Nov. 14, 1950 E. J. BOHABOY 2,530,222

RECIPROCATING BENDER WITH SLIDING SIDE SHAPERS

Filed July 20, 1945 4 Sheets-Sheet 1

FIG. 1

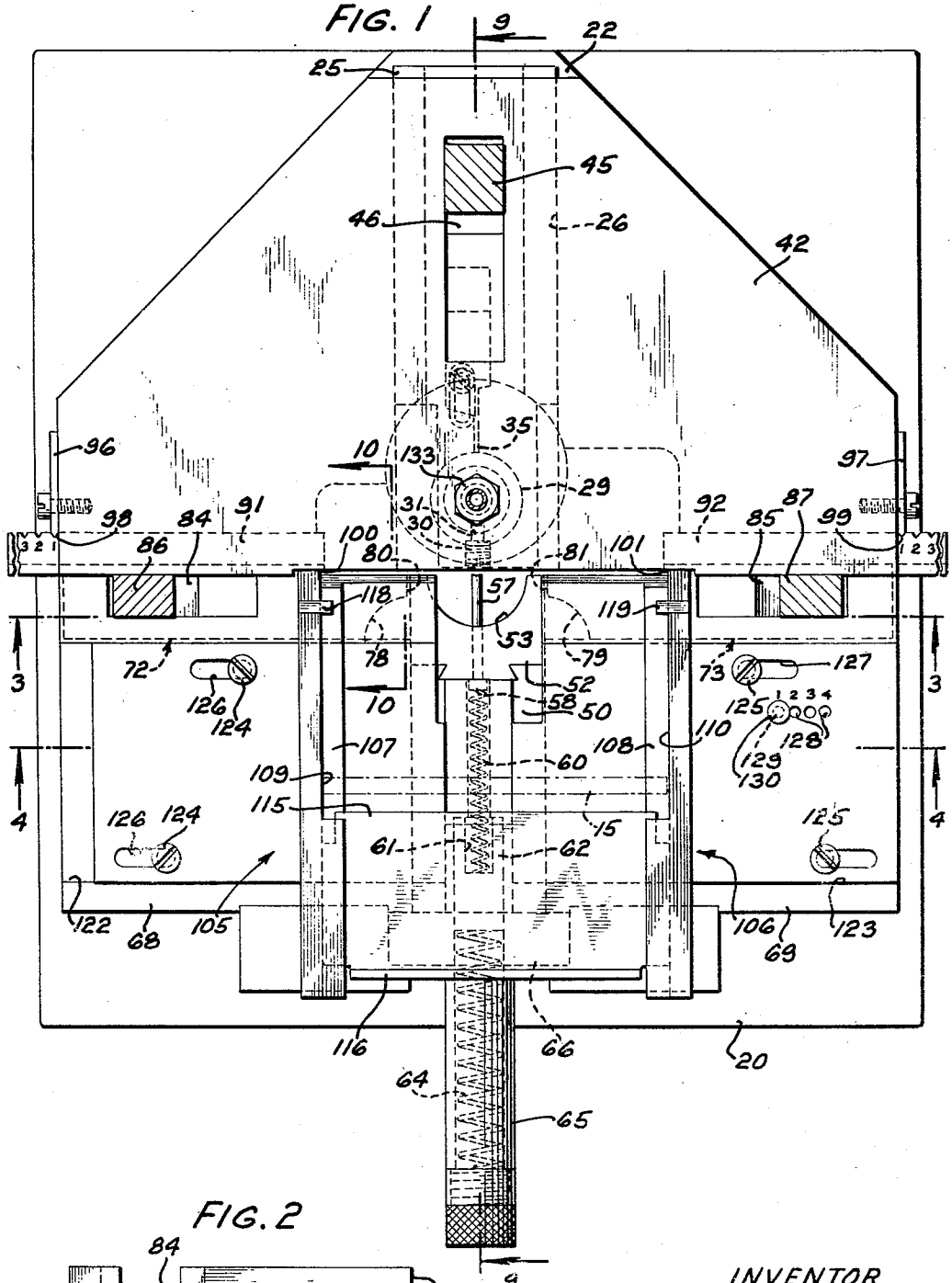
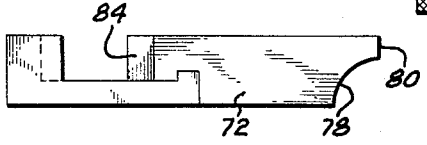


FIG. 2



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RECIPROCATING BENDER WITH SLIDING SIDE SHAPERS

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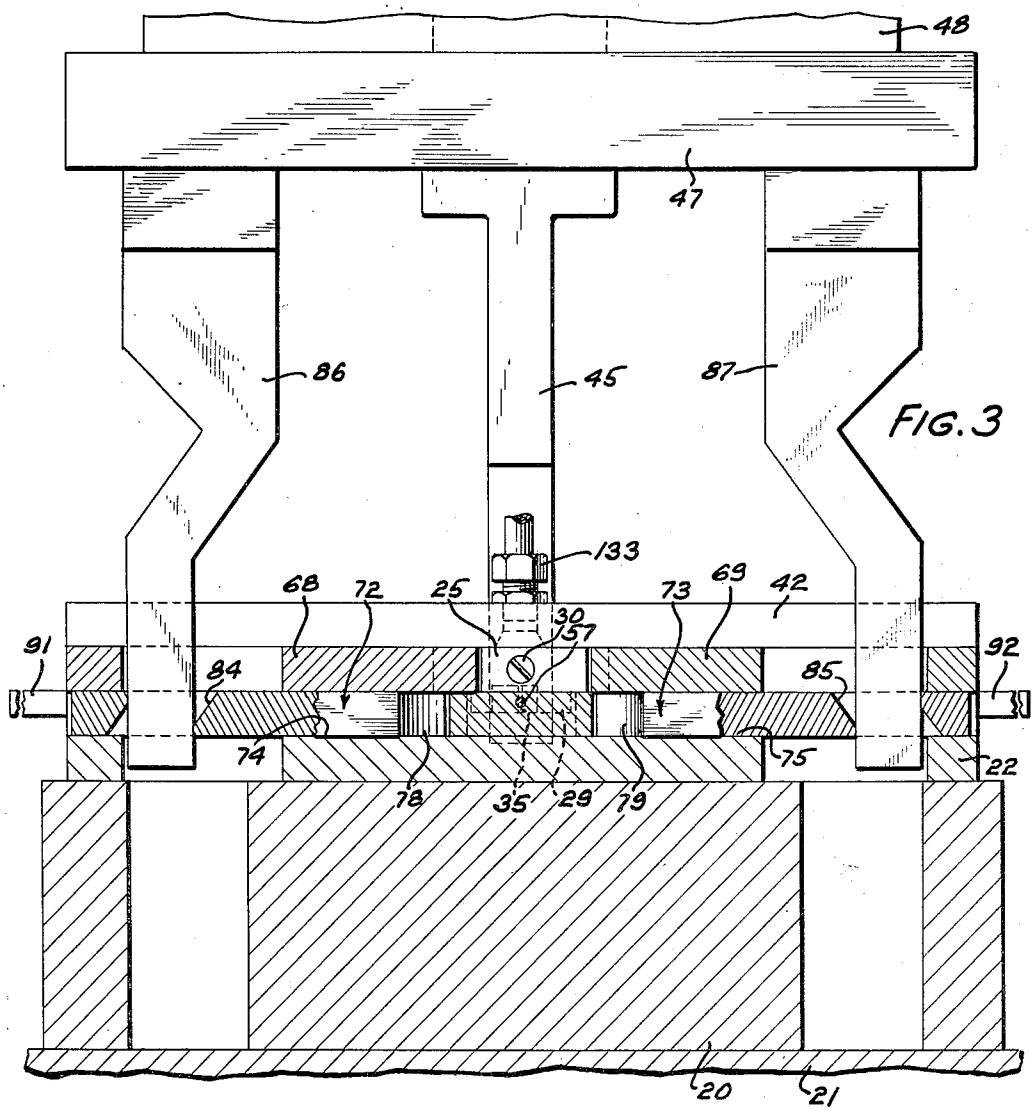
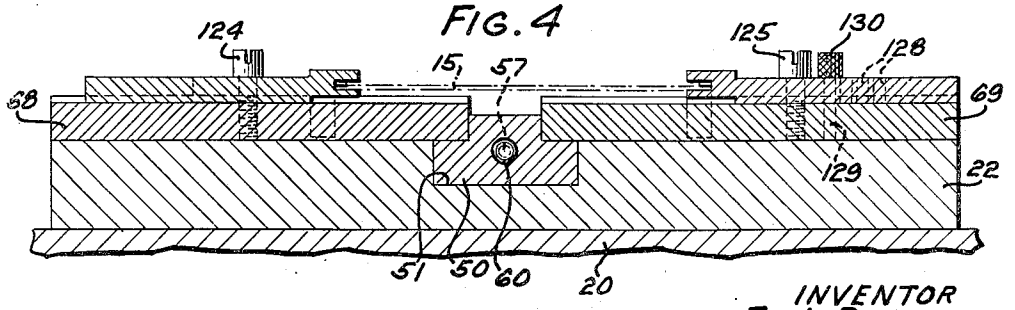


FIG. 3

FIG. 4



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RECIPROCATING BENDER WITH SLIDING SIDE SHAPERS

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FIG. 5

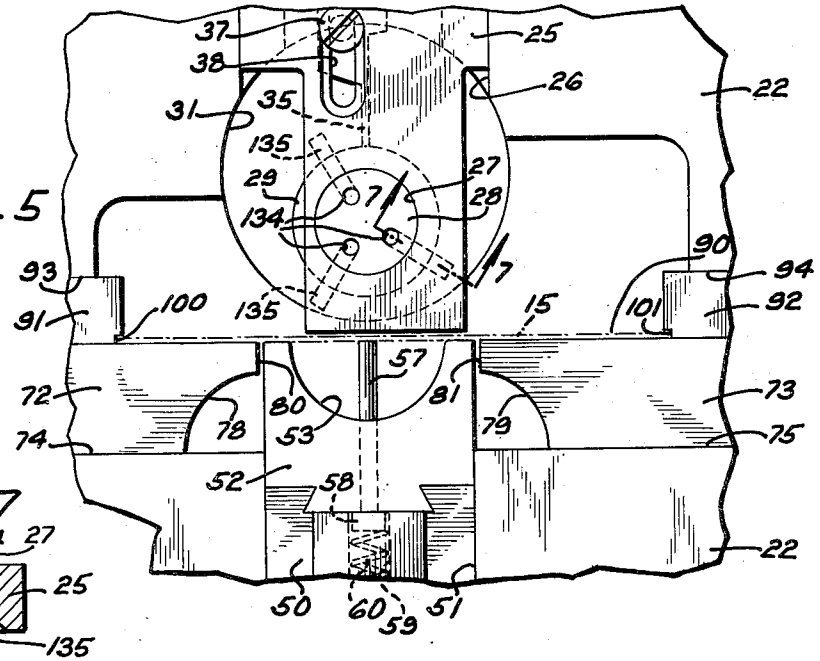


FIG. 7

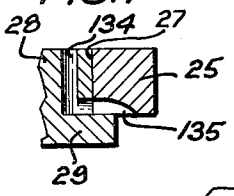


FIG. 6

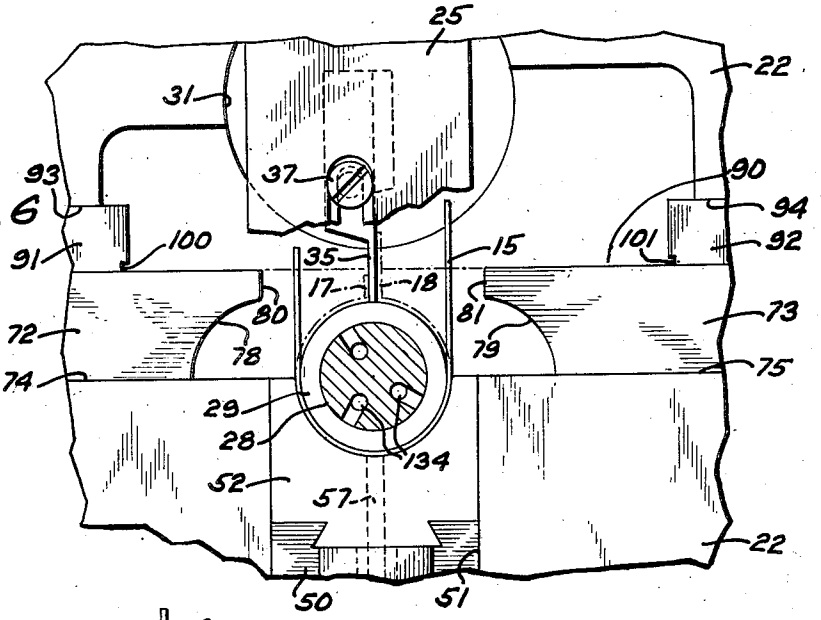
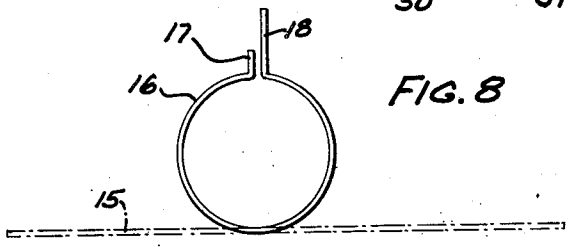


FIG. 8



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RECIPROCATING BENDER WITH SLIDING SIDE SHAPERS

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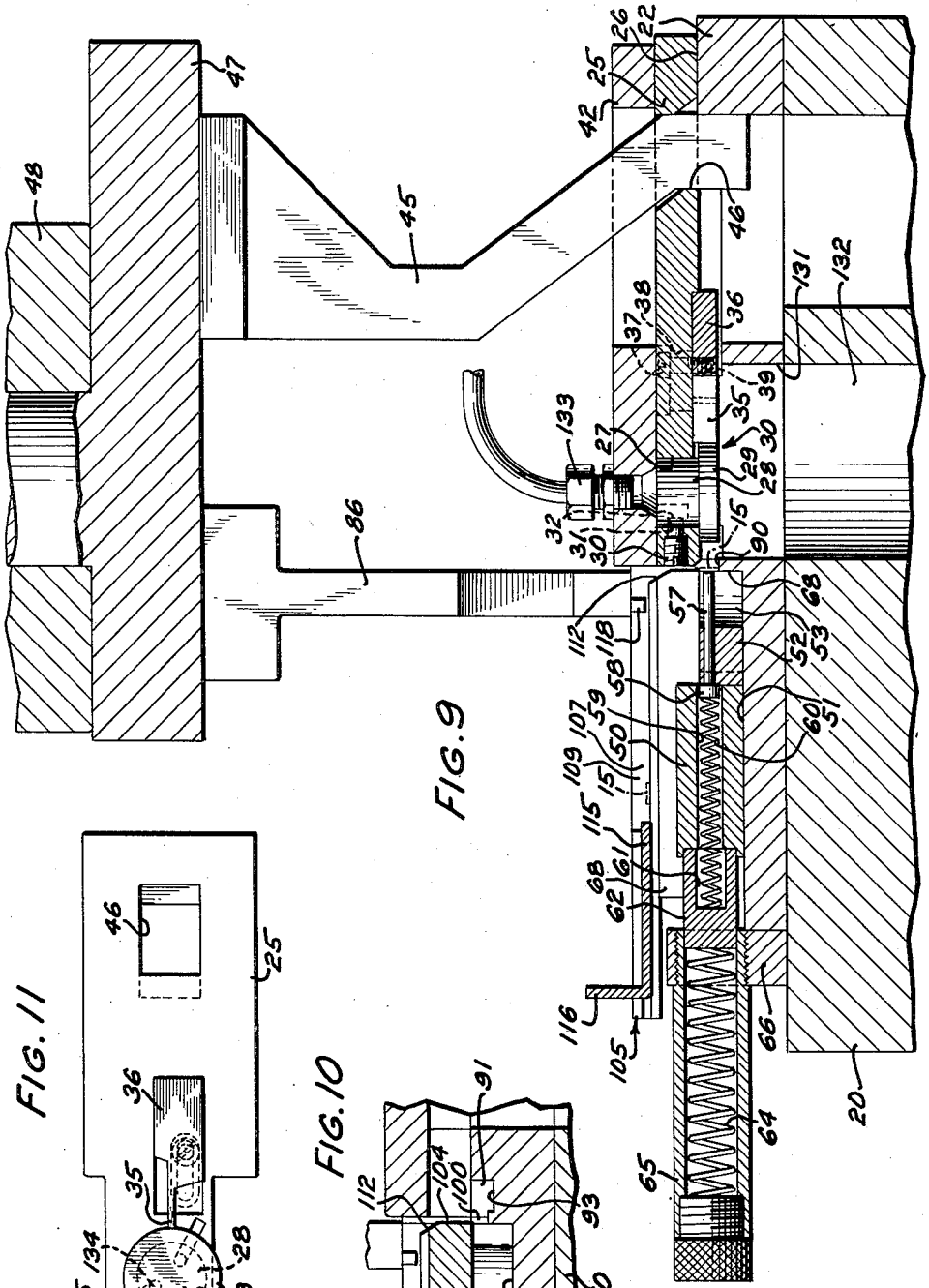


FIG. 9

FIG. 11

FIG. 10

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2,530,222

UNITED STATES PATENT OFFICE

2,530,222

RECIPROCATING BENDER WITH SLIDING SIDE SHAPERS

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Application July 20, 1945, Serial No. 606,218

13 Claims. (Cl. 153—34)

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This invention relates to article forming apparatus and more particularly to punch press operated forming apparatus for forming a blank into a loop-shaped article.

An object of this invention is to provide an efficient and effective forming apparatus for forming loop-shaped articles.

In accordance with one embodiment of the invention, there is provided a punch press operated apparatus in which a reciprocatable mandrel is disposed in spaced relation to a group of three dies comprising a middle longitudinally movable die and a pair of transversely movable dies each having a forming edge adapted to cooperate with the mandrel in forming a straight blank of material, which is positioned between the mandrel and the dies, into a loop-shaped article. The longitudinally movable middle die, disposed in alignment with the mandrel, is yieldingly held in its forward position between the pair of transversely movable forming dies and acts to form the blank into U-shape when the mandrel is moved against the die after which it is moved out of the way of the other forming dies, and the mandrel and U-formed blank are positioned in alignment therewith, and the transversely movable forming dies actuated to complete the operation of forming the article about the mandrel.

The invention will be more fully understood from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a plan view of the apparatus showing the actuating cams in section thereon;

Fig. 2 is a detail plan view of one of the transversely movable forming dies;

Fig. 3 is a vertical transverse sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary transverse vertical sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a plan view of a portion of the apparatus with some of the parts removed showing the mandrel and the forming dies in their normal position and showing a blank in position therebetween in dotted lines;

Fig. 6 is a fragmentary plan view of the apparatus similar to Fig. 5 showing the mandrel in its advanced position after it has formed the blank into U-shape and moved it to a position in alignment with the transversely movable dies and showing in dotted lines the forming position of the transversely movable dies;

Fig. 7 is a fragmentary vertical sectional view through the mandrel taken on the line 7—7 of Fig. 5;

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Fig. 8 is a view of the completed article as formed by the apparatus and showing in dot and dash lines the blank before being formed by the apparatus;

Fig. 9 is a central vertical longitudinal sectional view taken on the line 9—9 of Fig. 1;

Fig. 10 is a fragmentary vertical longitudinal sectional view taken on the line 10—10 of Fig. 1; and

Fig. 11 is a bottom view of the mandrel and the slide on which it is mounted.

In the embodiment of the invention illustrated in the accompanying drawings, the apparatus operates to form a flat blank or strip of material 15 into a loop-shaped article 16 having end portions 17 and 18 extending radially outwardly therefrom (Fig. 8). The apparatus for forming the article is adapted to be used in a punch press having a relatively short stroke. As shown particularly in Figs. 3 and 9, the apparatus comprises a die holder or block 20 secured to the bolster plate 21 of a punch press, and has fixed to the top side thereof in any suitable manner a slide supporting plate 22. A mandrel slide 25, mounted for longitudinal reciprocation in a slide way 26 of the slide supporting plate 22, is apertured at 27 to receive a shank 28 of a cylindrical portion 29 of a mandrel 30 which is retained therein by a lock screw 31, the end of which engages a recess 32 in the shank 28 thereof (Fig. 9). A thin blade-like member 35, engaging the cylindrical portion of the mandrel and forming an extension thereof about which the blank 15 is formed, is enlarged at 36 (Fig. 11) and adjustably mounted on the underneath side of the mandrel slide 25. The member 35 is retained in adjusted position by a machine screw 37 passing through a slot 38 in the slide and engaging a threaded aperture 39 in the enlarged portion 36 of the member 35. A plate 42, secured to the top of the supporting plate 22, overlies and retains the slide 25 in its way 26.

Mechanism for reciprocating the mandrel is provided and comprises a cam member 45, which engages the end walls of an aperture or cam slot 46 in the slide 25 and is so shaped that upon reciprocation it will advance and retract the mandrel the proper distance in timed relation with the other mechanism later to be described. The cam member 45 is attached to a head or punch plate 47 which is secured to and is reciprocatable with a ram 48 of the punch press.

Spaced from and in alignment with the mandrel 30 and reciprocally mounted in a way 51 in the plate 22 is a slide 50, the forward end of which

has secured thereto a replaceable die 52. The die 52 is provided with a semi-circular recess 53 adapted to receive a portion of the cylindrical part 29 of the mandrel 30 therein, the parts being proportioned to provide sufficient clearance to receive a blank 15 therebetween.

The replaceable die 52 is provided with a dovetailed end which engages in a dove-tailed slot in the slide 50 and rests on the bottom of the way 51. The die 52 is apertured to carry a horizontally disposed pin 57 slidably mounted therein which is provided with an enlarged head 58, slidable within an aperture 59 in the slide 50. The front end of the pin 57 terminates in alignment with the front end portions of the die 52 (Fig. 5) and is adapted to cooperate with the mandrel 29 to engage and grip a blank 15 during the forming operation as will hereinafter be described. The pin 57 is urged in a forward direction by a spring 60, which seats in a recess 61 in a cylindrical block 62 engaging the end of and movable with the slide 50. The die 52 and the slide 50 are urged forward by a helical compression spring 64, one end of which engages the cylindrical block 62 and the other end of which engages the closed end of a tubular housing 65. The housing 65 is secured to a block 66 which is fixed to the die block 20. The die 52 is stopped in its forward position by the engagement of its forward end portions with a shoulder 68 formed in the slide supporting plate 22 at the forward end of the way 51. The slide 50 and die 52 are retained in the way 51 by a pair of plates 68 and 69 which are suitably secured to the plate 22 and which overlie a portion of the slide and die, as shown in Figs. 1 and 4.

A pair of transversely movable forming dies 72 and 73 (Figs. 1 and 3) are mounted for reciprocation in ways 74 and 75 of the slide supporting plate 22 and are disposed on opposite sides of and adjacent the front end of the die 52. The inner ends of the dies 72 and 73 are provided with curved forming portions 78 and 79, and with flat portions 80 and 81, respectively, which conform to and cooperate with the cylindrical portion 29 and the flat portion 35 of the mandrel to form a portion of the article 16. The dies 72 and 73 are provided with cam slots 84 and 85 for receiving cam members 86 and 87 for imparting reciprocative movement thereto. The cam members 86 and 87 are attached to the head 47 and are shaped to impart the desired movement to the dies 72 and 73 and in timed relation to the movement of the mandrel 29. The plates 68 and 69 overlie the dies 72 and 73 to retain them in their respective ways. Clearance holes are provided in the die block 20, the supporting plate 22, and the retaining plates 42, 68 and 69 for the reciprocation of the cam members 45, 86 and 87.

The blank 15, in the form of a narrow straight strip of thin flat material having a predetermined length, is positioned between the dies and the mandrel adjacent the end portions of the die 52 and portions of one side of the dies 72 and 73, as indicated in Fig. 5. To support the blank 15 in horizontal alignment with the mandrel and the dies, the plate 22 is shaped to provide supporting surface 90 which extends forward from the dies to accommodate the movement of the blank as the blank is formed about the mandrel. The blank 15 is positioned longitudinally on the supporting surface 90 by a pair of end gages 91 and 92 which are adjustably mounted in ways 93 and 94 in the plate 22. The gages 91 and 92 are held in adjusted position by the retaining plates 96 and 97, each engaging one of a series of notches 98 and 99, of the gage members 91 and 92, respectively. Shallow vertical notches 100 and 101 for receiving the ends of the blank 15 are provided in the ends of the gage members 91 and 92 and act to support the blank 15 in the vertical position on the supporting surface 90 in cooperation with some of the vertical surfaces of the dies 52, 72 and 73.

Portions of the front edges of plates 68 and 69 and the rear edge of the slide 25 and a portion of the rear edge of the plate 42 are positioned so as to form a vertical slot or passageway 104 (see Fig. 10) in alignment with the notches 100 and 101 of the gage members 91 and 92 to guide a blank 15 into the loaded position illustrated in dotted lines in Figs. 5 and 9.

To aid in feeding a blank 15, a feeding mechanism is provided and comprises a pair of transversely adjustable guide members 105 and 106 having ledges or rails 107 and 108, on which the blank 15 may be supported. Vertical shoulders 109 and 110, extending upwardly from the rails 107 and 108, respectively, are formed on the guide members 105 and 106 to engage the ends of and guide the blank 15 during its forward movement. The forward ends of the rails 107 and 108 and a portion of the plates 68 and 69 are bevelled, as indicated at 112 (Figs. 9 and 10), to form an inclined surface to facilitate the movement of the blank into the vertical pasageway 104 and to the loaded position. A reciprocatable feed plate 115, having an upwardly extending handle 116 and resting upon the rails 107 and 108, is adapted to engage and feed a blank 15. To prevent the feeding of more than one blank at a time, gage blocks 118 and 119 are mounted on the shoulder portions 109 and 110 of the guides 105 and 106 and are spaced from the top surface of the rails 107 and 108 a distance sufficient to permit only one blank to pass therebetween.

The guide members 105 and 106, in order to accommodate blanks of various lengths are adjustably mounted in ways 122 and 123 in the plates 68 and 69, respectively, and are secured in position thereon by machine screws 124 and 125, which pass through slots 126 and 127 in the guide members 105 and 106, and engage threaded apertures in the plates 68 and 69, respectively. The guide member 106 is adjustable to a number of predetermined positions and for this purpose it is provided with a plurality of equally spaced apertures 128 arranged in a row, each one of which may be aligned with an aperture 129 in the plate 69 to obtain one of the predetermined positions. The guide member 106 may be held in the selected position by a pin 130 inserted through the aligned aperture 128 of the guide member 106 and into the aperture 129 of the plate 69. One end of a blank 15 may be then positioned on the ledge 108 and engage the shoulder 110 and the guide member 105 may be adjusted so as to freely receive and support the opposite end of the blank 15, after which the guide members 105 and 106 may be secured in position by tightening the machine screws 124 and 125.

The apparatus is designed to operate on blanks of various predetermined lengths and form them into completed articles of various sizes. For this purpose, removable mandrels and dies of various sizes are provided and used as needed.

In the operation of the apparatus, a blank 15 is placed on the guide rails 107 and 108 and fed forward thereon by the actuation of a feed plate 115. The blank slides down the inclined surface

112 and through the vertical slot 104 and comes to rest on the supporting surface 90 in the position indicated in Figs. 5 and 9 with its ends engaging in the notches 100 and 101 of the gage members 91 and 92, respectively. The ram 48 is then actuated to reciprocate the head 47 and the cams 45, 86 and 87, attached thereto. On the first portion of downward movement of the came 45, the slide 25 and the mandrel 30 will be moved toward the die 52 during which movement the mandrel will engage the blank 15 intermediate its ends and move it into the recess 53 on the die 52 and form it into U-shape. The pin 57 will press the blank against the mandrel and prevent its being displaced during the forming operation. The die 52 is maintained in a stationary condition in its forward position by the action of the spring 64 while the blank 15 is being formed into U-shape. After the blank is formed into U-shape, the mandrel imparts a rearward movement to the die 52 and the slide 51 against the action of the spring 64 until the parts have reached the position shown in Fig. 6, at which time the die 52 will have been moved out of the path of travel of the transversely movable forming dies 72 and 73 and the mandrel 29 and the U-shaped blank thereon will have been positioned in alignment with the forming dies 72 and 73. The mandrel 30 and the forming die 52 remain at rest in this position for a short period of time.

The forming dies 72 and 73 are then moved inward by the cam members 86 and 87 to the position indicated in dotted lines in Fig. 6, which movement of the dies completes the forming operation of the blank 15 about the mandrel 30. The end portions 17 and 18 of the blank 15 will engage the part 35 of the mandrel and be shaped to extend outwardly from the circular body portion of the article, as indicated in the drawings. On the upward stroke of the ram 48, the cams actuated thereby will return the dies 72 and 73 to their normal retracted position and the slide 25 and the mandrel 29 to its normal retracted position. The slide 50 and the die 52 will be moved to their forward position by the spring 64 as the mandrel 29 is retracted.

The formed article 16 surrounding the mandrel will be carried with the mandrel to a position above enlarged apertures 131 and 132 in the plates 22 and 20, respectively, which apertures are aligned with an opening (not shown) in the bolster plate 21 and through which the article may be ejected. Means to aid in the ejection of the article are provided in the form of a nozzle 133, through which air may be forced, the air passing through suitable conduits or apertures 134 in the mandrel communicating with downwardly directed ports 135 in the slide 25. Should the completed article tend to adhere to the mandrel, the air being forced through the ports 35 will free the article therefrom and insure its ejection through the aperture 131.

What is claimed is:

1. In an article forming apparatus, a movable mandrel about which a blank is to be formed, a movable first forming die spaced from and in alignment with said mandrel and having a recess for receiving a portion of said mandrel, a second forming die having a portion shaped to conform to a portion of said mandrel and being laterally disposed adjacent said first die, said second forming die being movable in a path transversely to the movement of said first die and normally blocked in its forming movement by said first die,

means for supporting said blank in a predetermined position between said mandrel and said dies, said first forming die and said mandrel being shaped and operable to bend said blank into U-shape, means for actuating said mandrel to first move said mandrel into the recess of said first die to partially form said blank about said mandrel into U-shape and then move said first forming die from the path of said second forming die and align said mandrel and said partially formed strip thereon with said second forming die, and means for actuating said second forming die to further form said blank about said mandrel.

2. In an article forming apparatus, means for supporting a blank in a predetermined position, a movable mandrel about which said blank is adapted to be formed disposed on one side of said blank supporting means, a plurality of forming dies on the other side of said supporting means comprising a movable middle die in alignment with said mandrel and a pair of movable side dies disposed on opposite sides of and adjacent said middle die, said middle die having a semi-circular recess to receive a portion of said mandrel and shaped to bend said blank into U-shape about said mandrel, said middle die also having a normal advanced position adjacent said blank supporting means, said side dies being transversely movable relative to the path of movement of said middle die and in paths not in normal alignment with said mandrel, means for advancing said mandrel to a first forming position to cause the movement of said blank into the recess of said middle die to form said blank into U-shape, means for holding said middle die in said advanced position during said forming operation, means for moving said middle die from the path of said side dies and moving said mandrel with said U-shaped blank thereon into a second forming position in alignment with said movable side dies, and means operable while said mandrel remains in said second forming position for actuating said movable side dies to further form the blank about said mandrel.

3. In an article forming apparatus, a reciprocatable mandrel about which a blank of material is to be formed, a reciprocatable first forming die having a recess therein in alignment with and adapted to receive a portion of said mandrel for bending said blank into U-shape about said mandrel and having a normally advanced position spaced from said mandrel, a second forming die laterally disposed adjacent said first die and movable inwardly in a path at right angles to the movement of said first die and normally blocked in its inward movement by said first die, means for supporting said blank of material between said mandrel and said dies, means for feeding said blank to said supporting means, means for actuating said mandrel to move said blank into said recess of said first forming die to form said blank into U-shape and then move said die to clear said second forming die and move said mandrel with said U-shaped blank thereon into a position of alignment with said second forming die, means for holding said first forming die in said normally advanced position during said forming operation and for returning said die to said normal advanced position, and means for actuating said second forming die to further form said blank about said mandrel.

4. In an article forming apparatus, a base, a reciprocatable mandrel about which a blank is to be formed mounted on said base, a die in align-

ment with said mandrel and having a recess for receiving a portion of said mandrel and shaped to bend said blank into U-shape about said mandrel, said die being longitudinally movable on said base and having a normal position thereon spaced from said mandrel, a transversely movable die mounted on said base laterally disposed adjacent said longitudinally movable die and having its inward movement normally blocked by said longitudinally movable die, means for supporting a blank in a predetermined position between said mandrel and said forming dies, means for moving said mandrel into the recess of said longitudinally movable die to a first forming position to form said blank into U-shape, means for holding said longitudinally movable die stationary during said forming operation, means for moving said mandrel and said U-shaped blank thereon to a second forming position in alignment with said transversely movable die after the first forming operation and for moving said longitudinally movable die from the path of said transversely movable die, means operable while said mandrel remains in said second forming position for actuating said transversely movable die to further form said blank about said mandrel, and means for ejecting said article from said mandrel.

5. An article forming apparatus comprising a movable mandrel about which a blank may be formed, a longitudinally movable forming die spaced from and in alignment with said mandrel and having a recess shaped to receive a conforming portion of said mandrel therein for bending a blank positioned between said die and said mandrel into U-shaped, transversely movable dies laterally disposed on opposite sides of and adjacent to said longitudinally movable die, said transversely movable dies having portions shaped to conform to portions of said mandrel and having their paths of movement perpendicular to the movement of said movable die and normally blocked by said longitudinally movable die, means for supporting said blank in a predetermined position between said mandrel and said dies, means for guiding said blank to said blank positioning means, means for feeding said blank to said positioning means, means for actuating said mandrel to first move said mandrel and said blank into the recess of said first die to form said blank about said mandrel into U-shape and then move said first mentioned die from the path of said transversely movable dies and align said mandrel and said partially formed strip thereon with said transversely movable die, and means for actuating said transversely movable dies to complete the forming of the blank about said mandrel.

6. In an article forming apparatus, a mandrel about which a blank is to be formed, a longitudinally movable die normally spaced from said mandrel and having a semi-circular recess therein for receiving a portion of said mandrel, means yieldingly projecting from the forming surface of said longitudinally movable die for clamping said blank against said mandrel during the forming operation, a transversely movable die disposed laterally adjacent said longitudinally movable die and out of alignment with said mandrel and having its movement normally obstructed by said longitudinally movable die, means for supporting said blank between said mandrel and said dies, means for effecting relative movement between said mandrel and said longitudinally movable die to form said blank into U-shape, means for effecting a longitudinal relative movement between said transversely movable die and said mandrel and said longitudinal die to align said transversely movable die with said mandrel and the U-shaped blank thereon and to remove the obstruction to transverse movement of the transversely movable die, and means for advancing said transversely movable die to further form said blank about said mandrel while said mandrel remains stationary.

7. In an article forming apparatus, a mandrel about which a blank is to be formed, a reciprocatable slide for supporting said mandrel, a first forming die having a semi-circular recess formed therein to conform to and to receive a portion of said mandrel, said first forming die being reciprocatable in alignment with said mandrel and having a normal advanced position spaced from said mandrel, a pair of second forming dies having portions thereon shaped to conform to the contour of portions of said mandrel, said second forming dies being mounted on opposite sides of said first forming die and movable in a path transversely of the path of movement of said first forming die, stationary means for supporting and guiding said dies and said mandrel slide, means for supporting said blank in a predetermined position between said dies and said mandrel, a reciprocatable ram, cams mounted on said ram for actuating said mandrel slide and said second forming dies in timed relation whereby said mandrel is advanced into the recess of said first forming die to form said blank into U-shaped and advanced further with the U-shaped blank thereon into alignment with said second forming dies and said second forming dies are advanced to complete the forming of said blank about said mandrel, and resilient means for moving said first forming die to its normal advanced position and holding it there while the blank is formed into U-shape.

8. In an article forming apparatus, a mandrel about which a blank is to be formed, a first forming die having a recess therein for receiving a portion of said mandrel and shaped to bend said blank into U-shape about said mandrel, means for supporting a blank in a predetermined position between said mandrel and said first forming die, means for effecting relative movement between said mandrel and said first forming die to form said blank into U-shape, a second forming die disposed to one side of said first forming die and said mandrel and having a portion thereof shaped to conform to a portion of said mandrel, said second forming die being movable in a path normally out of alignment with said mandrel and perpendicular to the path of relative movement between said mandrel and said first forming die, means for effecting a relative movement between said second forming die and said mandrel and said first forming die to align said second forming die with said mandrel, and means for moving said second forming die toward the mandrel to further form the blank about said mandrel.

9. An article forming apparatus comprising a first forming member about which a substantially straight blank is to be formed movable in one direction, a second forming member having a recess for receiving a portion of the first forming member and in cooperation therewith to bend the blank around the first forming member into U-shape, a third forming member laterally disposed adjacent said second forming member and movable in a direction perpen-

dicular to said one direction and normally out of alignment with said first forming member, means for supporting the blank between the first and the other forming elements, said second and third forming members being relatively movable to permit the alignment of said third forming member with the said partially formed blank and said first forming member whereby the third forming member may be advanced to further form said blank about said first forming member.

10. An article forming apparatus comprising a first forming member about which a straight blank is to be formed movable in one direction, a second forming member having a recess for receiving a portion of the first forming member and in cooperation therewith to form the blank around the first forming member into U-shape, a third forming member laterally disposed adjacent said second forming member and movable in a path perpendicular to said one direction and normally out of alignment with said first forming member, one of said second and third forming members being movable relative to the other parallel to said one direction to permit the alignment of the third forming member with the first where it may be advanced to further form the blank around the first forming member, means for supporting the blank between the first and the other forming members, and means for actuating said forming members in sequence to cause said first and second forming member to form said blank into U-shape and to effect the proper positioning of the members and the actuation of the third member to further form said blank about said first forming member.

11. An article forming apparatus comprising a first forming member about which a substantially straight blank is to be formed and which is movable in one direction, a movable second forming member having a recess for receiving a portion of said first forming member and for cooperating therewith to bend said blank into U-shape, a third forming member laterally disposed adjacent said second forming member and movable in a path substantially perpendicular to said one direction and adapted to cooperate with said first forming member to further form said blank, means for supporting a blank between said first forming member and said other forming members, said forming members being arranged so that the first forming member may be moved into engagement with the second forming member to bend a blank into U-shape at one position and then advanced to and stopped in another position in the path of movement of said third forming member and causing the movement of said second forming member therewith, whereby said third forming member may be actuated to further form said blank, and means for sequentially actuating said first and third forming members.

12. An article forming apparatus comprising a mandrel about which a substantially straight blank is to be formed and which is movable in a longitudinal path from an inoperative position through a first forming position to a second forming position, a longitudinally movable die normally disposed at said first forming position and engageable with said mandrel for movement therewith from said first forming position to said second forming position, said die having a recess for receiving a portion of said mandrel and for cooperating with said mandrel

to bend a blank into U-shape, a transversely movable die disposed laterally of and adjacent said longitudinally movable die in its normal position and adapted to cooperate with said mandrel in its second forming position to further form said blank, means for supporting a blank between said mandrel and said dies, means for advancing said mandrel from said inoperative position to said second forming position to cause said blank to be formed into U-shape about said mandrel at said first forming position and moved to said second forming position, and means operable while said mandrel remains in said second forming position to move said transversely movable die into cooperative engagement with said mandrel to cause the further forming of said blank.

13. In an article forming apparatus, a mandrel about which a substantially straight blank is to be formed, a longitudinally movable die normally spaced from said mandrel and having a recess therein for receiving a portion of said mandrel and for cooperating therewith to form said blank into U shape, a transversely movable die adapted to cooperate with said mandrel to further form said blank, said transversely movable die being disposed laterally adjacent said longitudinally movable die and movable in a path normally out of alignment with said mandrel and having its movement normally obstructed by said longitudinally movable die, means for supporting said blank between said mandrel and said dies, means for effecting relative longitudinal movement between said mandrel and said longitudinally movable die to form said blank into U shape, means for effecting a relative longitudinal movement between said transversely movable die and the mandrel and the longitudinal die to align said transversely movable die with the mandrel and U shape blank thereon and to remove the obstruction of said longitudinally movable die to transverse movement of the transversely movable die, means for actuating said transversely movable die to further form said blank about said mandrel, and means for holding said mandrel stationary while said transversely movable dies are being actuated.

EDWARD J. BOHABOY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
270,362	Alpress	Jan. 9, 1883
1,058,775	McKillop	Apr. 15, 1913
1,078,707	Tevander	Nov. 18, 1913
1,138,639	Dietrich	May 11, 1915
1,163,933	Kurschus	Dec. 14, 1915
1,335,908	Mueller	Apr. 6, 1920
1,433,879	Fancher	Oct. 31, 1922
1,529,746	McDonald	Mar. 17, 1925
1,758,237	Paine	May 13, 1930
2,121,901	Butty	June 28, 1938
2,166,347	Farney	July 18, 1939
2,442,908	Sirp	June 8, 1948

FOREIGN PATENTS

Number	Country	Date
1,384	Great Britain	Jan. 19, 1914
28,387	Great Britain	Dec. 14, 1903
79,261	Switzerland	Dec. 28, 1933