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SHIELD CUTTER FOR SHIELDED CABLE

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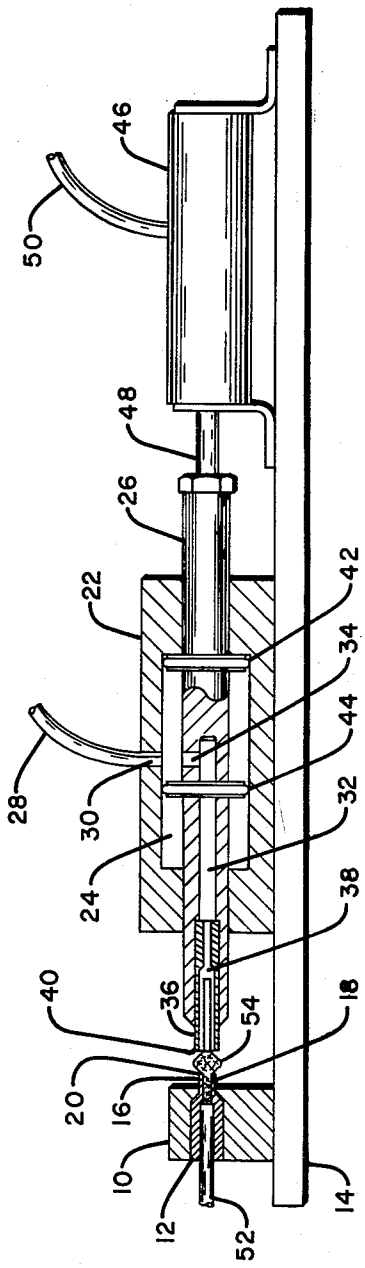


Fig. 1

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SHIELD CUTTER FOR SHIELDED CABLE

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This invention relates to apparatus for stripping the shielding sheath from a shielded cable.

A shielded cable consists of an inner electrical conductor surrounded by a coaxial layer of insulation which in turn is covered by a coaxial layer of braided shielding sheath of an electrically conductive material. In many instances where shielded cable is utilized to make electrical connections in electrical circuitry it is necessary to remove a portion of the shielding from the ends of the conducting cable without removing the same amount of insulating layer. Difficulties are often encountered in removing a length of shielding from a shielded cable utilizing a common cutting tool such as a knife or side-cutters. If the insulating layer is of a relatively soft material there is insufficient backing for the cutting edge so that the cutting pressure applied to the shielding nicks the insulation. Even with a relatively hard material as the insulating layer, the cutting tool will often cut into the insulating layer or weaken it. Additionally, it is difficult to obtain a clean cut, that is, one free of frayed edges. Furthermore, many present-day shielded cables have a fairly brittle material as the insulating layer so that bending the cable in the process of removing the prescribed length of shielding or nicking the insulating layer while cutting results in breakage of the insulating material.

In the instant invention the length of shielding to be cut or stripped is flared away from the insulating layer prior to the cutting operation so that the cutting edges of the cutting tool do not make contact with or apply any pressure to the insulating layer when in cutting engagement with the shield. Furthermore, the end of the length of cable to be stripped is guided so as to prevent any curvature or bending of the cable. The means provided in the instant invention for accomplishing this include an axially apertured male cutting die, an axially apertured female cutting die axially aligned with the male cutting die and movably displaced therefrom, means for applying pneumatic pressure to the end of the shielded cable to be stripped to flare the shielding away from the insulating layer, and means for placing the female and male cutting dies into cutting engagement with the flared shielding to effect the cutting operation.

Therefore, it is an object of this invention to provide a new and improved apparatus for stripping the shielding sheath from a shielded cable.

Another object of this invention is to provide apparatus for effecting a clean cut when stripping shielding from the end of a shielded cable.

Still another object of this invention is to provide apparatus for stripping the shielding from a shielded cable without harmfully affecting the inner insulating layer.

As will become more obvious in the subsequent detailed description of the embodiment of the instant invention, the means for effecting the improved cable stripping operation is readily adaptable to automation so that the cable stripping operation of a large number of cables can be performed at a rapid rate.

Therefore, still another object of this invention is to provide apparatus for stripping shielding from a shielded cable with a resulting substantial saving of time.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawing which is a cross-sectional view of one embodiment of apparatus utilizing the teachings of this invention.

In the figure there is shown a first support member 10 having an opening 12 extending there-through fixedly mounted on base member 14 by any convenient means, not shown. A cylindrical male cutting die 16 having an axial aperture 18 is attached to support member 10 in opening 12 with the cutting edge 20 extending beyond one side of the first support member 10. Second support member 22 with air chamber 24 is also fixedly mounted to base member 14 by means not shown. Support member 22 is a rectangular block and air chamber 24 is a cylindrical chamber. A bored cylindrical opening extends through the support member 22 through which rod member 26 is slidably engaged with the support member 22. Tubular support member 22 is coupled to another opening 30 extending from the top of support member 22 to air chamber 24. Pressurized air from a source not shown is conveyed into air chamber 24 via tube member 28 and opening 30. Two openings exist in rod member 26, one extending from the end of the rod member which is closest to the male cutting die longitudinally to approximately half the length of the rod member. A second opening in rod member 26, opening 34, allows passage of air from air chamber 24 into opening 32 so that the pressurized air entering via tube member 28 passes through the air chamber 24, opening 34 in rod member 26 and continues through opening 32 to reach the atmosphere. Cylindrical female cutting die 36 is mounted in rod member 26 coaxial with opening 32 and is further axially aligned with the male cutting die 16. Air seals 42 and 44 are fixedly mounted to rod 26 and are slidably engaged with the walls of chamber 24 so that pressurized air from the air chamber 24 is not allowed to leak around the rod member 26 and must pass to the outside air through opening 32 in the rod member 26. Alternatively, the slidable member on support member 22 need not be cylindrical and need not be enclosed by air chamber 24 although it would still require an air passage. The pressurized air would then be conveyed to the air passage by directly coupling member 28 to the slidable member.

A mechanical driving source 46 actuates longitudinal motion of rod 26 via drive shaft 48. Preferably the mechanical driving source 46 is a spring-biased air cylinder which drives the rod member 26 in support member 22 toward support member 10 when pressurized air is supplied thereto, for example, through tube member 50 from an air pressure source not shown, and has reciprocating motion to withdraw the rod member 26 to the position substantially as shown in the figure when the pressurized air in tube 50 is removed. Obviously, other types of mechanical driving sources, such as an electric motor, are useable and instead of spring-biasing for withdrawing the sliding member when the driving source power is removed a double acting driving source could be utilized.

The operation of the embodiment for this invention shown in the figure will now be described in relation to the stripping of the shielding layer of a coaxial cable. A coaxial cable, as is well-known, has a further layer of insulation covering the shielding sheath. Prior to stripping the shielding sheath from the end of the cable to a prescribed length, the outer insulating layer is removed to expose the shielded braid. The coaxial cable 52 is inserted through opening 12 and support member 10 and the length of the cable which is to be stripped of its shielding layer extends through the aperture 18 in male cutting die 16 longitudinally beyond the cutting edge 20 of the male cutting die towards the female cutting die 40 which is mounted in rod member 26. Pressurized air,

from a source not shown, passes through tubular member 28 which is coupled to opening 30 in support member 22 into air chamber 24 and continues through openings 34 and longitudinally extending opening 32 in rod member 26 through the aperture 38 of the female cutting die 36. The air pressure applied to shield 54 causes the shielding to flare away from the inside insulating layer in a bowed manner as shown in the figure. It should be noted that the figure includes an illustration of a length of the cable extending into the aperture 38 from which the shielding sheath has already been flared by the air pressure. With the shielding sheath flared as shown, prressurized air applied to air cylinder 46 causes its drive shaft 48 to actuate mechanical motion of rod member 26 in a direction such that the female cutting die is driven toward the male cutting die. When the respective cutting edges 20 and 40 of the male die 16 and female die 36 come into cutting engagement with the flared shielding 54, the shielding is cut and thereby stripped from the cable. Both of the cutting edges of the dies make contact only with the shielding and not with the insulating layer and, therefore, there is no possibility of cutting or adversely affecting the inside insulating layer. After the stripping operation, the air pressure applied to air cylinder 46 is removed and a biasing spring, not shown, in the air pressure cylinder withdraws the rod member 26 so that the male and female dies are no longer in cutting engagement with the shield and the material stripped by the cutting operation can be removed. It should be understood, of course, that through the above described a stripping operation of coaxial cable having an outer layer of insulating material that this invention is not so limited and shielding without the outer insulating layer can be stripped in the same manner as described.

Preferably, the pressurized air to flare the shielding and that applied to the driving means 46 is from a common source so that they are concurrently applied to effect the stripping operation. Additionally, although not shown, a guiding member may be inserted in the aperture 38 of the female cutting die in order to properly align the end of the cable which is to be stripped with the aperture through which the pressurized air passes so that more efficient application of the pressurized air results in a uniform flaring.

It is understood that suitable modifications may be made in the structure as disclosed provided such modifications come within the spirit and scope of the appended claims. Having now, therefore, fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. Apparatus for stripping the shielding sheath from a length of shielded cable, comprising: an axially apertured male cutting die; an axially apertured female cutting die axially aligned with said male die and axially displaced therefrom on a base member; the length of shielded cable to be stripped extending through said male die aperture into a space between said dies; first means operatively associated with said female die for applying pneumatic pressure to said extended cable length for flaring the shielding away from the cable; and second means operatively connected to said first means for bringing said male and female dies in cutting engagement with said flared shielding.

2. Apparatus for stripping the shielding sheath from a length of shielded cable, comprising: a support member having an opening extending there-through for receiving a shielded cable; an axially apertured male cutting die mounted on said support member at one end of said opening and in axial alignment with said opening, a length of shielded cable to be stripped extending beyond the cutting edge of said male die; an axially apertured female cutting die axially aligned with said male die and displaced therefrom in the direction of said extending cable length; means for applying pneumatic pressure to said extending cable length to flare its shielding away from the cable; and means for placing said male and female dies in cutting engagement with said flared shielding.

3. Apparatus as in claim 2 wherein said pneumatic pressure applying means comprises a pressurized air conveying chamber in axial alignment with said dies.

4. Apparatus for stripping shielding sheath from a shielded conductor, comprising: a male die having a cutting edge and an axial aperture for receiving a shielded conductor, at least a portion of said shielded conductor extending longitudinally beyond the cutting edge of said male die; a female die having an axial aperture longitudinally displaced from and axially aligned with said male die, said dies being mounted on a base member; an air pressure conveying chamber operatively associated with said female die having an opening coaxial with said die apertures for conducting pressurized air along said longitudinally extended portion of said shielded conductor such that air pressure flares said extended shielding away from said cable; and means cooperating with said chamber for placing said female and male dies in cutting engagement with said flared shielding.

5. Apparatus for stripping the shielding sheath from a length of shielded cable, comprising: a first support member, fixedly mounted on a base member, having an opening extending there-through for receiving a shielded cable; an axially apertured male cutting die mounted on said support member at one end of said opening and in axial alignment therewith, the length of shielded cable to be stripped extending beyond the cutting edge of said male die; a second support member fixedly mounted on said base member having an opening extending therethrough in substantial axial alignment with said first support member opening and displaced from said first support member in the direction of said extending cable length; a slidable member coupled longitudinally through said second support member opening, said slidable member including an air passage chamber having an axial opening at the end of said slidable member closest to said extending shielded cable; an axially apertured female cutting die mounted in said slidable member at said air passage opening; means for applying pressurized air through said air passage chamber opening and said female die aperture to said extending shielded cable for flaring the shielding away from said cable; and means for longitudinally driving said slidable member in a direction towards said first support member such that said male and female dies are placed in cutting engagement with said flared shielding.

6. A method for stripping shielding from an end of a length of cable having an inner conductor, an inner layer of insulation and an outer shielding sheath, comprising the steps of: positioning the end of the length of shielded cable to be stripped to substantially zero radius of curvature of said length; applying pressurized air to said positioned cable length end in a longitudinal direction for flaring the shielding away from the cable; and cutting the flared shielding substantially concentric with the inner conductor of said cable.

7. A method of stripping the outer metallic shielding from an end of a coaxial cable, comprising the steps of:

(*a*) passing the end of the cable to be stripped through an aperture in a circular male cutting die having a cutting edge so that a length of cable extends beyond said aperture;

(*b*) applying pressurized fluid in a longitudinal direction to said end of the cable to flare the shielding away from the cable to a degree such that the flared portion circumferentially extends beyond the cutting edge of the male die;

(*c*) and passing a female die over the extended length of cable into cutting engagement with the flared shielding and the male die.

8. Apparatus for stripping shielding from an end of a length of cable having an inner conductor, an inner

layer of insulation and an outer shielding sheet, comprising:

means for applying pressurized air to said cable length end in a longitudinal direction for flaring the shielding away from the cable;

and means for cutting the flared shielding substantially concentric with the inner conductor of said cable.

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