

In the Matter of

CERTAIN SELF-STRIPPING ELECTRICAL TAP CONNECTORS

Investigation No. 337-TA-150



USITC PUBLICATION 1586

MAY 1984

UNITED STATES INTERNATIONAL TRADE COMMISSION

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OFFICE OF THE SECRETARY

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of)
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CERTAIN SELF-STRIPPING ELECTRICAL)
TAP CONNECTORS)
)

Investigation No. 337-TA-150

NOTICE OF ISSUANCE OF EXCLUSION ORDER

AGENCY: U.S. International Trade Commission.

ACTION: Notice is hereby given that the Commission has issued a general exclusion order in the above-captioned investigation.

AUTHORITY: 19 U.S.C. §1337.


SUPPLEMENTARY INFORMATION: The presiding officer issued an initial determination on January 11, 1984, in which she determined that there has been a violation of section 337 in the unauthorized importation and sale of certain self-stripping electrical tap connectors by reason of infringement of claim 1 of U.S. Letters Patent 3,388,370, owned by complainant Minnesota Mining and Manufacturing Company, Inc., the effect and tendency of which importation and sale was to substantially injure the relevant domestic industry.

On February 25, 1984, the Commission determined not to review the presiding officer's initial determination, thereby allowing it to become the Commission determination on violation of section 337. The Commission requested written submissions on the issues of remedy, the public interest, and bonding from the parties, other government agencies, and the public. Complainant and the Commission investigative attorney filed written submissions; no other submissions were received.

Copies of the Commission's Action and Order, its Opinion, and all other non-confidential documents filed in connection with this investigation are available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 701 E Street NW., Washington, D.C. 20436, telephone 202-523-0161.

FOR FURTHER INFORMATION CONTACT: Judith M. Czako, Esq., Office of the General Counsel, U.S. International Trade Commission, telephone 202-523-3395.

By order of the Commission.


A handwritten signature in black ink, appearing to read 'K. R. Mason', written over a horizontal line.

Kenneth R. Mason
Secretary

Issued: May 24, 1984

CERTIFICATE OF SERVICE

I, Kenneth R. Mason, hereby certify that the attached Notice of Exclusion Order was served upon Victoria L. Partner, Esq., and upon the following parties via first class mail, and air mail where necessary on May 25, 1984.


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Ltd., of Taiwan ("Lumiaction") — were allegedly foreign manufacturers and exporters of tap connectors. On June 23, 1983, 3M moved to add three other respondents, allegedly engaged in the importation and/or sale of tap connectors that infringe the '370 patent. The three companies were Trail Brite, of New York, Standard Motor Products, Inc., of New York, and AJA Electronics, of California. At the preliminary conference held on June 24, 1983, counsel for complainant agreed to withdraw the motion. Rather than being added to the investigation, on July 7, 1983, the three proposed respondents and one other company, Tun Kuang World Trade Corp., of Taiwan, were informed by the Commission's Secretary of the pendency of this investigation. No responses from these four companies have been received.

On September 12, 19, and 20, 1983, 3M filed joint motions with respondents Blazer, Allison, and Chieftain, respectively, seeking to terminate those respondents from the investigation on the basis of settlement agreements (Motions Nos. 150-2, 150-3, and 150-4). The Commission investigative attorney filed a public interest statement supporting the motions. On September 28, 1983, the presiding officer issued three initial determinations (Orders Nos. 4, 5, and 6) granting the motions and terminating Blazer, Allison, and Chieftain. On October 28, 1983, the Commission published notice of its decision not to review the initial determinations. 48 Fed. Reg. 50,628, 50,629 (1983). Respondent Burda was terminated from the investigation at the time of the initial determination on violation, no evidence having been presented that Burda sold or imported tap connectors into the United States.

On November 17, 1983, complainant 3M filed a motion for summary determination that a violation of section 337 had been established in this investigation. The motion was supported by the Commission investigative attorney. On December 20, 1983, the presiding officer cancelled the hearing in this investigation, and on January 4, 1984, she issued her initial determination on violation. The presiding officer found that there was a violation of section 337 in the importation into and sale in the United States of the subject self-stripping electrical tap connectors. On January 25, 1984, the Commission determined not to review the initial determination on violation. 49 Fed. Reg. 4048 (February 1, 1984). The parties were requested to file written submissions on remedy, the public interest, and bonding by February 22, 1984. Complainant and the Commission investigative attorney have submitted briefs concerning remedy, the public interest, and bonding. No submissions were received from any of the respondents, Government agencies, or the public.

Action

Having determined that the issues of remedy, the public interest, and bonding are properly before the Commission and having reviewed the written submissions filed on remedy, the public interest, and bonding and those portions of the record relating to those issues, the Commission has determined to issue a general exclusion order prohibiting entry into the United States, except under license, of self-stripping electrical tap connectors that infringe U.S. Letters Patent 3,388,370, owned by complainant 3M, for the remaining term of the patent. The Commission also determined that the public


interest factors enumerated in section 337(d) (19 U.S.C. §1337(d)) do not preclude issuance of a general exclusion order, and that the bond during the Presidential review period should be in the amount of 163 percent of the entered value of the imported tap connectors.

Order

Accordingly, it is hereby ORDERED THAT—

1. Self-stripping electrical tap connectors which infringe claim 1 of U.S. Letters Patent 3,388,370 are excluded from entry into the United States for the remaining term of the patent, except under license of the owner of the patent;
2. The articles ordered to be excluded from entry into the United States shall be entitled to entry under bond in the amount of 163 percent of the entered value of the subject articles from the day after this order is received by the President pursuant to subsection (g) of section 337 of the Tariff Act of 1930, until such time as the President notifies the Commission that he approves or disapproves this action, but, in any event, not later than 60 days after the date of receipt of this action;
3. The Secretary shall serve copies of this Commission Action and Order, and the Opinion of the Commission, upon each party of record to this investigation, and publish notice thereof in the Federal Register;
4. The Commission may amend this Order in accordance with the procedure described in section 211.57 of the Commission's Rules of Practice and Procedure (19 C.F.R. §211.57).

By order of the Commission.



Kenneth R. Mason
Secretary

Issued: May 24, 1984

In the Matter of)
CERTAIN SELF-STRIPPING)
ELECTRICAL TAP CONNECTORS)

Investigation No. 337-TA-150

COMMISSION OPINION

The Commission has determined not to review the administrative law judge's initial determination that there is a violation of section 337 in this investigation. ^{1/} The only issues remaining to be resolved in this investigation are remedy, the public interest, and bonding.

Remedy

1. General exclusion order

We determine that the appropriate remedy in this investigation is a general exclusion order. The facts of this case satisfy the criteria set forth in Certain Airless Paint Spray Pumps and Components Thereof, ^{2/} for the issuance of a general exclusion order. ^{3/} In Spray Pumps, the Commission noted that it has an obligation to balance complainant's interest in complete protection against the inherent potential of a general exclusion

^{1/} See Federal Register notice of February 1, 1984, (49 Fed. Reg. 4048).

^{2/} Inv. No. 337-TA-90, USITC Pub. No. 1199, (1981); 216 U.S.P.Q. 465 (1981).

^{3/} It should be noted that a general exclusion order was not issued in Spray Pumps because the Commission determined that the criteria were not met.

order to disrupt legitimate trade. ^{4/} Therefore, the Commission has since required that a complainant seeking a general exclusion order prove "both a widespread pattern of unauthorized use of its patented invention and certain business conditions from which we might reasonably infer that foreign manufacturers other than the respondents to the investigation may attempt to enter the U.S. market with infringing articles." ^{5/}

In Spray Pumps, the Commission stated that in order to establish a widespread pattern of unauthorized use, there must be:

- (1) a Commission determination of unauthorized importation into the United States of infringing articles by numerous foreign manufacturers; or
- (2) pending foreign infringement suits based upon foreign patents which correspond to a domestic patent in issue; and
- (3) other evidence which demonstrates a history of unauthorized foreign use of the patented invention. ^{6/}

In this investigation, the record demonstrates that there was unauthorized importation into the United States of the infringing tap connectors. ^{7/} Moreover, it was established that there is ample capacity

^{4/} Id at 18.

^{5/} Id.

^{6/} Id. at 18-19 (footnotes omitted).

^{7/} Initial Determination (hereinafter ID) at 3, 4. The administrative law judge found one foreign manufacturer to be in default as to all issues, from which the fact of importation may be inferred. ID at 7.

on the part of the foreign firms involved to deliver large numbers of infringing tap connectors. ^{8/}

The record demonstrates a history of unauthorized foreign use of the patented invention. Complainant 3M has brought infringement suits or issued notices of infringement to foreign competitors based on foreign patents that correspond to the '370 patent. These actions resulted in decrees enjoining further infringement of 3M's patents, or agreements to refrain from infringement of 3M's patents. ^{9/}

In order to establish the "business conditions" referred to in Spray Pumps as a prerequisite for the issuance of a general exclusion order, the Commission has considered:

- (1) an established demand for the patented product in the U.S. market and conditions of the world market;
- (2) the availability of marketing and distribution networks in the United States for potential foreign manufacturers;
- (3) the cost to foreign entrepreneurs of building a facility capable of producing the articles;
- (4) the number of foreign manufacturers whose facilities could be retooled to produce the article; or

^{8/} ID at 6; Elm affidavit, 3M exhibit 5 to Motion for Summary Determination.

^{9/} 3M brought suit on corresponding patents in Great Britain and West Germany. 3M also issued notices of infringement to companies in Great Britain, Germany, and Australia. Qualey affidavit, 3M exhibit 3 to Motion for Summary Determination.

(5) the cost to foreign manufacturers of retooling their facility to produce the articles. 10/

The record in this case establishes a strong U.S. demand for the subject tap connectors. A very large number of tap connectors have been sold in the United States as of the end of 1982. 11/ In addition, an undetermined number of infringing tap connectors have been sold by respondents and other companies, indicating a strong demand for the product. The existence of distributors in the United States who have already been solicited by foreign manufacturers or have sold imported tap connectors establishes the availability of marketing and distribution networks in the United States for potential foreign manufacturers. 12/ The record also establishes the low cost of production for foreign manufacturers of the tap connectors, the ease with which foreign manufacturing facilities can prepare to produce tap connectors, and the low cost of such preparation. It appears that for an investment of \$5,000 a manufacturer could use a single cavity mold and single track die stamp and, by manual assembly, produce approximately one million tap connectors per year; a more efficient operation using a twelve cavity mold and a single track die stamp would cost about \$25,000-\$30,000. 13/ Because the tap connectors are small and involve few parts, they lend themselves to large scale production.

10/ Spray Pumps, *supra*, at 18-19.

11/ 3M confidential exhibit 1 to Motion for Summary Determination.

12/ ID at 5-6.

13/ 3M exhibit 5 to Motion for Summary Determination.

While the issuance of a general exclusion order carries with it the inherent potential to disrupt legitimate trade, we believe that this consideration is outweighed in this investigation by the factors outlined above. We therefore conclude that a general exclusion order is the most appropriate form of relief in this case.

The Public Interest

The Commission may issue an exclusion order only after "considering the effect of such [an order] upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers." ^{14/} We conclude that an exclusion order will not have an adverse effect on these public interest factors.

Tap connectors are not an essential item for the preservation of the public health and welfare. The record establishes that numerous electrical connectors exist which do not infringe upon 3M's proprietary rights. 3M appears to have sufficient production capacity to meet the entire domestic demand for its patented product, and it has adequate means to distribute its product throughout the United States.

^{14/} 19 U.S.C. § 1337(d).

Bonding

Section 337(g)(3) provides for the entry of infringing articles upon the payment of a bond during the 60-day Presidential review period. ^{15/} The bond is to be set at a level sufficient to "offset any competitive advantage resulting from the unfair method of competition or unfair act enjoyed by persons benefiting from the importation." ^{16/} A bond of 163 percent of the entered value of respondents' tap connectors should offset the competitive advantage enjoyed by respondents. The figure is derived from a comparison of the wholesale price of 3M's model 801 tap connector, 4.5 cents, with the wholesale price of the corresponding imported L&S model 90802, 1.71 cents. ^{17/}

^{15/} 19 U.S.C. § 1337(g)(3).

^{16/} S. Rep. No. 1298, 93d Cong., 2d Sess. 198 (1974).

^{17/} 3M exhibit 4 to Motion for Summary Determination. L&S is the source of the actual importation and sales established by complainant.

PUBLIC INSPECTION

023989

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of)
)
CERTAIN SELF-STRIPPING ELECTRICAL)
TAP CONNECTORS)

Investigation No. 337-1

OFFICE OF THE SECRETARY
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INITIAL DETERMINATION

On June 3, 1983, the Commission issued a notice of investigation in the above matter initiating an investigation to determine whether Section 337 is being violated in the unlawful importation of certain self-stripping electrical tap connectors into the United States, or in their sale, by reason of infringement of U.S. Letter Patent No. 3,388,370, the effect or tendency of which is to destroy or to injure substantially an industry that is efficiently and economically operated in the United States.

Seven respondents were named. Three respondents (Allison Corporation, Chieftan-Uniworld Corporation, and Blazer International Corporation) have been dismissed based on settlement agreements. The remaining four respondents are Allen Group, Inc., a company located in Melville, New York, and three Taiwanese respondents, L&S (Taiwan) Allied Co., Ltd., Burda Enterprises, Inc., and Lumiaction Co. Ltd.

On November 17, 1983, complainant, Minnesota Mining and Manufacturing Company (3M), filed a motion under Section 210.50 of the Commission's Rules for summary determination in favor of complainant upon all issues in this

investigation. (Motion 150-5). The motion is supported by the Commission investigative attorney, and it is not opposed by any respondent. Many of the exhibits submitted with 3M's motion and the staff's memorandum supporting the motion are in affidavit form or in a form that can be considered under Section 210.50. Complainant seeks a permanent exclusion order.

No responses to the complaint and notice of investigation have been filed by any respondent. Burda filed a letter dated June 21, 1983, which will be treated as Burda's response. In this letter Burda indicates that it never sold tap connectors in the United States, but did offer them for sale. Burda assured 3M that it would stop offering the product in the United States. In addition, L&S apparently sent a letter to the Commission investigative attorney (Staff Ex. 1) indicating that it also would stop offering tap connectors for sale in the United States.

One respondent, Allen Group, Inc., has responded to complainant's request for admissions by making certain admissions. The failure of other respondents to respond to requests for admissions can be deemed to be admissions if jurisdiction over these respondents is established and the requests were properly served, but complainant does not rely upon these admissions to make its prima facie case.

Complainant has submitted facts adequate to establish a prima facie case showing that there have been unfair acts under Section 337 in connection with the importation of the self-stripping electrical tap connectors in

issue, and that the effect or tendency of these unfair acts is to destroy or to injure substantially an efficiently and economically operated domestic industry. No opposing affidavits were submitted setting forth specific facts showing that there is a genuine issue of material fact that must be litigated.

The following facts have been established by affidavit, admission, or deposition:

There is a domestic industry consisting of that portion of complainant's business devoted to the manufacture and sale of self-stripping electrical tap connectors made under the claims of '370 patent in issue. There are no licenses under the patent. Complainant 3M practices the patent in the manufacture of self-stripping electrical tap connectors. (Welch affidavit).

The domestic industry is efficiently and economically operated. One respondent, Allen Group, Inc., admits this fact. (Response to Request for Admissions). Modern manufacturing techniques and processes are used to produce the electrical tap connectors, and complainant has developed innovations in electrical connector technology. (Welch and Elm affidavits).

Complainant has established that respondent L&S (Taiwan) Allied Co., Ltd. has exported the tap connectors in issue to the United States. (Bond deposition, 3M Ex. 7, Hamilton affidavit, 3M Ex. 13, Hardick affidavit, 3M Ex. 12).

Complainant also has established by responses to its requests for admissions that respondent Allen Group, Inc. (a U.S. company) has imported the tap connector in issue into the United States. (See also Hardick affidavit, 3M Ex. 12.)

Under Section 282 of the Patent Act, a patent is presumed to be valid. (35 U.S.C. §282). Since no party has challenged the validity of the Elm '370 patent, it is found to be valid. The patent was assigned to complainant. (3M Ex. 6).

The affidavit of Robert A. Elm, the inventor under the '370 patent, contains facts showing that tap connectors of Lumiaction, L&S and Burda infringe the '370 patent (attached to Elm affidavit). Mr. Elm indicates that he examined these tap connectors and found that each performed the same function in the same way and accomplished the same result as his patented connector. Based on the facts stated by Mr. Elm, it is found that claim 1 of the '370 patent reads directly on each of the above tap connectors, and that all of the elements recited in claim 1 are present in each of these tap connectors.

The fourth remaining respondent, Allen Group, Inc., specifically admitted in response to complainant's request for admissions that its imported tap connectors infringed the '370 patent.

Complainant 3M established that the domestic industry already has been injured substantially by the imported connectors and that if the importation of the tap connectors in issue is not stopped, there will be a tendency to injure the domestic industry substantially in the future. (Welch affidavit, 3M Ex. 4, and exhibits thereto).

One U.S. company (Cal-Term) imported \$1,500,000.00 of these connectors from L&S in a single order in 1982. (3M Ex. 7).

Another U.S. firm, Hoffman Industrial Products, purchased over 5,000,000 tap connectors from L&S. In 1982, Premier Industrial Corporation, a distributor of electronic components, acquired Hoffman, and began selling L&S tap connectors in direct competition with 3M tap connectors. The L&S tap connectors were sold at prices more than 25 percent lower than the prices of 3M's tap connectors. (Hamilton affidavit, 3M Ex. 13). 3M's prices for its tap connectors also are substantially higher than the prices of tap connectors sold by the other respondents. (Welch affidavit, 3M Ex. 4).

Complainant's sales of its own tap connectors have decreased by 44 percent from 1980 to the end of 1982. (Welch affidavit, 3M Ex. 4).

One U.S. company, Hollywood Accessories, stopped purchasing 3M tap connectors and started buying L&S connectors because the L&S prices were 25 percent of 3M's prices. (Hardick affidavit, 3M Ex. 12). Hollywood Accessories imported more than 100,000 L&S tap connectors. These were sales lost by 3M to L&S, and the L&S sales directly injured the domestic industry.

Complainant also submitted facts showing that the imported tap connectors are of inferior quality, and contends that the imported tap connectors have a tendency to damage the reputation of the 3M product. (Elm affidavit, 3M Ex. 5, and Johansson affidavit, 3M Ex. 14).

Several affidavits support the position that foreign producers can enter this market with ease, with an investment of as little as \$5,000 to \$25,000. (Qualey affidavit, 3M Ex. 3, Elm affidavit, 3M Ex. 5). This demonstrates that respondents and others have the capacity to export enough tap connectors to the United States to injure substantially or to destroy the domestic industry in the future.

Even though L&S and Burda have stated that they will not export any more tap connectors to the United States, other companies can produce as many tap connectors as are necessary to meet the total market demand in the United States. The lower prices at which the imported tap connectors are sold make it likely that respondents' sales will continue to injure the domestic industry even if respondents' products are not of the same quality as the 3M tap connectors.

Complainant 3M did not rely solely on the default of any respondent, but submitted (in affidavit form or in admissions or in sworn testimony) substantial evidence that unfair acts had occurred under Section 337, and that these acts tended to injure substantially the 3M domestic industry devoted to the production of the self-stripping electrical tap connectors in issue. Based on the affirmative evidence of violation of Section 337, 3M is entitled to summary determination in its favor on all issues.

It is found that at least two respondents, L&S and Allen Group, Inc., engaged in an unfair act violating Section 337 of the Tariff Act, as amended, in connection with the importation into the United States of certain self-stripping electrical tap connectors by reason of infringement of the '370 patent, the tendency of which is to injure substantially an efficiently and economically operated industry in the United States.

To the extent that some issues relating to Lumiaction Co. have not been addressed by 3M, Lumiaction Co. is in default as to all issues.

With respect to Burda, however, this respondent advised 3M that it does not manufacture the tap connectors in issue, it had offered but never sold the product in the United States, that it would not offer the product in the United States in the future, and that it had only taken some samples to the APAA for exhibition. Complainant advised Burda that it could be easily eliminated from this case if it made these assurances to the Commission. Complainant has not tried to prove that Burda sold any tap connectors in the United States or that it caused any injury to the domestic industry. Based on these facts, Burda is dismissed as a respondent in this case.

Motion 150-5 is granted. The record, consisting of Motion 150-5 and all papers filed in connection therewith, together with the pleadings and all requests filed in this matter, is certified to the Commission.

Janet D. Saxon
Janet D. Saxon
Administrative Law Judge

Issued: January 4, 1984

(12-40)

U. S. DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

February 14, 1983

(Date)

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office
of the printed Specification and Drawings of U. S. Patent
388,370.

By authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

G. V. Dorsey
Certifying Officer.

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3,388,370
**SOLDERLESS CONNECTOR FOR
INSULATED WIRES**

Robert A. Elm, St. Paul, Minn., assignor to Minnesota
Mining and Manufacturing Company, St. Paul, Minn.,
a corporation of Delaware

Filed Apr. 14, 1966, Ser. No. 542,514
7 Claims. (Cl. 339-98)

ABSTRACT OF THE DISCLOSURE

A solderless wire-connector contains a slotted resilient metal connector plate slidably retained in a grooved insulating body having a folding self-locking cover unitary therewith.

This invention relates to wire-connectors and, in one important aspect, to insulated connectors for making solderless connection between parallel small insulated wires. Wire-connectors of the type described have particular utility in low voltage wiring, for example in the installation of additional or replacement wiring in automobiles, where speed of application, complete insulation, and permanency of conductive contact under prolonged vibration are important requisites.

Solderless connectors for insulated small wires have heretofore been described, for example in U.S. 3,012,219, wherewith permanent positive contact is obtained by sliding a grooved resilient contact member into a receptive slotted wire-supporting base and over one or more insulated wires supported thereon. The contact member may be provided with an insulating cap which is ridged for positioning and retention within an insulating base.

The present invention likewise relies on a grooved resilient contact member slidably insertable within a wire-supporting base, but distinguishes over prior art conductors in a number of important respects. The contact member may be pressed into position with but moderate effort, to form a permanent conductive contact, with no possibility of injury to the insulating cap. The insulating body and cap are combined in a single unit; any possibility of improper assembly of the connector is thereby eliminated. In a preferred modification, one or all of the wires to be connected may be inserted from the side of the connector, so that X- and T-splices can be made as well as terminal or pigtail splices.

These and other advantages are attained by providing a hard but resilient insulating base which is preferably longitudinally recessed and openable along one longitudinal edge to accept and support a plurality of parallel insulated wires and is transversely slotted to accept and retain a flat slotted contact plate, and, integral therewith, a snap-cover member for covering a said plate in contacting position and for retentively enclosing the wires within the said insulating base.

The principles of the invention will now be further described and illustrated by reference to the accompanying drawing and wherein

FIGURE 1 is a view in perspective of a presently preferred form of wire-connector in readiness for use,

FIGURE 2 is a transverse cross-section of a portion of the wire-connector taken along line 2-2 of FIGURE 1 and after application to a pair of insulated wires.

FIGURE 3 is an end plan view of the base and cover member of the connector of FIGURE 1 in fully closed position and with the interconnected enclosed pair of wires indicated in cross section.

FIGURE 4 is a view in perspective of an alternative base and cover member, and

FIGURE 5 is a somewhat schematic view in perspective of another alternative form of connector.

The wire-connector illustrated in FIGURES 1-3 is designed for use in connecting a pair of wires, as in connecting two parallel wires in a T-splice or X-splice. It will be appreciated that the same principles may equally well be applied to connectors for three or more wires, although two-wire connectors are of most significance commercially.

The wire-connector 10 of FIGURE 1 will be seen to consist of a slotted resilient flat metal insert or contact member 11 and an insulating base member 12 comprising a central body section 13, two opposed end sections 14, 15 and a cover 16. The base 12 is provided with longitudinal interconnected circularly cross-sectioned wire-accepting recesses or channels 17, 18 to which access may be obtained through either end or through a longitudinal edge slot or opening 19. The body 13 is transversely slotted at 20, the slot being extended into the lower half of the body as indicated in FIGURE 2 to provide space for entry of the three wire-contacting lobes 21, 22, 23 of the contact member 11. Lobes 21 and 23 are shown partly cut away to reveal further structural detail. Projections 24, 25 extend across the thickness of the slot 20 and serve as additional support for wires inserted within the connector body, a pair of wires being shown in cross-section in FIGURE 2 as consisting of metallic conductors 26, 27 and insulating plastic coverings 28, 29. The connector is effective with both solid and stranded conductors.

The base 12 is further longitudinally internally grooved at a location opposite the opening 19, the shallow groove 30 being provided to permit flexing of the edge wall of the base in the manner of a hinge, prior to or during insertion of wires through the opening 19 and thence into the wire-accepting channels 17 and 18. The hinge structure permits substantial reduction in the thickness of the slot 19 since the two halves may be pried apart to any degree required for introduction of wires.

The cover 16 is attached to the upper side edge of the body 13 along a flexible hinge area 31 of reduced thickness. The cover includes a flat top wall 32, flat side wall 33, and interned edge hook member 34. A cooperating hook member 35 is provided along the lower segment of the body 13 at the opening 19.

The combination of the hinge formed at the groove 30 and the hook elements 34 and 35 provide an important feature of the invention by making possible initial opening of the connector body to permit wires to be laid in place without difficulty and then, after electrical connection has been established, providing for the permanent and secure enclosure of the entire connection.

The adjacent side edges of the resiliently connected lobes 21, 22, 23 of the contact element 11 are generally parallel, and the rounded end edges are smoothly divergent, providing wire-accepting openings and strong electrically conductive resiliently loaded contact surfaces for wires onto which the element is forced. The element 11 is tightly held within the narrow slot 20 so that it is permanently retained in place, but can be forced further into the slot and over the inserted wires by means of ordinary pliers or side-cutters. Once fully inserted, it is protected and insulated by folding the cover 16 into the closed position, with the hook 34 engaging the hook 35 and thereby preventing any accidental subsequent separation of the upper and lower segments of the base 12 and exposure of the connection.

In a typical connector designed for connecting two plastic coated solid or stranded No. 14, 16 or 18 gauge copper wires, the connector element 11 is $\frac{3}{16}$ inch wide and $\frac{1}{2}$ inch deep and is made of phosphor bronze sheet of $\frac{1}{32}$ inch thickness. The base 12 is $\frac{11}{16}$ inch in length, the body 13 being $\frac{1}{2}$ inch and each end section $\frac{5}{16}$ inch. The connector in closed position as shown in FIGURE 3

has a width of $\frac{1}{2}$ inch and a thickness of $\frac{11}{32}$ inch. The wire-receiving channels 17, 18 are each $\frac{1}{4}$ inch in diameter. The insulating base is constructed in one piece of polypropylene and is most conveniently produced by injection molding. Other suitable materials for the base include nylon and polycarbonate, both of which are hard and tough polymeric material with sufficient flexibility to permit hinge bending. Hardened copper, brass, Phosphor bronze and plated steel are all suitable as materials for the contact member.

In the alternative structure shown in FIGURE 4 the cover 36 is provided with additional raised edge closure members 37, 38 as extensions of a hook member 39 and the flat upper free portion of the body 40, as well as the hook member 45, is shortened to accommodate these members, thus providing a more rigid structure and more completely sealed enclosure for the contact member, not shown, when inserted in slot 41. In addition, only the outer wire-receiving channel 42 is fully open, the inner channel 43 being closed at one end by a closure tab 44 which further protects the free end of a wire introduced into said inner channel from the opposite end. If desired, the outer channel may be similarly closed at one end, the flexure groove 48 and edge opening 49 then becoming unnecessary since both wires must be introduced from the open end of the appropriate channel.

Connectors such as illustrated in FIGURES 1-3 are particularly useful in splicing together a pair of wires in a line or X-splice, whereas connectors having features shown in connection with FIGURE 4 are preferred for T-splices or, where both of the wire-receiving channels are closed at one end, for pigtail or terminal splices. In other modifications the connector may include channels for one, two, three or even more wires or wire-ends, with appropriate numbers of contact plates for connecting the wires in any desired sequence. For example, two wires may be connected with a single wire by means of two separate doubly slotted contact plates or alternatively with a single triply slotted contact plate. Another modification employs a singly slotted plate which in addition is provided with a spring socket or other non-permanent connector element fitting within an open-top channel and with which contact is made by a suitable plug. The structure is indicated in perspective and in exploded view in FIGURE 5. The contact element 50 includes a pair of contact legs fitting within a narrow slot 51 for making contact with a wire in the outer channel 52, and a spring contact clip 53 fitting within an open trough 54 and thereafter in position for receiving a plug connector 55 inserted endwise into the inner channel 56. The cover encloses the connector element after insertion and aids in retaining the wire within the channel 52, whereas the plug 55 may be inserted and withdrawn as desired.

What is claimed is as follows:

1. A solderless wire-connector comprising, in combination: a hard tough insulative body member channeled to provide at least two parallel wire-receiving and wire-supporting channels and slotted transversely of said channels to provide a thin slot extending from a flat surface of said body member across and perpendicular to said channels; a thin flat resilient conductive contact member of substantially the same thickness as said slot, slidably retained and fully insertable within said slot and slotted in line with at least one of said channels to provide resiliently connected first and second contact lobes having generally parallel contact surfaces for making resiliently loaded electrically conductive contact with a wire supported in said one of said channels; and a folding cover member, unitary with and extending directly from said body member along one edge, having a flat segment for positioning over said flat surface and over the exposed edge of a said contact member inserted within said slot, and an adjacent edge segment for positioning over a first side of said body member adjacent

said flat surface, said edge segment and said body member being provided with cooperating locking means for holding said cover member tightly against said body member, said body being slotted along its entire length between said channels and between the outermost channel and the said first side to provide access from said first side to each of said channels.

2. The solderless wire-connector of claim 1 wherein said body member contains two wire-receiving channels, one of said channels being enlarged axially from said slot to provide a widened trough-like opening extending to said flat surface, and wherein said contact member comprises a single pair of contact lobes defining an open-ended wire-receiving slot in alignment with the other of said two channels and a spring clip contact element fitting within said trough for alignment with the said one channel.

3. The solderless wire-connector of claim 1 wherein said body is hinged at a line extending along the side opposite said first side and alongside the innermost channel and wherein said edge segment is of sufficient length to extend across the longitudinal access slot in said first side.

4. The solderless wire-connector of claim 3 wherein said contact member is slotted in line with each of said channels.

5. The solderless wire-connector of claim 3 wherein the body member includes, for at least one of said wire-receiving channels, a closure tab for closing an end of the channel.

6. An integral insulating member for a wire-connector, comprising a body portion and a cover portion; said body portion having generally rectangular upper and lower segments hingedly connected along one side and being oppositely doubly channeled along adjacent inner surfaces and parallel to said side to provide two parallel wire-receiving and wire-supporting channels in said body; said upper segment being slotted perpendicularly to said one side and to said channels to provide a thin open slot, and said lower segment being correspondingly slotted to provide a thin slot in line with said open slot and extending past said channels but short of the bottom surface of said lower segment, and including a hook member extending along the edge of said lower segment opposite the body hinge side; said cover portion being hingedly connected with said upper body segment adjacent the body hinge and comprising a face plate for covering the slotted upper surface of said upper body segment, an edge plate extending from and at an angle to said face plate for covering the edge of said body portion opposite the hinged edge, and an edge hook member along the terminal edge of said edge plate for interlocking with the hook member of said lower segment.

7. The method of making and insulating a solderless connection between two insulated wires, using a wire-connector having a hard tough insulative body member channeled to provide interconnected parallel longitudinal open-ended wire-receiving and wire-supporting channels open to one side of said body and slotted to provide a thin slot extending from an upper face across and perpendicular to said channels, and recessed along the lower edge of said one side to provide a hook-like projection, a cover member hingedly united with said body member near the edge of said face opposite said projection and including a face plate for covering said face, an edge plate for covering said one side, and an edge hook for interlocking with said projection, and further having a metal contact member slidably retained and fully insertable within said slot for making resiliently loaded electrically conductive contact with insulated wire supported within said channels; said method comprising: spreading apart the upper and lower segments of said channeled body member from said one side to expose the opposed inner surfaces defining said chan-

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nels; inserting a wire into each said channel and bringing together said body segments about said wires; forcing said contact member into said slot and onto said wires to make resiliently loaded contact therewith; and folding said cover over said upper face and said one side, and interlocking said edge hook with said projection.

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3,118,715 1/1964 Potruch ----- 339-98
3,202,957 8/1965 Leach ----- 339-98

FOREIGN PATENTS

509,482 3/1952 Belgium.
699,856 11/1953 Great Britain.

References Cited

UNITED STATES PATENTS

2,333,266 11/1943 Miller ----- 339-95 10
2,745,065 5/1956 Maher ----- 339-99

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3,388,370

SOLDERLESS CONNECTOR FOR INSULATED WIRES

Filed April 14, 1966

FIG. 1

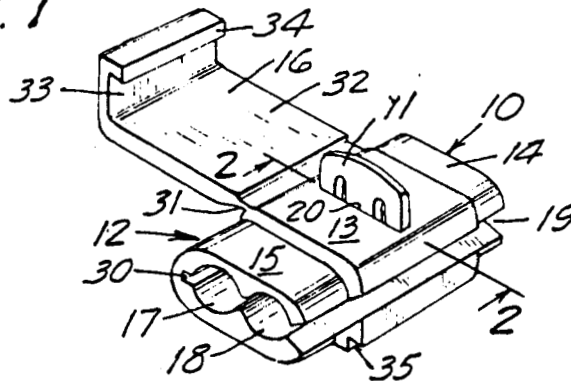


FIG. 2

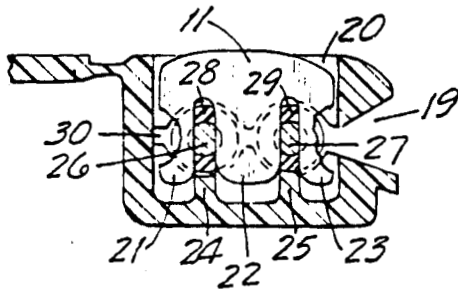


FIG. 3

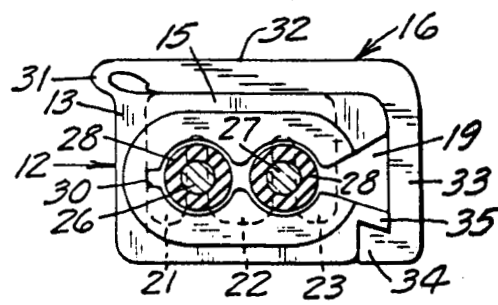


FIG. 4

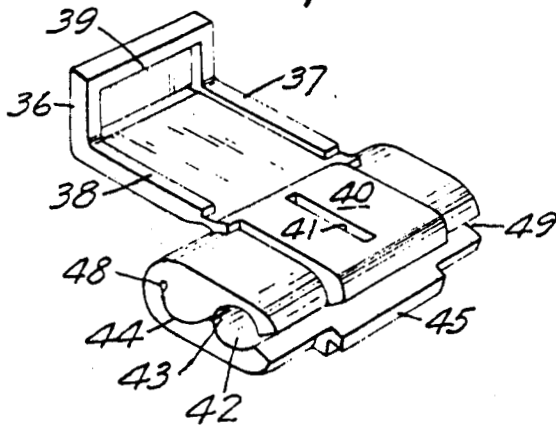
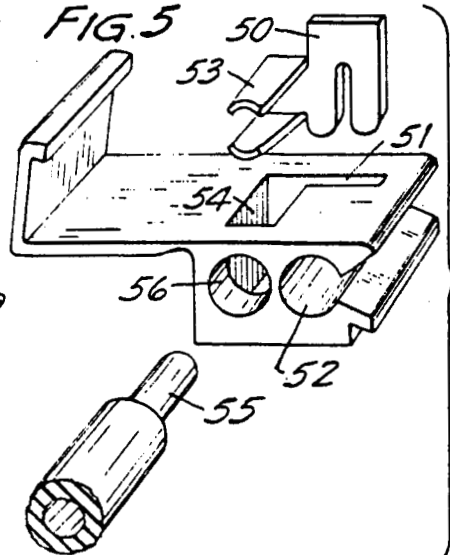


FIG. 5



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