July 21, 1959 M. A. STEINHAUER 2,895,528

METAL FENCE POST LEG BENDING AND FORMING MACHINE

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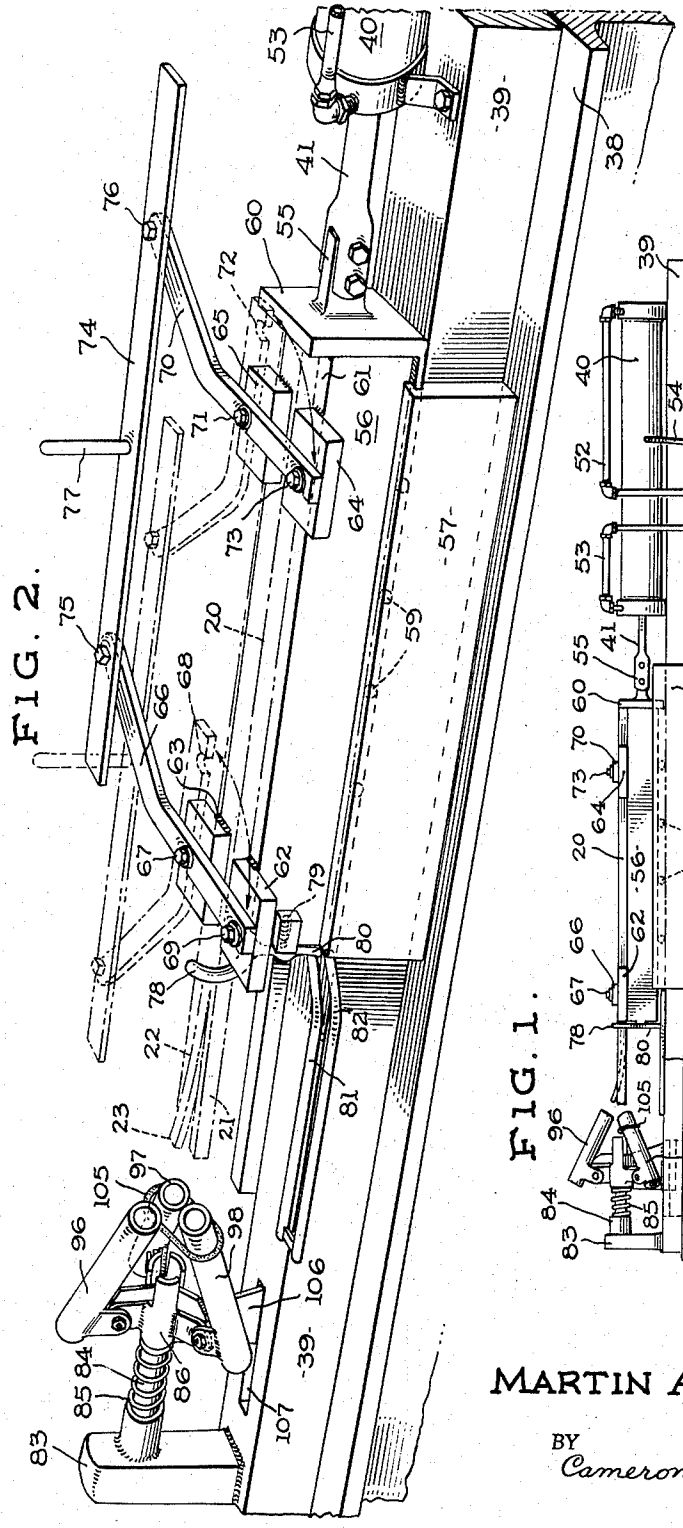


FIG. 2.

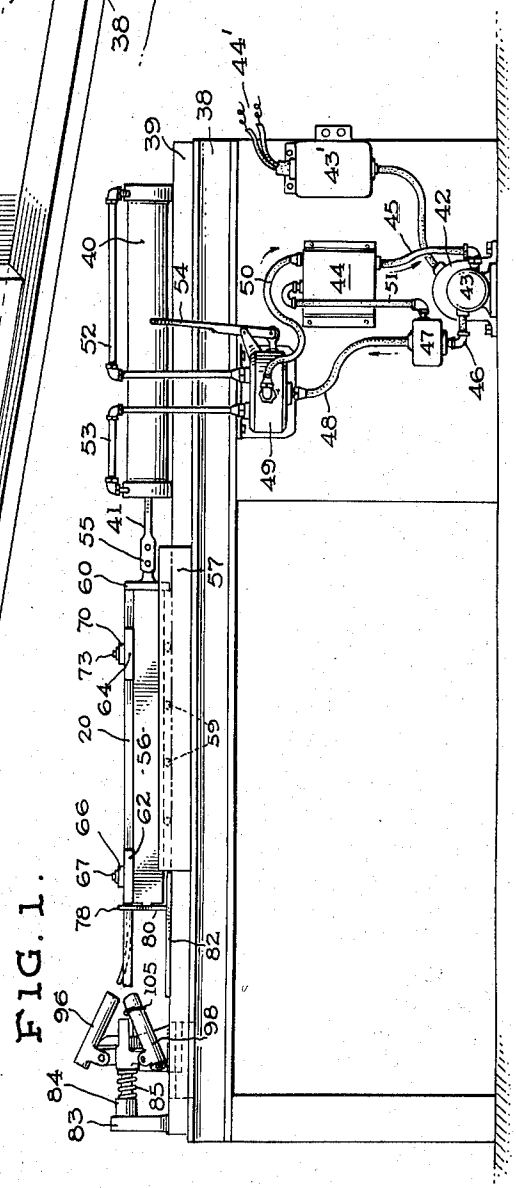


FIG. 1.

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FIG. 3.

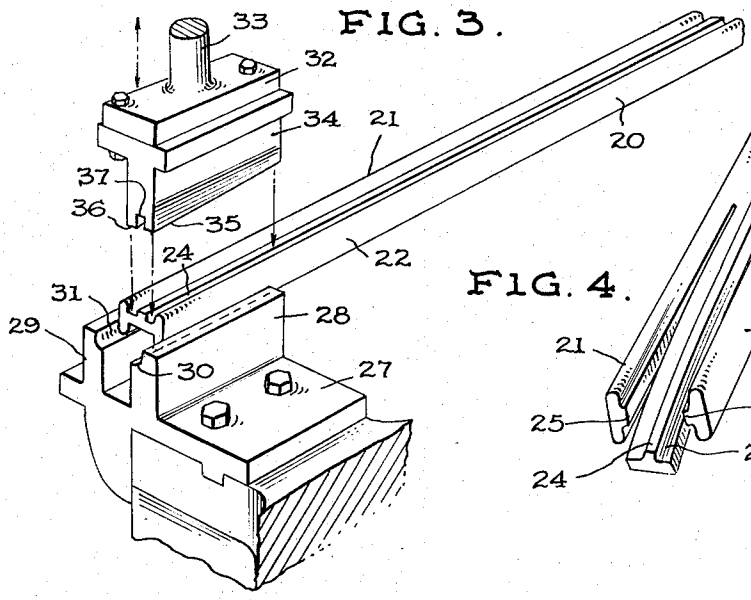


FIG. 4.

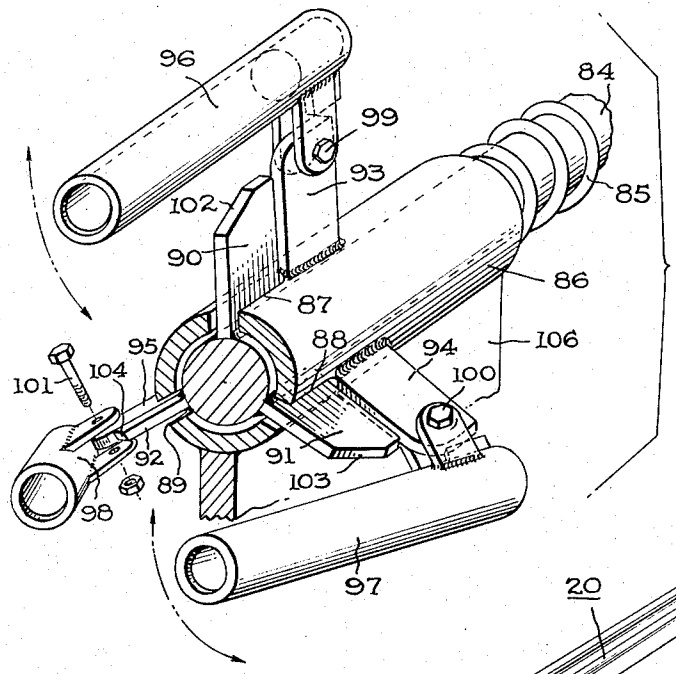


FIG. 5

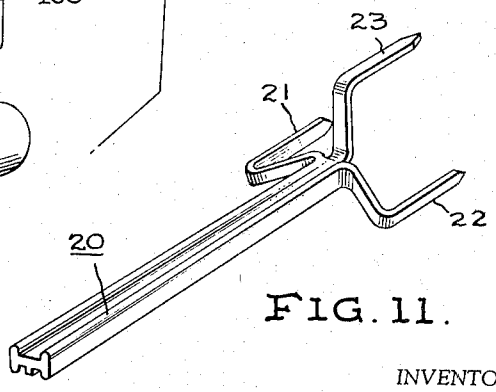


FIG. 11.

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FIG. 6

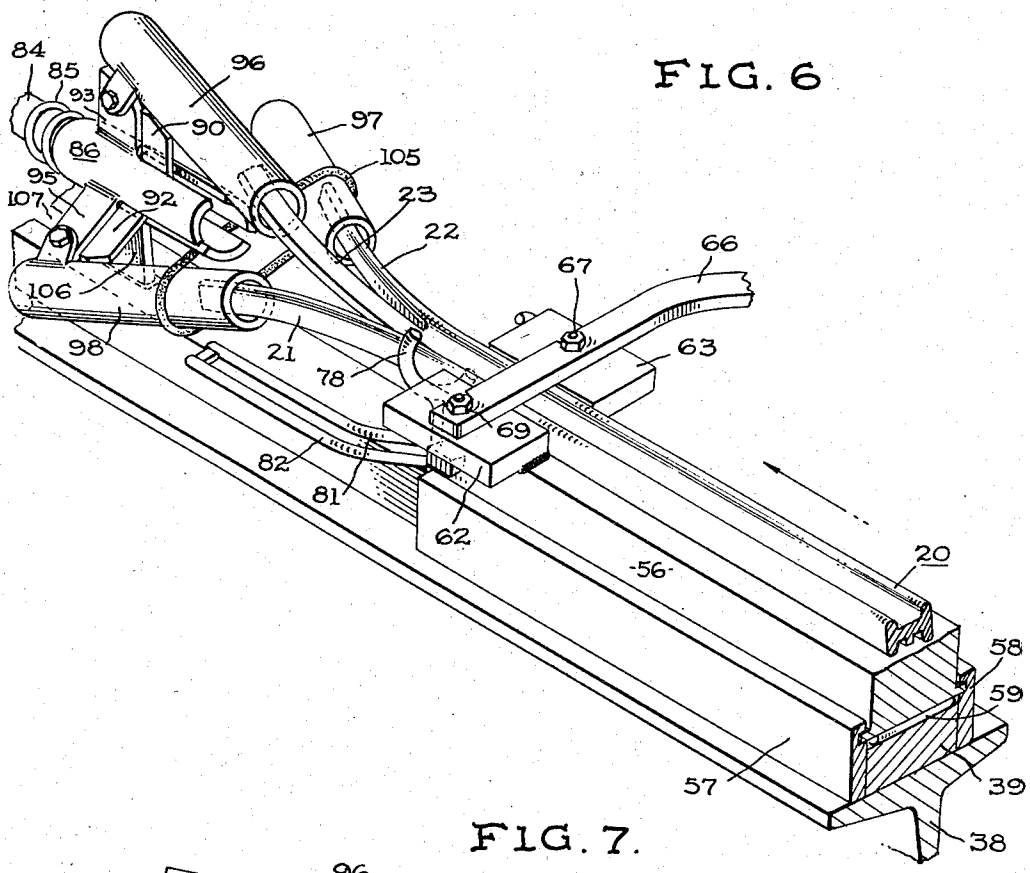
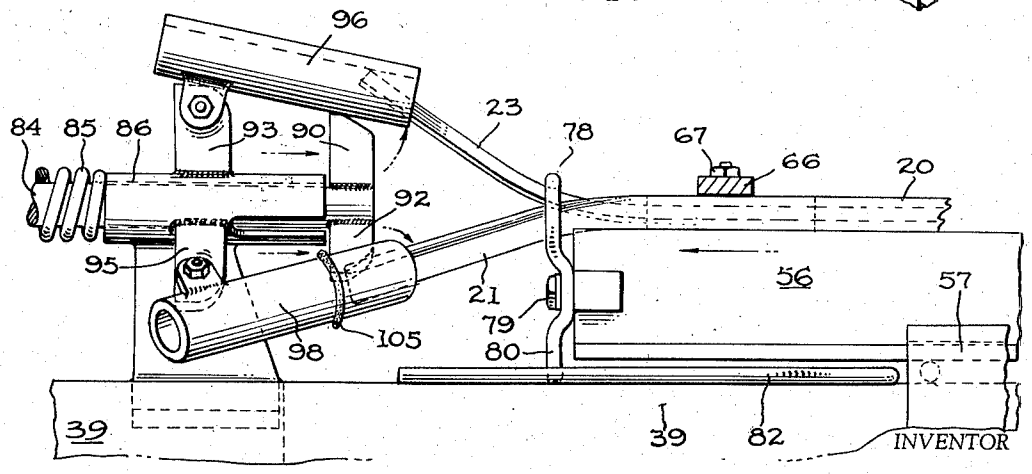


FIG. 7.



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FIG. 8

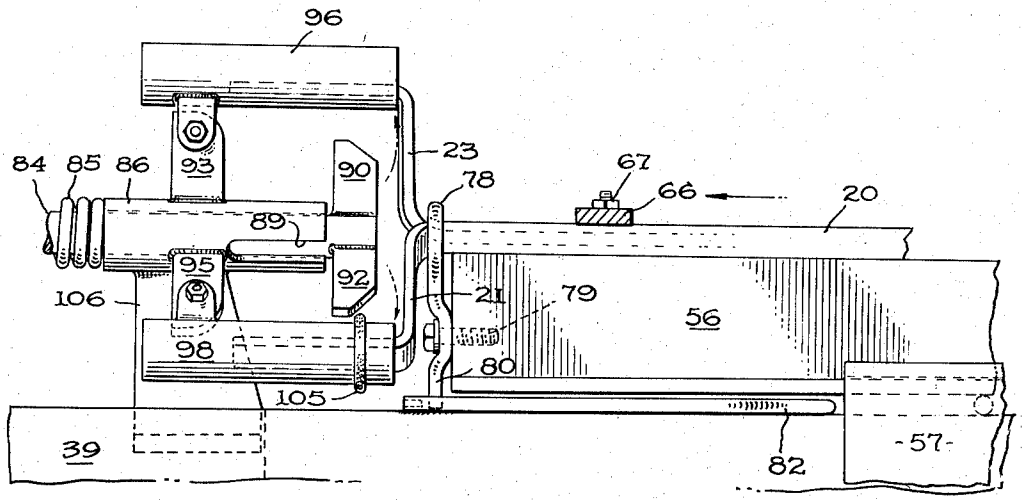


FIG. 9.

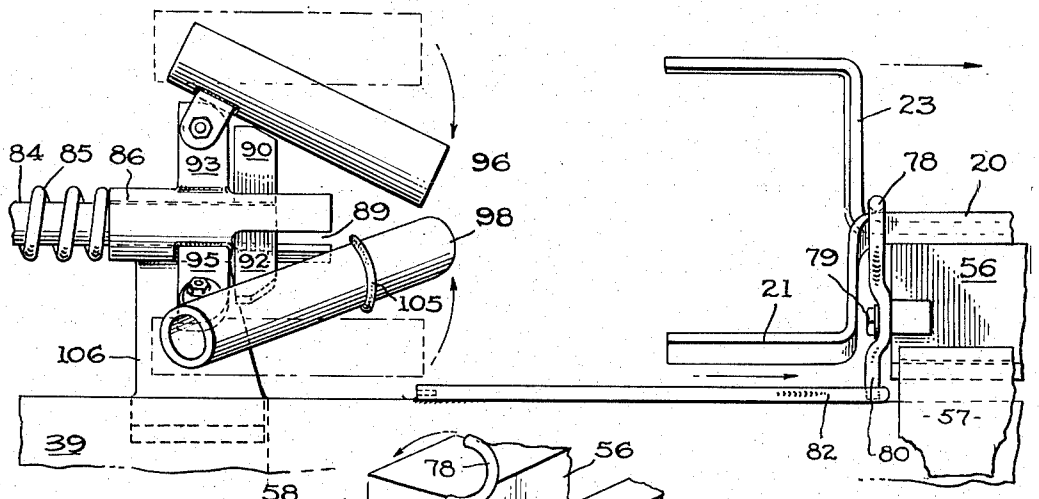
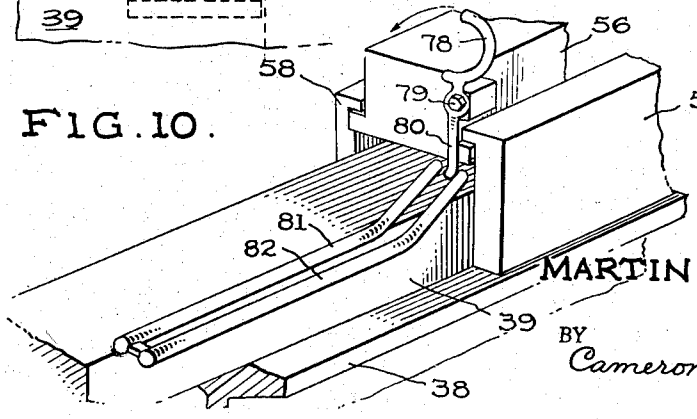


FIG. 10.



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United States Patent Office 2,895,528 Patented July 21, 1959

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METAL FENCE POST LEG BENDING AND FORMING MACHINE

Martin A. Steinhauer, High Bridge, N.J.

Application October 8, 1957, Serial No. 688,861

9 Claims. (Cl. 153—15)

This invention relates to apparatus for slitting and forming fence posts of the type described and claimed in my co-pending application Serial No. 413,379 which was filed March 1, 1954 and now abandoned.

In my application aforesaid, a fence post is described and claimed in which the fence post is H-shaped in cross section and has three legs formed from the body member extending outwardly at right angles thereto at approximately a 120° angle to each other, one of the legs being formed from the web of the body member, and the other two legs being formed from the sides thereof, with a prong for insertion into the ground formed from and at the end of each of the legs and extending at approximately right angles to the remainder thereof. Manual cutting and bending of such H-shaped members would be most uneconomical and the cost of producing a fence post by such manual procedures would be prohibitive.

By the present invention I have provided novel apparatus for slitting such H-shaped body members and thereafter for bending the web portion and the two side portions thereof to form the legs of the fence post with prongs for insertion into the ground extending at right angles to each leg. With such apparatus it is now possible to slit the H-shaped body members and form the same into fence posts in a rapid and economical manner making it commercially feasible to vend such fence posts in competition with posts of the types heretofore known.

It is accordingly an object of the present invention to provide novel apparatus for slitting an end of a metal member which is H-shaped in cross section to separate the web from the two sides thereof and to thereafter bend and form the web and the two sides of the member into three legs extending at approximately a 120° angle to each other with a prong at the end of each leg extending at approximately a right angle thereto.

Another object is to provide such apparatus in which the slitting of the H-shaped member is done in a single shearing operation and the bending and forming of the legs of the fence post is performed in a single bending and forming operation.

Another object of the present invention is to provide novel apparatus for bending and forming metallic members in which the amount and degree of bending is accurately controlled.

Another object is to provide such apparatus which is relatively simple to construct; relatively simple and easy to operate by inexperienced personnel; and which is of simple and rugged construction requiring minimum maintenance and repair.

Apparatus within the present inventive concept is capable of various mechanical embodiments, one of which is shown in the accompanying drawings to illustrate the invention. This illustrative embodiment of the present concept should in no way be construed as defining or limiting the same and reference should be had to the appended claims to determine the scope of the invention.

In the accompanying drawings, in which like reference characters indicate like parts, Fig. 1 is a side view of an

illustrative embodiment of bending apparatus in accordance with the present concept showing the hydraulic system for operating the slide and the location of the slitted H-shaped member with respect to the bending dies at the start of the bending operation;

Fig. 2 is a perspective view of the embodiment of Fig. 1 showing in detail the arrangement of the mechanism for holding the slitted H-shaped member on the slide;

Fig. 3 is a perspective view of apparatus for slitting the end of the H-shaped member to separate the web from the sides thereof;

Fig. 4 is a view of the slit H-shaped member before the bending operation;

Fig. 5 is an enlarged detail perspective view of a portion of the embodiments of Figs. 1 and 2 showing the bending dies in enlarged detail;

Fig. 6 is an enlarged detail perspective view of a portion of the embodiment of Figs. 1 and 2 showing the position of the several elements thereof when the H-shaped member has entered the bending dies and the bending and forming operation has begun.

Fig. 7 is a side view of a portion of the embodiment of Figs. 1 and 2 showing a further step in the bending and forming operation;

Fig. 8 is a side view corresponding to Fig. 7 showing the position of the several elements of the apparatus upon completion of the bending and forming operation;

Fig. 9 is a side view corresponding to Fig. 8 showing the position of the several elements when the completely formed fence post has been withdrawn from the forming dies;

Fig. 10 is an enlarged detail perspective view of a portion of the embodiment of Figs. 1 and 2 to show the construction and method of operation of the bending loop; and Fig. 11 is a perspective view of a completed fence post formed in the apparatus of Figs. 1–10.

Referring now more particularly to Figs. 3 and 4, the apparatus for slitting an end of H-shaped member **20** is there shown. H-shaped member **20** is provided with side portions **21** and **22** and web portion **23** which web portion may be provided with an upstanding longitudinally extending rib **24** to correspond to ribs **25** and **26** of sides **21** and **22**, respectively, formed by the shearing operation. Member **20** is sheared by a suitably actuated vertically reciprocating shear having a base **27** provided with upstanding spaced parallel receivers **28** and **29**. Receivers **28** and **29** are longitudinally cut away at **30** and **31**, respectively, to receive the lower edges of sides **21** and **22**, respectively, of member **20** during the shearing operation.

A suitable shear head **32** is driven in reciprocating movement by a connecting rod **33** and carries die **34**. Die **34** is provided with spaced parallel cutting edges **35** and **36** which are separated by a longitudinally extending recess **37** shaped to receive upstanding ridge **24** of web **23**. Shearing edges **35** and **36** are arranged angularly with respect to base **32** so that a true shearing action is obtained when downward movement of head **32** brings cutting edges **35** and **36** into contact with web **23**.

Edges **35** and **36** are so spaced that upon shearing of web **23** upstanding ridges **25** and **26** will be left on sides **21** and **22** corresponding to rib **24** of web **23**. During the downward shearing motion of die **34** web **23** is bent downwardly into the space between receivers **28** and **29** and sides **21** and **22** are bent outwardly in lesser degree from web **23**.

After the shearing operation is completed, member **20** is sheared and partially shaped as shown in Fig. 4 and is then either automatically or manually transferred to the bending and forming apparatus of Figs. 1 and 2. This bending and forming apparatus is suitably mounted upon a base **38** and includes a bed **39** upon which is suitably mounted a cylinder **40** enclosing a piston, not shown,

which actuates piston rod 41. The piston and its piston rod 41 are driven in reciprocating movement by hydraulic pressure supplied by a system including an electric motor 42 provided with electric power through manually actuated electric switch 43' and a suitable source of electric power 44'. Motor 42 drives pump 43 which takes hydraulic fluid from tank 44 through pipe 45 and delivers this fluid under pressure through pipe 46 to relief valve 47 and from relief valve 47 through pipe 48 to manually actuated valve 49.

Valve 49 is provided with return piping 50 to tank 44 and relief valve 47 is connected to tank 44 through pipe 51. One side of manually actuated valve 49 is connected by pipe 52 to the right side of cylinder 40, as seen in Fig. 1, and the other side of valve 49 is connected by pipe 53 to the left side of cylinder 40 as seen in Figs. 1 and 2, valve 49 being actuated by any suitable manual means such as lever 54.

When motor 42 is energized hydraulic fluid under pressure is supplied to valve 49 and, upon suitable actuation of lever 54, is supplied either to pipe 52 or to pipe 53 to drive piston rod 41 in the desired direction, the fluid on the low pressure side of the piston being returned to tank 44 through the appropriate pipe 52 or 53 and return pipe 50.

Piston rod 41 is connected at 55 to a slide 56 which is mounted for reciprocal movement on bed 39 between side rails 57 and 58 (Fig. 6) with roller bearings 59 reducing friction between bed 39 and slide 56. Slide 56 is provided with an end plate 60 which extends above the upper surface 61 thereof.

Spaced pairs of parallel blocks 62 and 63 and 64 and 65 are suitably secured to the upper surface 61 of slide 56 as by welding and are spaced apart sufficiently to receive member 20 therebetween. A lockbar 66 is pivoted at 67 to block 63 and is notched at 68 to engage bolt 69 mounted in block 62. A similar lockbar 70 is pivoted at 71 on block 65 and is notched at 72 to engage bolt 73 mounted in block 64. A connecting rod 74 is pivotally connected at 75 and 76 to lockbars 66 and 70, respectively, and is provided with an actuating handle 77.

When handle 77 is moved to the left as seen in Fig. 2 lockbars 66 and 70 pivot about pivots 67 and 71, respectively, and disengage from bolts 69 and 73 and rotate to the position shown in dotted lines in Fig. 2 so that a sheared member 20 may be placed between blocks 62 and 63 and between blocks 64 and 65 with the unsheared end thereof in engagement with face plate 60. Handle 77 is then moved to the right as seen in Fig. 2 and lockbars 66 and 70 rotate about pivots 67 and 71, respectively, so that notches 68 and 72 thereof engage bolts 69 and 73, respectively, to secure member 20 in position between blocks 62 and 63 between blocks 64 and 65.

The left end of slide 56 is provided with a hook-shaped member 78 (Fig. 10) which is pivoted thereto at 79. Member 78 is provided with a tailpiece 80 which extends downwardly into engagement with guide rails 81 and 82 which are secured to bed 39. Upon reciprocating motion of slide 56 tailpiece 80 travelling in the track between guides 81 and 82 rotates hook member 78 about pivot 79 into and out of position surrounding member 20. As slide 56 moves to the left as seen in the several figures, hook-shaped member 78 is moved in counterclockwise rotation as seen in Fig. 10 to surround member 20 to control the bending of the legs of the fence post as will appear more fully hereinafter.

As seen in the several figures, the bending and forming dies are mounted upon a post 83 secured at the left end of bed 39. Post 83 carries a horizontal shaft 84 which supports a compression spring 85 and a tubular member 86. Member 86 slides upon shaft 84 against the tension of spring 85. As best seen in Fig. 5, member 86 is axially slotted at 87, 88 and 89, slots 87, 88 and 89 being disposed at approximately 120° angles with respect to each other. Uprights 90, 91 and 92 are secured to shaft 84 and pass through the adjacent slots 87, 88 or 89, respectively, when member 86 is in its extreme left position as shown in Fig. 5. Uprights 93, 94 and 95 are secured to member 86 and extend parallel to members 90, 91 and 92, respectively. Die tubes 96, 97 and 98 are mounted for rotation on bolts 99, 100 and 101, respectively, passing through the ends of uprights 93, 94 and 95, respectively, and when in normal position lie upon bevel surfaces 102, 103 and 104, respectively, of members 90, 91 and 92, respectively. A spring member 105 passes around die tubes 97 and 98 to assure that they engage the bevel surfaces 103 and 104, respectively, before the bending and forming operation and in the position shown in Figs. 1 and 2.

Suitably secured to member 86 is downwardly depending guide plate 106 which extends into a suitable slot 107 in base 39 to prevent rotation of member 86 during the bending and forming operation.

The sequence of the bending and forming operation is shown in Figs. 1, 2, 6, 7, 8 and 9. With member 20 mounted on slide 56 and held in position by lock bars 66 and 70 with one end engaging plate 60, when lever 54 is moved appropriately hydraulic fluid under pressure passes through pipe 52 into cylinder 40 and moves piston rod 41 to the left. Movement of rod 41 to the left moves slide 56 to the left and plate 60 bearing against the end of member 20 moves member 20 with slide 56 to the left. Movement of slide 56 to the left moves tailpiece 80 of hook 78 in guides 81 and 82 and rotates hook 78 in a counterclockwise direction as seen in Fig. 10 about pivot 79 so that hook 78 embraces member 20. Movement of member 20 to the left, as described, brings side 21 thereof into die 98; side 22 into die 97; and web 23 into die 96, stops being provided in dies 96—98 to determine the length of the prongs formed on the fence post. This stage of the bending and forming operation is seen best in Fig. 6.

Thereafter, further movement of member 20 to the left acting through sides 21 and 22 and web 23 in their respective dies moves member 86 to the left against the action of spring 85. As member 86 moves to the left, dies 96, 97 and 98 slide over uprights 90, 91 and 92, respectively, and rotate about their pivots 99, 100 and 101, respectively and stop at positions approaching parallel with the upper surface of base 39. This rotary movement of dies 96, 97 and 98 starts the bending of sides 21 and 22 and web 23 about hook 78. This stage of the bending and forming operation is best seen in Fig. 7.

Further movement of member 20 to the left moves member 86 further to the left until its motion is stopped by spring 85 and dies 96, 97 and 98 rotate into parallel with bed 39, completing the bending of sides 21 and 22 and web 23 about hook 78 and bending the ends of sides 21 and 22 and web 23 to form prongs which extend at right angles to the balance of their respective leg portions. This stage of the bending and forming operation is best seen in Fig. 8.

The operator then reverses the position of lever 54 and hydraulic fluid under pressure flows through pipe 53 into cylinder 40 to move rod 41 to the right, low pressure hydraulic fluid returning from cylinder 40 through pipe 52 to tank 44. Motion of rod 41 to the right moves slide 56 to the right and member 20 is likewise moved to the right withdrawing the formed leg portions of the fence post from their respective dies 96, 97 and 98. At the same time spring 85 moves member 86 to the right and die 96 drops by gravity onto its upright 90 while dies 97 and 98 are returned to position on their uprights 91 and 92, respectively, by spring 105. Toward the end of the movement of slide 56 to the right tailpiece 80 moving in guides 81 and 82 rotates hook 78 about pivot 79 in a clockwise direction as seen in Fig. 10 to release member 20. This stage of the bending and forming operation is best seen in Fig. 9.

Thereafter, the operator moves handle **77** to the left to rotate lockbars **66** and **70** about their respective pivots **67** and **71** to the dotted position shown in Fig. 2 so that the completed fence post may be removed from slide **56**.

It will now be apparent that the present invention in every way satisfies the several objectives described above.

Changes in or additions to the above described illustrative embodiment of this invention may now be suggested to those skilled in the art without departing from the present inventive concept. Reference should therefore be had to the appended claims to determine the scope of this invention.

What is claimed is:

1. In fence post forming apparatus, a carriage, manually operable means for controlling the reciprocation of said carriage, a fence post member removably mounted on and for movement with said carriage, leg forming portions of said fence post member extending beyond said carriage, a die member for each of said leg portions receiving its respective leg portion upon movement of said carriage in one direction and means on said apparatus for supporting each of said die members and said means permitting rotation of said die members outwardly into parallel with the direction of motion of said carriage upon further movement of said carriage in said one direction while maintaining said die members at a predetermined angle with each other.

2. In fence post forming apparatus, a carriage, manually controlled hydraulic means for reciprocating said carriage, a fence post member H-shaped in cross section removably mounted on and for movement with said carriage having three leg forming portions comprising the two sides and the web thereof extending beyond said carriage, a hook rotatable into position embracing said fence post member at the inner end of said leg forming portions upon movement of said carriage in one direction, a hollow die member for each of said leg portions receiving its respective leg portion upon movement of said carriage in said one direction and support means for said die members permitting rotation thereof into parallel with the direction of movement of said carriage upon further movement of said carriage in said one direction while maintaining said die members at a predetermined angle with each other.

3. In apparatus for forming a fence post from an extended metal member H-shaped in cross section and sheared adjacent an end separating the web from the sides thereof, a carriage, manually operable means for removably securing said member on said carriage, means for reciprocating said carriage in direction lengthwise of said member, a hollow die member for each side and for the web of said member receiving its respective side and web upon motion of said carriage in one direction and resiliently mounted support means for said die members permitting rotation thereof outwardly into parallel with the direction of movement of said carriage upon further movement of said carriage in said one direction while maintaining said die members at a predetermined angle with each other.

4. In apparatus for forming a fence post from a member H-shaped in cross section and having a web separated from the sides of said member adjacent an end thereof, a carriage, manually operable means for removably securing said member to said carriage, means for reciprocating said carriage along the line of the length of said member, a hollow die member for each side and for the web of said member receiving its respective portion of said member upon movement of said carriage in one direction, support means for said die members movable in the line of the length of said member, and

resilient means opposing movement of said support means, said support means permitting rotation of said die members into parallel with the line of the length of said member upon further movement of said carriage in said one direction while maintaining said die members at a predetermined angle with each other.

5. In apparatus for forming a fence post, a member divided into leg forming portions adjacent an end thereof, a carriage, power means for reciprocating said carriage, locking means for removably securing said member on said carriage parallel to the line of reciprocation thereof, an open ended tubular die for each leg portion of said member receiving its respective portion upon movement of said carriage in one direction, support means for said dies movable in the line of movement of said member, resilient means opposing movement of said support means, and means for mounting each of said dies on said support means for rotation into spaced parallel rotation with the line of movement of said member while maintaining said dies at a predetermined angle with respect to each other.

6. Apparatus as described in claim 5 including a hook rotatably mounted on said carriage and guide means for said hook rotating said hook into position embracing said member adjacent the end of said leg forming portions when said carriage is moved in said one direction.

7. Apparatus as described in claim 5 including spring means urging the open ends of said dies together.

8. Apparatus as described in claim 5 in which said support means include a shaft supported in the line of movement of said member, a sleeve mounted for movement on said shaft, said resilient means opposing movement of said sleeve on said shaft, an upright on said sleeve for each of said dies and circumferentially spaced at a predetermined angle with each other, means for pivotally mounting each of said dies at the outer end of its respective upright, and an upright on said shaft for and engaging each of said dies and rotating said dies into spaced parallel relation with the line of movement of said member when said sleeve is moved on said shaft against said resilient means.

9. In apparatus for bending and forming longitudinally extending portions of a body member, a carriage, power means for reciprocating said carriage, means for removably securing said member on said carriage parallel to the line of movement thereof, a die for each of said portions receiving its respective portion upon movement of said carriage in one direction, and means on said apparatus for supporting each of said dies and said means permitting rotation of said dies outwardly into spaced parallel relationship with the line of movement of said member upon further movement of said carriage in said one direction while maintaining said dies at a predetermined angle with each other.

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