J. A. GOSSETT & J. C. HEWITT.

PIPE FORMING MACHINE.

APPLICATION FILED MAY 15, 1915.

1,184,947.

Patented May 30, 1916

5 SHEETS—SHEET 1.

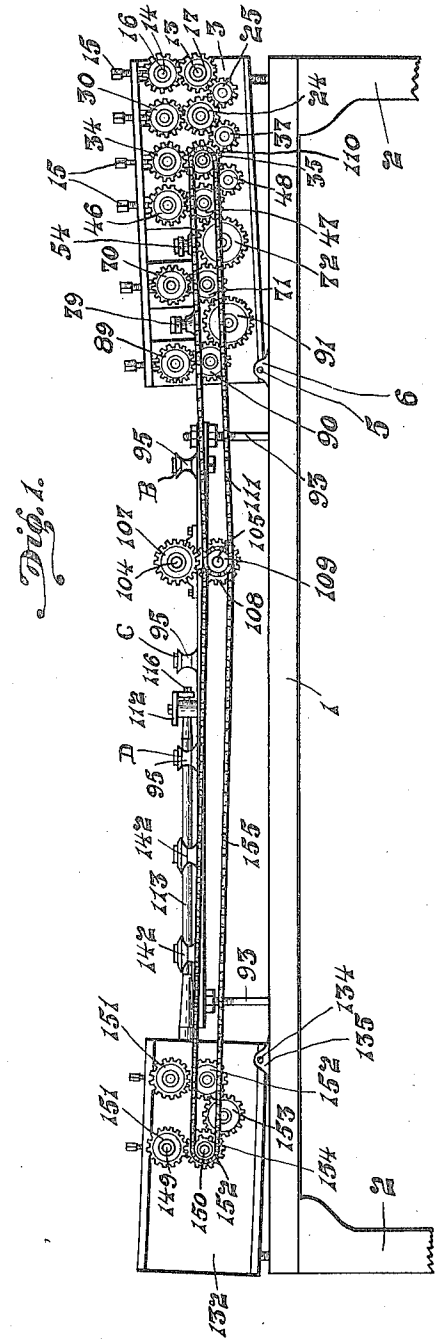


Fig. 1.

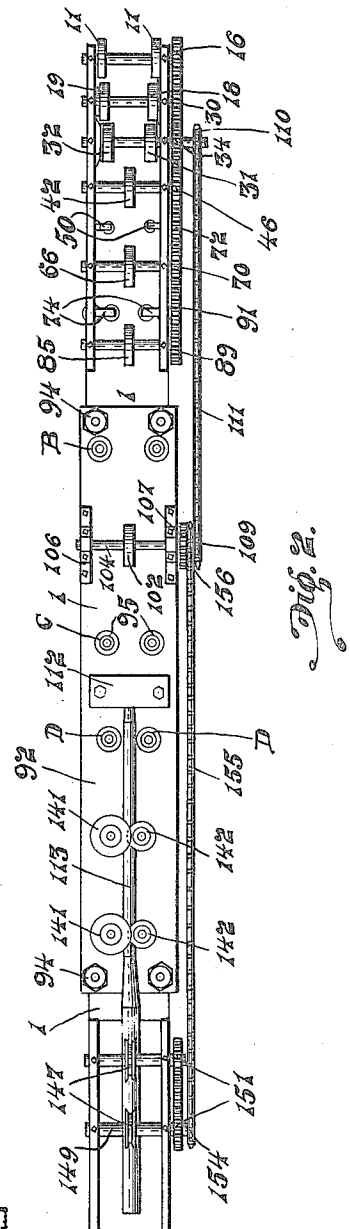


Fig. 2.

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By F. W. Bond
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5 SHEETS—SHEET 2.

Fig. 3.

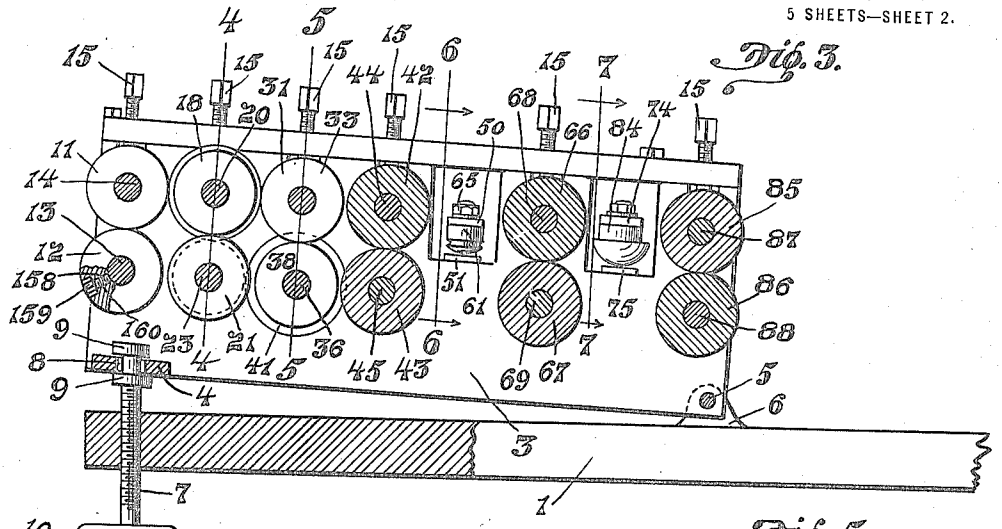


Fig. 4.

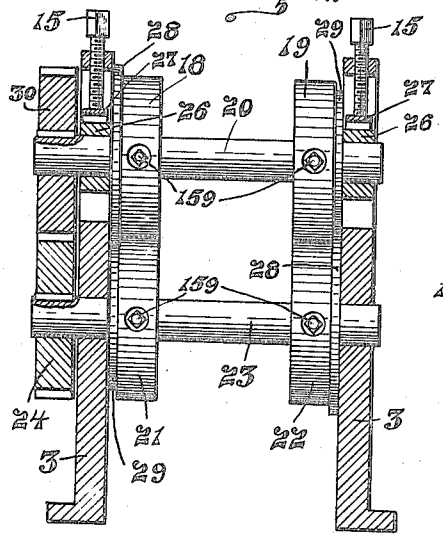
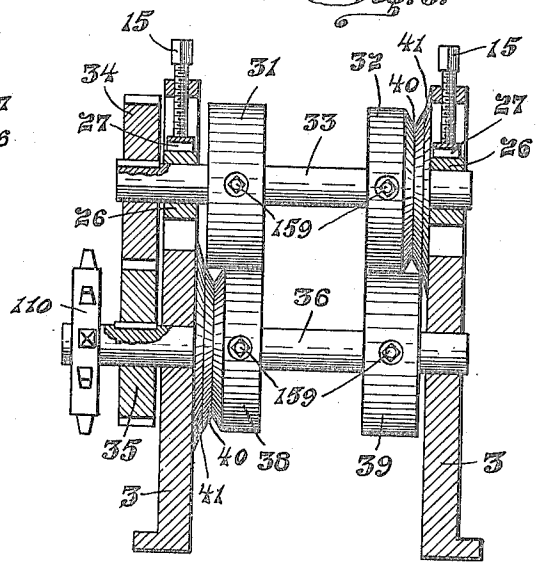
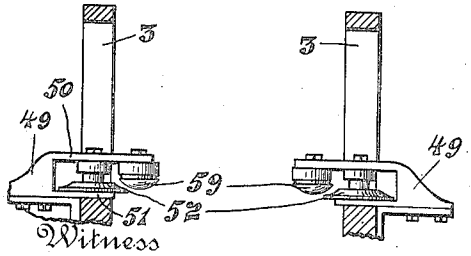


Fig. 5.





Witness

Robert Kaucher.

Fig. 6.

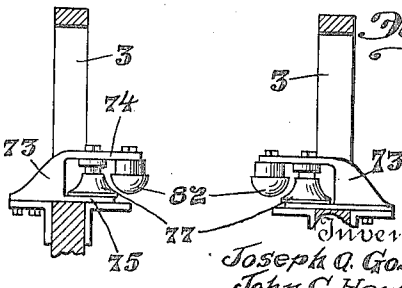


Fig. 7.

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5 SHEETS—SHEET 3.

Fig. 8.

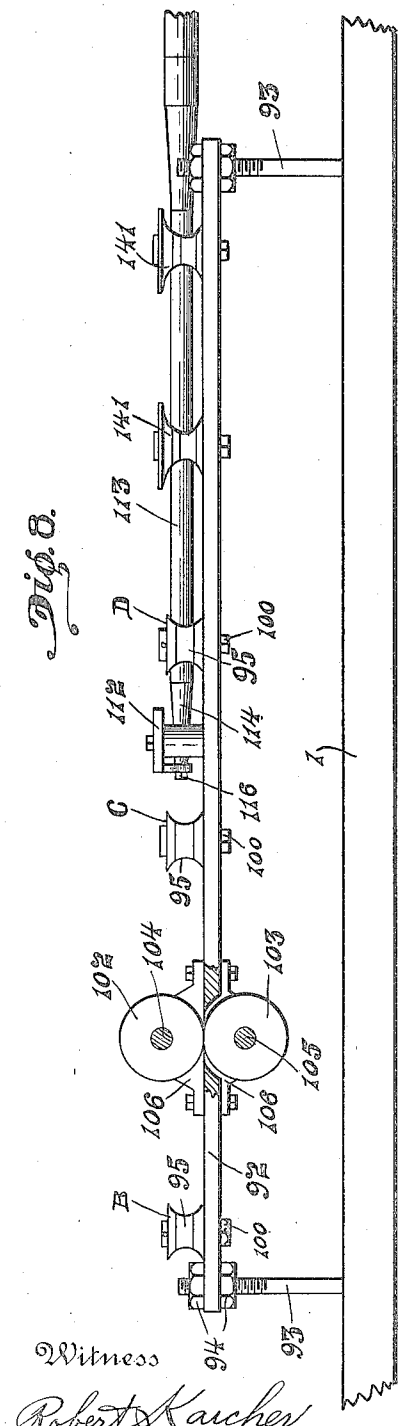


Fig. 9.

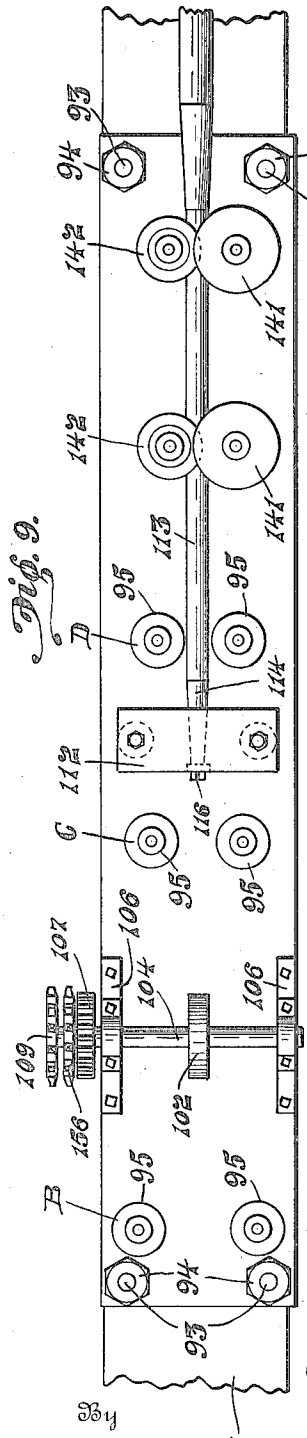


Fig. 10.

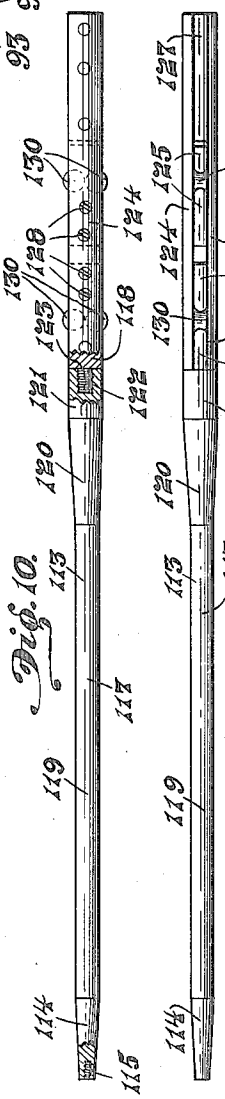
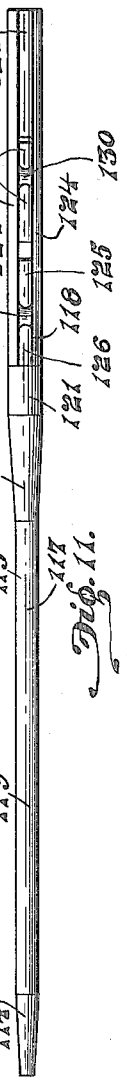


Fig. 11.



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5 SHEETS—SHEET 4.

Fig. 15.

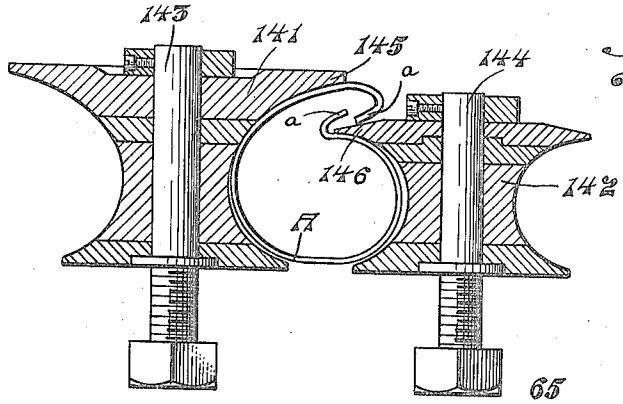


Fig. 12.

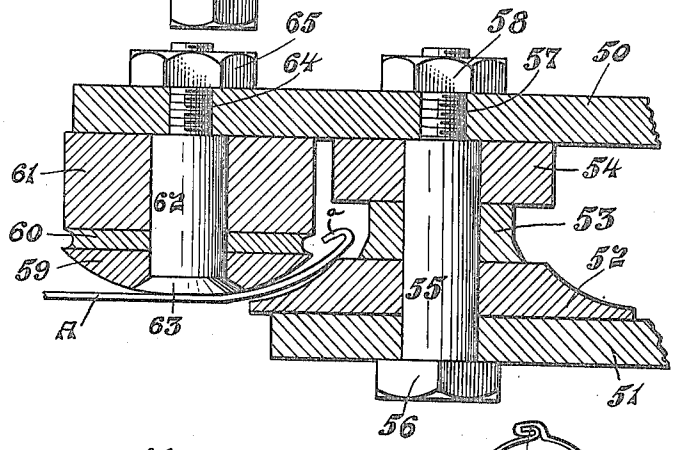


Fig. 14.

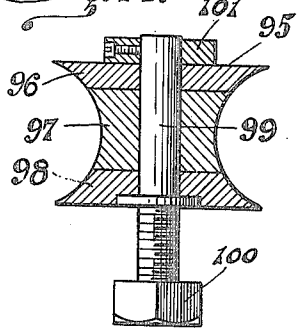
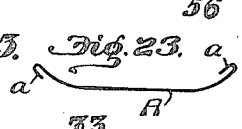


Fig. 13.

Fig. 23.



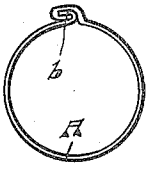


Fig. 28.

Fig. 21.

Fig. 22.

Fig. 24.

Fig. 27.

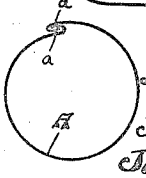


Fig. 26.

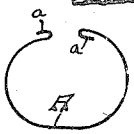


Fig. 25.

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PIPE FORMING MACHINE.

APPLICATION FILED MAY 15, 1915.

1,184,947.

Patented May 30, 1916.

5 SHEETS—SHEET 5.

Fig. 16.

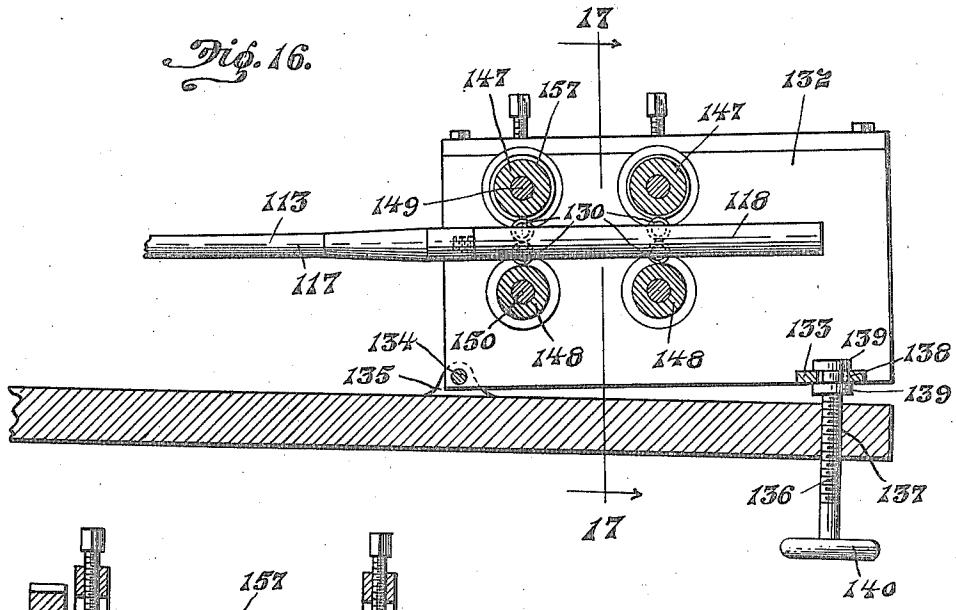


Fig. 17.

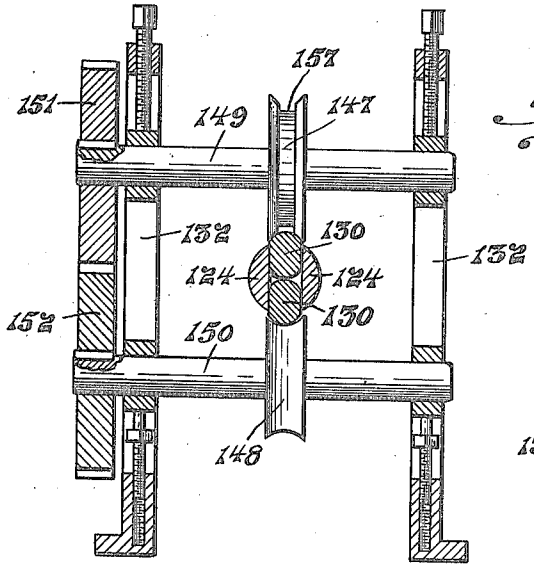


Fig. 19.

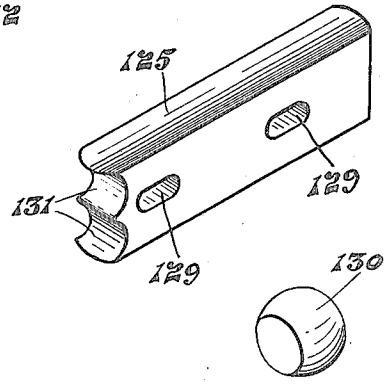


Fig. 18.

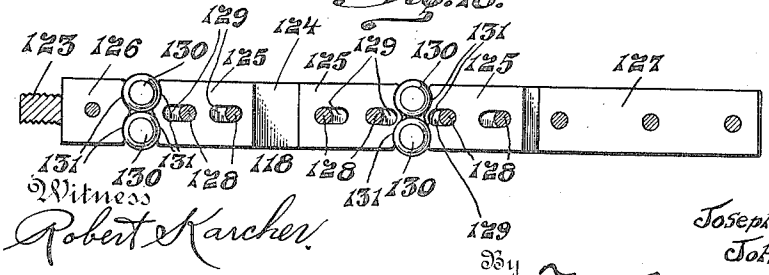


Fig. 20.

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UNITED STATES PATENT OFFICE.

JOSEPH A. GOSSETT AND JOHN C. HEWITT, OF CANTON, OHIO, ASSIGNORS TO THE CANTON FOUNDRY AND MACHINE COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO.

PIPE-FORMING MACHINE.

1,184,947. Specification of Letters Patent. Patented May 30, 1916.

Application filed May 15, 1915. Serial No. 28,248.

To all whom it may concern:

Be it known that we, JOSEPH A. GOSSETT and JOHN C. HEWITT, both citizens of the United States, both residing at Canton, in the county of Stark and State of Ohio, have invented a new and useful Pipe-Forming Machine, of which the following is a specification.

This invention relates to improvements in pipe forming machines and has more especial reference to a machine of this character in which a sheet of metal is shaped upon an arbor by means of forming rolls.

The object of our invention is to provide pipe forming machines in which sheets of metal are first passed through edging rolls which form lips along opposite edges of the metal, said sheets being then passed between forming rolls where they are formed over an arbor, the lips upon the opposite edges of the sheets being interlocked and seaming rolls being provided for the purpose of forming a snug joint at the point where the lips interlock.

Another object is to provide a device of the character described, which comprises an edging device, a forming device and a seaming device, each of these devices being separately adjustable with relation to the remaining portions of the machine in order to take care of the stretch in the edges of the stock.

A further object is to provide a device of this character in which are employed forming rolls which are formed in sections to prevent the sheet from binding between the rolls or from sliding against the rolls.

Another object is to provide a built up arbor of improved construction over which the pipe is adapted to be formed.

Another object is to provide an adjustable edger for different widths of sheets.

Another object is to provide spring tension upon the bearings of the several different rolls.

With these objects in view the invention consists in the novel construction and arrangement of parts, hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of construction may be made within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings: Figure 1 is a side elevation of a machine constructed in accordance with our invention. Fig. 2 is a top plan view of the same. Fig. 3 is a longitudinal sectional view on a larger scale through the edging mechanism. Fig. 4 is a section on an enlarged scale on line 4—4, Fig. 3. Fig. 5 is a sectional view on the line 5—5, Fig. 3. Fig. 6 is a similar view on the line 6—6, Fig. 3. Fig. 7 is a sectional view on the line 7—7, Fig. 3. Fig. 8 is a side elevation of the forming mechanism. Fig. 9 is a top plan view of the same. Fig. 10 is a side elevation of the arbor used in the forming mechanism, parts being broken away for the purpose of illustration. Fig. 11 is a top plan view of the same. Fig. 12 is a section through a pair of the first set of forming rolls carried in the edger. Fig. 13 is a sectional view of the second set of forming rolls carried in the edger. Fig. 14 is a sectional view of one of the forming rolls upon the former. Fig. 15 is a sectional view of a pair of the forming rolls carried by the former which interlock the lips of the opposite edges of the sheets. Fig. 16 is a longitudinal sectional view through the edger. Fig. 17 is a section on the line 17—17, Fig. 16. Fig. 18 is a detail view of a portion of the arbor parts being broken away for the purpose of illustration. Fig. 19 is a detail perspective view of one of the roller retainer blocks in the arbor. Fig. 20 is a detail perspective view of one of the rollers. Fig. 21 is a transverse sectional view through a sheet after it has passed through the edging rolls. Fig. 22 is a similar view after the sheet has passed through the lip forming rolls. Fig. 23 is a similar view after a sheet has passed through the first set of initial bending rolls. Fig. 24 is a similar view after the sheet has passed through the second set of initial bending rolls. Figs. 25 and 26 show different stages of the formation of the sheet as it passes through the former. Fig. 27 is a similar view showing the pipe after the lips have been interlocked. Fig. 28 is a similar view after the pipe has passed through the seaming rolls.

Similar numerals of reference indicate

corresponding parts throughout the several figures of the drawings:

The machine comprises a bed-plate 1 supported by suitable standards 2 and supports the mechanism which comprises three separate units, viz: the edger, the former and the seamer, which devices receive the stock in the order above named and in one continuous operation form lips along the opposite edges of the stock, shape the stock into cylindrical form interlocking the lips on the opposite edges and form a tight seam along the edge where the lips are interlocked.

The edger comprises a pair of side frames 3 which are tied together by means of the bar 4 and the shafts upon which the several rolls, provided in the edger are mounted. The edger is hinged at its forward extremity to the bed-plate, preferably by means of a shaft 5 which ties the two side plates 3 together, and is pivoted within suitable ears 6 formed upon the bed plate.

In forming sheet metal pipe there is a tendency for the edges of the stock to stretch thus forming curvatures in the finished pipe due to the edges of the stock being stretched longitudinally while the central portion of the stock remains unstretched, and in order to overcome this difficulty we provide independent adjustment for the edger, the former and the seamer as the stretch of the edges will vary in different widths of stock.

The edger is arranged to be adjusted by means of an adjusting screw 7 which has screw threaded relation to the bed-plate 1, the upper extremity of the screw being loosely mounted within an aperture 8 provided in the tie bar 4, spaced collars 9 being provided above and below the tie-bar and a hand wheel 10 being located at the lower extremity of the adjusting screw. By rotating the adjusting screw the rear extremity of the edger may be raised or lowered as desired, the edger being rocked upon the shaft 5, changing the angle at which the sheets are passed through the several rolls in the edger.

Located at the rear of the edger are the upper and lower feed rolls 11 and 12 respectively, the lower rolls being mounted upon a shaft 13 journaled in the side frames and the upper rolls being mounted upon the shaft 14 journaled in sliding bearings of the usual construction which are adjusted by the usual adjusting screws 15. Pinions 16 and 17 are mounted upon the upper and lower shafts respectively, said pinions being arranged to mesh with each other.

The edging rolls are mounted adjacent the feed rolls above described and in a position to receive the stock as it passes from the feed rolls. The edging rolls comprise the upper rolls 18 and 19 mounted upon the shaft 20 and the lower rolls 21 and 22 mounted upon the shaft 23. The shaft 23 is journaled in the side frames 3 and is provided upon one extremity with the pinion 24 meshing with the idler 25, which idler also meshes with the pinion 17. The upper shaft 20, is journaled in sliding bearings 26 which are adjusted by means of adjusting screws 15, springs of other suitable resilient members 27 being interposed between the screws and bearings for the purpose of allowing for any variation in the thickness of the stock due to defects in the galvanizing of the sheets. The upper roll 18 and lower roll 22 are each provided upon their outer sides with a peripheral flange 28, said flanges registering with the reduced portions 29 upon the lower and upper rolls 21 and 19 respectively, being arranged to turn the opposite longitudinal edges of the sheet A in opposite directions as indicated at *a* in Fig. 21. The upper shaft 20 is provided with the pinion 30 which meshes with the pinion 24.

The lip forming rolls are located adjacent the edging rolls and in a position to receive the stock from the edging rolls. The upper lip forming rolls 31 and 32 are mounted on the shaft 33 which is journaled in sliding bearings 26 of the usual construction, said bearings being adjustable by means of adjusting screws 15, the springs 27 being provided in the bearings as above described. A pinion 34, mounted upon the shaft 33 meshes with the pinion 35 mounted upon the shaft 36, an idler 37 connecting said pinion 35 to the pinion 24. The lower lip forming rolls 38 and 39 are mounted upon the shaft 36 and coöperate with the upper rolls 31 and 32 respectively. The rolls 31 and 39 are plain and the rolls 32 and 38 are each provided with a V-shaped annular groove 40 and a frusto-conical annular flange 41. As the stock designated by the numeral A passes through the lip forming rolls the flanges *a* along the edges of the stock are bent back as shown in Fig. 22 thus forming oppositely disposed lips which are adapted to be interlocked as will be hereinafter described.

A pair of feed rolls 42 and 43 are preferably located between the lip forming rolls and the first set of forming or shaping rolls, said feed rolls being mounted on the shafts 44 and 45 respectively, the lower shaft being journaled in the side frames and the upper shaft mounted in the usual sliding bearings. Pinions 46 and 47 are mounted upon the shafts 44 and 45 respectively, the pinion 47 meshing with an idler 48 which also meshes with the pinion 35.

The first set of initial bending rolls carried in the edger is mounted beyond the feed rolls just described and comprises two pairs of rolls, one pair mounted in each side frame. As each pair of these rolls is alike with the exception that they are lefts and

rights, it is only thought necessary to describe one pair in detail. In Fig. 12 of the drawings one pair of the rolls is shown together with a portion of the bracket upon which they are mounted. The bracket 49 is bifurcated and comprises the upper relatively long arm 50 and the lower arm 51. Each pair of these rolls comprises a convex roll and a concave roll, the convex roll of each pair being mounted nearest the longitudinal center of the edger. The concave roll comprises the lower concave portion 52, the central restricted portion 53 and the upper enlarged portion 54, each of said parts being independently rotatable upon the shaft 55, which is carried between the upper and lower arms 50 and 51 of the bracket 49. The shaft 55 is preferably in the form of a bolt having a head 56 at its lower end, the upper extremity being reduced and screw threaded at 57 and a nut 58 being provided thereon. The convex roll comprises the lower convex section 59, the central annularly grooved section 60 and the upper cylindrical section 61, all of said parts being independently rotatable upon the shaft 62 which is preferably provided with a head 63 at its lower extremity and with a reduced screw threaded portion 64 at its upper extremity, said reduced portion being passed through a suitable aperture in the upper arm 50 of the bracket, a nut 65 being provided for retaining said shaft upon the bracket. Each longitudinal edge of the stock A is passed between one pair of these rolls, said rolls curving the edges upward as shown in Fig. 23, the lips *a* upon the stock being accommodated between the annularly grooved section 60 of the convex roll and the restricted section 53 of the concave roll. These rolls as well as all of the forming rolls as will be hereinafter described are formed in sections, each section being rotatable independently of the other sections, in order to prevent the sheet from binding or sticking as it passes through the rolls, any portion of the roll which the sheet comes in contact with being caused to rotate with the movement of the sheet.

Located between the first and second sets of shaping or forming rolls in the edger is a pair of feed rolls 66 and 67 mounted upon shafts 68 and 69 respectively, the lower shaft 69 being journaled in the side frames in the usual manner and the upper shaft 68 journaled in the usual sliding bearings. A pinion 70 is mounted upon the upper shaft and a pinion 71 meshing therewith is mounted upon the lower shaft, said pinion 71 meshing with the idler 72 which also meshes with the pinion 47.

The second set of bending rolls is similar to the first set and is arranged to increase the curvature produced in the stock by the first set of bending rolls, shaping the stock as indicated in Fig. 24. These rolls the same as the first set of rolls are located in pairs carried by each of the side frames, each pair of rolls comprising a concave and a convex roll carried in a bracket 73 adjustably mounted upon the side frame, said bracket being bifurcated and provided with the relatively long arm 74 and the short arm 75. The shaft 76 upon which the concaved roll is mounted is of substantially the same construction as the shaft 55 as above described. The concaved roll comprises the concaved portions made up of sections 77 and 78, and the upper section 79 provided with the reduced portion 80, all of said sections being independently rotatable upon the shaft 76. The convexed roll is mounted upon a shaft 81 substantially the same as the shaft 62 and comprises the convex portion composed of the sections 82 and 83 and the upper reduced section 84, all of said sections being independently rotatable upon the shaft 81. As the stock passes through these rolls the longitudinal edges of the sheet are carried between the concave and convex portions of the rolls and shaped as shown in Fig. 24, the lips *a* upon each edge being accommodated between the reduced portions 80 and 84 of the concave and convex rolls respectively.

Upper and lower feed rolls 85 and 86 are mounted upon shafts 87 and 88 respectively, the upper shaft 87 being journaled in suitable sliding bearings of the usual construction and provided with a pinion 89, which meshes with the pinion 90 mounted upon the lower shaft 88, said pinion 90 also meshing with the idler 91, which engages the pinion 71.

The former comprises a table 92 which is mounted for vertical adjustment upon the posts 93, each of said posts being provided with a nut 94 above and below the table, a series of forming rolls and an arbor being mounted upon the table as will be hereinafter described. A series of concaved forming rolls, located in pairs, is mounted upon the table 92, each succeeding pair of rolls being placed closer together than the pair immediately preceding. As shown in the drawings, three pairs of rolls B, C and D are provided. Each of these forming rolls designated by the numeral 95 is made up of a plurality of sections such as indicated at 96, 97 and 98 illustrated in Fig. 14, each of said sections being independently rotatable upon the shaft 99, the lower extremity of which is screw threaded in order to receive the nut 100 for connecting the shaft to the table 92, the collar 101 being adjustably secured upon the upper extremity of the shaft for the purpose of retaining the roll thereon. For the purpose of assisting the movement of the stock forward through the former, a pair of feed rolls 102 and 103 are

mounted upon shafts 104 and 105, said shafts being journaled in suitable bearings 106 located upon the table 92. Pinions 107 and 108 are mounted upon the shafts 104 and 105 respectively and a sprocket wheel 109 is carried upon the shaft 105, said sprocket wheel being connected to the sprocket wheel 110 upon the shaft 36 by means of the chain 111, the feed rolls 102 and 103 being thus driven in unison with the rolls in the edger.

A bracket 112 is supported upon the table, preferably between the rolls C and D and supports an arbor 113 which extends forwardly along the longitudinal center of the former and into the seamer. The rear extremity of the arbor is tapered at 114 and provided with a screw threaded aperture 115, a screw 116 being used for the purpose of connecting the arbor to the bracket 112. The arbor is preferably formed in two sections 117 and 118, the section 117 comprising portion 114, the elongated cylindrical portion 119, and the frusto-conical portion 120, a short cylindrical portion 121 being located at the base of the frusto-conical portion 120 and provided with a screw threaded aperture 122, which receives the reduced screw threaded portion 123 of the section 118. The portion of the arbor designated by the numeral 118 is cylindrical and is made up of a plurality of plates connected together by screws, suitable rollers being contained between said plates for assisting the movement of the pipe through the seamer. The outer plates 124 are rounded upon their outer surfaces, their inner faces being flat and a series of roller retaining plates 125 and the end plates 126 and 127 are interposed between said outer plates, all of said parts being firmly connected together by means of screws 128. The roller retaining plates 125 are provided with slots 129 through which the screws are passed for the purpose of adjusting said plates toward or away from the rollers and for the purpose of moving said plates back from the rollers in order to allow the rollers to be taken out or replaced. The rollers 130 are of the construction shown in Fig. 20 and the end portions of the plates 125 and 126 are concaved as indicated at 131 to conform to the surface of the rollers. The rollers are thus contained within the arbor forming a roller bearing over which the pipe passes as it moves through the seamer.

The seamer comprises the side frames 132 tied together by means of the tie bar 133 and the shaft 134, said shaft being pivotally mounted in ears 135 mounted upon the bed plate 1. An adjusting screw 136 is passed through a suitable aperture 137 in the bed plate and the upper portion thereof is rotatably mounted within an enlarged aperture 138 in the tie bar 133, the collars 139 being provided upon said adjusting screw above and below the tie bar and a suitable hand wheel 140 being provided at the lower extremity of said adjusting screw. By this construction the seamer may be adjusted in the same manner as the edger.

As the stock passes through the pair of forming rolls designated by the letter B it is shaped as shown in Fig. 25 and as it passes farther along the arbor through the rolls C and D it assumes the form shown in Fig. 26. A plurality of pairs of interlocking rolls 141 and 142 are provided at intervals upon each side of the cylindrical portion 119 of the arbor, each of said rolls being made in sections independently rotatable upon the shafts 143 and 144 respectively. The upper section of the roll 141 is provided with the peripheral flange 145 which extends over the peripheral flange 146 provided upon the upper section of the roll 142, said flange being for the purpose of bringing the lips *a* upon the opposite edges of the stock into the position shown in Fig. 15. As the stock is carried over the frusto-conical portion 120 of the arbor the stock is forced into cylindrical form, the lips *a* interlocking as shown in Fig. 27 of the drawings.

A plurality of upper and lower seaming rolls 147 and 148 respectively are proved at intervals above and below the seamer, the upper rolls being mounted upon shafts 149 carried in the usual sliding bearings, the lower rolls being mounted upon shafts 150 journaled in the side frames 132. Intermeshing pinions 151 and 152 are mounted upon the upper and lower shafts, respectively, the pinions 152 meshing with an idler 153. A sprocket wheel 154 is provided upon one of the lower shafts 150, said sprocket wheel being connected to a sprocket 156 upon the shaft 105 by means of a chain 155. The peripheries of the lower rolls 148 conform to the curvature of the pipe, each of the upper rolls 147 is provided with peripheral grooves 157 which form the seam *b* along the interlocking edge of the pipe as indicated in Fig. 28.

Each of the rolls employed in the machine is adjustably secured to its shaft by means of a screw 158 provided with a squared head 159, said screw being located through a screw threaded radial aperture 160, provided in the roll, the extremity of the screw bearing against the shaft. This feature is illustrated in Fig. 3 of the drawings. By this construction the rolls are readily adjustable laterally upon the shafts so that the machine may be quickly adjusted for manufacturing pipe of different sizes.

It will be understood that as the stock passes through the rolls in the edger there will be a tendency to stretch the edges of the stock more than the longitudinal center of the stock. It will also be understood that

there is a tendency of the pipe to stretch along the seam as it passes along the seaming rolls and if the edger and seamer were both located in alinement with the arbor the pipe formed therein would be stretched to a greater extent along the seam thus forming a curvature in the pipe.

It will also be understood that the stretch in the edges of the stock will be different in manufacturing different sizes of pipe, therefore, the edger and seamer are made adjustable for the purpose of changing the angle at which the stock is passed through the machine as is required in the manufacture of various sizes.

Although the drawings and above specification disclose the best mode in which we have contemplated embodying our invention we desire to be not limited to the details of such disclosure, for, in the further practical application of our invention, many changes in form and construction may be made, as circumstances require or experience suggests, without departing from the spirit of the invention, within the scope of the appended claims.

Each of the brackets 49 and 73 is mounted for adjustment toward or away from the longitudinal center of the device, this adjustment being secured by providing each of these brackets with a slot such as is indicated at 161 on the bracket 73, best shown in Fig. 13 of the drawings.

We claim:

1. A machine of the character described, comprising a bed plate supported upon suitable standards, an edging device hinged at its forward extremity upon the bed plate, edging rolls mounted in said edging device, means for adjusting said edging device, forming rolls mounted upon said bed plate adjacent said edging device, means for adjusting said forming rolls, a seaming device hinged at its rear extremity upon said bed plate beyond said forming rolls, seaming rolls carried in said seaming device, an arbor supported between said forming rolls and extending into said seaming device and means for adjusting said seaming device.

2. In a machine of the character described, the combination of a bed plate supported upon suitable standards, an edging device comprising side frames hinged at their forward extremities to the bed plate, feed rolls carried between said side frames, lip forming rolls carried between said side frames, initial bending rolls carried by said side frames and means for adjusting said side frames with reference to said bed plate, a table carried by said bed plate and located beyond said side frames, means for adjusting said table with relation to said bed plate, spaced pairs of forming rolls mounted at intervals upon said table, an arbor mounted upon said table, lip interlocking rolls mounted upon said table upon each side of said arbor, seaming rolls located adjacent said arbor and means for rotating said feed rolls, said lip forming rolls and said seaming rolls in unison.

3. In a machine of the character described, the combination of a bed plate supported upon suitable standards, an edging device comprising side frames, hinged at their forward extremities to the bed plate, feed rolls carried between said side frames, lip forming rolls carried between said side frames, initial bending rolls carried by said side frames and means for adjusting said side frames with reference to said bed plate, forming rolls carried by said bed plate beyond said edging device, an arbor carried by said bed plate, seaming rolls mounted adjacent said arbor and means for rotating said feed rolls, said lip forming rolls and said seaming rolls.

4. In a machine of the character described, the combination of a bed plate mounted upon suitable standards, an edging device comprising side frames tied together and hinged at one extremity to the bed plate, means for raising or lowering the other extremity of said side frames, feed rolls carried between said side frames, edging rolls carried between said side frames, lip forming rolls carried between said side frames, means for adjusting all of said rolls laterally within said side frames, initial bending rolls carried by said side frames, spaced pairs of forming rolls mounted at intervals upon said bed plate, an arbor mounted upon said bed plate between certain of said forming rolls, lip interlocking rolls mounted upon said bed plate upon each side of said table, seaming rolls located adjacent said arbor and means for rotating said feed rolls, said edging rolls, said lip forming rolls and said seaming rolls in unison.

5. In a machine of the character described, the combination of a suitable frame, feed rolls mounted upon said frame, lip forming rolls mounted upon said frame adjacent said feed rolls, forming rolls mounted at intervals upon said frame beyond said lip forming rolls, an arbor mounted upon said frame between certain of said forming rolls, said arbor comprising side plates, spaced blocks located between said side plates, the adjacent extremities of said blocks being provided with concavities, rollers contained between the concaved extremities of said blocks, means for connecting said side plates and blocks together, seaming rolls mounted in said frame adjacent said arbor and means for rotating said feed rolls, said lip forming rolls and said seaming rolls in unison.

6. A machine of the character described, comprising a bed plate, an edging device

adjustably mounted upon said bed plate, edging rolls mounted in said edging device, forming rolls mounted upon said bed plate, a seaming device adjustably mounted upon said bed plate, seaming rolls carried in said seaming device, and an arbor supported between said forming rolls and extending into said seaming device.

7. A machine of the character described, comprising an arbor, forming rolls mounted at each side of said arbor, an edging device located at an angle to said arbor, edging rolls mounted in said edging device, a seaming device located at an angle to said arbor, and seaming rolls mounted in said seaming device, said arbor extending between said seaming rolls.

8. In a machine of the character described, the combination of an arbor, said arbor comprising side plates, spaced blocks located between said side plates, said blocks provided with elongated slots, screws passed through said side plates and through the slots in said blocks, the adjacent extremities of said blocks being provided with concavities, rollers loosely mounted between the concaved extremities of said blocks, edging rolls mounted at one extremity of said arbor, forming rolls mounted at each side of said arbor and seaming rolls located above and below said arbor adjacent the rollers mounted in said arbor.

In testimony that we claim the above, we have hereunto subscribed our names in the presence of two witnesses.

JOSEPH A. GOSSETT.
JOHN C. HEWITT.

Witnesses:
ROBERT KARCHER,
J. H. BISHOP.