Dec. 3, 1929. J. W. CHANNELL 1,737,640

MACHINE FOR PRODUCING INSULATING SLEEVES

Filed Feb. 7, 1928 3 Sheets-Sheet 1

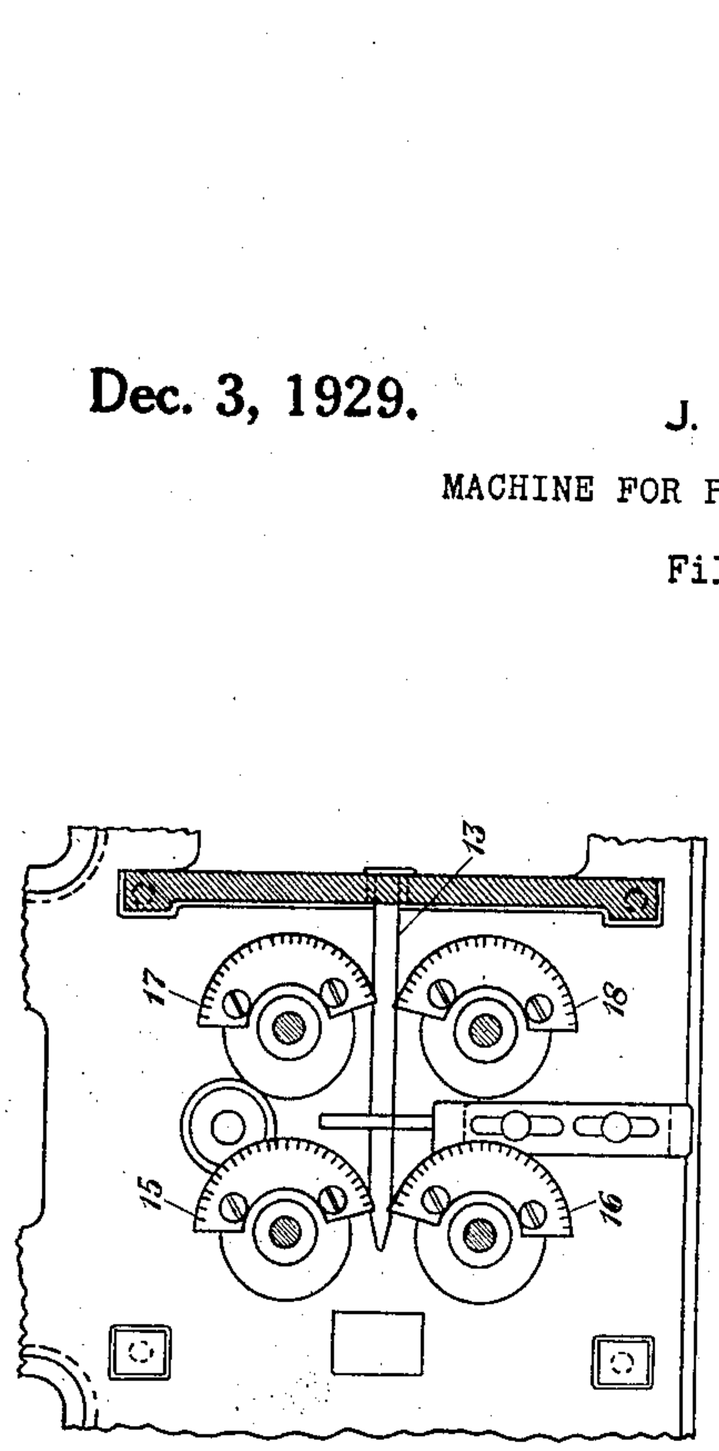

Fig. 4

Fig. 1

Fig. 5

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MACHINE FOR PRODUCING INSULATING SLEEVES

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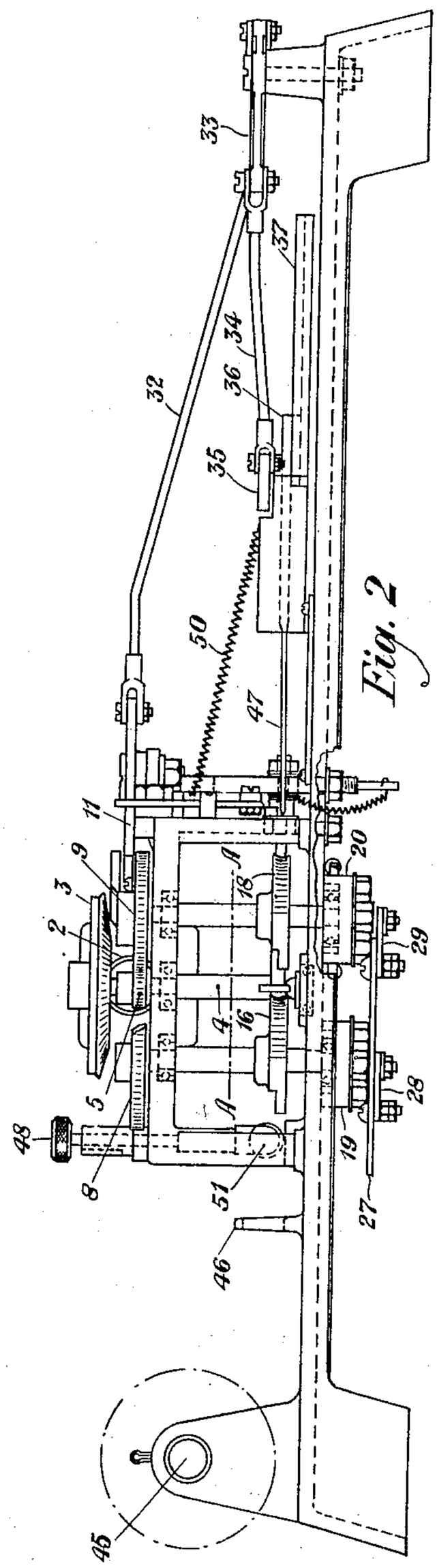

Fig. 2

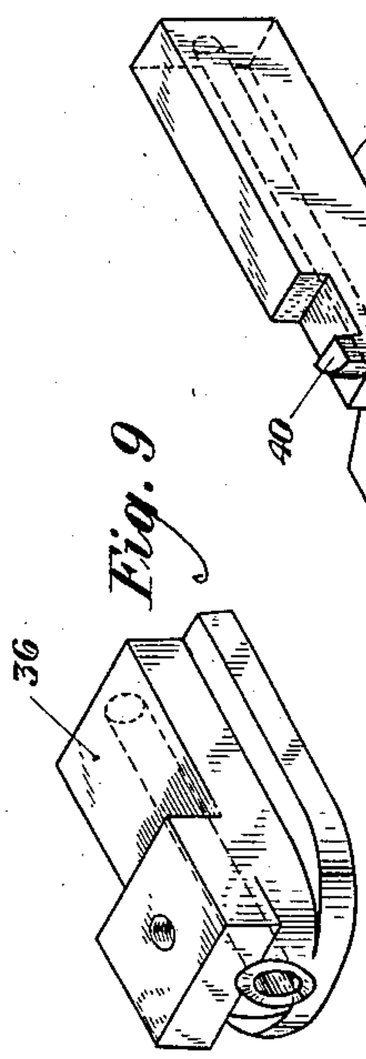

Fig. 9

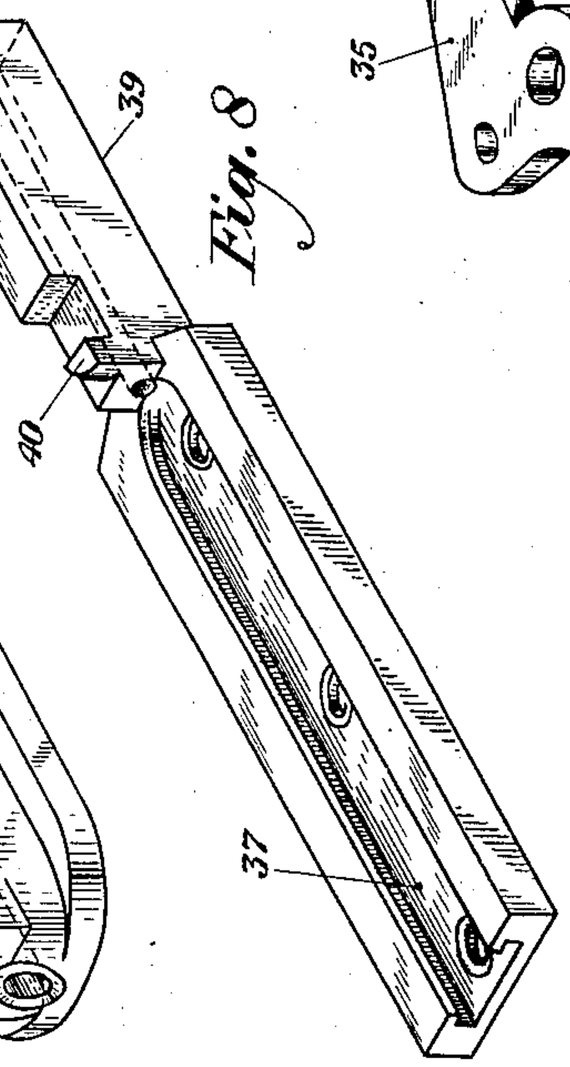

Fig. 8

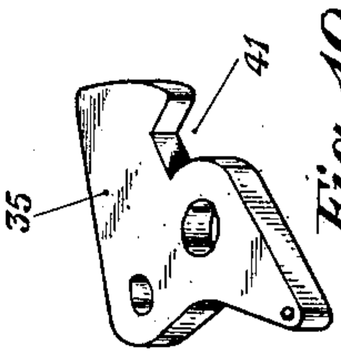

Fig. 10

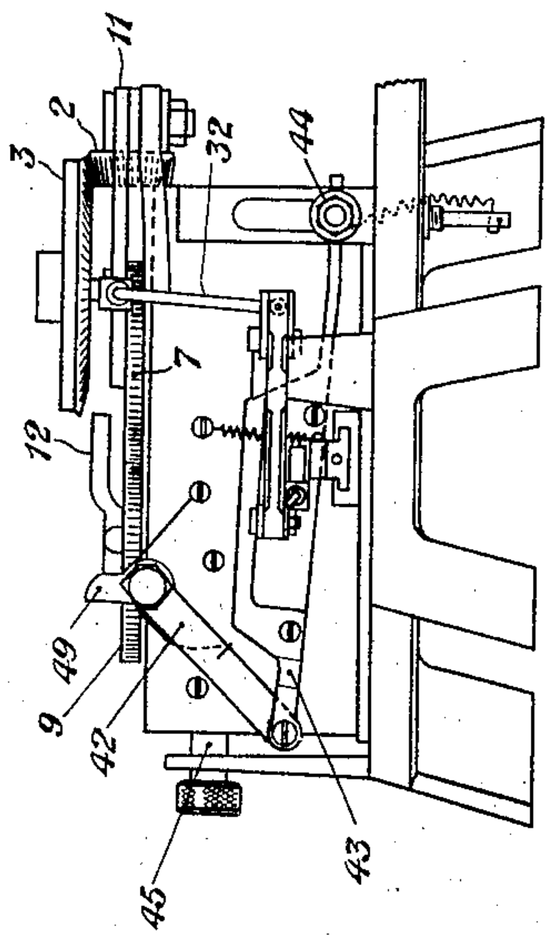

Fig. 3

Fig. 6

Fig. 7

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MACHINE FOR PRODUCING INSULATING SLEEVES

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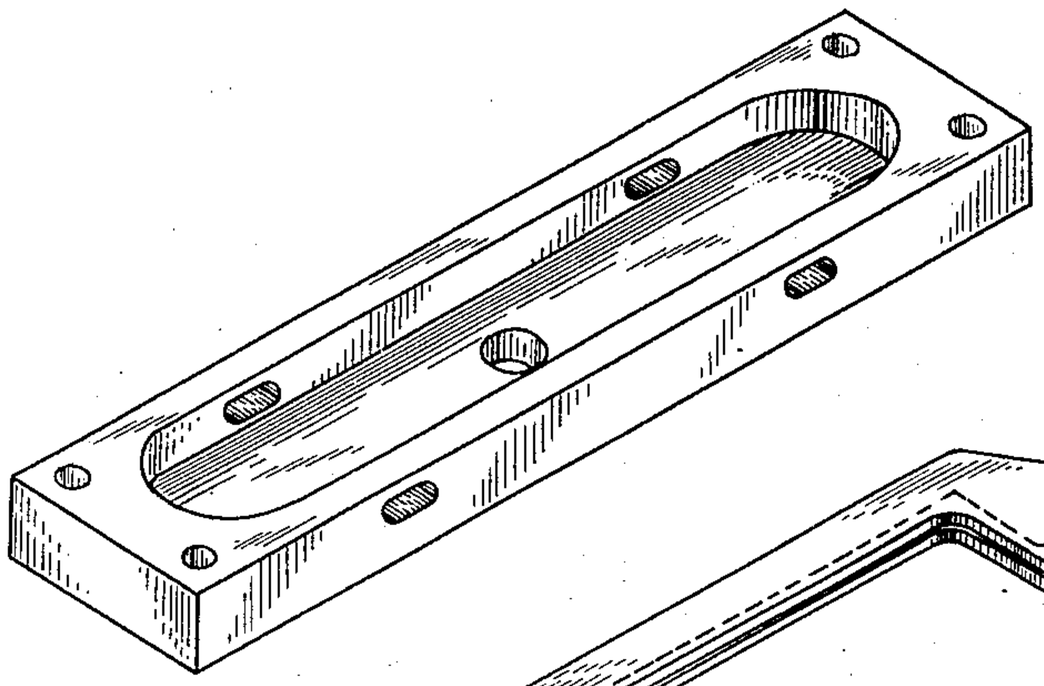

Fig. 11

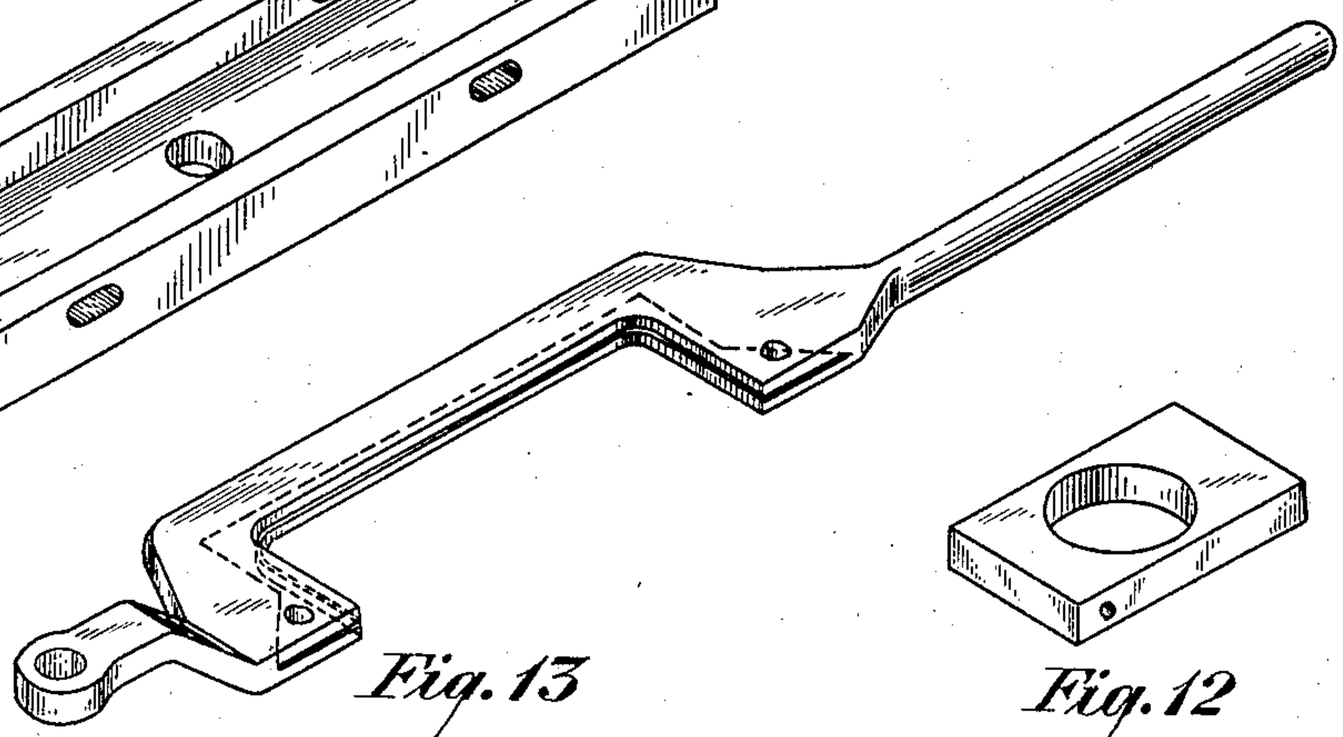

Fig. 13

Fig. 12

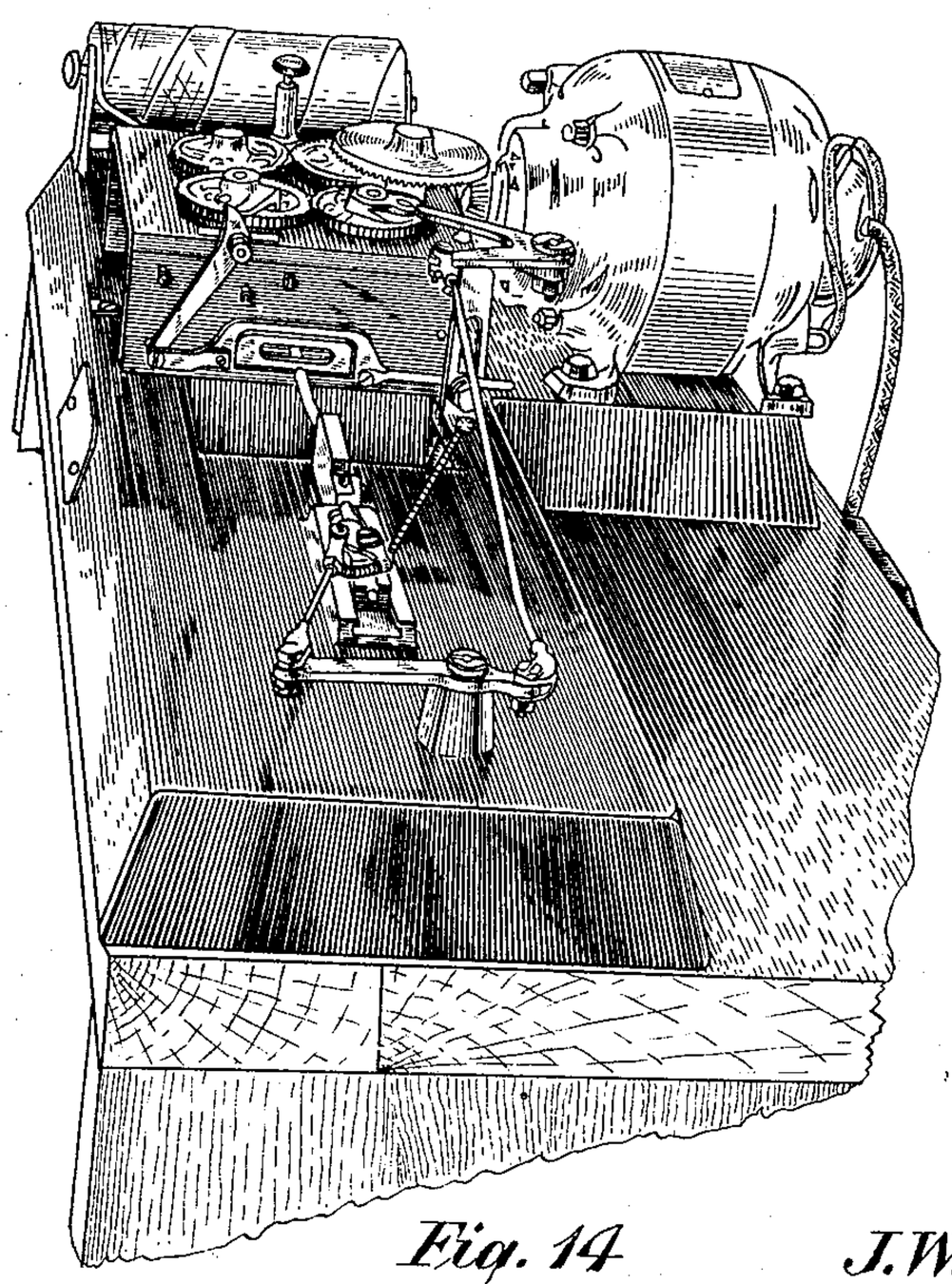

Fig. 14

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Patented Dec. 3, 1929 1,737,640

UNITED STATES PATENT OFFICE

JAMES W. CHANNELL, OF SOUTHGATE, CALIFORNIA, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK

MACHINE FOR PRODUCING INSULATING SLEEVES

Application filed February 7, 1928. Serial No. 252,631.

This invention relates to a method and means for preparing sleeves used for insulating electrical conductors, the said method and means being characterized by the automatic expansion of sleeving or tubing into cylindrical form and the cutting of it into sections of desired length.

In the splicing of electrical conductors, particularly those used in telephone cables, which are of relatively fine wire insulated with paper, it is customary to insulate the bare section of twisted wire by means of a section of braided cotton sleeving. The section employed for this purpose, commonly known as a sleeve, is usually about three inches long, and the method heretofore employed for producing such sleeves is as follows: In order to drive off such moisture as the cotton in its natural state has absorbed, and also to prevent the absorption of moisture after the sleeve has been employed in the splicing of a cable, a length of cotton sleeving is impregnated by immersing it in melted paraffin maintained at a fairly high temperature, the sleeving being kept in the paraffin until all moisture has been driven therefrom and thorough impregnation has taken place. The amount of the sleeving impregnated at any one time depends upon various factors, such as the number of conductors to be spliced and the rate of splicing. After the sleeving has cooled it is cut into sections of desired length by the splicer's helper. These sections, which are in a flattened condition not unlike, in appearance, a piece of cotton tape, must be expanded and formed substantially cylindrical, in order to render them readily usable by the splicer. For this purpose, the splicer's helper employs a sleeve-punch of suitable diameter which, when inserted into the tubing, expands it, thus forming a cylindrical tube of such diameter as will permit it to slip readily over the twisted joint to be insulated thereby.

Usually this preliminary work on the sleeving is done by the splicer's helper during the time when he must remain on the street to guard the open manhole in which the splicer is working. Where local traffic conditions are such that it is unnecessary to guard the manhole, the helper could be employed in the manhole to assist the splicer in work upon the cable, if it were not necessary for the helper to prepare the sleeves. It will therefore be apparent that if the sleeving were impregnated, cut and punched before it is furnished to the splicer on each job, the helper's services could then be employed directly in the making of the splice.

The copending application of Reed and Odell, Serial No. 40,615, filed June 30, 1925, discloses an arrangement for producing cotton sleeves in which an S-shaped mandrel is employed for expanding the tube, the said mandrel being supported by rollers, having roughened grooves therein, which grip the sleeving and force it over the mandrel. In the system therein disclosed, the expansion of the sleeving is a continuous operation, the expanded sleeving being cut into desired lengths without interrupting the continuity of the expanding operation.

The invention consists in a method and means for expanding collapsible sleeving and for cutting it into sections of desired length, the said method being characterized by a periodic stopping of the expanding operation in order to permit the severance of the section of sleeving previously expanded.

Other objects and novel features of this invention will be apparent from the following description when read in connection with the attached drawing, of which Figure 1 is a top view of the machine having a portion represented as broken in order to facilitate description of the mechanism; Fig. 2 is a front view of the machine with the motor omitted; Fig. 3 is a side view (along the line CC of Fig. 1), serving to illustrate the cutting apparatus; Fig. 4 shows the arrangement of the propelling cams (as viewed from the line AA of Fig. 2) by means of which the sleeving is forced over a mandrel shown in detail in Fig. 6; Fig. 5 shows the arrangement of the bearing supports as seen from the under side of Fig. 2. Fig. 7 shows a receiving rod which serves to receive the sleeving as expanded by the mandrel and at the same time to keep the mandrel in position between the cams during the expanding operation; Figs. 8, 9 and 10

show details of the mechanism by which the receiving rod is withdrawn from the expanded sleeving to permit the cutting thereof; Figs. 11 and 12 are details of the bearings for the cam shafts; Fig. 13 is a detail of the knife-holder; and Fig. 14 is an isometric view of the machine as viewed from the cutting end. The figures showing details have not been drawn to the same scale, since they are intended solely for the purpose of aiding in the description of the invention.

As will be seen from Figs. 1, 2, 3 and 14, a source of power, such as the motor 1, is connected by means of the bevelled pinion 2 with a bevelled gear 3, the shaft 4 of which is shown in Fig. 2. This shaft carries a pinion 5 (see Figs. 1 and 2) which meshes with the gears 6 and 7, which gears in turn mesh with gears 8 and 9. Thus the gears 6 and 7, which are driven directly by the pinion 5, in turn serve to rotate the gears 8 and 9. The gear 7 carries a cam 10 which cyclically engages the crank 11 to operate the mechanism that withdraws the receiving rod 47 from the sleeving. In like manner, the gear 9 carries the cam 12 which coacts with the cutting mechanism in order to effect its operation. The shafts connected with the gears 6, 7, 8 and 9 have connected with them the propelling cams which are clearly shown in Fig. 4, which figure represents a view looking downward from a plane through the line AA of Fig. 2. These propelling cams are designed to be in contact with the sleeving during only a portion of the time of revolution of their shafts in order that the sleeve propelled by them will be at rest during the interval of cutting. As will be seen in Fig. 4, a portion of the mandrel 13 is arranged to lie between the cams 15, 16, 17 and 18. The shafts of these cams are so mounted that the separation between them may be varied at will, but may be fixedly held in any desired position. This will be seen in Fig. 5 wherein the bearing supports 19 and 20 (which are shown in detail in Fig. 11) serve to carry the bearing plates 21, 22, 23 and 24 (shown in detail in Fig. 12), which support the lower ends of the shafts upon which the cams 15 to 18 are mounted. The bearing plates have pins inserted through their outer ends and springs, such as 25 and 26, serve to draw the bearing plates together. This brings the cams associated with the shafts supported by those bearing plates in closer relation with each other. As will subsequently be seen, it is desirable to control the pressure of the propelling cams upon the sleeving as it passes over the enclosed mandrel. This pressure is governed by means of the adjusting device, consisting of the arm 27 to which are connected the links 28 and 29 which have associated therewith the hexagonal nuts that lie between the bearing plates. When the arm 27 is moved, the two links 28 and 29 are rotated and the hexagonal nuts 30 and 31 are turned. The inner edges of the bearing plates, such as 21 and 22, are normally in contact with parallel sides of the nut 30, so that any rotation of the nut will tend to vary the separation of the bearing plates.

The means for withdrawing the receiving rod 47 comprises the rod 32 which is connected with one arm of the crank 11. The other end of the rod 32 is connected with an arm of the crank 33. The other arm of this crank is connected by the rod 34 with a trigger 35 (shown in detail in Fig. 10) which is carried by the sliding block 36 (see Fig. 9), which moves within the guides of the slide 37 (see Fig. 8). The rod 47 is rigidly fastened to the block 36. The slide 37 not only serves to guide the block 36 but, as will be seen from Fig. 8, it has an end portion 39 which serves as a bearing for the receiving rod 47. The end portion 39 also has a pin 40 associated therewith which coacts with the detent 41 of the trigger 35, shown in Fig. 10, so as to hold rigid the reciprocating mechanism during the interval in which the propelling cams are forcing the sleeving over the mandrel and onto the receiving rod.

The cutting mechanism, shown in detail in Fig. 3, comprises a bell-crank 42, one arm of which is connected with the knife-holder 43, which is shown in detail in Fig. 13. This knife-holder is arranged to carry a thin blade which is readily removable therefrom by the loosening of two screws. The holder has an arm at the right-hand end which is slidably supported by a bearing 44, as shown in Fig. 3, which bearing is capable of vertical adjustment. This arrangement enables the cutting edge of the blade to be properly adjusted to the sleeving.

The invention will be apparent from the following description of the method of operating the aforedescribed mechanism: A roll of cotton sleeving, which previously has been boiled in paraffin for the removal of moisture, is placed upon the supporting rod 45. The sleeving is fed through the eye of the guide 46 and under the straightening roller 51, the pressure of which upon the sleeving is capable of being adjusted by means of the knurled nut 48. This roller serves to keep the sleeving from twisting. The sleeving is then fed over the mandrel 13 (see Figs. 4 and 6) until the sleeving is in such position as to be gripped by the propelling cams. The mandrel is held in position between the propelling cams by the rod 47 during the interval in which the cams are forcing the sleeving over the mandrel. During this part of the cycle of operation, the sliding block or carriage 36 is at the left-hand end of the slide 37 (as shown in Fig. 2) and is held there by the coaction of the trigger 35 with the pin 40. As the motor rotates, the propelling cams 15, 16, 17 and 18 will grip the sleeving

and force it over the portion of the mandrel 13 that lies between and within the grooves of the propelling cams, thus expanding the sleeving and rendering it cylindrical. The sleeving, after being expanded by the mandrel 13, will be pushed onto the rod 47, which is smaller in diameter than the mandrel. When it has been moved over the portion 47 a distance that represents the desired length of sleeve, the mechanism for withdrawing the receiving rod 47 and also for operating the cutting mechanism, will be set in motion. The timing of these operations is controlled by the positioning of the cams 10 and 12 which are carried by the gears 7 and 9 shown in Fig. 1. As soon as the desired length of sleeving has been forced over the rod 47 the cam 10 comes in contact with one arm of the crank 11 and the direction of motion of this crank will be such as to cause the rod 32 to move to the left. This motion is translated by the crank 33 so as to exert a pull upon the rod 34. This causes the trigger 35 to be disengaged from the pin 40 (which is fixedly connected with the end portion of the slide 37) and permits the movement towards the right of the carriage 36. Since the receiving rod 47 is rigidly attached to the carriage 36, this act withdraws the said rod from the expanded sleeving. This not only permits the knife to cut freely through the expanded portion of the sleeving but also permits the cut section to drop through the base of the machine into a suitable container. For the sake of simplicity, such collecting apparatus has not been shown but it will be understood that any suitable form of such apparatus may be readily associated with the aforedescribed machine.

As soon as the receiving rod 47 has been withdrawn sufficiently to permit the knife-blade to pass freely through the sleeving, the mechanism for cutting is set in motion and the timing of this operation is controlled by the positioning of the cam 12 which is carried by the gear 9. This cam, which moves in a clockwise direction, is arranged to make contact with the arm 49 of the crank 42, shown in Fig. 3. This causes the lower end of the crank to which the knife-holder is connected, to move to the right and forces the blade across and down through the expanded sleeving to such an extent as to completely sever the extruded portion of the sleeving from the main body thereof. As soon as the cut section of the sleeving falls, the cam 10 will have moved out of engagement with the arm of the crank 11. This permits the return of the carriage 36, which is effected by the spring 50, one end of which is connected with the carriage and the other end with the base of the machine. As soon as the carriage returns to its normal position, the detent 41 of the trigger 35 coacts with the pin 40 to keep the carriage rigid during the next cycle of the operation of forcing the sleeving over the mandrel.

While the invention has been described as embodied in a particular form, it will be apparent that it is capable of embodiment in other forms which are the equivalent of those shown without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a machine for producing insulating sleeves, the combination with an expanding mandrel, of means to force the insulating sleeving over said mandrel to be expanded thereby, receiving means substantially coaxial with said mandrel and in contact therewith to keep said mandrel in position during the forcing of the sleeving thereover, and to receive the sleeving expanded by said mandrel, means to withdraw said receiving means from the expanded sleeving, and means to cut the expanded sleeving.

2. In a machine for producing insulating sleeves, the combination with an expanding mandrel, of means to force the insulating sleeving over said mandrel to be expanded thereby, receiving means substantially coaxial with said mandrel and in contact therewith to keep said mandrel in position during the forcing of the sleeving thereover, and to receive the sleeving expanded by said mandrel, means controlled by the operation of said forcing means to withdraw said receiving means from the expanded sleeving, and means also controlled by said forcing means to cut the expanded sleeving.

3. In a machine for producing insulating sleeves, the combination with an expanding mandrel of means to force the insulating sleeving over said mandrel, the said forcing means being so designed as to be effective during a predetermined interval of time, receiving means in contact with said mandrel to prevent its longitudinal movement and to receive the expanded portion of said sleeving, and means to remove said receiving means from contact with said mandrel during the interval in which said forcing means remains ineffective to force the sleeving over said mandrel.

4. In a machine for producing insulating sleeves, the combination with an expanding mandrel of means to force the insulating sleeving over said mandrel, the said forcing means being so designed as to be effective during a predetermined interval of time, receiving means in contact with said mandrel to prevent its longitudinal movement and to receive the expanded portion of said sleeving, means to remove said receiving means from contact with said mandrel during the interval in which the said forcing means is ineffective to force the sleeving over the mandrel, and means to cut that part of the expanded sleeving from which the said receiving means has been withdrawn.

5. In a machine for producing insulating sleeves, the combination with an expanding mandrel of a plurality of simultaneously coacting cams having roughened grooves therein to force sleeving over said mandrel, holding means in contact with said mandrel to prevent its motion during the forcing operation of said cams, and means to rotate the said cams, the said rotating means having means associated therewith to effect the removal of the said holding means from contact with the said mandrel.

6. In a machine for producing insulating sleeves, the combination with an expanding mandrel of a plurality of simultaneously coacting cams having roughened grooves therein to force sleeving over said mandrel, holding means in contact with said mandrel to prevent its motion during the forcing operation of said cams, means to cut the expanded sleeving, and means to rotate the said cams, the said rotating means having means associated therewith to effect the removal of the said holding means from contact with said mandrel and to effect the operation of the said cutting means.

7. In a machine for producing insulating sleeves, the combination with an expanding mandrel of rotatable grooved members adapted to support said mandrel within the grooves thereof, a holding device comprising a member normally in contact with said mandrel, and a carriage for supporting said device, said carriage being arranged to withdraw said member from contact with said mandrel and to subsequently restore said contact.

In testimony whereof, I have signed my name to this specification this 8th day of December, 1927.

J. W. CHANNELL.