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Tucker

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[54] **CORD ADAPTER FOR TELEPHONES**

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[73] Assignee: **American Telecommunications Corporation,** El Monte, Calif.

[22] Filed: **Oct. 19, 1972**

[21] Appl. No.: **299,180**

[52] **U.S. Cl.** ..... **339/103 R,** 339/91 R, 339/176 M, 339/196 M, 339/220 R

[51] **Int. Cl.** **H01r 13/58,** H01r 13/54

[58] **Field of Search** ..... 339/49 R, 176, 195, 196, 339/206, 256 SP, 258 S, 103, 220

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Primary Examiner—Bobby R. Gay
Assistant Examiner—Lawrence J. Staab
Attorney, Agent, or Firm—Christie, Parker & Hale

[57] **ABSTRACT**

A cord adapter has a plurality of male plug stabs to establish electrical contact with a cooperating contact in a plug receptacle or jack. Each plug stab is comprised of a post extending upwardly from the base of the adapter and receiving a blade of a contact with the end of the blade staked to the post at the top thereof. The vertical portion of the blade faces laterally outward. Spade terminals of the cord are adapted to be received in spade terminal receptacles within the base and engage additional blades of the contacts. The spades are bent at right angles so that their shanks are received in troughs of the adapter's contact mounts to keep individual spades from touching other spades and to present a low vertical profile in the cord adapter. The cord itself is secured within the adapter either by a T-type connection or a fixed loop connection. A catch for a latch extends from the base on the plug stab side for latching engagement in the female plug receptacle.

11 Claims, 5 Drawing Figures

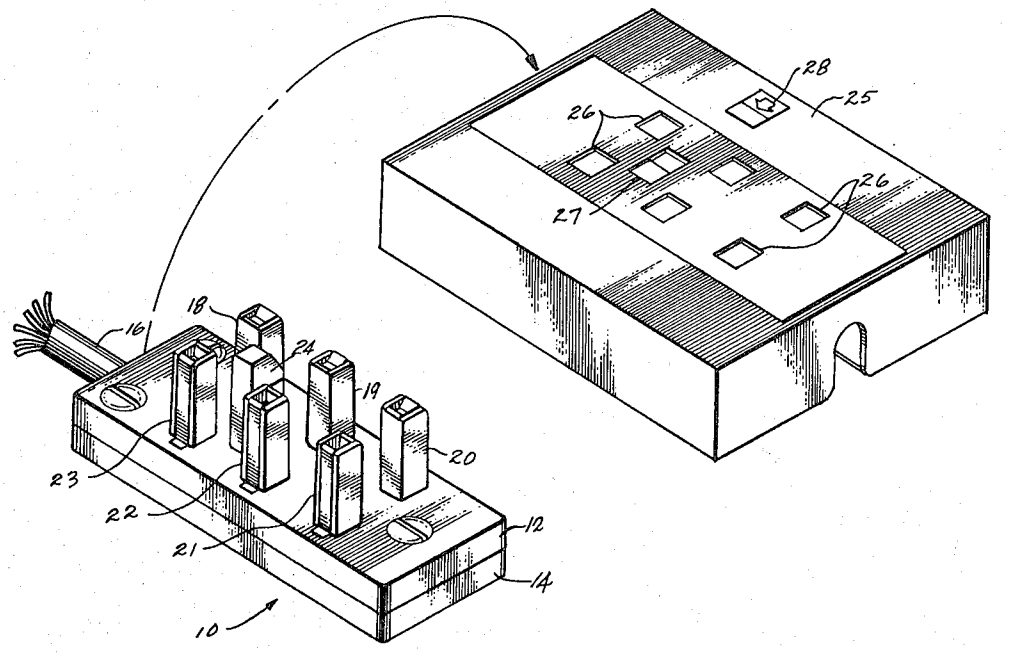


Fig. 1

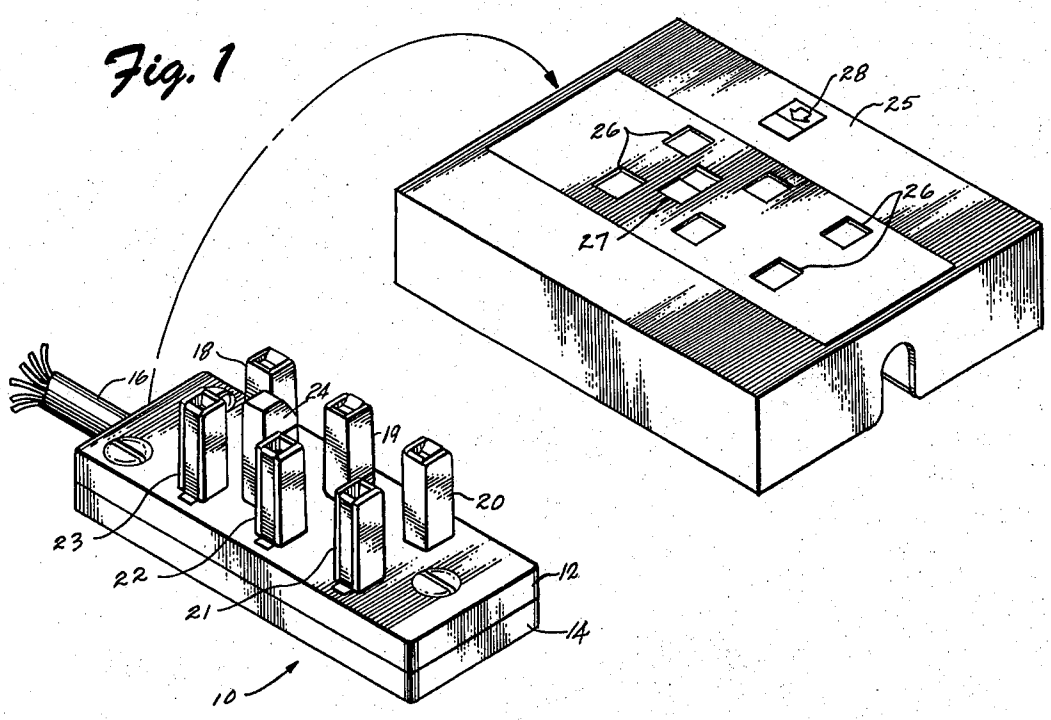


Fig. 5

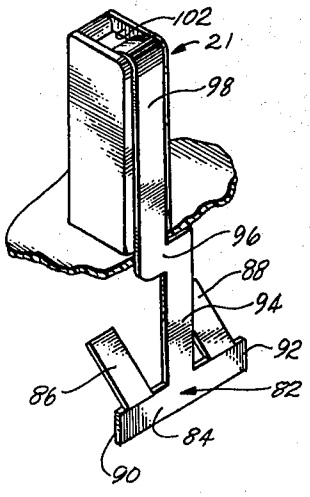
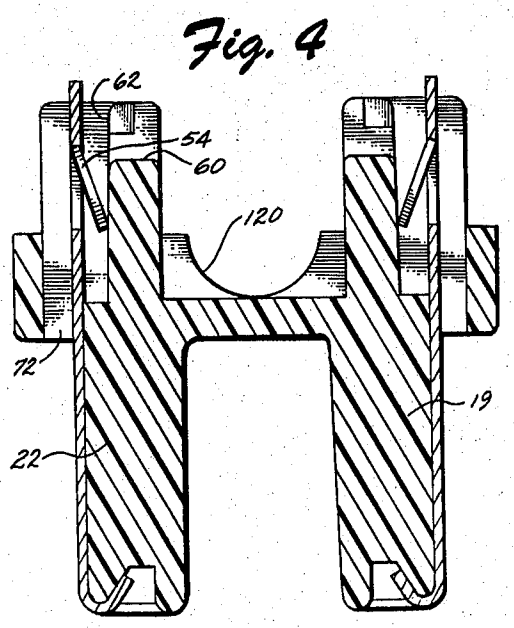


Fig. 4



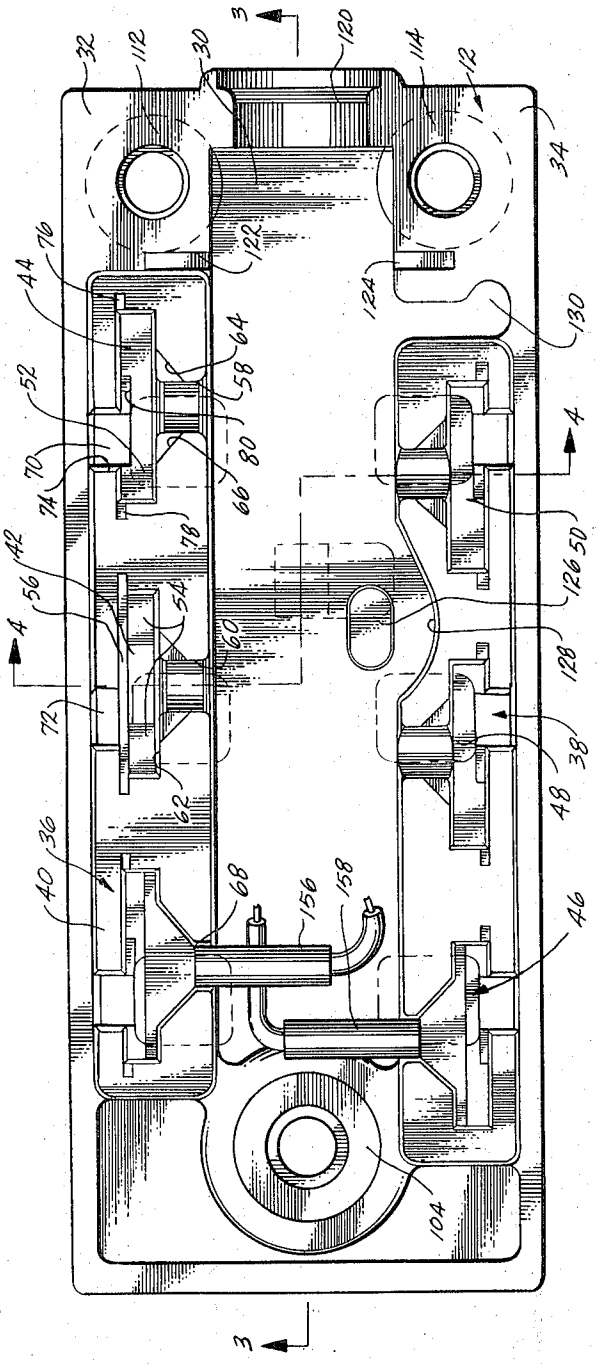

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Fig. 2

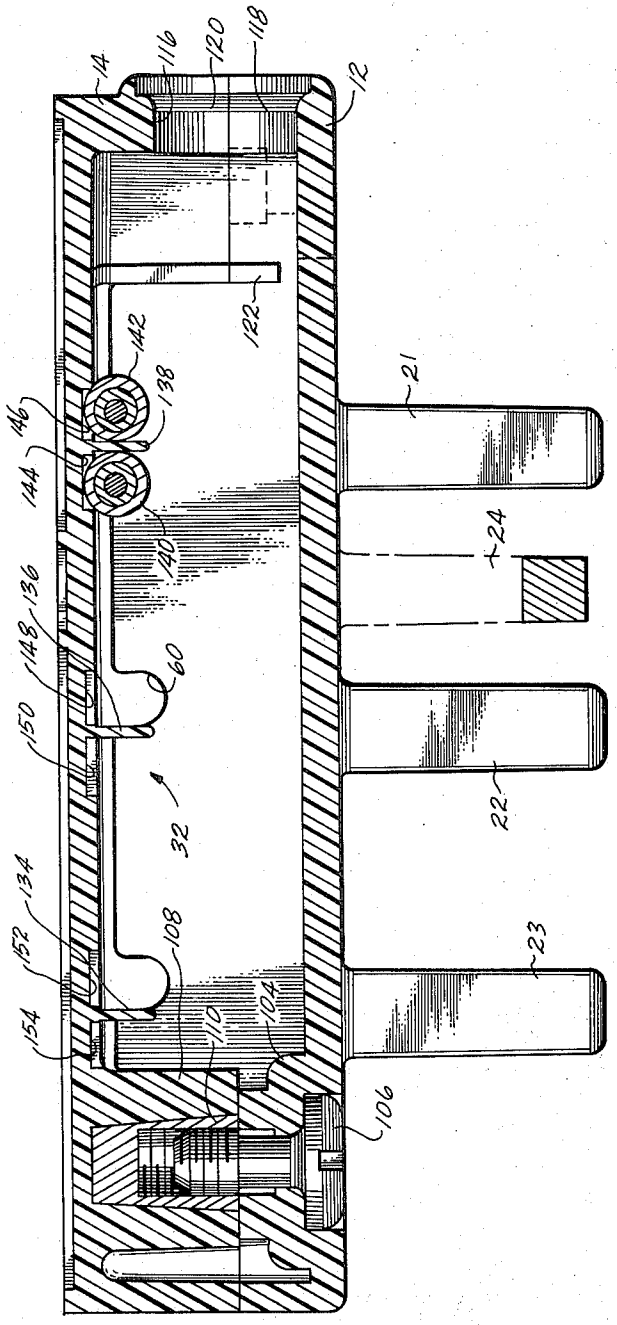

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Fig. 3

CORD ADAPTER FOR TELEPHONES

BACKGROUND OF THE INVENTION

The present invention relates to electrical plugs for use with plug receptacles in general and, more in particular, to a plug especially adapted for telephones.

The portability of telephones has been effected through the use of a cord adapter or plug from a telephone instrument. These adapters connect the telephone with the telephone service by plugging into a jack or a plug receptacle. It is becoming increasingly obvious that telephone instruments in general, regardless of portability requirements, are advantageously connected with telephone service through the cord adapter-jack arrangement.

One of the problems encountered with previously known cord adapter-jack arrangements is that the arrangements are susceptible to "noise." Noise is a condition where electrical contact between engaged contacts is poor or susceptible to becoming intermittently poor by vibration. The reasons that noise is a problem with previous cord adapters and jacks include the fact that the contacts have slop or play to compensate for wide dimensional tolerances. In addition, the force between engaged contacts tends to separate them. Scoring of contact surfaces, as by a sharp edge or corners of contacts scratching mating contacts, often leads to point engagement and not line engagement which is desirable to avoid noise.

There is a need, therefore, for a plug adapter which is economically produced, while avoiding the problems of noise.

SUMMARY OF THE INVENTION

The present invention provides a plug adapter characterized in the absence of noise or static when used with a cooperating jack.

One form of the present invention includes a cord adapter for a plural conductor cord to electrically connect the conductors of the cord with contacts of a female plug receptacle. The adapter has a base from which first and second plug stabs extend. Each plug stab has an electrically non-conductive post integrally connected to the base and extending upright therefrom and a contact blade rigidly secured to the post. Contact means is provided for each stab, including the contact blade of the stab, for electrical connection to a conductor of the cord.

A more particular form of the present invention includes a base and a cover which receive the conductors of a telephone cord. The base mounts upstanding, non-electrically conductive plug posts of relatively high strength material, such as a hard plastic. A blade of a contact extends up the lateral outside of each of the posts and is staked to the post within a recess at the top thereof to rigidly and fixedly secure the contact blade and post together. The contact blade extends from the post interiorly of the base to meet the balance of a contact of which the blade forms a part. The contact within the base is for electrical connection to one of the conductors of the cord. The posts and their contact blades are arranged in pairs so that the force on the post and contact blades from a cooperating jack's contact blades is inwardly of the axis of the plug and the post. Consequently, a condition of static equilibrium exists which assures substantial contact between

the jack's and the plug adapter's contacts for static-free or noise-free service.

Spade pockets for receiving spade terminals of the conductors of the cord also receive a portion of the adapter's contacts. Each contact for each post has a pair of blades in its pocket for engaging the blades of the spade terminal. Each pocket is open to the central portion of the adapter through a trough, which receives the shank of the spade terminal after the latter has been bent about 90° from its blades. Fins in the cover of the adapter prevent the shanks of the spade terminals from touching each other and causing a short circuit. The axial position of the pockets on one side of the base is offset from the axial position of the pockets on the opposite side of the base to prevent the shanks of the spade terminals from touching each other without making the adapter exceedingly wide. The cord from the telephone instrument is secured either in T slots in the base or by way of a loop over a post in the base.

These and other features, aspects and advantages of the present invention will become more apparent from the following description, appended claims and drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a perspective view of the cord adapter of the present invention and a cooperating jack;

FIG. 2 is a top plan view of a base of the cord adapter of the present invention;

FIG. 3 is a view taken along line 3—3 of FIG. 2 with a cover on the base;

FIG. 4 is an elevational view taken along the lines 4—4 of FIG. 2; and

FIG. 5 is a fragmentary view of a post and contact of the cord adapter.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIG. 1, a cord adapter **10** of the present invention is illustrated. In general, the cord adapter has a base **12** attached as through fasteners to a cover **14**. A space within the cover and the base provides for the individual conductors of a multiconductor cord **16** to a telephone instrument. These conductors are electrically connected to contacts within the adapter. The base has a plurality, say, six male plug elements or stabs **18, 19, 20, 21, 22** and **23**. Pairs of stabs are symmetrically disposed on either side of the longitudinal axis of the cord adapter. Thus in stab pairs **18** and **23**, each stab is the same distance from the longitudinal axis of the cord adapter as the other and both fall within a band disposed at right angles to the longitudinal axis. Each of the pairs of stabs are so arrayed. Base **12** also mounts a hook or latch catch **24** which cooperates with a latch in a jack **25** to securely clamp the cord adapter to the jack. The jack as such forms no part of the present invention but is illustrated to aid in understanding the function of the construction of the cord adapter. The jack has a plurality of apertures **26** for receiving the stabs of the cord adapter. An aperture **27** in the jack leads to the latch for catch **24**. A release tab **28** of the latch is displaceable to release catch **24**.

With initial reference to FIGS. 2 and 3, the detailed construction of the cord adapter of the present invention will be discussed. In the Figures, base **12** has a floor **30**. The floor bounds on one side a valley or space which receives the individual conductors of cord **16**. A

pair of parallel and longitudinal contact mounts **32** and **34** bound the sides of the valley and are spaced from the longitudinal centerline of the base an equal distance. A first bank of spade terminal receptacles **36** in mount **32** and a second bank of spade terminal receptacles **38** in mount **34** face each other, but are longitudinally offset to avoid spade terminal contact and shorts.

In the illustrated embodiment, each bank of spade terminal receptacles has three individual receptacles for receiving individual spade terminals. Thus in bank **36** terminal receptacles **40, 42** and **44** are provided and in bank **38** terminal receptacles **46, 48** and **50** are provided.

The construction of each receptacle is typified by identical receptacles **42** and **44.** Receptacles **42** and **44** are shown in FIG. **2** and receptacle **42** again in FIG. **4.**

Receptacle **44** has a spare pocket **52** for receiving the blades of a spade terminal as well as the blades of a contact for the receptacle. The contact blades are shown at **54** for a contact **56** in receptacle **42.**

A trough **58** leads from pocket **52** to the valley inwardly of mount **32** and above the floor of the base. An identical trough **60** between a pocket **62** of receptacle **42** and the valley above floor **30** is provided for the other detailed receptacle. Each trough is floored by an arcuate surface for snugly nestling the shank of a spade terminal.

Extending below the upper surface of each mount and bounding the opening of each trough into its pocket is a pair of triangular steps such as shown for pocket **52** at **64** and **66.** Both steps are symmetrical about the axis of the trough. These triangular steps each have floors at a level below the upper surface of the mounts about the thickness of a flat triangular portion of a spade terminal. The triangular cutout portions are for receiving the flaring, triangular portions of a spade terminal when the spade terminal is bent 90° about its blades within a pocket until its shank nestles in a trough, such as shown at **68** in FIG. **2.** With continued reference to FIGS. **2** and **4,** the bottom of each pocket opens through the base at apertures **70** and **72** for pockets **52** and **62.** The back wall of each bank bounding each pocket and to either side of the aperture through the base is open for tooling purposes, such as shown at **74** for pocket **52.**

The aperture passes a blade of the contact through the base. The blade is staked to and forms a part of each of the plug stabs which will be described with reference to FIG. **5.** End tabs of a contact at each end of its top are received in appropriately sized slots **76** and **78** in the end walls defining pocket **52.** The slots anchor the top portion of the contact in place. At the bottom of a pocket a third slot **80** receives and stabilizes a knee of the contact. The walls of each pocket are tapered to facilitate the withdrawal of mold cores from them.

With reference to FIG. **5,** a typical contact **82** for receipt in the pocket of one of the spade receptacles is illustrated from the bottom of the cord adapter. The contact has a top portion **84** from which extends a pair of blades **86** and **88.** The blades extend from the top portion inwardly of end tabs **90** and **92** into the interior of a pocket, such as shown by blade **54** of contact **56.** The end tabs are received in the end slots bounding a pocket, such as slots **76** and **78** for pocket **52.** A centrally disposed shank **94** of the contact extends upwardly to a knee **96** which extends at a right angle to the shank parallel with top portion **84.** The knee is received in a slot such as slot **80** at the bottom of a pocket to stabilize the contact there. A contact blade **98** extends from this knee, offset from and parallel to shank **94** along the outer wall of a post **100** of one of the plug stabs, say stab **21.**

The post is integral with the base and has a recessed bottom **102** at its exposed end. The blade is staked over the bottom of the post and into the recess to secure the blade thereto, the lateral walls of the recess gripping the staked-over portion of the blade and providing a guard for the end of the blade.

It is seen, then, that the contact is secured to the base in four places: for the blade at the stake on the post, in the intermediate slot for the knee, and at the upper slots for the end tabs of the top portion of the contact. The post is externally tapered from its bottom end to the planar surface of the under surface of the base for mold separation purposes. The edge of the recess over which the contact blade is staked is rounded to avoid bending the blade too sharply and failing it, and to prevent sharp edges of the blade damaging the cooperating contact in the plug receptacle.

With reference to FIG. **3,** a centrally disposed fastener mounting boss **104** extends upwardly from floor **30** of the base for receiving a male fastener **106.** Cover **14** has a fastener mounting boss **108** for receiving a threaded female insert **110** into which the threads of fastener **106** are screwed. Preferably the fasteners used in securing the base and the cover have an unthreaded shank portion with a diameter smaller than the diameter of its threads so that the screws can be captured by elastic deformation of the passage through the base mounting boss. With reference to FIG. **2,** a pair of fastener mounting pads **112** and **114** augment mounting boss **104** to provide for the receipt and capture of two more male fasteners.

With reference again to FIG. **3,** a standard cord of a telephone having six conductors is received through an aperture **116** defined by semicylindrical passages **118** and **120** of the base and the cover. Referring to FIG. **2** the cord is made fast in the base as by a T-fitting secured to the cord, with the legs of the T received in slots **122** and **124.** Alternatively, the cord can have a loop affixed to it which is placed over a post **126.** Both the T-slots and the post are closed when the cover is secured. The interior facing, longitudinal wall of contact mount **34** immediately outward of post **126** is recessed at **128** to provide room for the loop on the cord. A recess **130** at the cord inlet end of mount **34** is to avoid an excessively large amount of plastic and therefore to reduce mold cycle time and avoid sinking or dimpling when the plastic cools.

Again with reference to FIG. **3,** cover **14** of the cord adapter includes six fins, three of which are shown at **134, 136** and **138.** These fins are disposed to be sure that the shanks of the spade terminals in opposite banks are separated from one another to avoid shorts. This is shown for shanks **140** and **142** of typical spade terminals. The cover is recessed over the location of the shanks of the spade terminals to receive a portion of the terminals and to allow a lower height of the cord adapter. This is seen in FIG. **3** for shanks **140** and **142** at **144** and **146,** respectively. Other such recesses are shown at **148, 150, 152** and **154.** The width of the cord adapter is narrow enough so that the shanks of adjacent

spades in opposite pockets in opposite contact mounts bypass one another, as shown in FIG. 2 at 156 and 158.

It should be appreciated now that the contact mounting within the base is very rigid and their positions accurately fixed. Significantly, the contact blades staked over the posts of the plug elements are rigidly fixed and accurately positioned. Adjacent posts on opposite sides of the longitudinal centerline of the cord adapter have their contact blades facing away from each other. With the blades facing away from each other, forces exerted on them by the contacts in the female receptacle or jack cancel each other out. Consequently there is static force equilibrium on the plug stabs, and good, positive line contact between the blades and the cooperating contacts in the female receptacle or jack are maintained. The structural portions of the cord adapter are from molded plastic parts. Consequently, tolerances can be held to very close limits. This fact allows for the rigid securing of the blades of the contacts to the posts of the plug stabs and again avoids a condition of inadequate contact between contacts. The rolled ends of the blades into the recesses of the posts of the stabs protects the leading edges of the blades during insertion into the female receptacle, the walls of the recesses acting as guards. The rolled ends of the blades also avoid sharp edges which could otherwise score the female contacts and produce point instead of line contact. Point contact can result in noise.

The present invention has been described with reference to a certain preferred embodiment. The spirit and scope of the appended claims should not, however, necessarily be limited to the foregoing description.

What is claimed is:

1. A cord adapter for a cord having a plurality of conductors, the adapter being for connecting the conductors of the cord with contacts of a female plug receptacle, the cord adapter comprising:

a. a base;

b. a first series of at least two posts integrally connected to the base and extending upright therefrom, the first posts being equidistant from and to one side of the longitudinal centerline of the base;

c. a second series of posts corresponding in number to the number of posts in the first series, the second series of posts being integrally connected to the base and extending upright therefrom, the second posts being equidistant from and to one side of the longitudinal centerline on the side opposite thereof from the first series of posts;

d. posts of the first and second series being paired with each pair of such posts being bisected by an imaginary plane perpendicular to the longitudinal centerline;

e. a first contact blade associated with each of the posts, each first contact blade being rigidly secured to its associated post, each pair of posts having their first contact blades facing in the same direction relative to the longitudinal centerline;

f. a pocket in the base associated with each of the posts, each of the pockets being sized to receive a spade terminal attached to one of the conductors of the cord;

g. a second contact blade associated with each of the posts, each second contact blade being in the pocket associated with the same post for engagement by the blades of a spade terminal, each second contact blade being integral with the first contact blade associated with the same post; and

h. a trough into each of the pockets for receiving the shank of a spade terminal when the spade terminal is bent at a right angle to its blades.

2. The cord adapter claimed in claim 1 including steps on the interior side of the troughs for receiving a triangularly shaped transition section of a spade.

3. The cord adapter claimed in claim 1 wherein:

a. each pocket includes:

i. vertical walls and a horizontal base, the walls being generally parallel with the posts and the horizontal base being generally perpendicular thereto;

ii. a pair of opposed slots in opposed of the vertical walls;

iii. a slot in the horizontal base; and

b. each second contact blade includes:

i. end tab portions received in the opposed slots in the vertical walls; and

ii. a generally horizontal knee section in the slot of the horizontal base.

4. The cord adapter claimed in claim 3 wherein:

a. each post has a recess at its exposed end; and

b. each first contact blade is staked within the recess, whereby the integrated first and second contact blades are fixed in position parallel to their associated post by the knee of the second contact blade and the staking of the first contact blade.

5. A cord adapter for adapting a multiconductor cord for plug-in engagement with a female plug receptacle comprising:

a. a base;

b. a first row of at least two upstanding posts integrally connected with the base equidistant from a longitudinal centerline through the adapter, each of the posts having a rectangular cross section;

c. a second row of upstanding posts integrally connected to the base equidistant from the longitudinal centerline of the adapter with the distance to the second series of posts from the longitudinal centerline being the same as from the longitudinal centerline to the first series of posts, each of the second row of posts having a ractangular cross section, and opposed pairs of the first and second series of posts across the longitudinal centerline being bisected by an imaginary plane perpendicular to the longitudinal centerline;

d. a first bank of pockets in the base, the pockets corresponding in number to the number of posts in the first row of posts;

e. a second bank of pockets in the base with the pockets of the second bank corresponding in number to the posts in the second row of posts;

f. contact means in each of the pockets for direct intimate contact with a space terminal secured to a conductor of the cord, each contact means having a blade element extending along and in engagement with a lateral side of the post associated with its pocket and being rigidly secured thereto by being staked within a recess at the exposed end of the post; and

g. each blade in each opposed pair of posts facing in the same direction relative to the longitudinal centerline as the other blade in the opposed pair of posts.

6. The adapter claimed in claim 5 wherein each of the contact means includes:

a. an upper portion;

b. a pair of spaced-apart contact blades extending at an angle from the plane of the upper portion for engagement with a spade terminal, the blades being spaced from the ends of the upper portion to define tabs thereon;

c. the contact's pocket having slots receiving the tabs and rigidly securing the upper portion in place in the base;

d. an intermediate shank extending from the upper portion toward the bottom of the pocket of the contact;

e. a knee extending laterally of the shank;

f. the contact's pocket having a slot at the bottom thereof receiving the knee and rigidly securing the knee to the base; and

g. the blade portion extending from the knee and offset from the shank.

7. The adapter claimed in claim 6 including:

a trough from each of the pockets at a right angle to the longitudinal centerline and leading into a longitudinally, centrally disposed valley within the adapter for conductors of the cord, each trough being sized to receive the shank of a spade terminal bent over 90° from its blades.

8. The adapter claimed in claim 7 wherein the first bank of pockets is offset longitudinally from the second bank of pockets and the space between the first and second banks of pockets is such that shanks of spades in both banks of pockets bent over 90° from their blades bypass each other.

9. The adapter claimed in claim 8 including fins disposed to separate the bypassing shanks of the spades.

10. The adapter claimed in claim 9 including means in the adapter to anchor the cord.

11. The adapter claimed in claim 10 including a cover secured to the base, the cover having recesses for receiving a portion of the shanks of the bent-over spade terminals.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,825,882 Dated July 23, 1974

Inventor(s) Council A. Tucker

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the claims: Claim 5, column 6, line 45 "ractangular" should be --rectangular--.

Signed and sealed this 18th day of March 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks