United States Patent [19]

Gothberg

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[54] **CONNECTOR FOR ELECTRIC INSTALLATION SYSTEMS**

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[52] **U.S. Cl.** **339/23,** 174/69

[51] **Int. Cl.** **H01r 13/60**

[58] **Field of Search** ..... 339/20, 21 R, 21 S, 22 R, 339/22 B, 22 T, 23, 24; 174/69

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Primary Examiner—Paul R. Gilliam
Assistant Examiner—Robert A. Hafer
Attorney, Agent, or Firm—Burns, Doane, Swecker & Mathis

[57] **ABSTRACT**

Electrical wiring for house or building installations having all cables enclosed in an electric ledge. The electrical ledge is premanufactured. Where the end section of one electrical ledge is joined to the end section of another ledge, for example, in a corner of a room, there is a connector which forms the joint between said two ledges. Said connector has a central portion and two end portions which are telescopically displaceable relative to the central portions to thereby accommodate the dimensional length tolerances customarily experienced in the erection of buildings. Thus, the electrical ledge can always be brought to exactly fit the available space.

13 Claims, 24 Drawing Figures

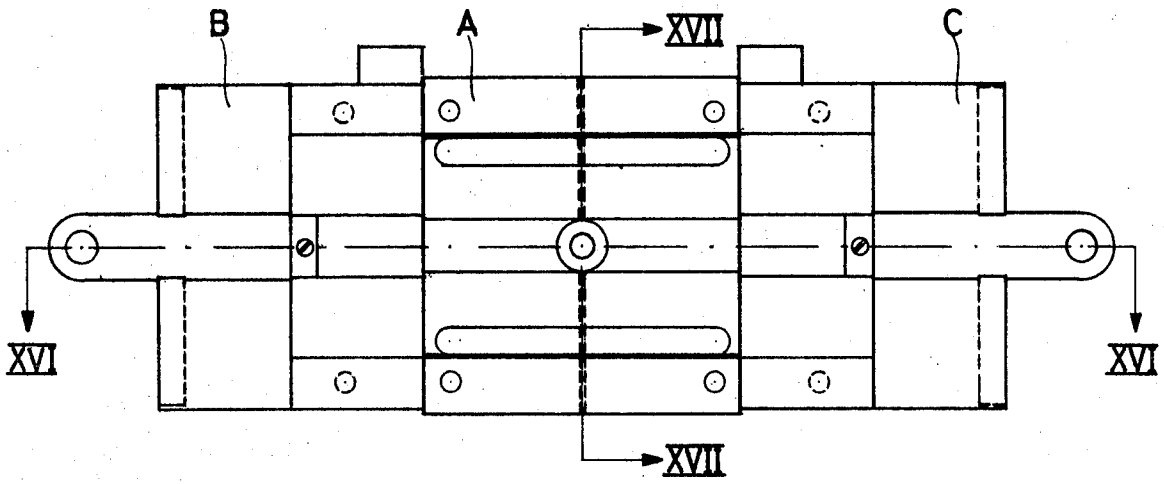


Fig.17

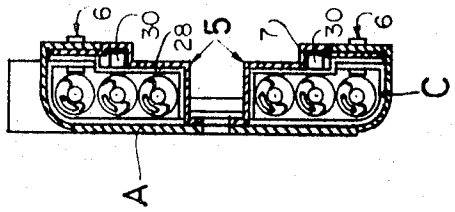


Fig.1

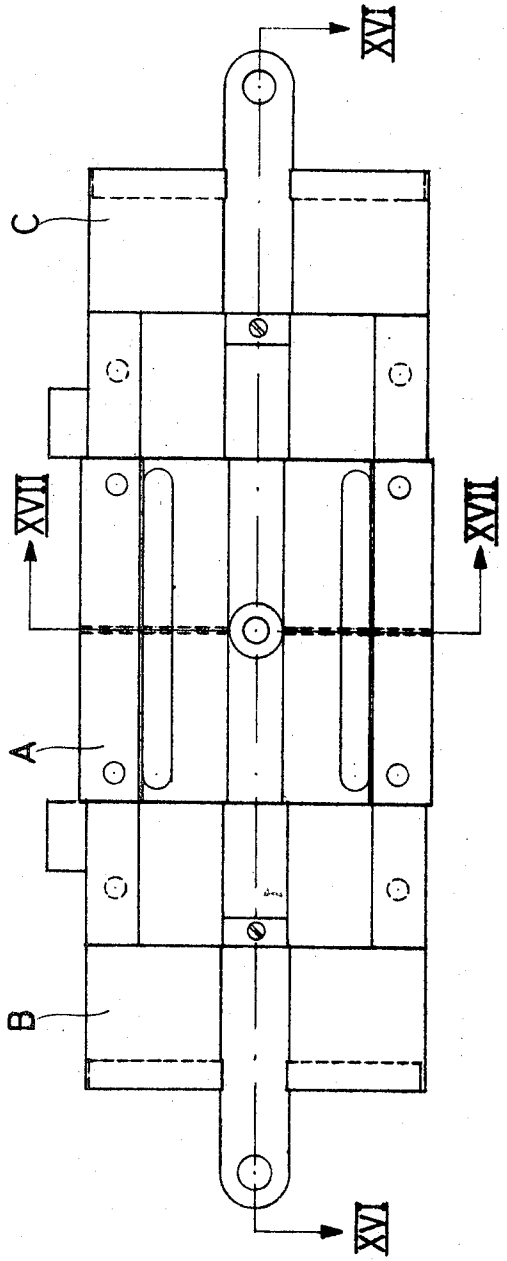


Fig.16

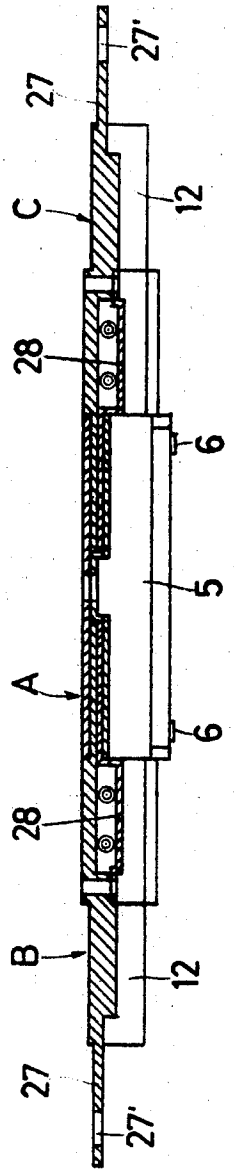


Fig.2

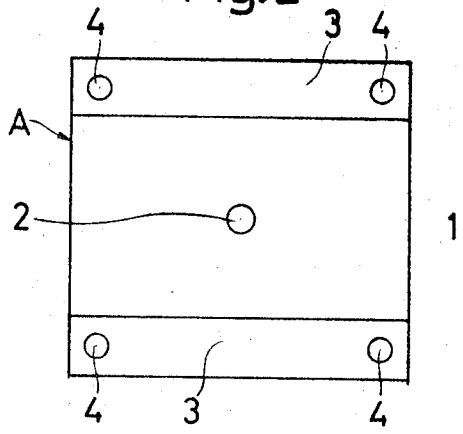


Fig.3

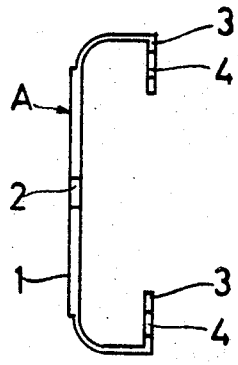


Fig.4

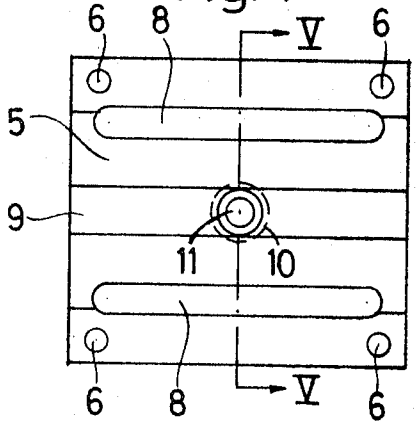


Fig.5

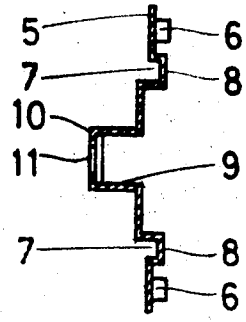


Fig.18

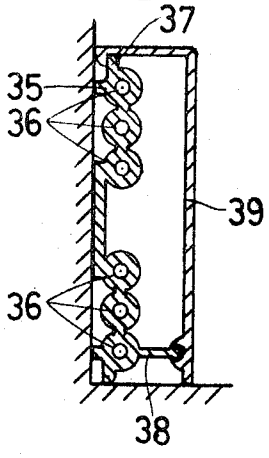
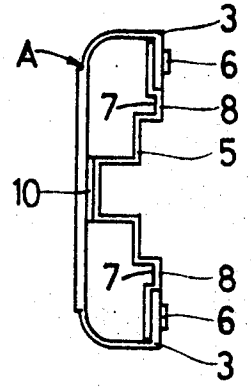


Fig.6



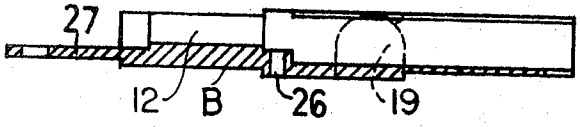


Fig. 8

Fig. 7

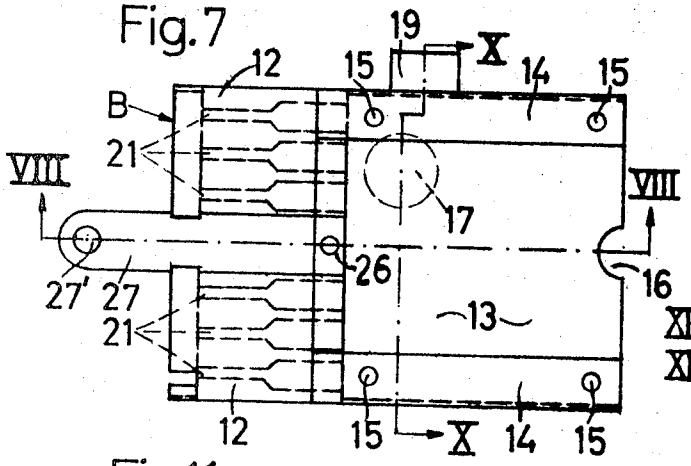


Fig. 9

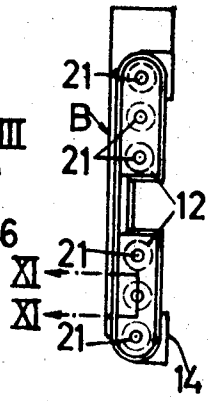


Fig. 10

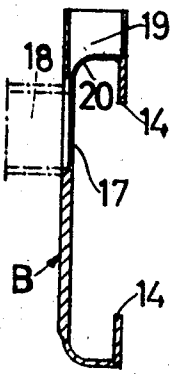


Fig. 11

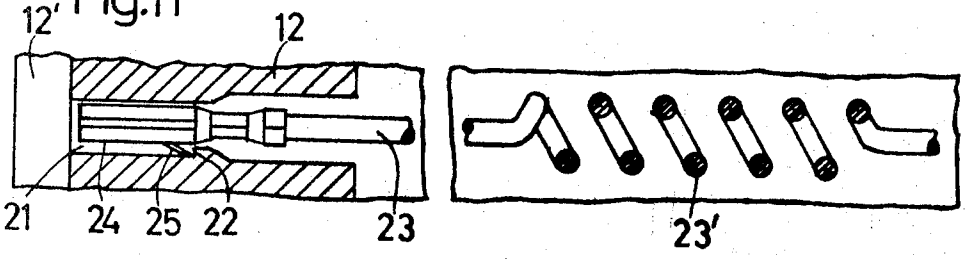


Fig. 13

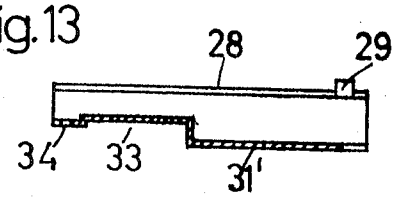


Fig. 12

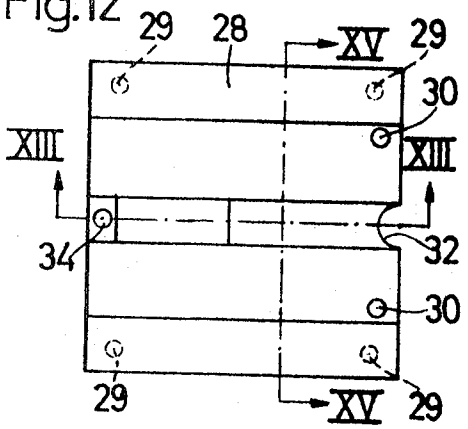


Fig. 14

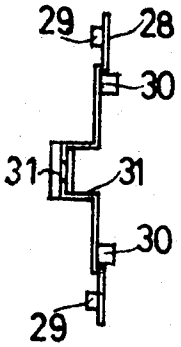


Fig. 15

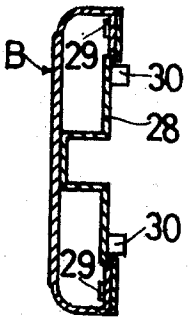


Fig. 19

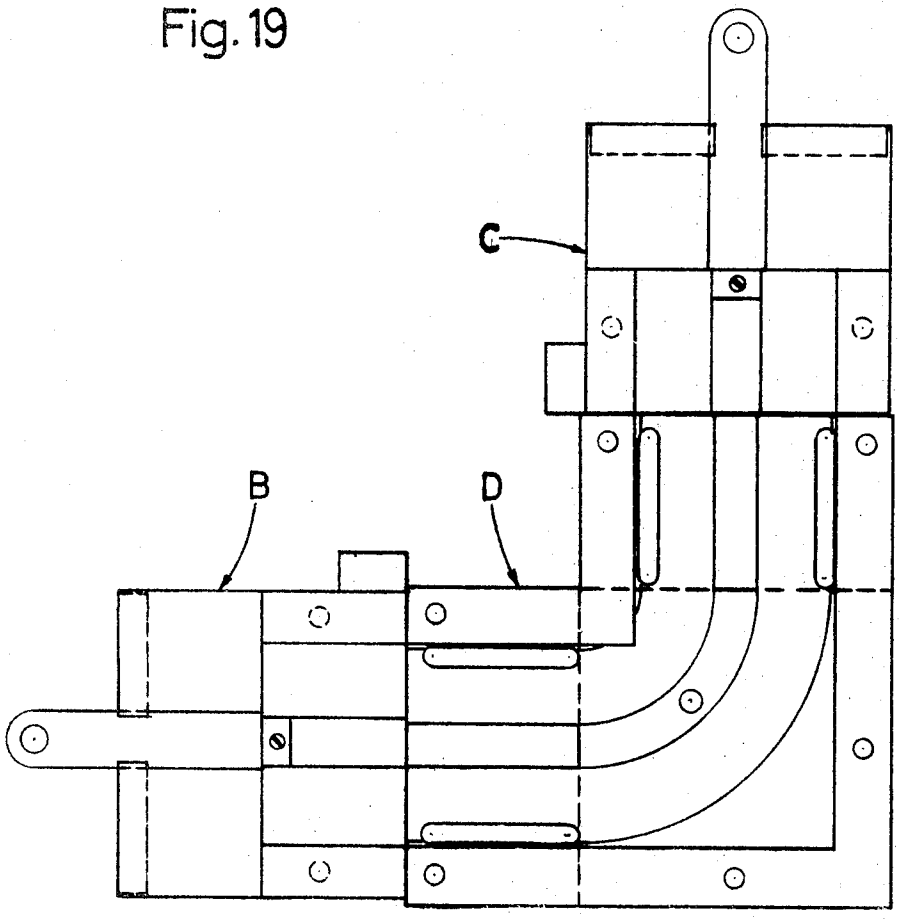
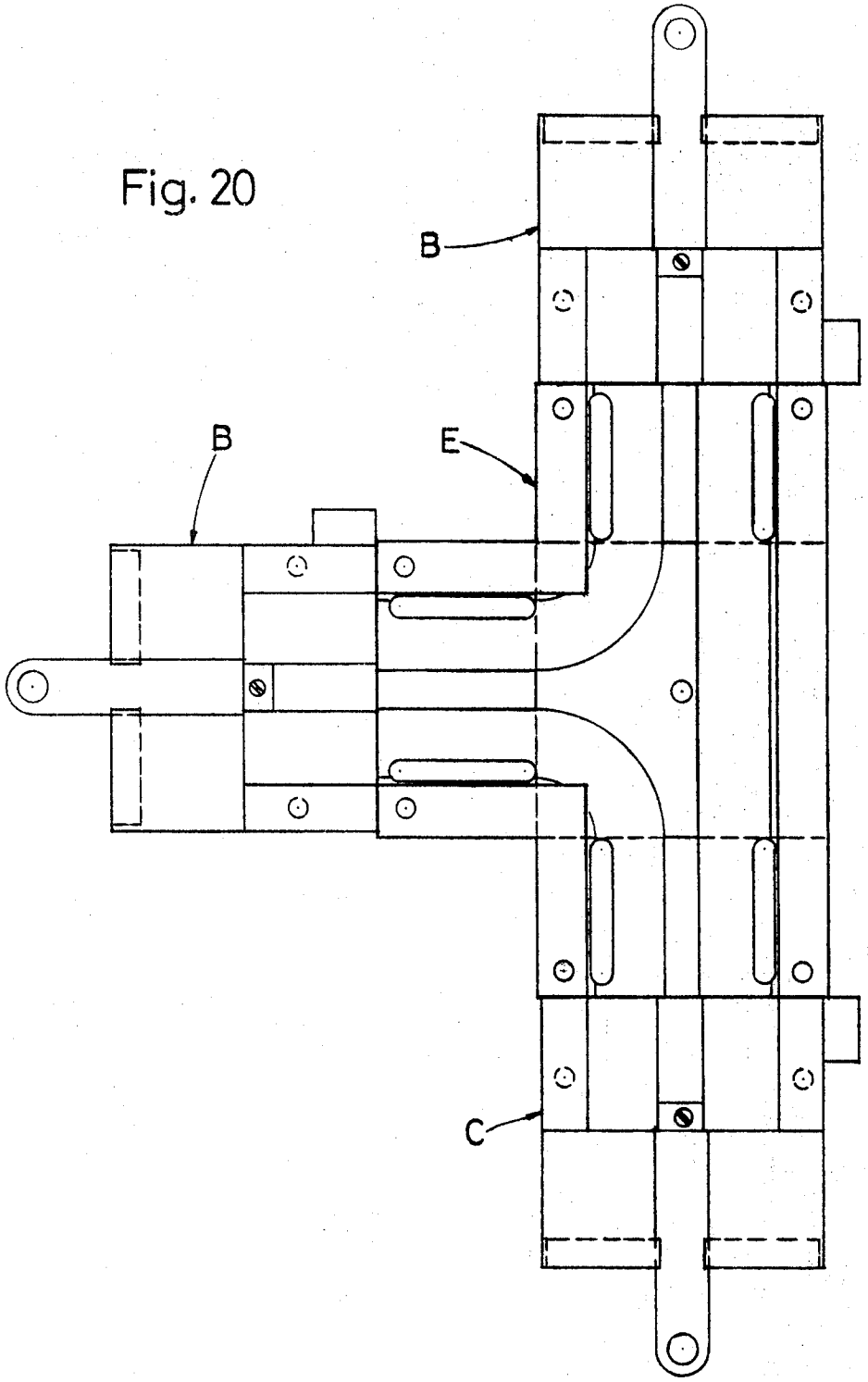


Fig. 20



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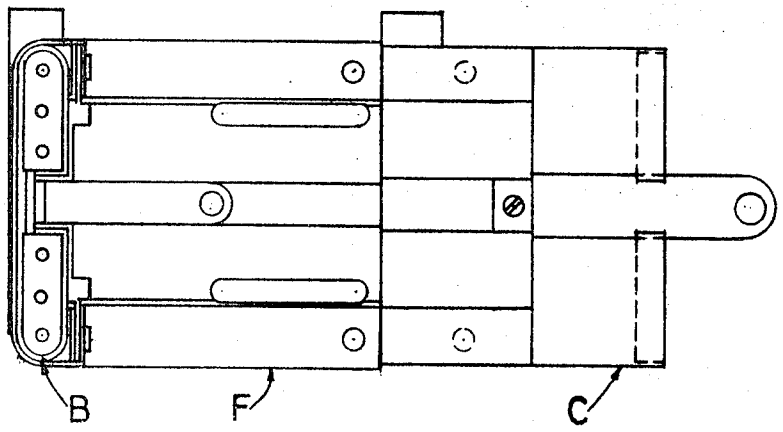


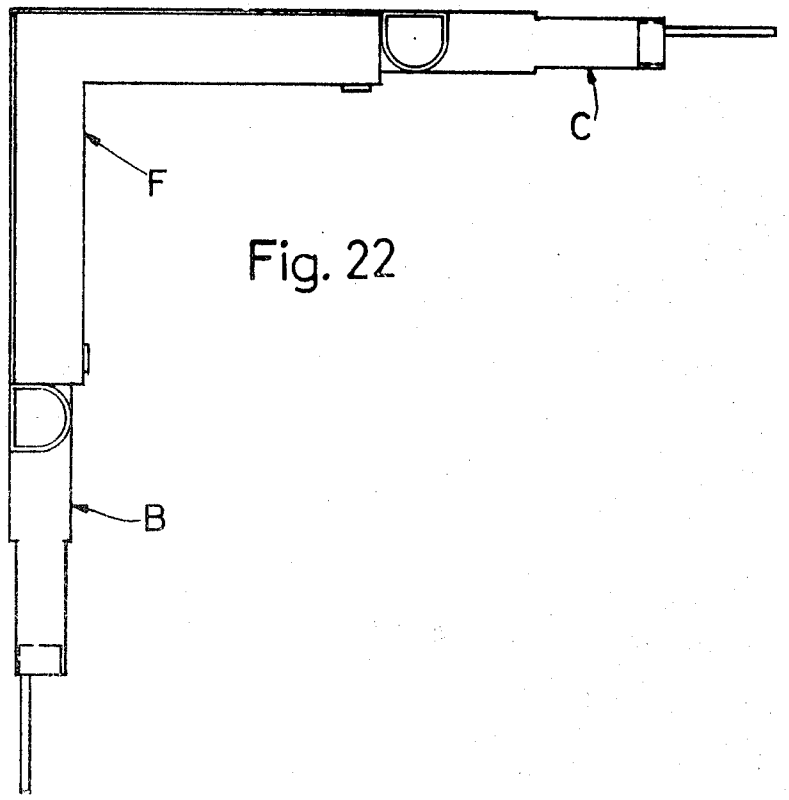


Fig. 22

Fig. 23

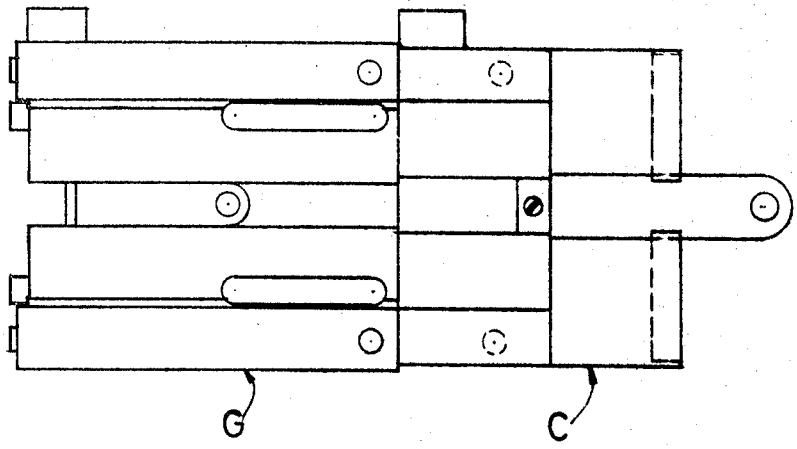
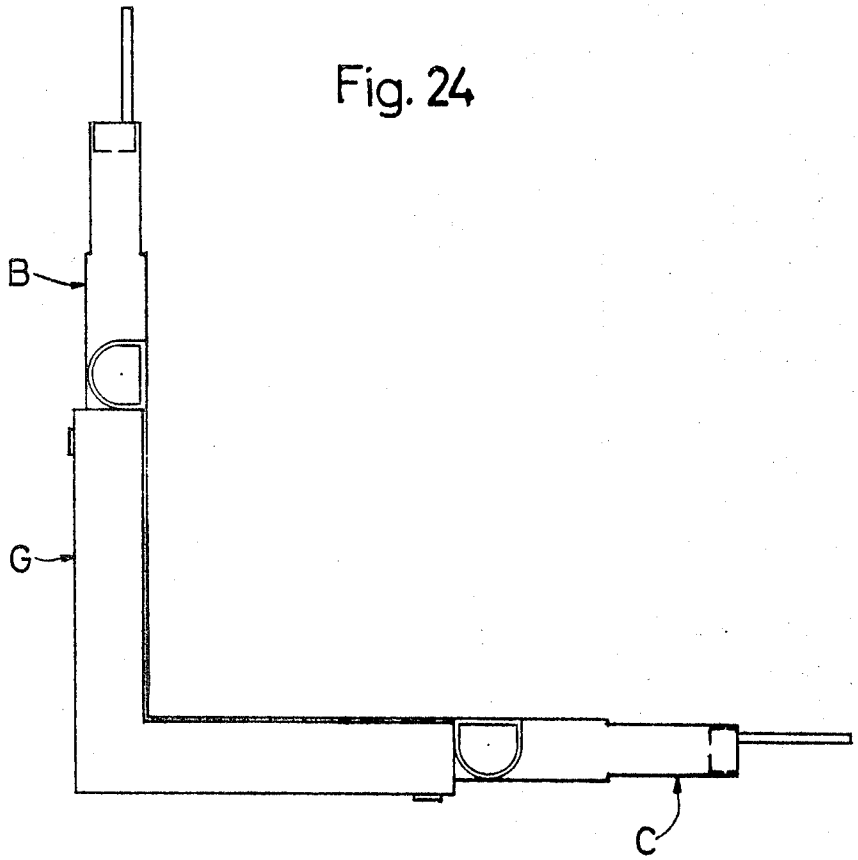


Fig. 24



CONNECTOR FOR ELECTRIC INSTALLATION SYSTEMS

This invention relates to a connector for a multi-wire electric cable comprising an electric ledge with a plurality of conductors. In electric installations of today carried out in buildings of different types, the electric cables usually are laid in pipes and connector boxes embedded in the wall or the like. With the present building methods, this is neither practical nor rational and, moreover, it is expensive. In certain building systems it is to a large extent impossible to apply this installation method at all. The different steps such as piping, wiring and connecting operations with mounting of apparatus are to be synchronized with other building activities, which render continual decisions of a depending nature between different professional categories necessary. It is also known to utilize for electric installations so-called electric ledges in the form of cable channels. These ledges are placed on the surface of the wall and covered by a cover of ledge-shape. With these known arrangements, however, it had been necessary heretofore to adjust the lengths of the ledges and covers to the dimensions of the building in which the installation in each special case had to be carried out. Besides, as a rule all connecting work had to be carried out on the site of installation.

The application of ledge-shaped installation material, thus, was rendered more difficult by the fact that the ledges could not be prefabricated, because at normal building activity (this applies also to houses assembled of prefabricated units) relatively large dimensional tolerances are required. It is, therefore, not unusual that the dimensions of a room may vary by 5 cm for different specimens of one and the same house type.

According to the invention, the above problems are solved, and by utilization of the invention all cables required for a house installation can be formed as electric ledges, all of which can be delivered in complete state and cut to lengths adapted for the house. Tolerances in dimensions of the house, or of single rooms in the house, amounting to ± 5 cm or more are permissible without interfering with the quality or appearance of the installation.

The present invention relates to a connector for a multi-wire cable of the electric-ledge type with a plurality of conductors and intended for use in electric installation systems, which connector ledge comprises a central section and at least two end sections, all with substantially U-shaped cross-section and each covered by a cover with fixed position on the central section and end sections, respectively, said end sections being displaceable within limits with respect to the central section, in such a manner, that the end sections and the central sections coact telescopically with each other, said end sections at their ends remote from the central section being provided with connecting members, for example connecting sleeves, for contact connection to the conductors of the electric cable, and each connecting member of one of the end section being connected to its corresponding connecting member of at least one other end section associated with the connector by means of a cable extending through the central section.

The invention is substantially characterized in that all cables connecting the connecting members in one end section to the connecting members in another end section are extensible and thereby permit displacement of the end sections relative to the central section.

By utilizing connectors according to the invention, prefabricated electric ledges can be applied, which are dimensioned according to the smallest dimensions possible in view of the building tolerances. When larger length dimensions are required, the connectors connected to the appropriate electric ledge are extended by pulling out one or both of the end sections of the connector relative to its central section such a distance, that the total length of the electric ledge inclusive of the connectors fits the space available in the case in question.

The invention is described in the following with reference to some embodiments shown by way of examples in the accompanying drawings.

FIG. **1** shows a horizontal view of a connector according to the invention.

FIGS. **2** and **3** show a horizontal view and, respectively, an end view of a central section comprised in the connector.

FIG. **4** shows a horizontal view of a cover for the central section.

FIG. **5** shows a section along the line V—V in FIG. **4.**

FIG. **6** shows an end view of the central section with the cover mounted thereon.

FIG. **7** shows a horizontal view of an end section in the connector.

FIG. **8** shows a section along the line VIII—VIII in FIG. **7.**

FIG. **9** shows an end view of the end section in FIG. **7.**

FIG. **10** shows a section along the line X—X in FIG. **7.**

FIG. **11** shows on an enlarged scale a section along the line XI—XI in FIG. **9.**

FIG. **12** shows a horizontal view of a cover for the end section.

FIG. **13** shows a section along the line XIII—XIII in FIG. **12.**

FIG. **14** shows an end view of the cover in FIG. **12.**

FIG. **15** shows a section along the line XV—XV in FIG. **12** through the end section completed with cover.

FIG. **16** shows a section along the line XVI—XVI in FIG. **1**

FIG. **17** shows a section along the line XVII—XVII in FIG. **1.**

FIG. **18** shows a section through an electric ledge.

FIG. **19** shows a horizontal view of an angular connector.

FIG. **20** shows a horizontal view of a T-shaped connector.

FIGS. **21** and **22** show a connector for inner corners, seen from the side and, respectively, from above.

FIGS. **23** and **24** show a connector for outer corners, seen from the side and, respectively, from above.

According to the embodiment shown in FIG. **1,** the connector of the invention comprises a central section A and adjoining end sections B and C.

According to FIGS. **2** and **3,** the central section A is of U- or groove shape and comprises a base portion **1** to rest against a wall or the like and provided with a central screw hole **2.** The edges of the of the groove

have plane inward edge borders **3** provided with through guide holes **4.**

According to FIGS. **4** and **5** a cover **5** is provided in a pair of opposed edge portions on one side, viz. the upper side, with guide pins **6** and on the other side, viz. the lower side, with a pair of parallel limited grooves **7,** which have a whole bottom portion **8** formed by the cover material. Said cover **5** includes in parallel with said grooves a central recess **9,** which centrally of its length has an additional lowered cylindrical portion **10** with screw holes **11.**

FIG. **6** shows how the cover **5** is positioned to cover the central section A, viz. such that the edge portions of the cover **5** are located below the edge borders **3** of the central section, with their guide pins **6** extending through the guide holes **4** in said borders **3** and with the cylindrical portion **10** resting against the inside of the base portion **1,** while the grooves **7** are open inwards.

According to FIGS. **7–11** the end section B comprises two block portions **12** and adjacent thereto a U-shaped member **13** with inwardly extending edge borders **14** and through guide holes **15.** The member **13** includes a semi-circular recess **16** with the same radius as aforesaid cylindrical portion **10.** The member **13** further includes a circular portion **17** of break-through material, to which a pipe socket **18** may be connected as shown by dash-dotted lines in FIG. **10,** into which socket is inserted at wall passage a VP-pipe of a length depending on the wall thickness. A tubular outlet **19** on one side wall of the member **13** is intended to connect cables to switches, wall or lamp outlets and is sealed by a break-through wall portion **20.**

Each of said block portions **12** includes three bores **21** each with a shoulder **22,** see FIG. **11.** A contact sleeve **24** connected to the end of an electric cable **23** engages by a support projection **25,** upon insertion of the contact sleeve **24** from the right in FIG. **11** into the bore **21,** the stop shoulder **22** and thereby prevents the contact sleeve from being pulled out to the right in FIG. **11.** The block portions **12** are provided with a protective flange **12'** outside the contact sleeves. The cable **23** is wound helically on a part **23'** for a purpose which will be explained below. The end section B further is provided with a screw hole **26** and a projecting strip-shaped holder **27** with screw holes **27'.**

FIGS. **12–14** show a cover **28,** which on one side surface of each of the opposed edge portions has two guide pins **29** and on the other side surface is provided with a stub **30** having a diameter equal or substantially equal to the width of the grooves **7.** The cover **28** has a lowered central portion **31** with a semi-circular recess **32** in its bottom part **31',** which extends in steps as shown in FIG. **13** to form a transverse passage **33.** A screw hole is provided in said bottom part **31'.**

FIG. **15** shows how the cover **28** is inserted in the end section B in such a manner, that the guide pins **29** extend through the guide holes **15** of the end section B with the stubs **30** extending outwardly.

The various components shown in FIGS. **2–14** are assembled as shown in FIGS. **1, 16** and **17.** The assembling work is carried out such that the two end sections B and C, which are of the same design, are slid into the central section A. Cables **23** are laid in together with the contact sleeves, which are pushed into the bores **21** of the end section B until the projections **25** snap down adjacent the stop shoulder **22.** Some cables from the end section B may be taken out through the break-through portion **17** or outlet **19,** and the remaining cables may continue until their contact sleeves are secured in the through bores of the end section C. Thereafter a cover **28** is placed upon each end section B, C and finally the cover **5** is mounted on the central section A from below. Due to the engagement between the guide pins and guide holes, the covers **5, 28** are secured on and efficiently cover the central section and the end sections. A screw with threads for sheet metal is inserted in the screw hole **34** of the respective cover **28** and is screwed into the material surrounding the hole **26** of the end section.

The end sections B, C are slidable in the central section in the longitudinal direction of the cables **23,** but the stubs **30** of the covers **28** on the end sections B, C engage each in a respective limiting groove **7** of the central section, so that the end sections B, C cannot be pulled out of the central section A. The push-in movement of the end sections B, C is stopped as the end sections meet, or the grooves **7** may be formed so as to limit said movement. Owing to the helically wound and extensible parts **23'** of the cables **23,** the cables do not constitute an obstacle to said sliding movement of the end sections B, C relative to the central section A.

FIG. **18** shows an electric ledge, which is adapted for connection to an end section B or C and made of a hard creeping-current-proof plastic material, such as PVC, and six embedded bare conductors **36.** The electric ledge **35** is prefabricated so that bare ends extend beyond the ledge material and an end bore (not shown) through the central portion of the ledge is located at a predetermined distance from said bare ends. The bare ends are pushed into the contact sleeves **24,** and a screw is inserted through the screw hole **27'** of the holder **27** and through said end bore in the electric ledge and into the support, thereby ensuring that the bare conductor ends are inserted completely into the contact sleeves and a satisfactory contact is obtained. The central section A may be secured, if desired, on the support also by means of a screw through the screw holes **2** and **11.** The ledge **35** has edge borders **37** and **38,** which are engaged by a shielding section **39** forming a floor or ceiling ledge or a door or window dressing etc. Said section **39** is located at such a distance from the ledge **35** that it can extend across the connector formed by the central section and the end sections, thereby also protecting the connector and rendering it invisible. The central portion **9** and **31** extending through the electric ledge and all connectors is, upon demand, intended to house telephone lines, radio and television cables or other communication cables.

So far only a straight connector has been described, but also other configurations may be provided as shown in FIGS. **19–24.**

According to FIG. **19** the connector forms an angle for mounting on a plane surface. In this case the central section D with its cover is of angular shape, but shows in other respects the same detail design as the central section A. The end sections B and C are identical with those end sections B and C described above.

According to FIG. **20** the connector forms a T for mounting on a plane surface. The central section E and its cover are T-shaped, and the three end sections B, B and C are inserted therein and adjustable.

According to FIGS. **21** and **22** the connector forms an angle, too, but its legs lie in different planes forming

90° relative each other. The connector is thereby adapted for application in an inner corner of a room etc. The central section F and its cover have angular shape, and the end sections B and C are as described above.

According to FIGS. **23** and **24** the connector also forms an angle having its legs located in different planes. The central section G and its cover fit in this case an outer corner. The end sections B and C are connected to the central section G.

The connectors have the form of completely closed housings and thereby prevent safely any touching of the electrical components located therein. The contact sleeves **24** are located inside of the protective flange **12'** and thereby prevent touching prior to the connection of the electric ledge. The shielding section **39**, moreover, provides complete protection against touching of components under tension.

The invention must not be considered to be restricted only to the embodiments shown and described as these may be varied within the scope of the invention. The guide pins, for example, and the guide holes engaging each other may be replaced by other engaging means, and the means for limiting the sliding movement of the end sections relative to the central section may be established in different ways, possibly directly between the end sections and the central section. The live components in the connectors may be of various kinds and their longitudinal adjustability may be obtained, for example, by cable laid in bights between the contact sleeves, which may be different types of contact means. The end sections and the electric ledge, instead of in common, may be secured individyally on a support. The angles between the legs of the central section may be other than those shown.

I claim:

1. In a building having electrical wiring provided by rigid electrical wiring ledges each containing a plurality of current carrying conductors, a connector adapted for installation between a pair of said ledges, said connector comprising:

a central section having a hollow interior;

a pair of end sections mounted for sliding movement at opposite ends of said central section;

each end section having a connector member including terminals for electrical contact connection to current carrying conductors in said wiring ledges, said terminals mounted at the free end of each said end section and accessible to said current carrying conductors in said adjacent wiring ledges through openings in said free ends of said end sections; and

a cable of insulated wires in said central section with cable ends connected to said connector member terminals and the cable being extendable with a displacement of the end sections relative to the central section to adjust the connector length to the space between a pair of said ledges.

2. A connector as defined in claim **1**, characterized in that the cable connecting the connecting member in one end section to the connecting member in another end section is wound helically.

3. A connector as defined in claim **1**, characterized in that the cable connecting the connecting member in one end section to the connecting member in another end section is laid in bights.

4. A connector as defined in claim **1**, characterized in that the central section has a U-shaped cross section and has on opposed edges inwardly extending, apertured edge members; and a cover for the open side of the central section located at a fixed position and having guide pins engaged in the edge member apertures, and a plurality of outwardly shielded, longitudinal grooves for limiting the sliding movement of said end sections.

5. A connector as defined in claim **4**, characterized in that each end section has a cover which has a fixed position relative to the associated end section, and includes a pair of projecting stubs for engagement in the grooves in the cover of the central section for limiting the outward displacement of the respective end section relative to the central section.

6. A connector as defined in claim **1**, characterized in that the central section and the end sections lie in the same plane and all have a common longitudinal axis.

7. A connector as defined in claim **1**, characterized in that the central section is angularly shaped having two legs located in the same plane with each end section coacting telescopically with each angle leg.

8. A connector as defined in claim **1**, characterized in that the central section is T-shaped and the end sections on the legs all lie in the same plane with each end section coacting telescopically with each leg.

9. A connector as defined in claim **1**, characterized in that the central section is angularly shaped, having its underside legs extending in two different planes with each end section coating telescopically with each leg of the angle.

10. A connector defined in claim **1**, characterized in that the end sections have side outlets closed by a break-through material.

11. A connector as defined in claim **1**, characterized in that the end sections have bottom outlets.

12. A connector as defined in claim **1**, characterized in that each end section has block portions at an outer end with through bores and a stop shoulder; and wherein the electrical contact connection means includes a connecting sleeve located in each of said bores with the connecting sleeve having a support projection portion engaging said stop shoulder; and wherein each block portion has a protective flange outside of the connecting sleeves.

13. A connector as defined in claim **12**, mounted on a support and positioned by fasteners extending through a screw hole in the respective end sections and through an end bore in the electric ledges, said ledges having edge border portions shaped for retaining a shielding member which extends across the connector and the electric ledge.

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