

Sept. 12, 1939.

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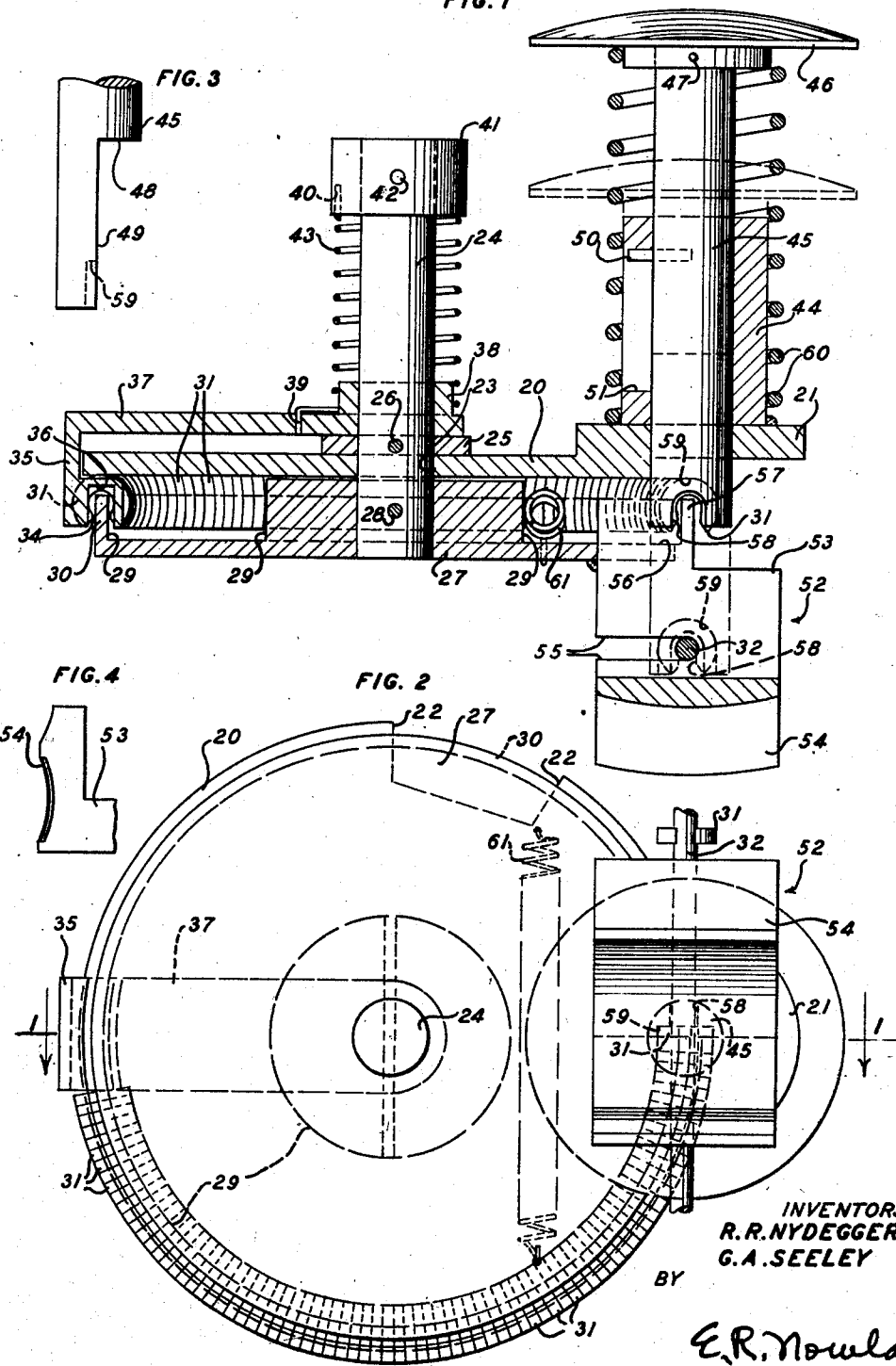
2,172,847

ASSEMBLING TOOL

Filed June 20, 1936

2 Sheets-Sheet 1

FIG. 1



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FIG. 5

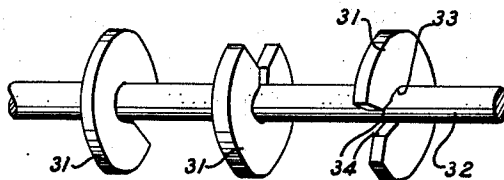


FIG. 6

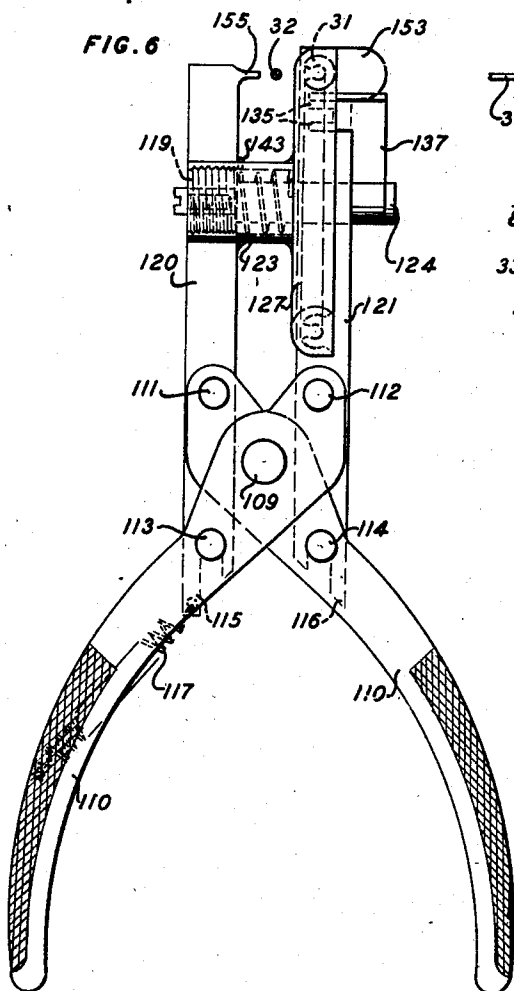


FIG. 7

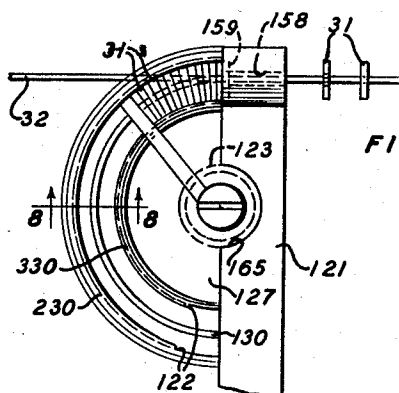
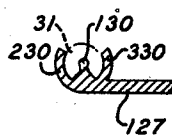


FIG. 8



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ASSEMBLING TOOL

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Application June 20, 1936, Serial No. 86,240

10 Claims. (Cl. 173—244)

This invention relates to an assembling tool, and more particularly to a tool for assembling slotted disks upon a strand, such as are employed in the manufacture of coaxial conductor electrical cable.

In manufacturing one form of coaxial conductor cable, disks of insulating material with a radial slot are forced over a conductor strand at intervals along the strand, and then a tubular conductor is placed or formed over the peripheral edges of the disks. In such a cable the disks serve to locate and support the inner conductor coaxially within the tubular outer conductor. In some instances the disks may be assembled on the inner conductor by automatic machinery. This conductor with its disks must then be inspected before the outer conductor is applied, to be sure that no disk has been omitted or been accidentally removed. If such be the case a manually manipulable tool may be used to apply disks in the empty positions. Also when a splice is made to join two portions of such cable end to end, a similar tool may be used to apply disks in the place of such as may have been removed in making the splice.

An object of the present invention is to provide a simple, reliable and convenient tool for assembling slotted disks on a strand.

In an illustrative embodiment, the invention contemplates a pair of coating relatively movable members, one being formed and provided with means to hold a portion of strand, one being provided with a magazine for holding a supply of slotted washers and present them to the strand with their slots properly oriented toward the strand, and one member being also provided with means such that relative motion of the members will position the strand in the slot of a disk from the magazine.

Other objects and features of the invention will clearly appear from the following detailed description of two forms of embodiment thereof taken in connection with the accompanying drawings in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a view in central longitudinal section of a tool constructed in accordance with the invention, taken on the line 1—1 of Fig. 2;

Fig. 2 is a view thereof in end elevation;

Fig. 3 is a detached broken view of the end of the loading plunger;

Fig. 4 is a broken detached view in side elevation of the front portion of the strand supporting block;

Fig. 5 is a view of a portion of a strand with slotted disks thereon;

Fig. 6 is a plan view of another form of tool also constructed in accordance with the invention;

Fig. 7 is a broken view thereof in side elevation, and

Fig. 8 is a sectional view on the line 8—8 of Fig. 7.

In the embodiment disclosed in Figs. 1, 2, 3 and 4 the member 20 with its integral offset 21 is the base upon which the rest of the device may be said to be mounted and carried. The member 20 generally speaking is a circular disk of uniform thickness, except where the offset portion 21 joins the main part, and except for a magazine loading notch 22 in its upper edge. The terms upper, lower, left, right, front and back will be used with the device oriented as shown in Figs. 2 and 1 applied to a vertical strand.

A shaft 24 is journaled to rotate in a corresponding central aperture 23 in the base 20 and is held against longitudinal movement therein by means of a collar 25 pinned at 26 to the shaft and in contact with the rear face of the shaft, and a magazine body member 27 in front of the base and pinned to the shaft at 28.

The magazine body member 27 is a thick disk having a concentric groove or chamber 29 in its rear face. The outer side of the chamber 29 is defined by a peripheral flange 30. The members 20 and 30 are the disk retaining and housing elements of a magazine intended to hold a sequence of disks 31 (Fig. 4) to be assembled on a strand 32, each disk 31 having a central perforation 33 and a radial slot 34 extending from the perforation out to the periphery of the disk. The thickness of the flange 30 is a trifle less than the width of the narrowest part of the slots of the disks for which the tool is made; and the width of the flange is such that when a series of the disks are in place straddling the free edge of the flange 30 as shown at the left side of Fig. 1, the backs of the disks are in or nearly in contact with the front face of the base 20, which thus keeps the disks 31 on the flange. A tension spring 61 secured at its opposite ends to the base member 20 and to the magazine body 27 respectively tends to prevent clockwise rotation of the magazine body with respect to the base member.

A magazine follower head 35 formed with a slot 36 to loosely enclose the flange 30 is formed integrally on the outer end of a follower lever 37 journaled on the shaft 24 through its hub

38. The follower 35 is continually urged along the flange 30 in a counter-clockwise direction (Fig. 2) by means of a coil spring 43 positioned around the shaft 24, secured to the follower lever 37 at 39 and secured at 40 to a collar 41 pinned to the shaft 24 at 42.

To the rear face of the offset 21 of the base 20 is brazed or otherwise secured a hub 44 having a central bore aligned with a corresponding perforation in the offset. In this bore is slidably housed a plunger 45 provided at its rear end with an enlarged head 46 pinned to the plunger at 47. The main rear portion of the plunger is cylindrical, but its forward portion is cut away underneath to its center as shown in Fig. 3, forming a stop shoulder 48 and a bearing surface 49. A pin 50 set in the plunger body and sliding in a longitudinal slot 51 in the hub 44 limits the motion of the plunger in the hub. A compression spring 60 surrounding the plunger body and hub and abutting at its ends against the head 46 and the offset 21 respectively tends to keep the plunger in its rearward position.

A strand supporting block generally indicated at 52 is set into a correspondingly shaped notch cut into the magazine body member 27 and is secured to the member 27 as by brazing, welding or the like. The block 52 comprises a table portion 53 whose flat upper surface is aligned with the flat under surface of the forward end of the plunger, and an appropriately curved upstanding thumb rest 54. The table 53 has a transversely aligned vertical strand slot or notch 55 to receive and support a strand 32 while a disk 31 is seated thereon. The rear end of the block 52 is formed with a notch 56 and a rearwardly extending tongue 57 which latter matches in position, shape and size the upwardly facing right hand end of the flange 30 and forms in effect a continuation thereof.

The forward end of the plunger 45 is formed with a vertical longitudinal slot 58 dimensioned to easily admit a strand 32. In the under face of the forward end of the plunger is a U-shaped recess 59 dimensioned to snugly but not tightly receive and support but not hold a disk 31.

In operation, assuming the magazine to be empty, the follower lever 37 is rotated clockwise against the tension of the spring 43 until the follower 35 stands beyond the notch 22. A convenient number of disks 31 to fill the magazine as desired is then fed by hand through the notch 22 to stand with their slots 34 embracing the flange 30, and are slipped along the flange counter-clockwise. When a desired number has been put into the magazine, the lever 37 is released to be rotated counter-clockwise by the spring 43, whereby the follower 35 pushes the disks 31 around on the flange 30 until the foremost disk 60 is pressed up on the tongue 57 into the recess 59; for in its normal, inactive position the plunger 45 is held by the spring 60 and the stop pin 50 so that the recess 59 is positioned to receive a disk 31 from the magazine. The depth of the recess 65 59 is less than the least thickness of one disk 31, and the disk 31 in the recess has its lower face substantially aligned to slide on the surface of the table 53.

With the tool thus loaded for use, it may be applied to a strand 32 to receive the strand in the bottom of the slot 55, this being so proportioned and located that the strand will then be in one plane with the vertical slot 58 in the nose of the plunger 45. If then the plunger be driven forward against the tension of the spring 60 as

by pressing with the fingers on the head 46 and with the thumb of the same hand on the thumb rest 54, the plunger pushes the disk 31 contained therein forward until it is seated on the strand 32 with the strand held in the central perforation 33 of the disk 31. On releasing the plunger, it returns under the tension of the spring 60 leaving the particular disk 31 in position on the strand and picks up the next disk from the top of the range of disks in the magazine and receives it in the recess 59 in readiness for a repetition of the operation.

In some cases the disks 31 are made by punching from a sheet of suitable material, e. g., paper or fabric impregnated with artificial resin, and in such a case may carry a slight burr on the edges of one side which will render the overall thickness of the disks somewhat variable. To handle this condition smoothly the rear edge of the table surface 53 and of the top surface of the tongue 57 may be slightly rounded or beveled so that a slightly over thick disk 31 will ride up as the plunger is pushed forward, and will push the table down a trifle as necessary against the tension of the spring 61. This is a reason for making the magazine body 27 rotatable with respect to the base member 31 instead of rigid with respect thereto. However, the principal reason is that the disks 31 may be securely held in the recess 59 by the resilient pressure of the table 53 against the disk under the tension of the spring 61.

In the embodiment shown in Figs. 6, 7 and 8, a pair of parallel jaw pliers of familiar construction is used as the base. These pliers have handles 110 and 110 of U-shaped cross section pivoted together at 109. Parallel jaws 120 and 121 are pivotally connected to the handles at 111 and 112 respectively. Guide pins 113 and 114 fixed in the handles and playing in slots 115 and 116 in the jaws, coast with the pivots 111 and 112 to keep the jaws parallel at all times. A tension spring 117 connected at one end to the jaw 120 and at the other end to the handle 111 tends to hold the jaws apart.

The far end of the jaw 120 is formed with an inwardly projecting nose 155, and the far end of the jaw 121 is formed with a corresponding transverse vertical slot 158. At the upper end of the slot 158 is a U-shaped recess 159 adapted to receive and support one disk 31 in such fashion that if a strand 32 be positioned opposite the nose 155 (Fig. 6) and the pliers be closed the strand will be pushed into the slot 158, and into the slot 34 of the disk 31 in question.

The jaw 120 carries a cylindrical shell 123 rigidly mounted therein, as by being brazed or welded into a corresponding semi-cylindrical notch cut into the jaw, the shell being axially at right angles to the jaw and having at its right hand end a disk like, semi-circular magazine body 127 rigidly secured transversely thereto so that the straight lower edge of the body 127 rests slidably on the upper surface of the jaw 121. This jaw 121 is formed with a semi-circular clearance notch 165 to allow the shell 123 to pass.

The magazine body 127 has three projecting parallel arcuate flanges 130, 230 and 330 on its right side around its periphery. The flange 130 is transversely straight while the flanges 230 and 330 are on each side of the flange 130 and transversely concave toward the middle flange. The three flanges together form a magazine trough and are curved and dimensioned, as shown in Fig. 8, to hold an arcuate stack of disks 31, the outer flanges 230 and 330 extending far enough around

the disks 31 so that they cannot fall out of the magazine laterally, and the center flange 130 serving to orient all the disks 31 with their slots 34 facing the left.

5 A shaft 124 is journaled in a plug 119 rigidly mounted in the left end of the shell 123 and carries at its right end a follower lever 137 rigidly mounted on the shaft. The lever is formed with a forked follower head 135, the prongs of which
10 play in the grooves between the flanges 230, 130 and 330. A coil spring 143 secured at one end to the shell 123 and at the other end to the shaft 124 tends to turn the follower lever clockwise (Fig. 7).

15 The far end of the jaw 121 is also formed on its right side with an integral table 153 whose upper face is coplanar with the top face of the jaw 121. Also, the flanges 230 and 330 are cut away at their near ends (Fig. 7) to provide a loading opening
20 122 into the magazine.

In operation, the magazine being assumed empty, the follower is drawn back (counter-clockwise, Fig. 7) until it rests against the jaw 121 and the magazine is filled with disks 31 to the desired extent. The follower is then released and drives the disks around in the magazine until the first one enters the recess 159 and rests therein.

With the tool thus loaded, it may be positioned
30 to stand with a strand 32 aligned between the nose 155 and the slot 158 as shown in Fig. 6. By squeezing the handles 110 and 111 together the nose 155, recess 159 and slot 158 coact to force the strand and disk together, seating the disk on the strand or the strand in the disk. Meantime, the magazine and its appurtenances, being rigidly mounted on the jaw 120, it is carried over the jaw
35 121, leaving the strand free to pass undisturbed into the disk and into the slot 158; while the table 153 closes the outlet of the magazine. Upon releasing the handles, the jaws open again because of the spring 117 and the apparatus returns to the position of Fig. 6 ready to be operated again.

45 In Fig. 5 the several disks 31 are shown with their slots extending radially from the strand 32 in different directions. Obviously the tool of either Fig. 1 or Fig. 6 may be applied to the strand from any radial direction as may be desired.

50 The embodiments herein disclosed are illustrative only and may be modified and departed from in many ways without departing from the spirit and scope of the invention as pointed out in and limited only by the appended claims.

55 What is claimed is:

1. In a tool for assembling slotted insulating disks on an electrically conductive strand and having a supporting block and a magazine to hold a supply of disks and means on the supporting
60 block to support a strand, means to receive a disk from the magazine and assemble the same on a strand, comprising a member reciprocable with respect to the supporting block and having a recess to receive a disk from the magazine, the
65 strand supporting means and the disk receiving means being so proportioned and arranged as to coact to assemble the disk and the strand when the reciprocable member is actuated.

2. In a tool for assembling slotted insulating
70 disks on an electrically conductive strand and having a supporting block and a magazine to hold a supply of disks and means on the supporting block to support a strand, means to receive a disk from the magazine and assemble the same on a
75 strand, comprising a member reciprocable into

either of two positions and formed with a recess to receive a disk from the magazine when in one position and to assemble the disk with a strand on the supporting means when reciprocated into the other position.

3. In a tool for assembling slotted insulating
5 disks on an electrically conductive strand and having a supporting block and a magazine to hold a supply of disks and means on the supporting block to support a strand, means to receive a
10 disk from the magazine and assemble the same on a strand, comprising a member reciprocable into either of two positions and formed with a recess to receive a disk from the magazine when in one position and to assemble the disk with a
15 strand on the supporting means when reciprocated into the other position, and means on the reciprocable member to close the magazine when the reciprocable member is moved from the disk receiving position thereof.

4. A tool for assembling slotted insulating disks
20 on an electrically conductive strand, comprising a supporting block, strand supporting means, and a magazine to hold a supply of disks to be delivered one by one and including a flange to enter and mutually align the slots of a plurality of
25 disks and means to move the disks along the flange in combination with means to receive a disk from the magazine and assemble the same on a strand, including a member reciprocable with respect to the supporting block and having
30 a recess to receive a disk from the magazine, the strand supporting means and the disk receiving means being so proportioned and arranged as to coact to assemble the disk and the strand when the reciprocable member is actuated.

5. A tool for assembling slotted insulating disks
35 on an electrically conductive strand, comprising a supporting block, strand supporting means, and a magazine to hold a supply of disks to be delivered one by one and including an arcuate flange to enter and mutually align the slots of a plurality of disks and means to confine the
40 disks on the flange laterally thereof, and spring means to move the disks along the flange in combination with means to receive a disk from the magazine and assemble the same on a strand, including a member reciprocable into either of
45 two positions and formed with a recess to receive a disk from the magazine when in one position and to assemble the disk with a strand on the supporting means when reciprocated into the other position.

6. A tool for assembling slotted insulating
55 disks on an electrically conductive strand, comprising a supporting block, strand supporting means, and a magazine to hold a supply of disks to be delivered one by one and including an arcuate flange to enter and mutually align the slots of a plurality of disks and means to confine the disks on the flange laterally thereof, and spring means to move the disks along the
60 flange in combination with means to receive a disk from the magazine and assemble the same on a strand, including a member reciprocable into either of two positions and formed with a recess to receive a disk from the magazine when in one position and to assemble the disk with a
65 strand on the supporting means when reciprocated into the other position, and means on the reciprocable member to close the magazine when the reciprocable member is moved from the element receiving position thereof.

7. A tool for assembling slotted insulating
75 disks on a strand, comprising an arcuate mag-

azine having an arcuate flange therein over which a plurality of disks may be placed, means for continuously urging the disks in one direction along said flange, a portion having a slot 5 transverse to the slot in the disks for receiving and supporting a strand, a reciprocable member having a recess for receiving a disk and having a slot therein corresponding to the slot in the disk for transferring a disk from said 10 magazine and applying it to said strand, and means for actuating said reciprocable member to apply a disk to the strand.

8. A tool for assembling slotted insulating disks on a strand, comprising a magazine for a plurality of disks, a reciprocable member having 15 a recess for receiving a disk and having a slot therein corresponding to the slot in the disk, means for positioning a strand against movement in the direction of movement of said reciprocable member, and means for actuating 20 said reciprocable member to apply a disk to the strand.

9. A tool for assembling slotted insulating disks on a strand, comprising a magazine for a plurality of disks, a reciprocable member having a recess for receiving a disk and having a slot therein corresponding to the slot in the disk, 5 means for positioning a strand to enter the slot in the disk and to support the strand against movement in the direction of movement of said reciprocable member, and means for actuating said reciprocable member to apply a disk to the 10 strand.

10. In a tool for assembling slotted insulated disks on a strand, a flange shaped to engage the slots of disks to support the disks, a reciprocable member having a wall abutting the end of 15 the flange, said wall being recessed to receive an adjacent disk, and a slot in the recessed wall similar to the disk slot to facilitate applying the disk to a strand, and resilient means urging the disks toward the reciprocable member. 20

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