April 30, 1929. V. B. PIKE ET AL 1,710,786

METHOD AND MEANS FOR PRODUCING INSULATING SLEEVES

Original Filed July 2, 1925 3 Sheets-Sheet 1

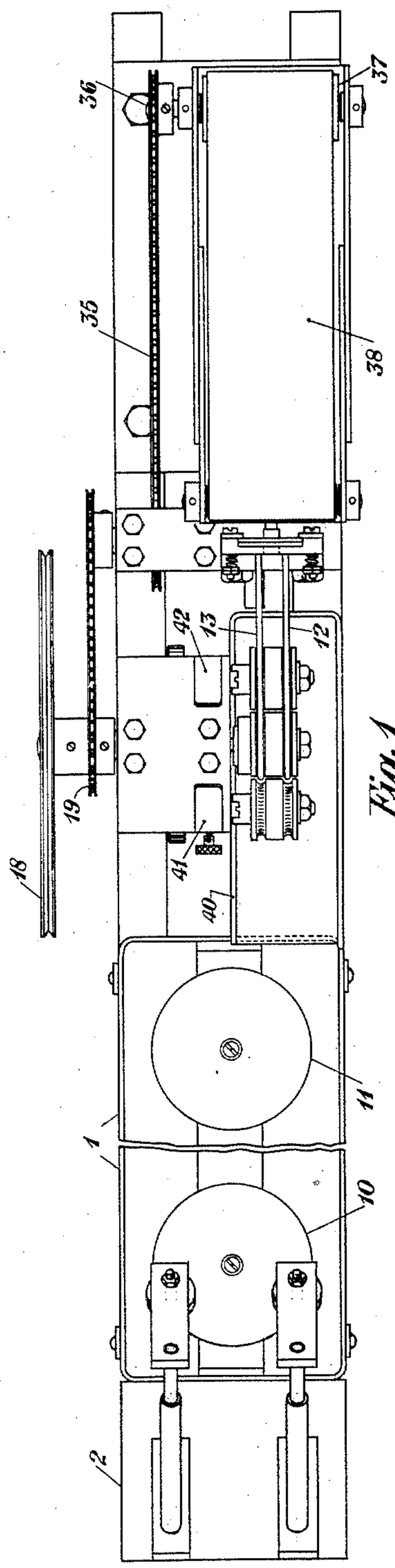

Fig. 1

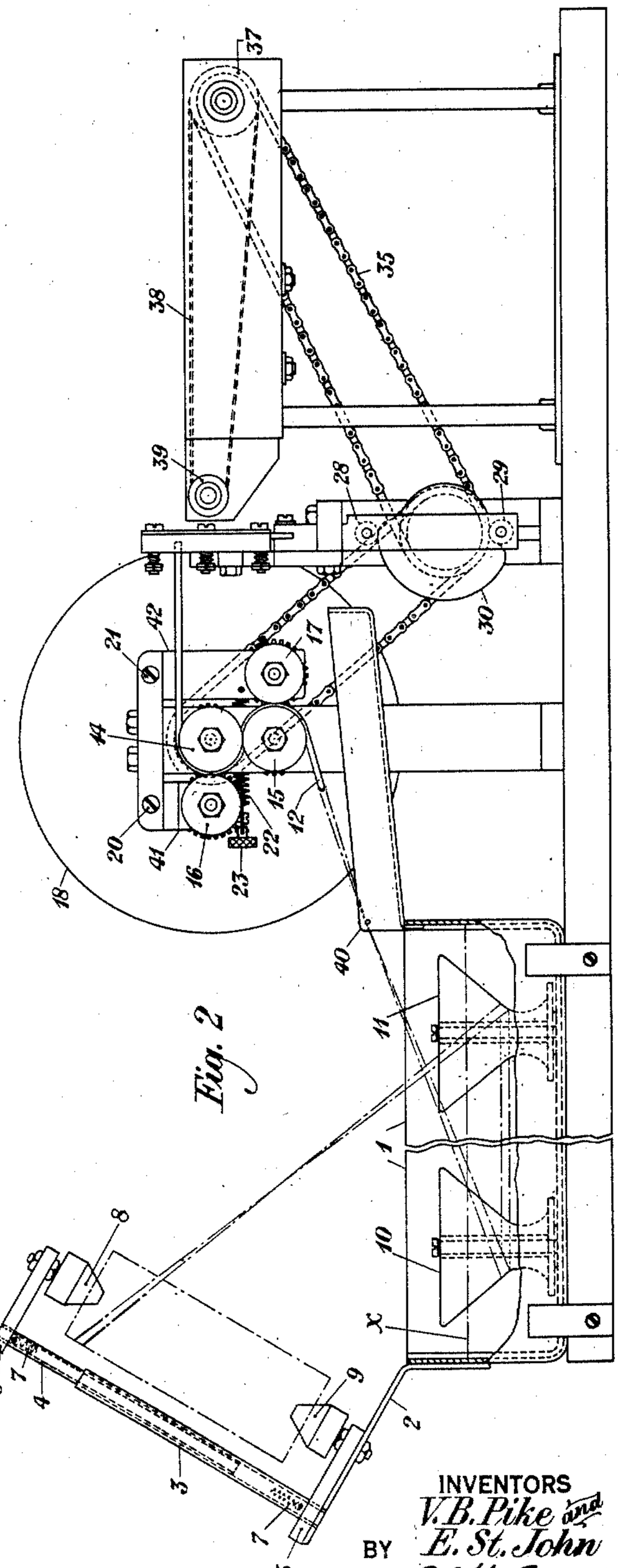

Fig. 2

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METHOD AND MEANS FOR PRODUCING INSULATING SLEEVES

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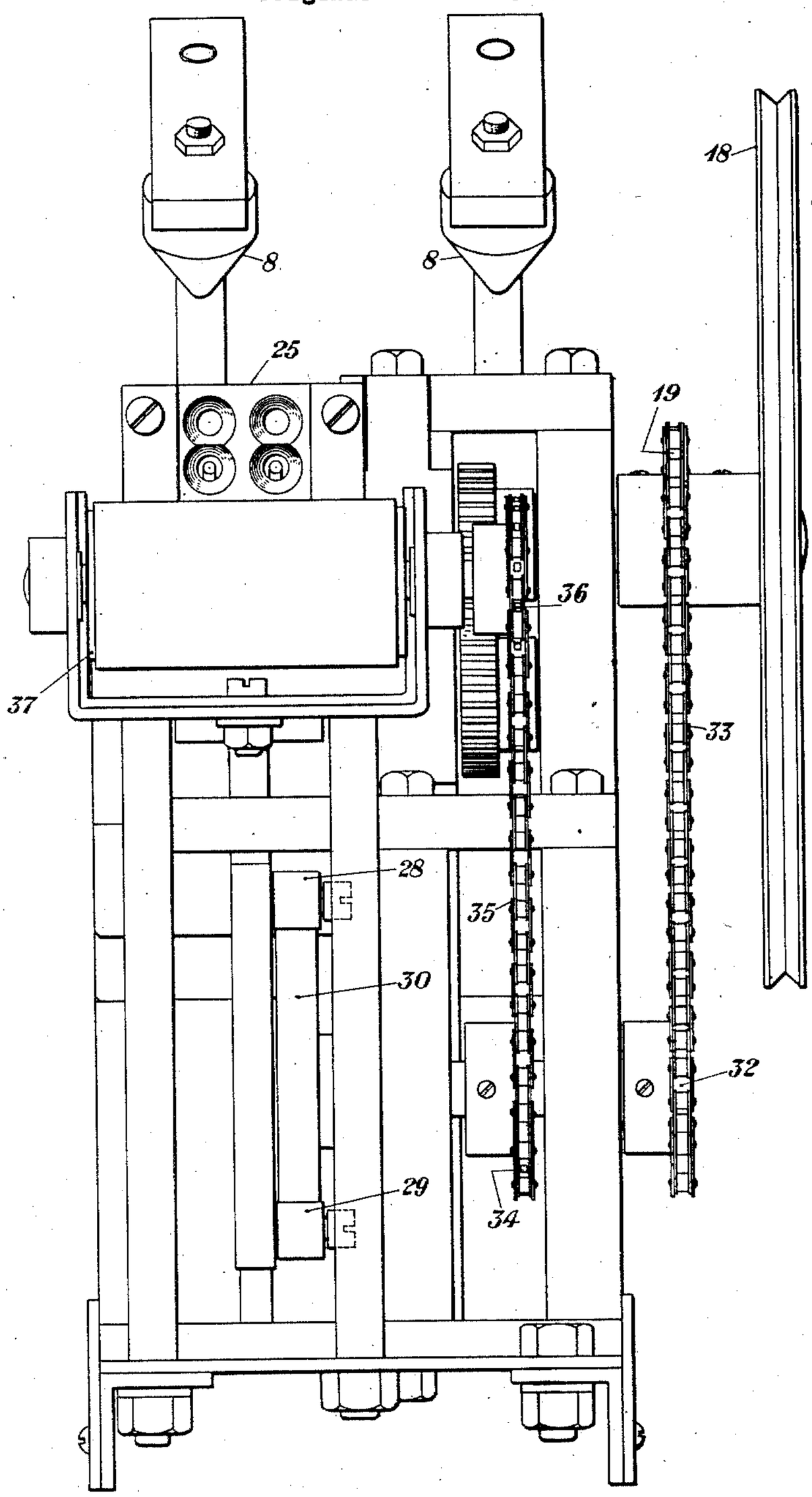

Fig. 3

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Original Filed July 2, 1925 3 Sheets-Sheet 3

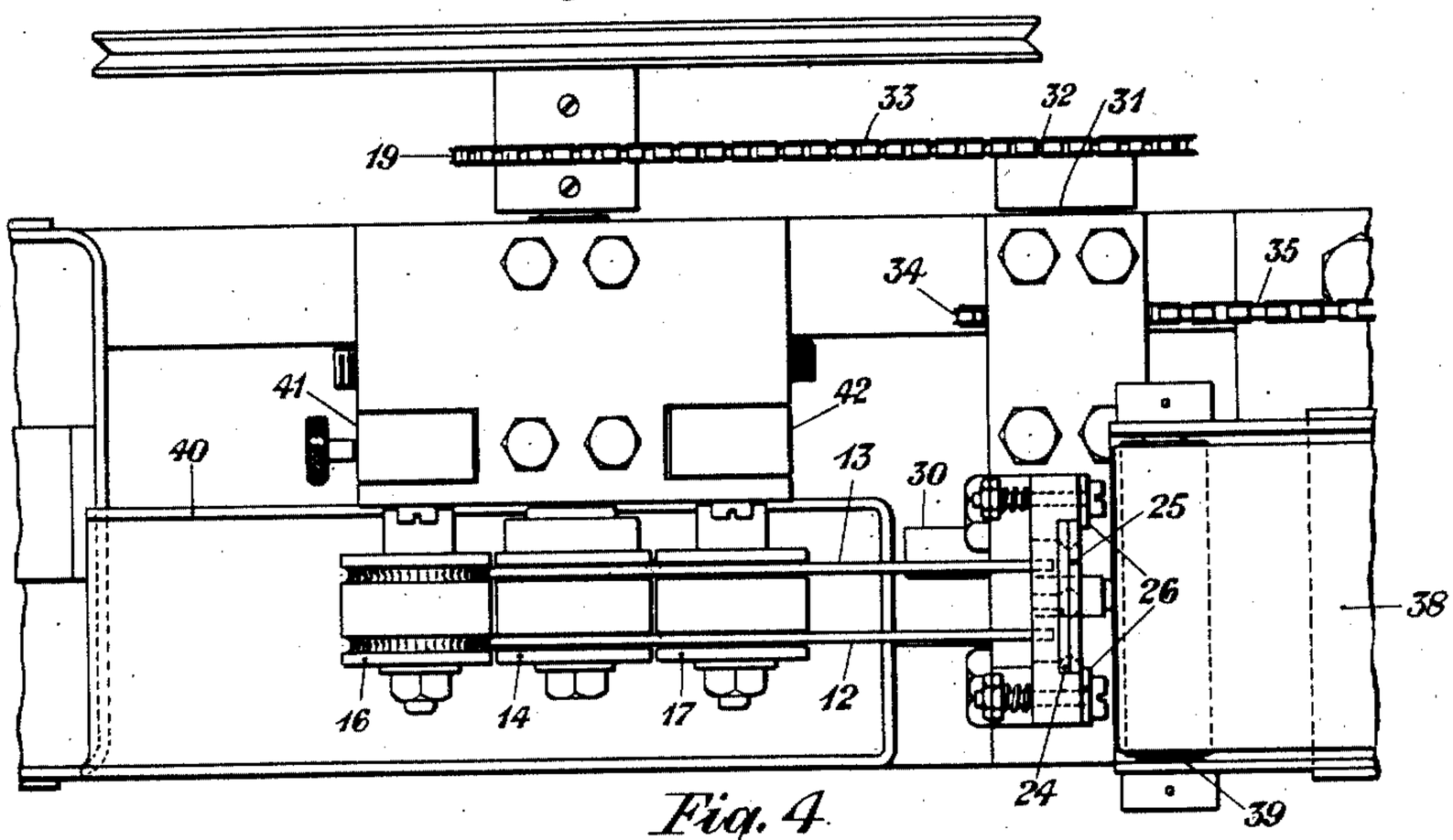

Fig. 4

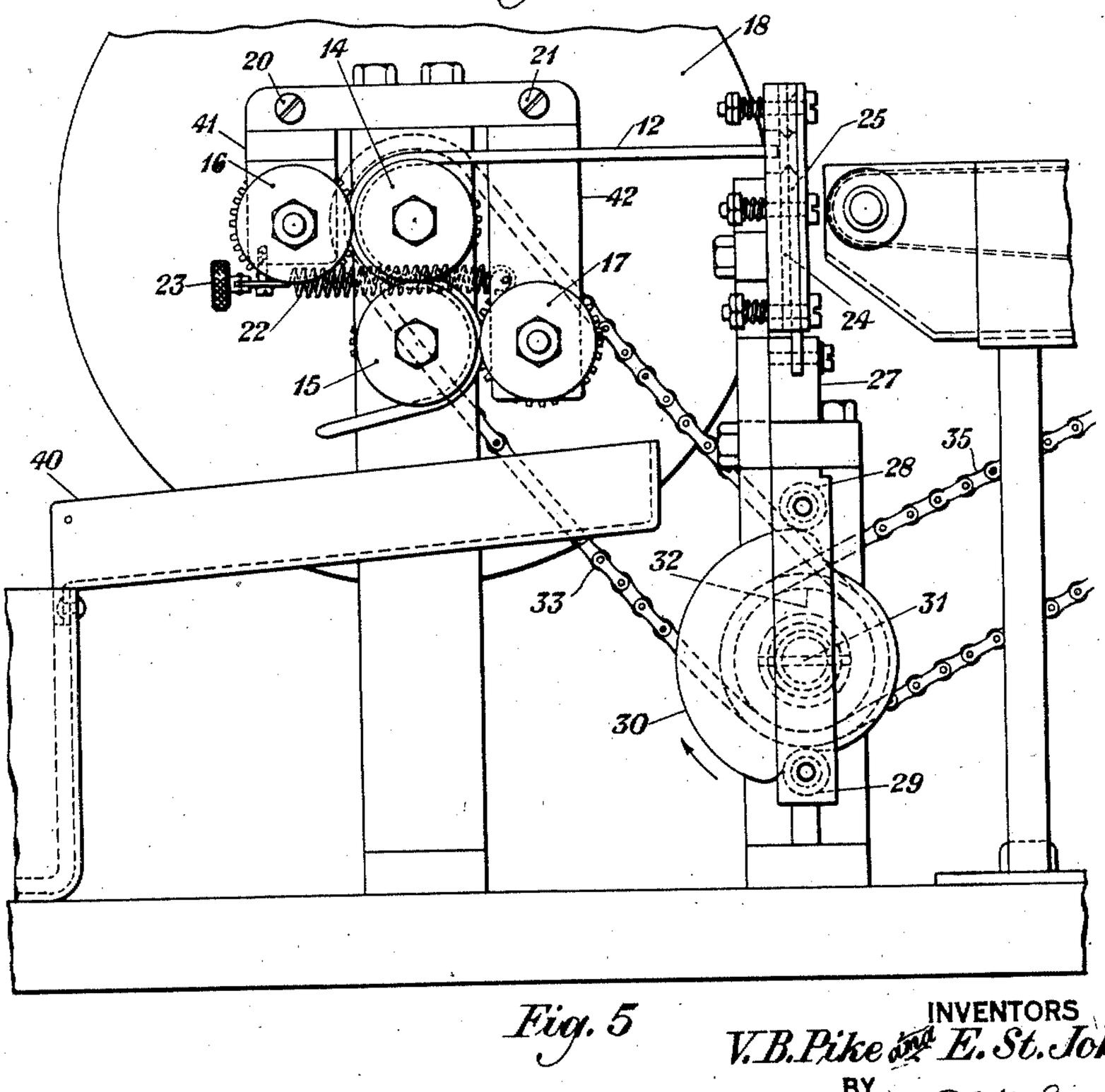

Fig. 5

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Patented Apr. 30, 1929. 1,710,786

UNITED STATES PATENT OFFICE.

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METHOD AND MEANS FOR PRODUCING INSULATING SLEEVES.

Application filed July 2, 1925, Serial No. 41,227. Renewed October 17, 1928.

This invention relates to a method and means for producing sleeves used for insulating electrical conductors, the said method and means being characterized by the impregnation of a sleeving or tubing formed of cotton or other suitable material to render it moisture proof, expanding the sleeving into cylindrical form and cutting it into sections of desired length.

In the slicing 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 sleeve or tube of cotton. The sleeve employed for this purpose is usually about three inches long and the method heretofore employed for preparing such tube is as follows: In order to drive off the moisture that 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, the cotton sleeving is impregnated by dipping it into melted paraffin at a fairly high temperature, the sleeving being kept in the paraffin until all moisture has been driven from the sleeving and thorough impregnation has taken place. The length 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 and not unlike in appearance a piece of cotton tape must be punched in order to render them substantially cylindrical, thereby making them readily usable by the splicer. For this purpose the helper employs a cotton sleeve punch 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 conditions are such that the helper can assist the splicer in a manhole a considerable saving in labor cost may be effected if the sleeving is impregnated, cut, and punched at some central point, and is thus furnished to the splicer on each job. By so doing, the helper's services may be employed more directly in the making of the splice.

In the copending application of Reed and O'Dell, Serial No. 40,615 filed June 30, 1925, is disclosed a machine for the automatic production of cotton sleeves of any desired length, impregnated with paraffin or other material to render them moisture proof, and cylindrically expanded to the desired diameter.

One of the objects of the present invention which is an improvement upon that disclosed in the said application of Reed and O'Dell is to provide an arrangement whereby the pressure of the grooved rollers upon the cotton sleeving as it passes over the **S** shaped mandrel may be readily controlled. Another object of this invention is to provide better lateral support for the **S**-shaped mandrel whereby it may be held more securely in the desired position. A further object of the invention is to render the rollers more readily accessible in order to facilitate the placing of the mandrels thereon, or for removing the said rollers from the machine. Another object of this invention resides in an improved type of guide by means of which the sleeving is kept submerged in the impregnating liquid. A further object of this invention resides in an improved type of cutting device for sectionalizing cotton sleeving.

Other objects of this invention will be apparent from the following description when read in connection with the attached drawing, of which Figure 1 is a plan view of the machine embodying our invention; Fig. 2 is a side view of the machine drawn to the same scale as Fig. 1; Fig. 3 is a view upon slightly larger scale of the machine from the right hand end of Fig. 2; Fig. 4 is a view of the central portion of Fig. 1 upon an enlarged scale in order to bring out the details of the expanding and cutting mechanisms; and Fig. 5 is a similarly enlarged view of the mid-section of Fig. 2.

In Fig. 1, the tank 1 at the left hand end thereof serves to hold the material for impregnating the sleeving, which may be kept at the desired temperature by any source of heat, such as a gas flame. For the purpose of illustrating and describing the invention it will be assumed that the sleeving to be impregnated is wound upon spools. Accord-

ingly, at the left hand end of the tank a supporting member 2 is affixed to the end wall of the tank, the purpose of which is to support the spool-holding devices. While only two of these devices are shown in the figure, the number may be varied, depending upon the number of punching-mandrels and cutting devices with which the machine is equipped. The spool-holding device, which is shown more clearly in Fig. 2, comprises two telescopic tubes 3 and 4, tube 4 fitting into tube 3. The tube 3 is mounted upon a base 5 and the tube 4 is similarly mounted upon the base 6. The spring 7, of which only the ends are shown is, in reality, continuous throughout the tubes, and the ends are connected effectively with the tubes at the end members 5 and 6. It will thus be seen that the spring tends to pull together the members 5 and 6, the tube 4 moving downward within the tube 3. Connected with the outer end of the member 6 is a conical support 8 which is rotatably mounted upon the member 6, the friction of rotation being reduced by means of a ball bearing. A similar support 9 is mounted upon the member 5. A spool of cotton sleeving may be readily inserted in the supporting device by lifting the upper member 6 and inserting the conical supports 8 and 9 in the holes in the ends of the spool. The member 6, when released, will be drawn by the spring 7 toward the member 5, and the spool will be firmly held within the conical supports 8 and 9, but adapted to rotate readily thereon. In the event of the sleeving being impregnated, and cut into sleeves at the factory where the sleeving is manufactured, it would normally be supplied to the impregnating machine from cans or other similar containers into which the sleeving falls from the braiding machine. Under such condition a spool-holding device would of course, be unnnecessary inasmuch as the sleeving would pass directly from the said cans or similar container to the impregnating tank.

Rotatably mounted upon the bottom of the tank 1 are the inverted conical guides 10 and 11 by means of which the cotton sleeving (indicated by dot and dash lines) may be led from the spool through the impregnating liquid within the tank 1, and thence to the end of one of a plurality of mandrels such as 12. If the liquid within the tank 1 is kept at a level below the upper side of the conical guides 10 and 11 (as, for example, the level represented by the dot and dash line x), it will be possible to place the cotton sleeving under the guides without coming in contact with the impregnating liquid. This feature is of importance whenever it is necessary to place a new spool of sleeving upon the machine or when a defect on the sleeving necessitates a stoppage of the machine and an adjustment of the sleeving. In doing so, the sleeving is extended from the spool to the guide 11, thence backwards to guide 10, and thence upward to the lower end of the mandrel 12. As soon as the sleeving is put under tension it will tend to pull downwards on the guides, thus bringing it below the level of the impregnating liquid.

The punching mechanism comprises one or more S-shaped mandrels which lie within the grooves of a plurality of rollers which coact so as to hold the mandrels securely in position and at the same time to force the sleeving over the said mandrels. As will be seen clearly in Figs. 2 and 5, two of the rollers 14 and 15 are in vertical alignment. A third roller 16 is in horizontal alignment with the roller 14 and a fourth roller 17 is in similar alignment with roller 15. Roller 14 is connected with a shaft to which is also connected the driving pulley 18, and a sprocket wheel 19 (see Fig. 1) by means of which the cutting mechanism is operated. The roller 15, which is supported by suitable bearings, is geared to the roller 14 to which also the roller 16 is geared. The roller 17 is geared to the roller 15. Rollers 16 and 17 are each supported by members which are hinged at the points 20 and 21 respectively. The hinged supporting members 41 and 42, by which the rollers 16 and 17 are carried, are held together by means of a spring 22, the tension upon which is such as to maintain the desired pressure between the rollers. As will be seen clearly from Figs. 1 and 4, the grooves of each of the rollers are knurled, which enables them to firmly grip the cotton sleeving to force it over the mandrels lying in the said grooves. The rollers are readily removable from their shafts, so that rollers having other sizes of grooves may be put in position.

The cutting mechanism comprises two blades which may be seen clearly in Figs. 3, 4 and 5. One of these blades 24 is fixed and the other blade 25 is movable vertically within the guides 26. The blade 24 has therein a single hole opposite the end of each mandrel and in close juxtaposition to the said end. The movable blade 25 has therein two holes for each mandrel so arranged that when the blade is in either position—viz, at the bottom or at the top of its stroke (as will later be described)—a hole in the said movable blade will always be opposite the hole in the fixed blade. The punched sleeving, which is issuing from the mandrel at a uniform rate, will pass through the holes in the fixed and the movable blades and will be cut by the sharp edge of the corresponding hole in the movable blade as the latter moves upwards or downwards. The blade 25, as will be seen clearly from Fig. 5, is detachably connected with a member 27, which carries two rollers 28 and 29 with which coacts the cam 30. This cam is carried by a shaft 31 to which the sprocket wheel 32 is attached. This sprocket

is connected with the sprocket 19 by means of the chain 33. The rotation of the pulley 18 not only operates the rollers of the punching mechanism but also operates the cutting mechanism through the medium of the sprocket wheels 19 and 32 connected by the chain 33. As the shaft 31 rotates in clockwise direction as indicated by the arrow in Fig. 5, the cam 30 moves into contact with the upper roller 28 (as the figure shows) and forces the member 27 upwards, which, in turn, raises the movable blade 25 so that the lower holes in this blade coincide with the holes in the fixed blade. With the blades in this position, the cotton sleeving, being forced over the mandrel 12, will pass through the hole in the blades opposite the end of the said mandrel. As soon as the shaft 31 is rotated sufficiently to bring the eccentric part of the cam 30 in contact with the roller 29, the member 27 will be pulled down. This pulls down the blade 25 and thus cuts off a section of the punched cotton tubing which extended through the holes in the said blades, and it brings the upper holes of the movable blade in line with the holes in the fixed blades, thus making ready for the next sleeve from each mandrel. The shaft 31 also carries a sprocket wheel 34 which is connected by the chain 35 with a similar wheel 36 which serves to rotate the roller 37. A belt conveyer 38, supported by rollers 37 and 39 serves to carry away the sections of cotton sleeving from the cutting mechanism. It is desirable to make the conveying system, which may comprise a plurality of belts, of such length that the cotton sleeves will be sufficiently cooled at the end of the conveyer to be placed in packages with a minimum chance of distorting their shape.

It will be seen that by means of a machine of the type herein disclosed, one or more spools of cotton sleeving may be readily inserted in their supporting devices and the sleeving may be fed therefrom with a minimum of friction, or, as stated before, the sleeving may be fed directly from cans or other containers in which it is loosely held. The sleeving may be readily threaded through the guides of the impregnating tank with a minimum of difficulty and of possible injury to the operator. Furthermore, the sleeving may be more readily controlled in the course of its passage over the S-shaped mandrels by means of the spring-controlled device which holds together the lateral rollers. This serves not only to prevent lateral displacement of the S-shaped mandrel but also serves to maintain the proper pressure upon the cotton sleeving in order to propel it over the mandrel at the desired speed and to make complete contact with the knurled grooves. The invention furthermore reduces the probability of closing the ends of the sleeves at the time of cutting, which beneficial result is obtained not only by means of the type of cutter employed but also by virtue of its being placed close to the ends of the mandrels.

While this invention has been disclosed as embodied in a particular form and arrangement of parts, it is to be understood that it is capable of embodiment in other and different forms 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 means for holding a spool of sleeving, of a tank for holding impregnating material, and means to guide the said sleeving through the said tank, the said guiding means comprising a plurality of inverted cones rotatably mounted within said tank.

2. In a machine for producing insulating sleeves, the combination with means for holding a spool of sleeving, of a tank for holding impregnating material, means to guide the said sleeving through the said tank, the said guiding means comprising a plurality of inverted cones rotatably mounted within said tank, and means to substantially cylindrically expand the said sleeving.

3. In a machine for producing insulating sleeves, the combination with means for holding a spool of sleeving, of a tank for holding impregnating material, means to guide the said sleeving through the said tank, the said guiding means comprising a plurality of inverted cones rotatably mounted within said tank, means to substantially cylindrically expand the said sleeving, and means to cut the said sleeving into sections of predetermined lenth.

4. In a machine for producing insulating sleeves, the combination with a tank for holding impregnating material, of a source of cotton sleeving, and means to guide the said sleeving through the said tank, the said guiding means comprising a plurality of inverted cones rotatably mounted within the said tank.

5. In a machine for producing insulating sleeves, the combination with a tank for holding impregnating material, of a service of cotton sleeving, means to guide the said sleeving through the said tank, comprising a plurality of inverted cones rotatably mounted upon the bottom of said tank, and means to cylindrically expand the said sleeving.

In testimony whereof, I have signed my name to this specification, this 29th day of June, 1925.

VERNON B. PIKE.

In testimony whereof, I have signed my name to this specification this 25th day of June 1925.

EVERETT ST. JOHN.