

May 14, 1940.

A. C. NYSTROM ET AL
STRAND HANDLING APPARATUS

2,200,933

Filed Sept. 1, 1937

2 Sheets-Sheet 1

FIG. 1.

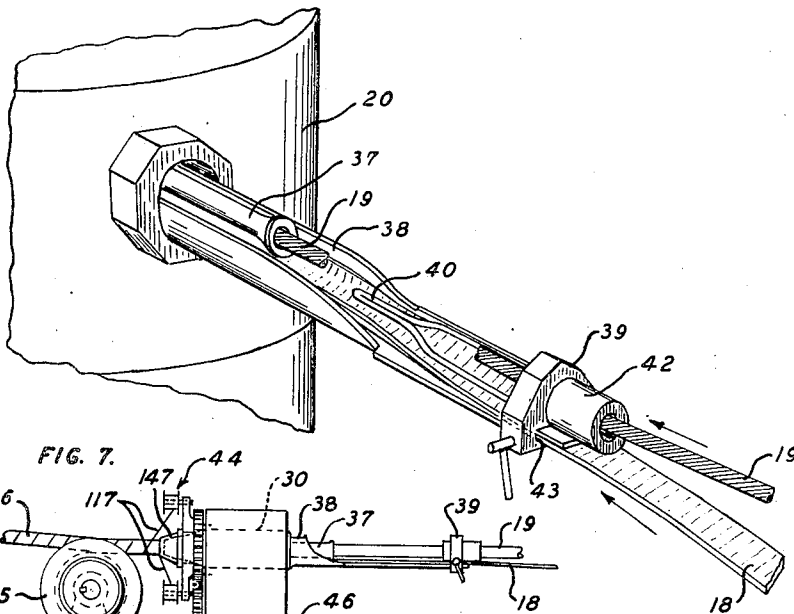


FIG. 7.

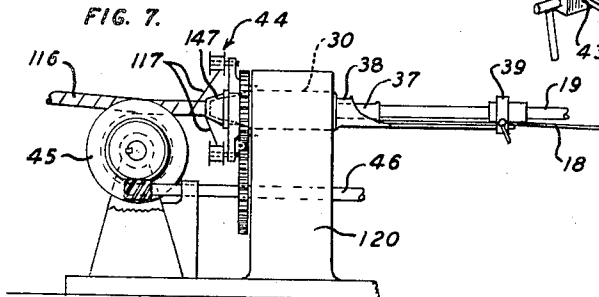
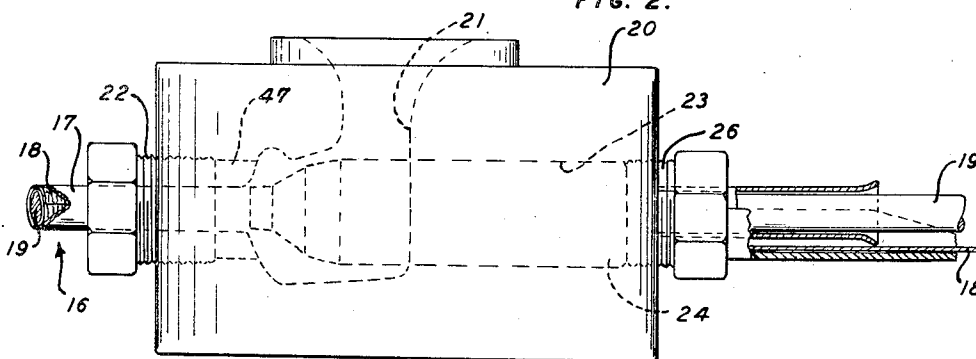


FIG. 2.



INVENTORS
A. C. NYSTROM
L. O. REICHELT
BY
E. R. Nowlan
ATTORNEY

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FIG. 3.

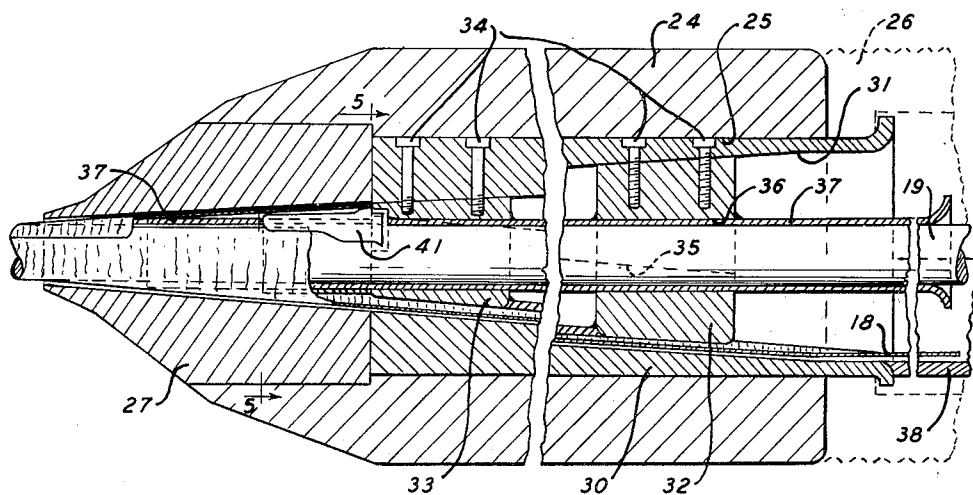


FIG. 4.

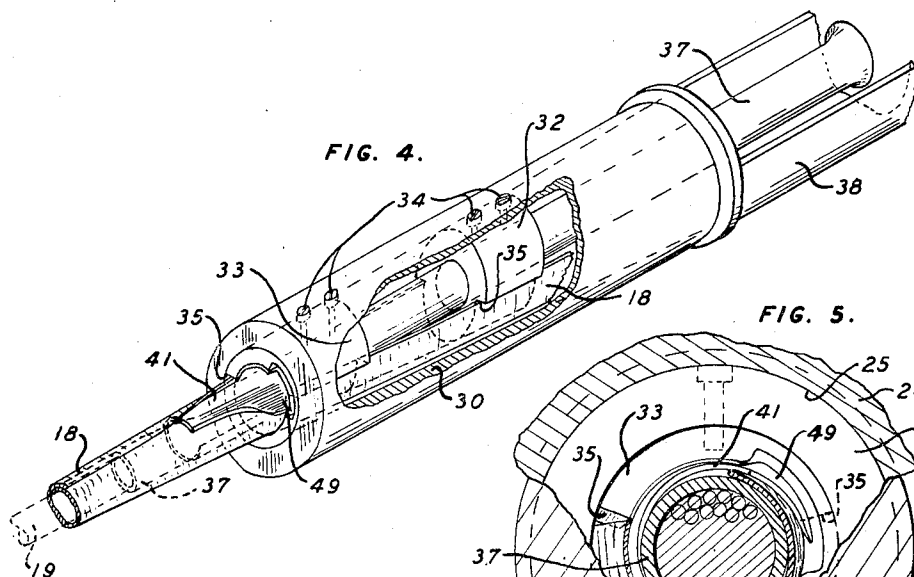


FIG. 5.

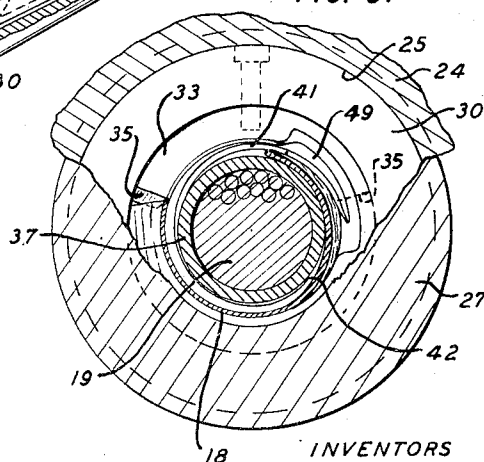
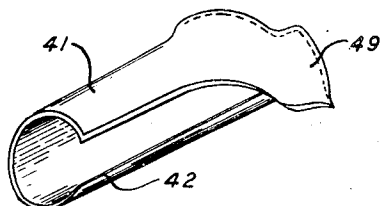


FIG. 6.



INVENTORS
A. C. NYSTROM
L. O. REICHEL
BY

E. R. Nowlan
ATTORNEY

UNITED STATES PATENT OFFICE

2,200,933

STRAND HANDLING APPARATUS

Axel C. Nystrom, Rutherford, and Lester O. Reichelt, Cranford, N. J., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application September 1, 1937, Serial No. 161,976

4 Claims. (Cl. 173-244)

This invention relates to strand handling apparatus and more particularly to an apparatus for folding a tape longitudinally of itself about a core strand and forming a sheath over the whole.

In the manufacture of certain kinds of electrical conductor cable, a core strand comprising one or a plurality of insulated conductors is provided with an insulating sheath in the form of a crepe paper tape applied longitudinally of itself to the core and folded into a tube about the core, and then a metal protective sheath is formed thereover, ordinarily by extrusion.

It is found that in this process it is eminently desirable to control the precise form and successive changes in cross-sectional form of the tape as it is applied to and folded about the core, and to continue this control up to a point as near as may be practicable to the point where the extruded sheath is being formed on the tape sheathed core. The necessity for any auxiliary binding of the tape sheath between its forming and the application of the metal sheath may thus be obviated; and also other difficulties arising out of lack of complete control may be avoided.

An object of the present invention is to provide a guide and forming device for folding a tape longitudinally of itself to form a sheath for a core while maintaining accurate control of the position and cross-sectional form of the tape at all points in the forming process.

With the above and other objects in view, one embodiment of the invention contemplates a core and tape guide for insertion into the core tube of an extrusion press, the guide being provided internally with a passage for a core and externally with means to gradually convert a tape passing thereover from a flat form into a tube while controlling the motion and form of the tape and its position on the core.

Other objects and features of the invention will appear from the following detailed description of one embodiment thereof taken in connection with the accompanying drawings in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a broken view in perspective of the entrance side of an extrusion press containing a guide constructed in accordance with the invention;

Fig. 2 is a partial view thereof in side elevation;

Fig. 3 is an enlarged detached broken view in longitudinal central vertical section of the core tube and guide;

Fig. 4 is a broken detached perspective view on a smaller scale of the guide;

Fig. 5 is a sectional view on the line 5-5 of Fig. 3;

Fig. 6 is an enlarged detached view in perspective of the tape folding member, and

Fig. 7 is a diagrammatic representation of a modified form of the invention.

In the embodiment of the invention herein disclosed, an extrusion press of conventional construction for sheathing an electrical conductor core, has an extrusion chamber block 20 formed with an extrusion chamber 21, an exit passage in which is mounted the customary extrusion die 47 held in place by a supporting locking nut 22, and a passage 23 to receive a core tube body 24. The core tube body has a central longitudinal bore 25 and is locked in place by the nut 26.

A core strand 19 and a tape 18 enter the press from the rear, pass through the extrusion chamber and die, and emerge at the front of the press enclosed in a seamless extruded sheath 17, ordinarily of lead or lead alloy, as the completed cable 16. In so doing, means must be provided to fold the tape 18 accurately and closely, longitudinally of itself, about the core and to maintain it so until the lead sheath is formed thereover.

A guide body 30, having a generally cylindrical outer surface, fits closely into the bore of the core tube 24 and abuts at its front end against the rear wall of the core tube nose 27. This nose is externally of the usual conoidal form. The guide body 30 and the nose 27 are formed with axial bores which together provide a single axial conical passage 31 tapering generally from nearly the full diameter of the body 30 at the rear to very little more than the diameter of the core 19 with the tape 18 wrapped tightly about it, at the front.

One or more (here two) blocks 32, 33, spaced conveniently apart, are located within the body 30 in the bore or passage 31. Each of the blocks is formed as to its upper part with a conical surface fitting closely against the surface of the passage 31, and is held in place by a suitable number of screws 34. The lower part of each block 32, 33 is also conical of the same taper as the passage 31 but of smaller diameter, so as to leave a transversely arcuately curved passageway between the lower part of each block and the inner wall of the body 30. Thus there is a guide shoulder 35 on each side of each block between the upper and lower parts of the block. These shoulders 35 are not parallel to the general axis of the body 30 but incline upwardly and for-

wardly at an angle predetermined by the course to be followed by the edges of the tape 18.

The blocks 32, 33 are further formed with central axial cylindrical bores 36 in which is rigidly mounted a core guide tube proper 37, a substantially cylindrical tube of diameter barely large enough to permit the core 19 to pass easily through, and projecting for some distance beyond both ends of the body 30.

An auxiliary trough like tape guide 38 is mounted on the rear end of the body 30 and extends out rearwardly therefrom. Near its flat rear end the guide 38 carries mounted thereon a block 39 formed in its lower part with a straight horizontal slot 43 to pass the tape 18 and having a short tube 42 in its upper part to pass the core 19. A spring tongue 40, mounted in the block 39 serves to press the tape passing thereunder down into the beginning of the trough portion of the guide 38.

A little back from the front end of the tube 37 and on the outer surface thereof is mounted a tape folding member 41. This has a generally tubular and spiral body with a longitudinal slot. The lower edge 42 of the slot is bevelled down and lies snugly against the tube 37 and is welded thereto. The lower part of the body follows the tube and lies snugly against it, but the upper part is formed to depart gradually from the tube and leave a space to receive one edge of the tape 18 between the tube 37 and the body 41, while the other edge of the tape lies outside of the body 41 as best shown in Figs. 4 and 5. At the rear corner of the upper edge of the body, this is provided with an enlargement in the shape of an extended wing 49 to ensure that the underfolded edge of the tape will feed properly under the guide 41. Ordinarily the tube 37 will extend forwardly into the conical passage of the nose 27 until there is barely sufficient space between the nose and the tube to allow the tape to pass.

In operation, the core 19 feeds directly into and through the tubes 42 and 37. The tape 18 passes through the slot 43 which is barely long and wide enough to pass the tape and so provides the first control of the tape, ensuring that it is properly oriented and located before any forming of the tape is done. Thence the tape passes under the forming spring 40 and over the first arcuately curved part of the trough 38. It is to be remembered that the tape 18 which may consist of one or more layers may in some instances be of dimensions of the order of 2 to 3 inches wide by .007 to .010 inch thick before crimping, of peculiarly tough and even stiff material; and while fairly flexible and even extensible longitudinally, because of the transverse crinkling or creping, it may be quite stiff transversely and difficult to bend and form in a uniform manner. Hence the slot 43, the spring 40 and the trough 38 are provided to coact to ensure that the first yielding of the tape to the forming forces shall be substantially along the center line of the tape.

Thence the tape passes on into the conical walled passage 31 being held snugly against the wall by its own stiffness and the outer surface of the lower halves of the blocks 32, 33 under which it passes. At the same time any tendency to spiral distortion is prevented by the shoulders 35 against which the edges of the tape ride. Finally the left edge of the advancing tape (right edge in Fig. 5 which faces backwards) passes under the wing 49 of the folding member 41, while the other edge passing thereover is folded down thereon by the bore 31 in the nose 27. The tape is now com-

pletely tubular with one edge overlapping the other, and passing off the front end of the tube 37 is finally snugged down on and around the core 19 by the nose 27 just before it emerges from the nose to be met by the metal in the extrusion chamber. As the forward tip of the nose is customarily at or within the entrance to the extrusion die, the forming of the metal sheath over the tape begins substantially as the tape sheathed core issues from the nose 27 and before any loosening of the tape can occur.

Ordinarily, all the propelling force required to advance a core through an extrusion sheathing press is provided by the extrusion process itself. The extruded sheath being formed and pushed out of the press grips and drags the core along. This produces tensile stresses particularly in the tape as it is being formed and applied to the core, which may be met in an unpredictable and incalculable fashion by the transversely and minutely irregularly crimped or crinkled crepe material of the tape. The tape therefor is liable to tend unpredictably to yield more on one side than the other and thus to strive to become twisted and to move helically. In the construction disclosed it is evident that the tape can neither twist nor shift laterally once it enters the first block 32, and will be fed to this block 32 predisposed to accept the guidance and control imposed within the body 30 because of the preliminary forming by the spring 40 and trough 38. The blocks 32, 33 coacting with the conical wall of the passage 31 bring the tape gradually into deeper and narrower U-shaped forms, while the shoulders 35 force the tape to remain parallel to the core.

The edge control of the tape is relinquished only when the tap passes from the last block 33 into the immediately adjacent folding member 41 and is replaced within a very short distance by the friction against each other of the overlapped edges of the tape between the tube 37 and the nose 27 and then at once by the permanently immobilizing grip of the extruded metal sheath 17.

Another application of the invention is disclosed diagrammatically in Fig. 7. Here the guide tube 30 with all the inner appurtenances 32, 33, 37 and 41 and the outer appurtenances 38, 39, 40, 42 and 43, described above, is mounted in a stationary pedestal 120, and the core 19 and tape 18 pass therethrough to be combined as above described. Instead of an extruded sheath, a retainer wrapping of strands 117 is served over the folded tape by means of a serving head generally indicated at 44 and of any suitable construction. A rotary compacting die 147 is mounted on the serving head to maintain the closure of the tape about the core until the wrapping 117 is applied. The served cable 116 is propelled through the apparatus by a capstan 45, both the capstan and the serving head being driven by appropriate gearing, as shown, from a drive shaft 46.

The embodiments of the invention herein disclosed are illustrative only and may be modified and departed from in many ways without departing from the spirit and scope of the invention as pointed out in and limited solely by the appended claims.

What is claimed is:

1. In a strand handling apparatus, a tube to guide longitudinal advancement of a core strand, a guide having a straight tape control slot to center a tape with respect to the tube prior to the bending of the tape longitudinally of itself about the tube, a support for the tape leaving the guide having a flat portion adjacent the guide merging

into a curved portion spaced from the guide, an element engaging the tape and positioned to press the central part of the tape into engagement with the support adjacent the curved portion thereof, and means to complete the bending of each portion of the tape about the tube prior to the passage of the corresponding portions of the core strand from the tube and continue the bending of the tape about the core strand.

2. In a strand handling apparatus, a tube to guide longitudinal advancement of a core strand, a guide having a straight tape control slot to center a tape with respect to the tube prior to the bending of the tape longitudinally of itself about the tube, a support for the tape leaving the guide having a flat portion adjacent the guide merging into a curved portion spaced from the guide, an element engaging the tape and cooperating with the curved portion of the support to cause central longitudinal bending of the tape, and means to complete the bending of each portion of the tape about the tube prior to the passage of the corresponding portions of the core strand from the tube and continue the bending of the tape about the core strand.

3. In a strand handling apparatus, a tube to guide longitudinal advancement of a core strand, a guide having a straight tape control slot to center a tape with respect to the tube prior to the bending of the tape longitudinally of itself about the tube, a support for the tape leaving the guide having a flat portion adjacent the guide merging into a curved portion spaced from the guide, an element engaging the tape and cooperat-

ing with the curved portion of the support to cause central longitudinal bending of the tape, a body having a conical passage therethrough to receive the centrally bent tape from the support and to continue bending the tape about the tube, means to complete the bending of each portion of the tape about the tube prior to the passage of the corresponding portions of the core strand from the tube and continue the bending of the tape about the core strand, and means interposed between the support and the last mentioned means to maintain the central bending of the tape about the tube.

4. In a strand handling apparatus, a tube to guide longitudinal advancement of a core strand, a guide having a straight tape control slot to center a tape with respect to the tube prior to the bending of the tape longitudinally of itself about the tube, a support for the tape leaving the guide having a flat portion adjacent the guide merging into a curved portion, an element cooperating with the curved portion of the support to bend the tape along a central longitudinal line and about the tube, a body having a conical passage therethrough to receive the centrally bent tape from the support and to continue bending the tape, a spirally tubular member coacting with the core strand guide tube to cause the edges of the tape to overlap over the tube, and means adjacent the entrance of the spiral tubular member to maintain the central bending of the tape.

AXEL C. NYSTROM.
LESTER O. REICHELT.