United States Patent [19]

Helzer

[11] **3,908,433**

[45] **Sept. 30, 1975**

[54] **ROD FORMING MECHANISM**

[76] Inventor: **Russell H. Helzer,** 336 NW. 10th, Ontario, Oreg. 97914

[22] Filed: **Nov. 26, 1974**

[21] Appl. No.: **520,331**

[52] **U.S. Cl.** **72/388;** 72/319; 72/321

[51] **Int. Cl.**[2] **B21D 9/05;** B21D 31/00

[58] **Field of Search** 72/310, 319, 320, 321, 72/387, 388, 217, 218, 219

[56] **References Cited**

UNITED STATES PATENTS

1,167,983	1/1916	Davis et al.	72/217
2,228,448	1/1941	Fader, Jr.	72/319 X
2,414,926	1/1947	Burke	72/217
3,194,038	7/1965	Small et al.	72/319 X
3,538,737	11/1970	Del Monica	72/388
3,808,867	5/1974	Becker	72/321

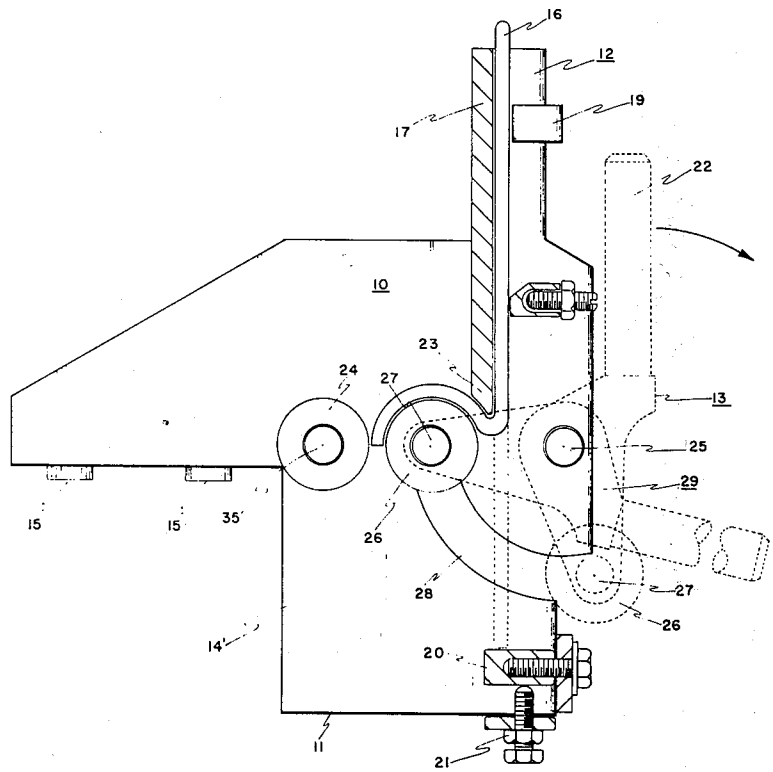
Primary Examiner—Victor A. DiPalma

Attorney, Agent, or Firm—John W. Kraft; Charles L. Kraft

[57] **ABSTRACT**

A rod forming mechanism comprises a frame including suitably joined and reinforced vertical, parallelly disposed walls being open at one of their vertical ends; a rod securing guide being mounted to the frame, the guide providing means for retaining a selected length of rod in a vertical position distally adjacent the open vertical edge of the frame; and a rod forming assembly including a forming lever pivotally mounted at its center to the frame adjacent the open end, a roller mounted at the lower end of the forming lever, means for applying force rotating the forming lever at its pivot provided at the end of the forming lever opposite the roller, a return bend shoe being disposed between the frame walls with the lowermost terminal end of the shoe being in substantial alignment with the pivot of the forming lever, and a stationary forming roller being disposed rearwardly of the lever, between the frame walls.

6 Claims, 4 Drawing Figures



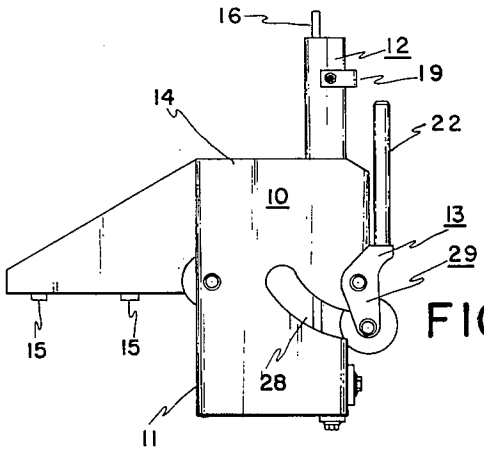


FIG. 1

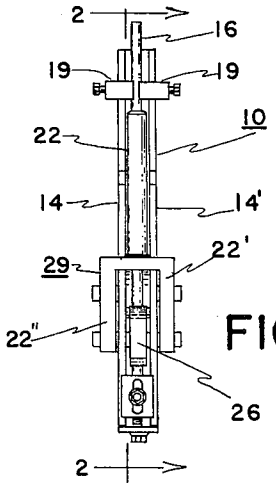


FIG. 2

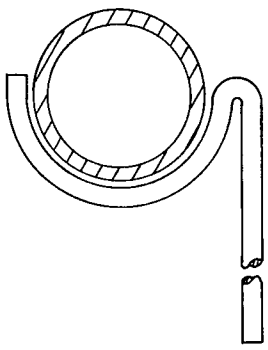


FIG. 3

FIG. 4

ROD FORMING MECHANISM

FIELD OF INVENTION

The present invention relates to apparatus for deforming metal, and more particularly to apparatus for deforming rod into certain products such as saddle-type pipe supports.

DESCRIPTION OF THE PRIOR ART

Means commonly used and employed to fabricate products made of metal rod have included impact devices, and continuous pressure devices. Continuous pressure rod deformation devices include swages, forges and the like which employ a high-impact blow to deform the material into a predetermined shape. Continuous pressure devices include the various types of vices and clamping formers which employ a screw, pressure cylinder, or the like to make a bend in a predetermined direction. Generally, impact devices have been employed to make bends having long, arcuate shapes, while continuous pressure devices may be employed to make tighter, return bends.

Forming of rod products having complicated shapes has been attempted either by apparatus having extremely great power sources to overcome mechanical limitations in either of the two main apparatus genera, attempting to employ a hybrid of compression and impact devices, or forming the product in sequential steps accomplished on separate devices. Accordingly, it is an object of the present invention to provide apparatus for deforming rod into product which are characterized by complicated shapes and combinations of shapes. It is a more particular object to provide an apparatus which may form saddle-type pipe supports.

It is a further object of this invention that the aforesaid apparatus have as an inherent feature optimal use of power both over long arcuate sections, and sharp return bends.

These and other objects shall become apparent from the description following, it being understood that modifications may be made without affecting the teachings of the invention here set out.

SUMMARY OF THE INVENTION

A rod forming mechanism comprises a frame including suitably joined and reinforced vertical, parallelly disposed walls being open at one of their vertical ends; a rod securing guide being mounted to the frame, the guide providing means for retaining a selected length of rod in a vertical position distally adjacent the open vertical edge of the frame; and a rod forming assembly including a forming lever pivotally mounted at its center to the frame adjacent the open end, a roller mounted at the lower end of the forming lever, means for applying force rotating the forming lever at its pivot provided at the end of the forming lever opposite the roller, a return bend shoe being disposed between the frame walls with the lowermost terminal end of the shoe being in substantial alignment with the pivot of the forming lever, and a stationary forming roller being disposed rearwardly of the lever, between the frame walls.

A more thorough and comprehensive understanding may be had from the detailed description of the preferred embodiment when read in connection with the drawing forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of the rod forming mechanism of this invention.

FIG. **2** is a front view of the rod forming mechanism of this invention.

FIG. **3** is an elevational view of a formed pipe support produced by the present mechanism shown supporting a pipe in broken lines for illustrative purposes.

FIG. **4** is a cross-sectional, side elevational view taken substantially along the lines **2—2** of the FIG. **2.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly to the FIG. **1,** the rod forming mechanism of this invention is shown to advantage and generally identified by the numeral **10.** The mechanism **10** comprises a frame **11,** a rod retaining guide **12,** and a rod forming assembly **13.** The frame **11** is a rectangular framework having a pair of vertical, parallelly oriented and suitably reinforced walls **14** and **14'.** The frame **11** may be portable or bench mounted by means such as hold-down lugs **15.**

Referring to the FIGS. **1** and **4,** the guide **12** provides means for guiding a section of rod **16** into the forming assembly **13,** and then retaining the rod **16** for deformation. The guide **12** may be fabricated of tube, or of a U-shaped channel **17** having adjustable securing clamps **19.** As shown in the drawing, the channel **17** issues from the uppermost terminal edge of the frame **11** at the forward end of the walls **14** and **14'.** The cavity of the channel **17** is disposed toward the forwardmost end of the frame **11,** in registry with the cavity formed between the walls **14** and **14'.** The clamps **19** provide means for modifying the size of enclosure required to accommodate and retain the rod **16.** Any of a number of clamps may be employed which may be interdigitated into the cavity of the channel **17.** The lowermost portion of the cavity formed by the walls **14** and **14'** corresponding to the rod receiving enclosure formed by the guide **12** is provided with a stop **20** which describes the lowermost penetration of a rod **16** which is inserted downwardly from the uppermost terminal end of the guide. The stop **20** may be adjustable by means such as a screw **21** disposed at the lowermost terminal end of the frame **11,** to selectively adjust the size of sections of rod **16** formed by the mechanism **10.**

As shown more clearly in the FIG. **4,** the rod forming assembly **13** comprises a rod forming lever **22,** a return bend forming shoe **23,** and a stationary forming roller **24.** The lever **22** is journally mounted on a pivot **25** with walls **22'** and **22''** forming the lever **22** disposed exteriorly adjacent the walls **14** and **14'.** The lowermost terminal end of the lever **22** carries a forming roller **26** which travels between the walls **14** and **14'.** The roller **26** is journally mounted on a shaft **27** which travels along arcuate grooves **28** in the walls **14** and **14'.** An actuating lever **29** issues from the end of the lever **22** opposite the roller **26.** It may be seen that mechanical advantage may be derived by employing a bell-crank-like, or dog leg, configuration for the lever **29,** with the interior vertex thereof disposed forwardly with respect to the mechanism **10.** The actuating lever **29** may be provided with force by either manual or mechanical means.

The return bend forming shoe **23** is actually a pointed portion of the lowermost terminal end of the base wall

of the guide **12.** The sharpness of the point forming the shoe **23** may be modified to provide various degrees of sharpness in the return bend formed in the rod **16.** In operation, the lever **22** is rotated with the rearward side of the roller **26** engaging the forwardmost side of the lower, exposed portion of the rod **16.** As the lever **22** is rotated, the roller **26** causes the lower portion of the rod **22** to bend about the shoe **23.**

The stationary rod forming roller **24** is journally mounted between the walls **14** and **14'** on an axle **35** which is in alignment with the pivot **25.** The stationary roller **24** is primarily intended as an idling capston engaging the lowermost terminal end of the rod **16.** The forming roller **26** carried on the lever **22** both engages the rod **16** and determines the primary shape of longer, arcuate portions in the product discussed above. Thus, the diameter of the roller **26** is selected so that its outside circumference provides a pre-selected degree of curvature in the product. Between the rollers **24** and **26,** it has been found to advantage to provide rollers which, when mounted and are actuated adjacently, provide a space between their circumferences which may accommodate the thickness of the rod **16.** This consideration is also present when determining the length of the lever **22** from the pivot **25** to the shaft **27** so that a suitable space is disposed between the circumference of the roller **26** and the shoe **23.**

A portion of a typical product which may be formed in the mechanism may be seen in FIG. **3.** Although rod is described as a primary material to be formed in the device **10,** it is to be understood that other materials, such as tube and strip, may be employed to similar advantage.

As shown in the FIG. **4,** with special reference to secondary positions of the forming assembly **13** and the rod **16,** in operation rod **16** is inserted into the guide **12** and between the walls **14** and **14'** until the lowermost terminal end of the rod **16** engages the stop **20.** The lever **22** is rotated to actuate the roller **26** rearwardly with respect to the mechanism **10.** As the roller **26** moves rearwardly and upwardly between the walls **14** and **14',** the rod **16** is first formed into a return bend, and then as the roller **26** becomes more approximate to the roller **24,** the lower, free end of the rod **16** is caused to contact the circumferential face of the forming roller **24.** As the forming roller **26** completes its travel, the portion of the rod **16** caught between the rollers **24** and **26** is caused to be pulled about the circumferential face of the roller **26** into the desired curved configuration. It may be seen that the circumferential faces of the rollers **24** and **26** may be fabricated with either flat or grooved faces (that may be flat or grooved) according to demands of alignment and accuracy.

The stationary roller **24** may be disposed in horizontal alignment with the pivot **25** of the lever **22** as set out above to provide arcuate portions in the product up to a semi-circle. For bends greater than a semi-circle, it may be seen that the stationary roller **24** may be disposed somewhat lower in the frame **11** than the pivot **25.** This will cause the rod **16** to be conformed over a greater surface of the roller **26.**

Having thus described in detail a preferred apparatus which embodies the concepts and principles of the invention and which accomplishes the various objects, purposes and aims thereof, it is to be appreciated and will be apparent to those skilled in the art that many physical changes could be made in the appartaus without altering the inventive concepts and principles embodied therein. Hence, it is intended that the scope of the invention be limited only to the extent indicated in the appended claims.

I claim:

1. A rod forming mechanism, comprising:

a frame including suitably joined and reinforced vertical, parallelly disposed walls being open at one of their vertical ends;

a rod securing guide being mounted to said frame, said guide providing means for retaining a selected length of rod in a vertical position distally adjacent said open vertical edge of said frame; and

a rod forming assembly including a forming lever pivotally mounted at its center to said frame adjacent said open end, a roller mounted at the lower end of said forming lever provided at the end of said forming lever opposite said roller and means for applying force rotating said formed lever at its pivot, a return bend shoe being disposed between said frame walls with the lowermost terminal end of said shoe being in substantial alignment with said pivot of said forming lever, and a stationary forming roller being disposed rearwardly of said lever, between said frame walls, the distance between said actuating lever pivot and the center of said stationary roller being sufficient to accommodate said roller carried on said lever and thicknesses of rod when said roller carried on said lever is disposed between said return bend shoe and said stationary roller.

2. The apparatus of claim **1** wherein the lowermost travel of said rod through said guide and between said frame walls is determined by a stop disposed at a lower portion of said frame walls.

3. The apparatus of claim **2** wherein said stop is provided with means for adjusting the vertical position of said stop with respect to said frame walls.

4. The apparatus of claim **1** wherein said guide is provided with means adjusting the interior dimension of said guide to accommodate various sizes of rod.

5. The apparatus of claim **1** wherein said lever pivot and the center of said stationary forming roller positions are in horizontal alignment.

6. The apparatus of claim **1** wherein said center of said stationary forming roller is vertically below the pivot of said forming lever.

* * * * *