March 22, 1960 T. A. GULEMI 2,929,285

METHOD AND MACHINE FOR STRIPPING METAL BRAID FROM THE END OF SHIELDED WIRE OR CABLE

Filed Nov. 26, 1956 4 Sheets-Sheet 1

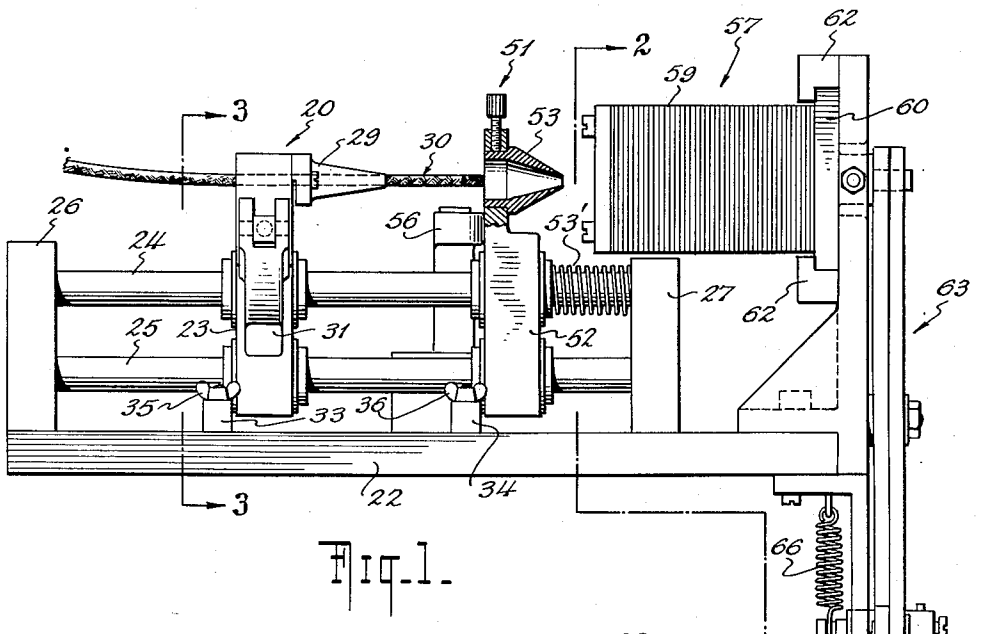


Fig. 1.

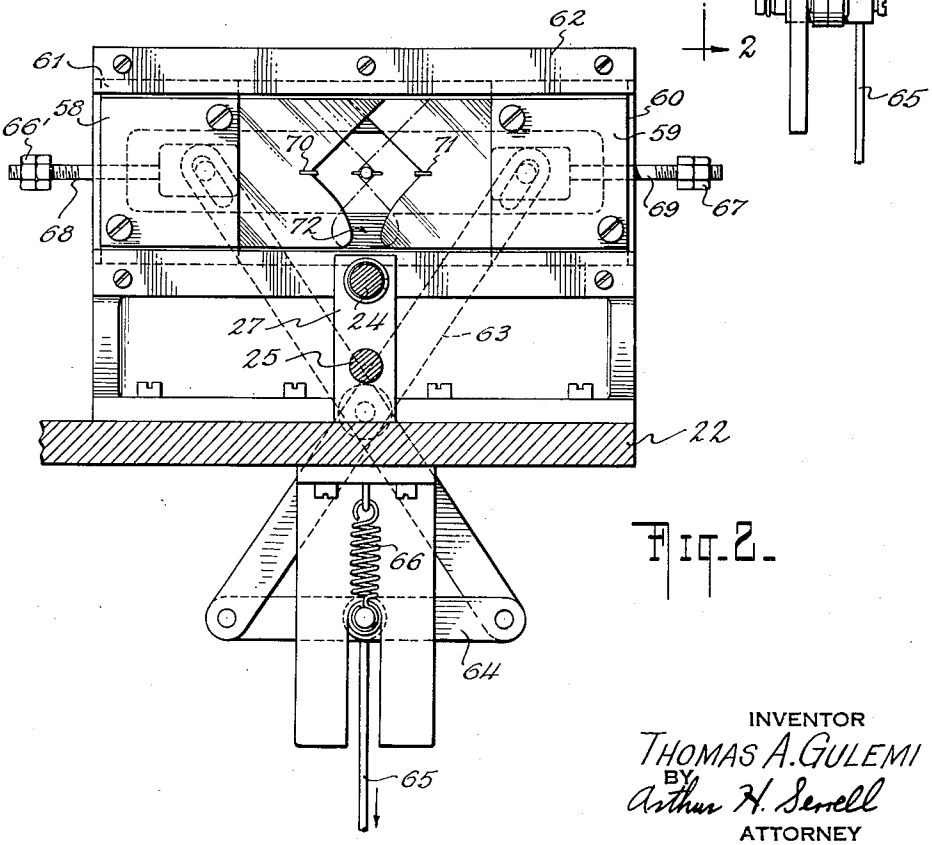


Fig. 2.

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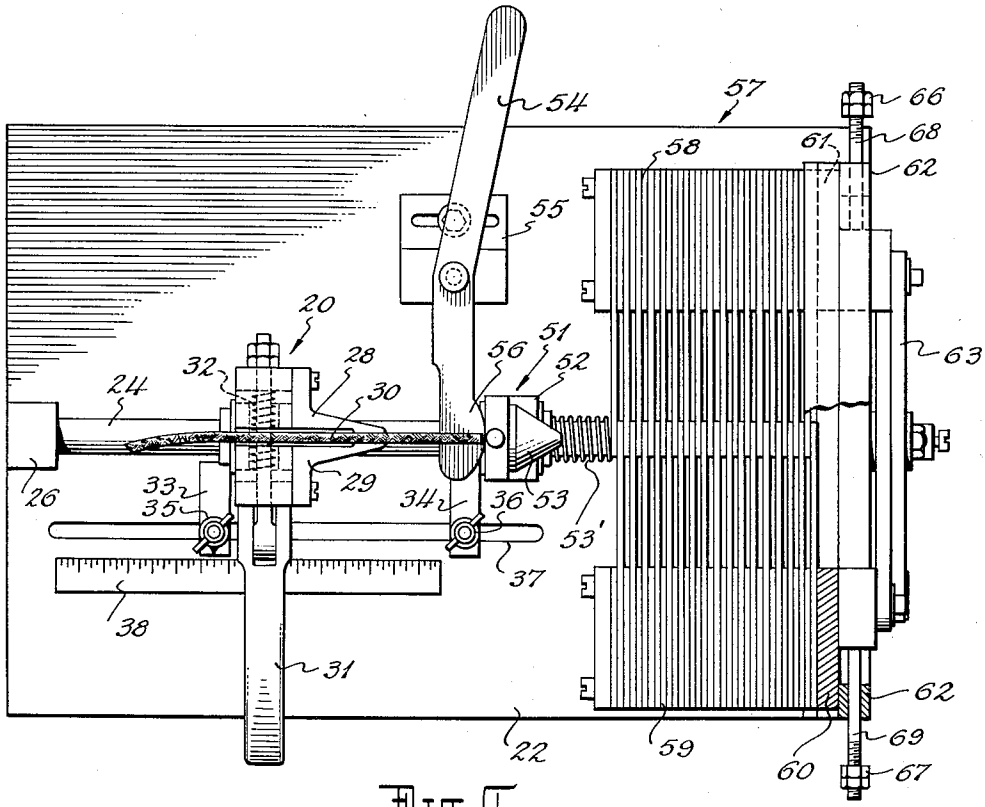


FIG. 4.

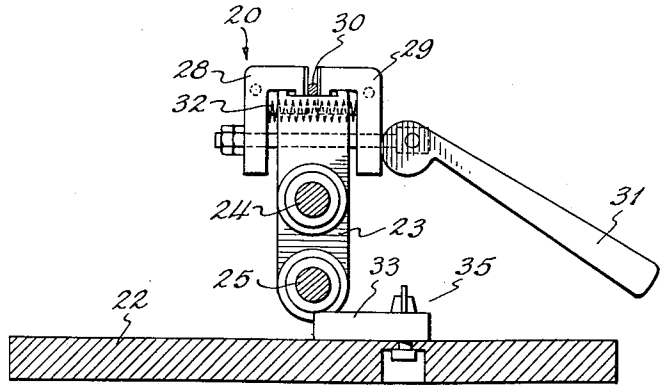


FIG. 3.

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Fig. 5.

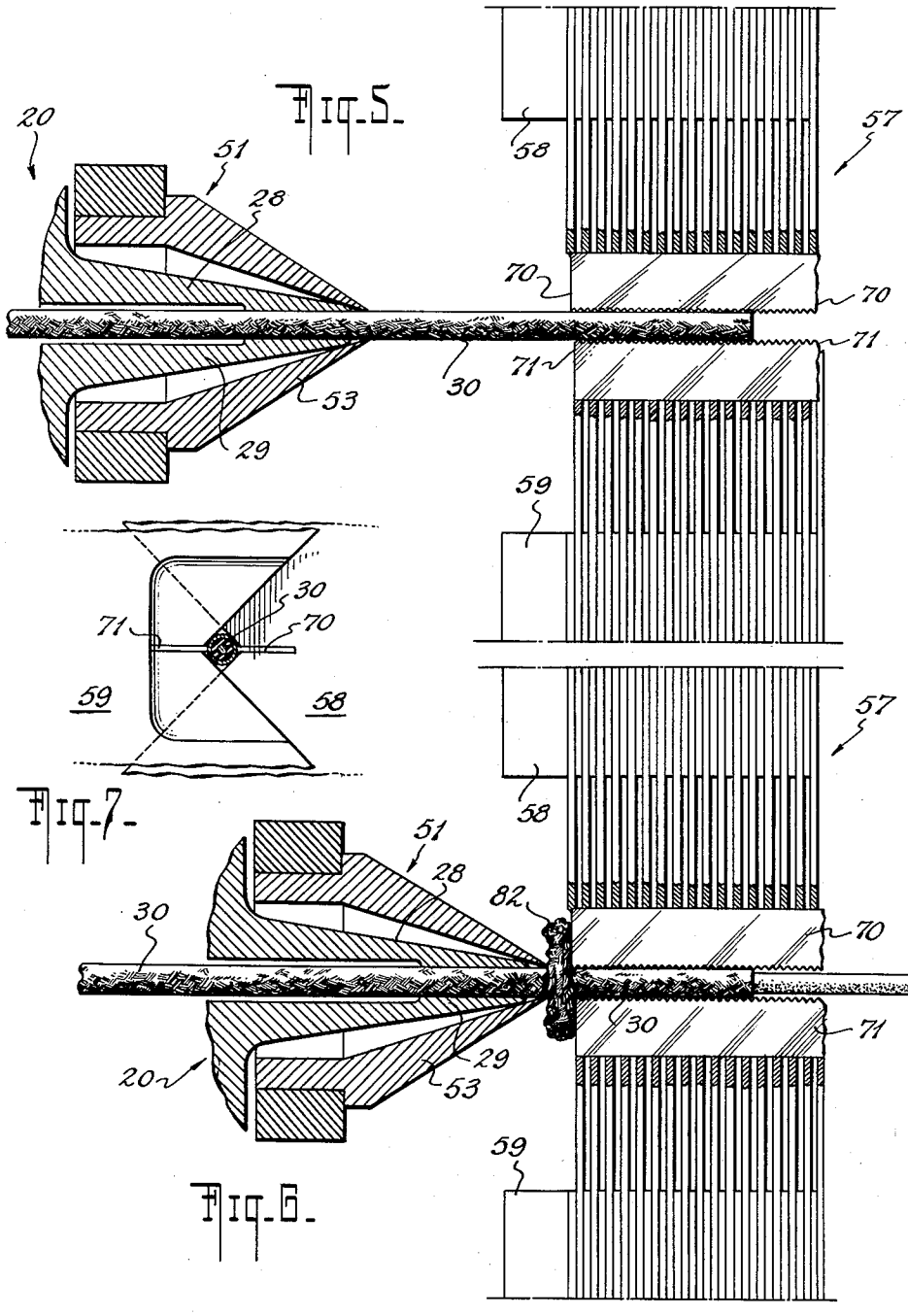


Fig. 7.

Fig. 6.

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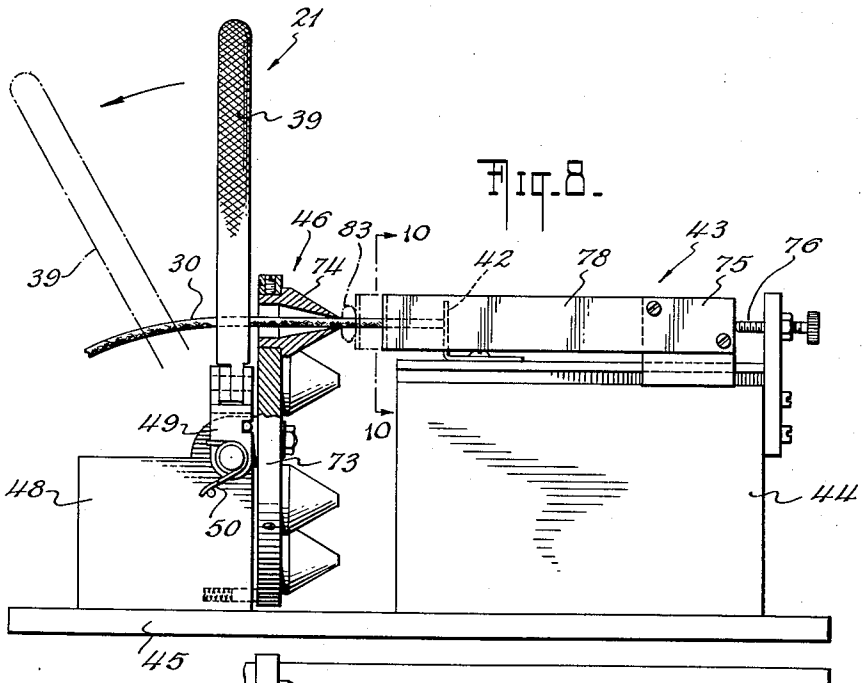


Fig. 8.

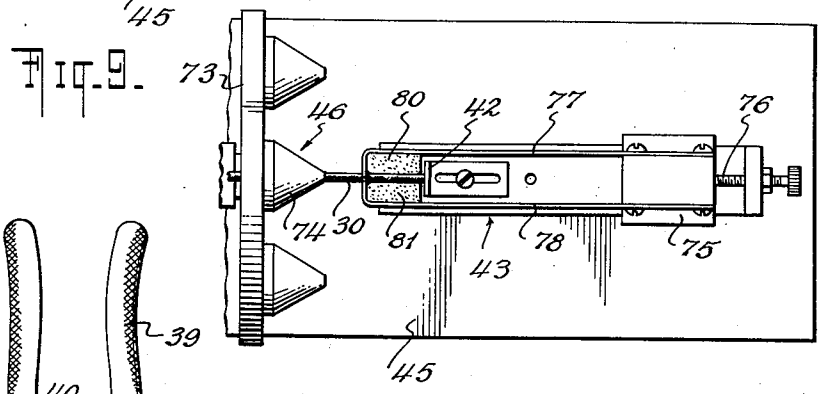


Fig. 9.

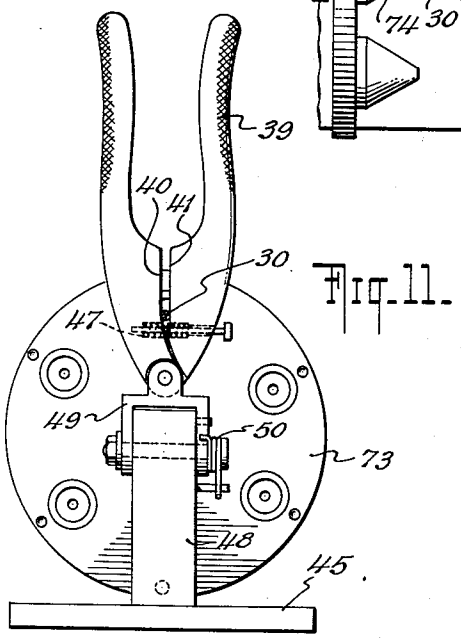


Fig. 11.

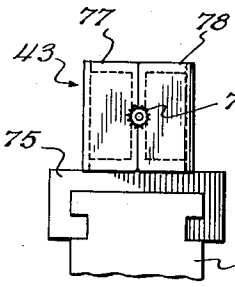


Fig. 10.

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2,929,285

METHOD AND MACHINE FOR STRIPPING METAL BRAID FROM THE END OF SHIELDED WIRE OR CABLE

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Application November 26, 1956, Serial No. 624,305

7 Claims. (Cl. 81—9.51)

This invention relates to a method and machine for stripping metal braid from the end of shielded wire or cable. Shielded wire is insulated wire having around it a braided conductor of tinned copper or other metal.

In order to strip or remove the braid at the ends of wire of this type to make electrical connections, it has heretofore been necessary to employ small hand tools to bunch the braid away from the insulated body of the wire in order to cut it. The thusly conditioned braid was then cut by manipulation of the operator in rotating the wire at the area of the braid where it was bunched with relation to a rotating blade type of cutter. Due to the fact that such procedure required the human operator to hold the bunch in the braid as well as to move the wire in relation to the cutter, the results of the operation were irregular and accordingly unsatisfactory. The edges of the braid stripped in this manner usually were frayed, ragged and uneven.

The primary objects of the present invention are to provide a shield stripping method in which the braid is cut uniformly to obtain satisfactory results, in which the break in the braid is even and clean, and in which the length of the braid stripped is predetermined.

A machine operable in accordance with the improved method includes a braid cutting member or knife having a circular cutting edge making a close fit with the braid of the wire through which the wire is threaded in a lengthwise condition. It also includes cooperative braid holding means at the threaded side of the cutting means and braid and wire holding means at the other side of the cutting means operable to bunch the braid on the threaded side of the cutting means. The braid and wire holding means or member of the machine is a movable element operable to unthread the wire from the cutting means in stripped condition. The enumerated machine components constitute common novel structural features found in the respective physical embodiments teaching the improved method illustrating the present inventive concepts in the accompanying drawings. The braid bunching step in the method is effected in the respective machines by changing the longitudinal relation between the braid and the braid and wire. In one machine this is accomplished by holding the braid stationary at one point and moving the braid and wire at another point with relation to it. In the other machine, it is accomplished by holding the braid and wire stationary at one point and moving the braid at another point with relation to the point where both braid and wire are held stationary. The first of the noted machines further includes a feed member or means for threading the wire to the cutter and the cutter is a movable element. In the other machine the wire is threaded by the operator of the machine and the cutter component is a stationary element.

Other objects and practices of the improved method and structural features of the machines functioning in accordance therewith will become apparent in the following detailed description of the subject invention in relation to the accompanying drawings, wherein:

Fig. 1 is a side elevation of a machine of the type utilizing a feeding member for threading the wire in which the braid cutter member of the combination is translatably mounted with relation to the wire,

Fig. 2 is a cross section view taken in lines 2—2, in Fig. 1,

Fig. 3 is a cross section view taken on lines 3—3, in Fig. 1,

Fig. 4 is a plan view of the machine shown in Fig. 1,

Figs. 5 and 6 are enlarged cross sectional views along the axis of the wire showing the operations of the braid and wire holding member, the cutter and the braid holding member in the braid bunching step of the improved method as practiced in the machine shown in Figs. 1 and 4,

Fig. 7 is an enlarged cross sectional view perpendicular to the wire showing the operation of the jaws of the braid holding member in the machine illustrated in Figs. 1 and 4,

Fig. 8 is a side elevation of a modified type of machine in which the braid holding member is translatably mounted to move the braid along the axis of the wire,

Fig. 9 is a partial plan view of the machine shown in Fig. 8,

Fig. 10 is a sectional view taken on lines 10—10, in Fig. 8, and

Fig. 11 is an end elevation of the machine shown in Fig. 8.

The step required in the improved method of threading the cutter may be accomplished manually by the physical movements of the operator utilizing the machine in Fig. 8, or may be automatically accomplished by a combination braid and wire feeding and holding member or means such as generally indicated at **20** in Fig. 1. The equivalent of the element **20** is provided in the machine shown in Fig. 8 in the form of a member or means **21** which likewise functions to hold both the braid and wire. The members **20** and **21** are also both movable with respect to the cutter provided to unthread the wire therefrom in stripped condition.

As shown in Figs. 1, 2 and 3, the member **20** is a translatably mounted component that is moved by the operator through a predetermined feed distance with relation to the base **22** of the machine. This component includes a body **23** that is mounted in parallel guide rods **24** and **25**, the respective ends of which are secured to the axially spaced vertical posts **26, 27** extending from and suitably attached to the base **22**. In the threading step involved in the practice of the method by the machine shown in Fig. 1, the braid and wire is gripped in the jaws of the combination feed and holding member or means **20** at a predetermined distance from the end to be stripped, the jaws holding the wire so that with movement of the member **20** the wire is correspondingly moved axially or lengthwise through a predetermined distance. As shown in Fig. 3, the jaws are spaced clamps **28, 29** that firmly hold the wire and braid **30** together between the juxtaposed faces thereof when the operator of the machine moves the cammed end operating handle **31** against the action of the open jaw biasing spring **32** to grip the wire. The handle **31** also functions as the operating means provided for the operator of the machine to move the member **20** through its permitted range of translation on rods **24, 25** with respect to the base **22**.

The length of the braid to be stripped from the wire in the machine of Fig. 1 is determined by the amount of wire to be threaded through the cutter. This is regulated in the present instance by a pair of stops **33** and **34** that cooperate with the body **23** of the member **20** in determining its operating limits. Wing fasteners **35** and **36** for the respective stops **33** and **34** may be secured in the position desired in the longitudinal slot **37** provided to

receive the same in the base 22. As shown, stop element 33 defining the initial feed position of the member 20 may be provided with an index that is readable on a suitable scale 38. The scale may be calibrated in unit of length indicative of the amount of braid to be stripped from the wire. In the practice of the method in the machine shown in Fig. 1, the stop 34 is set to limit the extent of the secondary feeding movement of the member or means 20. The clamps 28, 29 of the feed and holding member 20 grip both the braid and wire 30 to facilitate movement of the same lengthwise in a direction parallel to the rods 24 and 25 in the vertical plane provided by the structure of the machine in Fig. 1.

The corresponding element 21 shown in Figs. 8 and 11 consists of hand operated pliers 39 whose oppositely aranged jaws 40, 41 are adapted to grip the wire and braid 30 and accordingly provide a holding member or means for the same. In this form of the invention, the member 21 cooperates in the performance of the braid bunching step and is effective in the unthreading step of the improved method. The length of the braid to be stripped, in this instance, is determined by the setting of a translatably mounted stop member 42 that is disposed in the path of the wire threaded through the cutter member and is located in the braid gripping component 43 of the combination of parts constituting the machine shown in Fig. 8. As shown in Fig. 9, the stop member 42 is a bracket with a slot and screw connection to a mounting plate 44 fixedly arranged on the base 45 of the machine. In the practice of the method with this machine, the end of the wire to be stripped is threaded through the cutter means or member 46 of the machine in a lengthwise condition until it abuts the stop member 42. Accordingly, the step comprises threading a predetermined length of wire in a lengthwise condition through the circular cutting edge on a stationary knife making a close fit with the braid. The holding step performed after the wire is threaded is accomplished by the operator in closing the jaws of the pliers 39 which constitutes the holding member. The spring 47 of the pliers normally biases the jaws thereof to an open condition. The influence of the spring 47 is overcome by the operator of the machine in the performance of this step of the improved method. As shown, the pliers 39 are also mounted on the base 45 by a fixed mounting plate 48 and a pivotally mounted connecting bifurcated piece 49. Spring 50 between the piece 49 and plate 48 normally urges the member 21 so that the arms of the pliers 39 are located in an upright position as shown in the full lines in Fig. 8 wherein the jaws of the holding member 21 are arranged in axially spaced relation to the cutting member 46 to the unthreaded side thereof. With the structure described, the member 21 is also movable against the action of spring 50 about the axis of piece 49 to the dotted line position shown in Fig. 8, such movement occurring in the unthreading step of the method due to the action of the operator of the machine while holding the pliers in closed condition. The holding member or means 21 gripping the braid and wire is a component that is movable in relation to the cutting means or member 46 for the purpose of unthreading the wire therefrom.

In the practice of the method by operation of the machine of Fig. 1 the member 20 is set in its initial position against the stop 33 which is adjusted as desired with relation to the scale 38. The cutting member or knife 51 shown in Fig. 1 is a movable component of the machine consisting of slide body 52 on the rods 24, 25. An illustrative cutting die 53 for the particular wire being used is removably mounted in the body 52. As shown, the die 53 has a circular cutting edge therein that makes a close fit with the braid of the wire, the member 51, in this instance being axially movable along the wire. The cutting member 51 is positioned with relation to the base 22 by a spacing spring 53' between post 27 and the body 52 of the same. When the feed member is returned to its initial position in the unthreading step of the method as practiced in operation of the machine of Fig. 1, it may be desirable to hold the cutting member 51 with relation to the wire against the action of spring 53'. To accomplish this purpose, I provide a hand-operated lever 54 that is adjustably mounted on the base 22 with relation to the rods 24, 25 on a block 55. The cammed end 56 of the lever 54 is engageable with the body 52 of the cutting means 51 to hold the same in an advanced position as hereinafter described against the influence of the spring 53'. In this arrangement, the holding member 20 is axially spaced with relation to the cutting member 51 on the unthreaded side thereof. With the parts conditioned as represented in Figs. 1 and 4, the operator moves handle 31 to grip both the braid and wire between the jaws of clamps 28, 29 at a predetermined distance from the end of the wire which distance is determined by the position of the cutter means 51 and the setting of stop 33. The feed member 20 is adapted to move the wire and braid axially through a predetermined distance as determined by the spacing between the stops 33 and 34, such movement in this instance being effected by the operator of the machine through the handle 31. Movement of the member 20 by the operator effects the threading step of the method as practiced in the machine of Fig. 1. This step comprises threading the gripped wire through the circular cutting edge of a knife making a close fit with the braid by movement of the feed member through a predetermined distance less than the predetermined feeding distance. This distance is determined by engagement of the tapered ends of the jaws of the clamps 28, 29 within the interior of the circularly open cutting die as represented in Fig. 5. As depicted in this figure, the threaded portion of the wire 30 is to the right side of the cutting edge of the knife. The unthreaded portion of the wire is to the left side of the cutting edge of the knife. In this position of the components, element 20 acts as a member that holds both the braid and wire in an axially spaced relation close to the opening in the cutter on the unthreaded side of the wire.

The next step in the practice of the improved method is the gripping of the braid at the end of the wire apart from the wire in the jaws of a second holding member arranged in spaced axial relation at the threaded side of the knife member to facilitate relative axial movement between the braid and the wire. The braid holding means 57 utilized in the machine of Fig. 1 is a machine component that, in this instance, is stationary with respect to the wire. As particularly shown in Figs. 1, 2, 4, 5 and 6, the member 57 is formed of a number of interfitting slide plates that act as jaw defining elements 58, 59 adapted to engage the braid of the wire apart from the wire. The respective jaws have slide parts 60, 61, that move in a guide defining element 62 that is suitably fixed to the stationary base 22 of the machine. The means for operating the jaw elements 58, 59, is provided by a lazy tongs type of lever connection designated at 63, one of the lever arms being pivotally connected to slide part 61 and the other lever arm being connected in like fashion to the slide part 60. The opposite arms of the tongs are interconnected by an operating link 64 that is actuated by a rod 65 connected to a suitable treadle mechanism (not shown) under control of the operator of the machine. A spring 66 between the base 22 and the link 64 normally maintains the arms of the lazy tong lever in open condition with the respective interfitting jaw members 58, 59 correspondingly positioned. By stepping on the treadle, the operator of the machine moves the rod 65 in the direction of the arrow in Fig. 2 to effect movement of the jaws 58, 59 relative to one another to a gripping condition through the lazy tongs lever 63. As the jaws in this component of the machine have to grip the braid apart from the wire, the relative movement therebetween is controlled for different wire

sizes by the stop nuts 66', 67 on the rods 68, 69 fixed to and movable with the respective slide parts 61, 60. The stop nuts 66', 67 engage a fixed portion of the guide 62 in which the rods on which the nuts are adjustably mounted make a slide fit. The nuts 66', 67 accordingly limit the extent of the relative movement of the jaws 58, 59, to a braid gripping condition that is such as to enable the jaws to grip only the braid of the wire. The interfitting plates of the respective jaw parts 58, 59 extend along the axis of the lengthwise conditioned wire. As shown in Figs. 2, 5 and 7, the internally notched plate of each of the parts 58, 59 have a uniform slot therein adapted to receive a sawtooth blade member as respectively indicated at 70 for part 58 and at 71 for part 59. Both Figs. 5 and 6 show the saw blades 70, 71 in gripping relation to the braid of the wire along its axis. A cross sectional view of the same engagement of the components is presented in Fig. 7. The means provided to operate the braid gripping member 57 is constituted of the lazy tongs lever 63, link 64, and the rod 65. As particularly shown in Fig. 2, the interfitting plates of the jaw members 58, 59 are constructed so as to obtain an opening 72 through which the stripped braid may fall from the member 57 by the action of gravity thereover. The braid gripping step of the method is performed on the machine in Fig. 1 by actuation of the rod 65 to move the jaw members 58, 59 so that the toothed blades 70, 71 grip the braid of the stationary holding member 57 while facilitating relative axial movement between the wire and braid.

The machine shown in Fig. 8, employs a turret 73 pivotally mounted on the fixed plate 48 having a plurality of angularly arranged cutting dies of different sizes thereon. The particular die 74 utilized, in this instance, is of the same structure as the heretofore described die 53, the die selected being one whose opening makes a close fit with the braid of the wire. The cutting means or member 46 in this machine is a stationary component.

The braid holding means or member 43 in the machine of Fig. 8 is a translatably mounted component that is moved by the operator lengthwise of the wire 30 with respect to the stationary cutting means or member 46 and with respect to the braid and wire holding means or member 21. As shown in Figs. 8, 9 and 10, member 43 includes a slide block 75 movable along a track provided on the fixed mounting plate 44. The range of translatory motion of the block 75 may be adjusted by a screw element 76 that is threaded in an extension fixed to the plate 44. The cutting member 46 defines the fixed second limit for the slidable braid holder 43. The braid holding member 43 further includes two oppositely disposed jaws or spring fingers 77, 78 connected at one end to the block 75 that are normally biased in an open condition. The forward end of the fingers 77, 78 come together as shown in Fig. 10 and provide a toothed opening 79 therebetween adapted to engage the braid of the wire. Two rubber or flexible inserts 80, 81 attached to the fingers 77, 78 also hold the braid along the axis of the wire 30. Figs. 9 and 10 show the fingers 77, 78 in a braid gripping position as provided by the operator in pressing the fingers so as to contact the braid of the wire along its axis. The braid gripping step of the method as practised on the machine of Fig. 8 is provided by gripping the braid at the end of the wire apart from the wire in the jaws of a second holding member movable in relation to the cutting member and arranged in spaced axial relation at the threaded side thereof to facilitate relative axial movement between the wire and braid.

The braid bunching step of the method is accomplished by changing the longitudinal relation between the braid and wire to bunch the braid on the threaded side of the knife. In the machine of Fig. 1, this is accomplished by moving the wire with relation to the braid. In the machine of Fig. 8, the same result is accomplished by moving the braid with relation to the wire. In the performance of this step, the braid and wire holding means at the unthreaded side of the cutting means and the braid holding means at the threaded side of the cutting means cooperate, one of the components being movable with respect to the other to bunch the braid on the threaded side of the cutting means.

In the machine of Fig. 1, the braid bunching step is accomplished as shown in Figs. 5 and 6, by moving the cutting member 51 and the feed member 20 together through the effort of the operator at handle 31 to complete the stroke of the feed member 20 against the step 34. As shown in Fig. 6 the wire 30 is accordingly moved with relation to the braid which is held fixed by the member 57 to bunch the braid as indicated at 82 between the jaws of the stationary holding member 57 and the cutting member 51. The same result is accomplished in the machine of Fig. 8 by moving the braid holding member 43 with relation to the braid and wire holding member 21 to shorten the axial spacing between the jaws of the respective holding members. The operator of the machine of Fig. 8, holds member 21 stationary by the pliers 39 while sliding the braid gripping member 43 toward the cutting means 46. In this step of the method, the member 43 holding the braid is moved along the guiding plate 44 by the operator to its dotted line position in Fig. 8. This operation moves the braid in relation to the wire along the axis of the wire to a bunched condition as indicated at 83. The braid is accordingly bunched between the ends of the fingers 77, 78 and the cutting die or element 74.

The stripping step in the method is accomplished by moving the holding member 20 or 21 gripping both the braid and wire to unthread the wire from the cutting means. The braid is cut at the bunch by the knife and stripped from the wire as the wire is moved lengthwise by the action of the holding member 20 or 21 effected by the operator of the machine shown in Figs. 1 or 8. With regard to Fig. 1, particularly, the operator of the machine unthreads the wire from the cutting means 51 by returning the feed and holding member 20 to its initial feed position against stop 33. To complete the procedure, the wire and braid is then released from the jaws of the holding member 20 by proper movement of the handle 31 by the operator. The stripped portion of the braid is also released by the operator from the jaws of the braid holding member 57 through release of the operating rod 65. As the cutter member 51 is axially movable in the machine of Fig. 1, the operator of the machine may hold the member 51 in a stationary condition through the lever 54 in the unthreading step of the method. Where the braid holding member 57 is released prior to the unthreading step, it is unnecessary for the operator to hold the lever 54.

In the machine of Fig. 8, the unthreading step is performed by the operator through movement of the pliers 39 about its axis in the direction of the arrow shown in the figure. By this action, the braid of the wire is cut by the cutting means 46 where it is bunched and the wire is unthreaded from the cutting means in stripped condition. The operator then releases the pliers 39 whose jaws open to permit removal of the stripped wire from the holding member 21. The procedure is completed when the operator releases the fingers 77, 78 gripping the stripped braid and returns the member 43 to its initial operating position against the screw stop 76.

Since many changes could be made in the components utilized in the improved method and machines herein shown and described for stripping shielded wire, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limited sense, and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of the invention in its broader aspects.

What is claimed is:

1. A method of stripping metal braid from the end of shielded wire which consists in threading the end of the wire through a knife with a circular cutting edge making a close fit with the braid, changing the longitudinal relation between the braid and wire to bunch the braid on the threaded side of the knife, and unthreading the wire from the knife to cut the braid at the bunch and strip the cut braid from the end of the wire.

2. A method of stripping metal braid from the end of shielded wire which consists in threading the end of the wire through a knife with a circular cutting edge making a close fit with the braid, holding the braid and wire on the unthreaded side of the knife, holding the braid only on the threaded side of the knife, changing the longitudinal relation between the held braid and wire to bunch the braid on the threaded side of the knife, and unthreading the held wire and braid from the knife to cut the held braid at the bunch and strip the cut braid from the end of the wire.

3. A machine for stripping the metal braid at the end of shielded wire including a base, a cutting element on said base having a circular knife edge making a close fit with the braid of the wire through which the wire is threaded in a lengthwise condition, a first holding member on the base at the unthreaded side of the cutting element adapted to grip both the wire and braid along the axis of the wire, a second holding member on the base at the threaded side of the cutting element adapted to grip only the braid of the wire along the axis of the wire, means mounting said holding members on said base whereby one of the members is movable toward the other member along the axis of the wire to bunch the braid at the threaded side of the cutting element, and means mounting said first holding member and said cutting element on said base whereby the member and element are movable away from one another along the axis of the wire to unthread the wire from the cutting element and thereby cut the braid at the bunch and strip the cut braid from the wire.

4. A machine of the character claimed in claim 3, in which the braid and wire holding member is translatably mounted on the base to move along the axis of the wire with respect to the braid holding member.

5. A machine of the character claimed in claim 3, in which the braid holding member is mounted on the base to move along the axis of the wire with respect to the braid and wire holding member.

6. A machine of the character claimed in claim 3, in which the cutting element is translatably mounted on the base to move along the axis of the wire with respect to the braid holding member.

7. The combination in a machine for stripping the metal braid at the end of shielded wire of, cutting means having a circular knife edge through which the wire is threaded in lengthwise condition making a close fit with the braid of the wire, and means for bunching the braid on the threaded side of said cutting means including braid holding means at the threaded side of the cutting means and cooperable braid and wire holding means on the unthreaded side of the cutting means, one of said holding means being movable toward the other holding means along the axis of the wire to bunch the braid.

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