

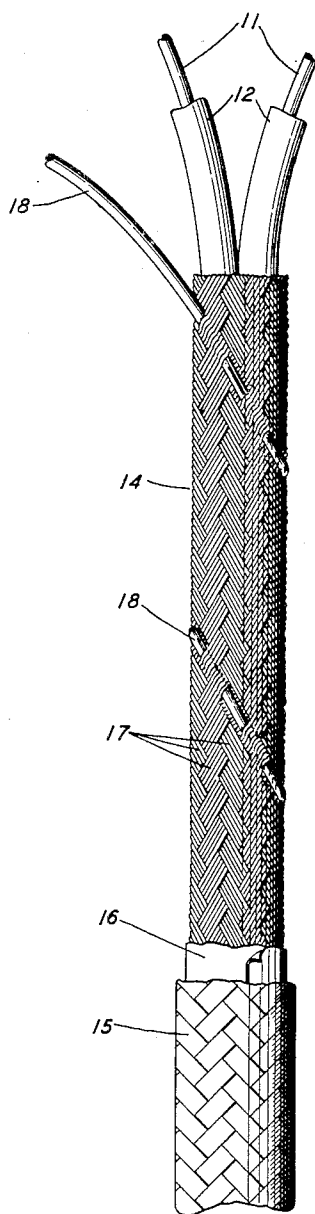
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A. J. WIER

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SHIELDED ELECTRICAL CONDUCTOR WITH GROUNDING STRAND

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INVENTOR  
A. J. WIER  
BY  
*[Signature]*

ATTORNEY

## UNITED STATES PATENT OFFICE

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SHIELDED ELECTRICAL CONDUCTOR WITH  
GROUNDING STRANDAnthony J. Wier, Cranford, N. J., assignor to Bell  
Telephone Laboratories, Incorporated, New  
York, N. Y., a corporation of New York

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This invention relates to electrical conductors and, more particularly, to shielded cables.

Heretofore, it has been common practice to provide conductors which may be subjected to the adverse effect of electrostatic or inductive interference, with conductive shields which, when flexibility is desired, are made up in a braided form. To attain maximum flexibility, the strands making up the braided shield comprise a plurality of fine wires, which, in connecting the shield to ground, must all be gathered together and connected, as by soldering, to some convenient grounding means, such as a lug. To avoid this time-consuming operation, it has been common practice to incorporate under the strands of the shielded cable a bare, large diameter wire which is in contact with the strands of the shield throughout the major portion of its length and may be employed as a grounding lug at the end of the shield. The use of a large diameter bare wire laid longitudinally under the braided shield has been found troublesome in the manufacture of cables containing wire insulated by soft insulation, such as polyethylene, since any pressure on the braid tends to push the ground wire through the insulation of the wire, thereby shorting the conductors to the shield and to ground.

One object of this invention is to facilitate the grounding of braided shields. A more particular object is to enable a ground wire to be employed with a braided shield while eliminating the danger of such a wire when the shield is subjected to external pressure to rupture the insulation of the underlying conductors.

One feature of this invention resides in providing a large diameter ground wire in place of one of the stranded braid strands of the shield, thereby maintaining the ground wire in excellent electrical contact with the strands of the shield and reducing the pressure which it exerts on the conductor insulation for a given applied force to the shield by increasing its effective supporting area to that of the entire shield.

Other objects and features of this invention will be more clearly understood from the following detailed description when read in conjunction with the accompanying drawing wherein the single figure shows in elevation a length of cable employing the shield constructed in accordance with the invention with portions of the various layers of the cable broken away to more clearly illustrate details of its construction.

In the form of cable shown in the drawing, a

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pair of conductors 11 having an insulating covering 12, which may be of polyethylene, is shielded by braid 14 constructed in accordance with this invention. An outer braided fiber sheath 15 of some material such as cotton is provided for the cable to insulate and protect the shield 14. Intermediate the sheath 15 and the shield 14 is a layer of crepe paper 16 which is applied by wrapping a crepe paper tape running longitudinally of the cable around the shield prior to the braiding of the sheath thereon. This tape permits the sheath to be readily slipped back at the end of the cable without catching on the metal braid of the shield, thereby facilitating the stripping and joining of the cable.

The shield 14, which may be constructed of an equal number of strands, half of which are wound in a clockwise direction and the other half in a counter-clockwise direction, is braided so that each strand passes under two and then over two of the strands running in the opposite direction. Each strand 17 of the braid is made up of a plurality of fine wires to provide flexibility in the completed cable. These fine wires, for example, may be No. 36 A. W. G. tinned copper, the tin coating providing high conductivity contact surfaces so that substantially all of the elements of the braid are interconnected electrically at the points of contact to form a substantially continuous shield.

The braided shield according to this invention differs in one way from those constructed according to prior practice in that a grounding means in the form of a large diameter wire 18 is woven into it in place of one of the multiple stranded braid strands. The grounding strand, which should have a high conductivity surface so that it is electrically connected to the other strands of the braid at each point of physical contact, may be, for example, a No. 24 A. W. G. tinned copper wire.

One advantage of incorporating the ground wire as a strand of the braid is to insure intimate contact with the other strands, thereby eliminating the need to gather all or a substantial portion of the fine wires making up the strands of the braid in order to connect them to ground. Further, the ground wire is of such size as may be conveniently grounded without the need of terminating it with a connector or lug. Mechanically, this structure is also advantageous, particularly where soft insulation, such as polyethylene, is employed on the shielded conductors. The alternative methods are to include a ground wire among the conductors or to spiral

it around with the conductor bundle. This would put a relatively large diameter wire against the soft insulation on the shielded conductors, which relationship with the application of a compressive force to the shield would eventually force the ground wire through the insulation of the conductors, thus shorting them to ground. Since in accordance with this invention, the ground wire is incorporated in the shield, its tendency to localize the effect of such compressive forces is removed, since the associated strands of the braid support it so that the effect of any external forces are distributed over the area of the shield.

In producing the shielded cable in accordance with this invention, it has been found that no material change is necessary in the manufacturing machinery. The major alteration in the equipment is the substitution of a single strand carrier in the shield braiding machinery to carry the ground wire braid strand for the ordinary multiple strand carrier.

What is claimed is:

1. A cable comprising a conductor, a layer of insulating material on said conductor, and a braided shield surrounding said insulating layer,

said shield consisting of a plurality of metallic strands, one of said braid strands consisting of a single strand, and the remaining braid strands each comprising a plurality of strands each of smaller cross section than said single strand.

2. A cable comprising a conductor, a layer of insulating material on said conductor, and a braided shield surrounding said insulated wire, said shield consisting of a plurality of metallic strands, one of said braid strands consisting of a relatively heavy wire and the remaining braid strands each comprising a plurality of metallic fibers, each of smaller cross section than said wire.

ANTHONY J. WIER.

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