

May 13, 1930.

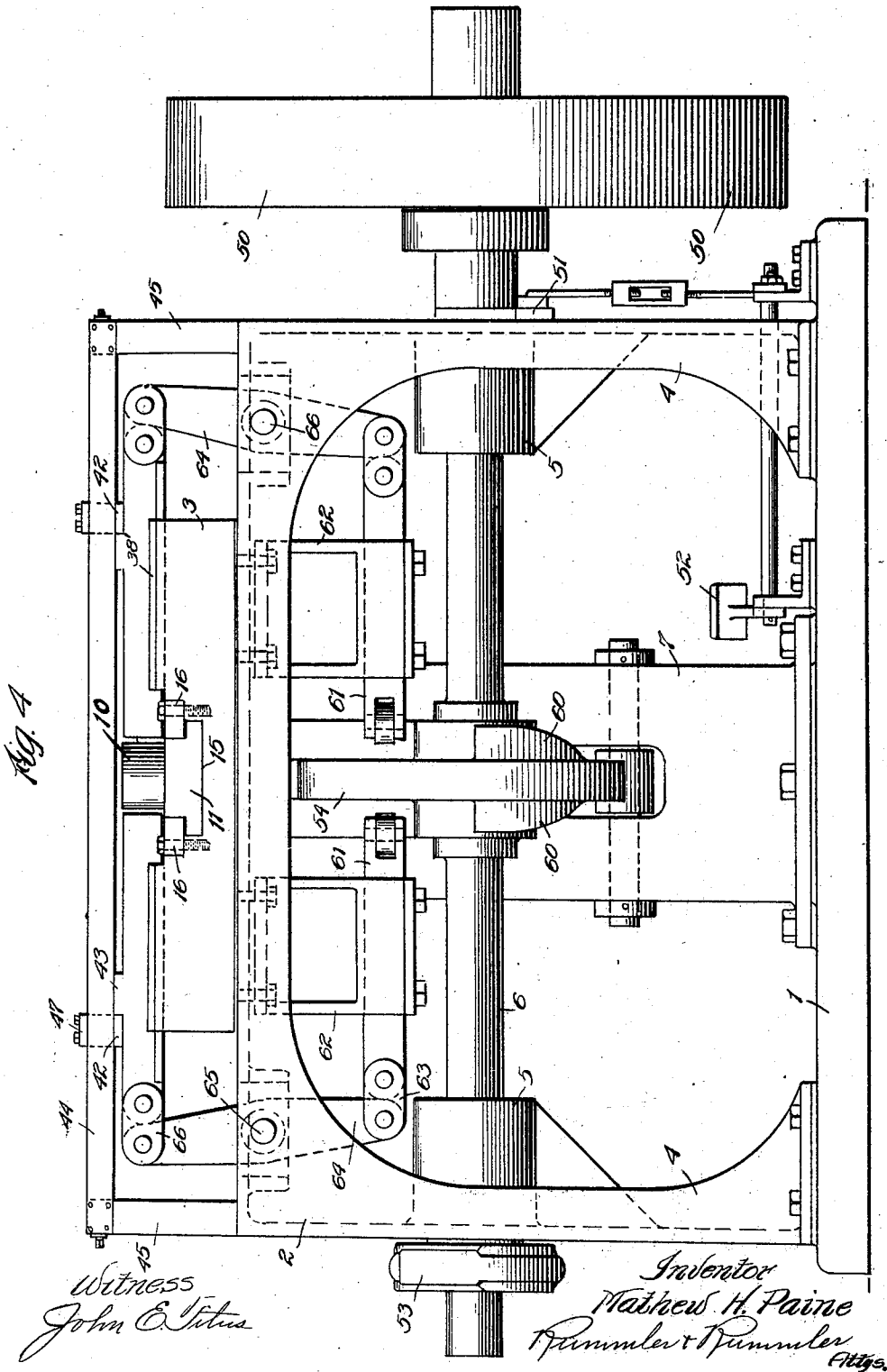
M. H. PAINE

1,758,237

BENDING PRESS

Filed Jan. 21, 1928

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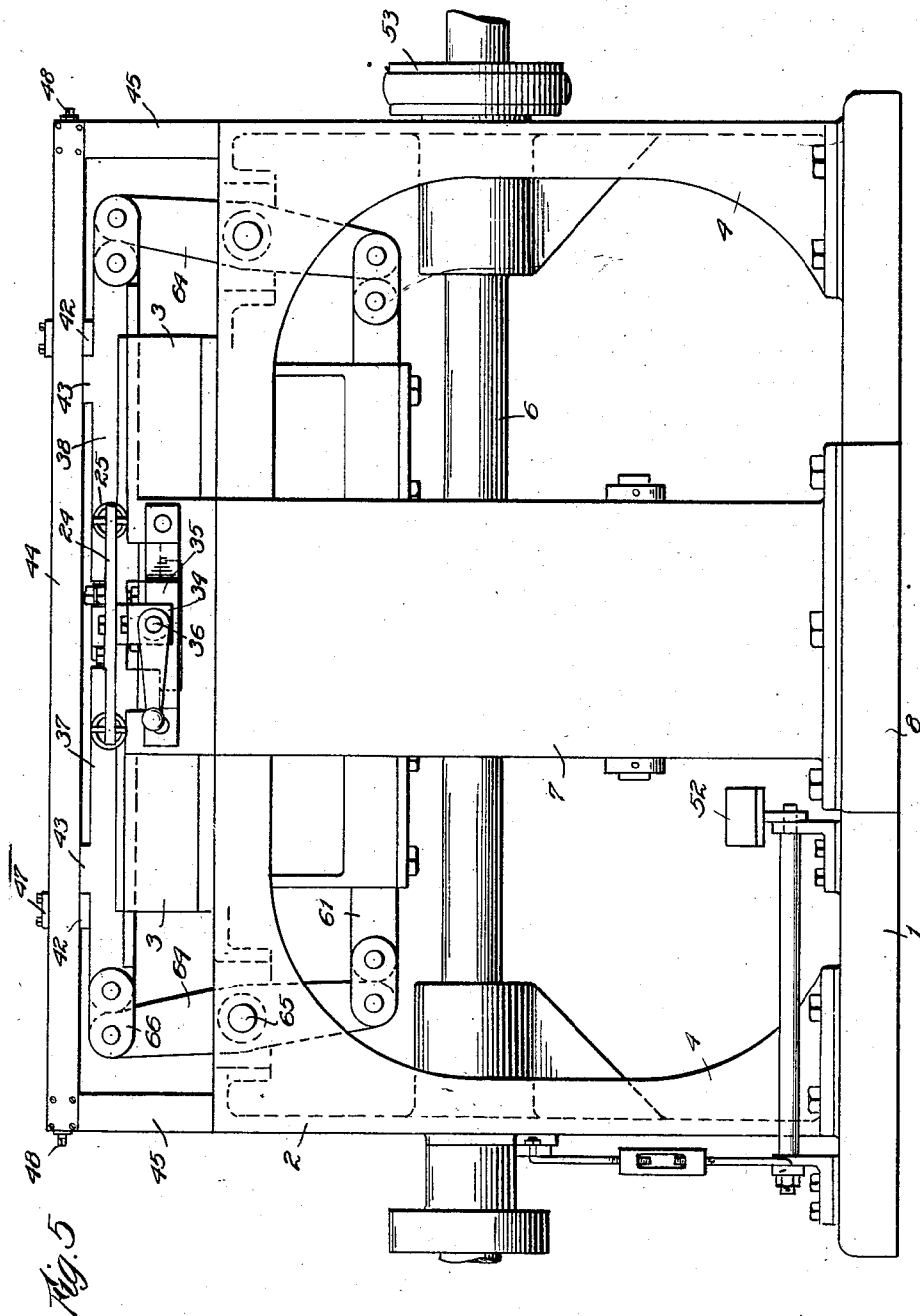


Fig. 5

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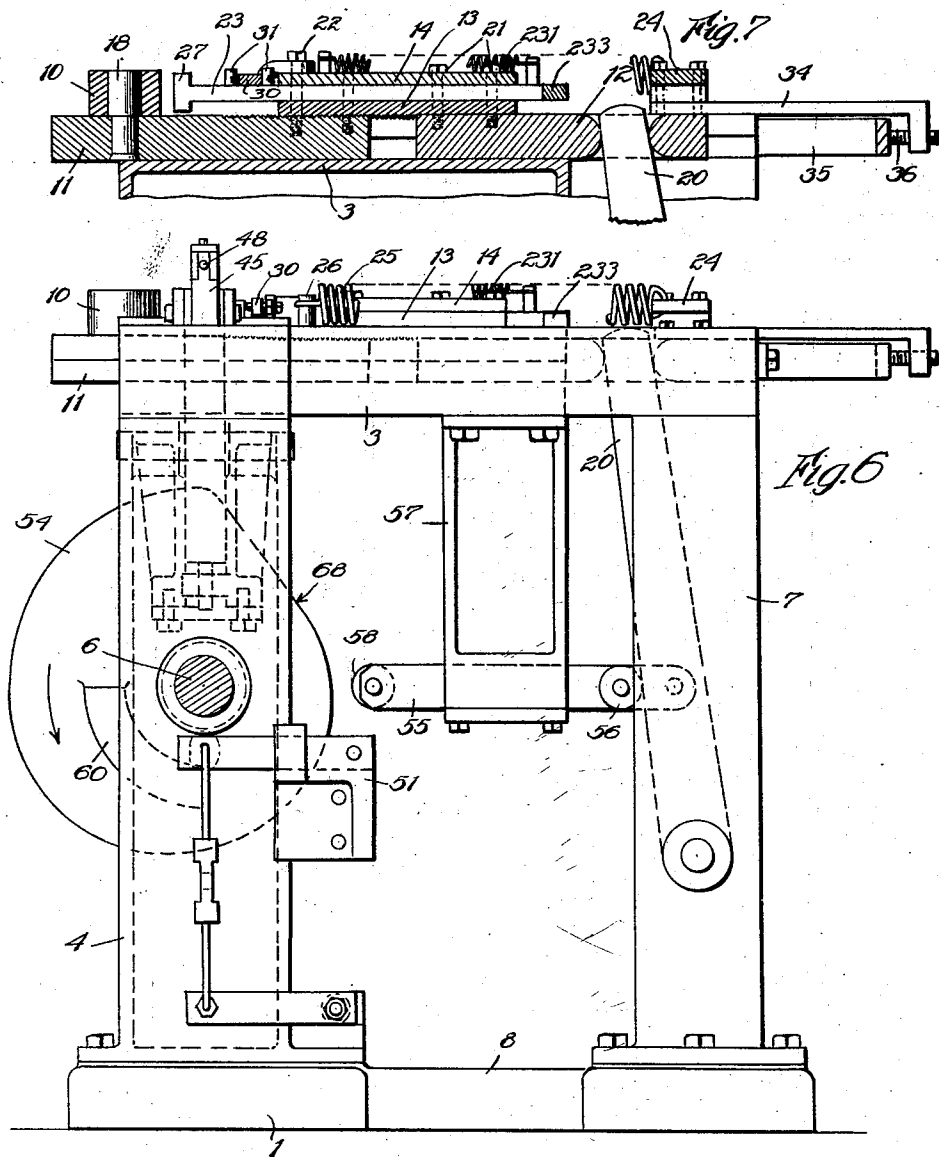
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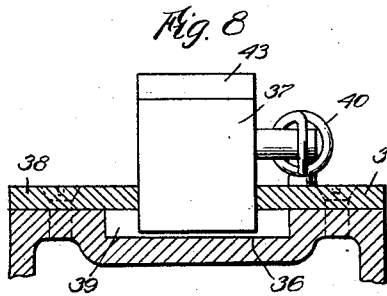
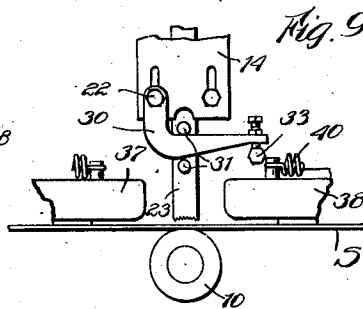
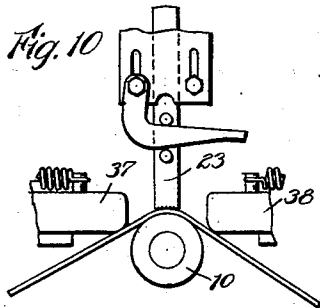
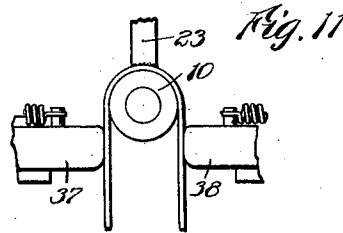
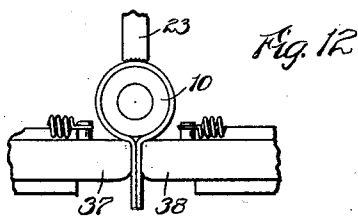
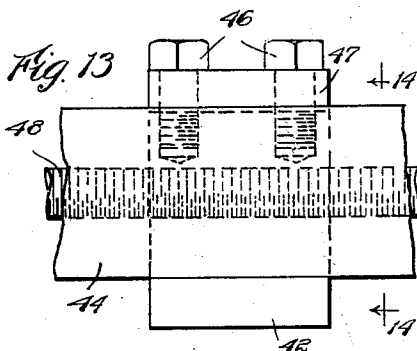
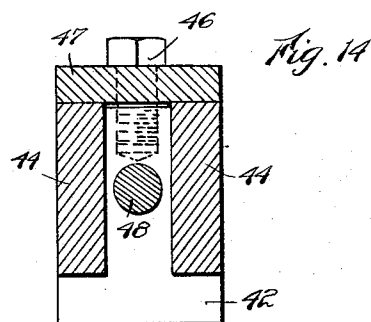
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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BENDING PRESS

Application filed January 21, 1928. Serial No. 248,374.

This invention relates to bending presses, more especially for forming loops and rings in such articles as pipe hanger bands and the like.

5 The main objects of this invention are to provide a machine suitable for manufacturing such devices in large quantities at a low cost; to provide a machine which can be readily altered or set up to accommodate
10 different sizes and shapes of work; and to provide a machine which is simple and rugged in construction and reliable in operation.

An illustrative embodiment of this invention is shown in the accompanying drawings,
15 in which:

Figure 1 is a plan view of the bending press.

Fig. 2 is a perspective view of a partially formed pipe hanger.

20 Fig. 3 is a perspective view of the completed hanger as formed on this machine.

Fig. 4 is a front elevation of the machine.

Fig. 5 is a rear elevation of the same.

Fig. 6 is an end view of the machine taken
25 on the line 6—6 of Fig. 1.

Fig. 7 is a fragmentary section taken on the line 7—7 of Fig. 1.

Fig. 8 is a detailed section of the hammer slide, taken on the line 8—8 of Fig. 1, with
30 the hammer shown in end elevation.

Fig. 9 is a diagrammatic view of the operating parts shown in Fig. 1, with a strip of stock in position.

Fig. 10 is a view of the parts shown in Fig. 9, in changed position, showing the first step
35 in the forming operation.

Fig. 11 shows the hanger partially formed.

Fig. 12 shows the completion of the forming operation.

40 Fig. 13 is an enlarged view of the hanger stock, as viewed in Fig. 4; and

Fig. 14 is a section taken on the line 14—14 of Fig. 13.

45 The frame, in general, consists of the base 1, the transverse table portion 2, and the bolster block 3. The table 2 is provided with a pedestal 4 at each end which is bolted to the base 1, the bearings 5 being integrally formed in the pedestals 4 for rotatably supporting
50 the cam shaft 6. The front end of the bolster

3 is supported on the table 2, and the rear end of the bolster is supported by the pedestal 7, which is bolted to a rearwardly extending portion 8 of the base 1.

The ram for carrying the mandrel 10 consists of two similar slides 11 and 12 which
55 are extensibly connected by means of the superposed plates 13 and 14. The slide members 11 and 12 are held down in a suitable guideway in the bolster by means of the gibs
60 16 which are set in suitable channel recess in the bolster 3 so that the upper surfaces of the slides 11 and 12 are substantially flush with the top of the bolster.

The front slide member 11 is provided
65 with a post 18 for carrying the ring shaped mandrel 10. The mandrels 10 are provided in different outside diameters and shapes according to the size of the work. The rear
70 slide member 12 is apertured to receive the upper end of the driving lever 20 and the two slide members are connected in adjustable spaced relation by the bolts 21 which extend
75 through the plates 13 and 14 and thread into the slide 12 and by the bolts 22 which extend through slotted holes in the plates 13 and 14 and thread into the slide 11. The upper surface of the plate 13 is provided with a channel for receiving the stock gripping plunger
80 23 which is drawn forwardly by means of the spring 231 which is attached to the post 232 in the plate 14.

The slide 12 is provided with a transverse yoke 24 at the rear end, to which are
85 attached the contractile springs 25. The front ends of the springs 25 are anchored to posts 26 secured in the bolster 3, to draw the ram and plunger forwardly. For holding the gripping end 27 of the plunger 23 from actual contact with the mandrel 10, stops are
90 provided by the set screws 28 which are adjustably threaded into the rear end of the plate 13 and form an abutment for the shoulders 233 formed on the rear end of the plunger 23.

95 On one of the bolts 22 at the front end of the plate 14, is pivotally mounted an angular lever 30 which extends between stop pins 31, fixed in the plunger 23 and cooperates with the fixed stop 33, in the bolster, for
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holding the gripping end 27 spaced from the mandrel 10 in the forward position of the ram, so that the strip of stock S can be inserted behind the mandrel, as shown in Fig. 9.

5 The forward position of the ram is positively determined by the cooperating brackets 34 and 35, the bracket 34 being bolted to the rear end of the slide 12 and provided with an adjusting screw 36 in the outer end, which
10 engages with the bracket 35 which is bolted to the bolster 3.

A pair of hammers 37 and 38 are slidably mounted, one at either side of the ram, in suitable guideways formed in the transverse
15 portions of the bolster 3, the hammers being held down by gib plates 38', Fig. 4, which are secured to the upper surface of the bolster and project over laterally extending portions 39 of the respective hammers. The
20 hammers are urged rearwardly, away from the ram, by means of contractile springs 40, Figure 1, which are anchored to the posts 41 fixed in the boltser, and attached at the opposite ends to the posts secured in the inner
25 ends of the hammers. The retraction of each hammer is limited by means of the adjustable stop 42, Fig. 5, the stop being engaged by an abutment 43 formed on the upper edge of the hammer. The stop member 42
30 is T-shaped, with the stem portion extending between the pair of rails 44 which are mounted on posts 45, which are secured at either end of the table frame portion 2. The stop member 42 is clamped in position by
35 means of the cap screws 46 which thread into the stem portion of the stop member and clamp the plate 47 against the upper edge of the rails 44. For moving the stops 42, suitable lead screws 48 are journaled in the
40 upper ends of the posts 45, and thread through the respective stops. In adjusting the stops, the cap screws 46 are loosened and the lead screws 48 rotated until the stops are in the proper position, the stops then being
45 locked by tightening the set screws.

Upon one end of the shaft 6, Fig. 4, is loosely mounted a heavy driving pulley 50 which may be connected to the shaft 6 for a single revolution by means of a suitable
50 clutch 51 which is controlled by the pedal 52. The clutch and the brake 53 which is mounted on the opposite end of the shaft to prevent overrunning, are of a construction which is commonly used for performing the
55 given function and need not be fully described herein.

In the middle of the machine is provided a cam 54 which is rigidly mounted on the shaft 6. The ram operating lever 20 is pivoted at its lower end in the rear pedestal 7,
60 and is connected at an intermediate point to the cam slide 55 by means of the pivotal links 56. The slide 55 is guided in the lower end of a bracket 57 which depends from the lower
65 side of the bolster 3 and the front end of the

slide 55 is provided with a roller 58 which is engaged by the peripheral surface of the cam 54.

The hammers 37 and 38 are driven inwardly by means of lugs 60 which are provided on the opposite sides of the cam 54.
70 As the cam is rotating, the lugs 60 pass between the inner ends of the slides 61 which are mounted on either side of the cam in suitable guiding brackets 62, which are secured
75 to the under side of the table portion 2. The rear ends of the slides 61 are connected by suitable side links 63 to the lower ends of the yokes 64; and the yokes 64 are centrally pivoted on the pins 65 which are fixed in the
80 frame portion 2, and the upper ends of the yokes 64 are connected to the rear ends of the hammers 37 and 38 respectively by means of the side links 66.

In setting up the machine, a suitable mandrel 10 is placed over the post 18. The cam is then turned to move the slide 12 to its extreme rear position. The length of the ram is then adjusted by setting the bolts 22 so that the forward edge of the mandrel is behind the rear edges of the hammers approximately the thickness of the stock which is to be used. The forward position of the ram is then adjusted by means of the screw 36
85 so that the rear edge of the mandrel 10 is then in front of the hammers 37 and 38 a sufficient distance to allow easy insertion of the strip of stock S. The stops 42 for limiting the retraction of the hammers are then adjusted to allow for the thickness of the stock as the mandrel is drawn between the hammers.
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In operation, when the stock is inserted, the press is set in motion by depressing the pedal 52, the wheel 50 being constantly
105 driven. As soon as the cam has rotated sufficiently to engage with the plunger 55, the ram is drawn rearwardly through approximately 180 degrees of the turning movement of the shaft 6.
110

As soon as the end of the lever 30 leaves the stop 33, the spring 231 draws the end 27 of the plunger 23 against the stock on the mandrel 10. In this manner the stock is pressed hard against the mandrel so that it cannot slip during the forming operations. The mandrel is drawn through between the ends of the hammers 37 and 38, the front corners of the hammers serving as stationary bending guides, as shown in Fig. 10. During the bending, the pressure of the plunger tends to prevent the stock from kinking in the middle as the stock is bent into the U-shape, as shown in Fig. 2 and Fig. 11, around the mandrel.
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120
125

After the mandrel passes through between the hammers, the hammers are forcibly driven together to draw and form the stock around the mandrel, closing the loop as shown in Fig. 12.
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The high portions of the cam 54 and lugs 60 then pass by their respective plungers, allowing the hammers to be drawn back against the stop 42 by means of the springs 40, the ram being allowed to move forwardly by the receding portion 68 of the periphery of the cam 54. The ram is drawn back by means of the springs 25 until the end of the lever 30 again strikes the stop 33. The plunger is then held, and the springs 25 draw the ram completely forward until the end of the screw 36 strikes against the stop member 35.

Considerable pressure on the hammers is required in the position shown in Fig. 12 to form the loop so that the ends will not spring apart. Therefore, the respective ends of the yokes 34 are formed to bear directly on the ends of the hammers and plungers 61. Since the lugs 60 are directly opposite each other on the sides of the cam, solid connections are provided by this arrangement for applying the heavy pressure for closing the stock.

From the foregoing, it can be perceived that the feeding and handling of the work is very simple, and that the machine can be operated fast. The machine can be built to accommodate a large range of sizes and shapes of work, and can be quickly changed over for accommodating different work.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In a bending press, a pair of hammers slidably mounted in opposed relation, a slide having a mandrel which is drawn between the hammers when the slide is reciprocated, means for reciprocating the slide, adjustable stops for limiting the retraction of the hammers to adapt the same to serve as bending guides to form stock around mandrels of various sizes, when one thereof is drawn between the hammers, and means for driving the hammers forwardly behind the mandrel to form the stock around the mandrel, said driving means being adapted to predetermine the commencement of the driving of said hammers to correspond with the size of the mandrel.

2. In a bending press, a frame, a ram having a mandrel, the ram being slidably mounted in the frame, means for driving the ram, means mounted in the frame for forming stock around the mandrel, a plunger slidably mounted on the ram, a spring attached to the plunger and anchored to the frame for pressing the plunger toward the mandrel, and a stop mounted on the frame for holding the plunger away from the mandrel in the forward position of the ram.

3. In a bending press, a frame, a ram having a mandrel, the ram being slidably mounted in the frame, a plunger slidably mounted on the ram, means for positively withdrawing the ram, a spring attached to the plunger and anchored to the frame for pressing the plunger against the mandrel and also drawing the ram forwardly, a lever pivotally mounted on the ram and connected to the plunger, and a stop mounted on the frame and engaged by the lever so that the ram is advanced to the forward end of its stroke and the plunger held back away from the mandrel.

4. In a bending press, a frame, a ram slidably mounted in the frame, a pair of hammers cooperating with the ram and slidably mounted one at each side of the ram, a cam rotatably mounted in said frame for withdrawing the ram, slides mounted in the frame at each side of the cam and connected for reverse motion to each of the hammers, and lugs fixed on the sides of the cam for wedging between the inner ends of the slides to drive the hammers together and lugs adjustably mounted on said frame for predetermining the commencement of the driving of said hammers relative to the position of said ram and limiting the outward movement of the hammers to adapt the press for forming articles of different sizes.

5. In a bending press, a frame, a ram slidably mounted thereon comprising a mandrel, hammers slidably mounted on said frame on each side of said ram, a cam rotatively mounted in said frame for withdrawing the ram between the said hammers, slides mounted in said frame at each side of the cam and connected for reverse motion to each hammer, lugs fixed on the sides of the cam for wedging between the inner ends of the slides to drive said hammers inwardly, adjustable means mounted on the frame for limiting the outward movement of said hammers to adapt the same for forming stock on mandrels of different sizes, and means for predetermining the starting position of said ram relative to said hammers, for assuring the occurrence of the driving thereof immediately after the mandrel has passed therebetween.

6. In a bending press, a ram having a mandrel, a pair of hammers, one slidable at each side of the ram, means for limiting the retraction of the hammers for bending the stock around the mandrel after the mandrel is drawn between the hammers, said means being adjustable for predetermining the distance between said hammers to correspond with the size of the mandrel, and means for driving the hammers in behind the mandrel to form the stock around the same, said driving means being adapted to predetermine the commencement of the driving of said hammers to correspond with the size of the mandrel.

7. A bending press comprising a frame, a
ram mounted on said frame, a mandrel on
said ram, a hammer slidably mounted on said
frame, means for retracting said hammer
5 relative to said mandrels, a cam for recipro-
cating said ram, and driving mechanism op-
erable by said cam for driving said hammer
forwardly behind said mandrel, said driving
mechanism being positively connected with
10 said hammer and adapted to predetermine
the commencement of the driving of said
hammer to correspond with its starting po-
sition.

15 Signed at Chicago this 19th day of Janu-
ary, 1928.

MATHEW H. PAINE.

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