

Oct. 12, 1948.

S. G. BLUMENSAADT ET AL

2,450,876

WIRE TWISTING DEVICE

Filed Sept. 19, 1945

6 Sheets-Sheet 1

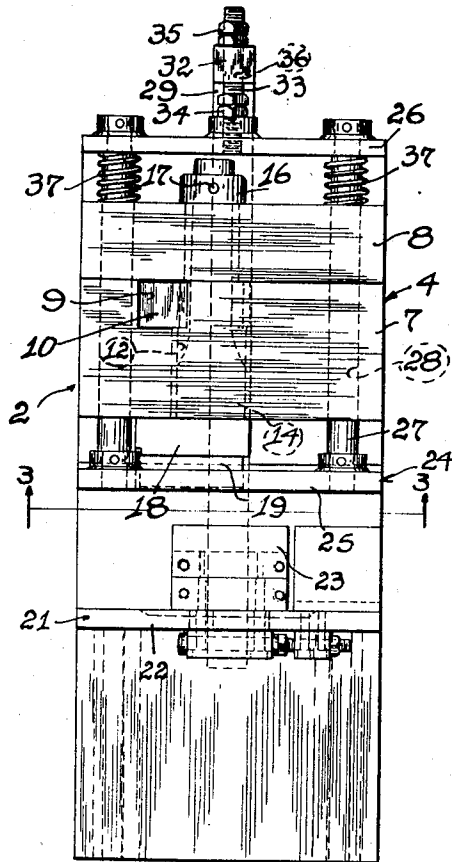


FIG. 1

FIG. 2

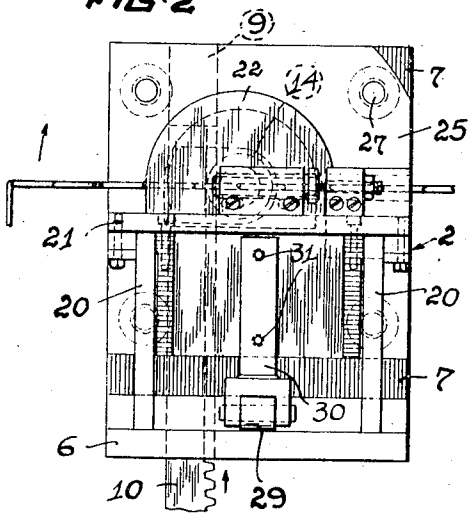
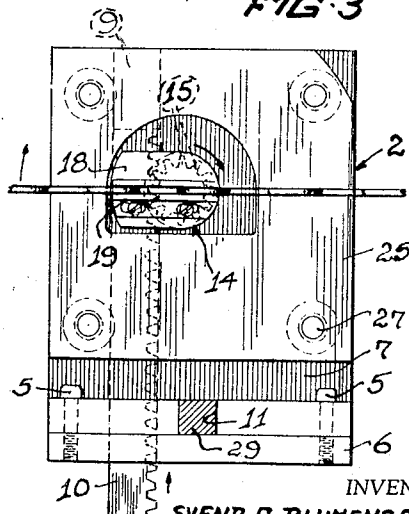


FIG. 3



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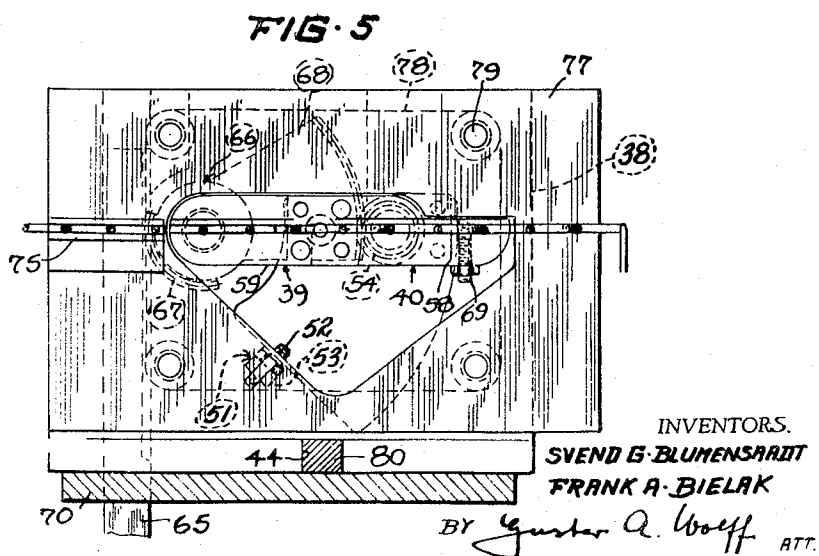
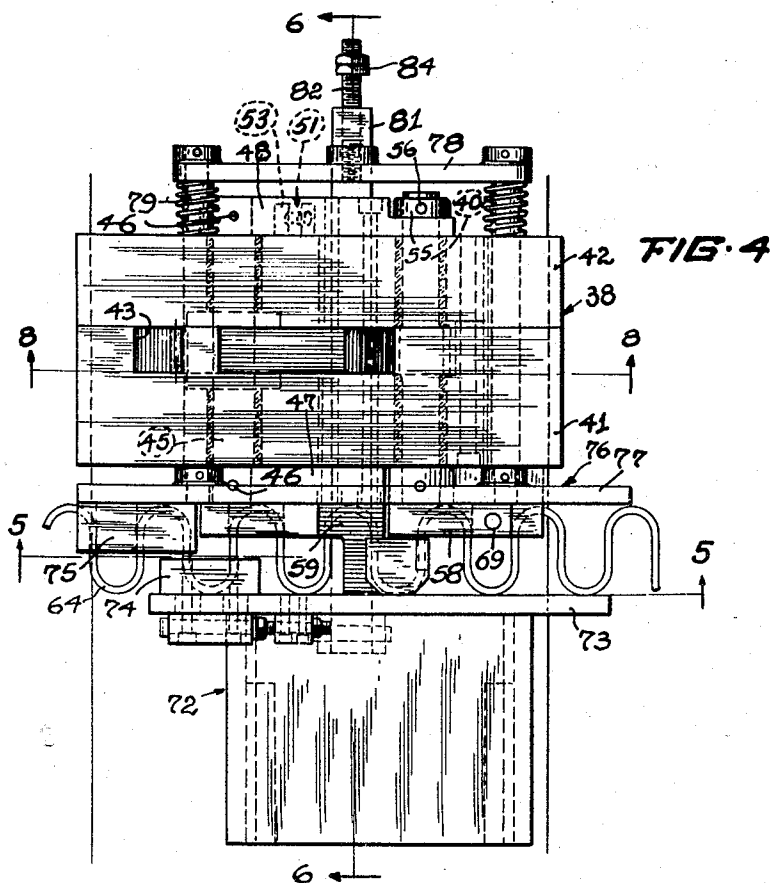
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6 Sheets-Sheet 2



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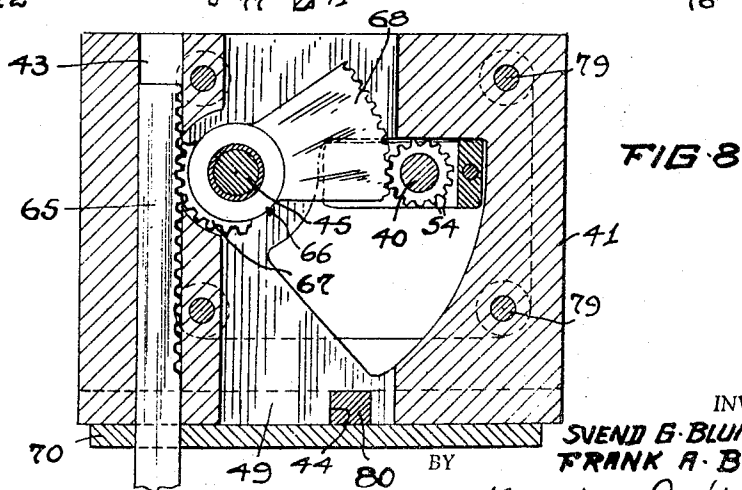
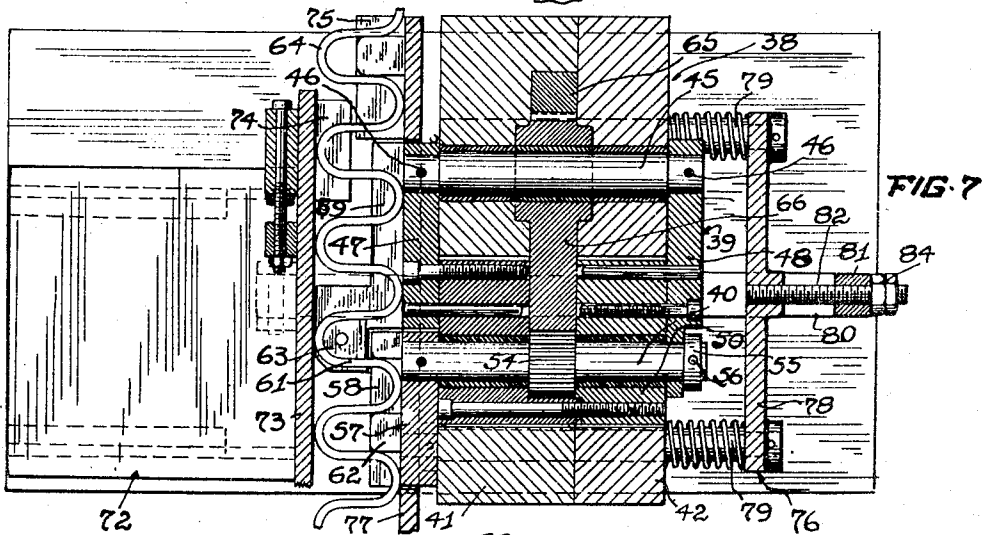
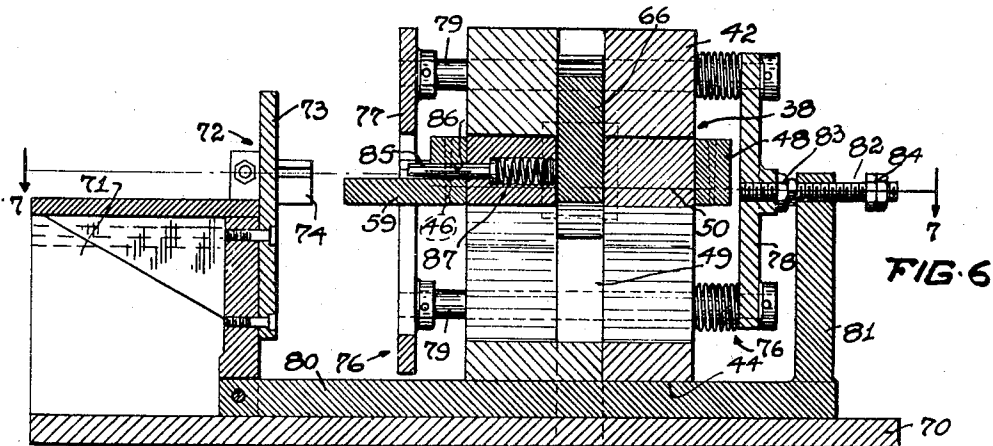
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WIRE TWISTING DEVICE

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6 Sheets-Sheet 3



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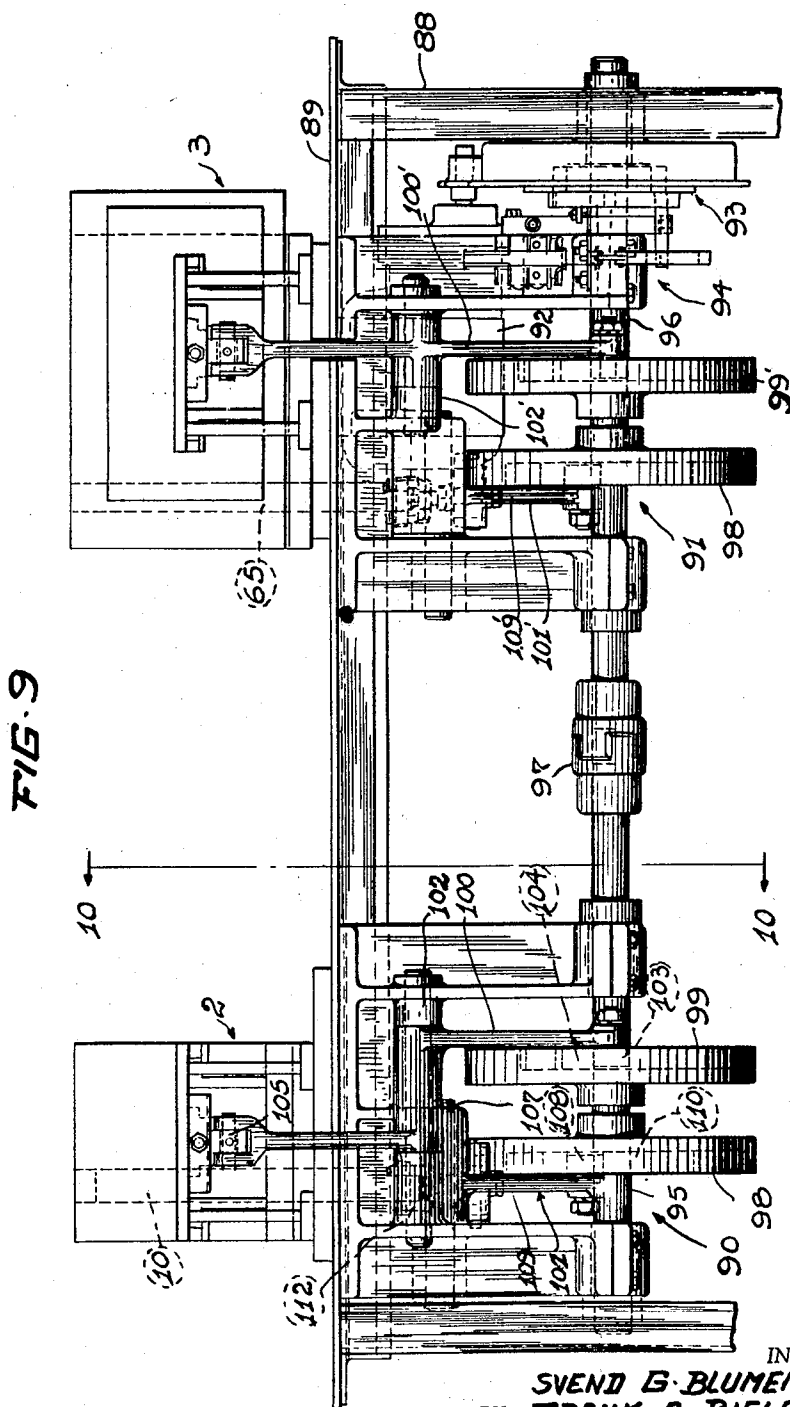
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WIRE TWISTING DEVICE

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6 Sheets-Sheet 4



6-514

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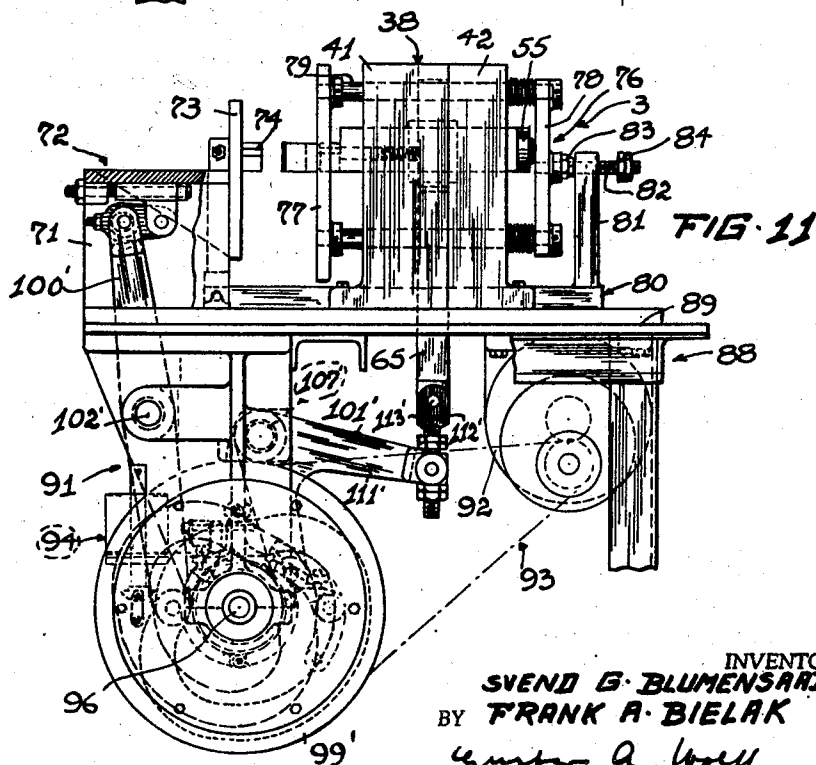
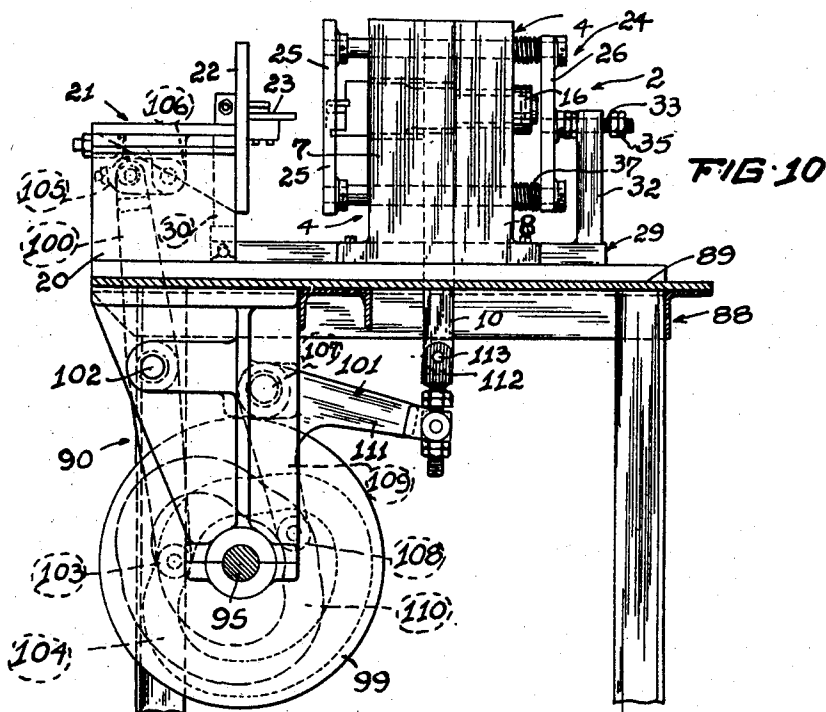
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WIRE TWISTING DEVICE

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6 Sheets-Sheet 5



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2,450,876

WIRE TWISTING DEVICE

Filed Sept. 19, 1945

6 Sheets-Sheet 6

FIG. 12

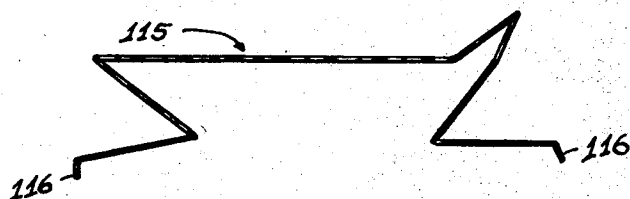


FIG. 13

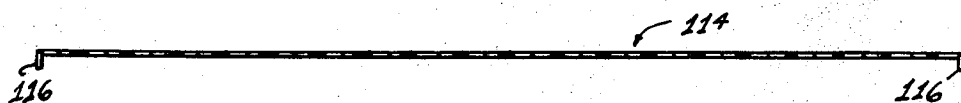


FIG. 14

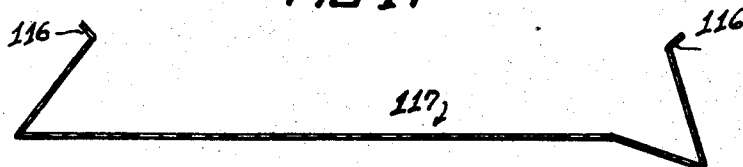


FIG. 15

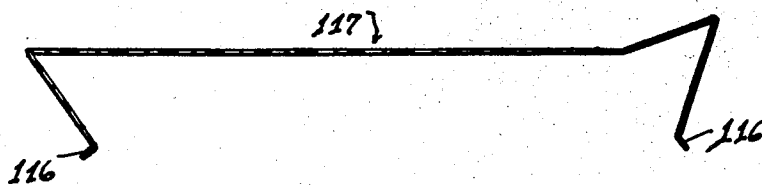
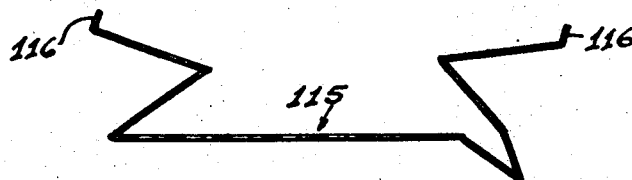


FIG. 16



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UNITED STATES PATENT OFFICE

2,450,876

WIRE TWISTING DEVICE

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Cleveland, Ohio, a corporation of Ohio

Application September 19, 1945, Serial No. 617,226

26 Claims. (Cl. 140—71)

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This invention refers to an apparatus for manufacturing wire springs from corrugated steel wire strips consisting of a continuously corrugated wire having substantially straight wire portions arranged between oppositely extended loops forming the corrugations of the wire strips. Wire springs of this type embody substantially straight resting portions, and supporting and attaching means integrally extended from the resting portions, and are shaped from corrugated wire strips by twisting some of their substantially straight wire portions, to form the springs with sharp-edged bends or folds and effect principally torsional stresses in the straight wire portions as counteracting forces when the springs are loaded.

The general object of the present invention is the provision of a wire spring forming apparatus for twisting a corrugated wire strip of the type referred to above to provide same with sharp-edged bends or folds, which apparatus includes means for holding one part of a corrugated wire strip and changing the angular relationship of an adjacent part thereof by torsionally twisting the straight wire portion between the said two parts.

To attain this general object of the invention, the wire spring forming apparatus embodies a stationary holding and supporting member for supporting a part of a corrugated wire strip and a shiftable holding and supporting member for supporting an adjacent part of the strip, the two members being hinged to each other and including positioning means for a wire strip to align a straight portion of such wire strip with the axis of the hinge and effect twisting of such straight portion when the second member is turned with respect to the first member.

Another object of the invention therefore is the provision of a wire spring forming apparatus for twisting a corrugated wire strip of the type referred to above to provide same with sharp-edged bends or folds, which apparatus includes stationary holding and supporting means for one part of a corrugated wire strip, other holding and supporting means for another part of said corrugated wire strip arranged adjacent to said first part and hinged connected therewith, and positioning means for such wire strip to align a straight wire portion of such strip with the hinge connecting the said holding means.

Corrugated wire springs with several sharp-edged bends or folds often have their adjacent bends or folds shaped with obtuse and acute angles or vice versa. Thus related folds, according to the present invention, can be produced simul-

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taneously by hingedly attaching to the shiftable holding and supporting member of a wire spring forming apparatus an additional, secondary holding and supporting member and providing actuating means for the supporting members for joint and individual actuation of these members.

A further object of the invention therefore is the provision of a wire spring forming apparatus for twisting a corrugated wire strip of the type referred to above to provide same with sharp-edged bends or folds, which apparatus includes stationary holding and supporting means for one part of a corrugated wire strip, other holding and supporting means for another part of said corrugated wire strip arranged adjacent to said first part and hinged connected therewith, a third holding and supporting means hinged to said other holding and supporting means for supporting still another part of a corrugated wire strip adjacent to said last named part thereof, positioning means on all said supporting means to locate predetermined straight wire portions of such wire strip in alignment with the respective hinges connecting the said supporting and holding means, and means actuating the movable holding and supporting means for joint and individual movements with respect to each other and the stationary holding and supporting means.

Still other important objects of the invention are the provision of operating and actuating means for the wire spring forming apparatus, means for automatically clamping and twisting a corrugated wire strip, means for discharging the twisted product after twisting operations, etc.

Still further objects and novel features of construction, combinations and relations of parts by which the objects in view have been attained will appear and are set forth in detail in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate certain practical embodiments of the invention, but it will be apparent as the specification proceeds that the structure may be modified and changed in various ways without departure from the true spirit and broad scope of the invention.

In the drawings:

Fig. 1 is a plan view of a wire spring forming apparatus for twisting a straight wire portion of a corrugated wire between adjacent oppositely extended loops forming the corrugations of the corrugated wire;

Fig. 2 is a front view of the apparatus shown in Fig. 1;

Fig. 3 is a cross sectional view through Fig. 1,

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the section being taken on line 3—3 of said figure;

Fig. 4 is a plan view of a wire spring forming apparatus for simultaneously twisting several straight wire portions of a corrugated wire in opposite directions, the straight wire portions being spaced from each other and each being arranged between oppositely extended loops forming the corrugation of the corrugated wire;

Fig. 5 is a cross sectional view through Fig. 4, the section being taken on line 5—5 of said figure;

Fig. 6 is a longitudinal sectional view through the wire spring forming apparatus shown in Fig. 4, the section being taken on line 6—6 of said figure;

Fig. 7 is a horizontal sectional view through Fig. 6, the section being taken on line 7—7 of said figure; and

Fig. 8 is a cross sectional view through Fig. 4, the section being taken on line 8—8 of said figure;

Fig. 9 is a side view of a wire spring forming mechanism adapted to simultaneously twist both ends of a corrugated wire strip, such as shown in Fig. 13 and form the twisted wire strip shown in Fig. 14, twisting operations being effected by wire spring forming apparatus shown in Figs. 1 through 3 and 4 through 8;

Fig. 10 is a sectional view through Fig. 9, the section being taken on line 10—10 of said figure;

Fig. 11 is an end view of Fig. 9;

Fig. 12 is a side view of a finished corrugated wire spring produced by wire spring forming devices such as shown in Fig. 9;

Fig. 13 is a side view of the corrugated wire strip prior to its forming by a wire spring forming apparatus;

Fig. 14 is a side view of the corrugated wire strip shown in Fig. 13, with the left end portion twisted downwardly and upwardly;

Fig. 15 is a side view of the twisted wire strip of Fig. 14 in inverted position ready for twisting and forming operations in a wire spring forming mechanism having the wire spring forming apparatus spaced for twisting the twisted wire strip at the desired locations;

Fig. 16 is a side view of the twisted wire strip shown in Fig. 15, with the left end portion twisted upwardly and the right end portion twisted downwardly and upwardly.

Referring now more particularly to the drawings, the wire forming mechanism shown therein embodies folding or twisting mechanism for a corrugated wire strip and mechanism for actuating such folding and twisting mechanism, which latter consists of two twisting devices 2 and 3. Twisting device 2 effects in a single operation twisting of a single straight wire portion of a corrugated wire strip, and twisting device 3 effects in a single operation twisting of several straight wire portions of a corrugated wire strip. These folding and twisting devices each embody means for holding such wire during twisting operations and means for ejecting the twisted wire, as will best be understood from the following specific description of each of these devices. Twisting and folding device 2 embodies a housing 4 secured by screws 5 to a base plate 6, which housing includes two sections, a front section 7 and a rear section 8. The front section 7 is at its rear face vertically channelled and forms with rear section 8 a rectangularly shaped vertical passage 9 for a rack bar 10, and the bottom portions of both front and rear sections are horizontally channelled to form a horizontal passage 11 extended from the front to the rear of said housing, all for a pur-

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pose later to be described. Housing 4 includes a horizontal bore 12 which intersects vertical passage 9 and has journaled therein a crank shaft 14. This crank shaft includes gear teeth 15 aligned with vertical passage 9 for rotation by rack bar 10, is extended through bore 12 and held against axial movement by a collar 16 secured to the rear end of the crank shaft by a pin 17. The front end of crank shaft 14 carries a crank arm 18 provided with slotted seating and positioning means 19 for a corrugated wire, which means are adapted to align a straight wire portion of such wire with the axis of crank shaft 14.

In addition base plate 6 mounts on a pair of slide bars 20 a slide 21. This slide includes a vertical plate 22 supporting a second slotted seating and positioning member 23, which latter co-operates with seating and positioning means 19 in seating a corrugated wire strip prior to and during wire twisting operations. Slide 21 is shifted and oscillated by the actuating mechanism of the wire forming apparatus and controls an ejecting device 24 consisting of spaced plates 25, 26 coupled with each other by rods 27. This ejecting device which has its rods 27 extended through bores 28 in said housing carries plates 25 and 26 opposite the front and rear faces of said housing and is coupled with slide 21 to permit limited individual movement of the coupled parts with respect to each other. This is effected by a U-shaped connecting member 29 slidably arranged in horizontal passage 11, which member has its front portion 30 rigidly secured to vertical plate 22 by screws 31 and its rear portion 32 slidably engaged with a bolt 33 secured to rear plate 26 and provided with nut members 34, 35 adapted to limit the relative movement between said ejecting device and said slide. The bolt 33 extends through a bore 36 in rear portion 32 and the relative movement between slide 21 and ejecting device 24 is limited by the position of the adjustable nut members 34, 35 on said bolt. Coil springs 37 arranged on rods 27 between the rear face of housing 4 and plate 26 yieldingly force the nut members 34 in engagement with the rear portion 32 of connecting member 29 and tend to hold ejecting device 24 in an inoperative position.

The described twisting and folding device 2 effects in a single operation twisting of a single straight wire portion of a corrugated wire, and the twisting and folding device 3 effects in a single operation twisting of two spaced straight wire portions of a corrugated wire. For such purpose, twisting and folding device 3 pivotally mounts on its sectional housing 38 a substantially yoke-shaped support 39 pivotally mounting a secondary crank shaft 40 adapted to effect twisting of an additional straight wire portion of a corrugated wire, as will be described hereinafter. The housing 38 of twisting and folding device 3 embodies a front and rear section 41 and 42 which are shaped to form a vertical passage 43 similar to vertical passage 9 and a horizontal passage 44 similar to horizontal passage 11, and this housing rotatably supports a horizontal shaft 45 there-through. Shaft 45 is secured by pins 46 to the arms 47, 48 of yoke-shaped support 39 and thus hinged to said housing 38 for free movement with respect thereto, which movement is limited only by the size and shape of open ended chamber 49 through which the horizontal shaft 45 of yoke-shaped support 39 extends and adjustable stop 51 co-operating with front arm 47. This stop consists of a rod 52 threadedly engaged with a lug 53 on housing 38. The middle portion 50 of

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yoke-shaped support 39 mounts the secondary crank shaft 40 which is centrally provided with gear teeth 54 and fully extended through a bore in said center portion. Shaft 40 is held against axial movement in said bore by a collar 55 pinned to shaft 40 by a pin 56. The front end of secondary crank shaft 40 carries a crank arm 57 provided with slotted seating and positioning means 58 adapted to seat a corrugated wire and align a straight wire portion thereof with the axis of secondary crank shaft 40.

The yoke-shaped support 39 forms a primary crank shaft means which supports the secondary crank shaft 40 and has attached to its front arm 47 slotted seating and positioning means 59 for the above referred to corrugated wire, which means are adapted to align one straight wire portion 61 with the axis of secondary crank shaft 40. To attain such an alignment, seating and positioning means 58 and 59 mount in their slots spacer members 62, 63 which guide the corrugated wire into proper position. This can readily be accomplished, as the distance between shaft 45 and secondary crank shaft 40 is a multiple of the distance between adjoining loops 64 of the corrugated wire.

The thus constructed twisting and folding device 3 is actuated by a rack bar 65 slidably mounted in vertical passage 43. This rack bar actuates upon a gear sector 66 which is axially rotatably mounted on shaft 45 and includes two sectors 67, 68, sector 67 being engaged with the teeth of rack bar 65 and sector 68 being engaged with the teeth 54 of secondary crank shaft 40. Gear sector 66 which is freely rotatably mounted on shaft 45, is rotated by rack bar 65 to effect joint or several rotation of shaft 45 and secondary crank shaft 40 as the case may be, shaft 45 being rotated only when the resistance against rotation of shaft 40 is sufficient to lock sector 68 with gear teeth 54 of shaft 40. Proper and accurate twisting of a corrugated wire strip by yoke member 39, the primary crank shaft means, and secondary crank shaft 40 is controlled by adjustable stop 51 which limits the movement of yoke member 39 and a second adjustable stop 69 on secondary crank shaft arm 57 which limits the movement of arm 57 with respect to yoke member 39.

The twisting and folding device 3 has its housing 38 mounted on a base plate 70 which mounts on a pair of slide bars 71 a slide 72. This slide includes a vertical plate 73 supporting a slotted seating and positioning member 74 which co-operates with stationary seating and positioning means 75 on housing 38 in seating a corrugated wire strip in the twisting and folding device prior to and during wire twisting operations. Slide 72 is shifted and oscillated by the actuating mechanism of the wire forming apparatus and controls an ejecting device 76 similar to ejecting device 24 previously described. This ejecting device, which embodies spaced plates 77, 78 arranged opposite housing 38 and coupled with each other by rods 79 extended through bores in said housing, is coupled with slide 72 by a U-shaped connecting member 80 slidably arranged in horizontal passage 44 and rigidly secured to vertical plate 73. The rear portion 81 of member 80 is slidably engaged with a bolt 82 secured to rear plate 78 and provided with nut members 83, 84 adapted to limit relative movement between ejecting device 76 and slide 72.

To facilitate ejection of a twisted corrugated wire strip there is provided in addition to ejecting device 76 an ejector pin 85 which is axially shift-

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ably mounted in a bore 86 of the middle portion 59 of yoke-shaped support 39. This ejector pin which is actuated by a spring 87 and yieldingly engages the corrugated wire strip during twisting operations, co-operates with front plate 77 of ejecting device 76 in ejecting the corrugated wire strip, when slide 72 is shifted to release such corrugated wire strip.

The twisting and folding devices 2 and 3 are mounted in spaced relation upon an elongated table support 88. Support 88 has mounted below its table surface 89 mechanism for actuating the twisting and folding devices, and this mechanism includes two substantially identically constructed operating devices 90 and 91. A motor 92 actuates devices 90 and 91 and is coupled therewith by a chain drive 93 and an automatic clutching device 94 (not specifically described). The operating devices 90 and 91 which have their main shafts 95 and 96 axially aligned and coupled with each other by means of a coupling 97, each embody two cam wheels 98, 99, and 98', 99', respectively, which are rigidly mounted on said main shafts and actuate shifting levers 100, 101, 100', 101' coupled with the slides and the rack bars of the respective twisting and forming devices 2 and 3. Cam wheel 98 on operating device 90 actuates upon double lever 100 pivoted to table support 88 at 102, which lever engages by roller 103 the cam slot 104 of cam wheel 98 and has its opposite end adjustably linked to slide 21 by means of a link 105 pivoted to a bracket 106 adjustably secured to slide 21, so that rotation of cam wheel 98 effects a horizontal reciprocatory shifting of said slide. Cam wheel 99 on operating device 91 actuates upon a bell crank lever 101 pivoted to table support 88 at 107, which bell crank lever engages with a roller 108 on lever arm 109 the cam slot 110 of cam wheel 99 and has its other lever arm 111 adjustably linked to rack bar 10 by means of a link 112 pivoted to rack bar 10 by a pin 113. Cam wheel 98' on operating device 91 reciprocates by means of double lever 100', slide 72, and cam wheel 99' of said device reciprocates by means of bell crank lever 101' rack bar 65.

Wire spring forming mechanisms of the type described above are used to twist and fold a corrugated wire strip 114 (see Fig. 13) into a corrugated wire spring 115 (see Fig. 12). This is effected by placing a strip 114, the opposite ends of which are bent downwardly at 116, on the table surface 89 and actuating the spring forming mechanism to cause rotation of coupled main shafts 95 and 96 which rotates cam wheels 98, 99 and 98', 99'. The cam wheels shift slides 21, 72 into clamping and holding positions and thereafter rotate crank shaft 14, yoke-shaped support 39 and secondary crank shaft 40 for twisting operations, shift slides 21, 72 in opposite directions to permit ejecting devices 24 and 76 to eject the twisted corrugated wire strip from the seating and positioning means of the twisting and folding devices 2 and 3, and finally return the crank shafts to their starting positions. In this operation, the corrugated wire strip 114 has been twisted into the shape of the strip 117 shown in Fig. 14. Further twisting of the corrugated wire strip into its final shape is effected on another wire forming mechanism which is constructed similar to the first mechanism, with the exception that the twisting and folding devices are differently spaced to align their crank shafts with the respective straight wire portions of the corrugated wire strip. To accomplish the

desired twist and give the twisted corrugated wire strip its final shape, such strip is placed on the table of this other wire forming mechanism in an inverted position as indicated in Fig. 15, showing the twisted corrugated wire strip in inverted position. As the operation of this other wire forming mechanism is similar to the described operation of the first wire forming mechanism, further description thereof is superfluous.

In wire bending operations, when a corrugated wire strip, such as strip 114, is placed in the wire supporting members 23 and 74, one revolution of cam wheels 98, 99 and 98', 99' completes a full cycle of operation. In the beginning of this cycle, cam wheels 98, 99' shift levers 100, 100' and therewith slides 21 and 72 which support the supporting members 23 and 74 toward twisting and folding devices 2 and 3. In this movement, loops of strip 114 are extended into the slots of seating and positioning means 19 of device 2 and seating and positioning means 58, 59 and 75 of device 3 to hold and support strip 114 during twisting operations, and plates 25 and 77 of ejecting devices 24 and 76 are shifted laterally toward the right by connecting members 29 and 80, respectively, and, in addition, ejector pin 85 of ejecting device 76 is axially shifted against spring 87 by strip 114. Twisting and folding devices 2 and 3 are not actuated in the above described movement, as will readily be seen from the positions of the respective cam slots of cam wheels 98, 98'. Further rotation of the cam wheels actuates levers 101 and 101' and effects vertical shifting of rack bars 18 and 65 which actuate the twisting and folding devices 2 and 3 as previously described. In this actuation of devices 2 and 3 slides 21 and 22 are held at a standstill to securely hold and support strip 114. Still further rotation of the cam wheels shifts levers 101 and 101' in an opposite direction and releases the tension in strip 114, a tension caused by twisting and folding operations, and then with twisting and folding devices 2 and 3 held in slightly released position, slides 21 and 72 are shifted away from the twisting and folding devices to release strip 114 and eject said strip by ejector pin 85 and ejecting devices 24 and 76 coupled with slides 21 and 22 by connecting members 29 and 80. When strip 114 is ejected, cam wheels 98, 99 and 98', 99' return to their starting position to complete the cycle of operation and position the devices for the next cycle.

Having thus described our invention:
What we claim is:

1. In a device for twisting the connecting wire portions of adjoining left and right-hand loops of corrugated wire strips, supporting and holding means for a corrugated wire strip, other supporting and holding means spaced from said first means and pivotally arranged with respect thereto, and aligning means arranged to align a loop connecting wire portion of a corrugated wire strip with the pivot axis of said other supporting and holding means.

2. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, stationary supporting and holding means for a corrugated wire strip, other supporting and holding means spaced from said first means and pivotally arranged with respect thereto, and aligning means on one of said supporting and holding means arranged to align a loop connecting wire portion of a cor-

rugated wire strip with the pivot axis of the other one of said supporting and holding means.

3. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, stationary supporting and holding means for a corrugated wire strip, other supporting and holding means spaced from said first means and pivotally arranged with respect thereto, aligning means on one of said supporting and holding means arranged to align a loop connecting wire portion of a corrugated wire strip with the pivot axis of the other one of said supporting and holding means, and actuating means for said other supporting and holding means adapted to rotate same and effect twisting of the said loop connecting wire portion.

4. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, slotted means adapted to seat and support the loops of a corrugated wire strip, other similarly slotted means pivotally arranged with respect to said first means, and means within one of said slotted means adapted to align a loop connecting wire portion of a corrugated wire strip with the pivot axis of said other means.

5. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, means for supporting and holding one part of a corrugated wire strip, other means for supporting and holding an adjacent part of such corrugated wire strip arranged adjacent to said first means in pivotal relation with respect thereto, means to align the loop connecting wire portion between said adjoining parts of the corrugated wire with the pivot axis of said other supporting and holding means, and means to rotate the said other means within predetermined limits.

6. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, means for supporting and holding one part of a corrugated wire strip, other means for supporting and holding an adjacent part of such corrugated wire strip arranged adjacent to said first means in pivotal arrangement with respect thereto, means hinged to said other means for supporting and holding an adjoining part of such corrugated wire strip, and means adapted to align the connecting wire portions between the said parts of the corrugated wire strip with the pivot and hinge axes of said other means and said hinged means.

7. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, means for supporting and holding one part of a corrugated wire strip, other means hinged to said first means for holding and supporting an adjacent part of such corrugated wire strip, and means to align the hinge between said supporting and holding means with the wire portion connecting said adjoining parts of the corrugated wire strip.

8. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, pivotally mounted means for supporting and holding one part of a corrugated wire strip, other means hinged to said first means for holding and supporting an adjacent part of such corrugated wire strip, means to align the pivot axis of said first means and the hinge axis of said other means with loop connecting wire portions of the corrugated wire strip, and means to rotate said holding and supporting

means jointly and severally within predetermined limits.

9. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, pivotally mounted means for supporting and holding one part of a corrugated wire strip, other means hinged to said first means for holding and supporting an adjacent part of such corrugated wire strip, means to align the pivot of said first means and the hinge of said other means with loop connecting wire portions of the corrugated wire strip, and means to rotate said holding and supporting means in opposite directions.

10. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, supporting and holding means for one part of a corrugated wire strip, other supporting and holding means for an adjacent part of said strip arranged in pivotal relation with respect to said first means, means adapted to align the connecting wire portion between said adjoining parts of the corrugated wire strip with the pivot axis of said other supporting and holding means, and ejector means adapted to eject the corrugated wire strip from said holding and supporting means.

11. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, stationary and shiftably mounted means for rigidly supporting a part of a corrugated wire strip, pivotally mounted means for holding an adjacent part of the corrugated wire strip adjacent to the first part thereof, means to align the connecting wire portion between said two parts with the pivot axis of said pivotally mounted means, means to rotate the said pivotally mounted means within predetermined limits, and ejector means for said corrugated wire strips associated with said supporting means and adapted to eject the corrugated wire strip for said supporting and holding means.

12. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, means for rigidly supporting and holding one part of a corrugated wire strip, other means for supporting and holding an adjacent part of such corrugated wire strip, said other means being arranged adjacent to said first means in pivotal arrangement with respect thereto, means hinged to said other means for supporting and holding another adjoining part of such corrugated wire strip, means adapted to align the connecting wire portions between the said parts of the corrugated wire strip with the pivot and hinge axes of said other means and said hinged means, and actuating means for said other and said hinge means, said actuating means including idler means arranged in axial alignment with the pivot axis of said other means to rotate said other and said hinged holding and supporting means jointly and severally in opposite directions.

13. A device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips as described in claim 12, wherein the actuating means for said other and said hinged holding and supporting means include a rack bar co-operating with gearing on said idler means, and wherein said idler means includes gearing co-operating with gearing on said hinged supporting means for joint and several rotation of said other and said hinged supporting means by said rack bar.

14. In a device for twisting the connecting wire

portions of adjoining left and right-handed loops of corrugated wire strips, a housing, supporting and holding means for a corrugated wire strip secured to said housing, other supporting and holding means rigidly mounted on a shaft pivoted in said housing, aligning means for a corrugated wire strip adapted to align a loop connecting wire portion of a corrugated wire strip with said shaft, shiftable means co-operating with said first supporting and holding means in rigidly supporting part of a corrugated wire strip, and rotating means for said shaft extended into said housing for co-operation with said shaft.

15. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, a housing, supporting and holding means for a corrugated wire strip secured to said housing, other supporting and holding means rigidly mounted on a shaft pivoted in said housing, aligning means for a corrugated wire strip adapted to align a loop connecting wire portion of a corrugated wire strip with said shaft, shiftable means co-operating with said first supporting and holding means rigidly holding and clamping a part of a corrugated wire strip, and spring-pressed ejector means coupled with said shiftable means and in inoperative position when said shiftable means is in its supporting and clamping position.

16. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, a chambered housing, stationary means on said housing for supporting and holding one part of a corrugated wire strip, a yoke-shaped member having its central portion pivotally mounted in said housing, a secondary housing in said chambered housing rigidly secured to the arms of said yoke-shaped member, a crank shaft mounted in said secondary housing, and means to effect joint and several rotation of said yoke-shaped member and said crank shaft, said yoke-shaped member and said crank shaft mounting on their arms supporting and holding members for a corrugated wire spring.

17. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, a chambered housing, stationary means on said housing for supporting and holding one part of a corrugated wire strip, a U-shaped crank shaft member having its crank shaft pivotally mounted in said housing, supporting and holding means on one arm of said crank shaft, a second crank shaft member having supporting and holding means on its arm, a secondary housing in said first housing pivotally mounting the shaft of said second crank shaft member and rigidly secured to the arms of said U-shaped crank shaft member, and operating means for said shafts including idler gearing mounted on the shaft of said U-shaped crank shaft member, and gearing on the shaft of said second crank shaft member.

18. A device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips as described in claim 17, embodying means on said housings and crank shaft members to limit the movement of said crank shaft arms with respect to said housings and with respect to each other.

19. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, supporting means for supporting part of a corrugated wire strip, crank shaft means having a crank arm engaged with another part of the wire strip adapted to effect

by rotation twisting of a connecting wire portion of such wire strip, ejecting means for ejecting the twisted wire strip, and actuating means for said crank shaft means and ejecting means adapted to actuate said means in timed relation.

20. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, supporting means for part of a corrugated wire, a primary crank shaft, a secondary crank shaft pivotally coupled with said primary crank shaft, means to actuate said crank shafts, means coupling said actuating means only with said secondary crank shaft, and means limiting the rotary movement of said crank shafts, said crank shafts having crank arms engaged with other parts of the wire strip to effect by rotation of the crank shafts twisting of loop connecting wire portions of the wire strip.

21. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, supporting means for supporting part of a corrugated wire strip, shiftable means for rigidly holding such part of a corrugated wire in said supporting means, spring-pressed ejecting means, and means to reciprocate said shiftable means, said ejecting means coupled with said shiftable means for limited individual movement with respect thereto and properly timed actuation of said shiftable means and said ejecting means.

22. In a device for twisting the connecting wire portions of adjoining left and right-handed loops of corrugated wire strips, supporting means for supporting part of a corrugated wire strip, shiftable means for rigidly holding such part of a corrugated wire strip in said supporting means, supporting and holding means for an adjacent part of such wire strip pivotally arranged with respect to said supporting means adjacent thereto for co-operation therewith in twisting the loop connecting wire portion between the said parts of said corrugated wire strip, spring-pressed ejecting means coupled with said shiftable means for limited individual movement with respect thereto, and means to actuate said shiftable means and ejecting means and rotate said supporting and holding means in timed relation with respect to each other.

23. In an apparatus for twisting a corrugated wire strip in axially spaced areas, a base member, oppositely arranged spaced twisting devices on said base member for twisting in axially spaced areas of a corrugated wire the wire portions connecting two adjoining loops of such a corrugated wire, and actuating means for said devices sup-

ported by said base member and timed to simultaneously actuate said devices.

24. In an apparatus for twisting a corrugated wire strip at spaced points, a base member, oppositely arranged devices on said base member for twisting wire connecting portions of adjoining loops of a corrugated wire strip, one of said twisting devices being constructed to twist one loop connecting wire portion of a corrugated wire strip and the other one of said twisting devices being constructed to twist two loop connecting wire portions of such corrugated wire strip, and means supported by said base member for actuating said twisting devices.

25. In an apparatus for twisting a corrugated wire strip at spaced points, a base member, oppositely arranged devices on said base member for twisting connecting wire portions of adjoining loops of a corrugated wire strip, coordinated clamping and ejecting devices for each of said twisting devices, and coordinated actuating means for said twisting, clamping and ejecting devices, said actuating means being mounted on said base member and including timed lever mechanism for said twisting devices and said clamping and ejecting devices.

26. In an apparatus for twisting a corrugated wire strip at spaced points, a base member, oppositely arranged devices on said base member for twisting connecting wire portions of adjoining left and right-handed loops, said devices including corrugated wire strip supporting means, shiftable clamping means for rigidly holding a corrugated wire strip in said supporting means, and ejecting means to eject such corrugated wire strip from said supporting means, said clamping means and ejecting means being coupled for limited movement with respect to each other, and actuating means for actuating said devices and their clamping and ejecting means in timed relation.

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Certificate of Correction

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Patent No. 2,450,876.

October 12, 1948.

SVEND G. BLUMENSAADT ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 9, line 42, claim 11, for the word "for" before "said" read *from*;
and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of February, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.