Jan. 19, 1932. C. KIRCHNER 1,841,820

METHOD OF SHEET METAL STAMPING

Filed June 26, 1930 3 Sheets-Sheet 1

Fig 1

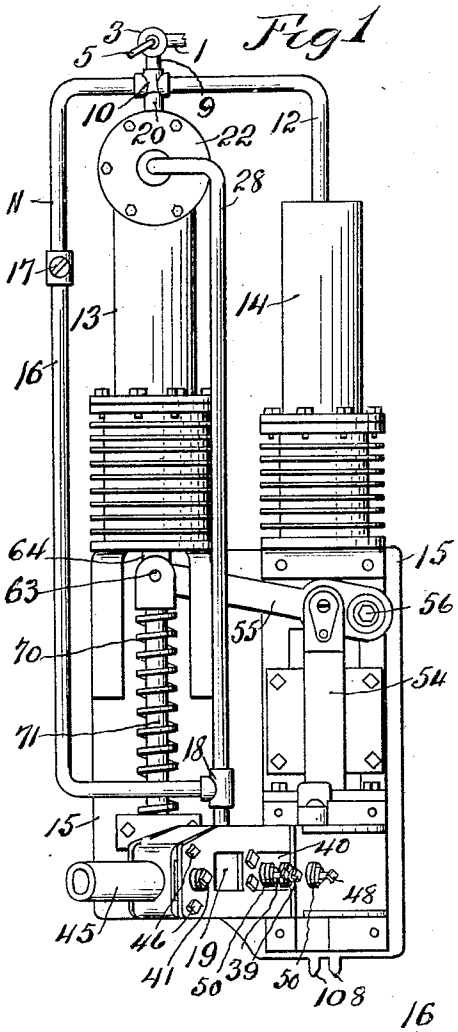


Fig 2

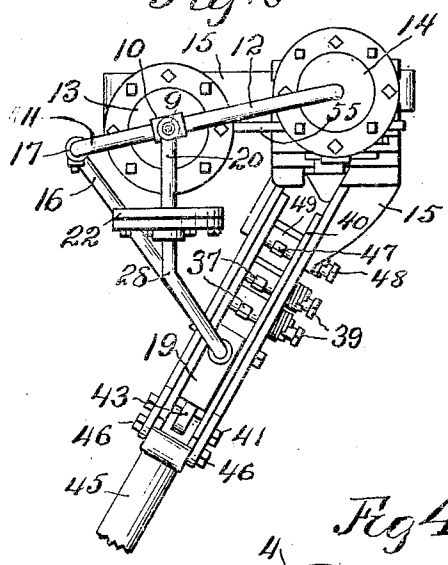


Fig 4

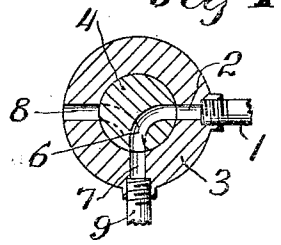
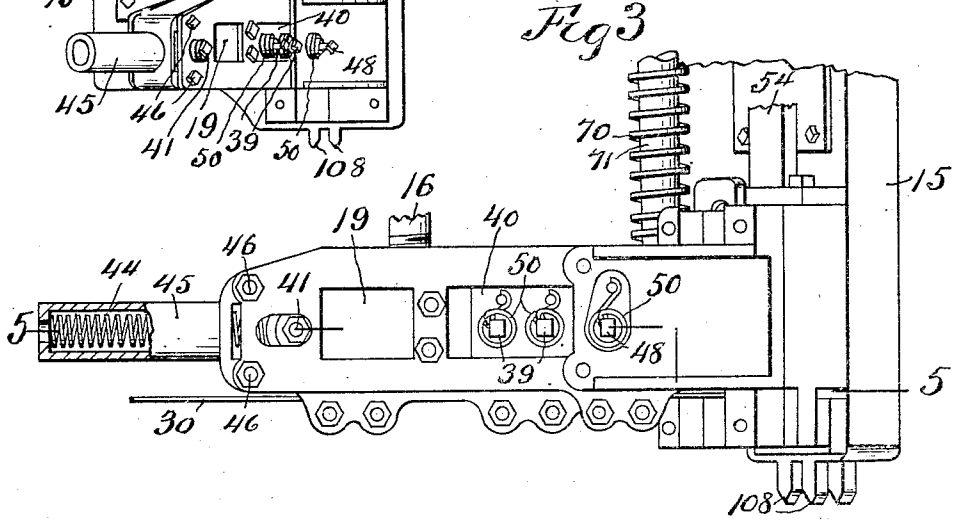


Fig 3



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Jan. 19, 1932. C. KIRCHNER 1,841,820

METHOD OF SHEET METAL STAMPING

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Fig 5

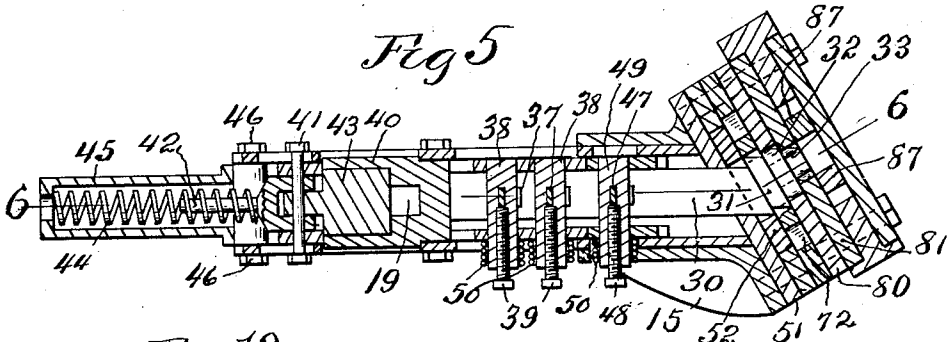


Fig 12

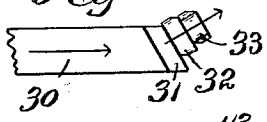


Fig 6

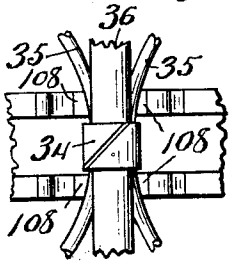


Fig 9

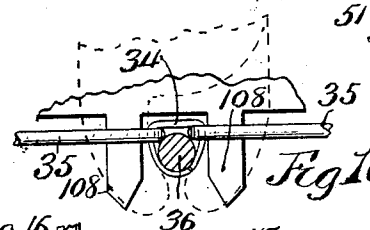


Fig 10

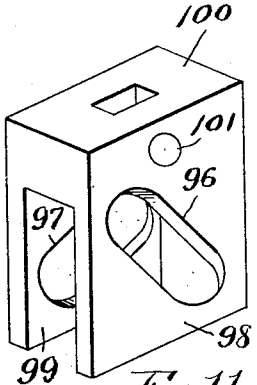


Fig 11

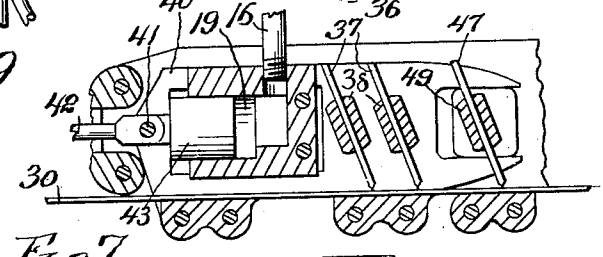


Fig 7

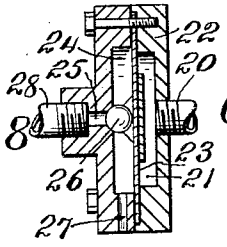


Fig 8

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Witness

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METHOD OF SHEET METAL STAMPING

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Fig 13

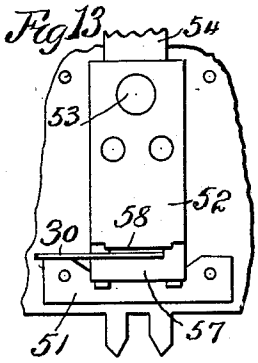


Fig 14

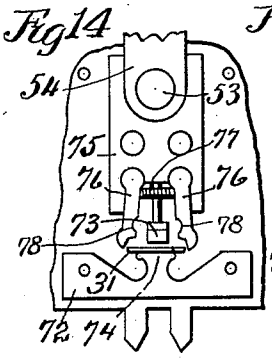


Fig 15

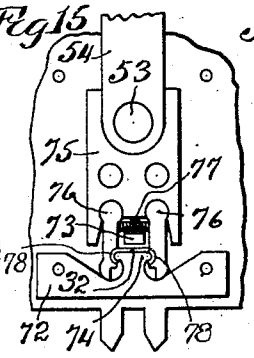


Fig 16

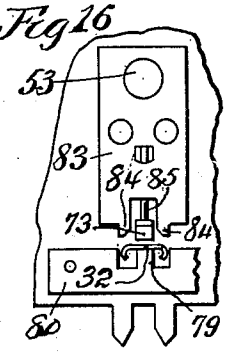


Fig 22

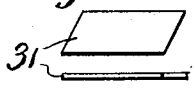


Fig 23

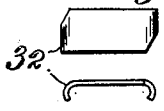
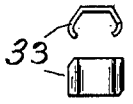


Fig 24



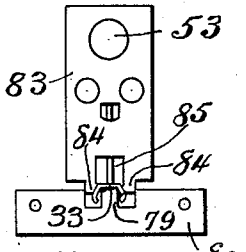


Fig 17

Fig 25

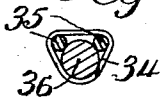
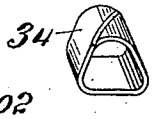


Fig 26



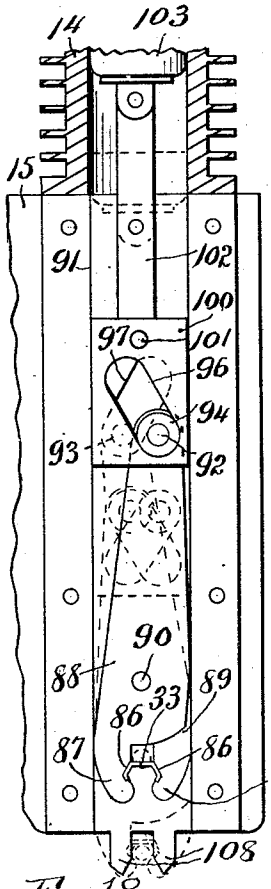


Fig 18

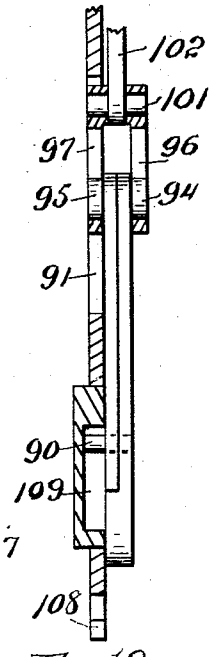


Fig 19

Fig 21

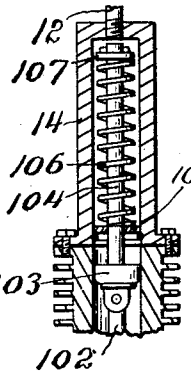
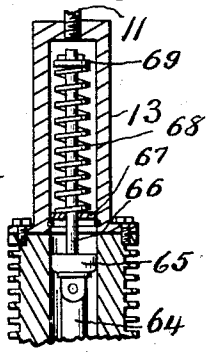


Fig 20



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Patented Jan. 19, 1932 1,841,820

UNITED STATES PATENT OFFICE

CARL KIRCHNER, OF CARTHAGE, MISSOURI, ASSIGNOR TO THE LEGGETT AND PLATT SPRING BED AND MANUFACTURING COMPANY, OF CARTHAGE, MISSOURI, A CORPORATION OF MISSOURI

METHOD OF SHEET METAL STAMPING

Application filed June 26, 1930. Serial No. 463,971.

My invention relates to improvements in methods of sheet metal stamping.

It relates particularly to a novel method of shearing blanks from the end of a strip of material obliquely to the length of the strip, and then feeding the blank in a direction at an angle to the direction in which the strip is fed, whereby a blank having beveled ends is produced, with the elimination of scrap waste and of stripping the blank from the strip.

My invention relates further to a novel method of forming a ring clip, which is transversely obliquely divided, and of enclosing articles to be clamped together by the ring clip.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, which illustrate an apparatus adapted for carrying my improved method into effect,

Fig. 1 is a front elevation of my improved apparatus.

Fig. 2 is a top view of the same.

Fig. 3 is an enlarged side elevation, partly broken away, of the strip feeding means and parts connected therewith.

Fig. 4 is an enlarged cross section through the air controlling valve.

Fig. 5 is a section on the line 5—5 of Fig. 3.

Fig. 6 is a section on the plane of the line 6—6 of Fig. 5, showing the carriage in the forward position.

Fig. 7 is a view similar to Fig. 6, parts shown in Fig. 6 being omitted, the carriage being shown retracted.

Fig. 8 is an enlarged cross section through the diaphragm controlled valve.

Fig. 9 is an enlarged bottom view of the ring clip clinched about the articles to be held together by it, and a portion of the article positioning means.

Fig. 10 is an enlarged side elevation of the positioning means and of the ring clip embracing the articles to be held by the clip.

Fig. 11 is an enlarged perspective of the slotted cam block.

Fig. 12 is an plan view of the clip forming strip, a severed blank, a clip blank after the first forming operation, and a clip blank after the second forming operation, the pieces being shown in the relative positions occupied by them in the apparatus during the process of manufacture of the ring clip.

Fig. 13 is an enlarged front elevation of the shearing punch and parts connected therewith.

Fig. 14 is an enlarged front elevation of the first forming punch and die, the punch being shown in the raised position and a clip blank shown resting on the die.

Fig. 15 is a similar view of the same parts, the punch being shown in its lowermost position and the ends of the clip blank being shown downwardly curved.

Fig. 16 is an enlarged front elevation of the second forming punch and die, the punch being raised, and the partly formed blank shown resting on the die.

Fig. 17 is a view similar to Fig. 16, the punch being shown in the lowermost position, the open clip being shown in the form in which it is adapted to receive the articles which it is to hold.

Fig. 18 is an enlarged view partly in vertical section and partly in elevation, parts being removed or broken away.

Fig. 19 is an enlarged view partly in vertical section and partly in elevation of some of the parts shown in Fig. 18.

Fig. 20 is a vertical section through one of the vertical cylinders shown in Fig. 1.

Fig. 21 is a vertical section through the upper portion of the other vertical cylinder shown in Fig. 1.

Fig. 22 shows a plan view and an edge view of one of the clip blanks as it is after the shearing operation.

Fig. 23 shows a plan view and an edge view of the clip blank as it is following the first forming operation.

Fig. 24 shows an edge view and a plan view of the clip blank as it is following the second forming operation.

Fig. 25 is an end view of one of the clinched ring clips shown embracing two wires and a rod, shown in cross section.

Fig. 26 is a perspective view of one of the clinched ring clips.

Similar reference characters designate similar parts in the different views.

The apparatus is operated by fluid, preferably air, held under pressure in a tank, not shown, with which is connected an air supply pipe 1, Figs. 1 and 4, which discharges into a port 2 in a casing 3 of a manually operated valve mechanism, the valve 4 of which is oscillative in the casing 3.

The valve 4 has an operating handle 5, Fig. 1, and is provided with an arcuate port 6. The casing 3 has a port 7 and a port 8, the latter communicating with the atmosphere.

The port 7 communicates with a pipe 9 which connects with a fitting 10, Figs. 1 and 2.

Two pipes 11 and 12 connect with the fitting 10 and are respectively connected with the upper ends of two vertical cylinders 13 and 14 which are mounted on the body 15 of the apparatus, Figs. 1, 2, 20 and 21.

A conductor 16 which includes an upwardly opening check valve 17, Figs. 1 and 2, and a fitting 18, communicates with the interior of a horizontal cylinder 19 mounted on the body 15, Figs. 1, 2, 3, 5, 6 and 7.

Also connected to the fitting 10 is a pipe 20 which communicates with a chamber 21 in a casing 22, Figs. 1, 2 and 8, said casing being divided by a flexible diaphragm 23 into chambers, the chamber 21, and the chamber 24, the latter having a port 25 adapted to be closed by a ball valve 26 which bears against and is held seated by the diaphragm 23. The chamber 24 has a port 27 which discharges to the atmosphere, Fig. 8.

Slidably supported and adapted to be fed forwardly lengthwise on the body 15 is shown a pliable strip of material 30 suitable for making ring clips, being preferably a metal strip of steel or brass ribbon, Figs. 3, 6, 7 and 12.

In making the ring clips the strip 30 is sheared obliquely across its forward end portion, and obliquely to the direction of feed of the strip, Figs. 3, 5, 6, 7 and 12, to form blanks 31 having parallel side edges and parallel end edges which are oblique to the side edges, Figs. 12 and 22.

Following the shearing operation, the blank 31 is subjected to the first forming operation, in which the pointed ends are downwardly curved to form the blank 32, Figs. 5, 12, 15 and 16.

The blank 32 is then subjected to the second forming operation to form the clip blank 33, Figs. 5, 12, 17 and 24.

The clip blank 33 is finally subjected to a closing operation in which it is clinched around the articles which it is holding together. The ring clip thus formed, designated by 34, Figs. 9, 10, 25 and 26, has its end edges overlapping, thus preventing articles held by it from coming out at the joint.

In Figs. 9, 10 and 25, the ring clip is shown clinched around two bed spring coils 35 and around a rod 36, such as the border rod of a bed spring.

For feeding the strip 30 lengthwise on the body 15, there are two forwardly and downwardly inclined blades 37, Figs. 5, 6 and 7, the lower ends of which are sharp and are adapted to engage the upper side of the strip 30 to force the latter forwardly to the shearing means. The blades 37 are respectively held in two oscillatory members 38 by set screws 39, Figs. 2, 3 and 5.

The oscillatory members 38 oscillate on horizontal axes on a carriage 40 which is horizontally reciprocative forwardly and rearwardly on the body 15.

To reciprocate the carriage 40, it has pivoted to its rear end by a horizontal pin 41, Figs. 5 and 6, the forward end of a horizontal rod 42 at the rear end of a piston 43 which is reciprocative in the cylinder 19, Figs. 5, 6 and 7.

For forcing the piston 43, rod 42 and carriage 40 forwardly, to feed the strip 30, the coil spring 44, encircles the rod 42 and bears at its rear end against the rear end of a horizontal cylinder 45, the forward end of which is open and attached by bolts 46 to the body 15. The forward end of the coil spring 44 bears against the bifurcated front end of the rod 42.

To hold the strip 30 from retracting when the carriage 40 retracts with the blades 37 there is provided a blade 47, Figs. 2, 5, 6 and 7, which inclines forwardly and downwardly and has its lower sharp end pressing against the top of the strip 30. The blade 47 is held by set screw 48 in an oscillatory member 49 mounted in the body 15, forward of the oscillatory members 38.

Coil springs 50 respectively encircle the members 38 and 49. Two of the springs are fastened at one set of ends to the carriage 40, the other ends being respectively fastened to the members 38. The other coil spring 50 encircles and is fastened to the member 49 and to the body 15. The tension of the springs 50 yieldingly forces the blades 37 and 47 against the strip 30.

To force the carriage 40 rearwardly, air is admitted from the conductor 16 into the cylinder 19, thus forcing the piston 43, carriage 40 and rod 42 rearwardly. Air under pressure is admitted to the conductor 16 by turning the valve handle 5, Fig. 1, to a position in which the port 6 will communicate with the pipe 1, through the port 2, and with the port 7. Air will then pass under pressure from the pipe 1 through the valve casing 3, pipe 9, fitting 10 and conductor 16 into the cylinder 19.

The air in the cylinder 19 will hold the piston 43 and carriage 40 in the rear position until the air is permitted to escape from the cylinder 19 through the conductor 16,

pipe 28, chamber 24, and port 27 to the atmosphere.

This release of air from the cylinder 19 will occur when the pressure in the chamber 21 of the casing 22 falls below that required for the diaphragm 23 to hold the valve 26 closed against the pressure in the port 25, Fig. 8.

Such lowering of the pressure in chamber 21 will occur when the handle 5 of the valve 4 is turned to a position in which the valve port 6 will communicate with the ports 7 and 8, at which time air under pressure in chamber 21 will pass therefrom through the pipe 20, fitting 10, pipe 9 and ports 7, 6 and 8, to the atmosphere. The turning of the valve to this position shuts off the supply from the pipe 1.

By thus alternately opening and closing the valve 4, the carriage 40 will be reciprocated, and will through the blades 37 feed the strip 30 forwardly step by step.

To shear from the forward end of the strip 30, blanks 31, there is provided the lower blade 51 of a shearing means, said blade being fastened to the body 15 obliquely to and extending across the path of the forwardly fed strip 30, Figs. 5, 6 and 13. Cooperating with the blade 51, and above it is an upper vertically reciprocative blade 52, Figs. 5, 6 and 13, comprising a steel plate mounted on a transverse pin 53, carried by a vertically reciprocative vertical link 54, pivoted at its upper end to a lever 55, which in turn is pivoted by a horizontal bolt 56 to the body 15, Figs. 1 and 2.

To the lower end of the upper blade 52 is fastened a blade 57, a slot 58 being provided between the upper blade 52 and the blade 57 for receiving the strip 30, Figs. 6 and 13.

To hold the strip 30 firmly against the lower shearing blade 51, a vertical plate 59 bears at its lower end against the strip 30 and is slidably mounted on a plate 60 fastened to the body 15. A coil spring 61 bears at its lower end against the plate 59 and at its upper end against the stud 62 in the plate 60, Fig. 6.

To swing the lever 55 downwardly so as to cause the shear blades 51 and 52 to shear off from the strip 30 a blank 31, and to effect the forming operation, that is the first and second, the lever 55 is pivoted at its left end by a bolt 63, as viewed in Fig. 1, to the lower end of a vertical link 64, which extends upwardly into the cylinder 13, Fig. 20, its upper end being pivoted to a piston 65 vertically reciprocated in the cylinder 13, and having a vertical piston rod 66, which extends upwardly through and is slidable in a transverse plate 67, in the cylinder 13.

A coil spring 68 encircles the piston rod 66 and bears at its lower end against the plate 67 and at its upper end against a collar 69, fastened to the rod 66. The tension of the spring 68 normally forces the rod 66, piston 65, link 64 and lever 55, together with the link 54, pin 53 and parts carried thereby upwardly.

To force these parts downwardly, and at the same time to force the carriage 40 rearwardly, the valve 4 is turned by its handle 5 to the position shown in Fig. 4, upon which the air under pressure will pass, and as has been described, from the supply pipe 1, fitting 10, pipe 11, into the cylinder 13, thus forcing the piston 65, and parts connected therewith, downwardly against the pressure of the spring 68, and also against the pressure of an auxiliary spring 70, Figs. 1 and 3, which encircles a vertical slidable bar 71 pivoted to the bolt 63, the ends of the spring 70 bearing against the bar 71 and the body 15.

Next to and forward of the die blade 51 is a lower forming die plate 72, Figs. 5, 6, 14 and 15, which is adapted to have forced onto it by the strip 30, a blank 31, which passes under a projection 73 above and spaced from the die plate 72, the middle portion of the latter having an upstanding portion 74, the side edges of which are undercut. The upper edge of the plate 72 at the sides of the part 74 converge downwardly.

Attached to the forward side of the upper shearing blade 52 is an upper forming die plate 75, which is above and co-operates with the die plate 72, Figs. 14 and 15, also Fig. 6. Two downwardly extending fingers 76, Figs. 14 and 15, have arcuate upper ends respectively pivoted in arcuate recesses in the lower end of the die plate 75. A horizontal coil spring 77 normally forces the fingers 76 apart. The lower portions of the inner edges of the fingers 76 have arcuate recesses 78 to receive the bevelled ends of the die blank 31, when the die blank is fed by the strip 30 on to the portion 74 of the lower die plate 72 and the plate 75 and the fingers 76 descend.

When the plate 75 descends, the fingers 76, will engage the ends of the blank 31 bending the ends of the blank downwardly, and curving them inwardly, when the fingers 76 strike the converging upper edges of the die plate 72, as shown in Fig. 15. On the next forward feeding of the strip 30, the next blank 31 will force the partly formed blank 32 forwardly off from the portion 74 and onto an upstanding portion 79 of a lower die plate 80 of the second forming set, which lower die plate 80 is fastened to the forward side of the die plate 72.

The projection 73, Figs. 6 and 14 to 16, projects from a plate 81 rearwardly over the die plates 80 and 72. The die plate 80 has a forwardly extending projection 82, Fig. 6, which extends through a hole provided in the plate 81, and is adapted to support the clip blank 33, after it has been formed in the second forming operation by an upper forming die plate 83, mounted in the pin 53 between the

die plate 75 and the stationary plate 71. The lower end of the die plate 83 has two downwardly extending fingers 84 at the sides of the upstanding portion 79 of the lower die plate 80.

When the link 54, pin 53, blade 52, die plate 75 descend, the die plate 83 also descends with them, and the fingers 84 bend further downwardly the already partly formed blank 32, thus forming the clip blank 33, Fig. 17.

To flatten the middle portion of the blank in the second forming operation, the die plate 83 has fitted in it a vertical pin 85, Figs. 14 to 17, vertically movable in a hole through the projection 73, before described. When the die plate 83 descends, the pin 85 will press downwardly and flatten the middle portion of the clip blank 33.

The clip blank 33 will now be in the form of a partly closed ring, the under side of which is open for receiving therethrough the wires 35 and the rod 36, which the ring clip is to clamp together.

Following the upward movement of the piston 65 in the cylinder 13, the feeding mechanism will feed forwardly the strip 30, as has been described, thereby advancing the clip blanks 31, 32 and 33. The partly closed ring blank 33 will now be resting on the forwardly extending projection 82 of the lower die plate 80. Upon the next forward feed of the strip 30, the partly closed ring blank 33 will be moved by the blank 33 behind it, off from the projection 82 on which it has been resting into two recesses 86 provided respectively in the inner edges of two jaws 87 of two plier members 88 and 89, which are pivoted to each other by a horizontal pin 90, Figs. 5, 6, 18 and 19.

The plier members 88 and 89 are vertically slidable in vertical guides 91 provided in the body 15. The plier members are vertically reciprocative, between the positions shown in solid and dotted lines in Fig. 18, by the following described means.

The plier members 88 and 89 are respectively provided in their upper ends with transverse pins 92 and 93, on which are mounted two rollers 94 and 95, adapted for travel respectively in two reversely inclined slots 96 and 97 provided in the downwardly turned arms 98 and 99 of a cam block 100, which is vertically slidably fitted in the guides 91. The block 100 has in it a transverse pin 101 to which is pivoted the lower end of a vertical link 102, the upper end of which is pivoted to a piston 103 reciprocative in the cylinder 14, Figs. 11, 18, 19 and 21.

The piston 103 has a piston rod 104 extended upwardly through and slidable in a plate 105 fixed in the cylinder 14. A coil spring 106 encircles the piston rod 104 and bears at its lower end on the plate 105 and at its upper end against a collar 107 fastened on the piston rod 104. The tension of the spring 106 normally forces upwardly the piston 103, and with it the link 102, block 100 and plier members 88 and 89.

The lower ends of the guides 91 are provided with four downwardly extending projections 108, arranged in quadrangular form, and serving as positioning means for the wires 35 and rod 36, when a ring clip 34 is to be clamped about them, Figs. 9, 10, 18 and 19.

When the valve 4 is turned to the position shown in solid lines in Fig. 4, to admit air pressure from the pipe 1 to pipes 11, 12 and 16, as has been described, the air from the pipe 12, on entering the cylinder 14, will push downwardly the piston 103 and with it the link 102, block 100 and plier members 88 and 89, to the position shown in dotted lines in Fig. 18.

The plier members will carry with them the partly closed ring clip 33, which has been deposited between them from the projection 82, as was described, to a position in which the wires 35 and rod 36 will enter the clip 33, Fig. 18.

The pivot pin 90 of the plier member 88 and 89 projects into a vertical groove 109, Fig. 19. When the projecting pivot pin 90 reaches the lower end of the groove 109 in the downward movement of the block 100 and plier members 88 and 89, the latter will have reached their lowermost position, and the clip 33 carried by them will have within it the wires 35 and rod 36. The downward movement of the plier members will cease, but the block 100 will still continue its downward movement, thereby causing the rollers 94 and 95 to travel in the slots 96 and 97. When the rollers will have reached the upper ends of the slots, the rollers will have forced apart the upper ends of the plier members 88 and 89, thus closing the jaws 87 of the latter to close the clip blank 33 around the wires 35 and rod 36 and thereby completing the forming of the ring clip 34, which will have its bevelled ends overlapping, as shown in Fig. 25, and causing it to tightly clinch together the wires and rod, as shown in Figs. 9, 10 and 25.

The operator then moves the control valve 4 to the exhaust position in which its port 6 will communicate with the ports 7 and 8, thereby effecting the exhaust of air from the cylinders 13 and 14, and from the chamber 21 of the casing 22.

The springs 68 and 70 will cause the piston 65 to rise, thus through the lever 55 and link 54 lifting the pin 53 and with it the upper forming members 75 and 83 and the shearing blade 52. At the same time the spring 106 will force upwardly the piston 103, link 102, and block 100. The upward movement of the latter will cause the rollers 94 and 95 to travel in the slots 96 and 97 to the lower ends thereof, thus forcing apart the jaws 87 so

that they release the clinched ring clip 34.

The continued upward movement of the piston 103 will cause the block 100 to lift the plier members 88 and 89 to their uppermost position, in which position, shown in solid lines in Fig. 18, their recesses 86 will be disposed in position for receiving another blank 33 from the projection 82, upon the next feeding operation of the strip 30.

The air passing from the chamber 21 will reduce the pressure at that side of the diaphragm 23, upon which the pressure of the air from the cylinder 19 through the pipe 28 will force the ball valve 26 from its seat, thus permitting the air under pressure in the cylinder 19 to escape to the atmosphere through the pipe 28, chamber 24 and port 27.

The coil spring 44 will then force forwardly the piston 43 in the cylinder 19 to the position shown in Figs. 5 and 6, thereby causing the carriage 40 to travel forwardly and cause its blades 37 to feed the strip 30 forwardly, which forward movement of the strip 30 pushes the blank 31, previously cut, off from the die plate 51, said blank 31 forcing the partly formed clip blank 32 off from the die plate 72 onto the die plate 80, the clip blank 32, thus pushed forward, in turn pushing the previously formed clip blank 33 from the die plate 80 onto the projection 82, upon which the clip blank 33 will push the clip blank 33, previously resting on the projection 82 into the recesses 86 of the waiting plier members 88 and 89.

This will have completed a cycle of operations during which the strip 30 is fed forwardly, sheared obliquely from its forward end to form the clip blank 31, the preceding clip blank 31 will have its pointed ends downwardly curved, the next preceding clip blank 32 will have been formed to a partly closed ring clip 33, and a partly closed ring clip will have been moved into the plier jaws 87.

If the operator now moves the valve 4 to the open position shown in Fig. 4 in solid lines, the cycle of operations which has been described will be repeated, and the piston 43 and carriage 4 with its blades 37 will again be retracted ready for another feeding movement of the strip 30 upon the valve 4 being again closed.

The check valve 17 in the conductor 16 prevents the cylinder 19 exhausting to the atmosphere through the pipe 16 and casing 3, when the valve 4 is turned to the exhaust position for exhausting the cylinders 13 and 14 and chamber 21 of casing 22.

The blank 31 together with the partly formed clip blanks 32 and 33 are caused to travel at an oblique angle to the direction of travel of the strip 30 by the edge walls of the forming members, which thus form guiding means by which the blanks are thus fed in the direction oblique to the direction of travel of the strip 30. This arrangement permits the elimination of stripping means for stripping the blank from the strip, a narrower strip may be employed, thus effecting a saving of material, avoiding scrap waste, while obtaining the bevelled ends required by the blank in order that such ends may over lap in the completed ring clip 34.

It will be noted that the partly closed ring clips 33 have each a flat middle portion from which diverge the two arms having the inwardly curved pointed ends. With this form having the flat middle portion and the curved ends, the clinching together by the plier members will always form a symmetrical ring clip 34.

By applying the partly closed ring clip 33 to the wires 35 and rod 36 in the manner shown and described, the bevelled overlapping ends of the clip will embrace the part of the rod 36 distant from the wires 35, thus eliminating liability of the clip opening under strain.

What I claim is:—

1. The method, in sheet material cutting and forming, consisting in feeding lengthwise in one direction a strip of material, shearing the forward end of said strip obliquely to the length of the strip, and then causing said strip to feed forwardly the blank thus sheared from the strip in a direction at an angle to the direction of feed of the strip.

2. The method, in sheet material cutting and forming, consisting in feeding a strip of material lengthwise in one direction, shearing from the forward end of the strip obliquely to the length thereof, disposing the blank thus sheared from the strip in the path of the latter, whereby the strip will feed said blank forwardly, and guiding the blank thus fed in a direction at an angle to the direction of feed of said strip.

3. In sheet material cutting and forming, the method consisting in feeding a strip of material lengthwise in one direction, shearing a blank obliquely to the length of said strip from the forward end thereof, whereby said blank will have parallel bevelled ends, and forming said blank into a ring clip with said bevelled ends overlapping each other at the bevelled edges.

4. In sheet material cutting and forming, the method consisting in feeding a strip of material lengthwise step by step in one direction, consecutively shearing blanks from the forward end of said strip obliquely to the length thereof, disposing said blanks in the path of said strip, whereby the rearmost blank will be advanced by said strip in the feeding movement of the latter and each blank will forwardly feed the ones in advance thereof, and guiding the blanks thus fed in a direction at an angle to the direction of feed of said strip.

5. In sheet material cutting and forming,

the method consisting in feeding a strip of material, having parallel longitudinal edges, lengthwise step by step in one direction, shearing a blank from the forward end of said strip obliquely to the length thereof, curving downwardly the pointed ends of the blank, then further forming the blank to form a partly closed ring clip with its ends spaced apart, encircling with each partly closed clip articles to be held by the clip, and then closing the partly closed clip with its ends overlapping each other.

6. In sheet metal cutting and forming, the method consisting in feeding a strip of material lengthwise step by step in one direction, shearing the front end of the strip obliquely to the length of the strip to form a blank having pointed ends, and causing the strip on its next forward step to move said blank forwardly at an angle to the direction of feed of the strip and out of the path of the strip.

7. In sheet metal cutting and forming, the method consisting in feeding a strip of material lengthwise step by step in one direction, shearing the front end of the strip obliquely to the length of the strip to form a blank having pointed bevel ends, causing the strip on its next forward step to move said blank forwardly at an angle to the direction of feed of the strip and out of the path of the strip, forming the blank, and causing the next succeeding blank, on the succeeding forward feeding of the strip to push forwardly the said formed blank in the direction of travel of the pushing blank.

8. In sheet metal cutting and forming, the method consisting in feeding a strip of material lengthwise step by step in one direction, shearing the front end of the strip obliquely to the length of the strip to form a blank having pointed bevel ends, causing the strip on its next forward step to move said blank forwardly at an angle to the direction of feed of the strip, forming said blank into a partly closed ring clip, causing said partly closed ring clip to encircle articles to be held by the clip, and then closing the partly closed ring clip around said articles with its bevel ends overlapping each other.

In testimony whereof I have signed my name to this specification.

CARL KIRCHNER.