

July 8, 1924.

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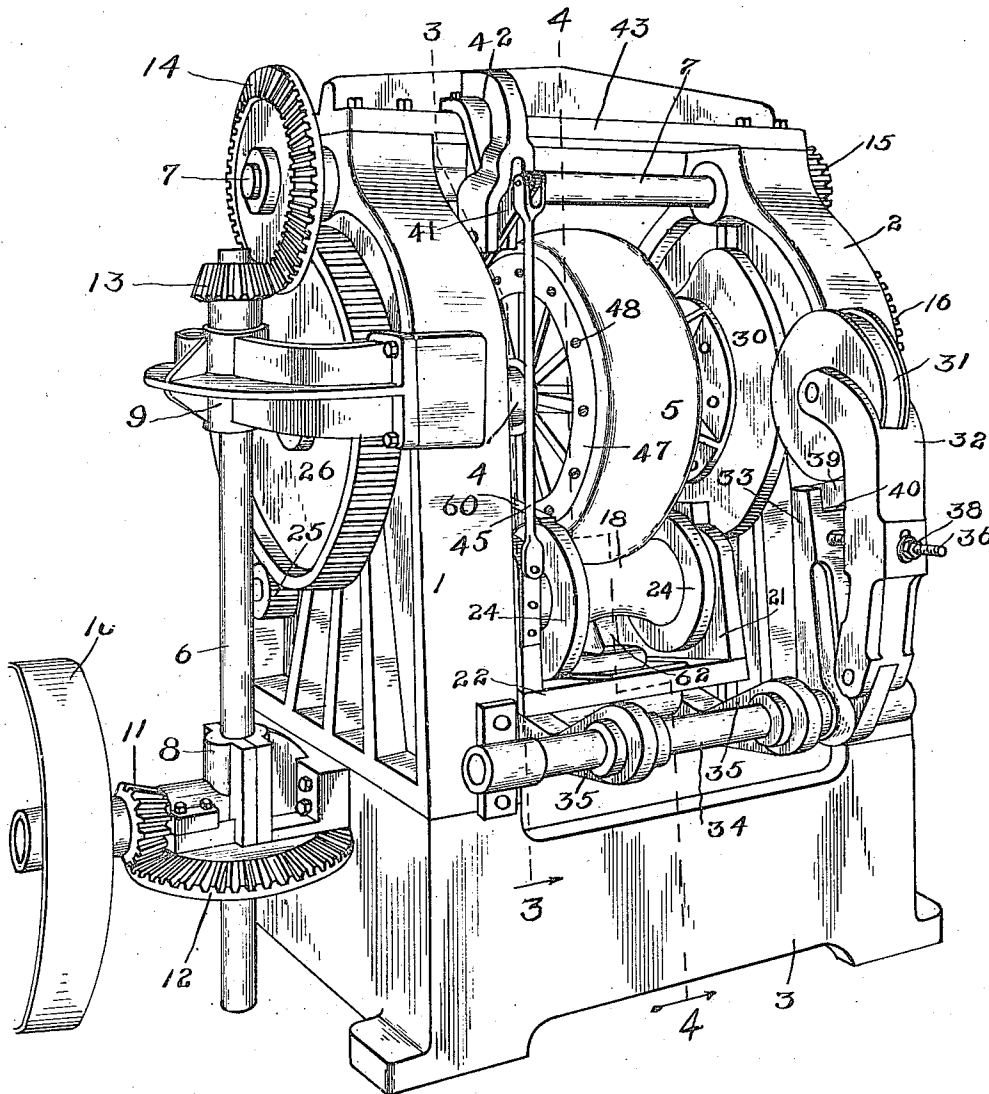
B. E. THOMPSON ET AL

METAL BENDING AND SHAPING MACHINE

Filed Aug. 18, 1922

4 Sheets-Sheet 1

FIG. 1.



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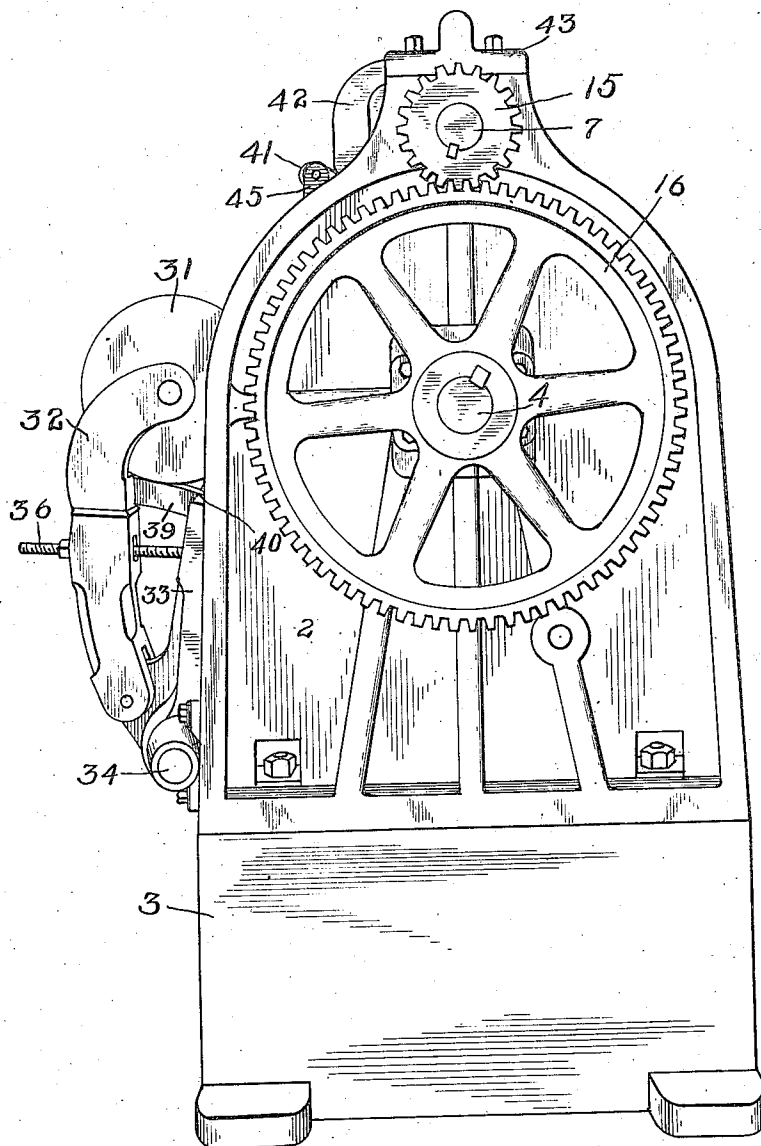
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4 Sheets-Sheet 2

FIG. 2.



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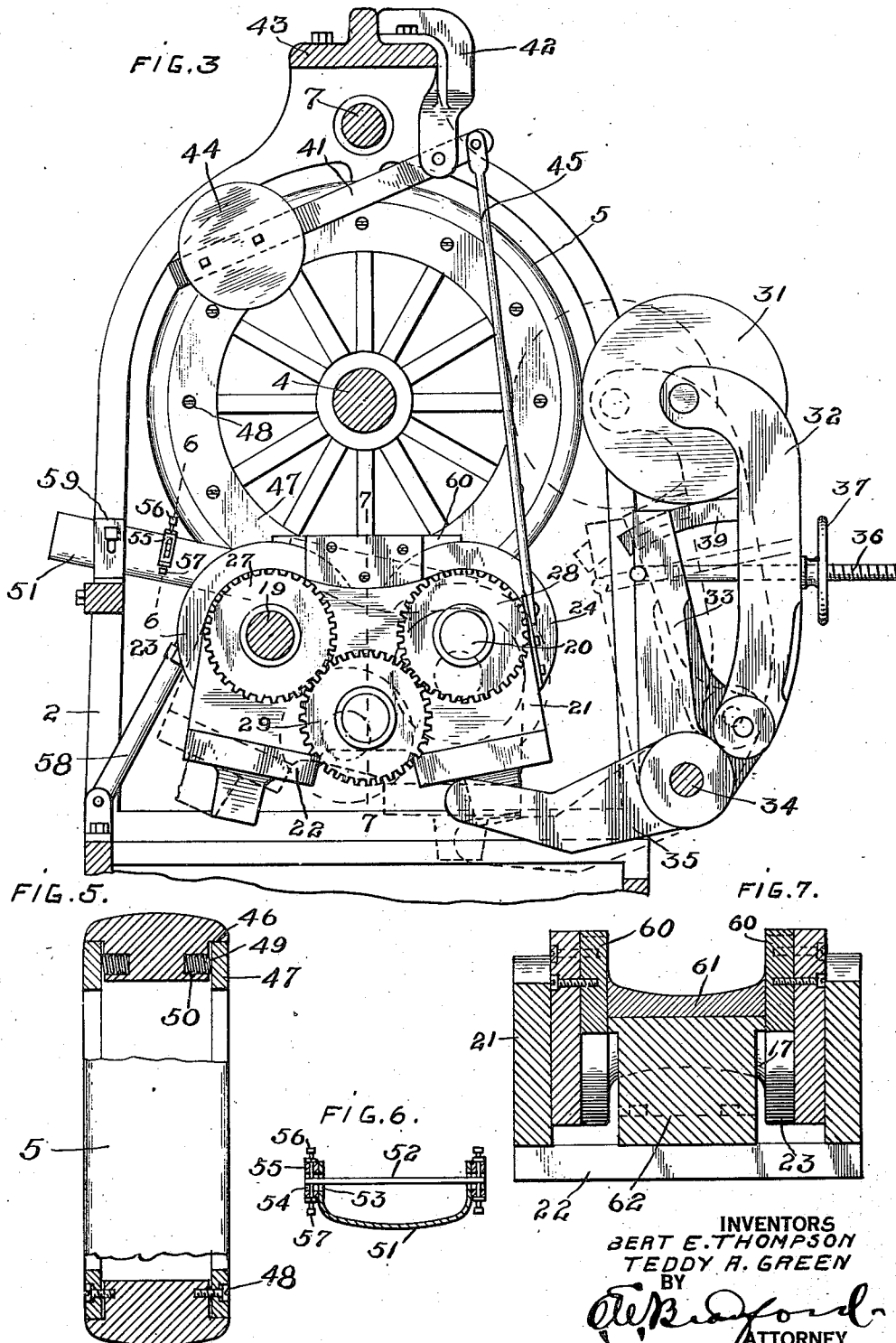
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4 Sheets-Sheet 3



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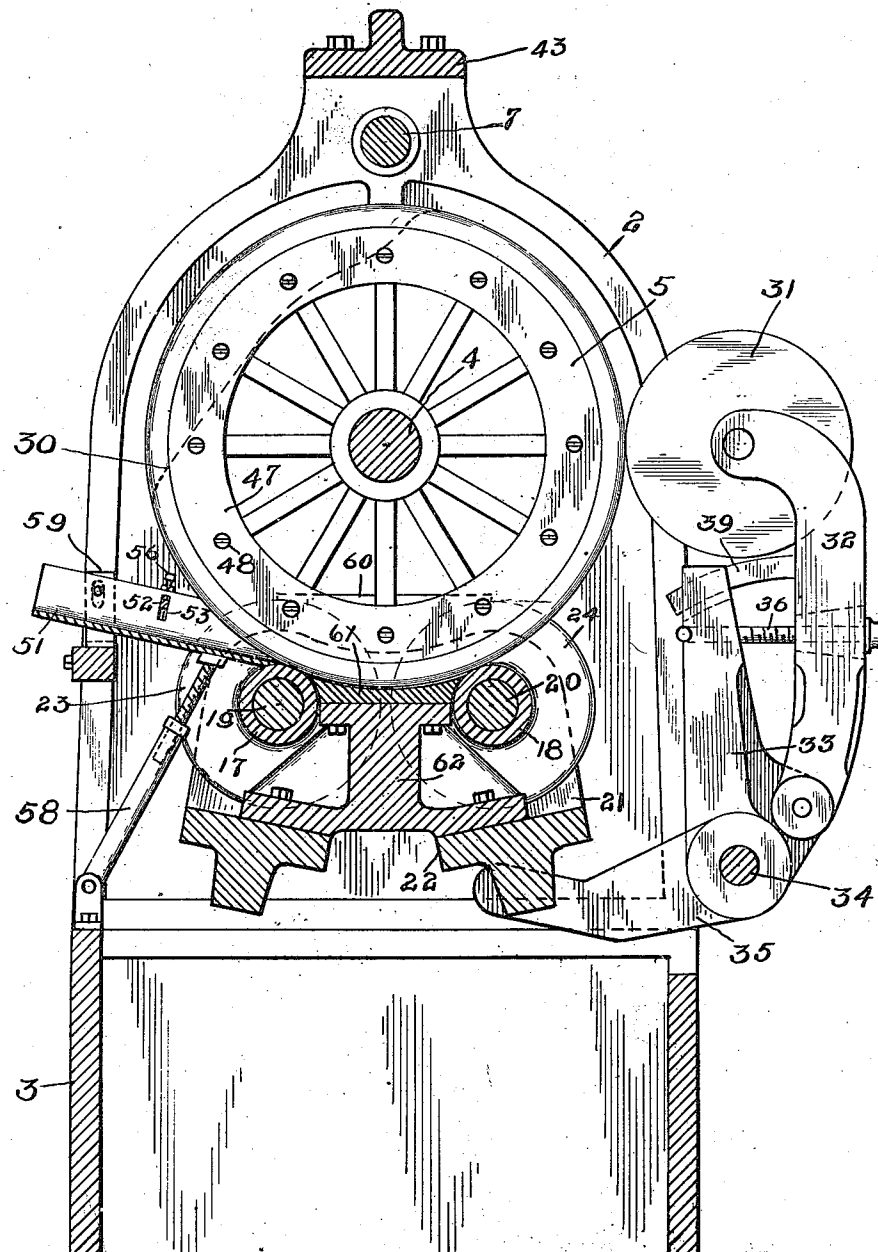
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METAL BENDING AND SHAPING MACHINE

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4 Sheets-Sheet 4

FIG. 4.



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UNITED STATES PATENT OFFICE.

BERT E. THOMPSON AND TEDDY A. GREEN, OF INDIANAPOLIS, INDIANA, ASSIGNORS
TO METAL AUTO PARTS COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION
OF INDIANA.

METAL BENDING AND SHAPING MACHINE.

Application filed August 13, 1922. Serial No. 582,713.

To all whom it may concern:

Be it known that we, BERT E. THOMPSON and TEDDY A. GREEN, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Metal Bending and Shaping Machines, of which the following is a specification.

10 This invention relates to a metal bending and shaping machine and is primarily adapted for bending and shaping fenders or mud guards of a motor propelled vehicle, although it will be understood that it may be used for bending metal to be used for various other purposes. One feature of the invention is the provision of rotating dies or rollers arranged for bending and shaping a fender, means being provided for causing the metal to bend uniformly and smoothly, and at the same time provide flanges at the edges of the fender.

15 A further feature of the invention is the provision of means for entering the metal of which the fender is formed between the rollers without developing kinks or uneven surfaces therein.

20 A further feature of the invention is the provision of means for automatically regulating the various rolls or dies whereby the fender will be bent into a curved contour or permitted to extend in a straight line.

25 A further feature of the invention is the provision of means in connection with the regulating device for determining the degree of bend imparted to the fender, whereby the fender may be given a greater or less radial curvature.

30 A further feature of the invention is the provision of means for regulating the lateral pressure of parts of the rollers or dies for preventing kinks or uneven surfaces developing in the flange portions of the fender.

35 And a further feature of the invention is the provision of means for guiding the metal of which the fender is constructed into the dies.

40 Other objects and advantages will be hereinafter more fully set forth and pointed out in the accompanying specification.

45 In the accompanying drawings, which are made a part of this application,

Figure 1 is a perspective view of the machine showing one face and one end view thereof;

Fig. 2 is a perspective view of one end of the machine,

Fig. 3 is a detail sectional view as seen from line 3—3, Fig. 1,

Fig. 4 is a sectional view as seen from line 4—4 Fig. 1,

Fig. 5 is an edge elevation of the master die with parts thereof broken away,

Fig. 6 is a sectional view through the metal feeding guide, as seen on line 6—6, Fig. 3, and

Fig. 7 is a sectional view as seen on line 7—7, Fig. 3.

Referring to the drawings, 1 and 2 indicate the end frames of the machine and 3 indicates the base therefor, said end frames and base being constructed in any preferred manner.

Extending transversely through the end members 1 and 2 at a distance above the base 3, is a shaft 4 on which is mounted the main or primary roller or die 5, said shaft 4 and roller 5 being driven from any source of power through a vertically extending shaft 6 and a horizontally extending shaft 7, the shaft 6 being supported in bearings 8 and 9, while the shaft 7 finds bearings in the end frames 1 and 2. Power is applied to the shafts 6 and 7 from a belt wheel 10, a pinion 11, and bevel gear 12, said pinion and gear being adjacent the lower end of the shaft 6, while adjacent the upper end of the shaft 6 is a bevel pinion 13 which meshes with a bevel gear 14 on one end of the shaft 7, the opposite end of said shaft 7 having a cog 15 which meshes with a driving gear 16 attached to that end of the shaft 4 projecting through the frame 2 and it can be readily seen that when power is applied to the belt wheel 10, the shaft 4 and the roller or die member 5 will be positively driven.

The peripheral face of the roller 5 is preferably oval in cross section so as to impart an oval or rounded curvature to the face of the fender, the outer edges of the roller also being preferably rounded so as to properly develop the flanges at the edges of the fender.

Co-operating with the main roller 5 is a pair of auxiliary rollers or die members 17 and 18 which are mounted respectively on shafts 19 and 20 and between the side walls 21 of a swinging frame 22, the shaft 19 extending transversely through the end frames 1 and 2 and forming a pivot for the swinging frame. The ends of the auxiliary rollers

or die members 17 and 18 are provided with end flanges 23 and 24 respectively, which co-operate with the side faces of the main roller 5 for forming flanges at the edges of the fender being constructed, while the peripheral surfaces of the auxiliary rollers between the end flanges, are curved co-incident to the curvature of the periphery of the roller 5, consequently when the metal blank from which the fender is constructed is passed between the main roller 5 and the auxiliary rollers 17 and 18, the metal will be caused to assume the contour of the curved faces of the die members between which it passes.

The auxiliary roller 17 is fixed to the shaft 19 and that end of the shaft extending through the end frame 1 has a cog 25 attached thereto which meshes with a gear 26 attached to that end of the shaft 4 projecting through the end frame 1, consequently the auxiliary roller 17 will be driven from the shaft 4 while the auxiliary roller 18 is driven from the shaft 19 through the medium of a gear 27 thereon and a gear 28 mounted on the shaft 20, and as both of the auxiliary rollers must rotate in the same direction an intermediate gear 29 is rotatably mounted on one side wall of the frame 22 which meshes with both the gears 27 and 28.

When the auxiliary rollers 17 and 18 are both in co-operative relation with the peripheral surface of the roller 5, the metal passing between said rollers will be bent in the arc of a circle thereby forming a curved portion for the fender, but if the fender is to have a straight portion in conjunction with the curved portion, after the curved portion is formed, that edge of the swinging frame 22 carrying the auxiliary roller 18 is swung downwardly out of contact with the roller 5 thereby permitting the metal to travel between the main roller 5 and the auxiliary roller 17 in a straight line and without forming any bend or curvature therein, except the transverse curvature or outline of the face of the fender.

Any preferred means may be provided for moving the auxiliary roller 18 into or out of engagement with the main roller 5, but preferably a cam 30 is fixed to the shaft 4 and rotated therewith, co-operating with which is a sheave 31 carried by an adjustable arm 32, said sheave being arranged to contact with and travel over the peripheral edge of the cam 30.

The adjustable arm 32 is pivotally connected at its lower end to a swinging standard 33 which is in turn mounted upon a shaft 34 carried by the end frames 1 and 2, the swinging standard 33 being fixed to said shaft. Also fixed to said shaft 34 is a pair of lifting arms 35 which project inwardly and engage the under face of the downwardly swinging end of the frame 22 so that as the standard 33 swings inwardly or out-

wardly the lifting arms 35 will be operated to lower or raise that end of the frame 22 carrying the auxiliary roller 18. The swinging action of the standard 33 and the lifting arms 35 is controlled entirely by the contour of the peripheral edge of the cam 30, as the sheave 31 is arranged to travel on the peripheral edge of said cam, and by arranging suitable inequalities in the surface of the cam the standard 33 will swing back and forth as the cam rotates. In this manner the formation of the different contours in the fender will be automatic and the swinging motion of the controlling means for raising and lowering the swinging frame 22 will be so graduated that there will be no abrupt contours formed in the outlines of the fenders but the curved portion of the fender will gradually develop into the straight portion. As best shown in Fig. 4 of the drawings, the edge of the cam 30 is cut away as shown by dotted lines, consequently when the cam is rotated until the sheave 31 encounters this cut away portion, said sheave and parts co-operating therewith, will swing inwardly to substantially the position shown by dotted lines in Fig. 3, while the frame 22 and the auxiliary roller 18 will swing substantially to the position shown by dotted lines in Fig. 3, consequently the remaining portion of the fender will pass between the rollers 5 and 17 in a straight line or until such time as the cam 30 rotates to again engage the sheave with the extreme outlines of the cam.

The degree of curvature of the curved portion of the fender may be readily regulated and determined by pivotally connecting one end of a screw shaft 36 to the swinging standard 33 passing the opposite end through a slot in the arm 32, any suitable means being provided for moving the arm 32 towards or from the standard 33, such for instance, as a hand wheel 37, as shown in Fig. 3 of the drawings, or through the medium of a nut 38, as shown in Fig. 1 of the drawings.

The arm 32 is braced and held in proper alignment with the standard 33 by extending a shank 39 from the arm 32 which passes through a slot 40 in the upper end of the standard 33.

In order to partially counterbalance the swinging frame 22, a beam 41 is pivotally suspended by means of a bracket 42 from the bar 43 connecting the upper ends of the members 1 and 2, the beam 41 having a weight 44 slidably and adjustably mounted on one end thereof, while the opposite end of said beam is connected with the swinging end of the frame 22 through the medium of a link 45, and by properly adjusting the weight 44 the strain upon arms 35, incident to raising and lowering the swinging end of the frame 22, will be practically eliminated.

The opposite faces of the roller or die 5 are provided with recesses 46 in which are located pressure rings 47 employed for maintaining the shape of the flanges on the fender, said rings being held in engagement with the remainder of the roller 5 through the medium of screws 48, or in any suitable manner, said screws being arranged to permit of lateral movement of the rings so that they may be forced outwardly and direct pressure against the flanges of the fender. A plurality of coil springs 49 are entered in sockets 50 formed in the side faces of the felloe portion of the roller 5 which normally hold the pressure rings 47 against the flanges of the fender under sufficient pressure to prevent buckling of the flanges or of the formation of kinks therein.

The blank from which the fender is constructed is guided into position between the rollers 5 and 17 through the medium of a guide chute 51 which is shaped to assume the general outline of the blank prior to its being properly shaped between the die rollers, the blank being properly guided and held against the inner face of the chute by means of a guide bar 52 which in this instance projects transversely across the path of the chute and through the side flanges thereof, the ends of the guide bar extending through elongated slots 53 in the walls of the chute and through similar slots 54 provided in adjusting blocks 55 which are attached to the chute and are provided with screws 56 and 57 for adjusting the height of the guide bar 52 above the face of the chute. In view of the fact that the guide chute 51 is constructed of relatively light material and that considerable stress is directed against the chute incident to the swedging action on the fender as it enters between the rollers 5 and 17, an adjustable brace 58 is pivotally connected at one end to parts of the base 3 while the opposite end thereof engages the lower face of the chute 51 in proximity to the auxiliary roller 17, consequently the guide chute 51, at this point, will be so braced as to prevent yielding thereof and avoiding any possibility of forming inequalities or kinks in the face of the fender prior to its entering between the rollers 5 and 17. The outer end of the chute 51 is adjustably supported by brackets 59 to parts of the frame structure so that the angle thereof may be readily regulated.

To prevent any buckling of the flanges of the fender as it is passing from the roller 17 to the roller 18, a guide block 60 is provided at each end of the rollers 17 and 18 and the under edge thereof is shaped to fit the contour of the flanges 23 and 24, said guide blocks holding the flanges in proper alignment as the fender is being shaped. Likewise, a bed plate 61 is introduced between the auxiliary rollers 17 and 18 and

from end to end thereof, the bed plate 61 resting upon a support 62 and having a curvature co-incident to the curvature of the roller 5, thereby preventing that portion of the metal between the auxiliary rollers 17 and 18 from extending downwardly or buckling between these points.

Owing to the degree of pressure required between the roller 5 and the rollers 17 and 18, and in view of the tendency of the fender to slip when contacting solely with metals of a similar nature, the guide blocks 60 and the bed plate 61 are preferably constructed of a metal different from that of which the various rollers are constructed, the best results being found through the use of bronze or similar material, and the ends of the bed plate 61 are so curved that they will develop into the guide blocks 60 without forming a material break between the contours of these two parts.

In operation, in the event the curved portion of the fender is the first to be formed, the cam 30 is set to cause the sheave 31 to engage the extremity thereof. A fender blank is then introduced into the chute 51 and the guide bar 52 adjusted to hold the blank in proper alignment with the chute. The blank is then moved inwardly until it is engaged by the roller 5 and the roller 17, and is moved lengthwise and between the roller 18 and the roller 5, and as said roller 18 is in juxtaposition to the roller 5, that portion of the blank passing between the rollers will be caused to assume a curved contour and such curvature will continue until the cut out portion of the cam is encountered by the sheave 31, whereupon the sheave and parts associated therewith will move inwardly and that end of the frame 22 carrying the auxiliary roller 18 descend. At this instant the curving of the fender will cease and the remainder of the fender extend in a substantially straight line, although the roller 5 and auxiliary roller 17 will continue to properly shape the fender. As soon as one fender is completed the cam 30 will have again rotated until it has again returned the sheave and parts associated therewith to their initial positions, when the same operation is performed on an additional fender.

It will readily be seen that by changing the contour and diameter of the cam the curvature and straight portion of the fender may be varied and easily regulated, and a straight portion may be formed at each side of the curved portion, if desired, by first passing a length of the fender blank between the rolls 5 and 17 then elevating the auxiliary roll 18 for forming the curved portion and again lowering the roll 18.

Likewise, the transverse contour of the fender may be changed by substituting different shaped rolls or dies.

And furthermore, by properly adjusting the arm 32 with respect to the standard 33 the degree of curvature imparted to the curved portion of the fender may be readily regulated.

Having thus fully described our said invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a metal bending and shaping machine, a primary roller, auxiliary rollers co-operating therewith for bending a section of metal passing between the primary and auxiliary rollers, and pivot means operable by means in conjunction with the primary roller for automatically positioning one of the auxiliary rollers for causing a strip of metal to bend or extend in a straight line.

2. In a metal bending and shaping machine, a primary roller, a pair of auxiliary rollers co-operating with the primary roller, and pivot means operable by means in conjunction with the primary roller for automatically moving one of the auxiliary rollers into juxtaposition to the primary roller for bending the material passing between the rollers in the arc of a circle or moving said auxiliary roller away from the primary roller for causing the material to extend in a straight line.

3. In a metal bending and shaping machine, the combination with a primary roller, and a pair of auxiliary rollers co-operating therewith, one of said auxiliary rollers being adjustable, of means including a lifting arm operable by a cam in conjunction with the primary roller for adjusting said auxiliary roller towards the primary roller for causing the material passing between the primary and auxiliary rollers to bend in the arc of a circle, and automatically operable means for determining the degree of bend imparted to the material.

4. In a metal bending and shaping machine, a primary bending and shaping roller, auxiliary rollers associated therewith, means including a lifting arm operable by a cam in conjunction with the primary roller for positioning one of the auxiliary rollers with respect to the primary roller for causing the article passing between said rollers to assume a curved shape or extend in a straight line, means for directing pressure against parts of the article passing between the rollers, and means for holding the article against buckling while passing between the rollers.

5. In a metal bending and shaping machine, the combination with a primary bending and shaping roll, an auxiliary bending and shaping roll co-operating therewith, of means for guiding a section of metal between the primary and auxiliary rolls, means for causing said metal to feed in a direct line, and automatically operable means

in conjunction with the primary roll for varying the position of the auxiliary roll for causing the metal to assume a curved contour or extend in a straight line.

6. In a metal bending and shaping machine, the combination with a primary bending and shaping roll, and an auxiliary bending and shaping roll co-operating therewith, of a chute for conveying and guiding a metal blank between the primary and auxiliary rolls, independently adjustable means for reinforcing said chute for holding the same against yielding whereby the blank will be held against buckling while entering between the primary and auxiliary rolls and a vertically adjustable guide associated with said chute for maintaining the blank in proper alignment.

7. In a metal bending and shaping machine, the combination with a primary roll and an auxiliary roll co-operating therewith, of a chute for guiding a flanged metal blank to position between the primary and auxiliary rolls, a guide extending across said chute and vertically adjustable in slots therein for maintaining the blank in proper alignment, and means for adjusting said guide for accommodating blanks of varying dimensions.

8. In a metal bending and shaping machine, a primary bending and shaping roll, a pair of auxiliary shaping rolls, a fixed shaft carrying one of said auxiliary rolls, a frame pivotally mounted on said shaft and carrying the other auxiliary roll, and automatically operated means for raising or lowering the end of the frame member carrying the second auxiliary roll for determining the degree of bend in the article passing between the primary and auxiliary roll.

9. In a metal bending and shaping machine, a primary bending and shaping roll, a driving shaft therefor, an auxiliary bending and shaping roll for co-operation with the primary roll, said auxiliary roll being in fixed position with respect to the primary roll, a second auxiliary roll adjustable with respect to the primary roll and movable in an arc around the first mentioned auxiliary roll, means for controlling the swinging movement of the second auxiliary roll, and means on the shaft of the primary roll for operating the controlling means for the second auxiliary roll.

10. In a metal bending and shaping machine, a primary bending and shaping roll, a pair of auxiliary bending and shaping rolls for co-operation with the primary roll, one of which is in fixed position with respect to the primary roll and the other adjustable in respect therewith, automatically operable means for elevating the adjustable roll for causing the same to impart a bend to an article passing between the primary and auxiliary rolls, and means rotatable with the pri-

mary roll for determining the degree of bend imparted by the movable auxiliary roll.

11. In a metal bending and shaping machine, the combination with a primary bending and shaping roll, a pair of auxiliary rolls co-operating therewith, one of said auxiliary rolls being movable towards or from the primary roll, of means for moving the movable auxiliary roll towards the primary roll, means rotatable with the primary roll for determining the operation of the auxiliary roll moving means, and means for determining the degree of movement of said auxiliary roll.

12. In a metal bending and shaping machine, the combination with a primary bending and shaping roll, of auxiliary rolls for co-operation with the primary roll for bending and shaping a metal blank passing between the primary and auxiliary rolls, a shaft carrying one of said auxiliary rolls in fixed relation with the primary roll, a frame member pivoted on said shaft and carrying another auxiliary roll, arms for pivoting said frame on said shaft for moving the auxiliary roll carried thereby in juxtaposition to the primary roll, a cam associated with and operable co-incident to the primary roll, means associated with said arms and cam for controlling the swinging movement of said arms, and means for determining the position of the movable auxiliary roll with respect to the primary roll.

13. In a metal bending and shaping machine, a plurality of fixed shafts, a primary roller mounted on one of said shafts, an auxiliary roller mounted on another of said shafts in cooperative relation with said primary roller a pivoted shaft, a second auxiliary roller carried by said pivoted shaft, a pivoted arm, a sheave wheel carried by said arm and a cam carried by the shaft of the primary roller and rotatable therewith for operating said sheave wheel and arm for moving the pivoted auxiliary roller into and out of engagement with the primary roller, substantially as set forth.

14. In a metal bending and shaping machine, a shaft having a primary roller and a cam mounted thereon, a sheave wheel co-operable with the cam, a pivotally mounted adjustable arm supporting said sheave wheel, a pivoted frame, an auxiliary roller support-

ed by said frame, a second auxiliary roller for cooperation with said primary roller, a pivotally mounted lifting arm having one end in engagement with said adjustable arm, the other end of said lifting arm supporting the end of said pivoted frame said auxiliary roller carried by said frame being adapted to be moved toward and from said primary roller upon rotation of said cam, substantially as set forth.

15. In a metal bending and shaping machine, a primary bending and shaping roller, an auxiliary roller, a pivotally mounted supporting frame, a second auxiliary roller carried by said frame, means for counterbalancing the supporting frame comprising a pivotally suspended beam, a weight slidably and adjustably mounted on one end of the beam, said beam having its other end connected with the swinging end of the frame supporting the second auxiliary roller, substantially as set forth.

16. In a metal bending and shaping machine, a primary roller having an oval peripheral face and substantially flat side faces each of the side faces being provided with a recess, a spring pressed pressure ring in each recess, and means associated with the primary roller for forming flanges at the edges of work operated upon, substantially as set forth.

17. In a metal bending and shaping machine a primary roller, an auxiliary roller fixedly mounted to cooperate with the primary roller, a second auxiliary roller pivotally mounted for cooperation with the primary roller, means for rotating the auxiliary rollers in the same direction opposite the direction of the primary roller, means operable with the primary roller for determining the position of the pivoted auxiliary roller, and means for counterbalancing said pivoted auxiliary roller, substantially as set forth.

In witness whereof, we have hereunto set our hands and seals at Indianapolis, Indiana, this 16th day of August, A. D. nineteen hundred and twenty-two.

BERT E. THOMPSON. [L. S.]
TEDDY A. GREEN. [L. S.]

Witnesses:

M. L. SHULER,
CAREY S. FRYE.