crimp ferrule for the wire insulation of the insulated electrical wire.

FIGURE 6 is a top plan view of the terminal, itself, isolated from the insulating housing;

FIGURE 7 is an end elevational view looking toward the right-hand end of Figure 6; and

FIGURE 8 is an end elevational view looking toward the front of Figure 6.

Detailed Description of the Preferred Embodiment

Referring to the drawings in greater detail and first to Figure 1, the invention is disclosed herein as embodied in an insulated terminal generally designated 10, for connection to the end of a conventional insulated electrical wire (not shown). Suffice it to say, the insulated electrical wire has a stripped or exposed end of a con-

ductor core projecting from the wire insulation, as is well known in the art. Generally, insulated terminal 10 includes an angled insulating housing, generally designated 12. The housing mounts therewithin, substantially surrounding and insulating, an angled terminal, generally designated 14, and a crimp ferrule, generally designated 16.

It can be seen in Figures 1 and 2 that the entire configuration of housing 12, terminal 14 and crimped ferrule 16 is a right-angled configuration to provide a "flag" terminal. In other words, a complementary mating terminal will be inserted in the direction of arrow "A", and the insulated electrical wire will be inserted in the direction of arrow "B" at approximately 90° to the insertion direction of the mating terminal.

Referring to Figures 2 and 3 in conjunction with Figure 1, angled insulating housing 12 has a right-angled through passage, with a first passage portion 18 including an open end 20 for receiving the complementary mating terminal. The first passage portion communicates with, and is at a 90° angle to, a second passage portion 22 having an open end 24 for receiving the insulated electrical wire. The second passage portion has a slight reduced-diameter neck 26, as best seen in Figure 3.

Referring to Figures 6-8 in conjunction with Figure 2, terminal 14 is positionable into first passage 18 of housing 12 through open end 20 of the passage in the direction of arrow "A". The terminal includes an outward contact section having a generally planar portion 28, and an inward crimp section 30 for crimping onto the exposed conductor core of the insulated electrical wire inserted through open end 24 of second passage portion 22. The contact section of terminal 14 is formed as a receptacle, with curled flanges 32 along opposite side edges of planar portion 28, for receiving a complementary flat mating terminal tab. Specifically, looking at Figure 7, the complementary mating terminal tab would be inserted into the contact section overlying planar portion 28 and beneath down turned edges 34 of curled flanges 32, whereby the flanges resiliently hold the terminal tab in terminating condition.

Crimp section 30 is generally tubular, as seen best in Figure 8, for receiving the stripped conductor core of the insulated electrical wire. As seen best in Figure 6, the crimp section has a reduced diameter area defining a neck 40, for purposes described hereinafter.

Referring to Figure 5 in conjunction with Figures 2 and 6, crimp ferrule 16 is generally tubular in configuration and includes an outer tubular portion 42 and an inner tubular portion 44, with a folded area defining an internal annular shoulder 46. In addition, inner tubular portion 44 is indented, annularly thereabout, as at 48.

The method of assembling insulated terminal 10 now will be described. First, terminal 14 is inserted into first passage portion 18 of insulating housing 12, in the direction of arrow "A", to the position shown in Figure 2 wherein crimp section 30 is aligned with second pas-

sage portion 22. Crimp ferrule 16 then is inserted into the second passage portion in the direction of arrow "B" such that inner tubular portion 44 of the crimp ferrule telescopes over the reduced diameter portion of crimp section 30. The crimp ferrule is inserted until the inner end thereof abuts neck 40 of crimp section 30 of the terminal, shoulder 46 abuts the end of the crimp section and outer tubular portion 42 abuts neck 26 within the second passage portion of insulating housing 12. Indented section 48 of the crimp ferrule grips the crimp section of the terminal sufficiently to hold the crimp ferrule telescoped over the crimp section until a subsequent crimping operation. It can be seen in Figure 6 that a slot or relieved area 50 is provided in terminal 14 alongside crimp section 30 to allow crimp ferrule 16 to be telescoped over the crimp section. The insulated terminal now is in its preassembled condition ready to be crimped to an insulated electrical wire.

When it is desired to use insulated terminal 10, an insulated electrical wire, having an exposed or stripped end of a conductor core projecting from the wire insulation, is inserted into open end 24 of second passage portion 22 of insulating housing 12, through crimp ferrule 16 and into crimp section 30 of terminal 14. The stripped conductor core will project substantially into crimp section 30, and a portion of the wire insulation adjacent the exposed conductor core will be located within crimp ferrule 16 outwardly of crimp section 30. In other words, the end of the wire insulation will stop short of shoulder 46 defined in the crimp ferrule. In a single crimping operation, crimp section 30 of terminal 14 and crimp ferrule 16 can be crimped onto the insulated wire whereby the crimp section clamps or crimps onto the exposed end of the conductor core of the wire, and crimp ferrule 16 clamps or crimps onto the wire insulation adjacent the exposed conductor core to provide strain relief for the termination. It can be seen that the entire terminal (14), crimp ferrule (16) and exposed end of the conductor core of the wire are completely enclosed by insulating housing 12. There are no open side walls in the terminal other than the open ends required for the insertion of the mating wire and terminal.

It will be understood that the invention may be embodied in other specific forms without departing from the scope of the appended claims.

Claims

1. In an insulated terminal (10) for connection to an end of an insulated electrical wire having an exposed conductor core projecting from the insulation, said terminal including:

an angled insulating housing (12) having a through-passage defined by a first passage portion (18) communicating with and at an angle to a second passage portion (22), the first

5

10

15

20

25

30

35

40

45

50

55

55

4

passage portion including a first open end (20) through which a complementary mating terminal is received and the second passage portion including a second open end (24) for receiving the insulated electrical wire; a terminal portion (14) positionable into the first passage portion (18) through the first open end (20), the terminal portion (14) including an outward contact section (28, 32) for direct connection to the mating terminal and an inward crimp section (30) for crimping directly onto the conductor core of the insulated electrical wire inserted into the second passage portion (22); and

an open-ended cylindrical crimp ferrule (16) having one end adjacent the inward crimp section (30) of the terminal portion (14) and the other end adjacent said second open end (24), said crimp ferrule (16) adapted to receive the insulated electrical wire therethrough such that said exposed conductor core is positionable within said inward crimp section (30) of the terminal portion (14), an insulated portion of the wire adjacent the exposed conductor core being positionable within the crimp ferrule (16) adjacent said second open end (24), said housing (12) being deformable whereby the inward crimp section (30) of the terminal portion (14) is adapted to be crimped directly about said exposed conductor core and the crimp ferrule (16) is adapted to be crimped directly about said insulated portion of the wire by applying a crimping force to said housing (12);

said insulated terminal (10) characterized in that:

said crimp ferrule (16) is separate from said terminal portion (14) and is receivable through said second open end (24) of the second passage portion (22) of the housing an insulated portion of the wire adjacent the exposed conductor core being positionable within the crimp ferrule (16) adjacent said second open end (24), so that said crimp ferrule forms an insulation gripping strain relief means to prevent breakage of the conductor core, and

said housing (12) encloses entirely said terminal portion (14) and said crimp ferrule (16).

2. In an insulated terminal (10) as set forth in claim 1, including complementary interengaging means (44) between the crimp ferrule (16) and the crimp section (30) of the terminal portion (14) for fixing the crimp ferrule (16) to the crimp section (30).
3. In an insulated terminal (10) as set forth in claim 2, wherein said complementary interengaging means (44) comprise telescoped portions of the crimp fer-

- rule (16) and crimp section (30).
4. In an insulated terminal (10) as set forth in claim 1, wherein said first (18) and second (22) passage portions extend at a right angle with respect to each other. 5
5. In an insulated terminal (10) as set forth in claim 4, wherein said contact section of the terminal portion (14) is generally flat (28) with curled flanges (32) along opposite side edges thereof for receiving a generally flat mating terminal through the second open end of the second passage. 10
6. In an insulated terminal (10) as set forth in claim 5, wherein said crimp section (30) of the terminal is generally tubular. 15
7. In an insulated terminal (10) as set forth in claim 6, wherein said crimp ferrule (16) and crimp section (30) are interengaged by means of telescoped portions thereof. 20
8. A method of fabricating an insulated terminal (10) for connection to an end of an insulated electrical wire having an exposed conductor core projecting from the insulation, wherein the insulated terminal includes an angled insulating housing (12) having a through-passage with a first passage portion (18) communicating with, and at an angle to, a second passage portion (22), the first passage portion including a first open end (20) for receiving a complementary mating terminal and the second passage portion including a second open end (24) for receiving the insulated electrical wire, the method comprising the steps of: 25
- inserting a terminal member (14) into the first passage portion through the first open end, said terminal member having an inner crimp section (30) communicating with the second passage portion for crimping directly onto the exposed conductor core of the insulated electrical wire; and 30
- inserting an open-ended cylindrical crimp ferrule (16) into the second passage portion through the second open end into engagement with and communicating with the crimp section of the terminal member for crimping directly onto a portion of the wire insulation adjacent the exposed conductor core. 35
9. The method of claim 8, including the steps of: 40
- inserting an insulated electrical wire into said second passage portion (22) so that the exposed conductor core is located in said crimp section (30) and the portion of the wire insula- 45
- tion adjacent the exposed conductor core is located in the crimp ferrule (16); and crimping the crimp section (30) onto the exposed conductor core and crimping the crimp ferrule (16) onto the portion of the wire insulation adjacent the exposed conductor core. 50
10. The method of claim 9, wherein said crimping of the crimp section (30) onto the exposed conductor core of said insulated electrical wire and said crimping of the crimp ferrule (16) onto the portion of the wire insulation adjacent the exposed conductor core is performed in a single operation. 55

Patentansprüche

1. Isolierter Kontakt (10) zur Verbindung mit einem Ende einer isolierten elektrischen Leitung, die einen aus der Isolation vorstehenden, freigelegten Leiterkern besitzt, mit:
- einem winkligen, isolierenden Gehäuse (12) mit einem durch ein erstes Durchgangsteil (18) definierten Durchgang, der unter einem Winkel mit einem zweiten Durchgangsteil (22) in Verbindung steht, wobei der erste Durchgangsteil ein erstes offenes Ende (20) enthält, durch den ein komplementärer angepaßter Kontakt aufgenommen wird, und der zweite Durchgangsteil ein zweites offenes Ende (24) zur Aufnahme des isolierenden elektrischen Leiters besitzt,
- einen in den ersten Durchgangsteil (18) durch das erste offene Ende (20) einlagerbaren Kontaktteil (14), wobei der Kontaktteil (14) einen äußeren Kontaktabschnitt (28, 32) zur direkten Verbindung mit dem angepaßten Kontakt und einen äußeren Crimpabschnitt (30) zum direkten Crimpen an den Leiterkern der isolierenden elektrischen Leitung aufweist, die in den zweiten Durchgangsteil (22) eingesetzt ist, und eine offene zylindrische Crimphülse (16), bei der ein Ende nahe dem inneren Crimpabschnitt (30) des Kontaktabschnitts (14) und das andere Ende nahe dem zweiten offenen Ende (24) angeordnet ist, wobei die Crimphülse (16) die isolierende elektrische Leitung in sich aufnehmen kann, derart, daß der freigelegte Leiterkern in den inneren Crimpabschnitt (30) bei dem Kontaktabschnitt (14) einbringbar ist, wobei das Gehäuse (12) deformierbar ist, so daß der innere Crimpabschnitt (30) des Kontaktabschnitts (14) direkt auf den freigelegten Leiterkern und die Crimphülse (16) direkt auf den isolierenden Teil der Leitung durch Ausüben einer Crimpkraft auf das Gehäuse (12) aufcrimpbar sind,

- dadurch gekennzeichnet, daß die Crimpföhre (16) von dem Kontaktteil (14) getrennt und über das zweite offene Ende (24) des zweiten Durchgangsteils (22) des Gehäuses aufnehmbar ist,
- daß ein isolierender Teil der Leitung nahe dem freigelegten Leiterkern in die Crimpföhre (16) nahe dem zweiten offenen Ende (24) einbringbar ist, so daß die Crimpföhre eine isolationsergreifende Zugentlastungseinrichtung bildet, um einen Bruch des Leiterkerns zu verhindern, und
- daß das Gehäuse (12) den Kontaktteil (14) und die Crimpföhre (16) vollständig umschließt.
2. Isolierender Kontakt nach Anspruch 1 mit einer komplementären, verbindenden Einrichtung (44) zwischen der Crimpföhre (16) und dem Crimpabschnitt (30) des Kontaktabschnitts (14) zur Festlegung der Crimpföhre (16) an dem Crimpabschnitt (30).
3. Isolierender Kontakt (10) nach Anspruch 2, bei dem die komplementäre, verbindende Einrichtung (44) teleskopartig ineinandergreifende Teile der Crimpföhre (16) und des Crimpabschnitts (30) umfaßt.
4. Isolierender Kontakt (10) nach Anspruch 1, bei dem der erste (18) und der zweite (22) Durchgangsteil sich rechtwinklig zueinander erstrecken.
5. Isolierender Kontakt (10) nach Anspruch 4, bei dem der Kontaktabschnitt des Kontaktteils (14) generell flach (28) mit gebogenen Flanken (32) entlang entgegengesetzten Seitenkanten des Kontaktabschnitts ausgebildet ist, um einen generell flachen, angepaßten Kontakt durch das zweite offene Ende des zweiten Durchgangs aufzunehmen.
6. Isolierender Kontakt (10) nach Anspruch 5, bei dem der Crimpabschnitt (30) des Kontakts generell röhrförmig ist.
7. Isolierender Kontakt (10) nach Anspruch 6, bei dem die Crimpföhre (16) und der Crimpabschnitt (30) mit Hilfe teleskopförmiger Teile verbindbar sind.
8. Verfahren zur Herstellung eines isolierenden Kontakts (10) zur Verbindung mit einem Ende einer isolierten elektrischen Leitung, die einen aus der Isolation vorstehenden, freigelegten Leiterkern besitzt, wobei der isolierte Kontakt ein winkliges, isolierendes Gehäuse (12) einen Durchgang mit einem ersten Durchgangsteil (18) besitzt, der unter einem Winkel mit einem zweiten Durchgangsteil (22) in Verbindung steht, der erste Durchgangsteil ein erstes offenes Ende (20) zur Aufnahme eines komplementären, angepaßten Kontakts und der zweite

Durchgangsteil ein zweites offenes Ende (24) zur Aufnahme der isolierten elektrischen Leitung besitzt, mit den Verfahrensschritten:

- 5 Einsetzen eines Kontaktgliedes (14) in den ersten Durchgangsteil durch das erste offene Ende, wobei das Kontaktglied einen inneren Crimpabschnitt (30) besitzt, der mit dem zweiten Durchgangsteil in Verbindung steht und direkt auf den freigelegten Leiterkern der isolierten elektrischen Leitung aufcrimpbar ist, und
- 10 Einsetzen einer offenen zylindrischen Crimpföhre (16) in den zweiten Durchgangsteil durch das zweite offene Ende in Verbindung mit dem Crimpabschnitt des Kontaktgliedes zum direkten Aufcrimpfen auf einen Teil der Leitungsleitung nahe dem freigelegten Leiterkern.

- 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 3220 3225 3230 3235 3240 3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 4245 4250 4255 4260 4265 4270 4275 4280 4285 4290 4295 4300 4305 4310 4315 4320 4325 4330 4335 4340 4345 4350 4355 4360 4365 4370 4375 4380 4385 4390 4395 4400 4405 4410 4415 4420 4425 4430 4435 4440 4445 4450 4455 4460 4465 4470 4475 4480 4485 4490 4495 4500 4505 4510 4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600 4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700 4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800 4805 4810 4815 4820 4825 4830 4835 4840 4845 4850 4855 4860 4865 4870 4875 4880 4885 4890 4895 4900 4905 4910 4915 4920 4925 4930 4935 4940 4945 4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340 5345 5350 5355 5360 5365 5370 5375 5380 5385 5390 5395 5400 5405 5410 5415 5420 5425 5430 5435 5440 5445 5450 5455 5460 5465 5470 5475 5480 5485 5490 5495 5500 5505 5510 5515 5520 5525 5530 5535 5540 5545 5550 5555 5560 5565 5570 5575 5580 5585 5590 5595 5600 5605 5610 5615 5620 5625 5630 5635 5640 5645 5650 5655 5660 5665 5670 5675 5680 5685 5690 5695 5700 5705 5710 5715 5720 5725 5730 5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840 5845 5850 5855 5860 5865 5870 5875 5880 5885 5890 5895 5900 5905 5910 5915 5920 5925 5930 5935 5940 5945 5950 5955 5960 5965 5970 5975 5980 5985 5990 5995 6000 6005 6010 6015 6020 6025 6030 6035 6040 6045 6050 6055 6060 6065 6070 6075 6080 6085 6090 6095 6100 6105 6110 6115 6120 6125 6130 6135 6140 6145 6150 6155 6160 6165 6170 6175 6180 6185 6190 6195 6200 6205 6210 6215 6220 6225 6230 6235 6240 6245 6250 6255 6260 6265 6270 6275 6280 6285 6290 6295 6300 6305 6310 6315 6320 6325 6330 6335 6340 6345 6350 6355 6360 6365 6370 6375 6380 6385 6390 6395 6400 6405 6410 6415 6420 6425 6430 6435 6440 6445 6450 6455 6460 6465 6470 6475 6480 6485 6490 6495 6500 6505 6510 6515 6520 6525 6530 6535 6540 6545 6550 6555 6560 6565 6570 6575 6580 6585 6590 6595 6600 6605 6610 6615 6620 6625 6630 6635 6640 6645 6650 6655 6660 6665 6670 6675 6680 6685 6690 6695 6700 6705 6710 6715 6720 6725 6730 6735 6740 6745 6750 6755 6760 6765 6770 6775 6780 6785 6790 6795 6800 6805 6810 6815 6820 6825 6830 6835 6840 6845 6850 6855 6860 6865 6870 6875 6880 6885 6890 6895 6900 6905 6910 6915 6920 6925 6930 6935 6940 6945 6950 6955 6960 6965 6970 6975 6980 6985 6990 6995 7000 7005 7010 7015 7020 7025 7030 7035 7040 7045 7050 7055 7060 7065 7070 7075 7080 7085 7090 7095 7100 7105 7110 7115 7120 7125 7130 7135 7140 7145 7150 7155 7160 7165 7170 7175 7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 8245 8250 8255 8260 8265 8270 8275 8280 8285 8290 8295 8300 8305 8310 8315 8320 8325 8330 8335 8340 8345 8350 8355 8360 8365 8370 8375 8380 8385 8390 8395 8400 8405 8410 8415 8420 8425 8430 8435 8440 8445 8450 8455 8460 8465 8470 8475 8480 8485 8490 8495 8500 8505 8510 8515 8520 8525 8530 8535 8540 8545 8550 8555 8560 8565 8570 8575 8580 8585 8590 8595 8600 8605 8610 8615 8620 8625 8630 8635 8640 8645 8650 8655 8660 8665 8670 8675 8680 8685 8690 8695 8700 8705 8710 8715 8720 8725 8730 8735 8740 8745 8750 8755 8760 8765 8770 8775 8780 8785 8790 8795 8800 8805 8810 8815 8820 8825 8830 8835 8840 8845 8850 8855 8860 8865 8870 8875 8880 8885 8890 8895 8900 8905 8910 8915 8920 8925 8930 8935 8940 8945 8950 8955 8960 8965 8970 8975 8980 8985 8990 8995 9000 9005 9010 9015 9020 9025 9030 9035 9040 9045 9050 9055 9060 9065 9070 9075 9080 9085 9090 9095 9100 9105 9110 9115 9120 9125 9130 9135 9140 9145 9150 9155 9160 9165 9170 9175 9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 9850 9855 9860 9865 9870 9875 9880 9885 9890 9895 9900 9905 9910 9915 9920 9925 9930 9935 9940 9945 9950 9955 9960 9965 9970 9975 9980 9985 9990 9995 10000 10005 10010 10015 10020 10025 10030 10035 10040 10045 10050 10055 10060 10065 10070 10075 10080 10085 10090 10095 10100 10105 10110 10115 10120 10125 10130 10135 10140 1014

- le fil électrique isolé ; une partie borne (14) pouvant être placée dans la première partie de conduit (18) par la première extrémité ouverte (20), la partie borne (14) incluant, vers l'extérieur, une section de contact (28, 32) pour connexion directe à la borne complémentaire et, vers l'intérieur, une section de sertissage (30) pour sertissage directement sur l'âme conductrice du fil électrique isolé introduit dans la seconde partie de conduit (22) ; et une bague de sertissage cylindrique à extrémité ouverte (16) ayant une extrémité adjacente à la section de sertissage intérieure (30) de la partie borne (14) et l'autre extrémité adjacente à ladite seconde extrémité ouverte (24), ladite bague de sertissage (16) étant conçue pour y recevoir le fil électrique, de sorte que ladite âme conductrice dénudée puisse se placer dans ladite section de sertissage intérieure (30) de la partie borne (14), une partie isolée du fil, adjacente à l'âme conductrice, pouvant se placer dans la bague de sertissage (16) adjacente à la seconde extrémité ouverte (24) ; ledit boîtier (12) étant déformable, ce par quoi la section de sertissage intérieure (30) de la partie borne (14) est conçue pour se sertir directement autour de ladite âme conductrice dénudée et la bague de sertissage (16) est conçue pour se sertir directement autour de ladite partie isolée du fil, par application d'une force de sertissage audit boîtier (12) ; ladite borne isolée (10) étant caractérisée : en ce que ladite bague de sertissage (16) est distincte de ladite partie borne (14) et peut être mise en place par ladite seconde extrémité ouverte (24) de la seconde partie de conduit (22) du boîtier, de sorte que ladite bague de sertissage constitue un moyen de soulagement de traction serrant l'isolant pour prévenir la rupture de l'âme conductrice ; et en ce que ledit boîtier (12) renferme entièrement ladite partie borne (14) et ladite bague de sertissage (16).
2. Borne isolée (10) selon la revendication 1, comprenant un moyen de blocage réciproque complémentaire (44) entre la bague de sertissage (16) et la section de sertissage (30) de la partie borne (14) pour fixer la bague de sertissage (16) à la section de sertissage (30).
3. Borne isolée (10) selon la revendication 2, dans laquelle le moyen de blocage réciproque complémentaire (44) comprend des parties télescopiques de la bague de sertissage (16) et de la section de sertissage (30).
4. Borne isolée (10) selon la revendication 1, dans laquelle lesdites première (18) et seconde (22) parties de conduit s'étendent à angle droit l'une par rapport à l'autre.
5. Borne isolée (10) selon la revendication 4, dans laquelle ladite section de contact de la partie borne (14) est globalement plate (28) avec des ailes en boucle (32) le long de ses bords latéraux opposés, pour recevoir, par la seconde extrémité ouverte du second conduit, une borne complémentaire globalement plate.
10. 6. Borne isolée (10) selon la revendication 5, dans laquelle ladite section de sertissage (30) de la borne est globalement tubulaire.
15. 7. Borne isolée (10) selon la revendication 6, dans laquelle ladite bague de sertissage (16) et ladite section de sertissage (30) se bloquent réciproquement au moyen de leurs parties télescopiques.
20. 8. Procédé de fabrication d'une borne isolée (10) pour connexion à une extrémité d'un fil électrique isolé ayant une âme conductrice dénudée en saillie par rapport à l'isolant, la borne isolée comprenant un boîtier isolant en angle (12) comportant un conduit traversant avec une première partie de conduit (18) communiquant avec une seconde partie de conduit (22) et formant un certain angle avec elle, la première partie de conduit possédant une première extrémité ouverte (20), pour recevoir une borne d'accouplement complémentaire, et la seconde partie de conduit possédant une seconde extrémité ouverte (24) pour recevoir le fil électrique isolé, le procédé comprenant les étapes :
25. 35. d'introduction, par la première extrémité ouverte, d'un élément borne (14) dans la première partie de conduit, ledit élément borne possédant une section de sertissage intérieure (30) communiquant avec la seconde partie de conduit pour sertissage directement sur l'âme conductrice dénudée du fil électrique isolé ; et d'introduction, par la seconde extrémité ouverte, d'une bague de sertissage cylindrique à extrémité ouverte (16) dans la seconde partie de conduit, en contact et en communication avec la section de sertissage de l'élément borne, pour sertissage directement sur une partie de l'isolant de fil adjacente à l'âme conductrice dénudée.
40. 45. 50. 55. 9. Procédé selon la revendication 8, comprenant les étapes :
- d'introduction d'un fil électrique isolé dans ladite seconde partie de conduit (22) de sorte

que l'âme conductrice dénudée soit située dans ladite section de sertissage (30), et que la partie de l'isolant de fil adjacente à l'âme conductrice dénudée soit située dans la bague de sertissage (16); et
5
de sertissage de la section de sertissage (30) sur l'âme conductrice dénudée, et de sertissage de la bague de sertissage (16) sur la partie de l'isolant de fil adjacente à l'âme conductrice dénudée.
10

10. Procédé selon la revendication 9, dans lequel ledit sertissage de la section de sertissage (30) sur l'âme conductrice dénudée dudit fil électrique isolé et ledit sertissage de la bague de sertissage (16) sur la partie de l'isolant de fil adjacente à l'âme conductrice dénudée s'effectuent en une seule opération.
15

20

25

30

35

40

45

50

55

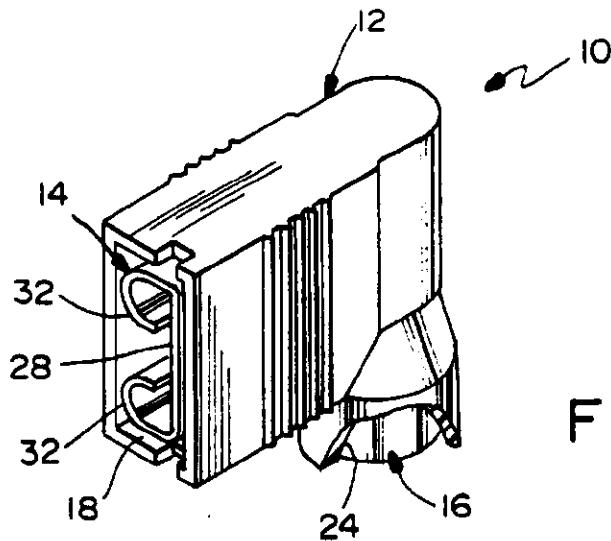


FIG.1

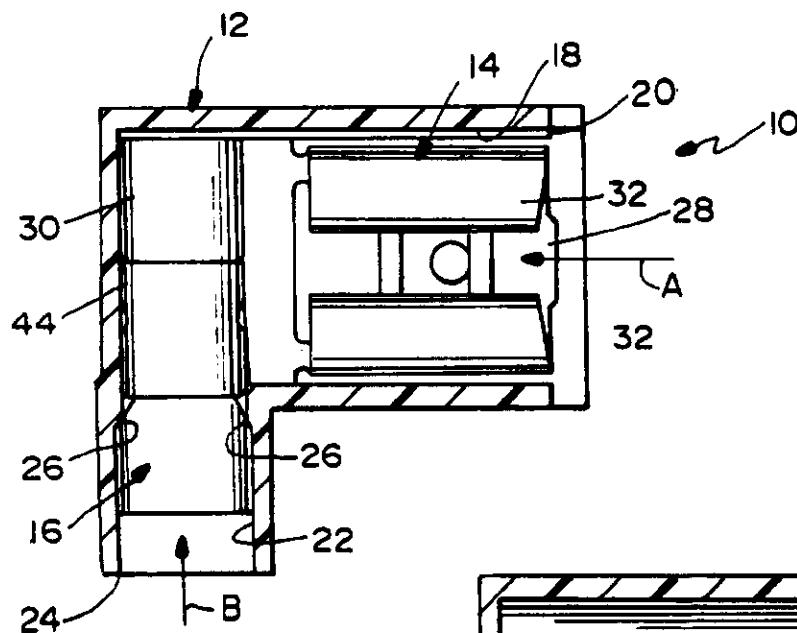


FIG.2

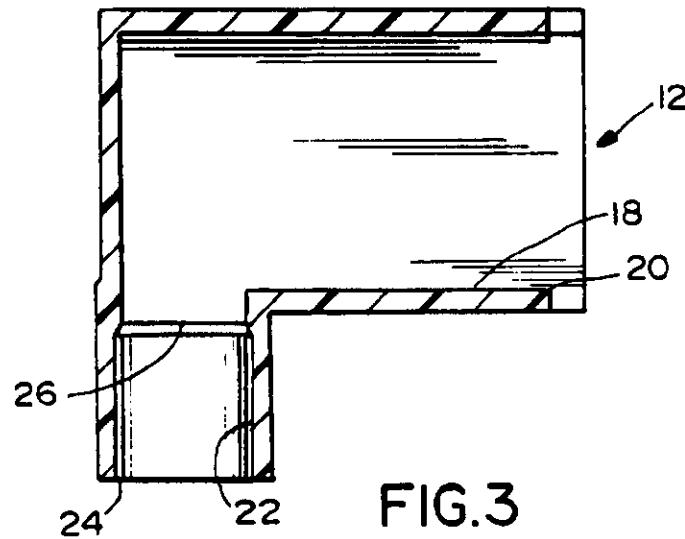


FIG.3

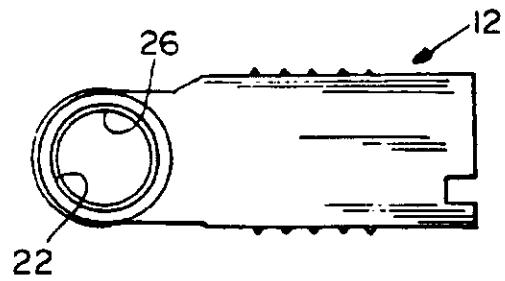


FIG.4

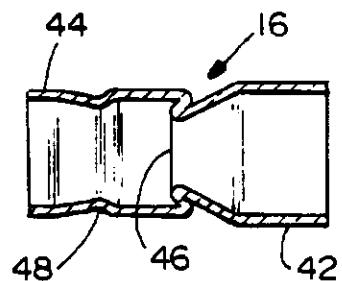


FIG.5

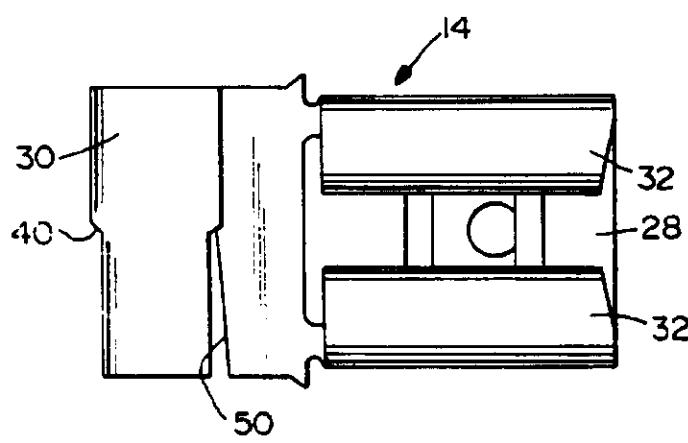


FIG.6

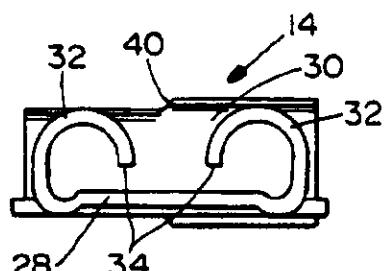


FIG.7

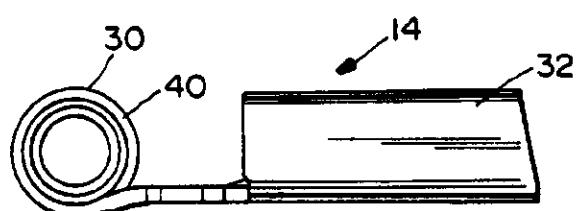


FIG.8

REGISTER ENTRY FOR EP0555716

European Application No EP93101496.3 filing date 01.02.1993

Priority claimed:

11.02.1992 in United States of America - doc: 834019

Designated States DE FR GB IT

Title INSULATED ELECTRICAL TERMINAL AND METHOD OF FABRICATING SAME.

Applicant/Proprietor

MOLEX INCORPORATED, 2222 Wellington Court, Lisle Illinois 60532, United States of America [ADP No. 50189273002]

Inventor

ROBERT L. QUINN, 3505 75th Street W., St. Petersburg, Florida 33710, United States of America [ADP No. 61138202001]

Classified to

H01R

Address for Service

F J CLEVELAND & CO, 40-43 Chancery Lane, LONDON, WC2A 1JQ, United Kingdom [ADP No. 00000141001]

EPO Representative

BLUMBACH WESER BERGEN KRAMER ZWIRNER HOFFMANN PATENTANWÄLTE, Sonnenberger Strasse 100, D-65193 Wiesbaden, Federal Republic of Germany [ADP No. 57171571001]

Publication No EP0555716 dated 18.08.1993

Publication in English

Examination requested 29.09.1993

Patent Granted with effect from 08.05.1996 (Section 25(1)) with title
INSULATED ELECTRICAL TERMINAL AND METHOD OF FABRICATING SAME

29.07.1994 Notification from EPO of change of EPO Representative details from
BLUMBACH WESER BERGEN KRAMER ZWIRNER HOFFMANN PATENTANWÄLTE,
Sonnenberger Strasse 100, D-65193 Wiesbaden, Federal Republic of
Germany [ADP No. 57171571001]
to

BLUMBACH WESER BERGEN KRAMER ZWIRNER HOFFMANN PATENTANWÄLTE,
Sonnenberger Strasse 100, D-65193 Wiesbaden, Federal Republic of
Germany [ADP No. 50114305002]

Entry Type 25.14 Staff ID. RD06 Auth ID. EPT

24.03.1995 Notification from EPO of change of EPO Representative details from
BLUMBACH WESER BERGEN KRAMER ZWIRNER HOFFMANN PATENTANWÄLTE,
Sonnenberger Strasse 100, D-65193 Wiesbaden, Federal Republic of
Germany [ADP No. 50114305002]
to

BLUMBACH, KRAMER & PARTNER, Patentanwälte Sonnenberger Strasse 100,
D-65193 Wiesbaden, Federal Republic of Germany [ADP No. 62903091001]

Entry Type 25.14 Staff ID. RD06 Auth ID. EPT

TIMED: 13/05/96 11:52:26

REGISTER ENTRY FOR EP0555716 (Cont.)

PAGE: 2

08.02.1996 F J CLEVELAND & CO, 40-43 Chancery Lane, LONDON, WC2A 1JQ, United
Kingdom [ADP No. 00000141001]

registered as address for service

Entry Type 8.11 Staff ID. LW1 Auth ID. AA

***** END OF REGISTER ENTRY *****

OA80-01
EP

OPTICS - PATENTS

13/05/96 11:50:20
PAGE: 1

RENEWAL DETAILS

PUBLICATION NUMBER EP0555716

PROPRIETOR(S)

MOLEX INCORPORATED, 2222 Wellington Court, Lisle Illinois 60532,
United States of America

DATE FILED 01.02.1993

DATE GRANTED 08.05.1996

DATE NEXT RENEWAL DUE 01.02.1997

DATE NOT IN FORCE

DATE OF LAST RENEWAL

YEAR OF LAST RENEWAL 00

STATUS PATENT IN FORCE
***** END OF REPORT *****