

March 29, 1966

H. P. DUPRE ETAL

3,243,760

COAXIAL CABLE GANG CONNECTOR

Filed Dec. 24, 1962

3 Sheets-Sheet 1

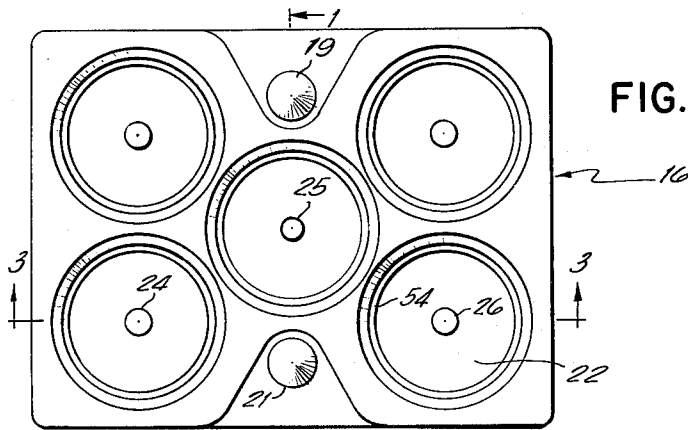


FIG. 2

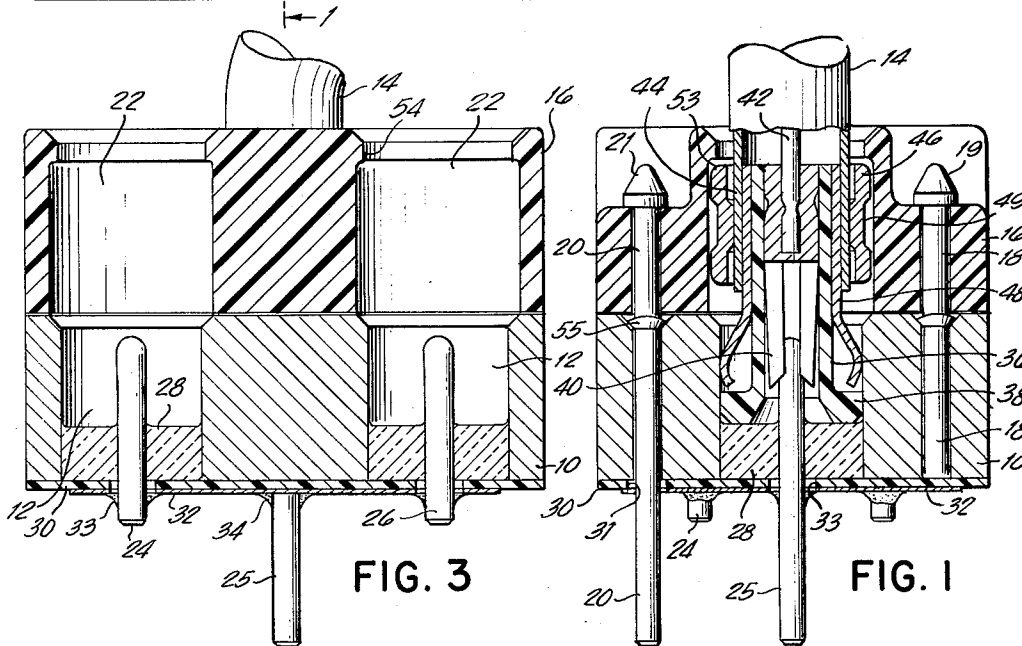


FIG. 3

FIG. 1

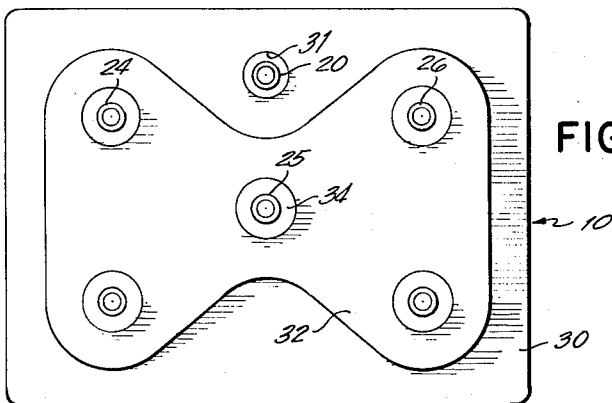


FIG. 4

INVENTORS
HENRY R. DUPRE
MICHAEL LAZAR
JACK E. ANTES
BY *Howard Kester*
ATTORNEY

March 29, 1966

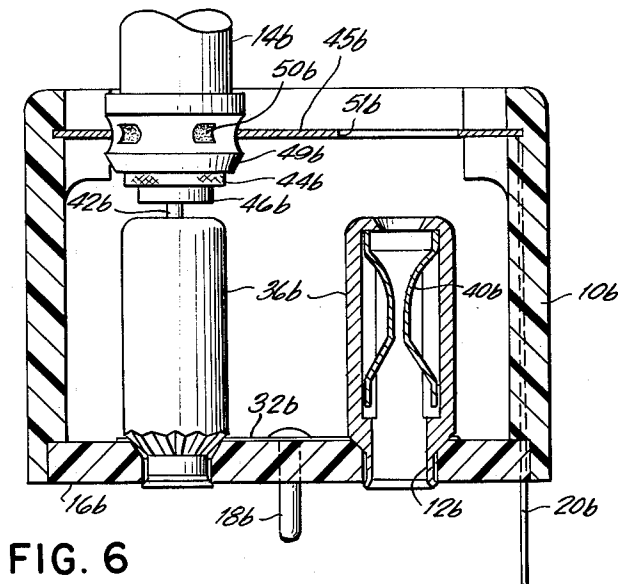
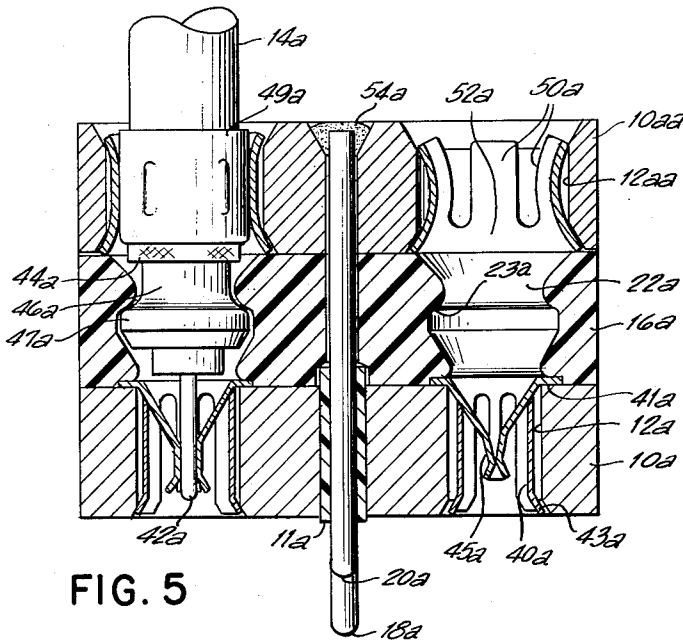
H. P. DUPRE ETAL

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3 Sheets-Sheet 2



INVENTOR.
HENRY R. DUPRE
MICHAEL LAZAR
JACK E. ANTES
BY *Howard A. Reiter*
ATTORNEYS

March 29, 1966

H. P. DUPRE ET AL

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COAXIAL CABLE GANG CONNECTOR

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3 Sheets-Sheet 3

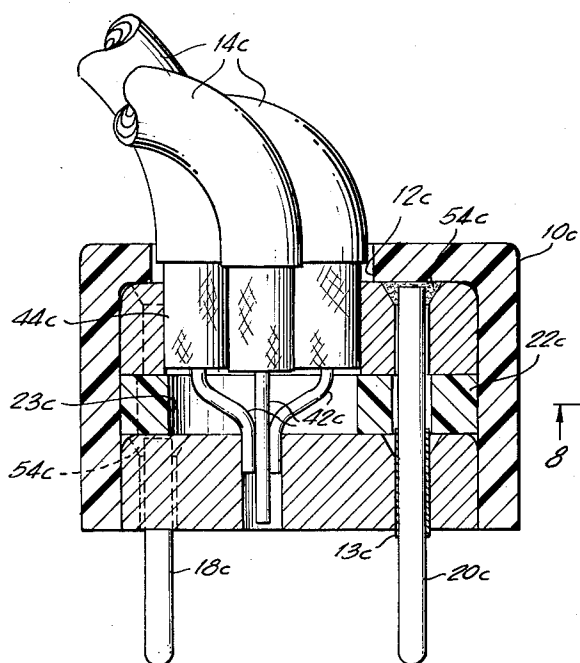


FIG. 8

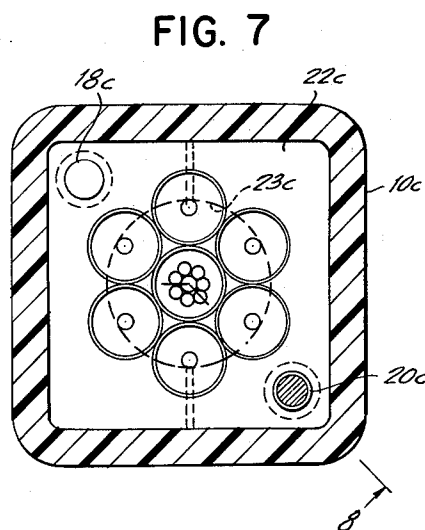


FIG. 7

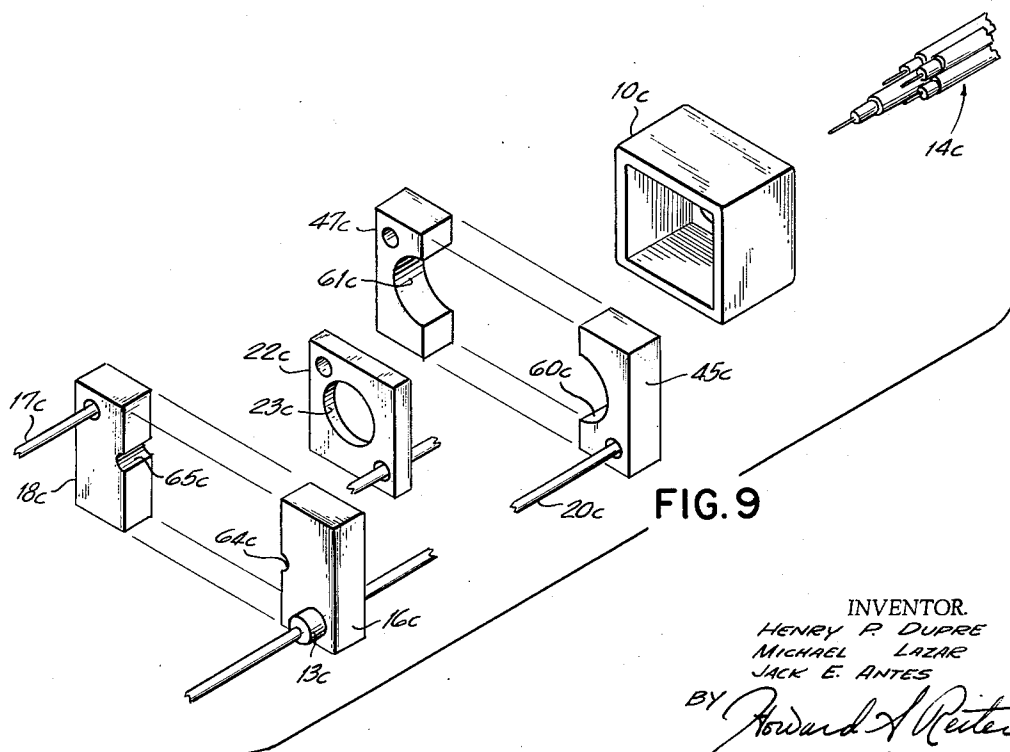


FIG. 9

INVENTOR.
HENRY P. DUPRE
MICHAEL LAZAR
JACK E. ANTES
BY *Howard A. Reiter*
ATTORNEY

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3,243,760

COAXIAL CABLE GANG CONNECTOR

Henry P. Dupre, Wilton, Conn., Michael Lazar, White Plains, N.Y., and Jack E. Antes, Greenwich, Conn., assignors to Burndy Corporation, a corporation of New York

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4 Claims. (Cl. 339—153)

Our invention relates to a multicoaxial cable connector. The principal object of the invention is to provide a connector into which a plurality of coaxial cables may be inserted to provide a common connection for the individual leads from the cables.

Further object is to provide a gang connector for a plurality of coaxial cables wherein all the coaxial connections may be simultaneously made and broken.

Still another object is to provide a gang connector for a plurality of coaxial cables, adapted to be manufactured in a microminature size block. One more object is to provide a connector containing a printed circuit for connecting a plurality of coaxial cables.

We accomplish these and other objects and obtain our new results as will be apparent from the devices described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing in which:

FIGURE 1 is a side sectional view of one form of our gang connector containing a coaxial cable, the terminal end of which is shown in partial cross-section;

FIGURE 2 is a top plan view of the same showing positions for five coaxial cables but with the coaxial cable of FIGURE 1 removed for clarity;

FIGURE 3 is a sectional view taken through plane 3—3 of FIGURE 2 but with the coaxial cable of FIGURE 1 again shown in its relative inserted position;

FIGURE 4 is a bottom view of the connector;

FIGURE 5 is a longitudinal section view of another embodiment of a connector constructed in accordance with this invention;

FIGURE 6 is a similar view of still another embodiment of this invention;

FIGURE 7 is a top plan view in section, of a fourth embodiment of this invention;

FIGURE 8 is a longitudinal section view of the connector of FIGURE 7 taken in the broken plane 8—8 thereof; and

FIGURE 9 is an exploded view of the parts of the connector of FIGURE 7.

Referring to FIGURES 1 to 4 of the drawings in greater detail, reference numeral 10 designates a lower metal housing having a plurality of openings 12 for seating coaxial cables such as 14 therein. Although five openings are shown, openings for additional cables may obviously be provided.

An upper housing member 16 made of insulating material is mounted to the lower housing member 10 by means of flock-down studs 18 and 20. Locking head portions 19 and 21 may be integral with the studs or may be separately affixed. One of the studs, 20, may be used for a shield lead-out connection, as will be hereinafter explained. Openings 22 in the upper housing are aligned with openings 12 in lower housing 10 for inserting the cables 14 therethrough.

Around the mouth of each aperture 22, a lip 54 may be provided to act as a detent for retaining coaxial cable terminals inserted into the housing. Terminals may be inserted prior to assembly of members 16 and 10, or member 16 may be made of resilient material adapted to permit insertion of a terminal having a diameter slightly larger than the lip 54 after the members have been locked together.

Inner commoning connection pins such as 24, 25 and 26 are centrally positioned in each opening 12 and are firmly secured and insulated therein by means of fused glass beads 28.

The pins are electrically connected together through a printed circuit board 30 which is provided with apertures 33 to receive the pins. The board may be made of phenolic material having a printed circuit conductor 32 disposed on the surface thereof and cooperating with each of apertures 33. Pins 24, 25 and 26 are soldered to the circuit adjacent each aperture, as at 34, to complete the electrical connection.

Pin 25 may be made to extend substantially below the printed board as shown to provide a connector plug or prong for engagement within a mating socket contact (not shown).

The coaxial cable 14 is provided with tubular insulating sleeve 36 formed with a positioning flange 38 which forms a substantially rigid support beneath shield conductor 44, and through which an inner spring contact 40 extends to engage the upper end of pin 25. The contact 40 is crimped to the inner coaxial cable conductor 42, thus transmitting current from the conductor to the commoning pin 25.

A shield-commoning spring contact 48 is positioned circumjacent the outer periphery of tubular sleeve 36 beneath shield conductor 44. Above the shield, a malleable metal sleeve 46 is crimped as at 49 to secure the braided shield and the spring 48 to the sleeve 36. The sleeve 36 insulates the contact 48 from the contact 40. Sleeve 46 provides an upper shoulder 53 for engaging detent lip 54 to retain the assembled terminal within the housing.

Current is transmitted from the braid shield to outwardly biased spring contact 48, which engages the inner wall of socket 12 to transmit the shield current through the metal housing 10 in common with each inserted coaxial cable. The conductive stud 20 is brazed as at 55 to the housing 10 to assure direct electrical contact. The projecting lower end of the stud thus serves as a commoning prong contact for the shield of each of the inserted cables.

The current from the central conductors 42 of the inserted cables is directed through the central pins such as 24 and 26, each of which is in turn electrically connected as at solder joint 34 to the printed circuit 32 to connect each of the central conductors in common to commoning pin contact 24. It will be noted that the printed circuit 32 is designed to avoid contact with prong or lead 20 which passes through circuit board 30 at aperture 31, as shown in FIG. 4, to maintain electrical isolation of the separate current paths to the shields and to the central conductors respectively.

In the modified embodiment shown in FIGURE 5, the metal housing member 10a has a plurality of openings 12a for seating terminations for five coaxial cables 14a therein.

A dielectric housing member 16a which may be made of resilient material is mounted intermediate lower housing 10a and upper conductive housing 10aa by means of lockdown studs such as 18a and 20a. One of the studs, 20a, may be used for a shield lead-out contact, and the other, 18a, as an inner conductor lead-out, as will be hereinafter explained. Openings 22a in the insulating housing member are aligned with openings in housing members 10a and 10aa for inserting the cables therethrough.

Inner conductor springs 40a are mounted in each opening 12a. They comprise shoulder flanges 41a and 43a which are adapted to engage the housing for locking the springs in position. Inner spring fingers 45a engage the inner coaxial cable 42a when it is inserted therebetween. The conductive housing member 10a conducts current from each of the inner conductor springs to the

integrally connected stud 18a which then acts as a commoning prong for the inner conductors.

Upper conductive housing member 10aa provides a common electrical connection for the shield 44a of each of the coaxial cables 14a as follows:

Underneath the braided shields 44a, a braid sleeve 46a is provided having a peripherally-formed detent shoulder 47a.

Above each of the braids is provided a deformable metal ring 49a which is crimped to the braid and the sleeve 46a to lock the parts together and assure an internal electrical connection. The shoulder 47a snap-fits into the openings 22a of the insulating housing 16a, beneath the detent shoulder 23a, to retain the cable sleeve assembly in the housing, when inserted therein.

A conductive spring collar 52a is seated in each of the openings 12aa of the upper housing member, and is retained therein by the resiliently biased arcuately curved fingers 50a engaging the inner walls of openings 12aa. The braid current is transferred through the ring 49a and collar 52a to the conductive upper housing. The conductive stud 20a is brazed or soldered, as at 54a, to the upper housing member 10aa and extends within insulating sleeve 11a through lower housing 10a and beyond, to form a common prong contact for the cable shields.

The two prongs 18a and 20a thus each "common" the inner conductors 42a of the coaxial cables, and the outer shields 44a, respectively.

The upper housing member may additionally or alternately be secured to the insulating member 16a and the lower member 10a by cementing along the respective interfaces.

The third modification of this invention, illustrated in FIGURE 6 employs a hollow housing.

The hollow dielectric housing 10b is provided with an upper plate 45b and a lower plate 16b, each provided with apertures 51b and 12b respectively, for the cables.

The upper plate 45b is made of conductive material and may preferably be molded into the housing 10b. A sleeve 46b is mounted under the braids 44b, over which a metal bushing 49b is crimped as at 50b, the bushing being adapted to be positioned in an opening 51b of the upper plate. The metal bushing may be peripherally grooved or notched as shown to permit a snap-fit with plate 45b within openings 51b.

On the lower plate 16b, a metal spring socket contact 40b for engaging inner conductors 42b of cables 14b within the conductive socket container 36b, which is staked to the lower wall in opening 12b. On the inner surface of wall 16b a circuit conductor 32b may be printed or otherwise applied to electrically connect the inner conductors 42b through contacts 40b and containers 36b to the prong 18b. The printed circuit may thus be employed for "commoning" the inner electrical conductors. The lower plate may alternatively be made entirely of conductive material.

The shield currents flow through bushings 49b to upper plate 45b and through lead out tab 20b, which may be an integrally formed, molded-in portion of the upper plate.

A fourth modification is illustrated in FIGURES 7, 8 and 9, where the housing 10c is provided with a single opening 12c through which seven coaxial cables 14c may be inserted.

Into the housing are fitted a pair of shield conductor closing blocks 45c and 47c, which are shaped as at 60c and 61c for clamping the shield braids 44c of all the coaxial cables therebetween in a common conducting connection, and a pair of inner conductor closing blocks 16c and 18c similarly shaped at 64c and 65c for clamping the inner conductors 42c therebetween. An insulator block 22c having an opening 23c is positioned intermediate the shield conductor blocks and the inner conductor blocks.

When the blocks are clamped about their respective conductors and push-fitted into the housing with insulator 22c properly positioned, the prongs 17c and 20c which are connected to one of the inner conductor closing blocks, and one of the shield closing blocks respectively, extend from the completed connector assembly or housing module for connection to external components. The prong 20c passes through the inner conductor closing block within an insulating sleeve 13c to assure electrical isolation of the two circuits. Solder is applied to each prong as at 54c to insure proper electrical connection, and may provide additional support as well as retaining force.

The foregoing embodiments of our invention provide a gang connector for a plurality of coaxial cables whereby all the coaxial cables may be inserted or withdrawn as a unit from a component. The gang connector may be made sufficiently small to permit incorporation in micro-miniature components.

We have thus described our invention, but we desire it understood that it is not confined to the particular form shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of our invention, and therefore we claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which objects of our invention are obtained and new results accomplished since the particular embodiments herein shown and described are only some of the many that can be employed to obtain these objects and accomplish these results.

We claim:

1. A gang connector for a plurality of shielded coaxial cables which have each been provided with an external contact coupled to an outer conductor and with an inner contact coupled to an inner conductor and axially extending beyond said external contact, said gang connector comprising: a housing member having a conductive portion including a plurality of apertures there-through for receiving and electrically coupling to the external contacts of a plurality of coaxial cables; a projecting contact member mounted to said housing and electrically coupled to said conductive portion for establishing external electrical connections to said conductive portion; an insulating member mounted to said housing member; a plurality of connector elements mounted to said insulating member substantially coaxially with said conductive portion apertures in position to electrically engage the inner contacts of a plurality of coaxial cables disposed in said apertures; and a projecting contact member mounted to said insulating member and electrically coupled to at least one of said connector elements on said insulating member for establishing external electrical connections thereto, whereby the internal and external conductors of a plurality of coaxial cables may be separately and separably coupled to external electrical conductors.

2. The coaxial cable gang connector of claim 1 wherein the apertures in said housing member conductive portion are provided with detent means for releasably engaging the external contacts on each of a plurality of coaxial cables to retain such cables within said apertures.

3. The coaxial cable gang connector of claim 1 wherein said insulating member includes a conductive circuit element associated therewith and electrically isolated from said conductive portion for electrically interconnecting certain of said connector elements mounted to said insulating member, and wherein a projecting contact member is mounted to said insulating member and electrically coupled to said conductive element for establishing external electrical connections thereto.

4. The shielded coaxial cable gang connector of claim 1 wherein the housing is provided with a plurality of recesses coaxial with said conductive member apertures, and an insulating sleeve is positioned between each co-

axial cable inner conductor and its shield, said insulating sleeve terminating in an outwardly extending flange having a diameter corresponding to the diameter of the recess, for seating the coaxial cable in the housing recess.

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JOSEPH D. SEERS, *Primary Examiner.*

A. S. TRASK, *Assistant Examiner.*