April 8, 1930. M. H. LANG 1,753,793

CABLE FORMING DEVICE

Filed Feb. 13, 1926 5 Sheets-Sheet 1

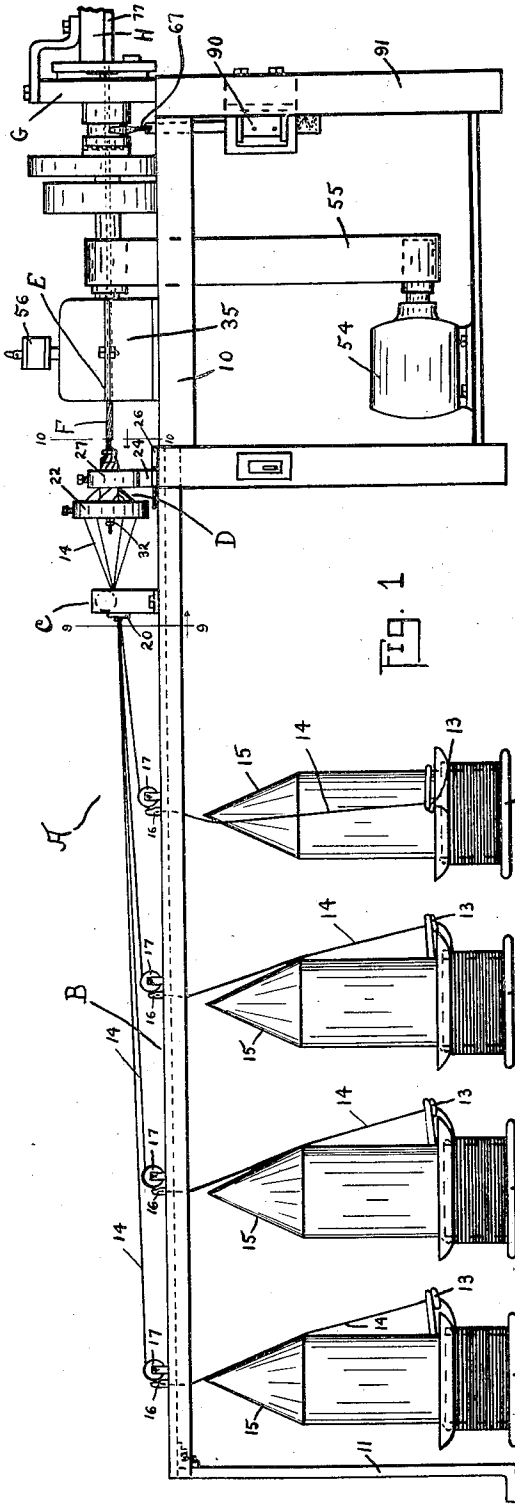

Fig. 1

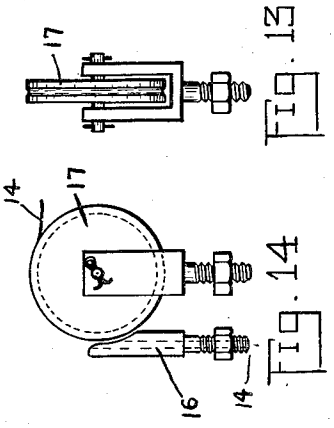

Fig. 13

Fig. 14

Fig. 12

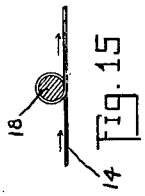

Fig. 15

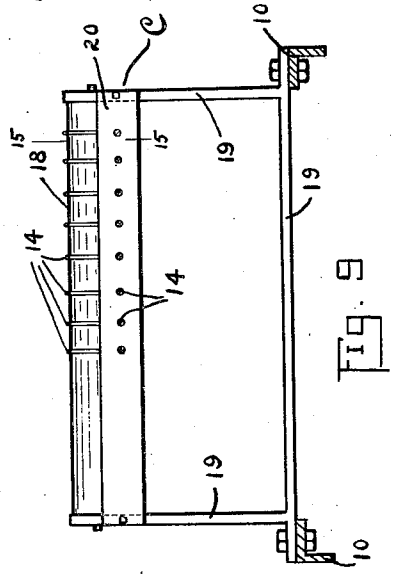

Fig. 9

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April 8, 1930. M. H. LANG 1,753,793

CABLE FORMING DEVICE

Filed Feb. 13, 1926 5 Sheets-Sheet 2

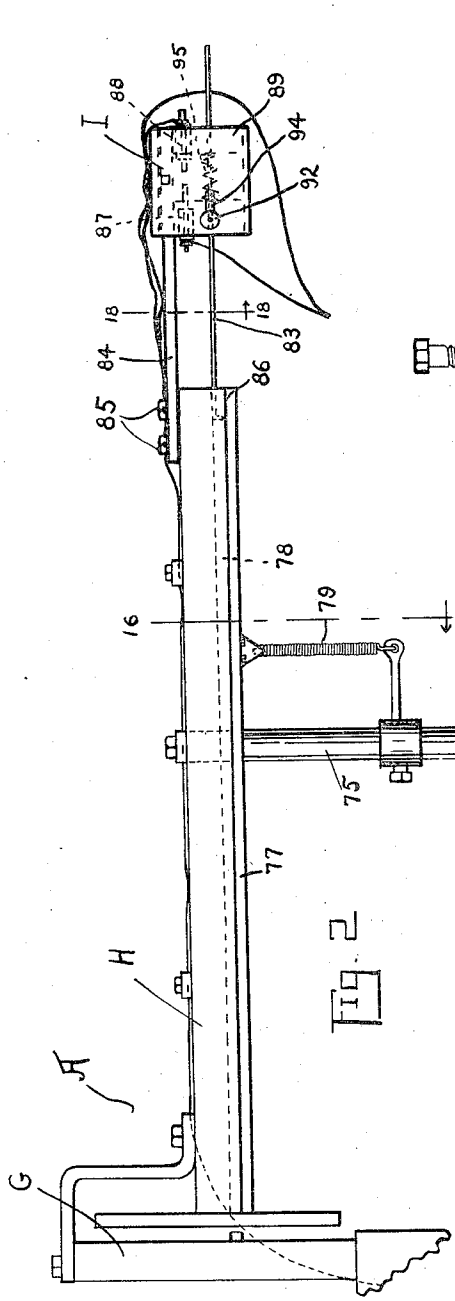

Fig. 2

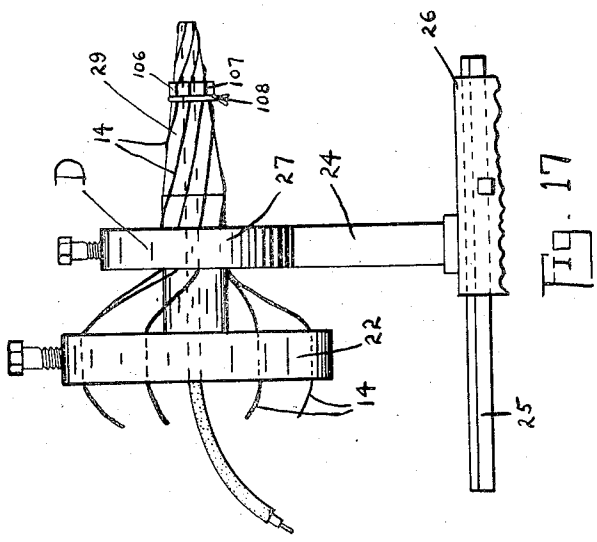

Fig. 17

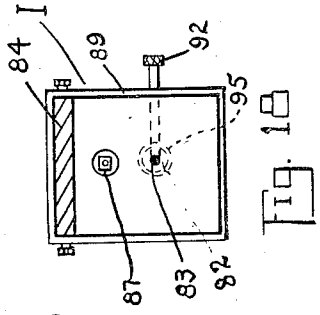

Fig. 18

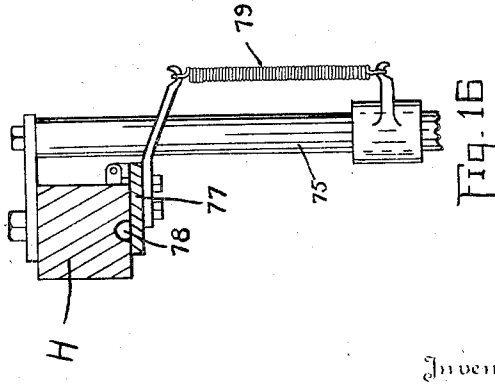

Fig. 16

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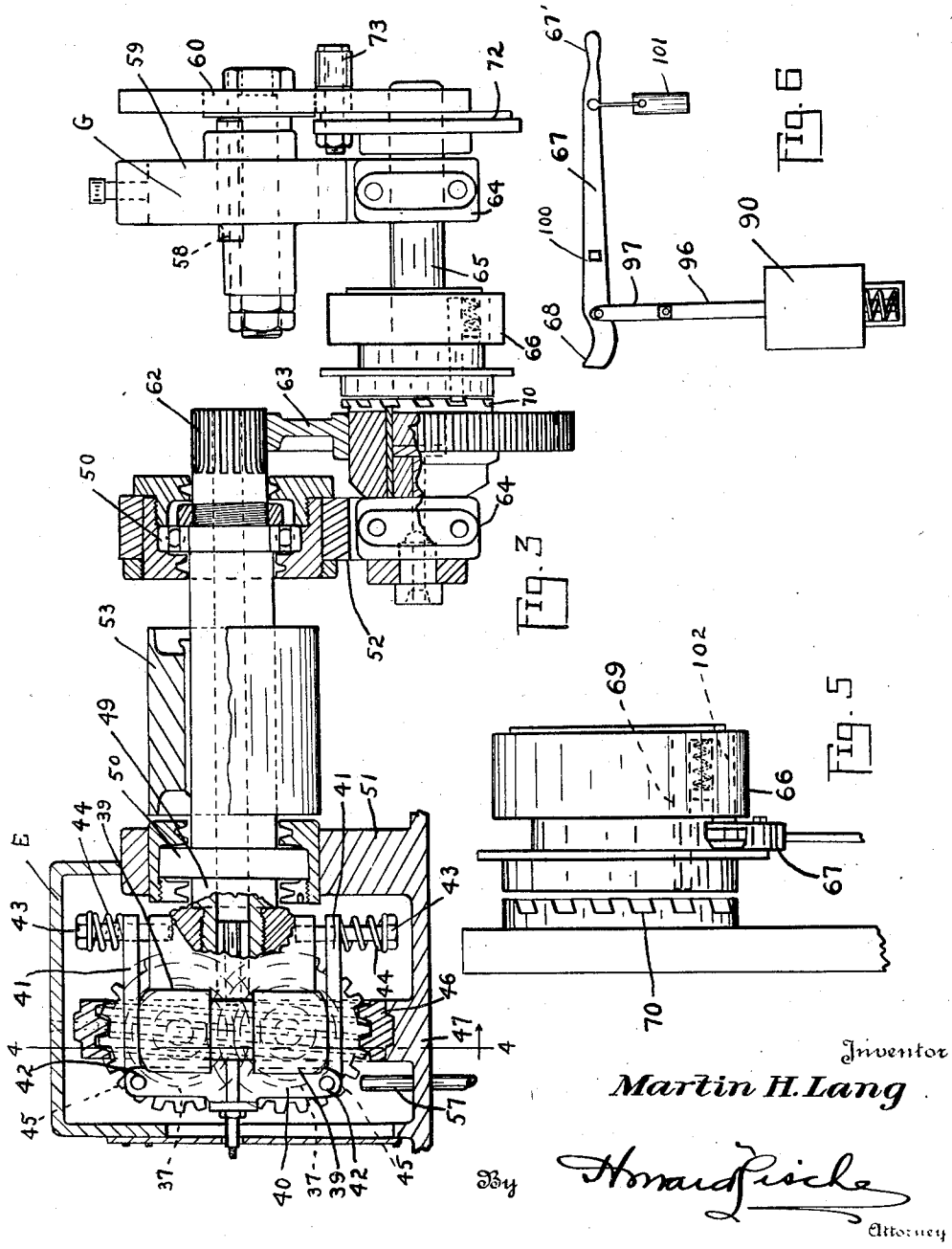
April 8, 1930. M. H. LANG 1,753,793

CABLE FORMING DEVICE

Filed Feb. 13, 1926 5 Sheets-Sheet 3



April 8, 1930. M. H. LANG 1,753,793

CABLE FORMING DEVICE

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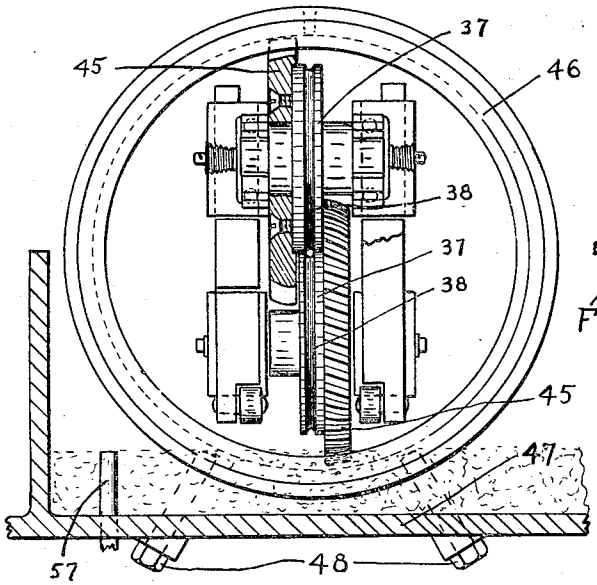

Fig. 4

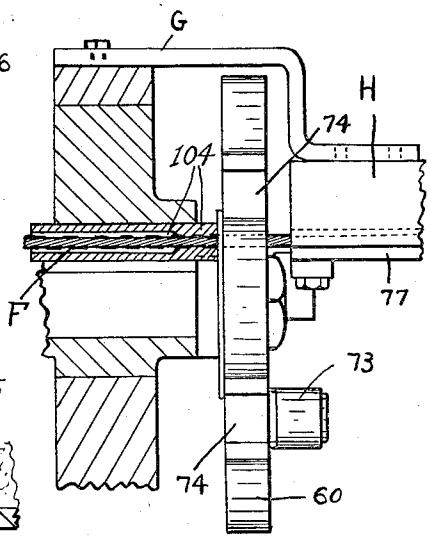

Fig. 7

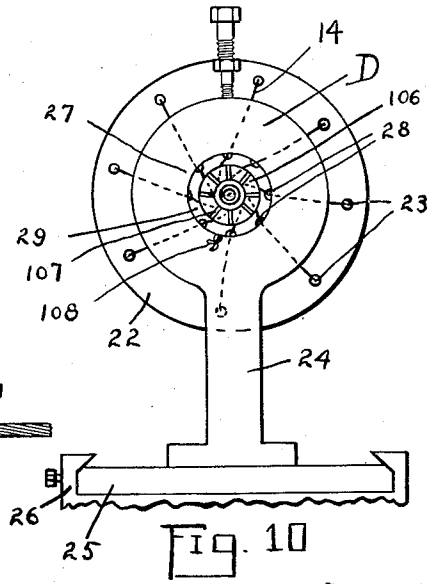

Fig. 10

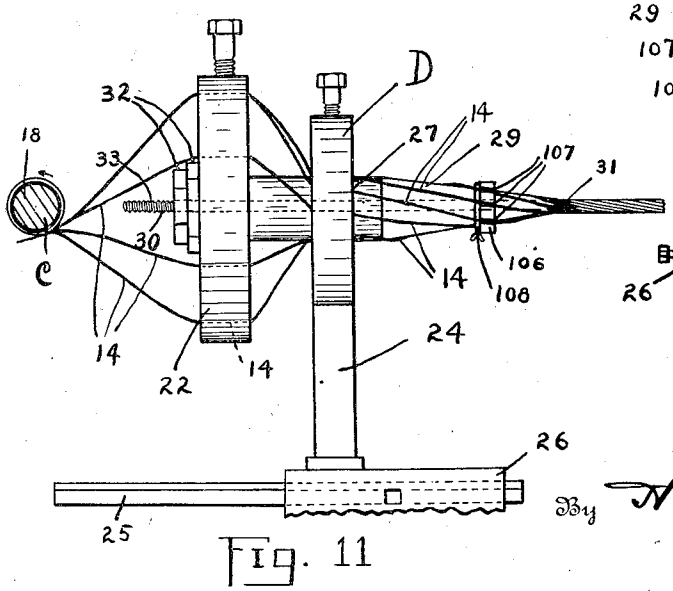

Fig. 11

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April 8, 1930. M. H. LANG 1,753,793

CABLE FORMING DEVICE

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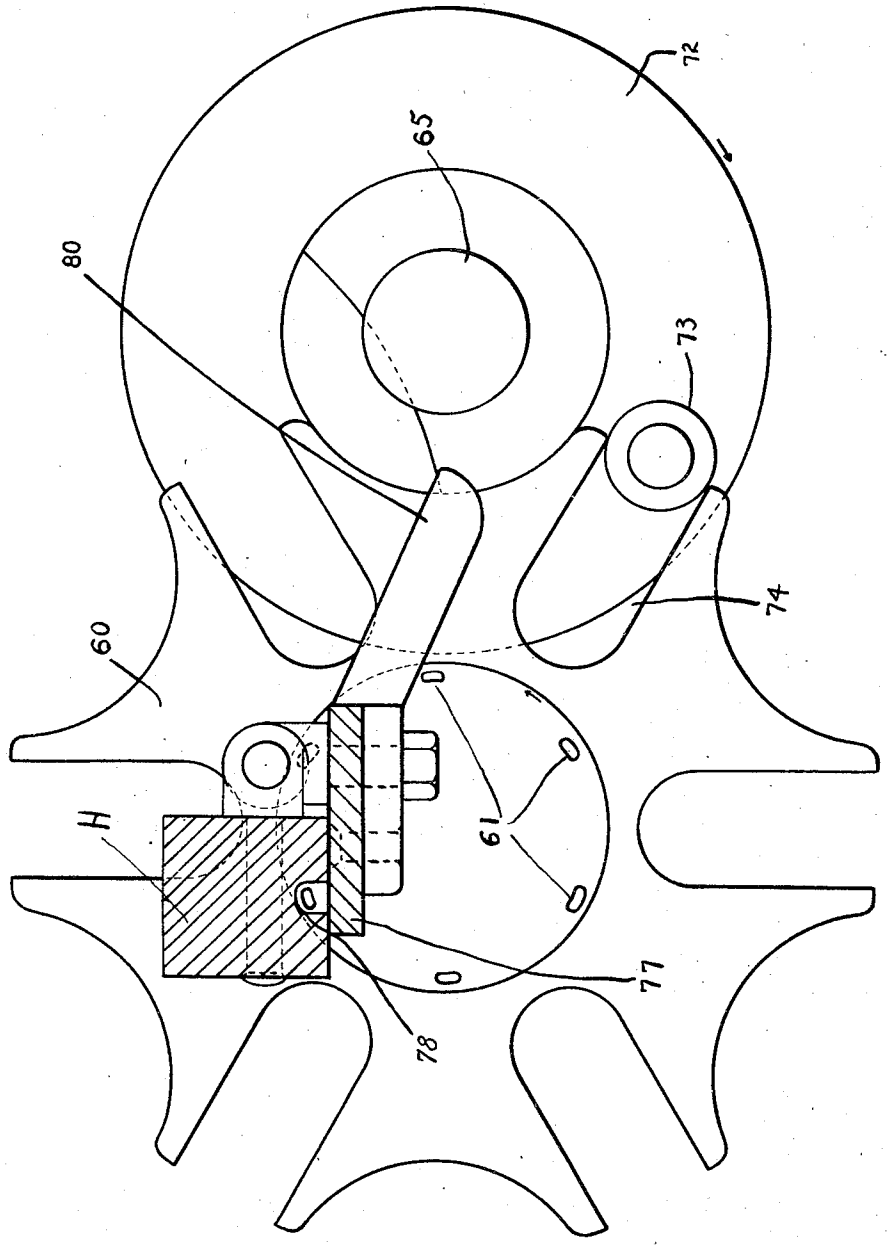

Fig. 8

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Patented Apr. 8, 1930 1,753,793

UNITED STATES PATENT OFFICE

MARTIN H. LANG, OF MINNEAPOLIS, MINNESOTA

CABLE-FORMING DEVICE

Application filed February 13, 1926. Serial No. 88,000.

My invention relates to a wire cable machine wherein it is desired to provide a wire cable of a uniform construction which is adapted to be used as a cable for bed springs, or for any other purpose where a wire cable with a hollow center is desired, or where it is desired to include in the cable electric insulated wires or a single wire.

A feature of the invention resides in the particular means for twisting the wire in a manner so that the cable made up of the wire strands is particularly uniform and stretchable or non-stretching yet having a hollow center.

The invention includes a particular means of feeding the individual strands to the forming and feeding head which may be designed to use a mandrel if it is desired and the means of engaging the wire by my feeding wheels which draw the wire through the same and pass the finished wire on through the wire cable machine in a manner so that a smooth, finished cable is formed very rapidly, and which may be cut off into any desired length.

The invention further includes means for automatically cutting off the wire into predetermined lengths, this automatic means being adjustable so that different length cables can be cut automatically, each cable being adapted to operate the automatic cutting off means as it extends through a receiving and holding member, the cable being discharged out of this member simultaneously with the cutting off of the cable. This construction provides a machine requiring very little attention in its operation as the wire cable is made up automatically after the machine is started and is formed in a manner so that the finished cables are dropped out of the machine one after the other very rapidly. The only attention which is practically necessary in the operation of the machine is to keep the feed cylinders with a supply of wire and to make the proper adjustment and connection if one of the wires break.

An important feature of my invention resides in the stationary feed wheels or spools which supply the wire from the individual spools to the forming machine. Further, this includes important detail of construction of the means which feeds the wire through the machine. The wire is pulled by this feeding means in a manner so that it is formed practically perfect in the size of the cable desired and with a hollow center, yet so closely and tightly formed together as to practically be non-stretching longitudinally if desired.

My machine is particularly designed to form radio wire cable which provides a radio cable having a very large area and permitting the radio waves to come in contact readily with the surface of the cable. An aerial cable of this nature is very desirable.

The invention includes electrical operating means for automatically operating the cutting off mechanism and the machine may be operated to cut off the cable by hand if it is desired.

A feature of the invention resides in twisting the wire into the desired size hollow cable, thus providing a means of forming the wire cable uniform and permitting the rotary feeding means to readily feed the finished twisted cable from the feeding head and up to the position to be cut off in the desired lengths.

My invention includes forming heads through which the wire passes which are adapted to twist the strands of the same to form the cable, and these forming heads, together with the rotary feeding means provides a device which forms a cable in a manner so that as the cable extends beyond and through the rotary feeding means there is no tendency of the strands of the cable to untwist whatsoever, thereby permitting the finished cable to be projected straight out of the machine and providing a uniform and finished cable product from the discharge end of my machine. The invention includes means for inclosing the rotary feeding means or head, and means for oiling the same automatically so as to keep the parts of the same well oiled, yet by centrifugal force the oil is prevented from coming in contact with the cable feeding wheels, and by means of a suitable overflow this oil is kept at a certain level within the casing of the feeding means.

A feature of the invention which is of pri-

mary importance owing to the fact that if the cable is not perfectly formed it is important that the machine stop forming the same. This is accomplished by means of my peculiar rotary feeding means which is designed to engage and draw through the machine a certain sized cable, then for instance, should one of the wires or strands of the cable break before it enters the feeding head, the cable would immediately or automatically stop feeding as the feeding wheels would not grip the same sufficiently to draw it through the machine even though the parts of the machine continue to operate, and thus I accomplish a very important feature for a machine of this nature. The forming heads remain stationary and the mandrel is held within the same by frictional engagement with the inside of the cable and strands forming the same, so that by means of this construction I provide a very simple yet extremely effective device adapted to form a cable of this nature.

These features, together with other objects and particular forms of construction will be more fully and conclusively set forth in the specification and claims.

In the drawings forming part of the specification:

Figure 1 is a side elevation of a portion of my machine.

Figure 2 is a side view of the other end of the same.

Figure 3 is a diagrammatic view, partly illustrating in section a portion of my machine including the rotary feeding means and cutting off mechanism.

Figure 4 is a section on the line 4—4 of Figure 3, a portion of which is broken away.

Figure 5 is a detail of the clutch mechanism of my machine.

Figure 6 is a diagrammatic view of the clutch operating handle and magnet.

Figure 7 is a detail partly in section, of the drop bar and cable guide.

Figure 8 is an enlarged end view of the same, illustrating in cross section the cable receiving box and the drop member which releases the cable, together with the operating means therefor.

Figure 9 is a section on the line 9—9 of Figure 1.

Figure 10 is a section on the line 10—10 of Figure 1.

Figure 11 is an enlarged detail of a portion of my machine illustrating the cable forming means and mandrel.

Figure 12 illustrates the mandrel removed therefrom.

Figure 13 is an enlarged detail of one of the guide rollers for the wire strands.

Figure 14 is a side view of the guide roller illustrated in Figure 13, together with the wire guide member through which the wire strand is adapted to extend.

Figure 15 is a section on the line 15—15 of Figure 9.

Figure 16 is a section on the line 16—16 of Figure 2.

Figure 17 illustrates the cable forming head which forms the cable about insulated electric wires which form the core of the cable.

Figure 18 is a view along the line 18—18 of Figure 2.

In the drawings my wire cable forming machine A is made up in a manner to extend out so as to permit the strands of the wire cable to be collected into one end of my machine and to permit the finished cable to be ejected from the other end of the machine.

The wire cable machine A is formed with a receiving end B including a frame 10 supported by the end member 11 which rests upon the floor and the frame member is adapted to extend over and above the spools 12 which carry the supply of wire strands which are used in making up the cable. The spools 12 are adapted to be set upon the floor in any suitable manner so as to be positioned so that the feeding member 13 may rotate about as the wire strand is drawn up off of the spool 12 and the top of the spools 12 are cut away so as to form conical ends 15 about which the wire strand 14 circles as it passes up through the guide member 16 and over the guide wheels 17. The guide wheels 17 are supported on the frame 10 and are in the form of idle pulleys or sheaves which merely hold the wire in place as it passes up from the spools 12 and extends to the tension feed C. My machine is designed to employ eight spools 12, only four of which are shown in the drawings as the other four spools are directly opposite on the other side of the machine to the spools 12 illustrated in Figure 1. Obviously, any number of spools can be employed as may be desired, but in this machine I have designed the feeding means of the desired dimensions as to receive and form an eight strand cable with preferably a hollow core. My feeding means may be designed to receive any desired number of strands without departing from the spirit of my invention and the size of the wire strands used may be varied by varying the size of the respective parts.

The tension means C includes a roller 18 which is supported by the frame 19 upon the frame 10 of the machine A. The wire strands 14 extend through the guide member 20 on the receiving side of the tension means C and as indicated in the cross section in Figure 15, the strands 14 are adapted to extend in a loop around the roller 18 of the tension means C. This holds the wire strands separated and at the proper tension.

From the tension means C the wire strands 14 extend into the guide head 22 which forms a part of the forming head D and which is

provided with a series of openings 23 which are equally spaced about in a circular manner. The forming head D is adapted to be supported in the standard 24 which is slidably and adjustably secured in the base 25 to the guide 26 which is carried by the frame 10 of the machine A. This permits the entire cable forming and guide head D to be adjusted on the machine A as may be desired.

The wire forming head D is provided with a guide member 27 which is positioned adjacent the member 22 and spaced a short distance therefrom, having a series of strand receiving grooves 28 formed in the face of the same which guide the wire strands 14 in a helical manner toward the cable feeding means E of the machine A. A conical shaped member 29 is formed on the guide member 27 and projects toward the feeding means in a manner so as to permit the wire strands to be drawn over the same in the formation of the cable. This guide member is formed hollow as is the supporting portion of the guide head 22, so that the mandrel 30 can extend into and through the same.

The mandrel 30 is freely disposed in the guide head 22 and the guide member 27, and is formed with a needle-like point with a drawn out portion 31 of a very small nature on one end. The other end of the mandrel 30 is provided with adjustable stop means including a pair of lock nuts 32 which operate on the thread 33 formed on the mandrel, so that the position of the mandrel within the wire forming means D is adjusted by the position of the adjusting nuts 32. In operation as the wire strands are pulled through and over the cable forming means D, the friction of the strands on the mandrel end 31 holds the mandrel in place therein.

I desire to include in my invention the means of using the wire forming head D in a manner to receive insulated electric wire or wires which is fed automatically into the cable by the friction of the forming cable about the same, so that the electric wire forms the core and mandrel over which the cable is formed and the cable forms a flexible armour covering for the insulated electric wire or wires. It may be preferred to use but one wire, or two wires may be used. The illustration in Figure 17 shows the electric wire extending into the cable as it is formed to form the core of the cable.

The feeding means E of my machine A forms an important feature of my invention and is designed in a manner so as to provide a simple, yet effective means of engaging the strands 14 and drawing the same through the machine A. The feeding means E is inclosed within a casing 35 which entirely incloses the same excepting as to permitting the cable F to be fed into one end and out through the other end of the same. The feeding means is provided with a tubular cable receiving member 36 which guides the cable into the feeding rollers 37 which are formed with cable receiving grooves and are positioned diametrically opposite each other having bearing surfaces 38 above the cable receiving groove formed in the same which limits the movement of the rollers one toward the other. This prevents the rollers 37 from pinching the cable F as it passes through the same.

The cable feeding means E is provided with adjustable bearing boxes 39 which carry the shafts which hold the rollers 37 adjustable so as to move toward or away from each other. These bearing boxes 39 are held in the frame 40 slidable in a manner so that the arms 41 may bear against the outer surface of the same. The arms 41 are pivoted on one end at 42 in the frame 40, while the other end is held by the bolt 43 which adjusts the tension of the spring 44 against the free end of the arm 41. In this manner spring tension is directed to the feeding wheels 37 so that they may grip the cable F under spring tension to feed the same uniformly into the machine A.

The frame 40 is provided with a pinion 45 which engages with the worm gear 46, adapted to be supported in the base portion 47 of the feeding means E. The gear 46 is held by the screws 48 to the base 47, as illustrated in Figure 4.

The feeding rollers with the frame 40 are carried on the hollow shaft 49 which is supported by the ball-bearing races 50 in the supporting standards 51 and 52 carried by the frame 10 of the machine A. A suitable drive pulley 53 is positioned between the standards 51 and 52 and by means of the electric motor 54 and the belt 55 the shaft 49 is adapted to be rotated. As the shaft 49 is rotated the feeding wheels 37 are rotated about in the casing 35, the pinion 45 engaging with the worm gear 36 and causing the cable feeding wheels 37 to rotate axially in relation to each other and rotating collectively about the internal worm gear 46 which is held rigid within the casing 35.

I provide a suitable oiler 56 on top of the casing 35 and by means of a suitable overflow oil drain pipe 57 I draw off the surplus oil from the casing 35. It is important, however, that the oil coming from the oiler 56 is discharged on to the working parts within the feeding means E, but by centrifugal force in the operation of the same, the oil is carried away from the cable F and thus prevents the same from slipping in the feeding wheels 37 and in fact when the machine is in operation, owing to the high speed of rotation of the shaft 49, practically no oil is directed against the cable F as it passes through the feeder E.

As the cable extends through the feeder E it is passed through the shaft 49 and extends through the passageway 58 formed in the cut-off means G of my machine A. The cut-off means G is provided with a supporting head

and cable guide 59 which supports the cutter 60 on the higher end of the same. This cutter is adapted to stand stationary and is formed with a series of holes 61 through which the cable F extends as it is ejected from the feeding means. When the cable passes through the openings 61 it is extended into the cable receiving box H which extends longitudinally with my machine A and forms a part thereof. The shaft 49 is formed with a pinion 62 which operates the gear 63 which is held in the supporting frame 64, so as to support the shaft 65 which carries the gear 63 extending parallel to the shaft 49 and adjacent thereto.

The shaft 65 carries a clutch 66 which is of an ordinary well known construction having an operating lever 67 with a beveled operating end 68 which is adapted to release the operating key 69 from the teeth 70 of the gear 63. This clutch means 66 is adapted to operate to rotate the shaft a single revolution when the operating lever 67 is operated to release the key 69. On the outer end of the shaft 65 I provide an operating disk 72 which carries the operating lug 73 which is adapted to engage within the recess 74 formed in the cutting wheel 60 in a manner to rotate the cutting wheel 60 so as to cut off the wire cable F as it passes through one of the openings 61 a predetermined distance. Thus by the operation of the clutch 66 the cutter 60 may be rotated to cut off the cable very quickly by one rotation of the disk 72 and the moving of the cutter 60, so that one of the openings 61 is in line to receive the cable as it comes through the feeder and through the guide passage 58 in the cutting off head G. Thus one of the openings 61 is at all times in line with the guide opening 58 to receive the finished cable from the feeding head E.

The cable receiving box H is supported by the standard 75 from the base 76 and is provided with a closure 77 which extends along the bottom of the same so as to close the cable receiving groove 78, and to normally hold the same in closed position I provide a coil spring 79. When the cutter means G is rotated so that the member 60 is rotated from one opening 61 to the other, the operating lug 73 carried by the operating disk 72 on the end of the shaft 65 simultaneously engages with the closure operating lever 80. The operating disk 72 rotates in the direction of the arrow in Figure 8. This cuts off the cable F and opens the closure 77 simultaneously with the cutting off, dropping the finished cable in the cable receiving box H out, so that the cable receiving box is ready to receive a fresh cable from the feeding means E.

The cable receiving groove 78 formed within the box H is provided within one end with an operating rod 83 which is adapted to be operated by the incoming cable in the groove 78. The operating rod 83 is adapted to operate the electrical switch I which is supported by the arm 84 which is held by the screws 85 to the outer end of the cable receiving box H, so that the switch I extends out and is adjustable by means of the screws 85 away from or toward the end 86 of the box H.

The electric switch I is provided with contact members 87 and 88. The contact member 88 is fixed within the insulating casing 89 of the switch I and provides one contact for my cutter operating means or magnet 90 which is supported directly below the operating lever 67 on the frame 91 of the machine A, and which will be hereinafter described. The other contact member 87 is slidably held within the casing 89 and is secured by the adjusting screw 92 to the operating rod 83. The adjusting screw 92 extends through the slot 94 in the casing 89 of the switch I. By this adjusting screw 92 the rod 83 can be set in the desired position in relation to the contact member 87 so that the rod 83 can be extended into the groove 78 as far as desired, or withdrawn to a position so that the cable F can be cut off into the desired length. A coil spring 95 within the switch I normally holds the member 87 away from the contact member 88.

When the contact is made by the cable F striking the inner end of the rod 83 which extends into the slot or groove 78 of the cable receiving box H, the contact between the members 87 and 88 is made so that an electrical circuit which is adapted to operate the magnet 90 is completed. The magnet 90 is connected by the arm 96 and the link 97 to the operating lever 67 so that when the cable strikes the rod 83, contact is made in the switch I, and the magnet operates the lever 67 automatically to draw the clutch 66 into operation, automatically operating the cutter 60 and the closure 77 discharging the cable within the box H and permitting the new portion of the cable to be extended into the groove 78.

The lever 67 which is illustrated in Figure 6 diagrammatically is pivoted at 100 to the frame 10 of the machine A and is provided with a counter weight 101 which assists in bringing the handle 67 back to normal position so as to engage the surface 102 of the key 69 to pull the same out of engagement with the teeth 70, releasing the clutch 66. The counter weight 101 also assists the lever to return to normal position against the weight of the members 96 and 97 which connect the magnet with the operating arm 67. This construction is desirable as it releases the clutch 66 quickly so as not to keep operating the cutting off member 60.

If one of the wire strands 14 break in the operation of my machine A, the effect is automatic in stopping to feed as the feeder mechanism E is designed to grip and feed

only a certain number of strands. This is gauged by the spring tension on the feeding rollers 37 and the cable engaging groove formed in these rollers. Thus when one of the strands 14 break the machine A continues in its operation of the feeding means E but the cable F immediately stops and will not continue through the machine A until the proper number of strands are fed from the forming head D into the feeding mechanism E. This provides an important feature of my invention as it prevents the machine from making up a quantity of cable so that the operator of the machine may be assured at all times that little or no cable will be passed through the machine A which is not properly made up.

The stopping of the feeding mechanism is apparent because the feeder is so constructed that it will not pull the cable through unless it is of the proper size and dimension.

The machine is automatic in signalling the operator that it is properly functioning because as soon as the cable stops feeding, the cutter does not make the usual cutting off noise which indicates to the operator that the machine is not properly functioning, thus if the operator does not hear the cutting off of the machine A, he knows that something has gone wrong and he can give the machine his attention. In this sense, the machine is automatic in its operation and provides a very desirable cable forming means.

My machine A is designed so as to provide the guide tube 104 illustrated in Figure 7 in the cutting off head G so as to guide the cable F through the same so that it will properly register with the openings 61 in the cutter 60.

In the cutting off operation the cutter 60 rotates in the direction of the arrow in Figure 8 and during the space between each opening 61, the cable is being fed against the inner surface of the cutter 61, being held stationary against movement until the opening 61 registers with the guide 104. Then the cable feeds right on through the opening 61 and into the holding or receiving box H. It is to be noted that the feeder E permits sufficient slipping of the rollers 37 over the cable between the openings 61 so as not to buckle the cable, but to permit the same to slip through the rollers, retarding the feeding momentarily until the proper opening 61 registers with the guide opening 104 and the groove 78 in the member H.

The cable forming head D is provided with a forward column 106 positioned on the conical member 29 and spirally positioned cuts 107 which assist in drawing the wire strands 14 in a helical formation over the end 31 of the mandrel 30 so that as the wire strands pass over the conical end 29, through the recess 107 and on to the end 31 of the mandrel, the wire strands are shaped into the proper helical curves to make up the helical formation in the cable F of the individual strands 14. This particular formation of my head D is important as it simplifies the operation in the forming of the cable F. A wire band 108 is extended over the strands 14 and is positioned adjacent the column 106 so as to hold the wires 14 in the grooves 107 and in close relation to the conical end 29. As the wires 14 pass over the conical end 29 the friction of the same wears slight helical grooves in the conical member 29, thus forming an ideal shaping means for the cable F.

Thus in operation my machine A is simple yet effective to form a wire cable in a very rapid manner with the strands closely wound in a uniform formation and with simple, effective parts. The wire strands extend through the tension means C, through the forming head D which completely forms the wire strands by extending therethrough in a helical curved formations so as to extend into the rotating feeding means E which draws the finished cable F through the same and feeds the cable in through the head G and into the receiving box H. It is to be noted that the operation of my cable forming member is such that the cable is completely formed in the desired shape as it leaves the forming head D after passing over the conical end 29. The rotation of the feeding means E is very rapid within the casing 35, is amply supported by the shaft 49 to practically eliminate vibration, thereby permitting the finished cable which extends from the head D into the feeder E to extend smoothly therein and in a straight line and to pass the cable out to the receiving box H so that there is no untwisting of the cable whatsoever, owing to the peculiar formation of the forming head D and the complete operation of the feeder E in conjunction with the forming head D.

I have found that the cable F is perfectly formed between the forming head D and the feeder E and in fact is so shaped and formed that there is no untwisting of the cable when it is cut off or no irregularity of the same passing through the feeding means E. The only tension which is brought to bear by the feeding wheels 37 on the feeder E on the cable F is that which would be sufficient to grip the strands of the cable and pull the cable through the machine A. My machine is entirely automatic although the cutter may be operated by the hand engaging end 67′ of the lever 67 if it is desired at any time to cut off the cable when desired, and by means of my automatic operating switch I the cable coming from my machine A can be formed of a desired length, cut uniformly, accurately and operating instantaneously with the dropping of the cable from the compartment H.

The formation of the cable is very important and in the simple effective forming head D I have provided a means which extends the

strands in a helical formation on to the mandrel 30 so that the strands of the cable F are so perfectly formed that even though the cable is hollow when finished, it has practically no longitudial stretch whatsoever. Such cables are now being used by bed springs and are most desirable for such use as they do not stretch and are not hard and rigid as a bed spring cable wherein a solid core or wire is used. I have made these bed spring cables very readily on my machine and I find the same to be most desirable to the manufacturers of bed springs.

I have found my cable forming machine to be very desirable for use in making copper radio wire which provides a radio cable of a hollow nature, thereby exposing the action of the radio waves to the inner and outer surface of the strands of the cable and forming a large area of copper surface which can be used to receive the radio waves so that a most desirable radio cable is provided.

Then when it is desired I have found my machine to be very practical and to provide a cable forming an armour for protecting electrical insulated wires so that in a simple and very effective manner my cable forming machine operates smooth and with practically little or no vibration drawing the wire from the feeding spools through the feeding head, through the rotary operated feeding means on through the cutter head and into the receiving compartment, all automatic and in a simple and very effective way forming a cable of a most desirable nature.

In accordance with the patent statutes I have described the principles of operation of my cable forming machine and while I have shown and illustrated in the drawings a particular formation of the parts and arrangement of the same, I desire to have it understood that this is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

I claim:

1. A cable forming device including, means for holding a series of wire strand feeding spools, means for directing the strands through a tension member, a forming head having a series of openings for receiving the individual strands and grooves positioned in a manner to cause the strands to pass through said head in a helical shape, a mandrel positioned within said head, and means for pulling the cable through said forming head.

2. A cable forming machine including, a cable forming head, an adjustable removable mandrel within said head, and cable feeding means adapted to pull the cable through said forming head and eject it out of the discharge end of said machine.

3. A cable forming device having means adapted to receive a series of wire strands from supply spools, a spiral forming head through which the strands are adapted to be pulled and formed to extend in close relation to each other in a spiral formation in the finished cable, and cable engaging means adapted to pull the strands through the forming head, and the finished cable from the forming head through said engaging means.

4. A cable making device including, means for receiving a series of strands from supply spools, an adjustable forming head adapted to separate the strands, means in said head for directing the strands in a spiral direction through the same, a mandrel held in position by the friction of the strands over the end of the same in the forming of the strands into a finished cable, a hollow core for pulling the same through said forming head, and means for pulling the cable from the forming head.

5. A cable forming device including, a forming head through which the strands forming the cable are adapted to extend in spiral formation, means for pulling the strands through said forming head by a longitudinal and transverse rotation of said cable pulling means.

6. A cable forming machine including, means for receiving a series of wire strands, means for holding the strands at a predetermined tension, means for directing the strands into a spiral formation with one adjacent the other having an axial opening formed therethrough and means whereby a continuous core may be fed into said opening.

7. The method of forming a cable of wire strands consisting of passing a series of strands through a forming head in a manner to form a cable with a hollow core and pulling the formed cable from the forming head by a cable engaging means adapted to rotate transversely about the cable and to draw the cable simultaneously through said cable engaging means.

8. The method of forming a cable consisting in directing a series of strands through a fixed forming head adapted to twist the strands into spiral formation with a hollow core, and pulling the cable from the forming head through the pulling means and through a cutting off device.

9. The method of forming a cable consisting in passing a series of wire strands through a tension member, then through a forming member in a manner to form a hollow cable with the strands extending in spiral relation about the same by pulling the strands from the forming head with a longitudinal and rotary pulling operation to provide a finished cable out of the pulling means.

10. The method of forming a cable consisting in pulling a series of strands through a forming head held in a fixed position, extend-

ing the same through the pulling means and passing the finished cable through a cutter and causing the cable to automatically operate means to cause the cutter to cut off the cable into predetermined lengths.

11. A cable forming device including, means for holding a series of spools of wire strands, means for directing the strands through individual openings for each strand, a forming member having a series of recesses adapted to direct the strands in a manner to assume a spiral formation, a pulling member through which the forming cable is adapted to pass, a cutter through which the cable passes, a receiving member adapted to receive predetermined lengths of cable, and means for automatically operating said cutter in a manner to cut automatically the finished cable into predetermined lengths.

12. A cable forming device including, a forming head through which the strands of the cable are pulled, a rotary pulling means through which the cable is passed, a cable receiving member adapted to receive the finished cable, a cutter through which the finished cable extends interposed between said pulling means and said receiving member, and helical means for automatically operating said cutter to cut the cable into predetermined lengths.

13. A cable forming device including, means for pulling a series of wire strands through a forming member and feeding the formed cable through the device by a longitudinal pulling action, and a rotary operation of the longitudinal pulling means for the purposes set forth.

14. A cable forming device including, a forming head through which the strands of the cable are pulled to form the same into a finished cable with a hollow core, rotary operated cable engaging and pulling means through which the cable is adapted to extend having a transverse and longitudinal rotary action, cutting means, cable receiving means, and electrical means operating by the finished cable adapted to automatically operate said cutting means to sever said cable into predetermined lengths.

15. Cable forming means including, a pulling member adapted to engage the twisted cable strands and pull the same therethrough and feed the formed cable through the device, said pulling means being adapted to rotate about the cable transversely for the purposes set forth.

16. A cable forming machine adapted to receive a series of wire strands, a forming head through which the strands are adapted to be pulled, means for pulling the twisted strands from the forming head, a cutter for the cable, a receiving compartment and means operated by the cable as it is ejected from said machine to automatically operate said cutter to cut the cable into predetermined lengths.

17. A cable forming machine adapted to form a series of wire strands over a core to provide a hollow cable means for pulling said cable through said machine, means for receiving said cable, means for automatically cutting off said cable by the free end of said cable operating said cutting off means, and means for dropping the cable out of said cable receiving means simultaneously with the cutting off of the same.

18. A cable forming machine including, a strand receiving and forming head through which the strands are pulled to form the same into a helical shape, one adjacent the other, a cable engaging means adapted to pull the cable from said forming head and push the same through said machine, a cutter through which the cable extends, means for operating said cutter by hand and automatically, and box means for receiving said finished cable in predetermined lengths having a drop bottom to drop the finished cable out of the same simultaneously with the cutting off operation.

19. A cable making machine including, a frame adapted to support a strand tension means, a forming head through which the strands are directed and adapted to be formed into cable shape by pulling the same therethrough, means for pulling the cable from the forming head, cutter means through which the cable extends from the pulling means, adjustable means for operating said cutter to permit the finished cable to be cut off in predetermined lengths, and means for holding and receiving the cable until it is cut off said receiving means including a drop side which is adapted to be operated simultaneously with said cutting off means.

20. A cable forming machine comprising a forming head, a removable mandrel within said head, cable feeding means adapted to pull the cable through said forming head and means for stopping the feed of the cable upon the breaking of one or more of the wires forming said cable.

21. A cable forming machine comprising a cable forming head, a mandrel within said head, cable feeding means and said cable feeding means being provided with grooves of such size that upon failure of feed of one or more of the wires constituting the cable said cable feeding means will fail to feed the cable.

22. A cable forming machine comprising a forming head, an adjustable mandrel therein, means for feeding the cable from said forming head, means for preventing feed of said cable upon the breakage of one or more wires constituting said cable and means for cutting off said cable in pre-determined lengths.

23. A cable forming machine comprising a forming head, an adjustable mandrel there-

in, means for feeding the cable from said forming head, means for preventing feed of said cable upon the breakage of one or more wires constituting said cable, means for cutting off said cable in pre-determined lengths and means for discharging the severed lengths of cable from the machine.

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