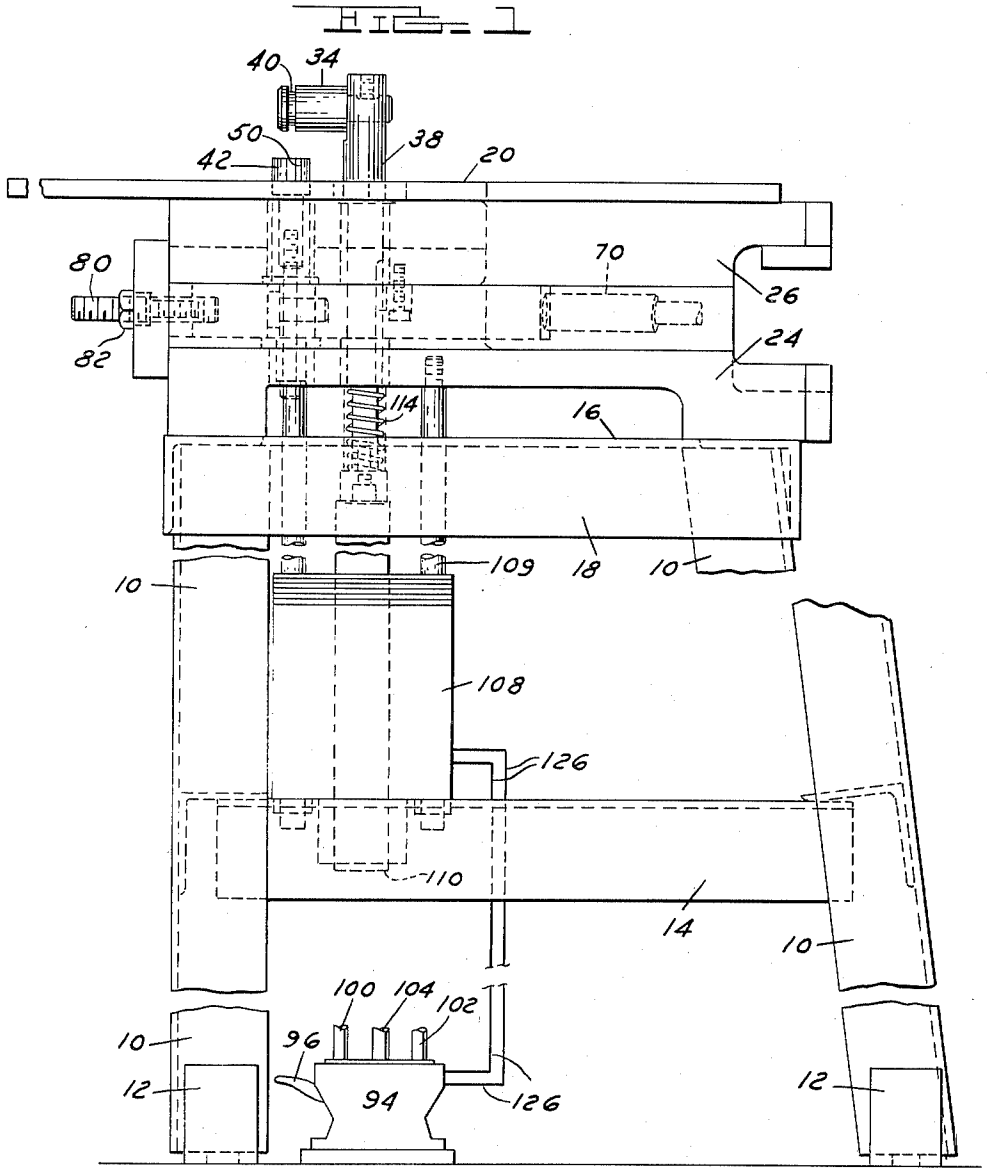
Aug. 16, 1955 H. H. FANTE ET AL 2,715,424

WIRE FORMING MACHINE

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FIG. 1



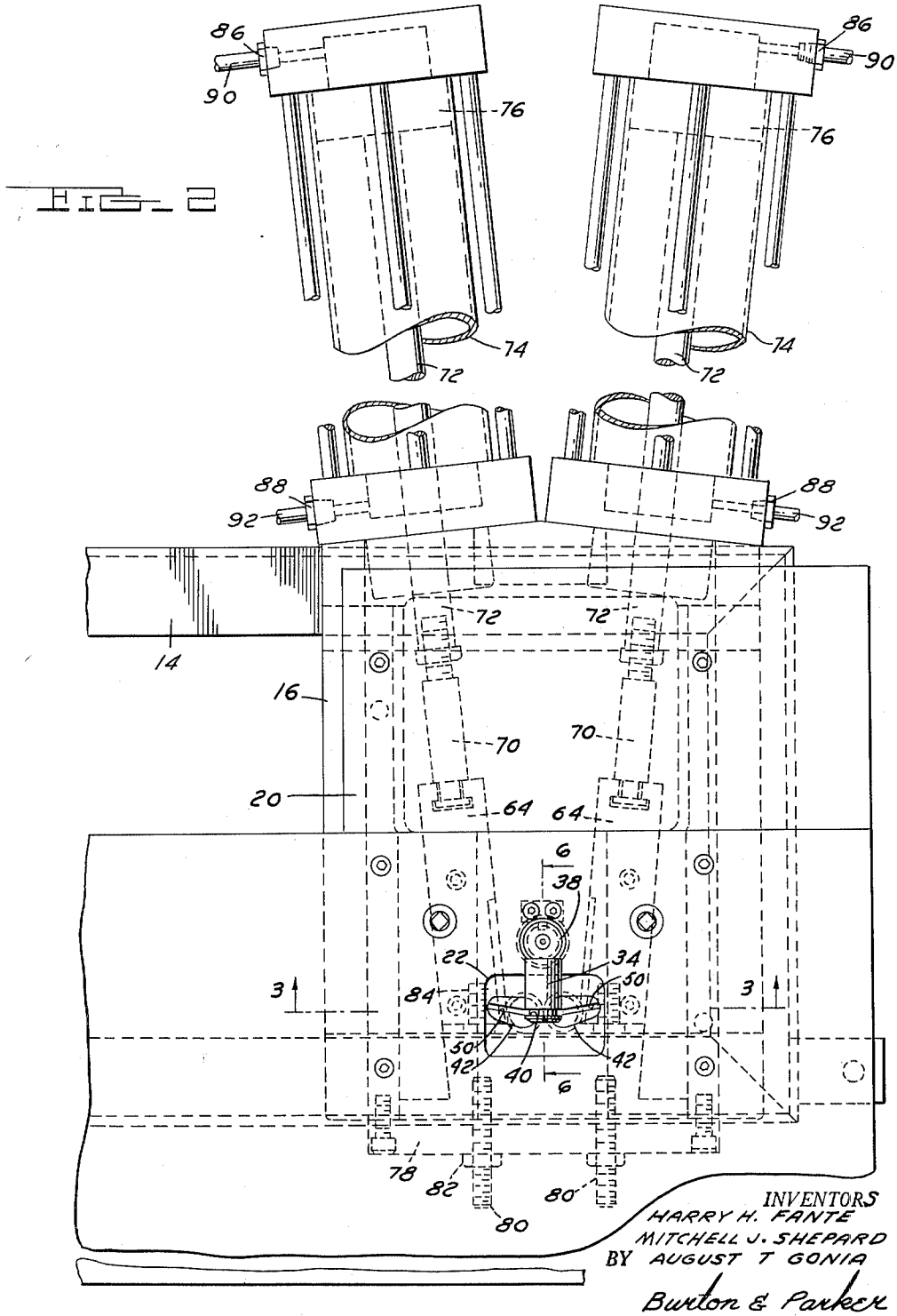
INVENTORS
HARRY H. FANTE
MITCHELL J. SHEPARD
BY AUGUST T. GONIA
Burton & Parker
ATTORNEYS

Aug. 16, 1955 H. H. FANTE ET AL 2,715,424

WIRE FORMING MACHINE

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FIG. 2



INVENTORS
HARRY H. FANTE
MITCHELL J. SHEPARD
BY AUGUST T GONIA
Burton & Parker
ATTORNEYS

Aug. 16, 1955 H. H. FANTE ET AL 2,715,424

WIRE FORMING MACHINE

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FIG. 3

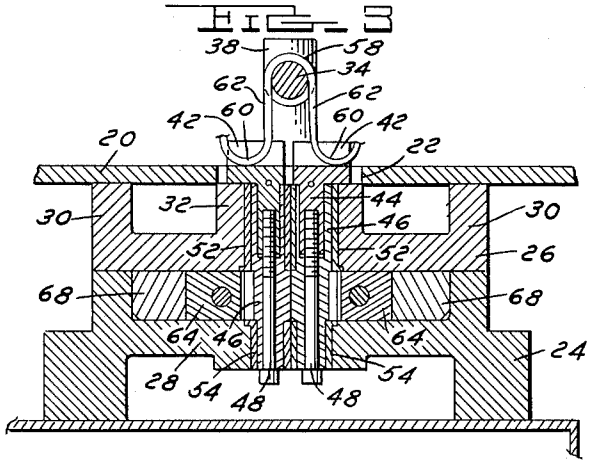
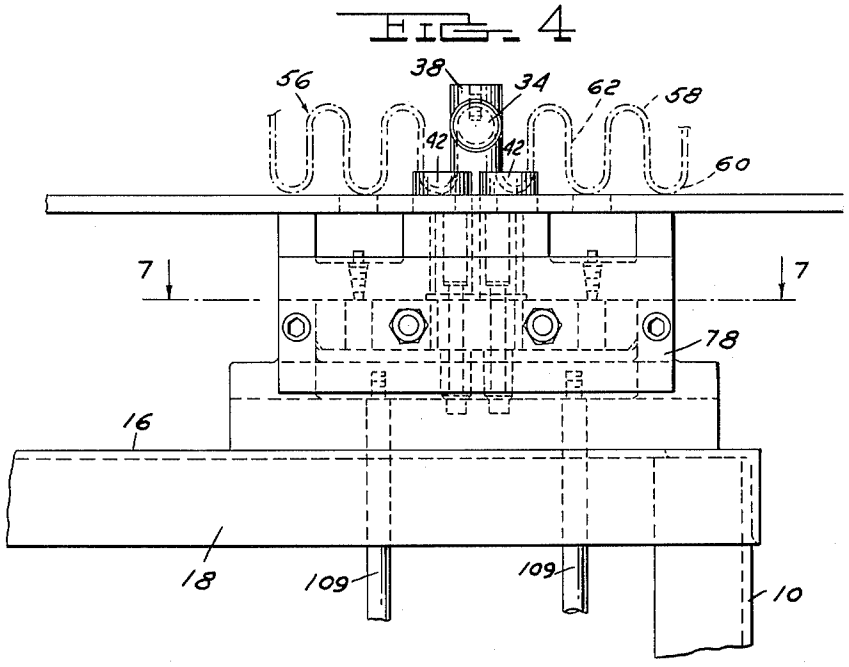


FIG. 4



INVENTORS
HARRY H. FANTE
MITCHELL J. SHEPARD
BY AUGUST T. GONIA
Burton & Parker
ATTORNEYS

Aug. 16, 1955 H. H. FANTE ET AL 2,715,424

WIRE FORMING MACHINE

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FIG. 5

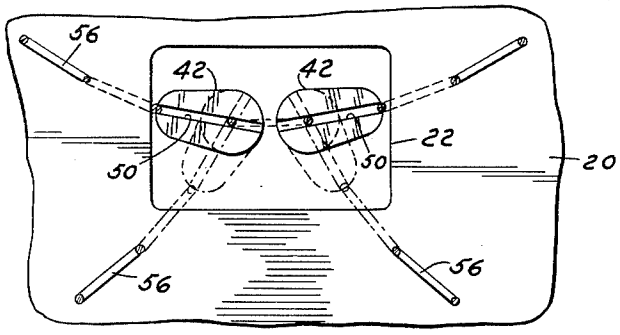


FIG. 6

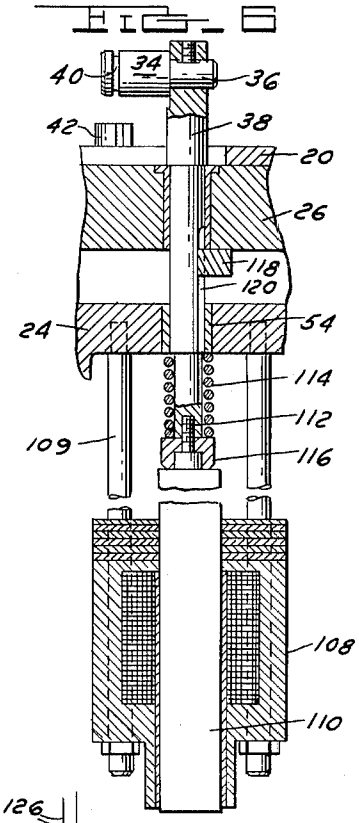
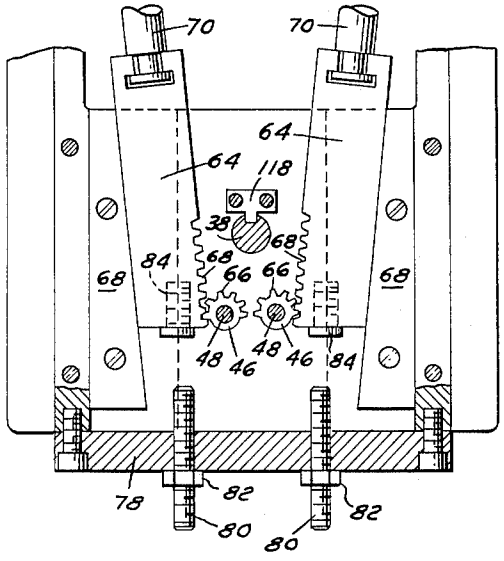


FIG. 7



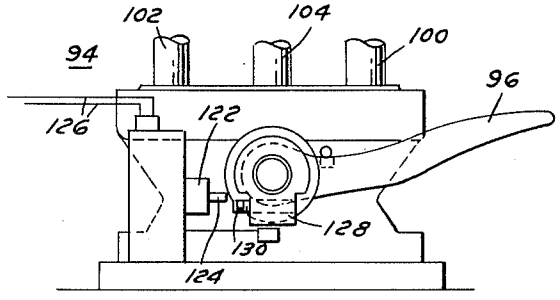


FIG. 9

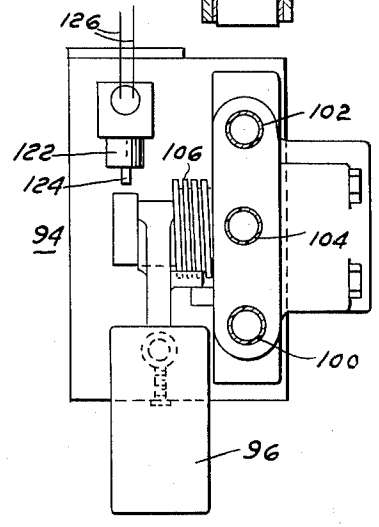


FIG. 8

INVENTORS
HARRY H. FANTE
MITCHELL J. SHEPARD
BY AUGUST T. GONIA

Burton & Parker
ATTORNEYS

United States Patent Office 2,715,424 Patented Aug. 16, 1955

2,715,424

WIRE FORMING MACHINE

Harry H. Fante, Riverside, Mitchell J. Shepard, Cicero, and August T. Gonia, Berwyn, Ill., assignors, by mesne assignments, to Rockwell Spring and Axle Company, Coraopolis, Pa., a corporation of Pennsylvania

Application January 30, 1952, Serial No. 269,044

12 Claims. (Cl. 140—71)

This invention relates to improvements in wire bending machines and particularly to an improved machine for bending preformed corrugated or zigzag wire.

Corrugated or zigzag wire has been used extensively as spring supports for seats and backs of seats and particularly in the seat constructions of motor vehicles. Such zigzag wire is shaped by laterally bending a straight length of wire first on one side then the other side thereof and results in a formation wherein the wire exhibits alternate oppositely disposed wire loop sections connected together by transversely extending wire sections. As it is made, the corrugated wire is cut off into strips of desired length and usually a curvature is set into the strip which causes the strip to assume an arched formation from one end to the other end thereof.

The present invention concerns an improved machine for further shaping zigzag wire and particularly for bending or folding strips of such wire at one or more places to extend portions of the strips at angles to the balance of the strips. This is effected by twisting one or more loop connecting transverse sections of a zigzag wire strip about their respective axes. In the past, it has been the practice to change the shape of wire products by twisting certain portions thereof upon their axes. Hand operated devices have been used for this purpose and particularly for twisting laterally bent portions of strut wires and the like for the purpose of producing the desired bend in the wire. The present invention constitutes an improvement over such hand operated devices and incorporates power means for effecting the twisting operation and for timing the movements of the parts to accomplish this end.

An important object of the invention is to provide an improved machine for rapidly bending zigzag wire into the desired formations and particularly for imparting folds therein which causes the zigzag wire to assume certain angular formations. Another important object of the invention is to provide an improved machine of this character and comprising parts which may be fabricated and assembled at low cost and which are arranged in a distinctly novel relation to one another and for quickly engaging the zigzag wire and for accurately and rapidly producing the desired bent formation. A further important object of the invention is to provide an improved machine of this character which is arranged in a novel manner for the convenience of the operator and which provides a work table for stacking unbent and bent zigzag wire strips adjacent to the operating members for effecting the bending operation.

Various other objects, advantages and meritorious features will become more fully apparent from the following specification, appended claims and accompanying drawings wherein:

Fig. 1 is a side elevation of a machine embodying the invention;

Fig. 2 is a plan view of the machine illustrated in Fig. 1;

Fig. 3 is a vertical sectional view of the upper portion of the machine taken along line 3—3 of Fig. 2 and showing the manner of supporting a portion of a zigzag wire thereon;

Fig. 4 is a side elevation of the upper portion of the machine showing in dotted lines the position assumed by a zigzag wire prior to the bending thereof;

Fig. 5 is an enlarged plan view of a portion of the table and illustrating by full and dotted lines the positions of two of the operating members at the commencement and termination of a wire bending operation;

Fig. 6 is a fragmentary vertical sectional view taken along line 6—6 of Fig. 2;

Fig. 7 is a horizontal sectional view taken along line 7—7 of Fig. 4;

Fig. 8 is a plan view of a foot controlled valve for controlling the operation of the hydraulic motors; and

Fig. 9 is a side elevation of the foot controlled valve of Fig. 8.

In the illustrated embodiment of the invention, the operating parts are supported upon a suitable frame which may consist of upright members or legs **10** having floor engaging inserts **12** in the lower ends thereof. The legs **10** may be connected together intermediate their heights by cross frame members **14** which are welded or otherwise secured to the upright members. The upper ends of the legs terminate on the same horizontal level, and overlying or capping these ends is a base platform or table **16**. The platform is provided with downwardly projecting marginal flanges **18** which embrace the upper portions of the legs and enclose the same therewithin.

The machine is provided with a wire support or work table **20** which as shown in Figs. 1 to 4 is supported in vertical spaced relation to the platform **16**. Preferably the work table is a metallic sheet having a flat upper surface of relatively large expanse as compared with the area occupied by the wire engaging operating members of the machine. This large expanse enables an operator of the machine to form separate groups of unbent and bent zigzag wire strips thereon in spaced relation to the wire bending members but within arm's reach. The work table is provided in one convenient area to the operator with a relatively small opening **22** therethrough. The opening may be of the rectangular formation shown in Fig. 2. Forming a small cluster above and immediately adjacent to the opening are the wire engaging and bending members of the machine.

Between the wire support or work table **20** and the base platform **16** is a structure including supporting plates and operating mechanism for controlling the movements of the wire engaging and bending members. The structure serves to support the work table in spaced relation to the platform. Two superimposing plates constitute the primary supporting parts of the structure. One plate is indicated at **24** and is referred to as the base plate. The other plate superimposes the base plate and is indicated at **26**. The two plates may be metal castings and of the cross sectional formation shown in Fig. 3. The base plate is provided with an intermediate horizontal portion **28** which is recessed both from its upper and lower edges and cooperates with the upper plate **26** to form a horizontal passage through which certain parts of the drive mechanism extend as hereinafter described. The upper plate is provided with upwardly extending parallel side flanges **30—30** which form rests for the work table. Between these flanges, the upper plate is provided with an upwardly projecting vertically bored body **32** which is aligned with the opening **22** in the work table.

Movably supported in the bore of the body portion **32** of the upper plate **26** and located above the upper surface of the work table are the wire engaging and bending members of the machine. One of these members serves as a rest for one loop section of a zigzag

wire strip and is stationary during the wire bending operation. Either one or two similarly formed rotatable members are employed to engage the zigzag wire strip and upon rotation bend a portion of the wire strip relative to the balance. In the illustrated embodiment of the invention two such rotary members are shown but it is understood that either one or the other may be omitted to vary the type of bend formed in the zigzag wire.

The normally stationary wire engaging member is in the form of a cylindrical shaped rest pin 34 supported as shown in Fig. 1 in spaced relation to the upper surface of the work table and having its axis extending horizontal and parallel to the plane of the work table. One end of the rest pin is reduced as shown at 36 in Fig. 6 and is fitted into and secured to the upper end of a vertical member, post, or shaft 38. The rest pin is preferably provided with a peripheral recess or groove 40 which as shown in Figs. 3 and 4 functions as a seat for retaining the loop section of the wire against axial movement therealong. The groove 40 is preferably located near the outer end of the rest pin and is of such a depth and width as to substantially fully seat the wire loop section therewithin. In this manner the rest pin serves as a saddle for a downwardly opening loop section of zigzag wire received thereon. Preferably the rest pin is located at a height above the table 20 such that when a loop is fully seated thereon the balance of the zigzag wire will lightly bear upon the upper surface of the table as is evident in Fig. 4.

Located above the work table but below the level of the rest pin are the one or two rotatable wire engaging members previously referred. Two such members are herein shown and since they are similarly constructed they are referred to by the same reference characters. Each rotatable member comprises a head portion 42 located above the level of the work table and over the opening 22 thereof. Each member is further provided with a vertical stem portion 44 which enters a bore in the upper end of a shaft 46. A bolt 48 entering the lower end of the shaft is utilized for securing the stem portion of each member to its respective shaft. Each head 42 may be elongated in one dimension as shown in Fig. 5. Provided in each head is an upwardly opening recess or groove 50 which as shown in Fig. 5 is preferably located on the axis of the long dimension of the head. The recess or groove 50 of each head is of a width sufficient to slidably receive a loop section of a zigzag wire strip and of a depth such that its bottom extends substantially flush with the upper surface of the work table as illustrated in Fig. 3.

The two shafts 46—46 for the heads 42—42 are located side by side and under the outer end of the rest pin. The two shafts are journaled in the body portion 32 of the upper plate 26 for rotation about their respective axes and for this purpose a separate brushing 52 is provided in the body portion of each shaft. It is preferred to additionally support the shafts 46—46 in the base plate 24, and for this purpose the intermediate portion 28 of the base plate is provided with a bore co-axially aligned with the bore in the upper plate. The lower ends of the two shafts 46—46 extend into the bore of the base plate and are suitably journaled therein by means of bushings 54—54. The bolts 48 securely hold the heads 42 on their respective shafts for joint rotation therewith.

The two shafts 46—46 are mounted so that the axes of rotation thereof and the heads 42—42 extend upwardly past the opposite sides of the rest pin 34 and substantially tangential to the peripheral surface thereof. The two shaft axes are disposed in the plane of the peripheral groove 40 but on opposite sides of the rest pin. The heads 42—42 are preferably eccentrically mounted on their respective shafts and arranged so that in the starting position of the parts their slots 50 substantially align with the

peripheral groove 40. The initial or starting position of the heads is shown in Fig. 2 and in full line in Fig. 5. The slight angular relation of the slots 50—50 to the groove 40 in exhibited in Fig. 2 is to accommodate a preset arch existing in the zigzag wire strip. This angular relation may be varied or the slots brought into exact alignment with the plane of the groove 40 depending upon whether an arch is preset into the zigzag strip and its radius of curvature.

It is apparent from the description thus far that for operating upon a zigzag wire strip, such as generally indicated at 56 in Figs. 3, 4 and 5, the strip is positioned so that it extends edgewise to the upper surface of the working table and in a plane perpendicular to the axis of the rest pin. Such a zigzag wire strip comprises alternate upper and lower loop sections 58 and 60 respectively connected together by transverse wire sections 62. The strip is manually positioned in the grooves of the rest pin 34 and the heads 42—42 with a selected upper loop section 58 in straddling relation to the rest pin and seated in the groove 40 thereof. The two immediately adjacent lower loop sections 60—60 are received in the upwardly opening grooves 50 of the heads 42—42. The two transverse wire sections 62—62 connecting the upper seated loop 58 with the two adjacent lower loops 60—60 extend vertically. Since the pin supported loop 58 is fully seated in the groove 40 the two transverse wire sections 62—62 leading downwardly therefrom are disposed in substantially but not necessarily accurate alignment with the rotating axes of the heads 42 and the shafts 46. When both shafts and their respective heads are rotated, such as to the dotted positions shown in Fig. 5, the transverse wire sections 62—62 connected to the seated loop 58 are twisted about their respective axes, thus imparting two closely adjacent folds or bends in the zigzag wire at the locations of these transverse sections.

When two such rotary heads 42—42 are employed as in the illustrated embodiment of the invention, they are preferably simultaneously rotated about their respective shaft axes and in directions opposite to one another. This is effected by the provision of drive mechanism operating in the passage formed between the intermediate portion 28 of the base plate 24 and the upper plate 26. As best shown in Fig. 7, this mechanism preferably comprises two reciprocating rack bars 64—64 of similar construction, one for each shaft 46. Carried by each shaft 76 is a pinion 66, the teeth of which are engageable with the teeth 68 of the rack bar with which the shaft is associated. The two rack bars are guided for travel along separate converging paths by two oppositely disposed wedge-shaped members 68—68 which rest upon the horizontal portion 28 of the base plate 24 as shown in Fig. 3.

The rack bars 64—64 are preferably reciprocated by hydraulic means and such means employing a compressible fluid. As shown in Fig. 2, each rack bar is connected by means of a tie rod 70 to the exterior end of a piston rod 72. Each piston rod 72 extends into a cylinder 74 and carries on its inner end a piston head 76. Compressible fluid, such as air, is introduced under pressure into the cylinders alternately on opposite sides of the piston head 76 to reciprocate the same and the rack bars associated therewith.

Adjustable stops are provided for limiting the extent of travel of the two rack bars 64—64. As shown in Figs. 2 and 7 the front side of the superimposing plates 24 and 26 are closed by a plate 78 forming a side wall therefor. Carried by the wall 78 are two adjustable stop members 80—80 which are disposed in line with the travel of the rack bars and are adapted to be engaged thereby. Each stop member 80 may be a set screw held in any adjusted position relative to the wall 78 by means of a jam nut 82. Each rack bar 64 may carry a replaceable wear resisting element in the form of a headed bolt 84 which is engageable with the inner end of the adjacent stop member 80. By axially adjusting the stops 80, the dis-

tance of travel of the two rack bars **64—64** may be varied and in this manner the amount of rotation of the heads **42—42** may be regulated.

The two pistons **76—76** are reciprocated in their respective cylinders **74—74** by means of fluid pressure directed into the opposite ends of the cylinders. As shown in Fig. 2, each cylinder is provided with a fitting **86** at one end and a fitting **88** at the other end which serve to connect conduits leading to a source of compressible fluid pressure (not shown). The conduits leading to the outer end fittings of the two cylinders are indicated by the reference character **90**; the conduits leading to the inner end fittings **88** of the two cylinders are indicated at **92**. These conduits are connected through a valve with a source of pressure. The valve is generally indicated at **94** in Figs. 8, 9 and 10 and is suitably designed to alternately direct the fluid under pressure through either the conduits **90** or the conduits **92** to reciprocate the pistons in their respective cylinders.

The valve **94** for controlling the flow of fluid pressure is preferably foot controlled and located under the machine near the floor so that it may be actuated by the foot of the operator. The valve is provided with a pedal or foot lever **96** which is secured to the outer end of a rotary valve member **98**. The latter extends into the body of the valve and is ported so that it directs fluid to either one or the other ends of the cylinders depending upon the position of the pedal. The two conduits **90—90** for the outer ends of the cylinders are joined together into a common conduit **100** leading to one side of the valve. Similarly, the conduits **92—92** for the inner ends of the cylinders are joined together and enter the valve through a common conduit **102**. Fluid pressure, such as air under pressure, is directed into the valve body by means of a conduit **104** which is shown in Figs. 8 and 9 and may be located between the two conduits **100** and **102**.

A coiled spring **106** encircles a tubular portion of the valve body through which the member **98** extends and is fixed at one end to the valve body and at the other end to the foot pedal. The spring is so mounted that it yieldingly urges the pedal to its upper position shown in Fig. 9. In this position, the ports of the valve are so arranged as to direct fluid pressure to the inner or forward ends of the cylinders **74—74**. However, when the pedal **96** is depressed against the resistance of the spring **106** the ports in the valve body are arranged to direct fluid pressure to the outer or rear ends of the cylinders **74—74**. Thus, when the pedal is depressed, fluid is directed into the cylinders to urge their respective pistons outwardly therefrom to advance the rack bars toward their respective limit stops and to rotate the heads **42—42** in the direction to impart the desired bend to the zigzag wire section being operated upon.

The rest pin supporting post **38** is movable axially through the table. It is reciprocated upwardly at the conclusion of each wire bending operation in order to clear the zigzag wire sections out of the heads **42—42** before their return to their initial starting position. In the illustrated embodiment of the invention, this is accomplished by power means comprising a solenoid **108** which is suspended from the base plate **24** by studs **109** and surrounds an armature **110** of magnetically attractable material. The armature constitutes a lower sectional portion of the post **38** and the two are secured together for joint reciprocation by a threaded connection indicated at **112**. The armature is so related to the solenoid that when the latter is energized it will cause the armature to be raised and lift the post and the rest pin **34** associated therewith.

Upward movement of the post **38** is yieldingly resisted by means of a coiled spring **114** surrounding the lower end of the post as shown in Fig. 6. The upper end of the coiled spring is seated against the bushing **54** mounted in the base plate **24** and the lower end is seated upon a cap or nut **116** surrounding the upper end of the armature. The post **38** is held from rotation by means of a key **118** fixed to the upper plate **26** and entering a longitudinal groove **120** formed in the side of the post.

The solenoid **108** is energized when the pedal **96** is depressed to its lowest position. This is accomplished by the closing of the solenoid circuit when the pedal is moved to such position. As shown in Figs. 8 and 9, the valve base carries a limit switch **122** from which projects a depressible electrical contact member **124**. When depressed, the contact member closes the circuit **126** extending to the solenoid **108**. The depressible contact member **124** is supported adjacent to the axis about which the pedal **96** moves and may be located on the side of the axis opposite to the pedal as shown in Fig. 9. Associated with the pedal and movable therewith is a body **128** carrying a trigger finger **130** which, when the pedal approaches a fully depressed position, engages the contact member **124** and depresses the same to close the solenoid circuit.

It is thus evident that during the early depressible movement of the pedal fluid pressure is directed to the rear or outer ends of the air cylinders to move the rack bars and the heads **42—42** in the direction to perform the wire bending operation, and that when the pedal is fully depressed the solenoid circuit is closed and the post **38** and its associated rest pin **34** are raised to clear the zigzag spring section out of the heads. When foot pressure is removed from the pedal, it returns to its initial raised position causing fluid under pressure to flow to the inner or forward ends of the cylinders to retract the back bars and return the heads **42—42** to their initial starting positions. At the same time, the upward movement of the pedal opens the solenoid circuit thereby de-energizing the solenoids and permitting the post **38** and rest pin **34** to return to their initial operating position.

What we claim is:

1. In a machine for bending pre-formed zigzag wire having alternate oppositely disposed loops each connected to one another by a transversey extending wire section, a table, a cylindrically shaped member supported spaced above the table and extending parallel thereto and so dimensionally proportioned as to receive a loop of a zigzag wire and form a supporting rest therefor, a pair of members located above the table near the first member and spaced there-below and each provided with a slot shaped to receive an opposite next adjacent loop to the loop of zigzag wire thus supported on the first member, said pair of members being rotatably mounted and provided with drive means extending through the table to the underside thereof, and power means under the table operatively connected to said drive means and adapted to rotate the same to impart a twist to the connecting transverse wire sections extending between said loops of zigzag wire.

2. In a machine for imparting bends in preformed zigzag wire strips, a table having a flat expanse sufficient to carry a plurality of preformed zigzag wire sections, mechanism located above the table for bending a zigzag wire strip and occupying a small portion of the entire surface area of the table, said mechanism including two members for engaging two immediately adjacent but oppositely disposed loop portions of a zigzag wire strip, one of said members constituting a horizontal extending cylindrically shaped pin positioned in spaced relation to the surface of the table and being dimensionally proportioned to function as a rest for a loop portion of a zigzag wire strip received thereon, said member being supported above the table for vertical reciprocation to-

ward and away from the table, the other member constituting a vertical shaft provided with an upwardly opening transverse slot on the upper end thereof shaped to receive an opposite loop portion of the zigzag wire strip next adjacent to the loop portion received on the first member, said shaft extending through the table to the underside thereof, and drive means under the table operatively coupled to the shaft for rotating the same.

3. In a machine for imparting bends in preformed zigzag wire strips, a table having a flat expanse sufficient to carry a plurality of preformed zigzag wire sections, mechanism located above the table for bending a zigzag wire strip and occupying a small portion of the entire surface area of the table, said mechanism including three members for engaging three immediately adjacent but alternately oppositely disposed loop portions of a zigzag wire strip, one of said members constituting a horizontal extending cylindrically shaped pin positioned in spaced relation to the upper surface of the table and being dimensionally proportioned to function as a rest for a downwardly opening loop portion of a zigzag wire strip received thereon, the remaining two members constituting a pair of vertical shafts having their upper ends terminating below the rest pin and on opposite sides thereof, the upper ends of said shafts being each provided with a transverse slot shaped to receive and support the upwardly opening loop portions on either side of the loop portion resting on the pin, said shafts extending through the table to the underside thereof, and drive means under the table operatively coupled to the shafts and arranged to rotate the same in directions counter to one another.

4. A machine for bending preformed zigzag wire comprising, in combination, a substantially cylindrically shaped member adapted to enter one of the loops of a zigzag wire and serve as a rest therefor, a pair of members rotatably mounted one on each side and adjacent to the first member and shaped to engage the next successive but opposite loops to that of the loop of the zigzag wire resting on said first member, the axes of rotation of said pair of members extending substantially tangential to the first member, means for rotating said rotatable members to twist the transverse section of wire connecting said adjacent loops to impart a bend in the zigzag wire, means for providing bodily shiftable movement of the cylindrically shaped member toward and away from the other members to lift a zigzag wire resting on the cylindrical member away from and out of engagement with the other members, and means for moving the bodily shiftable member away from the other members immediately following the wire twisting operation.

5. In a machine for bending preformed zigzag wire having alternate oppositely disposed loops each connected to one another by a transverse section of wire, a substantially cylindrically shaped member of a size to receive one of the loops of a zigzag wire and serve as a rest therefor, said member having a peripheral groove into which the loop thus received may seat to hold the loop against axial shiftable movement relative to the member, a pair of members having slots shaped to receive and overlap upon the opposite sides of loops of a zigzag wire, means mounting said pair of members for rotation adjacent to the first member and such that the slots thereof open toward the first member and are arranged to receive and overlap the opposite and next succeeding loop of the zigzag wire thus resting on the first member, means for rotating the pair of members to twist the transverse sections of wire connecting said loops about their axes to impart a bend to the zigzag wire, means mounting the first member for bodily shiftable movement toward and away from the pair of members, and means for bodily shifting the first member immediately following the twisting operation performed by the pair of members.

6. A machine for bending pre-formed zigzag wire comprising, in combination: a table, a post projecting upwardly through the table and movable axially through the table, a cylindrically shaped member mounted on the post and extending parallel to the table and located spaced above the table and adapted to support a downwardly opening loop of a zigzag wire, a pair of wire twisting heads projecting above the plane of the table spaced below the member and disposed on opposite sides thereof adjacent the post and adapted to engage the loops of wire adjacent and on opposite sides of the loop received over the member, means coupled with the heads to rotate the same to bend the wire around axes extending parallel to the post, and means coupled with the post to reciprocate the same and move the cylindrically shaped member toward and away from the table to lift a zigzag wire resting upon the cylindrical member and engaged with the heads upwardly away from the heads and to a position of disengagement with the heads.

7. A machine for bending pre-formed zigzag wire comprising, in combination: a table, a post projecting upwardly through the table and movable axially through the table, a cylindrically shaped member mounted on the post and extending parallel to the table and located spaced above the table, said member exhibiting a wire-receiving groove adapted to receive the curved portion of a downwardly opening loop of a zig-zag wire to support the wire on the member with the sides of the groove overlying the wire loop, a pair of slotted wire twisting heads projected above the plane of the table spaced below the member and disposed on opposite sides thereof with the slots in the heads alignable with the groove in the cylindrical member, said slots adapted to receive the loops of wire immediately adjacent and on opposite sides of the loop received within the groove in the cylindrically shaped member, means coupled with the heads to rotate the same in opposite directions, and means coupled with the post to reciprocate the same and move the cylindrically shaped member toward and away from the table a distance exceeding the depth of the slots in the wire twisting heads to lift a zigzag wire resting in the groove of the cylindrical member and receive in the slots of the heads upwardly away from the heads and out of the slots thereof.

8. In a machine for imparting bends in preformed zigzag wire strips, a table having a flat expanse sufficient to carry a plurality of preformed zigzag wire sections, mechanism located above the table for bending a zigzag wire strip and occupying a small portion of the entire surface area of the table, said mechanism including three members for engaging three immediately adjacent but alternately oppositely disposed loop portions of a zigzag wire strip, one of said members constituting a horizontally extending rest pin positioned in spaced relation to the upper surface of the table and being dimensionally proportioned to function as a rest for a downwardly opening loop portion of a zigzag wire strip received thereon, power means under the table for moving the rest pin toward and away from the table including a reciprocable post extending through the table and supporting the pin thereon, the remaining two members constituting a pair of vertical shafts having their upper ends terminating below the rest pin and on opposite sides thereof, the upper ends of said shafts being each provided with a transverse slot shaped to receive and support the upwardly opening loop portions on either side of the loop portion resting on the pin, said shafts extending through the table to the underside thereof, drive means under the table operatively coupled to the shafts and arranged to rotate the same in directions counter to one another, and means coupled to the power means and to the drive means and responsive to the movement of the drive means to actuate the power means to cause the pin to be shifted away from the table following the twisting of the wire and for a distance sufficient to clear the loops out of the slots.

9. In a machine for bending a preformed zigzag wire having alternate oppositely disposed loops each connected to one another by a transversely extending wire section,

a table, a wire rest supported spaced above the table and extending parallel thereto and so dimensionally proportioned as to receive a loop of a zigzag wire and form a supporting rest therefor, means supporting said rest for vertically shiftable movement toward and away from the table, a pair of members located above the table near the rest and spaced therebelow and each provided with a slot shaped to receive an opposite next adjacent loop to the loop of zigzag wire thus supported on the rest, said pair of members each being mounted on the end of a vertical shaft extending through the table to the underside thereof, a pinion gear mounted on each shaft underneath the table, power driven rack means operatively coupled with the pinion gears to rotate the same to impart rotation to the slotted pair of members to twist the connecting transverse wire secions extending between said loops of zigzag wire.

10. The invention as defined in claim numbered 9 characterized in that the power-driven rack means includes a fluid pressure operating device and valve means for controlling the operation of the fluid pressure device, and the means supporting the wire rest for vertically shiftable movement is responsive to the actuation of the valve means to shift the rest away from the table a distance sufficient to clear the loops out of the slots following the twisting of the wire.

11. A wire bending machine for bending a strip of preformed zigzag wire comprising: a frame; a pair of laterally spaced apart, slotted wire twisting heads adapted to engage over the same linear side edge of a strip of zigzag wire at spaced apart intervals with each loop of two adjacent similarly disposed loops of the wire received in the slot of each head; a pair of shafts mounted for rotation on the frame; means mounted on the frame and coupled with the shafts for rotating the shafts; each of said twisting heads mounted on one of said shafts; a slotted wire engaging and positioning member disposed opposite the twisting heads and adapted to engage the intermediate and oppositely disposed connecting loop of the zigzag strip from the loops received within said heads and with said connecting loop seated in the slot of the positioning member, said wire engaging and positioning member adapted to position and hold said connecting loop of the wire during bending of the wire; and means mounted on the frame and supporting said engaging and positioning member for shiftable movement in the plane of the wire strip toward and away from the twisting heads whereby the wire may be cleared out of the slots in the twisting heads.

12. A wire bending machine for bending a preformed zigzag wire strip comprising: a frame, a wire support mounted on the frame for supporting the zigzag wire preparatory to bending the same, a pair of slotted wire twisting heads extending through the support and adapted to engage over that edge of the wire resting on the support with a pair of similarly disposed adjacent loops of the wire received in the slots of the twisting heads, a pair of shafts mounted on the frame for rotation, each of said twisting heads mounted on one of the rotatable shafts, means mounted on the frame and coupled with the shafts for rotating the same, a slotted wire engaging and positioning member disposed opposite the twisting heads and spaced from said support and adapted to engage within its slot the intermediate and oppositely disposed connecting loop of the zigzag wire strip from the loops received within said twisting heads, said wire engaging and positioning member adapted to hold the wire at the loop with which it is engaged intermediate the loops received in said twisting heads during bending of the wire, and means mounted on the frame and supporting the wire engaging and positioning member for shiftable movement toward and away from the twisting heads and toward and away from said support whereby the zigzag wire may be celared out of the twisting heads.

References Cited in the file of this patent

UNITED STATES PATENTS

174,609	Wright	Mar. 7, 1876
487,679	Morse	Dec. 6, 1892
609,011	Criggal	Aug. 16, 1898
734,350	McFatridge	July 21, 1903
904,563	Rau	Nov. 24, 1908
1,737,261	Morin	Nov. 26, 1929
1,821,894	Otaka	Sept. 1, 1931
2,128,620	Lyons	Aug. 30, 1938
2,377,829	Vaill	June 5, 1945
2,389,055	Horton	Nov. 13, 1945
2,450,876	Blumensaadt	Oct. 12, 1948
2,615,478	Hopkes	Oct. 28, 1952
2,632,482	Lincoln	Mar. 24, 1953

FOREIGN PATENTS

226,328	Germany	Sept. 29, 1910
475,733	Canada	July 31, 1951