Jan. 12, 1937. J. W. OLSON 2,067,333

MEANS FOR PRODUCING INSULATED CONDUCTORS

Original Filed Nov. 14, 1935 2 Sheets-Sheet 1

Fig. 1.

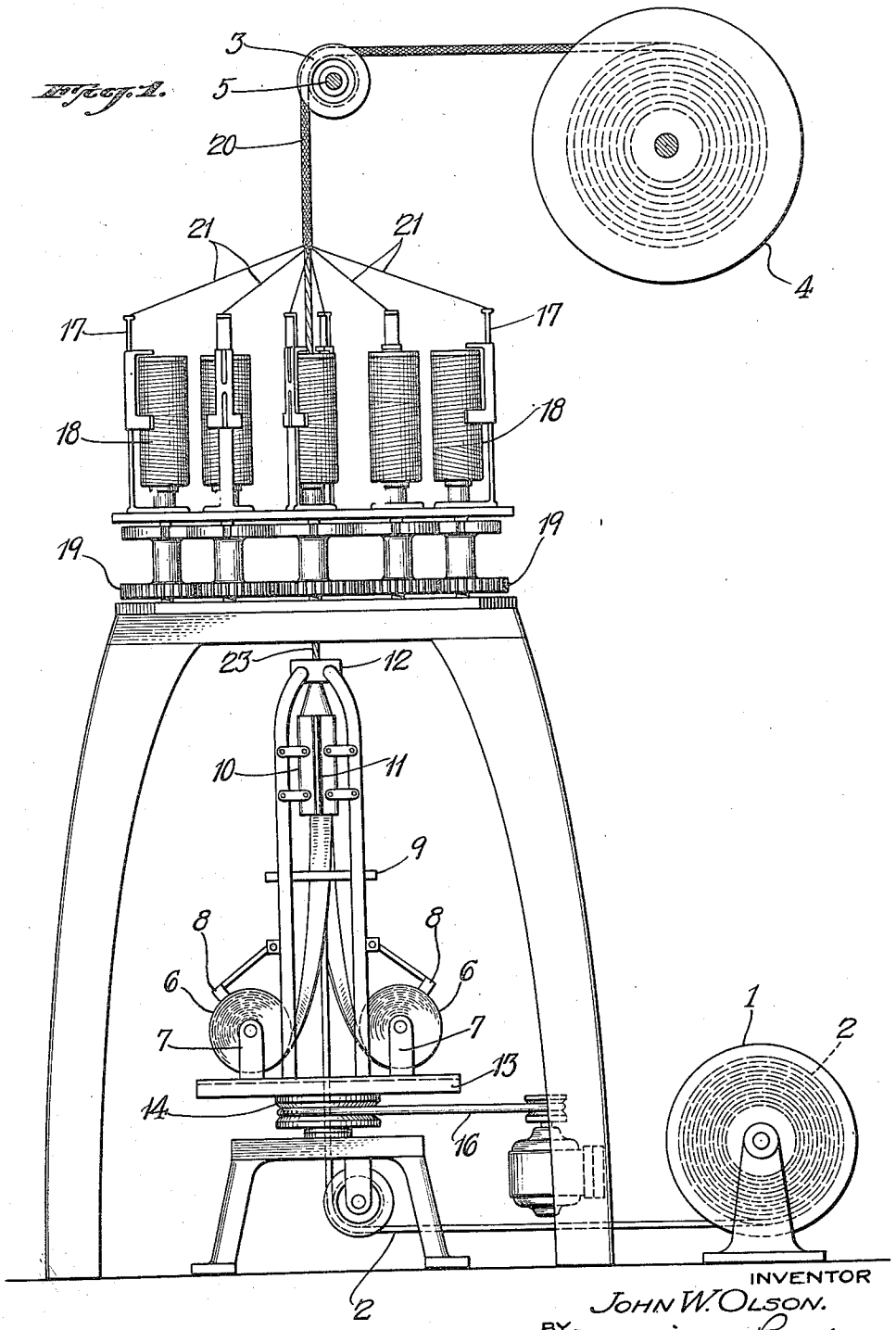

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Fig. 1.

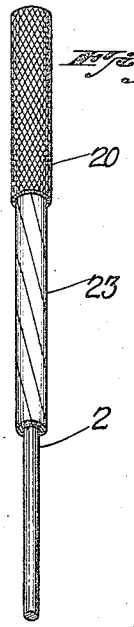


Fig. 2.

Fig. 5.

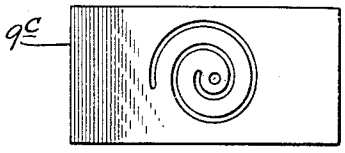


Fig. 3.

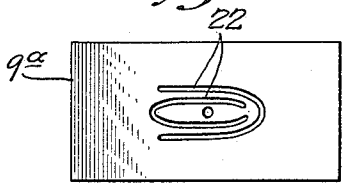


Fig. 6.

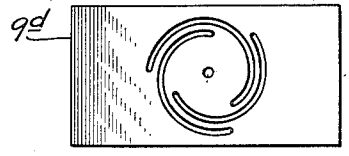


Fig. 4.

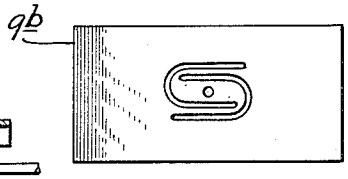


Fig. 7.

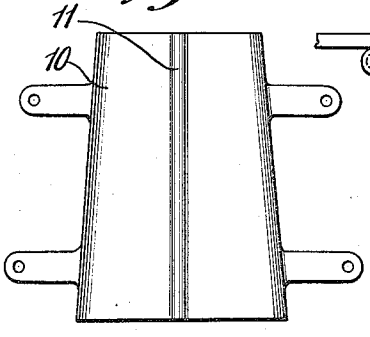
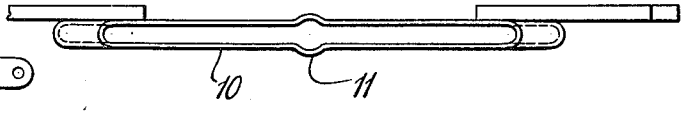


Fig. 8.



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Patented Jan. 12, 1937 2,067,333

UNITED STATES PATENT OFFICE

2,067,333

MEANS FOR PRODUCING INSULATED CONDUCTORS

John W. Olson, Hastings-on-Hudson, N. Y., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware

Original application November 14, 1935, Serial No. 49,689. Divided and this application April 9, 1936, Serial No. 73,415

8 Claims. (Cl. 96—3)

The present invention is a division of my copending application Serial No. 49,689, filed November 14, 1935. In the said application, I have described a novel insulated conductor and method and means for producing the same. The present invention relates to the novel combination of interdependent cooperating parts hereinafter more fully described, illustrated and claimed.

The accompanying drawings illustrate one embodiment of the invention.

In the drawings—

Fig. 1 is a side elevation illustrating the improved mechanism; Fig. 2 is a detail of the assembly shown in Fig. 1; Fig. 3 is a detail of a guide plate suitable for use in the assembly shown in Fig. 1; Fig. 4 illustrates a second form of guide plate; Fig. 5 shows a third variation of the same plate; Fig. 6 discloses a fourth design for the guide plate; Fig. 7 is an elevation of the folding tube; Fig. 8 is a top plan view of the folding tube of Fig. 7; Fig. 9 illustrates the finished product.

Referring in detail to the drawings, 1 represents a reel carrying a supply of wire 2, which is to be covered. Movement of the wire may be secured by a capstan 3 mounted, in this case, in an overhead position on the axle 5. The covered conductor is taken up on the reel 4. When paper is to be used as the fibrous covering, it is most conveniently supplied in the form of rolls 6, which are mounted on appropriate brackets 7 so that the material can be drawn off as needed. In order to prevent the supply of paper from unrolling more rapidly than it is needed, brakes 8 bearing on the outer surfaces of the rolls may be provided to retard their motion.

After leaving the rolls, the paper is drawn through the guide plate 9 which is arranged to bring the strips in proper position relative to one another as well as to bend the material prior to the time it passes through the folding tube 10. The form of the guide plate will vary according to the number of paper strips employed, and to a large extent, the advantages of this method are bound up in this number and its design.

In the preferred form, two strips of fibrous material are used. This gives the degree of flexibility necessary if the covering is to be distorted without rupture. A plate 9a is illustrated in Fig. 3 and the large degree of overlap secured by this arrangement may be clearly seen by the position of the slots 22 through which the strips are fed. For example, if the strips used are each four inches in width, the overlap at each end should be approximately two inches. It is not essential that the opposite edges of a strip be either adjacent to the conductor or directly under the braid as a plate of slightly different design 9b may be made up as illustrated in Fig. 4. This method of application is not limited to two strips, however, as the plate 9c shown in Fig. 5 will accommodate a single strip, if this is desired. Or a plate 9d shown in Fig. 6 may be used, if three strips are employed. It will, of course, be understood that appropriate variations will be made in the number of rolls and roll carriers depending on the number of strips employed.

After having been positioned by the guide plate, the strips pass to the folding tube 10. This member serves two purposes, first it flattens the large tube of paper into a single plane so that it is ready for twisting and secondly, it maintains the conductor or wire in the center of the paper so that the covering of paper will be substantially equal on all sides, while retaining a maximum degree of overlap. The form of the folding tube is illustrated in Fig. 7 and it will be seen that a portion of the tube along the center line has been flared out to form an enclosed section 11 designed for the accommodation of the wire. This construction, which maintains the position of the wire in the center of the paper is clearly illustrated by Fig. 8, which is a top plan view of the tube.

A smoothing die 12 presses the paper into a uniform circular cross-section as the wire and paper are advanced through it.

A snug fit between the paper jacket and the conductor is secured by rotating the entire paper supply assembly comprising the supply rolls 6, the guide plate 9, the folding tube 10 and the smoothing die 12. By this operation, the paper is drawn down upon the wire and not merely pressed into position. So that the assembly may be freely rotated, the base 13 is mounted on a turntable 14 which rotates upon a ball bearing 15. Any appropriate motor or other source of power may be used to actuate the mechanism for application of the paper, for example, through the medium of a belt 16 or through suitable gearing to the braider drive.

The braiding mechanism is of conventional design and the usual essential parts, such as carriers 17, spools 18, and horn gears 19 will be recognized in the drawings. The braided cover 20 is formed from a multiplicity of strands 21 and serves to retain the fibrous jacket in place both while in service and during subsequent handling consequent to manufacture and installation.

The mechanism described is peculiarly well

suited for carrying out the method disclosed in the hereinabove identified parent application. From the detailed disclosure, it will be apparent that as the conductor is advanced longitudinally, the strips of fibrous material, such as paper or the like are fed in a generally longitudinal direction, that is in the same direction as that in which the conductor to be covered is advancing. The thus longitudinally advancing strips are flexed transversely of their width and are positioned relatively to one another in an overlapping relationship. At the same time, these strips are being rotated with respect to the advancing conductor and the net result of this flexing, overlapping, advancing and rotating motion is to simultaneously crumple and interconnect the plurality of fibrous strips while at the same time twisting and compacting them around the conductor.

The product made by the improved mechanism herein described comprises a conductor, either solid or stranded, a layer of closely fitting fibrous material helically twisted about the axis of the conductor and an outer jacket of braided strands or threads. The arrangement of the component parts is illustrated in Fig. 9, in which the conductor 2, twisted fibrous insulation 23 and braid 20 are indicated.

While paper has been used as illustrative of the type of material suitable for the body of the insulation, it will be readily appreciated that any substance of a fibrous nature which may be made up in the form of a strip is adaptable to the purposes of this invention. Felt or fabric may be mentioned by way of illustration.

The use of paper as the body of insulation has been suggested prior to this time, but in all cases the material has been applied as a relatively narrow strip wound about the conductor. As compared with the product of this invention, the paper applied in the old manner lacks flexibility and presents a relatively short path to the conductor between openings in the solid dielectric even when a considerable degree of overlap has been employed between successive layers.

Furthermore, while a decrease in the width of strip employed will increase the flexibility of the cover, the length of path through openings is correspondingly shortened. Conversely, higher dielectric strength is gained only at the expense of flexibility.

As compared to an insulating covering which comprises a substantially uncompacted bulky filler such as cotton sliver under a braid, the method herein described offers two distinct advantages, namely, a marked increase in the dielectric value of the material immediately surrounding the conductor and, secondly, the assurance that the conductor will be surrounded by a concentric layer of insulation. The latter condition is extremely difficult to achieve when the fillers possess only a slight degree of mechanical strength, or are applied with little or no overlap by conventional methods.

While I have described quite precisely certain specific means for covering conductors, it is to be understood that the drawings and description are to be interpreted in an illustrative rather than a limiting sense since various modifications may be made in the spirit and scope of the invention as expressed in the appended claims.

What I claim is:

1. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing wire, means carried by said supporting means carrying a supply of strip material, forming means for bending said strip material transversely about the advancing conductor and means supported from said rotary support for converging said strip material toward the conductor.

2. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing wire, means carried by said supporting means carrying a plurality of supplies of strip material, forming devices for positioning said strip material in overlapping relationship, means supported from said rotary support for converging said strip material toward the conductor and a die also carried by said rotary support for compressing such converged strips about the conductor.

3. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing wire, means carried by said supporting means carrying a plurality of supplies of strip material, a forming device with overlapping apertures therein for positioning said strip material in overlapping relationship, supports for said device carried by said rotatable supporting means and rotating means above said forming device for compressing the strips about the conductor.

4. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing wire, means carried by said supporting means carrying a plurality of supplies of strip material, a plate having a central opening therein through which the conductor to be covered travels and having overlapping guide slots for positioning said strip material in overlapping relationship, a flattened former rotatable with said supporting means for guiding the strip material in overlapping relationship, and a die with a mouth flaring toward said former and rotating with said supporting means.

5. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing wire, means carried by said supporting means carrying a plurality of supplies of strip material, means for transversely bending a plurality of bodies of said strip material in overlapped relationship prior to their being twisted about the conductor, said means being rotatable with said supporting means and a rotatable means effective for compressing the overlapped strips about the conductor.

6. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing wire, means carried by said supporting means carrying a plurality of supplies of strip material, standards carried by said supporting means, means carried by said standards for transversely bending the strips of material in overlapping relationship about the advancing conductor, a flattened tubular member carried by said standards having an enlarged central portion effective to maintain the conductor substantially central with the overlapped strips while the latter are twisted about the conductor as said supporting means rotates.

7. Wire covering apparatus including in combination means for advancing a conductor to be

covered, supporting means rotatable about the axis of the advancing conductor, a plurality of supplies of strip material carried by said supporting means, means for folding such strip material in longitudinally overlapping relationship about the advancing conductor and guide means rotating with said supporting means effective to maintain the overlapped strips in such relative positions that the longitudinal fold in each strip is spaced a substantial radial distance from the axis of the conductor, whereby rotation of said guide means is effective to twist the overlapping folded strips in a relatively long helical lay around the advancing conductor.

8. Wire covering apparatus including in combination means for advancing a conductor to be covered, supporting means rotatable about the axis of the advancing conductor, a plurality of supplies of strip material carried by said supporting means, means for folding such strip material in longitudinally overlapping relationship about the advancing conductor and guide means rotating with said supporting means effective to maintain the overlapped strips in such relative positions that the longitudinal fold in each strip is spaced a substantial radial distance from the axis of the conductor, whereby rotation of said guide means is effective to twist the overlapping folded strips in a relatively long helical lay around the advancing conductor and braiding mechanism effective to form an outer jacket of interconnected strands about the overlapped twisted strips.

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