W. J. PLECKER.

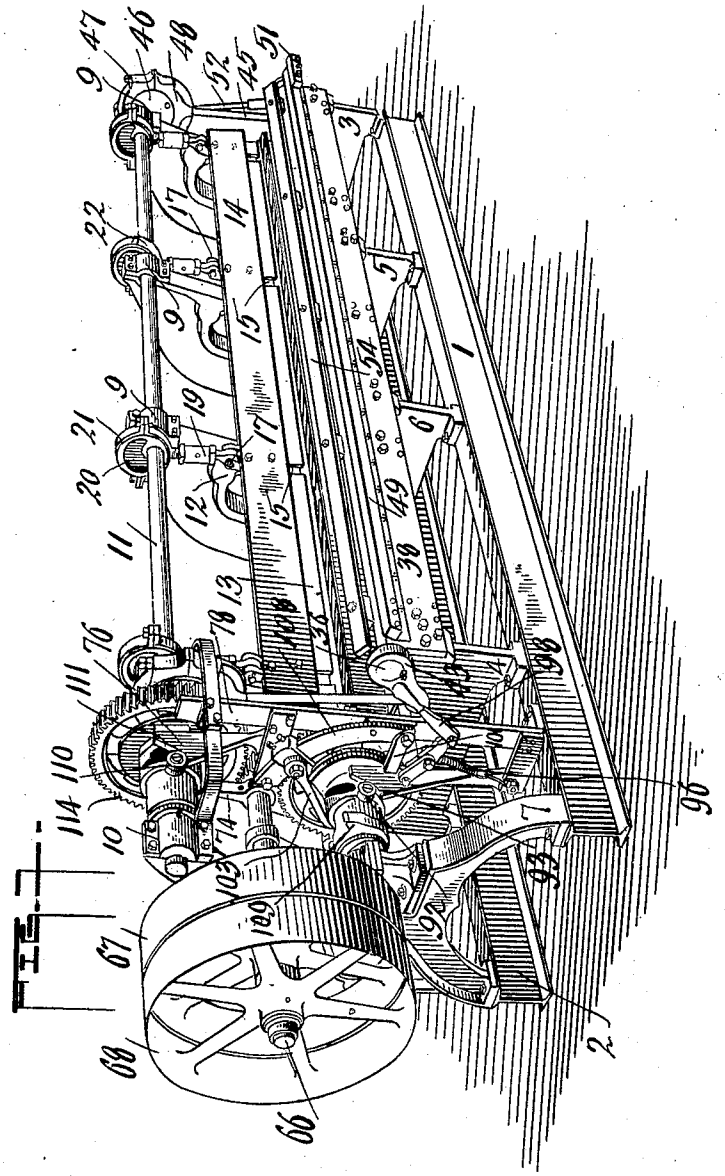
MACHINE FOR MAKING EAVES TROUGHS.

APPLICATION FILED JULY 20, 1906.

925,502.

Patented June 22, 1909.

8 SHEETS—SHEET 1.



Witnesses:-
S. V. Gibson.
J. Mc Anderson.

Inventor.
William J. Plecker,
By Chas. A. La Porte, Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

W. J. PLECKER.

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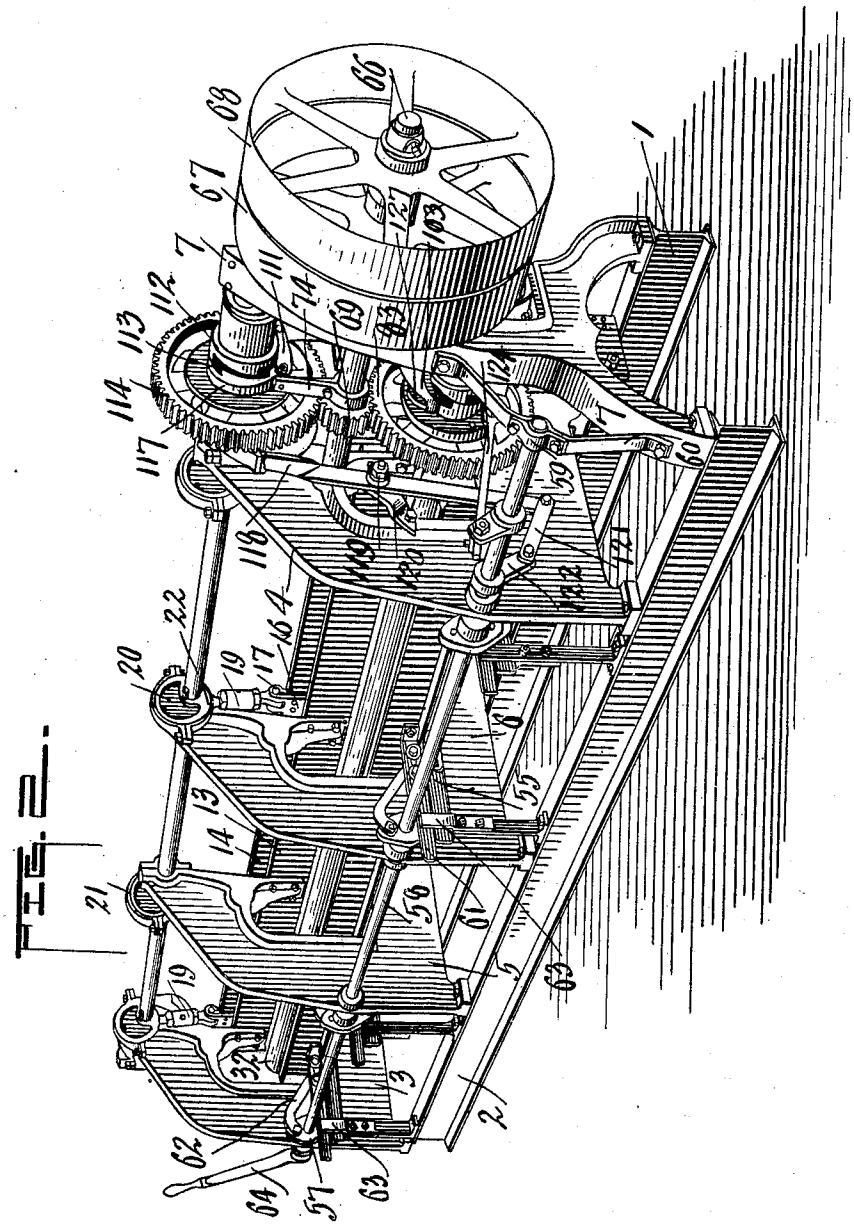


Fig. 2.

Witnesses:-
S. V. Gibson.
J. M. Anderson.

Inventor.
William J. Plecker.
By Chas. H. LaPorte Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

W. J. PLECKER.

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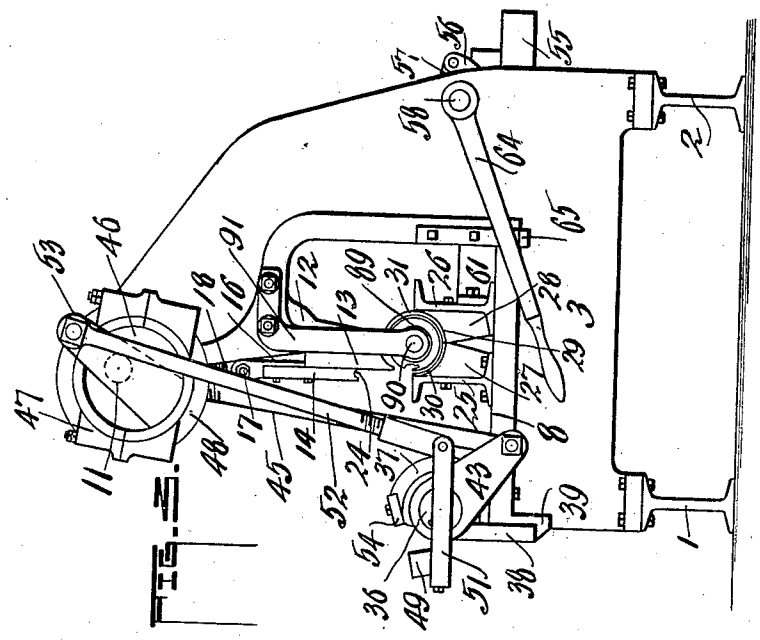


FIG. 3.

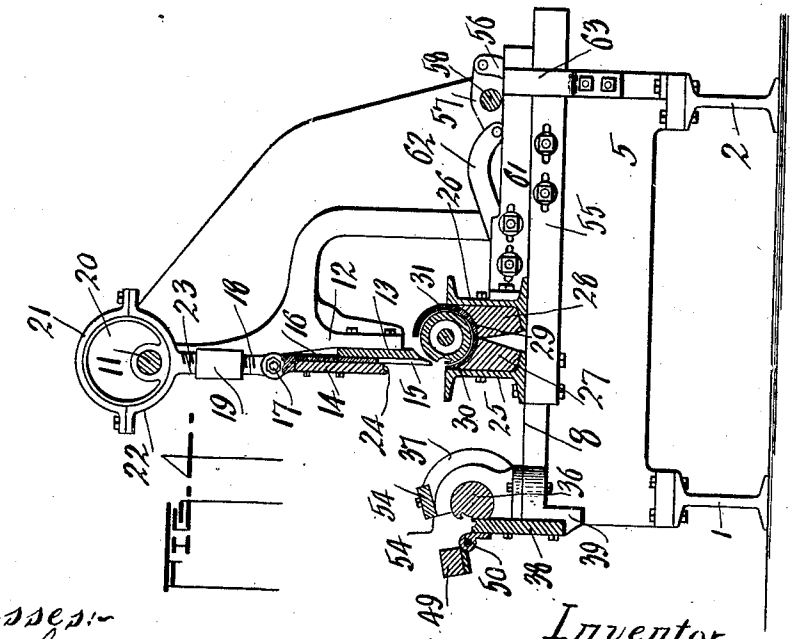


FIG. 4.

Witnesses:-
H. V. Gibson.
J. M. Anderson.

Inventor.
William J. Plecker,
By Chas. A. LaPorte Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

W. J. PLECKER.

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8 SHEETS—SHEET 4.

FIG. 5.

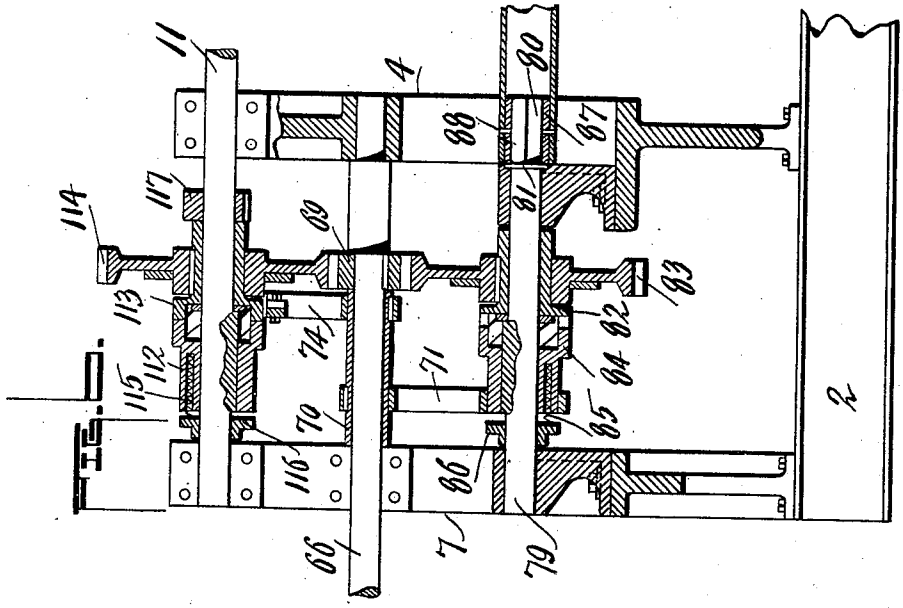
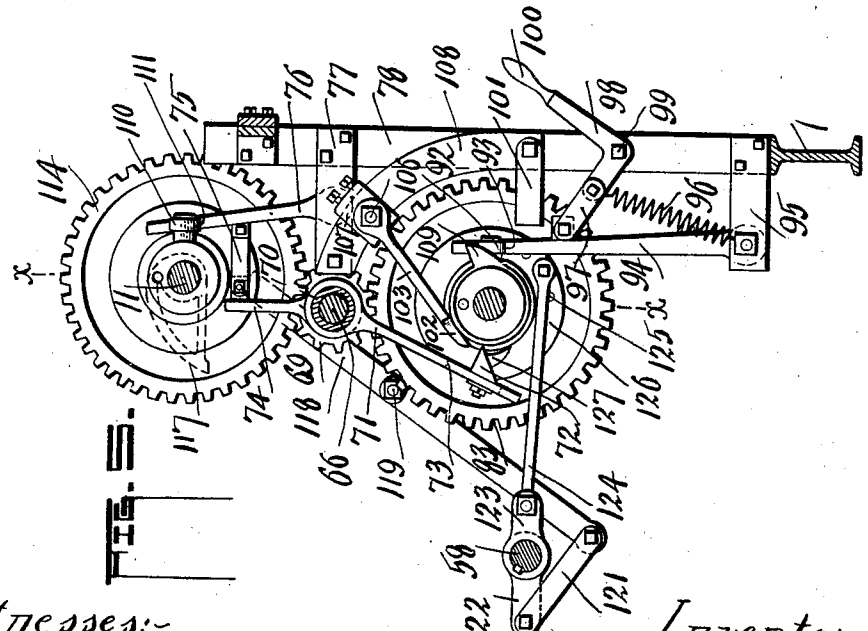


FIG. 5.



Witnesses:-

H. W. Gibson.

J. M. Anderson.

Inventor.

William J. Plecker,

By Chas. A. La Ponte, Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

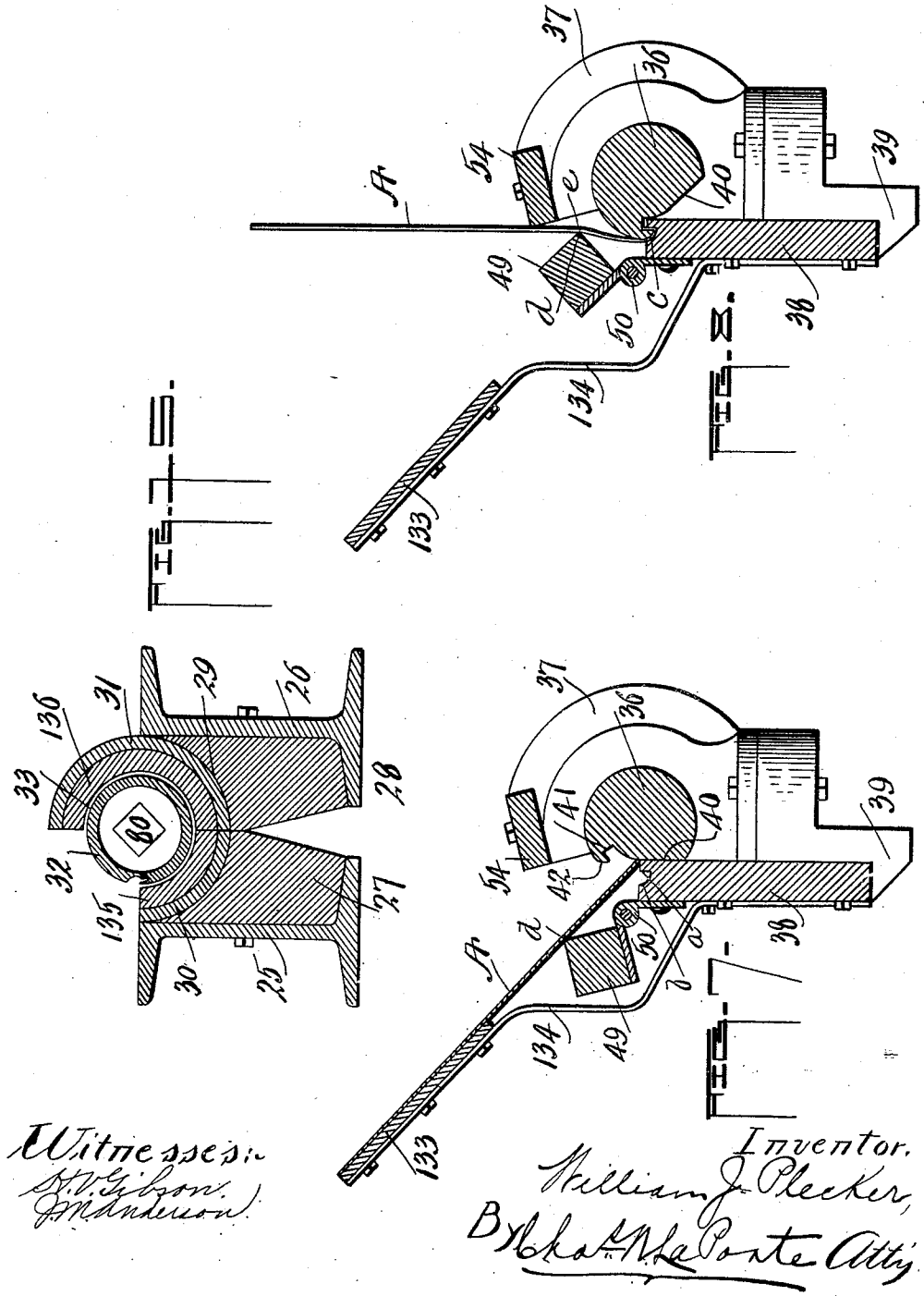
W. J. PLECKER.

MACHINE FOR MAKING EAVES TROUGHS.

APPLICATION FILED JULY 20, 1906.

925,502. Patented June 22, 1909.

8 SHEETS—SHEET 5.



Witnesses:
H. W. Gibson.
J. N. Anderson.

Inventor.
William J. Plecker,
By Hoh & N. La Porte Attys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

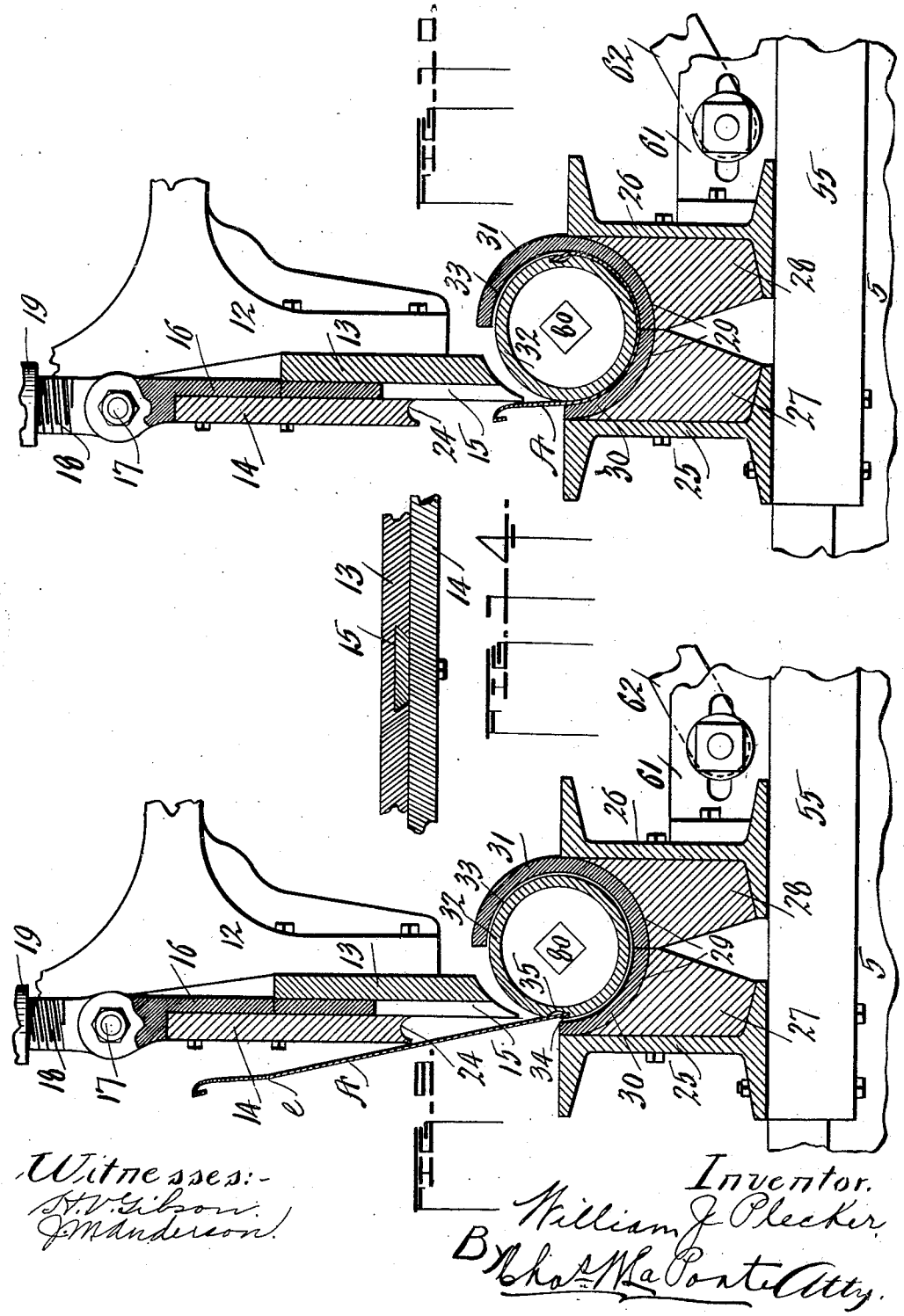
W. J. PLECKER.

MACHINE FOR MAKING EAVES TROUGHS.

APPLICATION FILED JULY 20, 1906.

925,502. Patented June 22, 1909.

8 SHEETS—SHEET 6.



Witnesses:-
H. V. Gibson.
J. Manderson.

Inventor.
William J. Plecker.
By Chas. A. LaPorte Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

W. J. PLECKER.

MACHINE FOR MAKING EAVES TROUGHS.

APPLICATION FILED JULY 20, 1906.

925,502.

Patented June 22, 1909.

8 SHEETS—SHEET 7.

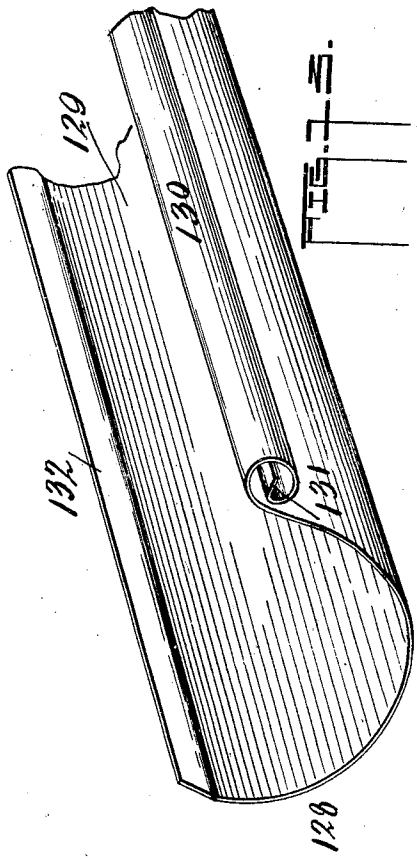


FIG. 7.

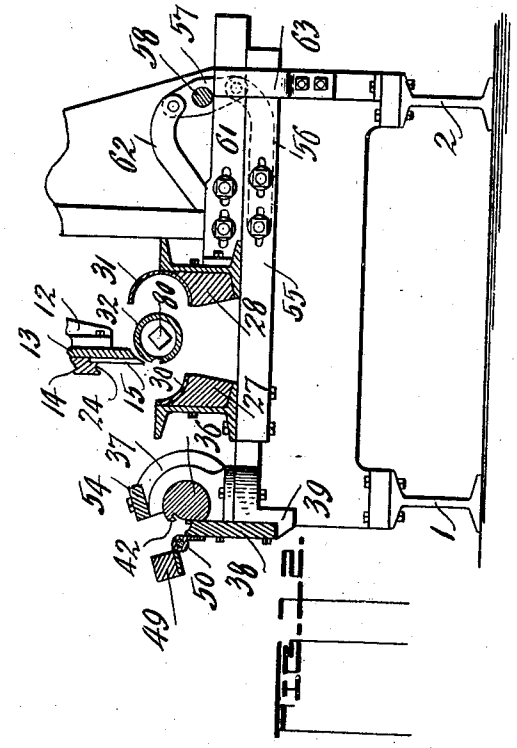


FIG. 12.

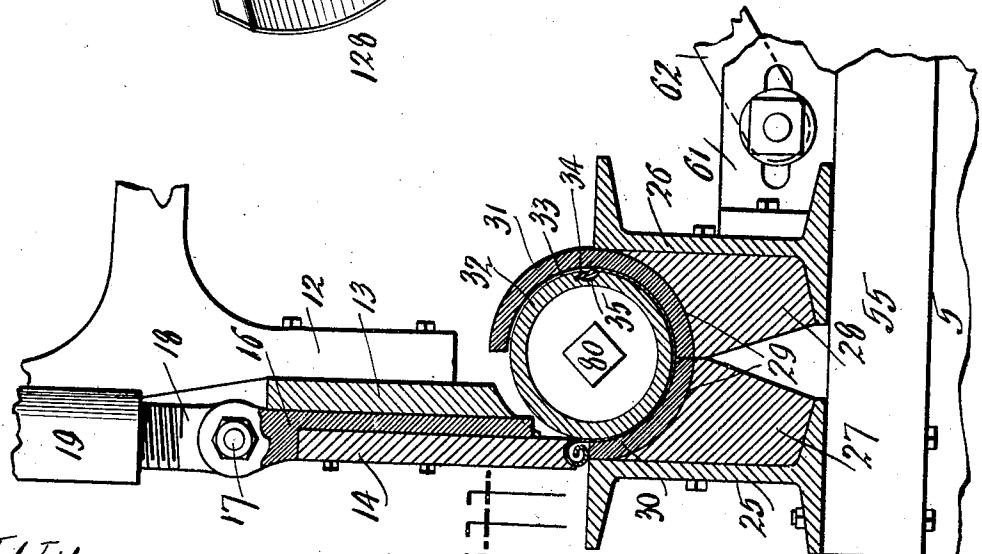


FIG. 11.

Witnesses:-
H. V. Gibson.
E. Anderson.

Inventor.
William J. Plecker,
By Chas. W. La Ponte Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

W. J. PLECKER.

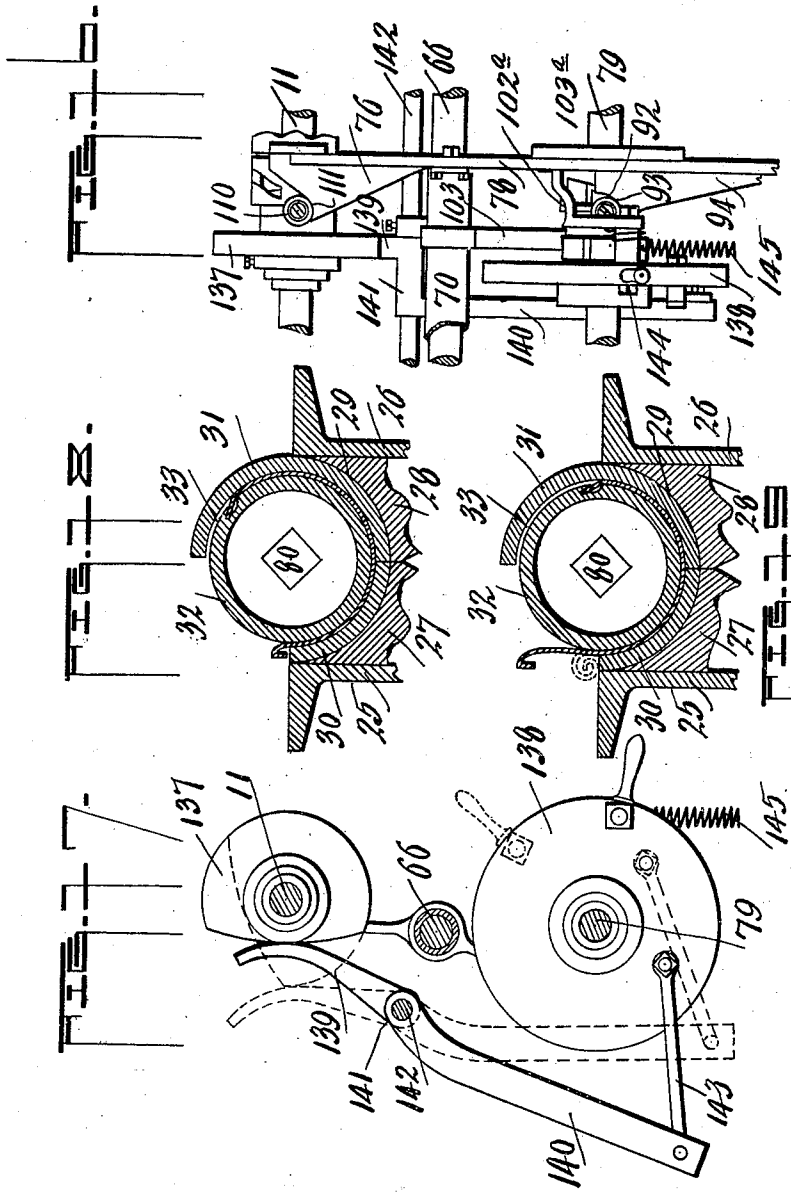
MACHINE FOR MAKING EAVES TROUGHS.

APPLICATION FILED JULY 30, 1906.

925,502.

Patented June 22, 1909.

8 SHEETS—SHEET 8.



Witnesses:-
H. V. Gibson.
J. M. Anderson.

Inventor.
William J. Plecker,
By Chas. N. La Ponte, Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM J. PLECKER, OF LOS ANGELES, CALIFORNIA.

MACHINE FOR MAKING EAVES-TROUGHS.

No. 925,502. Specification of Letters Patent. Patented June 22, 1909.

Application filed July 20, 1906. Serial No. 326,997.

To all whom it may concern:

Be it known that I, WILLIAM J. PLECKER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Machines for Making Eaves-Troughs; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for making eaves-troughs.

One of the objects of the present invention is the making of eaves-troughs without the use of the usual "nest" of forming rolls and the "bead-rod" into which one edge of a blank or trough is inserted, and through the rotation of such bead-rod is formed the bead of such trough.

The invention has for its further object a pair of die members adapted to act upon the longitudinal edge of the blank of an eaves-trough for forming a longitudinal lip along the said blank and a one quarter turn of a bead to be subsequently completed on the said blank.

A further object of the invention is a revoluble mandrel adapted to receive one edge of an eaves-trough blank, and being partially rotated, form a longitudinal gutter in the said blank; and reciprocally supported means for forming a bead along one edge of the said blank subsequent to the forming of the gutter therein.

A further object of the invention is a mandrel for forming a longitudinal gutter in an eaves-trough blank, and mechanism operating subsequent to the formation of said gutter for forming a longitudinal bead along one edge of the blank in which said gutter has been formed and for forming a longitudinal lip and a one quarter turn of a bead on an eaves-trough blank separate and distinct from the blank having the gutter formed therein as aforesaid.

A further object of the invention is means for forming a longitudinal lip and a one quarter turn of a bead on an eaves-trough blank; means for forming a gutter in the said blank; and means for engaging the one quarter turn aforesaid of said blank for completing the said bead subsequent to the formation of the gutter in the blank.

The invention has for its further object, means for bending a lip longitudinally along one edge of an eaves-trough blank; means for forming a longitudinal gutter in said blank; means for forming a longitudinal bead along the lip formed edge of the said blank, said lip and bead forming means adapted to be actuated simultaneously.

A further object of the invention consists in the provision of means for forming a lip and a one quarter turn of a bead longitudinally along one edge of an eaves-trough blank; means for subsequently forming a gutter longitudinally in the said blank and mechanism operating after the formation of said gutter for completing the bead a portion of which was made at the time the lip was formed; said mechanism operating simultaneously with the lip forming means which is actuated for forming a lip and a portion of a bead prior and subsequent to the operation of the means for forming the gutter, which operation facilitates in preparing an eaves-trough blank for the formation of the gutter and bead thereon alternately with the formation of such gutter.

The invention consists essentially of a pair of die-members, one of which is movable, the same adapted to engage with one edge of an eaves-trough blank for forming a lip and a one quarter turn of a bead thereon; of a revoluble mandrel adapted to have an intermittent rotation and provided to engage the edge of an eaves-trough blank opposite to that provided with the aforementioned lip and one quarter turn of the bead; means for partially rotating said mandrel for forming a gutter in the said blank; reciprocally supported means for engaging the one quarter turn of the bead of said blank for completing the said bead; mechanism for simultaneously actuating said lip and bead forming means, and means for releasing the eaves-trough from said mandrel.

For a further and full description of the invention herein and the merits thereof, and also to acquire a knowledge of the details of construction of the means for effecting the result, reference is had to the following description and the drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a perspective view looking at the front and one end of my improved eaves-trough machine; Fig. 2 is a perspective view

looking at the rear and one end of the machine shown in Fig. 1; Fig. 3 is an end elevation of the machine shown in Figs. 1 and 2, and the end of the machine opposite to that shown in Figs. 1 and 2; Fig. 4 is a vertical transverse section through the said machine and taken at some suitable intermediate point therethrough; Fig. 5 is an end elevation of the mechanism for controlling the operative parts of my machine; Fig. 6 is a vertical longitudinal section taken on the line X—X of Fig. 5 and in addition, showing the supports for the said mechanism; Fig. 7 is an enlarged sectional detail of the die-members which are employed for forming the lip at one quarter turn of the bead in the eaves-trough blank; the view showing an eaves-trough blank in position preparatory to the formation of the lip and one quarter turn of the bead thereon; Fig. 8 is a view similar to that shown in Fig. 7 and of the parts shown therein, but shows the parts having been operated to form the lip and one quarter turn of the bead on the eaves-trough blank; Fig. 9 is an enlarged sectional detail of the mandrel and coöperating parts and also the means for completing the bead subsequent to the forming of the gutter in the eaves-trough blank; said view further illustrating the preliminary steps of forming the gutter in the eaves-trough blank prior to the operation of the mandrel; Fig. 10 is a view similar to that shown in Fig. 9, with the exception that the mandrel has been partially rotated and through such operation forming the gutter in said eaves-trough blank; Fig. 11 is a view similar to that shown in Fig. 10, with the exception that the means for completing the bead on the blank has been operated and the bead formed in the manner shown; Fig. 12 is a vertical transverse section through my machine, being somewhat similar to that shown in Fig. 4 but with the upper parts of said machine broken away; the view further illustrating the operation of certain parts to adapt the release of the formed eaves-trough from the mandrel; Fig. 13 is a perspective view showing a portion of a completed eaves-trough; Fig. 14 is a sectional detail in plan of parts of the mechanism employed for completing the bead after the formation of the gutter in the blank; Fig. 15 is an enlarged sectional detail showing a modified structure, as the same appears when substituting a smaller or larger mandrel than that shown in the main figures or Figs. 9, 10 and 11; Figs. 16 and 17 show front and side elevations of modified devices, coöperating with the trough forming the mandrel to insure its being reversed to a suitable position after having made a partial rotation, and Figs. 18 and 19 show large sectional views of the trough forming mandrel, illustrating the first and partial rotation and reversed movement thereof.

Like characters of reference indicate corresponding parts throughout the figures.

In the drawings the working parts of my machine are preferably supported on the I beam sills 1 and 2, although any other suitable base may be provided. The said sills are adapted to support a series of standards 3, 4, 5 and 6; the first two disposed at the opposite ends of the die mechanism and mandrel and the other two standards being disposed at desirable points intermediate those indicated as 3 and 4, and 7 denotes a standard somewhat different in construction from those just previously mentioned and is supported on the sills 1 and 2 a suitable distance from the standard 4, as shown in Figs. 1 and 2. The standards 3, 4, 5 and 6 are all similar and are preferably shaped or constructed as seen in Fig. 3, having the shelf portion 8 and provided with the boxings 9 at their upper ends. Journaled in and passing through the boxings 9 of the standards 3, 4, 5 and 6 and a boxing 10 at the upper end of the standard 7 is a shaft 11, driven in a manner to be hereinafter more fully described.

The standards 3, 4, 5 and 6 are each provided with the depending portions 12, the lower ends of which are disposed a suitable distance above the shelf portions 8 thereof. Secured to said depending portions 12 of each of the said sandards 3, 4, 5 and 6 and extending longitudinally of the said machine is a plate 13. 14 denotes a plunger bar or plate which is substantially of the same length as the plate 13 and is slidably supported to be moved up and down adjacent to the front face of said plate 13. The plunger bar or plate 14 just referred to has a suitable connection with the plate 13 whereby the plunger bar or plate may be guided in its vertical movement for the purpose of retaining the same to its work; such connection is preferably accomplished through a dove-tail connection between said plunger bar or plate 14 and the plate 13, by providing in the front face of the latter plate at intervals the vertically disposed grooves 15 in which is dove-tailed and adapted to have vertical movement, bars 16 which are suitably secured to the plunger bar or plate 14. The bars 16 extend up above the upper edge of the plunger bar or plate 14 and are pivotally attached at 17 to the thread members 18 which have a screw connection with a threaded and tubular knuckle 19. And 20 denotes heads which are eccentrically carried on the shaft 11 and revoluble in the usual straps 21 and 22, the latter having a threaded extension 23 adapted to have screw connection with the knuckle 19 referred to. With the connections just described between the heads 20 and the plunger bar or plate 14, it will be seen that the latter may be adjusted to have a variable stroke, and thereby bring the lower edge of said plunger bar or plate closer to or farther from the material to be ac-

tuated upon or rather closer to or farther from a mandrel to be described whereby the said plunger bar may be caused to properly act upon the material on the said mandrel. The lower longitudinal edge of the plunger bar or plate 14 is provided with a concave groove 24 for a purpose to be described.

Extending longitudinally of the machine and supported by and movable upon the shelf portions 8 of the standards 3, 4, 5 and 6 is shown a pair of beams 25 and 26, which are normally held spaced apart and attached at intervals to the said beams are blocks, preferably of wood, indicated as 27 and 28 which are provided with upper concave faces 29. Attached to the concave faces of the said blocks 27 and 28 and extending longitudinally of the machine and parallel with the beams 25 and 26 are shown the concave or approximately semi-circular plates 30 and 31; the former attached to the blocks 27 and movable with the beam 25 and the latter attached to the blocks 28 and movable with the beam 26. The beams, blocks, and plates just referred to when in their normal position are closed substantially as seen in all of the figures with the exception of Fig. 12, in which said figure the beams, blocks and plates have been separated. When in such closed position, they are adapted to assist in the formation of a gutter in an eaves-trough blank and when opened as shown in Fig. 12, they are moved to adapt a finished eaves-trough to be removed from the said machine. The means for opening and closing or separating and bringing together the said beams, their blocks and plates will be hereinafter more fully described.

Extending longitudinally of the machine and disposed intermediate the upper ends of the beams 25 and 26 is a tubular forming mandrel or roller 32, although the same may be a solid rod if it is desired; and said mandrel is disposed within the circle described by the concave faces of the plates 30 and 31, and the face of the said mandrel and plates 30 and 31 are normally disposed a short distance from each other to provide the groove 33 between the same in which it is adapted to move the blank from which an eaves-trough is formed for the purpose of forming the gutter in the said trough. Said mandrel is provided with a longitudinal slot or groove 34 which extends diagonally into the body thereof from its surface and the said slot or groove 34 communicates with a concave depression 35 also extending longitudinally of the said mandrel, as seen in the figures, the purpose of which will be further described. In the construction of the concave plate 30 I prefer to have the upper edge thereof coincide with the upper edge of the beam 25, with which engages a portion of the blank of the eaves-trough to facilitate in the formation or completion of a longitudinal bead along one edge of said eaves-trough blank through and by means of the plunger bar or plate 14 in a manner to be described.

Referring now to the die members by means of which a lip or stiffening rib may be formed longitudinally along one edge of an eaves-trough blank and also the one quarter turn of a bead to be completed through the operation of the plunger bar or plate 14, 36 denotes a rocking die, mandrel or shaft which extends longitudinally of the machine and preferably of the same length as the rotatable mandrel 32 and said die 36 is disposed across the shelf portions of the standards 3, 4, 5 and 6 a suitable distance in advance of the beam 25, at least sufficient to enable the beam to be moved outwardly a proper distance without interfering with or engaging the die 36 or its supports. The said die 36 is journaled in boxings or bearings 37 which are supported or attached to the shelf portions 8 of the standards 3, 4, 5 and 6, substantially as shown in elevation in the figures.

A die plate with which the die, rocking mandrel or shaft 36 coöperates is indicated as 38 and the same extends longitudinally of the machine and preferably of the same length as the said die 36. This die plate is bolted or otherwise suitably secured to the standards 3, 4, 5 and 6 and rests on projections 39 thereof as seen in elevation of the said figures; and the upper edge of this die plate is provided with a die seat or depression extending longitudinally the entire length of the said plate, one wall of which such as *a* is perpendicular while the other, such as *b* is concave.

The rocking die, mandrel or shaft 36, is preferably solid and substantially circular in cross section, with the exception of a flat face 40 extending longitudinally of the shaft and tangent to the surface thereof, the same merging into a substantially rectangular seat 41 conforming to that portion of the upper edge of the die plate 38 intermediate the perpendicular walls *a* thereof and the rear face of the said die plate, with which the flat face 40 of the die 36 abuts or is in juxtaposition to when the said parts are in their normal or inoperative position. The surface of the die 36, as will be seen merges into the seat portion 41 thereof in such a way as to provide the longitudinal projection or die portion 42 which co-incides with and is adapted to co-act with and enter the die seat of the die plate; said projection or die portion 42 is provided with a convex outer face conforming and matching the concave wall *b* of the die seat of the die plate and the inner wall of such projection or die portion which also serves as one of the walls of the rectangular seat 41 of the die 36 conforms to and matches the perpendicular wall *a* of the die seat of the die plate, in manner shown and

all of which it is believed will be understood. On the opposite outer ends of the rocking die or shaft 36 is carried the crank-arms 43 to which are pivotally connected rods 45 eccentrically connected at their opposite ends with the shaft 11 through the heads 46 and straps 47 and 48. The shaft 11 has been referred to as being operatively connected with the plunger bar or plate 14 through the heads 20 eccentrically carried on the said shaft; thus it will be seen that the operation of said shaft not only lowers and raises the plunger bar or plate 14 but also simultaneously actuates the rocking die or shaft 36. Coöperating with the rocking die or shaft 36 and the die plate 38 and actuated by the shaft 11, simultaneously with the actuation of the plunger bar or plate 14 and the said rocking die or shaft 36, is a rectangular bar 49 extending parallel with and in front of the rocking die or shaft 36, the same being hinged at intervals throughout its length to the upper end of the die plate 38, through and by means of hinges 50 as shown. To one end of this bar 49 is attached a short strap or bar 51 to the outer free end of which is pivotally connected the lower end of a rod 52 which is connected at its opposite upper end with an extension 53 secured to the head 46 eccentrically carried on the outer end of the shaft 11. The bar 49, in the operation of the rocking die or shaft 36 to form the lip and one quarter turn of a bead on an eaves-trough blank, is adapted to be swung toward the said rocking die or shaft and one of its edges caused to engage with an eaves-trough blank for producing a slight indentation or kink in said blank, for purposes which will be more fully explained. The operation of said bar 49 in forming such indentation throws the eaves-trough blank into a substantially vertical position, which movement assists in the formation of the lip and one quarter turn of the bead through the action of the rocking die, and the blank engages with a longitudinal bar 54 which extends parallel with and above the rocking die or shaft 36 and is preferably fixedly secured to the bearings or boxings 37 in which the rocking die is journaled.

Referring again to the beams 25 and 26 which have been described as being slidably or movably supported on the shelf portions 8 of the standards 3, 4, 5 and 6, the beam 25 at intervals throughout the length thereof has connected therewith the reaches 55 which extend back to the rear of the machine and beneath the beam 26. Adjustably connected with each of said reaches 55 are shown bars 56 which at their outer free ends are pivotally connected to crank-arms 57 carried by and movable with a longitudinal rock shaft 58 which passes through and is journaled in the rear portions of the standards 3, 4, 5 and 6 and in a boxing 59 attached to a bracket 60 secured to the standard 7, as shown in Fig. 2. The beam 26 at intervals throughout the length thereof has connected therewith reaches 61 which extend back to the rear of the machine and overlie and are movable above the reaches 55 referred to. Adjustably connected with each of the said reaches 61 are shown bars 62 which at their outer free ends are pivotally connected to crank-arms 57, referred to, upon the opposite side of the rock shaft to that of the reaches 56. Figs. 4 and 12 illustrate very clearly the two different positions of the beams 25 and 26 and their coöperating connections with the rock shaft 58. That is, in Fig. 4 the beams are in a normally closed position and in Fig. 12 said beams and the parts connected therewith have been separated, which said view also illustrates the position which the reaches 56 and 61 assume upon the rocking of the shaft 58 to separate the beams 25 and 26. It is preferable to have the rear disconnected ends of the reaches 55 and 61 movable in brackets 63 supported in a suitable manner from the I beam 2. On the outer end of the rock shaft 58 and adjacent to the standards 3 is attached a lever 64, best seen in Figs. 2 and 3, and when in normal position it is disposed substantially as seen in Fig. 3 and engages with a rest or bracket 65, which to a certain extent governs the throw of the said lever and the rock shaft to which the same is connected; the purpose of the lever being more fully explained.

The mechanism for transmitting power to the shaft 11 carrying the eccentrics for operating the plunger bar or plate, the rotating mandrel 32 and the rocking die and component parts will now be described. 66 denotes a driving shaft, the inner end of which is journaled in the standard 4 and the outer portion thereof is journaled in the standard 7 and is projected some distance beyond the same and carries thereon the fast and loose driving pulleys 67 and 68 respectively by means of which power may be transmitted from a suitable source to the driving shaft 66. The driving shaft carries the driving pinion 69 which is adapted to be rotated during the rotation of the driving shaft, and on the driving shaft intermediate the driving pinion 69 and the standard 7 is an elongated sleeve to which is connected an arm 71 depending therefrom, and to the lower end of which is adjustably attached a lug or stop 72. The lower end of the arm 71 is provided with an elongated slot 73 indicated by dotted lines in Fig. 5 and it is in this slot that the lug or stop 72 is adjustably carried and retained by means of a nut engaging a threaded portion of the said lug or stop; the purposes of said arm and lug will be further described. Also connected to the said sleeve 70 is an arm 74 which extends upwardly therefrom and has connected thereto a strap 75, which at its outer free end is connected with a lever or bar

76 pivoted at its lower end to a frame part 77 attached to an upright frame part 78.

79 denotes a short longitudinally disposed shaft journaled in suitable boxings supported by the standard 4 and also by the standard 7 and the inner end of the said shaft projects a short distance beyond the boxing supported by the standard 4 and the same has the squared portion 80 separated from the body of the shaft by the flange or collar 81. Said flange or collar is adapted to be seated within a groove in the boxing in which the shaft is journaled, which is supported by the standard 4 and serves to prevent end thrust of the said shaft. On this shaft 79 is loosely carried a clutch part 82 to the hub of which is attached a gear wheel 83 which is in mesh with the teeth of the driving pinion 69 and during the continued operation of said driving pinion is adapted to be rotated therewith. Also carried on the said shaft 79 is a clutch part 84 adapted to have an intermittent engagement with the clutch part 82 and said clutch part 84 is slidably carried on the said shaft and rotatable therewith by the same having a feathered connection with the shaft. For yieldingly forcing the clutch part 84 into clutch engagement with the clutch part 82 whereby power may be transmitted from the driving shaft 66 through the pinion 69 and gear 83, I have provided one or more coil springs 85 which bear against the said clutch part 84 and a collar 86 fixedly carried on the shaft 79.

It is to the inner squared end 80 of the shaft 79 that I attach the inner end of the rotating mandrel 32 and the same is accomplished in the provision of a bushing 87 which is squared interiorly to adapt it to fit the squared end of the said shaft and said bushing has a round outer surface to conform to the inner face or wall of the rotatable mandrel 32, which is slipped over the end of the bushing somewhat as seen in Fig. 6 and preferably secured thereon by means of the pins 88. The outer end of the mandrel 32 has attached thereto a bushing 89 which is slipped into the end thereof and suitably secured thereto and said bushing is provided with a short stud or stem 90 which is journaled in the lower end of a bracket 91 supported by the standard 3, best seen in Fig. 3.

The shaft 79 is intended to be operated only at predetermined intervals, to a certain extent being controlled by the will of the operator and when operated it is preferable to have the same make a partial rotation and then stop and be again started when the same will return to its initial or normal position. The clutch part 84 has attached thereto a roller 92, which, when the shaft 79 is in a position of rest engages with the curved seat portion 93 of a lever or bar 94 which is pivotally connected at its lower end with a bar 95 supported by and projecting from the uprights 78 and the said lever or bar 94 is adapted to be yieldingly retained in such a position by means of a coil spring 96 which also serves to return the lever or bar 94 to the position shown in the figures after the oscillation or operation thereof to release the roller 92 therefrom. Pivotally connected with the lever or bar 94 is an arm 97 which has a pivotal connection with the inner end of a bell crank lever 98 which is pivoted at 99 to the uprights 78 and is provided with a hand hold 100 as shown. To the inner end of this bell crank lever is attached one end of the coil spring 96 which has its opposite end attached to the bar 95, see Figs. 1 and 5. The operator wishing to start the machine will move the bell crank lever 98 downwardly, which said movement through the connection of the bar 97 therewith and with the lever or bar 94 will move the same outwardly; the limit of movement of said lever being preferably regulated by an extension 101 supported by the uprights 78 with which the lever will engage. This movement of the lever is such that the roller 92 of the clutch part 84 will be disengaged therefrom which will permit the springs 85 to move the clutch part 84 along the shaft 79 and engage with the clutch part 82 and thereby connect the driving pinion 69 through the wheel 83 to the shaft 79 for imparting motion to the mandrel 32 connected therewith. The shaft 79 being in operation will rotate until the roller 92 of the clutch part 84 engages with a curved seat portion 102 of the lower end of a bar 103 which is pivotally connected at 106 to a block 107 adjustably attached to a curved bar or plate 108 supported by the uprights 78 and the bar 77 attached thereto. Such engagement of the roller 92 with the curved seat portion 102 of the arm 103 will be such as to cause the clutch part 84 to be separated from the clutch part 82 and thereby stop the rotation of the shaft 79.

On the outer end of the clutch part 84 is provided a dog 109 which is adapted to rotate with the said clutch part in the rotation of the shaft 79 and the same engages with the lug or stop 72 of the bar 71 by moving beneath the same, which raises the lower end of the said bar and partially rotates the sleeve 70 with which the bar is connected on the driving shaft 66. The position of the roller 92 and the dog 109 on the clutch part 84 is such that approximately at the time the roller engages with the curved seat portion 102 of the bar 103 for disconnecting the clutch parts to stop the shaft 79, the dog 109 has moved beneath the lug or stop 72 and raised the lower end of the bar 73 which falls immediately upon the passing of the dog 109 from beneath the lug or stop 72. Through the oscillation of the sleeve 70, the bar 74 is

moved outwardly, which, through the connection of the bar 75 with the lever or bar 76 oscillates the latter on its pivot which releases a roller 110 which is adapted to engage and rest on a curved seat portion 111 provided on the upper end of the lever or bar 76; which said seat portion is in all respects similar to the curved seat portion 93 of the lever or bar 94.

The roller 110 to which reference has been made is carried by a clutch part 112 feathered to have a slidable connection with the shaft 11. Loosely mounted on this shaft and adapted to have an intermittent clutch engagement with the clutch part 112 is a clutch part 113 on an extended hub portion of which is fixedly mounted a gear wheel 114, similar to the wheel indicated as 83 and the same is in mesh and adapted to be rotated with the driving pinion 69. Upon the oscillation of the lever or bar 76 which moves away from and releases the roller 110 of the clutch part 112, said clutch part by means of one or more springs 115 is forced into engagement with the clutch part 113 for connecting the gear 114 with the shaft 11 and thereby rotating the said shaft, for the purposes heretofore specified. The springs 115 bear against the clutch part 112 and also against a collar 116 fixedly carried on the shaft 11. With the rotation of the shaft 11 a cam 117 carried thereby during the last half of the rotation of said shaft 11 engages with and raises the upper end of a lever or bar 118 which is fulcrumed at 119 to a bracket 120 supported by or attached to the standard 4. This movement of the lever or bar 118 is adapted to rock the shaft 58, which through the connections described separates the beams 25 and 26 to permit the removal of a completed eaves-trough from the mandrel. To operate the rock shaft by means of the lever or bar 118 an arm 121 is pivotally connected with the lower end of said lever or bar and its opposite end is pivotally connected with a crank arm 122 carried on the shaft 58. With this movement of the rock shaft 58, parts connected therewith, which I will now describe, will be moved into position whereby the shaft 79 will be again partially rotated for moving the mandrel 32 to its normal or initial position and cause the roller 92 to engage with the curved seat portion 93 of the lever or bar 94 for retaining the said shaft and mandrel stationary until it is again desired to renew the operation of the shaft 79 and the mandrel connected thereto. On the shaft 58 is carried a crank arm 123 to which is pivotally connected a reach bar or rod 124 which at its outer end is pivotally connected with one of a series of perforations 125 in an annular ring 126 which is concentrically carried on the hub of the wheel 83 on the shaft 79. As the shaft 58 is rocked through the movement of the lever or bar 118 in the manner described, the ring 126 is partially rotated on the hub of the wheel 83 and a dog or pawl 127 pivotally connected thereto is carried over and to the rear of the lower end of the bar 103. For returning the parts to the position shown in Fig. 5 of the drawing which again allows the clutch parts 82 and 84 to engage for returning the shaft 79 to its normal or initial position the operator will throw the lever 64 from the position shown in Fig. 2 to the position shown in Fig. 3 which will rock the shaft 58 and through the crank arms 122 and 123 return the lever or bar 118 and the reach bar or rod 124 to the positions shown in Fig. 5; such movement will impart a partial rotation to the ring 126 and cause the pawl 127 to ride beneath and elevate the lower end of the bar 103 and such movement of the said bar will release the roller 92 and permit the springs 85 to force the clutch part 84 into engagement with the clutch part 82 and connect the power shaft with the shaft 79 in the manner described, which will return the said shaft and the parts carried thereby to the position shown in Fig. 5. Throwing the lever 64 into the position shown in Fig. 3, through the connections of the shaft 58 with the beams 25 and 26 will return the said beams to their normal or closed position.

In the further description of the machine it will become apparent that I am enabled to make different sizes of eaves-troughs, not only by changing the size of the mandrels 32 but also through the adjustment of driving parts coöperating with the mandrel carrying shaft to adapt the said parts to the different sizes of mandrels. For instance, in connecting different sizes of mandrels 32 to the shaft 79 I employ different size bushings 87 to adapt the connection of said mandrels for the squared end of the shaft 79. And to time the connection and disconnection of the clutch parts 82 and 84 I provide the adjustable connection of the bar 103 in the manner specified with the frame part 108 so as to enable me to shift the position of the lower end of said bar to provide for the engagement of the roller 92 sooner or later with the curved seat portion of the said bar which will regulate the separation of the clutch parts 82 and 84 after the shaft 79 has made a predetermined and partial revolution. With the adjustment of the bar 103 it is deemed necessary to adjust the lug or stop 72 on the bar 71 so as to time the movement of the said bar as the dog 109 of the clutch 84 rides beneath the same. With this adjustment may also be adjusted the inner connection of the reach bar or rod 124 with the perforations 125 of the ring 126, all of which it is believed will be understood.

In Fig. 13 is shown in perspective one end of a completed eaves-trough, substantially as the same appears when made upon the within machine. It is indicated as a whole as 128,

provided with the longitudinal gutter 129 and one edge of the said trough has the bead 130 formed thereon which is provided with the inturned and longitudinal lip 131. The opposite edge of the trough is provided with the longitudinal stiffening portion 132 which stiffens the back of the trough and keeps the edge thereof straight. I will now briefly describe how a complete trough is formed with the stiffening edge, the bead and inturned lip thereof.

From a study of the operating mechanism which is best seen in Figs. 1, 2, 5 and 6 it will be understood that the first operation of the machine is a partial rotation of the mandrel 32 and following such operation the rocking die and plunger bar or plate are operated: the rocking die forming the lip 131 and a one quarter turn of the bead 130. During the successive operations of the machine the eaves-trough blank on which the lip and one quarter turn of the bead are made is placed on the mandrel for forming the gutter therein and thereafter, the plunger bar or plate is actuated to complete the bead and simultaneously therewith a lip and one quarter turn is formed on a second eaves-trough blank which is then removed and placed on the mandrel after the previous eaves-trough blank has been completed in the form of the trough seen in Fig. 13; these operations are continuously carried out in the manufacture or formation of each successive trough.

In Figs. 7 and 8 two different positions of the rocking die 36 are shown and also the bar 49 which forms a kink in the eaves-trough blank. In Fig. 7 an eaves-trough blank is indicated as A and is shown in cross section. To insure a proper placing of the blank so that one longitudinal edge thereof will lie along and above the die plate 38 as shown in Fig. 7 it may be preferable to arrange a longitudinal shelf 133, the same being disposed in an inclined position and supported by the brackets 134 attached to the die plate 38. With the eaves-trough blank A in the position shown in Fig. 7, the rocking of the die member 36 through and by means of the mechanism heretofore described, into the position shown in Fig. 8, it will be readily seen how the lip 131 and the one quarter turn of the bead which is here indicated as *c* is formed longitudinally along one edge of the eaves-trough blank A. Operating with the rocking die 36 as was previously explained, is the bar 49 which is moved into the position shown in Fig. 8 and the edge *d* thereof on which the eaves-trough blank rests when in the position seen in Fig. 7, not only assists in elevating the eaves-trough blank into the position shown in Fig. 8 when the lip and one quarter turn of the bead is formed thereon, but also forms a slight kink at *e* in the said blank, the body of which engages with the bar 54 which limits the movement of the said blank as the same is thrown into the position shown in Fig. 8.

Upon the return of the rocking die 36 and the bar 49 to their normal or initial positions the blank A is removed from the die plate and the opposite end or longitudinal edge of the blank is inserted into the longitudinal slot 34 in the mandrel 32 substantially in the manner seen in Fig. 9. The concave groove or depression 35 in the mandrel is provided, so that as the edge of the blank is inserted into the slot 34 it will find its way thereto by engagement with the wall of the concave groove. At this time the mandrel 32 is set into motion and makes a partial revolution, substantially in the manner and by the means heretofore explained and the said mandrel is then stopped substantially in the position shown in Fig. 10. The rotation of the mandrel, through the engagement of the blank A in the slot 34 thereof draws the blank down into and around through the groove 33 formed between the mandrel and the concave plates 30 and 31 and thereby the gutter 129 is formed in the said blank. It is further seen that through the insertion of the edge of the blank into the slot 34 of the mandrel 32 and by rotating the said mandrel, there is not only formed the gutter 129 in the blank but also the stiffening edge 132. The slot 34 in the mandrel while serving to carry the blank partially around and through the groove 33 also serves to prevent the back edge of the eaves-trough blank from moving from the position substantially as shown in Fig. 10, when the plunger bar or plate is operated to descend and engage the forward edge of the blank provided with the lip and one quarter turn of the bead for completing the bead 130 substantially as is shown in Fig. 11.

Through the provision of the kink *e* in the eaves-trough blank, when the blank is moved into the position shown in Fig. 10 to form the gutter therein, the forward portion of the blank or that part thereof which projects from without the groove 33 is disposed in a position along and beneath the lower concave edge of the plunger bar or plate 14 so that when the plunger bar or plate is lowered it will engage with the one quarter turn of the bead and form the bead as shown in Fig. 11; in which view the plunger bar or plate has descended to its lowermost position. In the formation of the bead that portion of the blank is forced down upon the outer upper edge of the concave plate 30, as shown. It is after the operation and placing of the parts as shown in Fig. 11 that the rock shaft 58 is operated in the manner specified to separate the beams 25 and 26 to permit the completed eaves-trough to drop or be disengaged from the mandrel upon the shelf portions 8 of the standards 3, 4, 5 and 6, when the same may be removed.

In the above description I have shown how

different sizes of mandrels 32 may be interchangeably connected with the shaft 79 and in connection therewith I will now show or rather describe how provision is made for taking up the space between the outer surface of the mandrel and the inner concave surface or faces of the plates 30 and 31 when a mandrel is placed in a machine smaller than that illustrated in all of the figures where the mandrel is shown. In Fig. 15 the mandrel 32 there shown is somewhat smaller in diameter than the mandrel shown in the remainder of the figures and is adapted naturally to make a trough somewhat smaller than those previously described. And as a filler for the space between the mandrel 32 and the concave plates 30 and 31 with the exception of a groove into which the eaves-trough blank is drawn for forming the gutter therein I provide the linings or supplemental plates 135 and 136 conforming and adapted to be attached to the plates 30 and 31 respectively.

I have provided for eliminating the bar 49 which has been referred to as coöperating with the rocking die or shaft 36 and the die-plate 38, and also the connecting parts between the said bar and operating shaft 11. The use of the bar 49 was to throw the eaves-trough blank up into a position as shown in Fig. 8 for the purpose of kinking the blank, whereby, when the mandrel 32 was partially revolved to shape the trough, that portion of the eaves-trough blank upon which the bead was formed, would assume a position beneath the plunger-bar 14 to enable the same to engage with the edge of the blank and form the bead. As a substitute for the bar 49 and component parts I have provided a cam 137 on the shaft 11 and a disk 138 on the shaft 79, see Figs. 16 and 17. Coöperating with the cam and the disk just referred to are arms 139 and 140 forming part of or attached to a sleeve 141 which is carried by a rod 142. The arm 139 adapted to ride on the surface of the cam 137 as shown in Fig. 17 and to be operated thereby, and the arm 140 has pivotally connected therewith a pitman 143 which at its opposite end is pivotally connected with the disk 138, best seen in Fig. 17.

The arm which has been referred to as 103 and shown pivotally connected at 106 to a block 107 adjustably attached to the curved top or plate 108, see Fig. 5, is shaped somewhat differently from what is shown in Fig. 5, and more like that shown in Fig. 16, wherein the arm 103, for convenience is here referred to as 103^a provided with the curved seat portion 102^a and pivotally connected with the disk 138 at 144, as shown in Fig. 16. The curved seat portion of the arm 103^a rests upon the clutch part 84 much farther forward than is shown by the arm 103 in Fig. 5, which insures that when the clutch parts 82 and 84 are connected, the shaft 79 with the mandrel 32 will make much more of a revolution than heretofore described, and assume a position somewhat as seen in Fig. 18, bringing the edge of the eaves-trough blank which is provided with the inturned lip and one-quarter turn of the bead adjacent to the upper edge of the concave plate 30, in which position the mandrel 32 will assume a position of rest. This is accomplished by the roller 92 engaging with the curved seat portion 102^a of the arm 103^a which will separate the clutch parts 84 and 82. This operation of carrying the mandrel 32 around in the position shown in Fig. 18 shapes the eaves-trough blank into the shape in which it is desired to retain the said trough when completed, and it is then necessary to reverse the movement of the mandrel 32 to throw that edge of the trough blank provided with the lip and one-quarter turn of the bead into a position to be engaged by the plunger-bar 14 for forming the completed bead. The reverse position of the mandrel is clearly shown in Fig. 19 and the bead is shown in dotted lines complete. The shaft to which the mandrel 32 is attached has been described as being operated alternately with the shaft 11 and it is through the shaft 11 that the mandrel 32 is returned to the position shown in Fig. 19. This is accomplished by the cam 137 acting upon the arm 139 which will throw the disk 138 into the position shown in dotted lines in Fig. 17; such movement of the disk will throw the arm 103^a upwardly and the roller 92 being seated in the curved seat portion of said arm, it will be seen that the shaft 79 together with the mandrel 32 will be returned to the position shown in Fig. 19. The parts are retained in the position shown by the dotted lines in Fig. 17 until after the plunger-bar 14 has been operated to make the completed bead on the trough, when the cam 137 will have moved to a position to adapt a coil spring 145 connected with the disk 138 to return the said disk, its arm 103^a and parts connected with the said disk into the position shown by the full lines in Figs. 16 and 17. The arm 103^a is moved to be disengaged from the roller 92 in substantially the same manner and by the same means as employed and described for the arm 103, to adapt the return of the mandrel 32 and its shaft to their initial positions. However, a coil spring 145 is used for throwing the arm 103^a into its original position after the roller 92 has moved away therefrom.

Forming the trough in the blank by the means just described, just prior to the making of the bead, places that edge of the blank formed with the lip and one-quarter turn into a position to be very readily engaged by the plunger-bar 14 in its downward movement, and while I have referred particularly to parts which need to be modi-

fied, it may be found necessary to change the connection of the pitman 124 with the disk 126 and also change the position of the pawl 127, all of which it is believed comes within the scope of the invention herein and will be understood by those versed in the art.

It is obvious from the foregoing, that various changes may be made without departing from the spirit and the scope of the invention herein and therefore, I do not wish to be confined to the details of construction set forth.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent of the United States, is:—

1. In an apparatus of the class specified, the combination of a revoluble member for forming a gutter in an eaves-trough blank, and reciprocating means coöperating therewith for forming a bead along one edge of said blank.

2. In an apparatus of the class specified, the combination of a revoluble member for forming a gutter in an eaves-trough blank and simultaneously forming a stiffening portion along one edge thereof, and reciprocating means coöperating therewith for forming a bead along the opposite edge of said blank.

3. In an apparatus of the class specified, the combination of an intermittently revoluble member for forming a gutter in an eaves-trough blank, and reciprocating means coöperating therewith for forming a bead along one edge thereof.

4. In an apparatus of the class specified, the combination of a revoluble member adapted to be partially rotated and during such movement form a gutter in an eaves-trough blank, reciprocating means coöperating therewith for forming a bead along one edge of said blank, means for discharging the finished trough from the revoluble member, and means for automatically rotating said revoluble member to its initial position.

5. In an apparatus of the class specified, the combination of a revoluble member adapted to be partially rotated and during such movement form a gutter in an eaves-trough blank, and simultaneously form a stiffening portion along one edge thereof, means for forming a bead along the opposite edge of said blank, means for discharging the finished trough from the revoluble member, and means for rotating said revoluble member to its initial position.

6. In an apparatus of the class specified, the combination of a revoluble member for forming a gutter in an eaves-trough blank, and reciprocating means coöperating therewith for engaging one edge of said blank for curling the same into the form of a bead.

7. In an apparatus of the class specified, the combination of a revoluble member for forming a gutter in an eaves-trough blank, and a vertically movable member adapted for engaging one edge of said blank for curling the same into the form of a bead.

8. In an apparatus of the class specified, the combination of an intermittently revoluble member adapted during a partial rotation to form a gutter in an eaves-trough blank, and intermittently reciprocating means adapted when the said revoluble member has made a partial rotation to engage one edge of said blank and curl it into the form of a bead.

9. In an apparatus of the class specified, the combination of an intermittently revoluble member adapted during a partial rotation to form a gutter in an eaves-trough blank, intermittently reciprocating means adapted when the said revoluble member has made a partial rotation to engage one edge of said blank, and curl it into the form of a bead, means for removing the completed trough from the revoluble member, and means for imparting an additional partial rotation to said member for returning the same to its initial position.

10. In an apparatus of the class specified, the combination of a rocking member adapted to form a portion of a bead along one edge of an eaves-trough blank, means separate from said rocking member for engaging the opposite edge of said blank to form a gutter therein, and means coöperating with said gutter forming means for engaging that portion of the blank containing the partially formed bead for completing the bead thereof.

11. In an apparatus of the class specified, the combination of a coöperating stationary plate and a rocking member adapted to form a portion of a bead along one edge of an eaves-trough blank, means separate from said rocking member and plate for engaging the opposite edge of said blank to form a gutter therein, and means coöperating with said gutter forming means engaging that portion of the blank containing the partially formed bead for completing the bead thereof.

12. In an apparatus of the class specified, mechanism for forming an angular bend along one edge of an eaves-trough blank and simultaneously producing the initial bend for a bead, means for forming a gutter in said blank, and means adapted to engage that portion of the blank provided with the angular bend and partially formed bead for completing said bead.

13. In an apparatus of the class specified, mechanism for forming the initial bend for a bead along one edge of an eaves-trough and simultaneously producing an angular bend forming an inturned lip, means for forming a gutter in said blank, and means for engaging that portion of the blank provided with the partially formed bead and lip for completing the bead and for shaping said bead with the lip inturned and extending longitudinally within said bead.

14. In an apparatus of the class specified, the combination of a stationary plate and a rocking member coöperating therewith for forming a lip and a portion of a bead along one edge of an eaves-trough blank, a revoluble member separate from said rocking member for forming a gutter in said blank, and mechanism vertically movable along one side of said revoluble member for engaging that portion of the blank provided with the partially formed bead for completing the bead thereof and for shaping said bead with the lip aforesaid inturned and extending longitudinally thereof.

15. In an apparatus of the class specified, the combination of a stationary plate and a rocking member coöperating therewith for forming a lip and a portion of a bead along one edge of an eaves-trough blank, a revoluble member for forming a gutter in said blank, and reciprocating means for engaging that portion of the blank provided with the partially formed bead for completing the bead thereon and for shaping the said bead with the lip aforesaid inturned and extending longitudinally thereof.

16. In an apparatus of the class specified, the combination of a stationary plate and a rocking member coöperating therewith for forming a lip and a portion of a bead along one edge of an eaves-trough blank, a revoluble member for forming a gutter in said blank, and a plunger-bar provided with a curved lower edge adapted to engage that portion of the blank provided with the partially formed bead for completing the bead thereon and for shaping the said bead with the lip aforesaid inturned and extending longitudinally thereof.

17. In an apparatus of the class specified, mechanism for forming a partial bead along one edge of an eaves-trough blank, means for forming a gutter in said blank, and mechanism for engaging that portion of the blank provided with the partial bead for completing the said bead, the bead completing means and mechanism for forming the partial bead actuated simultaneously.

18. In an apparatus of the class specified, the combination of a plate provided with a die-seat, a rocking member provided with a die adapted to coöperate with the seat in the plate aforesaid for forming a quarter turn of a bead along one edge of an eaves-trough blank, a revoluble member for forming a gutter in the said blank, and mechanism coöperating with said gutter forming means for subsequently completing the bead on the blank.

19. In an apparatus of the class specified, the combination of a plate provided with a die-seat, a rocking member provided with a die adapted to coöperate with the seat in the plate aforesaid for forming a lip and one-quarter turn of a bead along one edge of an eaves-trough blank, a revoluble member for forming a gutter in the blank, and mechanism coöperating with said gutter forming means operating subsequently to the forming of the gutter for completing the said bead with the lip aforesaid projecting inwardly and longitudinally of the bead.

20. In an apparatus of the class specified, the combination of a plate provided with a die-seat, a rocking member provided with a die adapted to coöperate with the seat in the plate aforesaid for forming a lip and one-quarter turn of a bead along one edge of an eaves-trough blank, a revoluble member adapted to form a gutter in said blank, and reciprocally carried means for completing the bead on the trough with the lip aforesaid projecting inwardly and longitudinally of the bead.

21. In an apparatus of the class specified, the combination of a pair of coöperating die-members for forming a partial bead along one edge of an eaves-trough blank, means for forming a gutter in the said blank, a reciprocally supported member adapted to act on the partially formed bead on the blank for completing the said bead, an operating shaft, and connections between said shaft and one of said die members, and connections between said shaft and said reciprocal member.

22. In an apparatus of the class specified, the combination of a revoluble member, a pair of beams extending longitudinally of said member and disposed on opposite sides thereof, a pair of longitudinal plates carried by the said beams and normally partially surrounding the revoluble member, the arrangement of member and plates forming a groove between the same, power operated means for rotating the said member and for separating the beams and plates therefrom and manually actuated means moving said beams and plates toward the said member.

23. In an apparatus of the class specified, the combination of a pair of coöperating die members for forming a partial bead along one edge of an eaves-trough blank, a shaft and connections between said shaft and one of said members, a revolubly supported member adapted to engage the edge of the blank opposite to that provided with the partial bead and forming in said blank a gutter, a reciprocally supported bar adapted to engage the partial bead of the blank for completing the bead thereof, and connections between the aforementioned shaft and said bead completing bar.

24. In an apparatus of the class specified, the combination of a revoluble member adapted to form a gutter in an eaves-trough blank, a plunger-bar extending longitudinally of said member and adapted to have vertical movement above and upon one side thereof, the said bar having a concave lower edge adapted to engage with one edge of the eaves-

trough blank and curl the same into the form of a bead, means for actuating the revoluble member, and means for alternately actuating the plunger-bar.

25. In an apparatus of the class specified, the combination of a revoluble member having a groove extending diagonally into and longitudinally of said member and adapted to receive one edge of an eaves-trough blank, a pair of concave plates adapted to normally partially surround said member and spaced apart therefrom to form a groove into which it is adapted to draw the eaves-trough blank during the movement of said member to form a gutter in said blank, means for engaging the free edge of said blank for curling the same into the form of a bead, and means for separating said plates to discharge the completed trough from the member.

In testimony whereof I affix my signature, in presence of two witnesses.

WILLIAM J. PLECKER.

Witnesses:

WARREN E. LLOYD,

JOHAN U. ZINCK.