A. McKENZIE.

MACHINE FOR FORMING EAVES TROUGHS.

APPLICATION FILED JAN. 25, 1907.

901,637.

Patented Oct. 20, 1908.

3 SHEETS—SHEET 1.

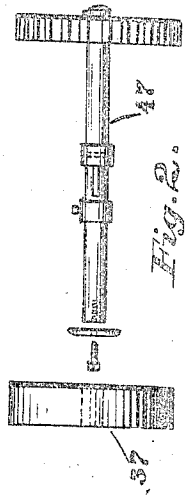

Fig. 2.

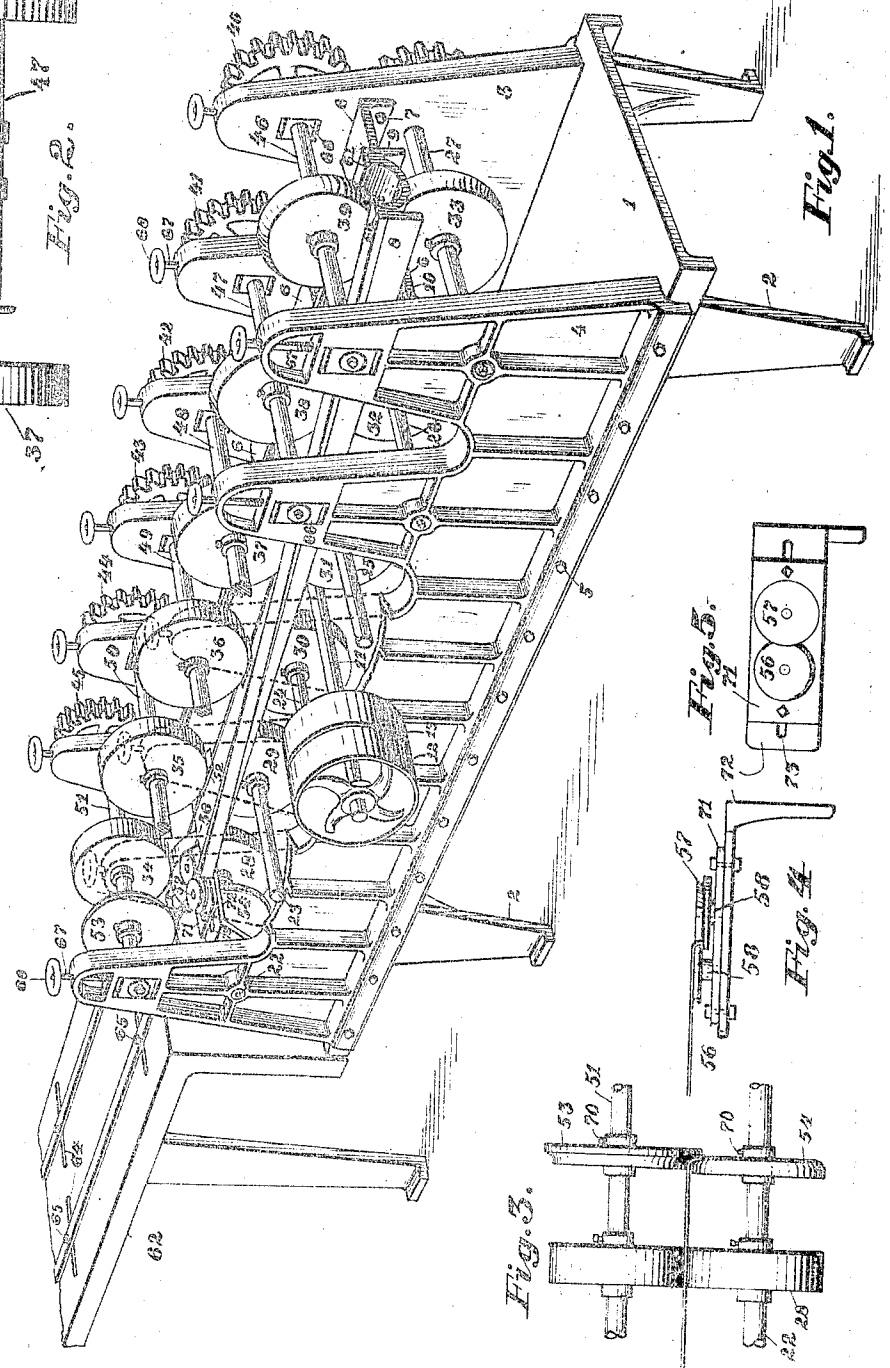

Fig. 1.

Fig. 5.

Fig. 4

Fig. 3.

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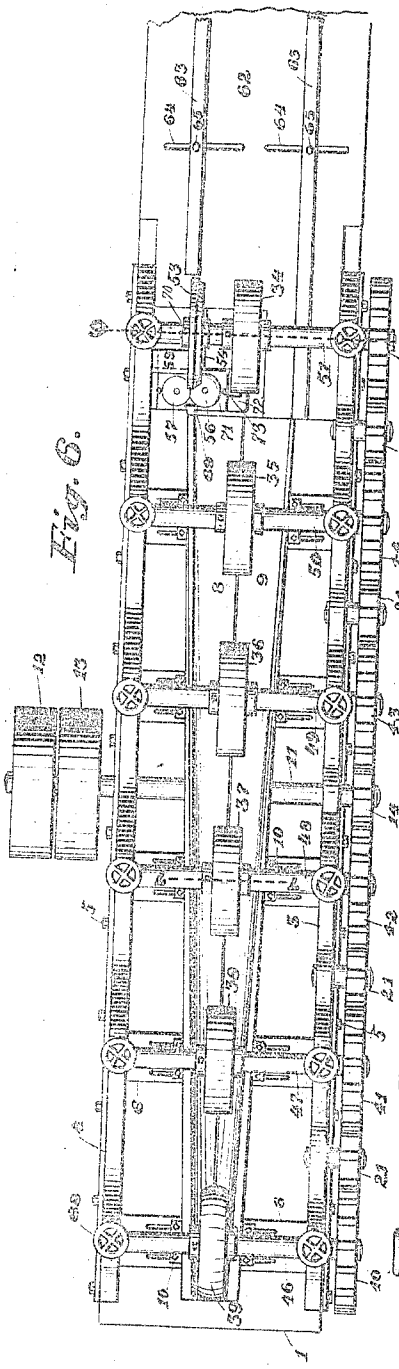

Fig. 6.

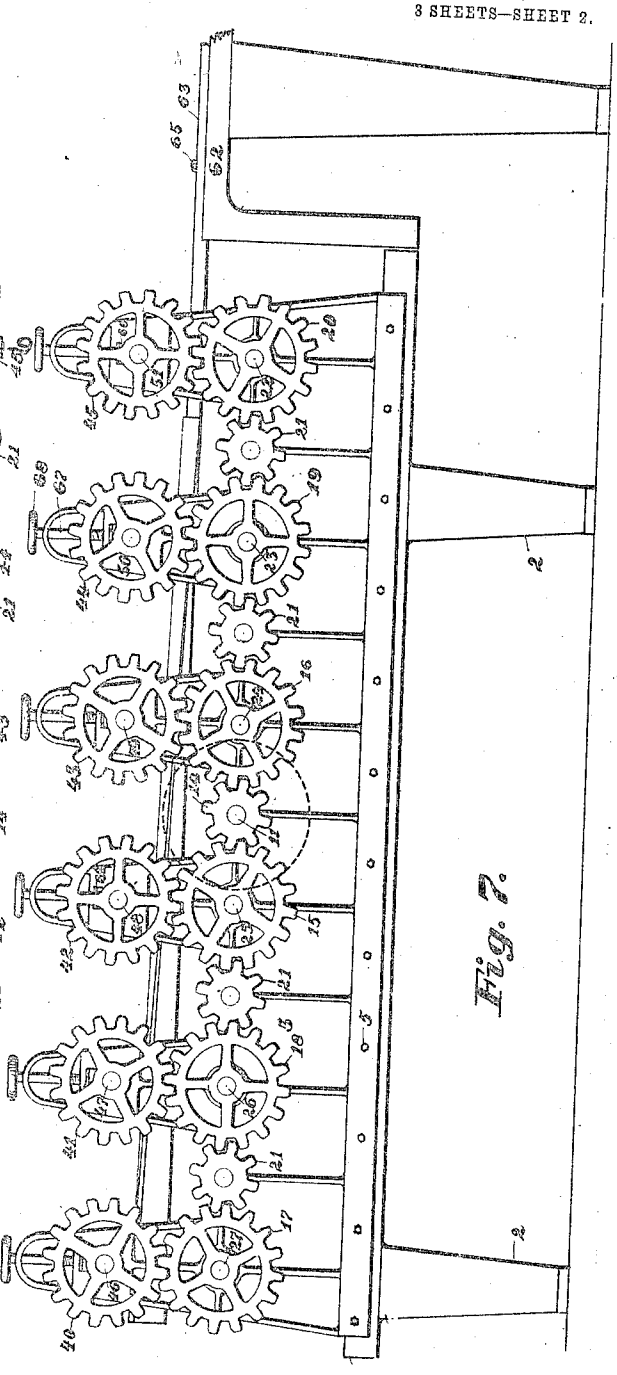

Fig. 7.

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3 SHEETS—SHEET 3.

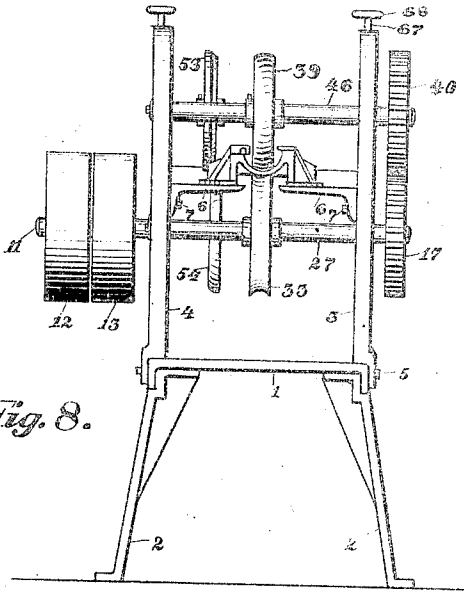

Fig. 8.

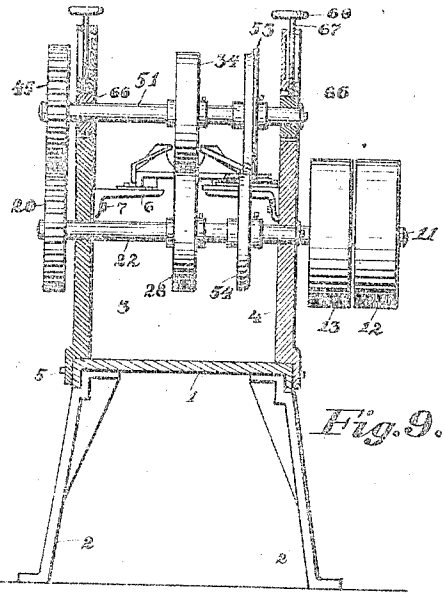

Fig. 9.

Fig. 10.

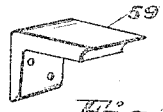

Fig. 18.

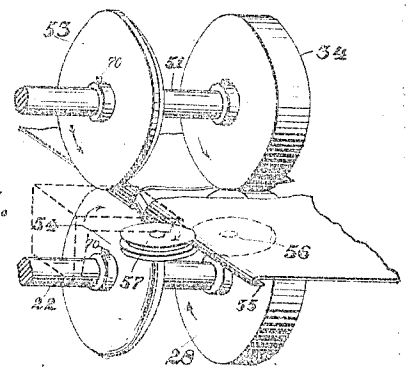

Fig. 11.

Fig. 12.

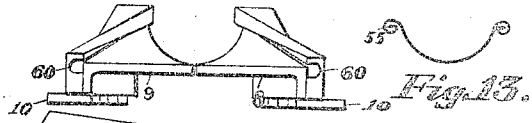

Fig. 13.

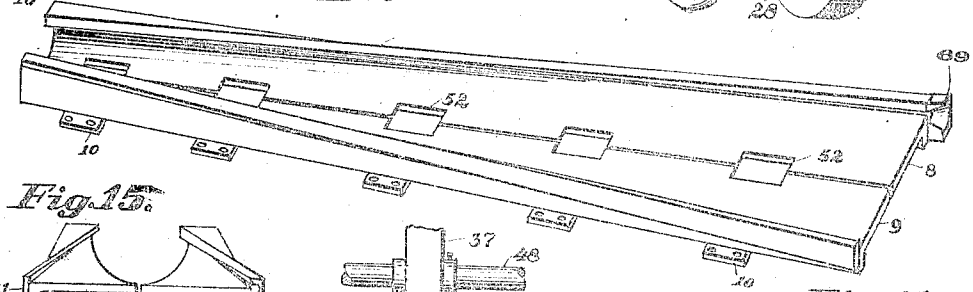

Fig. 15.

Fig. 14.

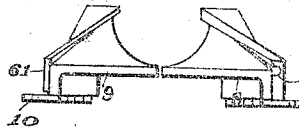

Fig. 16

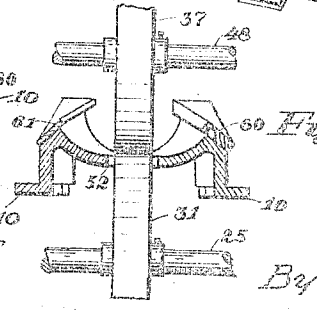

Fig. 17.

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UNITED STATES PATENT OFFICE.

ANGUS McKENZIE, OF CANTON, OHIO.

MACHINE FOR FORMING EAVES-TROUGHS.

No. 901,637. Specification of Letters Patent. Patented Oct. 20, 1908.

Application filed January 25, 1907. Serial No. 354,072.

To all whom it may concern:

Be it known that I, ANGUS McKENZIE, a subject of the King of Great Britain, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Machines for Forming Eaves-Troughs; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, and to the numerals and figures of reference marked thereon, in which—

Figure 1 is a perspective view showing the different parts of the machine properly arranged, and illustrating a portion of the feed-table. Fig. 2 is a detached view of one of the sheet moving shafts, its gear or propelling wheel, showing the feed roll detached. Fig. 3 is a view of the first set of shafts showing the sheet feeding wheels and the initial bending disks in proper relation and a sheet in position to be acted upon. Fig. 4 is a view of the lip forming disks showing them supported upon their bracket. Fig. 5 is a top view of the lip forming disks their plate and bracket. Fig. 6 is a top view showing a portion of the feed table. Fig. 7 is a side elevation showing the gear side of the machine. Fig. 8 is a view of the rear end of the machine. Fig. 9 is a vertical section on line 6—6, Fig. 6. Fig. 10 is a detached view of the sheet entering guide. Fig. 11 is a view of the first set of shafts and feed rolls, the initial and the lip forming disks, showing their relative position and illustrating their action upon a sheet. Fig. 12 is an end view of the trough forming or bending bars adapted to form beads upon each side of the trough. Fig. 13 is an end view of a finished trough. Fig. 14 is a perspective view of the trough forming bars. Fig. 15 is an end view of the trough forming bars designed to form a bead upon one side or edge of the trough. Fig. 16 is an end view of the finished trough. Fig. 17 is a sectional view of the trough forming bars taken on line 7—7, Fig. 6. Fig. 18 is a detached view of the guide plate designed to guide and hold the sheet between the initial bending and lip forming disks.

The present invention has relation to machines for forming eaves-trough, and it consists in the novel arrangement hereinafter described and particularly pointed out in the claims.

Similar numerals of reference indicate corresponding parts in all the figures of the drawing.

In the accompanying drawing, 1 represents the bed-plate, which is preferably supported in proper elevation by means of the supports 2. To the bed-plate 1 are attached or formed integral therewith the side housings 3 and 4. In the drawings I have illustrated the housings formed separate from the bed-plate 1 and attached thereto by suitable bolts 5, but this is mechanical as the only object designed to be accomplished is to securely connect the side housings 3 and 4 to the bed plate which may be done in any convenient and well known manner. To the housings 3 and 4 are securely attached the brackets 6 by the bolts 7 or their equivalents. said brackets being for the purpose of providing supports for the trough forming bars 8 and 9 to which brackets said trough forming bars are connected by means of the tie-plates 10. The trough forming bars 8 and 9 are substantially of the form shown and are best illustrated in Fig. 14, and as illustrated the bars, at their forward ends are provided with the straight or substantially straight or plain faced tops and the tops of said bars gradually curved, said gradually curved faces being for the purpose of giving to the sheet the desired and finished form of an eaves-trough during the time and while the plain sheet from which the eaves-trough is formed passes or moves endwise over and upon the forming bars. The sheets being fed or moved upon, over and through the bars as hereinafter described.

For the purpose of convenience in placing the bars 8 and 9 in proper relative position with reference to the adjacent parts of the machine, I prefer to form the bars in two separate parts but I do not desire to be confined nor to limit myself in this respect owing to the fact that the same object and purposes so far as the formation of eaves-trough is concerned can be carried out with a single bar or former, but when a single bar or former is used it necessitates the dismantling a portion of the machine in case it is decided to employ different sized formers. It is well understood that it is necessary to provide means for the formation of various sized eaves-trough, and by dividing the former or using two parallel bars or formers they can be removed from time to time and different sizes placed in position without the

necessity of dismantling the machine. Another advantage in dividing the former longitudinally is a slight adjustment between the bars or formers can be made by which adjustment the bars can be set with proper accuracy with reference to a given width of sheets from which a given size of trough is to be produced. In the housings 3 and 4 is properly journaled the power shaft 11, which power shaft is preferably provided with the tight and loose wheels 12 and 13, which are of the ordinary construction. Upon the power shaft 11 is securely mounted the gear wheel 14, which gear wheel meshes with the gear wheels 15 and 16. The gear wheel 14 by reason of its location will impart rotary motion to the gear wheels 15 and 16 in the same direction and in order that the lower train of gear wheels 17, 18, 19 and 20 may all rotate in the same direction the intermediate idlers 21 are provided. Upon the shafts 22, 23, 24, 25, 26 and 27 are securely mounted the lower train of feed wheels 28, 29, 30, 31, 32 and 33, and directly above the lower train of feed wheels is located the train of feed wheels 34, 35, 36, 37, 38 and 39, said upper and lower trains of feed wheels being for the purpose of moving and forcing the sheet from which a trough is formed over, upon and through the former.

It will be understood that in order to move the sheet it is necessary that the lower train of wheels all rotate in a given direction and the upper train of feed wheels rotate in the opposite direction and in order to provide for this opposite rotation of the upper and lower trains of feed wheels, the upper gear wheels 40, 41, 42, 43, 44 and 45 are provided, which gear wheels are securely mounted upon the shafts 46, 47, 48, 49, 50 and 51 and upon which shafts are mounted the upper feed wheels 34, 35, 36, 37, 38 and 39. It will be understood that in order that the sheets may be properly gripped the peripheries of the feed wheels should come in contact with the sheet of metal from which the eaves-trough is to be formed, and in order to provide for this gripping or contact upon the top and bottom sides of the sheet the peripheries of the lower train of feed wheels must be exposed for proper contact with the bottom or underside of the sheet and in order to provide for this the forming bars or the former are or is provided with openings 52, through which openings the upper portions of the lower train of gear wheels are passed.

For the purpose of giving to the sheet from which the eaves-trough is to be produced the desired trough form the forming bars 8 and 9 or the trough former is formed of considerable length and the forward portion thereof provided with substantially a straight or plain faced part or portion which is gradually curved toward the rear or delivery end of said former until the forming surface of the former or forming bars assume and is of the shape and size of the finished trough.

It will be understood that to change a straight or flat sheet of metal to the form of an eaves-trough it is of importance that the curve be formed gradually or by degrees to prevent the rupture of the metal or in other words to maintain the texture throughout the entire length of the trough and for this reason and at the same time better guiding and holding the sheet the formers should be of considerable length, but of course the length may be varied at will and the same object accomplished. In the formation of eaves-trough it is necessary to provide the trough with a bead either upon one or both of its edges and in order to give the sheet an initial bend or curve the disks 53 and 54 are provided, which disks are mounted upon the shafts 51 and 22 and their peripheries formed of such a shape that the proper initial bend will be imparted to the sheet.

For the purpose of forming the lip 55 upon the inner edge of a bead of an eaves-trough the horizontal forming disks 56 and 57 are provided, which forming disks are journaled upon the short studs 58 or securely mounted on said studs and the studs journaled in the adjustable plate. The peripheries of the disk 56 and 57 are formed of such a shape that as the sheet is moved endwise the lips 55 will be formed.

For the purpose of preventing the sheet from buckling or springing out of position and at the same time guiding the sheet so that its edge will properly enter between the disks 56 and 57 the guide plate 59 is provided, which guide plate is secured to the housing 4 in any convenient and well known manner and the inner or sheet contact end of the guide plate 59 curved to correspond substantially with the curvature given the sheet by the disks 53 and 54. After the sheet has passed the disks 56 and 57 the bead edge of the sheet or the edge of the sheet upon which the bead is to be formed passes into the bead forming groove 60, which bead forming groove is given a gradual curve or what might be more properly termed a twist surface, by which arrangement the bead is gradually formed in substantially the same manner that the body portion of the trough is formed; that is to say formed by degrees during the passage of the sheet over, upon and through the trough former proper. If it is desired to form a bead upon both edges of the trough then in that event a duplicate groove 60 is formed upon both sides of the eaves-trough former proper, but these grooves are duplicates only when two beads are to be formed.

It will be understood that there should be

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no lateral movement of the sheet during the time it is moved through the former, and in order to prevent any lateral movement of the sheet when but a single bead is to be formed one of the former bars or one side of the former as the case may be is provided with the guide flange 61, which guide flange is so located that it will hold a sheet so that that portion of the sheet from which the bead is formed will be held in proper relationship with the bead forming groove 60.

It will be understood that when beads are to be formed upon both sides of the finished trough the opposite groove 60 will act as a guide as against any lateral movement and of course the particular or single guide flange 61 is dispensed with and the second or bead forming groove takes its place. At the forward end of the machine proper is located the feed table 62, which feed table may be of any desired length, but should be of sufficient length to properly support and hold the sheet. The feed table 62 is provided with the adjustable guide bars or flanges 63, which guide flanges are adjusted upon the table so that their inner edges or faces will come in close contact with the longitudinal edges of the sheet from which an eaves trough is to be formed. I have illustrated the feed table provided with the slots 64, which slots provide a means for adjusting the guide bars 63 and when the guide bars are brought into proper adjustment they are held in fixed adjustment by means of the clamp bolt 65.

For the purpose of providing a means for adjusting the distance between the lower train of feed rolls and the upper train, the shafts upon which the upper train of feed rolls are mounted are journaled in adjustable bearings 66, which adjustment is made by the ordinary screw threaded shafts 67, which shafts are preferably provided with the hand wheels 68.

It will be understood that owing to the fact that the curvature of the trough former proper varies it must necessarily follow that the peripheries of the different sets of rolls must also vary in shape and curvature to correspond with the change of curvature of the former, so that the sheet of metal will be properly gripped at all points as it is fed or moved between the various sets of feed rolls. It is of importance that the sheet is properly entered in the former and in order to provide for the proper entering of each individual sheet the grooved guide block 69 is provided, which grooved guide block may be formed separate from the former or forming bar to which it is attached or it may be made integral therewith as the only object is to provide a suitable guide for the proper entering of the sheet, said guide being so arranged that it will adjust the entering end of the sheet and at the time it enters the former.

For the purpose of providing a means for adjusting the disks 53 and 54 to different widths of sheets they are slidably mounted upon the shafts and held in fixed adjustment by the set screws 70 or their equivalents. It is also necessary to provide adjustment for the lip forming disks 56 and 57 and in order to provide for this adjustment they are mounted upon the slidable plate 71, which plate is located upon the bracket 72 and said bracket provided with the slots 73. It will be understood that the manner of adjusting the various disks is mechanical and the means herein described for proper adjustment may be varied without departing from the nature of the invention.

For the purpose of providing means for adjusting the feed rolls so that they will come in proper position with reference to the former they are preferably slidably mounted upon the shafts, by which arrangement the proper adjustment can be made and so made that there will be no tendency of the sheet to move other than parallel with the former.

Having fully described my invention what I claim as new and desire to secure by Letters Patent, is—

1. In a sheet metal forming machine, a frame, a former provided with a bending surface, said surface having an increased degree of curvature between the ends of the former, a guide flange located at one side of the former, and the opposite side of the former provided with a bead forming groove, a series of upper and lower shafts, said upper and lower shafts provided with feed rolls, the peripheries of the lower feed rolls constituting a partial support for the sheet and the upper feed rolls adapted to press the sheet upon the peripheries of the lower feed rolls and means for rotating all of the feed rolls, substantially as and for the purpose specified.

2. In an eaves-trough forming machine, the combination of a frame, a trough former, initial sheet bending disks, lip forming disks adjustable laterally as to the former, said disks located in the path of the travel of a sheet, feed rolls adapted to grip the sheet, and means for rotating the feed rolls, substantially as and for the purpose specified.

3. In an eaves-trough forming machine, the combination of a frame, a trough former, initial sheet bending disks, lip forming disks located in the path of the travel of a sheet, a guide plate located between the initial bending disks and the lip forming disk, feed rolls adapted to grip and move the sheet and means for rotating the rolls, substantially as and for the purpose specified.

4. In an eaves-trough forming machine, a

suitable frame, a combined trough and bead former, a feed table provided with adjustable guide bars, a grooved guide flange adapted to guide a sheet upon the former, a sheet holding flange located upon the former, a series of feed rolls adapted to grip and move a sheet endwise, substantially as and for the purpose specified.

5. In an eaves-trough forming machine, the combination of a suitable frame, a trough and bead former held in fixed relationship with reference to the frame, initial bending disks lip forming disks adjustable laterally to the length of the former, and means for gripping and moving a sheet during the time between the entering and the delivering of a sheet to and from the former, substantially as and for the purpose specified.

6. In an eaves-trough forming machine, the combination of a suitable frame, an eaves trough former provided with a trough shaping surface having different degrees of curvature, a bead forming groove, a series of feed rolls adapted to grip a sheet, the former located in the path of the movement of the sheet, and means for rotating the feed rolls, substantially as and for the purpose specified.

7. In an eaves-trough forming machine, the combination of a frame, a trough former, initial sheet bending disks, lip-forming disks located in the path of the travel of the sheet, said lip-forming disks located at right angles to the initial bending disks, feed rolls adapted to grip the sheet, and means for rotating the feed rolls, substantially as and for the purpose specified.

8. In an eaves-trough forming machine, a frame, trough bending bars adjustable to and from each other, one of said bars provided with a bead forming groove, and the other bar provided with a guide flange, feed rolls adapted to grip a sheet, and means for rotating the feed rolls, substantially as and for the purpose specified.

9. In a sheet metal forming machine, a frame, a former consisting of bars with gradually increasing surfaces between their ends, a groove located at one side of the curved surfaces of one of the former bars, the surface of said groove having different degrees of curvature between its ends, and means for feeding the sheet of metal over, through and upon the former bars, substantially as and for the purpose specified.

In testimony that I claim the above, I have hereunto subscribed my name in the presence of two witnesses.

ANGUS McKENZIE.

Witnesses:
J. A. JEFFERS,
F. W. BOND.