

June 30, 1931.

G. C. BURD

1,812,646

METHOD OF APPLYING FITTINGS TO STRANDED STRUCTURES

Filed April 3, 1930

3 Sheets-Sheet 1

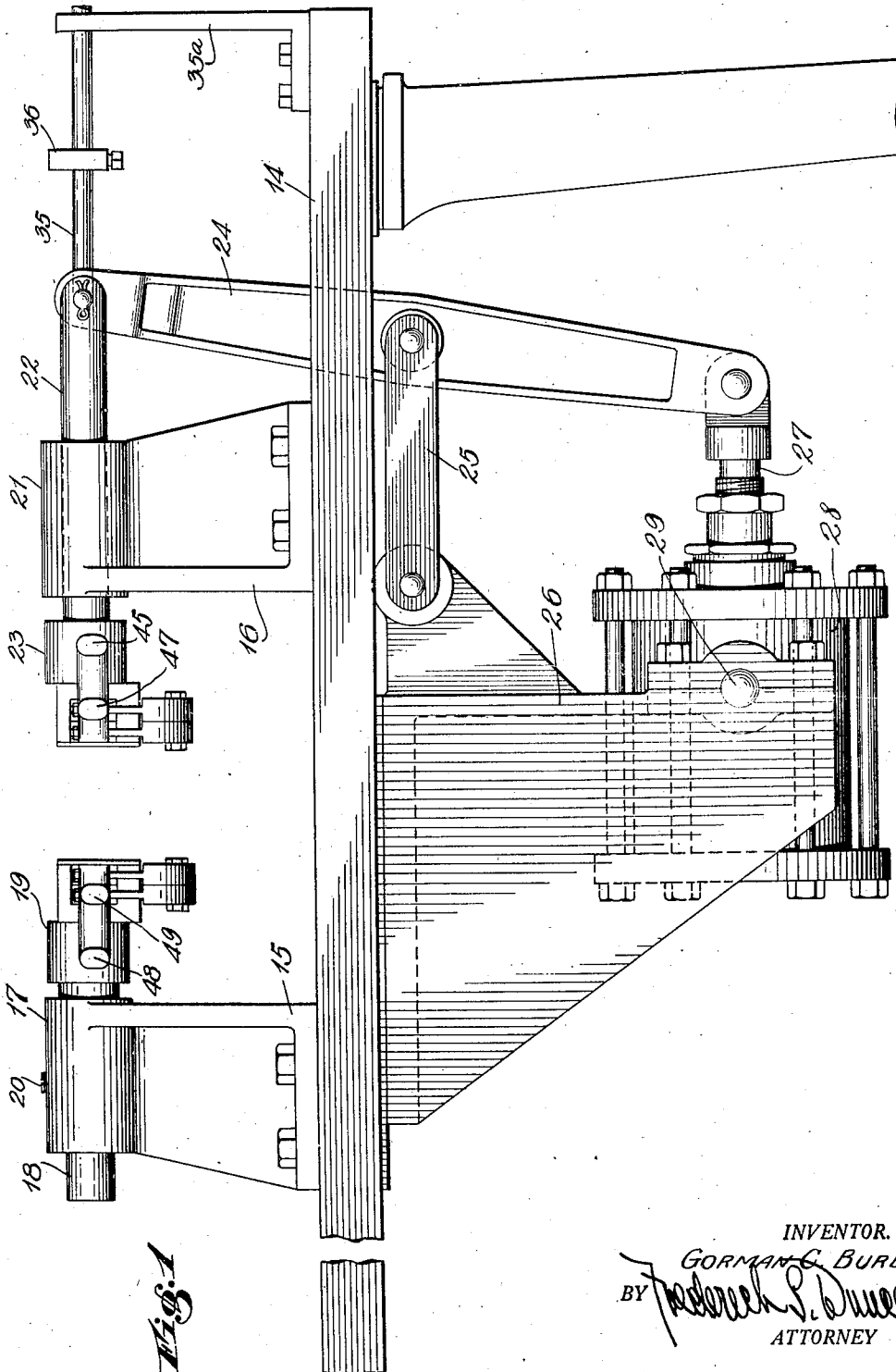


Fig. 1

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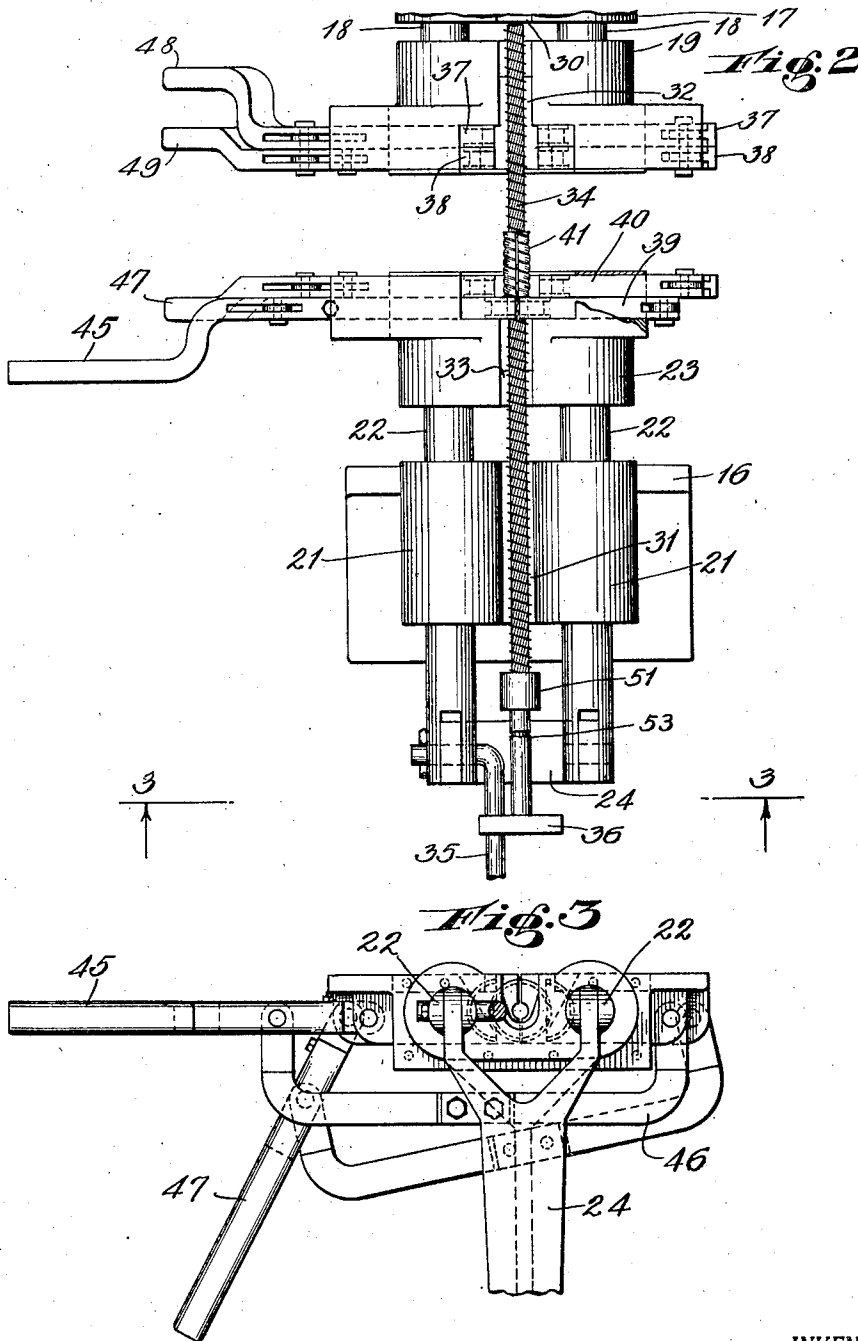
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METHOD OF APPLYING FITTINGS TO STRANDED STRUCTURES

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

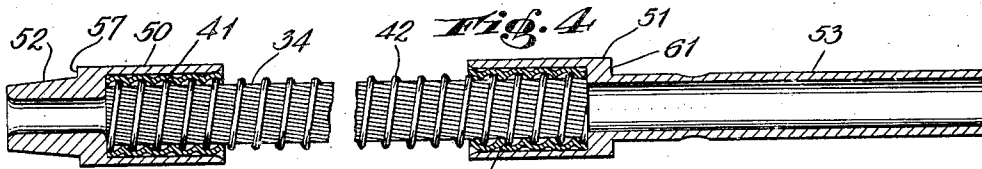


Fig. 5

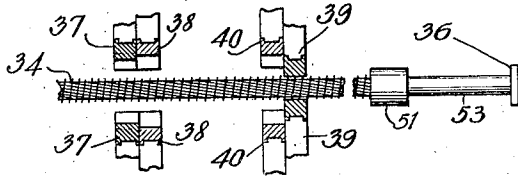


Fig. 6

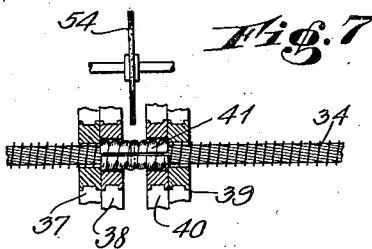
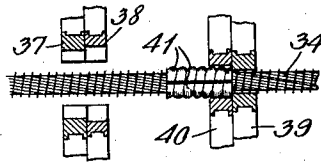


Fig. 7

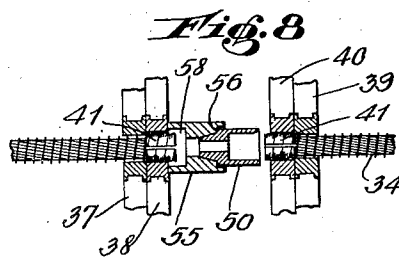


Fig. 8

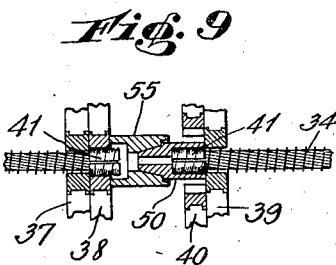


Fig. 9

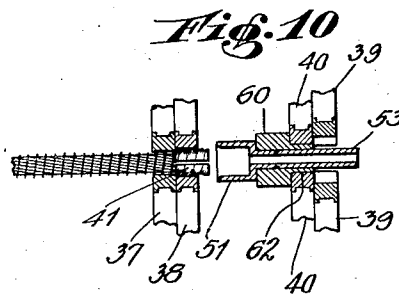


Fig. 10

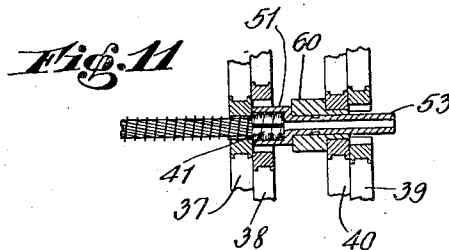


Fig. 11

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UNITED STATES PATENT OFFICE

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METHOD OF APPLYING FITTINGS TO STRANDED STRUCTURES

Application filed April 3, 1930. Serial No. 441,289.

My invention relates to a process of cutting sections from a continuous length of flexible tubing, cable, or the like and applying fittings to the cut ends.

5 The invention is particularly adapted for use on structures composed of coiled members which are liable to expand or become disarranged at the point where the structure is severed, and it has for an object to provide
10 a method of binding the ends of the structure to preserve the integrity thereof.

A specific application of my invention is to be found in the cutting and binding of flexible tubing such as used for Bowden-wire
15 casings. In certain structures, the casing is formed of longitudinal wire members held in place between inner and outer loosely coiled helices. When such a casing is cut,
20 the ends of the wires are apt to spring open and the longitudinal members in particular are apt to become disarranged, unless means are provided for retaining them in desired position.

My invention provides a method for temporarily holding the ends of the wires in proper relative position when the casing is cut and then applying ferrules or fittings over the cut ends so that they will be permanently bound in place. The fittings applied
30 to the casing serve not only to preserve the integrity of the structure but may also provide attachment means for the casing or may serve as supports for elements associated with the casing.

35 In a copending application Serial No. 399,125, filed October 12, 1929, I describe a method of and means for cutting off stranded wire members from a continuous length, and applying ferrules to the cut ends. In said
40 application, I describe a specific embodiment of the invention in which a bushing is applied about the part that is to be cut and the bushing is clamped on the structure. The structure is then severed by passing a cutter
45 transversely through the bushing as well as the structure, thus leaving a part of the bushing on each severed end. Thereafter, the bushed ends are pressed into opposite ends of a double length ferrule. The ferrule
50 is then cut in two, leaving a length thereof

on each bushed end. The present invention is directed to a specific modification of the invention broadly covered in said copending application. In the present modification, the cutting of the ferrule is dispensed with
55 and instead separate ferrules or fittings are applied to the cut ends.

An advantage of the process forming the subject matter of the present invention lies in the elimination of one of the cutting operations, thereby saving time and expense and
60 reducing wear on the cutter.

Another advantage lies in the fact that fittings of different form can be used on the opposite ends of the structure, also such fittings may be previously finished all over as
65 by plating or polishing, so that they will show no cut edges.

Other objects and advantages of the present invention will appear in the following description taken with the drawings forming part of the present application, and thereafter the novelty and scope of the invention will be pointed out in the claims.
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In the accompanying drawings;
75 Figure 1 is a view in side elevation of certain apparatus which may be used in carrying out my improved process;

Fig. 2 is a fragmentary plan view of the same with a piece of the work in position to be severed;
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Fig. 3 is a fragmentary view in section taken on the line 3—3 of Fig. 2 but with the work removed.

Fig. 4 is a view in longitudinal section of a stranded tubular casing provided with a pair of fittings secured respectively to opposite ends of the casing; and
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Figs. 5 to 11 inclusive illustrate various steps in the process of applying the fittings to the opposed cut ends of the stranded tubular casing.
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As shown in Fig. 1, the apparatus employed in carrying out my process is mounted on a bench 14. Secured to and rising from the bench 14 are two opposed brackets 15 and 16 respectively. The bracket 15 provides bearings 17 for a pair of rods or studs 18 which are connected by a cross-head 19. The studs 18 are slidable in the bearings 17 and
95 100

may be fixed at any desired adjustment therein by means of set screws 20. Thus the cross-head 19 is normally fixed.

The bracket 16 is similarly provided with bearings 21 which provide sliding support for a pair of rods 22 which are connected by a cross-head 23. The latter is adapted to be moved toward and from the fixed cross-head 19. The outer free ends of the rods 22 are pivotally connected to the upper end of a lever 24. This lever passes through a slot in the bench 14 and is fulcrumed on one end of a link 25, the other end of which is pivotally connected to a bracket 26 depending from the underside of the bench 14. The lower end of the arm 24 is pivotally connected to the stem 27 of a plunger which slides in a cylinder 28. The cylinder is provided with trunnions 29 which are journaled in the bracket 26 and by means, not shown, fluid under pressure may be admitted to the cylinder 28 on one side to force the plunger stem 27 outward and on the other side to draw the stem inward. By this means, the lever 24 is oscillated on its fulcrum causing the cross-head 23 to move toward and from the cross-head 19.

The bracket 15 is formed with a slot 30 (Fig. 2) between the bearings 17, and the bracket 16 is formed with a corresponding and aligned slot 31 between the bearings 21. Similarly the cross-heads 19 and 23 are provided with slots 32 and 33, respectively, which are aligned with the slots 30 and 31. These aligned slots are provided to receive a length of the tubular casing 34 which is to be cut. One of the pivot pins connecting the rods 22 to the lever 24 has an extension 35 which runs parallel to the tubular casing and is supported near its outer end in a bracket 35a rising from the bench 14.

Adjustably mounted on the rod 35 is a stop member 36 which serves as a gage for the length of casing that is to be cut off by the apparatus. This gage moves with the rods 22 and cross-head 23.

Mounted to slide horizontally and transversely to the casing 34 in the cross-head 19, are two pairs of jaws 37 and 38 and similarly two pairs of opposed jaws 39 and 40 are mounted in the cross-head 23. Each of these jaws is provided with a jaw-facing formed with a semicylindrical recess. The recesses in the jaws 37 and 39 are adapted to fit snugly on the tubular casing 34, while the recesses of the jaws 38 and 40 are of larger diameter so as to fit on a split bushing 41 which is applied to the casing 34. The bushing 41 may consist of two semicylindrical sections or it may consist of a single piece slit at one side, so that it may be spread open to fit over the casing 34 and then be closed upon said casing.

As shown in Fig. 4 the casing 34 consists of a series of longitudinal wire members which are spirally laid with a comparatively

long pitch and are held in place between an inner spiral coil not shown, and by an outer spiral coil 42. The split bushing 41 is formed with a spiral corrugation so as to fit over and between the coils of the spiral member 42. As shown particularly in Figs. 2 and 3, the opposed jaws 39 may be opened and closed by a handle 45. This handle is pivotally connected to the outer end of one of the jaws 39 and is also connected by means of a link 46 to the opposite end of the opposed jaw 39. It will be obvious that when the handle 45 is moved to the horizontal position shown in Fig. 3, the two jaws 39 will be moved inward to gripping position and when the handle is swung downward the jaws will be moved apart. Similarly, the other jaws are provided with operating handles and links. The handle 47 controls the jaws 40 and the handles 48 and 49 control the jaws 37 and 38 respectively.

As shown in Fig. 4, the casing 34 is adapted to have a ferrule or fitting 50 secured to one end thereof and a fitting 51 secured to the other end. The fitting 50 is formed with a sleeve portion which fits over the bushing 41 and with an outwardly projecting tapered nose portion 52. The fitting 51 is similarly provided with a sleeve portion which fits over the bushing 41 and has an outwardly projecting tubular extension 53 of reduced diameter. The fitting 51 is applied to the end of the casing 34 before it is severed from the stock and the fitting 50 is applied to the rear end of the casing section immediately after it has been cut off from the stock.

The method of applying the fittings to the casings is illustrated in Figs. 5 to 11, inclusive. The jaws 37, 38, 39 and 40 are opened and the cross-head 23 is moved toward the right by admitting fluid into the cylinder 28. The stock 34 is drawn through the aligned slots in the brackets and the cross-heads until the fitting 51 strikes against the stop 36. Then the jaws 39 are closed upon the stock as indicated in Fig. 5. A split bushing 41 is fitted over the stock and abutted against the jaws 39 after which the jaws 40 are closed upon the bushing, clamping it firmly to the stock, as in Fig. 6. Fluid is then admitted to the cylinder 28 to force the cross-head 23 toward the cross-head 19 and thereafter the jaws 37 and 38 are closed. As shown in Fig. 7, the jaws 38 will clamp the bushing 41 and the jaws 37 will grip the stock and abut against the rear end of the bushing. By means of a cutter 54, a cut is made through the bushing and the stock, leaving a portion of the bushing on each cut end with a part projecting from each pair of jaws 38 and 40. The cross-head 23 is then moved away from the cross-head 19. A holder 55 is used to hold the fitting 50 as it is applied to the section of casing held between the jaws 40 and 39. This holder is formed with a tapered opening to

receive the nose 52 of the fitting 50 and has a shoulder 56 adapted to bear against a shoulder 57 of said fitting. The holder is also formed with a recess 58 to clear the stock held by the jaws 38 so that it can be abutted against the side of said jaws, as illustrated in Fig. 8. The cross-head 23 is now again moved toward the cross-head 19 by admitting fluid into the cylinder 28 thereby forcing the bushed end of the casing section into the sleeve portion of the fitting 50. As soon as the bushed end has entered the fitting, the jaws 40 are opened so as to clear said fitting, and the parts then assume the position shown in Fig. 9 with the fitting 50 forced tightly on the bushed rear end of the casing section 34. The cross-head 23 is then withdrawn toward the right and the casing section is removed from the jaws 39.

A holder 60 is used in applying the fitting 51 to the bushed end of the stock held in the jaws 38 and 37. This holder is a tubular member which fits over the part 53 and abuts against a shoulder 61 of the fitting 51. The holder 60 is formed with a reduced extension 62 adapted to be engaged by the jaws 40 in the manner illustrated in Fig. 10. The jaws 39 are left open but all of the other jaws are closed. The cross-head 23 is then moved toward the cross-head 19 to force the sleeve portion of the fitting 51 upon the bushed end of the stock held in the jaws 38. As soon as said bushed end has entered the fitting 51, the jaws 38 are opened to clear the bushing 41 while the latter is forced home on the bushed end of the stock. This completes a cycle of operations, and it will be noted that in each cycle a fitting 50 is applied to the rear end of the casing section which has been severed from the stock and a fitting 51 is applied to the bushed end of the stock.

Initially the stock is bound at the end by means of a wire wrapping, so as to keep the parts thereof from flaring outward or becoming displaced, and to apply the first fitting 51 on the end of the stock, the operations shown in Fig. 6, 7, 10 and 11 are carried out omitting the operations shown in Figs. 8 and 9. The portion of wire-bound stock and the half bushing 41 which remain in the jaws 39 and 40 after the severing operation are thrown away. To avoid cutting the bushing and wasting half of it when applying the initial fitting to the stock a half length bushing can be clamped about the stock in the jaws 38 prior to the severing operation.

While I have described my invention as applied to a particular form of casing and fitting therefor, it will be obvious that the same process could be used with stranded structures that are not hollow and also with structures made of coiled ribbon stock as well as wire structures. It will, therefore, be understood that the description given above is to be taken as illustrative and not

limitative of my invention, and that I am at liberty to make such changes in form, construction and mode of procedure as fall within the spirit and scope of the following claims.

I claim:

1. In the method of cutting off sections from a stock of stranded structure and applying fittings to the cut ends, the steps which consist in applying a bushing about the stock where it is to be severed, clamping the bushing thereon, severing the bushing and the stock to leave a portion of the bushing on each cut end, separating the bushed ends, and applying a fitting on each of said bushed ends separately.

2. In the method of cutting off sections from a stock of stranded structure and applying fittings to the cut ends, the steps which consist in applying a bushing about the stock where it is to be severed, clamping the bushing thereon at each side of the point where the stock is to be severed, severing the bushing and the stock at said point to leave a portion of the bushing on each cut end, separating the bushed ends, applying a fitting on each of said bushed ends separately, and unclamping each of said bushed ends while the fitting is being forced thereon.

3. In the method of cutting off sections from a stock of stranded structure and applying fittings to the cut ends, the steps which consist in applying a bushing about the stock where it is to be severed, clamping the bushing thereon at each side of the point where the stock is to be severed, severing the bushing and the stock at said point to leave a portion of the bushing on each cut end, separating the bushed ends, introducing a fitting between said ends, approaching said ends to force the fitting on one of said ends, simultaneously unclamping the bushing portion on which the fitting is being forced, again separating the ends, and applying a fitting on the other of said ends.

4. In the method of cutting off sections from a stock of stranded structure and applying fittings to the cut ends, the steps which consist in applying a bushing about the stock where it is to be severed, clamping the bushing thereon at each side of the point where the stock is to be severed, severing the bushing and the stock at said point to leave a portion of the bushing on each cut end, withdrawing the severed section from the stock without unclamping the bushing portion on said section, introducing a fitting between said section and the stock, advancing said section toward the stock to force the fitting on the severed section, simultaneously unclamping the bushing portion on which the fitting is being forced, again withdrawing said section from the stock and applying a fitting on the freshly cut end of the stock.

5. In the method of cutting off sections

from a stock of stranded structure and applying fittings to the cut ends, the steps which consist in applying a bushing about the stock where it is to be severed, clamping the bushing thereon at each side of the point where the stock is to be severed, severing the bushing and the stock at said point to leave a portion of the bushing on each cut end, withdrawing the severed section from the stock, introducing a fitting between the freshly cut ends, approaching said ends to force the fitting on the severed section, simultaneously unclamping the bushing portion on which the fitting is being forced, protecting the freshly cut end of the stock from pressure by the fitting as the two ends are approached, again withdrawing the severed section, and applying a fitting on the freshly cut end of the stock.

6. In the method of cutting off sections from a stock of stranded structure and applying fittings to the cut ends, the steps which consists in applying a bushing about the stock where it is to be severed, clamping the bushing thereon at each side of the point where the stock is to be severed, severing the bushing and the stock at said point to leave a portion of the bushing on each severed end, separating the cut ends, applying a fitting on the freshly cut end of the severed section, simultaneously unclamping the bushing portion on said end, removing the severed section, and applying another fitting on the freshly cut end of the stock.

7. In the method of cutting off sections from a stock of stranded structure and applying fittings to the cut ends, the steps which consist in applying a bushing about the stock where it is to be severed, clamping the bushing thereon at each side of the point where the stock is to be severed, severing the bushing and the stock at said point, withdrawing the severed section from the stock, introducing a fitting between said ends, providing a fixed support for the fitting, approaching said ends to force the fitting on the severed section, simultaneously unclamping the bushing portion on which the fitting is being forced, removing the severed section, placing another fitting in a holder, advancing the holder toward the freshly cut end of the stock to force the latter fitting thereon.

In testimony whereof, I have signed this specification.

GORMAN C. BURD.