Feb. 8, 1949. E. R. GOLDFIELD 2,461,268

FOUR-WAY CABLE CONTACT

Filed July 13, 1946

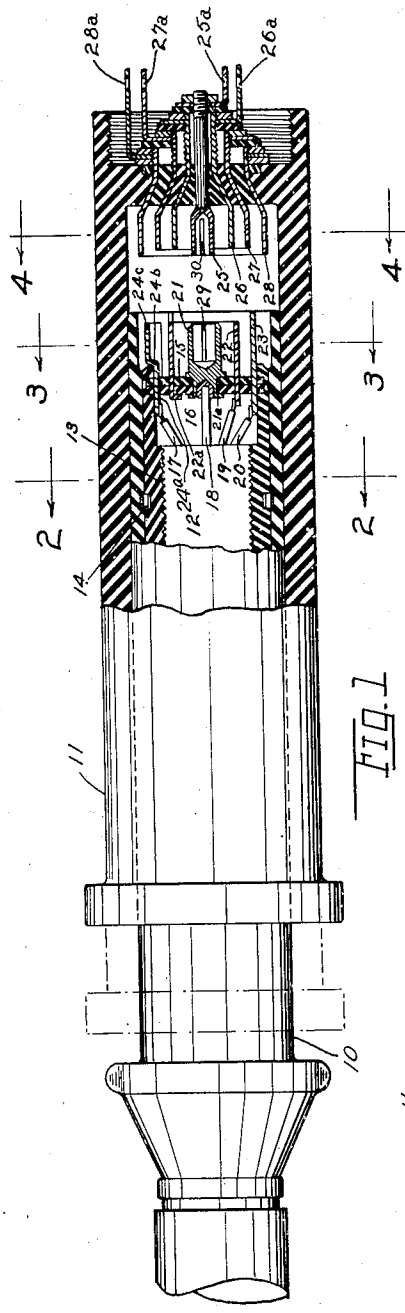


FIG. 1

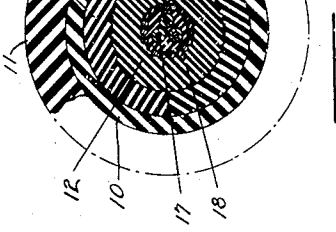


FIG. 2

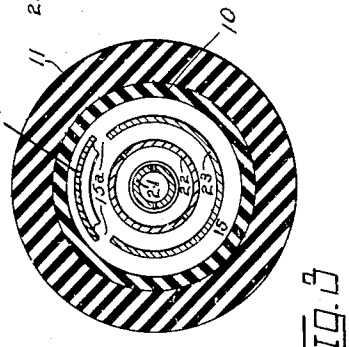


FIG. 3

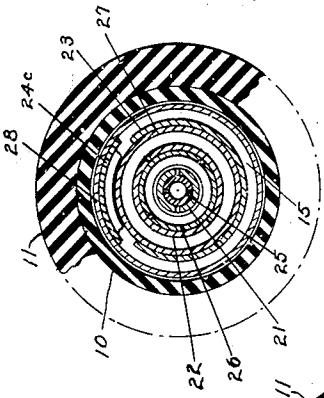


FIG. 4

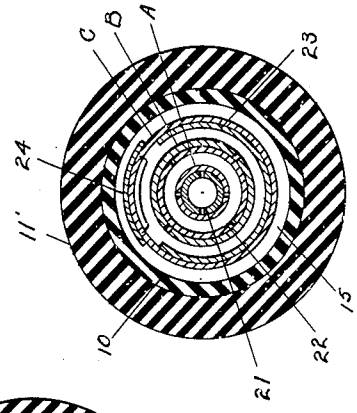


FIG. 5

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FOUR-WAY CABLE CONTACT

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Application July 13, 1946, Serial No. 683,313

2 Claims. (Cl. 173—328)

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This invention relates to improvements in high tension cable contacts and more particularly to a novel arrangement of concentric male and female contacts so arranged that a given set of male contacts may mate equally well with the same number of female contacts or with the same number minus one.

An object of the present invention is to improve the construction shown in my Patent No. 2,238,319, granted April 15, 1941, whereby four contacts may be provided in substantially the same space previously occupied by only three contacts.

Another object of the present invention is to provide a novel arrangement of an extra contact positioned radially outside the outermost of a set of concentric contacts by an amount slightly greater than the thickness of a mating contact so as to provide a construction wherein a mating contact may lie either radially inside or outside of the outermost concentric contact.

Another object of the invention is to provide in the combination of the preceding paragraph means for limiting the movement of the two sets of mating contacts toward each other so that the purposes of my invention will be accomplished.

Other objects and advantages of the present invention will be apparent from the accompanying drawings and description and the essential features thereof will be summarized in the appended claims.

In the drawings,

Fig. 1 is a side elevational view of mating sets of contacts with one end thereof being broken away in central longitudinal section to more clearly show the construction;

Figs. 2 and 3 are transverse sectional views taken along similarly numbered lines of Fig. 1;

Fig. 4 is a transverse sectional view taken along the line 4—4 of Fig. 1 when the mating contacts have been moved into engagement; while

Fig. 5 shows the structure of the male member of Fig. 1 as mated with a female member of three contacts only, the view of Fig. 5 being taken in a position similar to that of Fig. 4.

In my earlier Patent No. 2,238,319, I disclosed concentric male and female electrical contacts adapted to connect three high tension circuits in connection with X-ray apparatus. The purpose of the construction there shown, and of the present improvement thereon, is to provide means for connecting stiff high tension cables which are often twisted when in use, and the arrangement shown permits such twisting without interrupting the electrical circuits and without straining the cables. It is sometimes desirable to complete a fourth electrical circuit through such high tension cables either in connection with X-ray apparatus or other work. The present invention is directed to this improvement.

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Referring to Fig. 1, I have shown a male connector member 10 inserted in a female connector member 11 in a manner similar to that shown in my prior patent above referred to. The specific construction of the means for holding the concentric contacts is not a part of the present invention except insofar as it shows one manner of mounting the contacts for the purpose intended and suitably insulated from each other. The specific construction shown in the member 10 is, except for a modification mentioned later, exactly like that disclosed and claimed in my Patent No. 2,353,719, granted July 18, 1944, to which reference may be had for further description if necessary. It should be sufficient to state here that the end of the high tension cable is reduced in section at the end 12 which is surrounded by a sleeve 13 of insulating material, preferably formed in two half cylinders, as taught in my preceding patent. The ring 14 is a corrugated retaining ring like that shown at 32 in my prior Patent No. 2,353,719. The base disc 15 which holds the male contacts is non-circular in form and gripped by the sleeve 13 in exactly the same manner as was the disc 21 of my prior patent last referred to. The space 16 is filled with a flowable insulating compound like that shown in the space 23 of the same patent. The cable 12 is provided with four electrical conductors instead of the three shown in the earlier patent. These conductors comprise three, namely, 17, 18 and 19, imbedded in the central core of the cable and a conducting sheath 20 which is formed around the central core of the cable. This sheath is twisted into a compact filament for connection to one of the end contacts, as will presently appear.

Three concentric end contacts are secured to the base disc 15 in a manner similar to the three contacts shown in my prior patents. The innermost contact 21 has a ferrule 21*a* which extends through a central opening in the disc 15, and is riveted on the inner face thereof. The intermediate concentric contact 22 is cylindrical in form and provided with spaced tongues 22*a* which pass through suitable openings in the base disc and are bent over on the inside face thereof to secure the contact in place. The outermost of the concentric contacts, 23, is similar to 22 and is secured to the base disc 15 in a similar manner.

Referring to Figs. 1 and 3, a fourth contact 24 is provided by fixing in the base disc 15 a portion 24a on the same circle as the contact 23, but insulated therefrom by the material of the disc 15 as indicated at the points 15a of Fig. 3. At a point intermediate the length of this contact it is bent outwardly at the shoulder 24b so as to cause the outermost end portion 24c to lie radially outside the contact 23 by an amount slightly greater than the thickness of the mating female contact, as will later appear. The four male contacts 21, 22, 23 and 24 are connected each to one of the conductors 17, 18, 19 and 20, although the order of their connection is a matter of choice for the purpose intended.

The female contacts 25, 26, 27 and 28 are all concentric and mounted in a suitable base construction, as shown at the right-hand end of Fig. 1, and which is analogous to the structure shown in Fig. 4 of my Patent No. 2,238,319. The only difference is that the fourth ring 28 has been added with suitable insulators so that all of said female contacts are properly insulated, one from the other. Each of the female contacts is provided with an eye, respectively, indicated at 25a, 26a, 27a and 28a for the attachment of circuit connections.

When the mating contacts of Fig. 1 are moved together so that sleeve 11 occupies the dot-dash position of Fig. 1, the relationship of the contacts is shown clearly in Fig. 4. It will be noted that contacts 25, 26, and 27 lie respectively radially inside of the contacts 21, 22, and 23, whereas the contact 28 engages the contact 24 on the outside of the end portion 24c thereof. Thus, all of the contacts are suitably separated from each other and each completes its own individual circuit, a total of four circuits.

It will be noted that the contacts 21 and 25 are slotted as shown at 29 and 30, respectively. This is a known manner of obtaining some resiliency in the contacts, and the other contacts, both male and female, are likewise, slotted, as indicated in Fig. 4, although this construction has been omitted from Fig. 1 for clearness.

The male connection of Fig. 1 will mate equally well with a female connection having but three contacts, as taught in my prior Patent No. 2,238,319. In Fig. 5, I have shown in section, a construction entirely analogous to that shown in Figs. 4 and 5 of my prior patent, No. 2,238,319. In the present drawings, contacts A, B and C are exactly like the contacts shown at 25a, 25b and 25c, respectively, in the last mentioned United States patent. These contacts A, B and C are chosen of such a diameter that they mate radially outside of the male contacts 21, 22 and 23, respectively, as clearly shown in Fig. 5. The spacing of the contact 24 permits this engagement of the female contact C radially outside the male contact 23, as shown in Fig. 5. In this case, of course, the male contact 24 is not connected to any circuit.

I have thus shown how four male contacts may be arranged in the same space formerly occupied by but three male contacts, and the four are so arranged that they will mate equally well with four female contacts, as shown in Figs. 1 and 4, or with three female contacts, as shown in Fig. 5.

Means is provided to insure that the female contacts do not hit the shoulder 24b of the fourth male contact when the parts are fully inserted, as shown in dot-dash lines in Fig. 1. To this end, the contacts 21 and 25 are so constructed and arranged that when they are fully inserted, the female contact 27, which is shorter than 25, stops short of the shoulder 24b, thus preventing contact at this point.

What I claim is:

1. High tension electrical contacts adapted for relative twisting movement between male and female contacts comprising three spaced concentric contacts and a fourth contact having a base portion spaced from its end portion and substantially on the same radius as the outermost of said concentric contacts and having an end portion bent radially outwardly from said base portion by an amount slightly greater than the thickness of a mating concentric contact, said fourth contact being electrically insulated from said outermost of said concentric contacts, there being a shoulder portion connecting said base and end portions, and one of said three concentric contacts engaging its mating contact to limit movement of said male and female contacts toward each other before a mating contact can engage said shoulder.

2. In the combination of a plurality of spaced concentric circular male electrical contacts adapted to engage a plurality of mating female electrical contacts, the provision of an additional arcuate male contact extending around a small portion of a circle, said additional contact being insulated from said first named male contacts and spaced radially outwardly from the outermost circular male contact by slightly more than the thickness of a mating female contact, whereby said outermost circular male contact may engage a female contact positioned either radially inwardly or radially outwardly therefrom.

EDWIN R. GOLDFIELD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,238,319	Goldfield	Apr. 15, 1941
2,353,719	Goldfield	July 18, 1944