July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 1

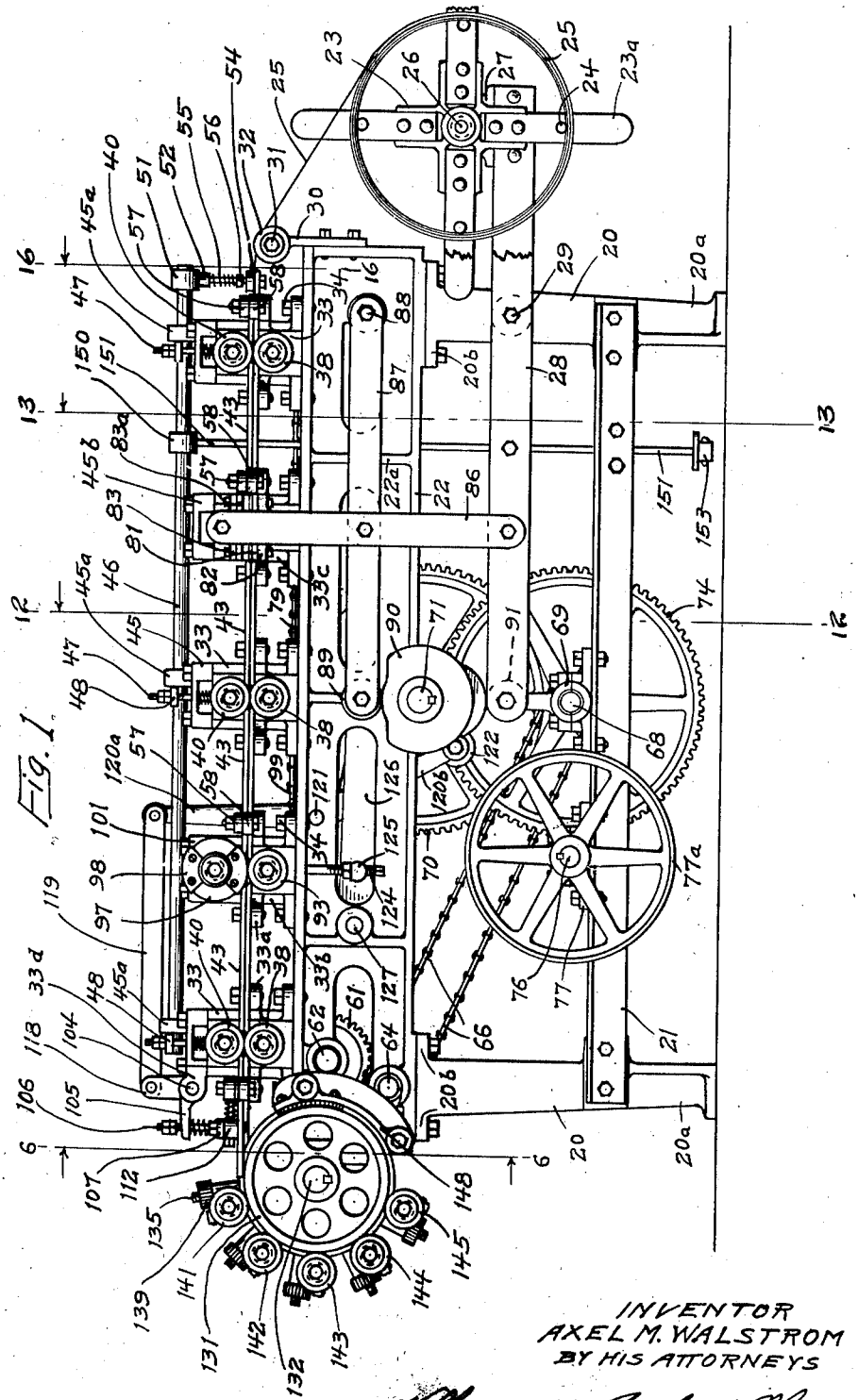


Fig. 1.

INVENTOR
AXEL M. WALSTROM
BY HIS ATTORNEYS

Thomson Reis & Williamson

July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 2

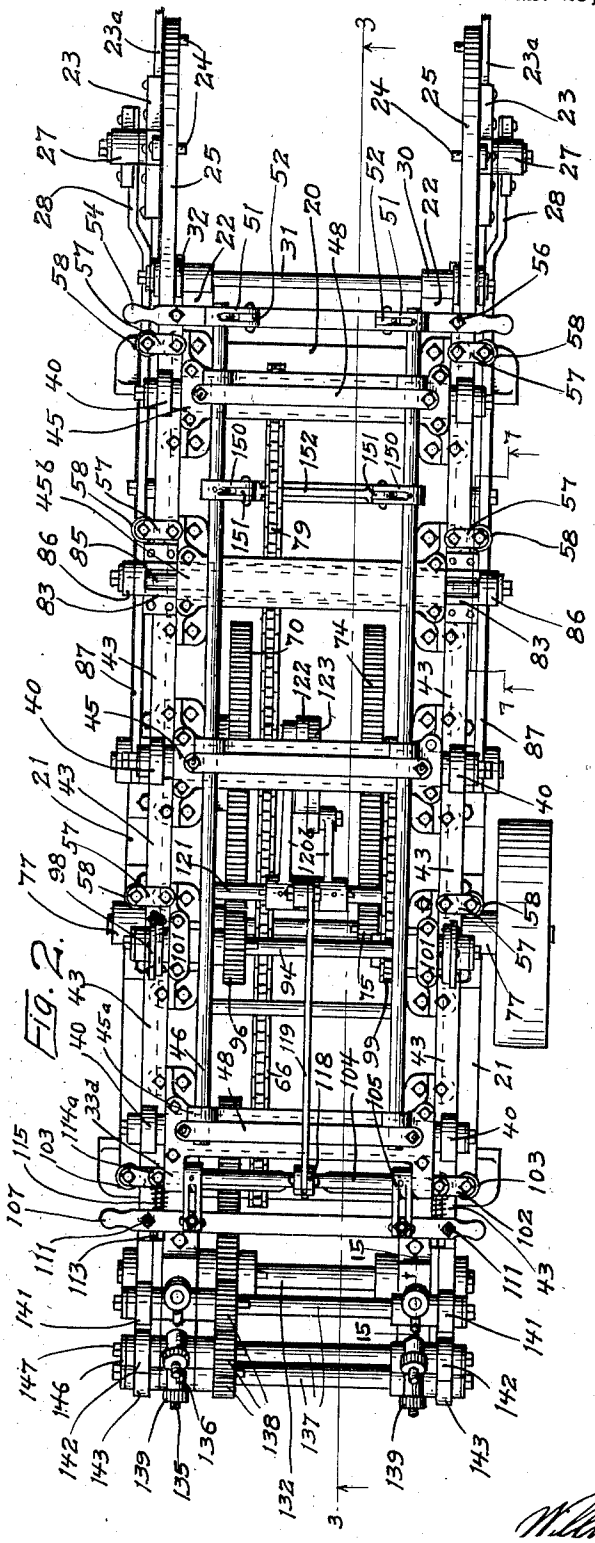


Fig. 2.

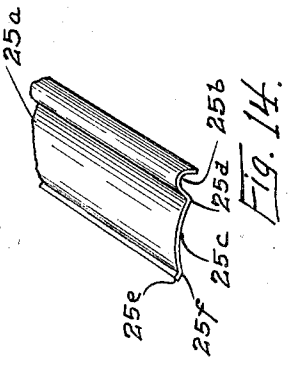


Fig. 14.

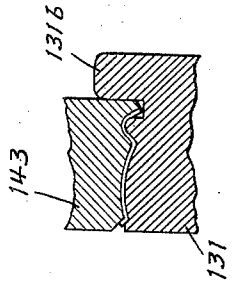


Fig. 10.

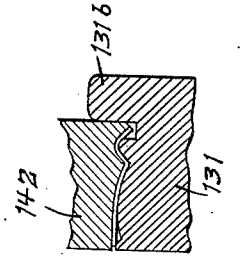


Fig. 9.

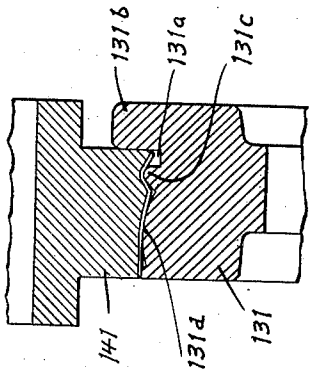


Fig. 8.

INVENTOR
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July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 3

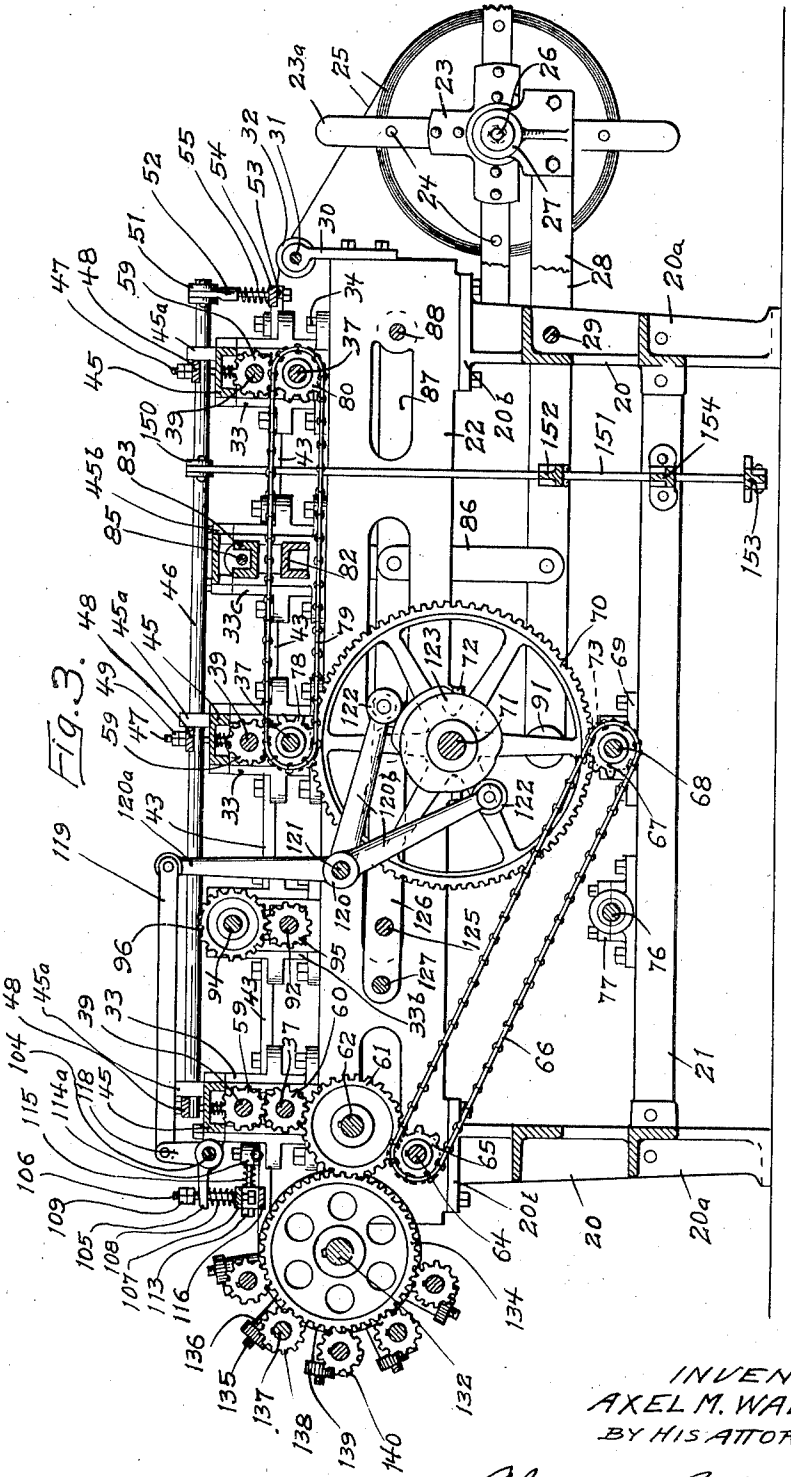


Fig. 3.

INVENTOR
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BY HIS ATTORNEYS

Williamson Reis & Williamson

July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 4

Fig. 5.

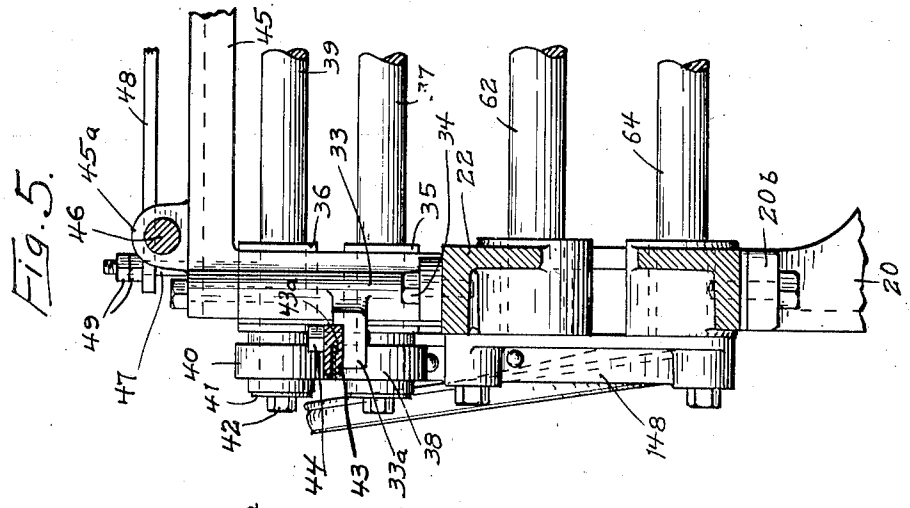
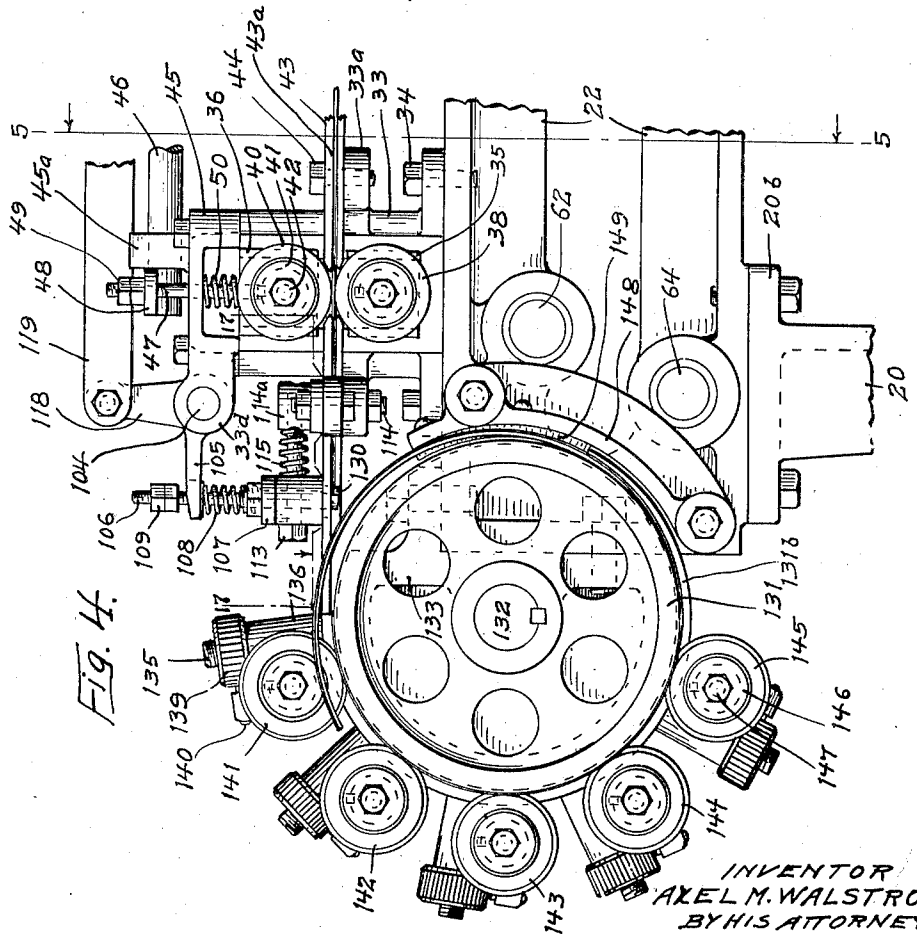


Fig. 4.



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Williamson Page & Williamson

July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 5

Fig. 6.

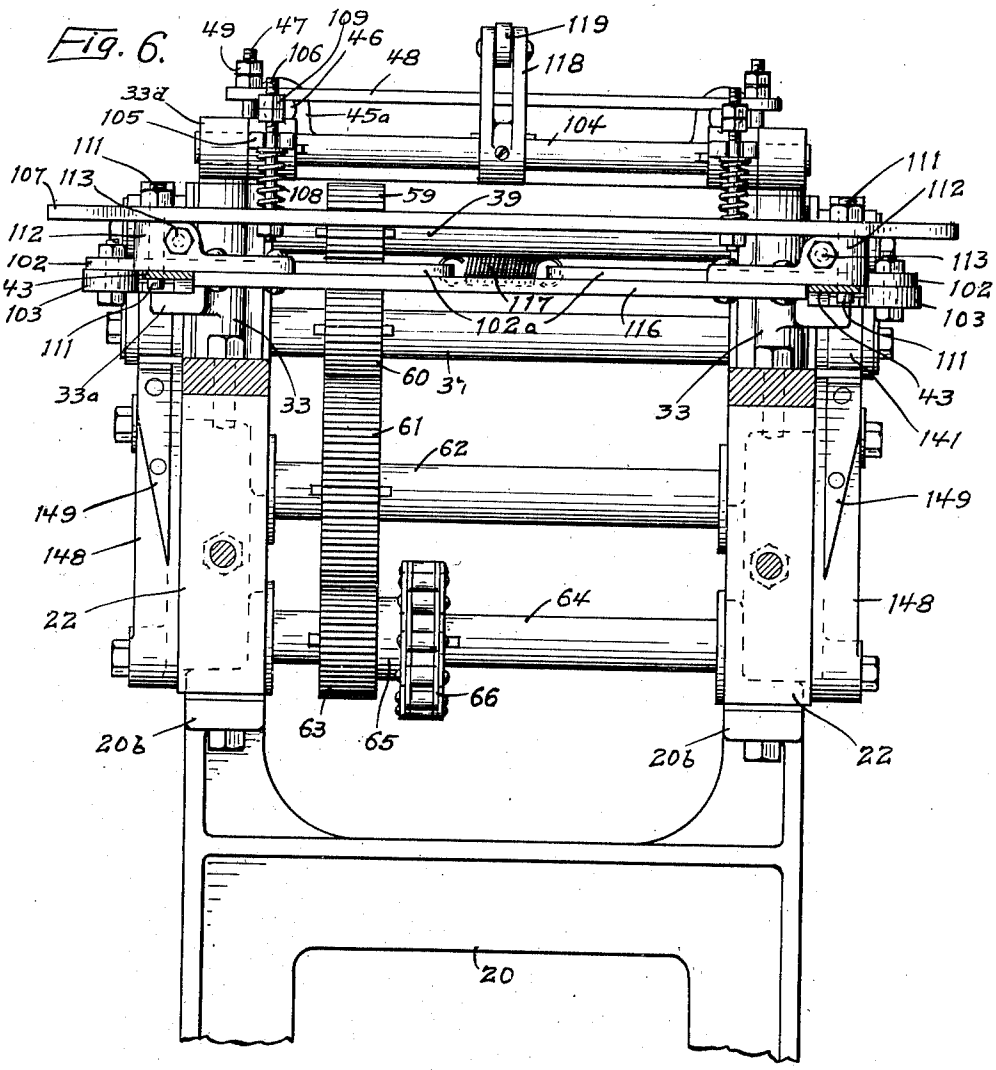
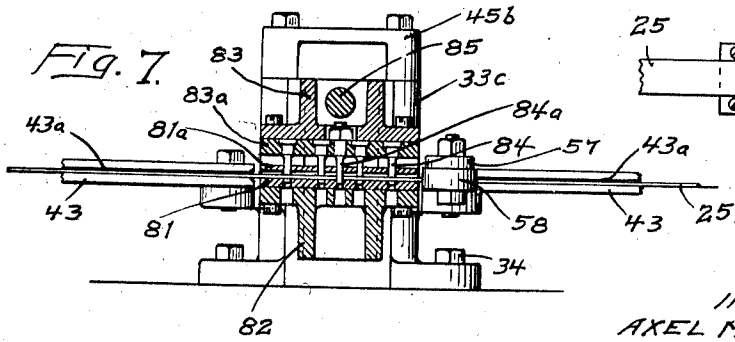


Fig. 7.



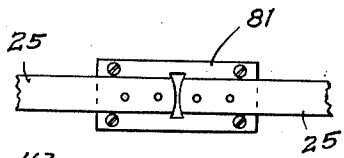


Fig. 18.

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July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 6

Fig. 15.

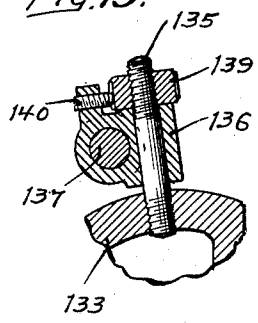


Fig. 13.

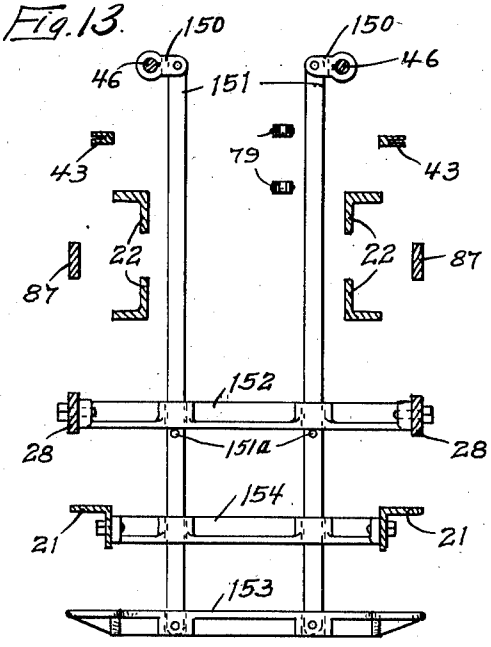


Fig. 16

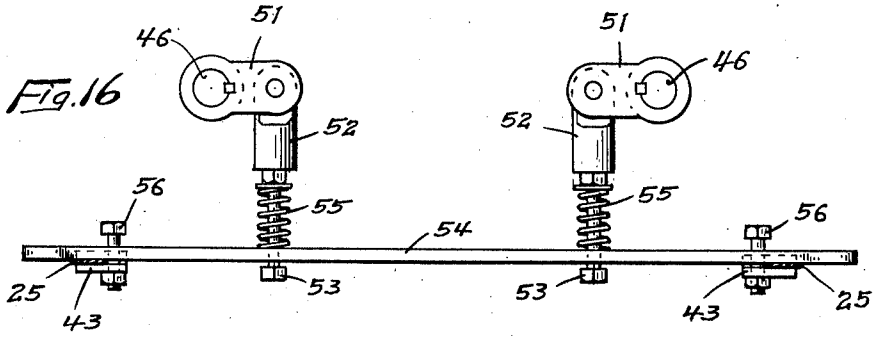


Fig. 11

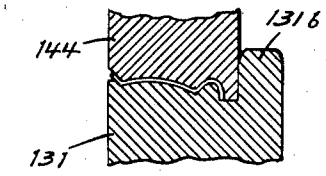
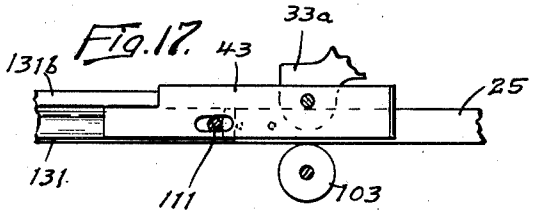


Fig. 17.



INVENTOR
AXEL M. WALSTROM
BY HIS ATTORNEYS

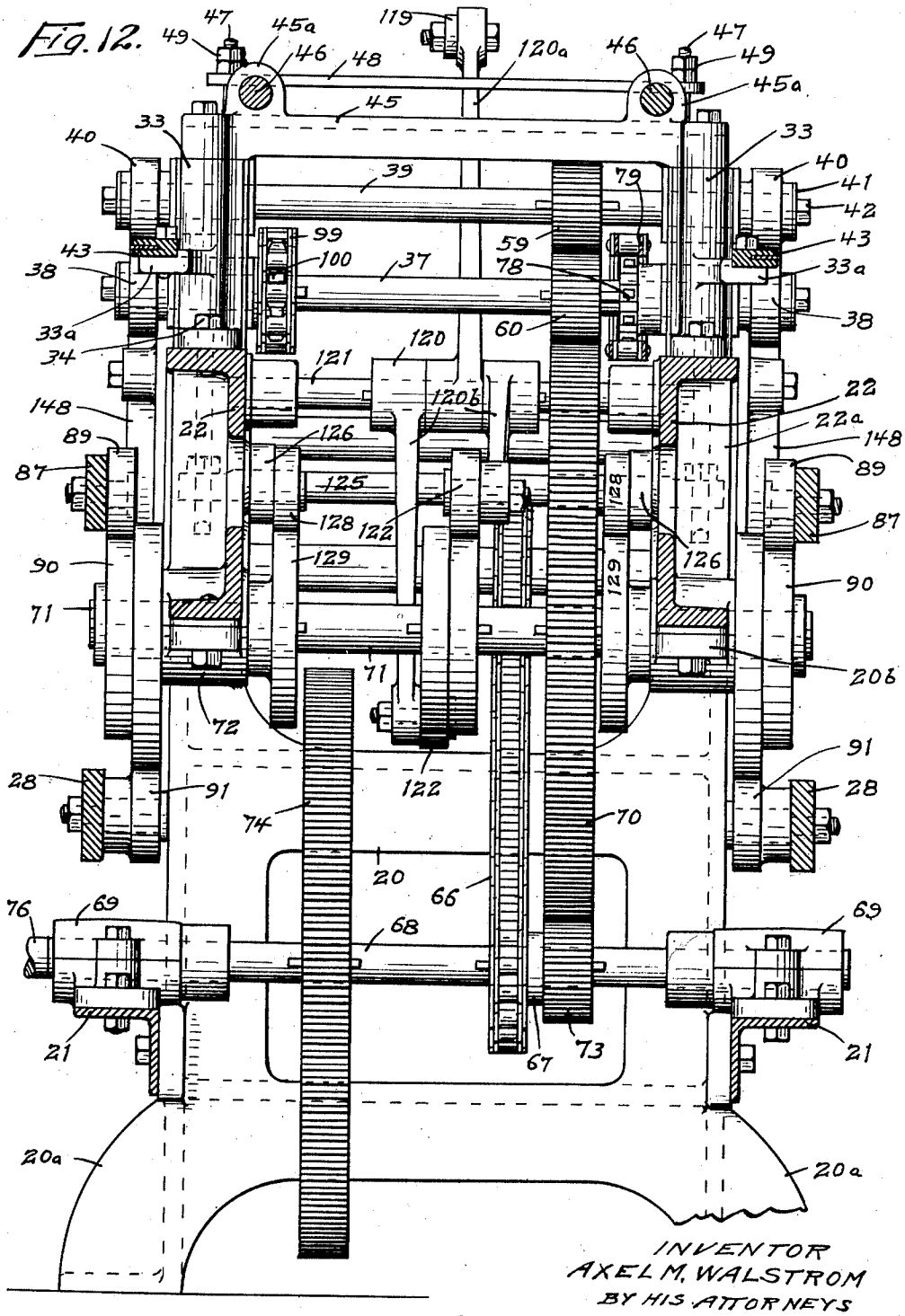
Williamson Reif & Williamson

July 2, 1929. A. M. WALSTROM 1,719,250

MACHINE FOR MAKING METAL HOOPS

Filed Jan. 25, 1926 7 Sheets-Sheet 7

Fig. 12.



INVENTOR
AXEL M. WALSTROM
BY HIS ATTORNEYS
Williamson Reif & Williamson

Patented July 2, 1929. 1,719,250

UNITED STATES PATENT OFFICE.

AXEL M. WALSTROM, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO ELGIN BUTTER TUB COMPANY, OF ELGIN, ILLINOIS, A CORPORATION OF ILLINOIS.

MACHINE FOR MAKING METAL HOOPS.

Application filed January 25, 1926. Serial No. 83,616.

This invention relates to a machine for forming metal articles, and while a machine of this type might be used to form various articles, in the embodiment of the invention illustrated, a machine is shown for forming metal hoops, such as commercially used on butter tubs. Metal hoops are now commonly used on wooden butter tubs, which tubs are also tapered toward one end and the hoop forced on the tub. The present machine is particularly designed for rapidly and efficiently making a type of hoop, such as disclosed in Patent No. 1,605,628, granted November 2, 1926, for metal hoops on an application for "metal hoops", filed by applicant.

It is an object of this invention to provide a machine for automatically, quickly and economically forming a hoop such as disclosed in said application, the hoop being formed all ready for riveting.

It is a further object of the invention to provide a machine having means for supporting a strip of metal from which the hoops are made, and also comprising means for feeding said strip punching rivet holes therein, cutting the strip into proper lengths for the hoop and forming said lengths into substantially circular form.

It is also an object of the invention to provide a machine for forming a metal hoop from a strip of material having a forming means at one end for shaping the hoop into the desired cross section and bending the same into substantially circular form, and also having means of considerable extent through which the strip is advanced and prepared for forming and bending while one hoop is being operated on by said forming means.

It is still further an object of the invention to provide a machine for forming a metal hoop having a forming means comprising a substantially cylindrical roll, the peripheral surface of which is formed in cross section similar to the cross section of the hoop, said roll having circumferentially spaced thereabout a plurality of smaller rolls adapted to press the strip of material against said first mentioned roll to form therein a plurality of parallel beads and grooves, and to bend the same to substantially circular form.

It is a further object of the invention to provide a machine, as set forth in the preceding paragraph, in which the first mentioned roll and plurality of rolls are positively and synchronously driven.

It is also an object of the invention to provide a machine, such as set forth in the last preceding paragraph save one, in which the said plurality of rolls are disposed about one portion of the periphery of said first mentioned roll and a discharging means for discharging the bent hoop from the roll is disposed about the other portion of the periphery of said first mentioned roll.

It is still another object of the invention to provide a machine for bending a metal hoop having a forming means in one end, means for feeding a strip to said forming means, and a stop member in advance of said forming means against which the end of the strip contacts so that the strip is stopped while being punched and severed and until the proper time for it to enter the forming means.

It is a further object of the invention to provide such a machine, as set forth in the preceding paragraph, together with means for rendering the feeding means inoperative when the strip engages said stop and also, together with means for engaging the strip to prevent retrograde movement thereof when the feeding means is rendered inoperative.

It is still another object of the invention to provide a machine for forming a metal hoop having means for feeding a strip of material, means for properly punching and severing said strip to form the same into suitable hoop lengths, forming means for forming and bending said lengths, a stop means for governing the entry of said strips into said forming means, together with power driven means for automatically and synchronously operating said parts.

It is also an object of the present invention to provide a machine which simultaneously froms a plurality of metal hoops from a plurality of strips of material.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to the same parts throughout the different views, and in which,

Fig. 1 is a view in side elevation of the machine;

Fig. 2 is a plan view of the machine;

Fig. 3 is a longitudinal vertical section

of the machine taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a view in side elevation of one end of the machine shown on an enlarged scale;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 4, as indicated by the arrows;

Fig. 6 is a vertical section taken on the line 6—6 of Fig. 1, as indicated by the arrows, shown on an enlarged scale;

Fig. 7 is a vertical section taken on the line 7—7 of Fig. 2, as indicated by the arrows;

Figs. 8 to 11, inclusive, are partial vertical sections taken through the main forming roll and the various small rolls co-operating therewith;

Fig. 12 is a vertical section taken on the line 12—12 of Fig. 1 as indicated by the arrows, and shown on an enlarged scale;

Fig. 13 is a vertical section taken on the line 13—13 of Fig. 1 as indicated by the arrow;

Fig. 14 is a perspective view of a portion of the hoop formed;

Fig. 15 is a vertical section taken on line 15—15 of Fig. 2, as indicated by the arrow;

Fig. 16 is a vertical section taken on line 16—16 of Fig. 1, as indicated by the arrows, shown on an enlarged scale;

Fig. 17 is a horizontal section taken on line 17—17 of Fig. 4, as indicated by the arrows; and

Fig. 18 is a plan view of the punched strip and lower die block.

Referring to the drawings, a machine is shown comprising a frame having end members 20, each of which has spaced legs 20ª, said end members being connected intermediate their ends by longitudinally extending members 21. The end members 20 have upstanding flanges 20ᵇ at their upper ends and spaced side frame members 22 illustrated as of channel shape in cross section, are secured to and extend between the end members 20 at each side thereof, said members 22 having spaced transversely extending ribs 22ª.

In the embodiment of the invention illustrated, a machine is shown which simultaneously operates on two strips of material to feed, punch and sever said strips simultaneously, forming the severed portions into two hoops which are then discharged. To this end, two reels are provided for separately supporting coils of the strip metal. While various forms of reels may be used, which reels might be variously mounted, in the embodiment of the invention illustrated, two reels 23 are provided, each comprising a plurality of radially extending arms 23ª illustrated as four in number, which have projecting from their adjacent sides, pins 24 on which the roll 25 of strip material is supported. The arms 23ª are held in a central hub in the reels 23, which reels are rotatably mounted on central shafts 26 mounted in bearings 27 secured to the outer end of levers 28, which levers are pivoted on the stud shafts 29 in the rear end members 20 and at the sides of said members. Secured to the rear end of members 22 are bearing members 30 in which are secured the shaft 31 having grooved guide rollers 32 at each end over which the strip of material 25 passes from each of the reels 23. Secured to the top of the members 22 in longitudinally spaced relation, is a plurality of saddles 33, each having laterally extending flanges bolted to the top flange of member 22 by suitable cap bolts 34. The saddles 33 each comprise spaced vertical sides between which are disposed bearing blocks 35 and 36, respectively. The bearing blocks 35 being at the bottom of the saddles 33 and having journaled therein shafts 37 extending transversely between the saddles 33 at each side of the machine and having secured thereto at the outer side of the saddles feed rollers 38. The bearings 36 also have journaled therein a shaft 39 extending between the saddles at opposite sides of the machine and also having secured thereto at their outer ends beyond said saddles, the upper feeding rolls 40. The rolls 38 and 40 are keyed on their respective shafts and additionally held thereon by washers 41 held in place by screws 42 threaded into the ends of their respective shafts. The saddles 33 have intermediate flanges 33ª projecting laterally therefrom rabbeted on their top surfaces to receive elongated members 43 secured thereto by bolts 44. The members 43 extend between the saddles 33 and are in the form of bars substantially rectangular in vertical cross section, each having a narrow slot 43ª formed therein at their outer sides. As shown in Figs. 1 and 4, the bars 43 extend partially between the feed rolls 38 and 40 and are beveled slightly to project part way between the rolls. The saddles 33 have cap members 45 bolted to their top surfaces, which cap members extend between the saddles at the opposite sides of the machine, as shown in Figs. 2 and 5. The cap members 45 have bearing lugs 45ª upstanding therefrom adjacent each end in which are journaled the shafts 46 extending longitudinally of the machine and parallel to the top of frame members 22 and bars 43. Rods 47 are secured at their lower ends in the bearings 36 and extend through the top of cap members 45 and through bars 48 extending across the top of the machine, said rods being threaded at their upper ends and having a pair of nuts 49 thereon, the lower of which engages the bar 48. Coiled compression springs 50 surround the rods 47 between the top of the bearings 36 and the

bottom surface of the cap 45, said cap members 45 being cut away at the ends between the sides of saddles 33 to provide a space for said springs 50. The shafts 46 are provided with flattened portions adjacent the bearing lugs 45[a] and the bars 48 engage said flat surfaces. With this construction it will readily be seen that if shafts 46 are oscillated the edges of the flat surfaces will raise the bars 48 and bearings 36 with the parts carried therein. It is here pointed out that there is a saddle 33[b] secured to each frame member 22 between the two forward saddles 33. The saddle 33[b] is, to a great extent, similar to the saddles 33 and has the same kind of flange 33[a] projecting therefrom, to which the adjacent sections of bar 43 are secured. There is also a saddle 33[c] bolted to each of the frame members 22 between the rear pair of saddles 33. The saddle 33[c] is adapted to carry a punching mechanism to be later described, but also has a flange 33[a] thereon to which the adjacent sections of bar 43 are secured. It will be noted that the center line of the slot 43[a] passes substantially tangent and to and between the respective pairs of feed rolls 38 and 40.

The shafts 46 at their rear ends have secured thereto arms 51 bifurcated to have pivotally secured therein depending arms 52 which have bolts 53 depending therefrom, which bolts extend through a bar 54 extending across and between the rear ends of bars 43. The bars 43, at said rear end have an upper portion above slot 43[a] cut away so that bar 54 rests on the lower portion or on the strips 25 disposed on said lower portion. The heads of bolts 53 are disposed under the bar 54 and coiled springs 55 surround bolts 53 and are disposed between the lower end of arms 52 and the bar 54. The bar 54 is further guided on bolts 56 extending therethrough and into the bar 43. The strips of material 25 pass over the rear end of bars 43 under the bars 54 and through the slots 43[a]. The shafts 46 also have connected thereto brackets 150 bifurcated to receive downwardly extending rods 151 extending through a crossbar 152, and having pins 151[a] normally just below said bar. Rods 151 are guided in a bracket 154 secured to the frame members 21 and are connected to a pedal 153 at these lower ends. The cross bar 152 extends between and is connected to the cam levers 28. Small brackets 57 are bolted to the flanges 33[a] of the rear saddles 33 and saddles 33[b] and 33[c] and carry small rollers 58 revoluble on vertical axes, which rolls are adapted to engage the outer edges of strips 25 and hold the same in the slots 43[a]. The feed rolls are driven through their shafts 39 and 37 which carry, respectively, the gears 59 and 60 which mesh with each other. The gear 60 in the forward saddle 33 is driven by a gear 61 carried on a shaft 62 journaled in bearings carried in the forward portion of the frame members 22. The gear 61 is, in turn, driven by pinion 63 secured to a shaft 64, also journaled in bearings carried in the forward portion of the frame members 22. The shaft 64 carries a sprocket wheel 65 driven by a chain 66 which also passes over a driving sprocket 67 carried on a shaft 68 journaled in bearings 69 secured to each of the longitudinal members 21. The shaft 68 carries a pinion 73 engaging with a larger gear 70 carried on a cam shaft 71 which is journaled in bearings 72 secured to the bottom of each frame member 22. The shaft 68 also carries a larger gear 74, which gear is engaged by and driven by a pinion 75, which pinion 75 is secured to a main driving shaft 76 journaled in bearing 77 also bolted to the top of one of the frame members 21, and the shaft 76 projects at one side of the frame and has secured thereto a driving pulley 77[a] adapted to be driven by a belt connected to any suitable source of power. The gear 70 also meshes with a gear 60 on the shaft 37 in the central saddle 33 and this shaft 37 which carries the lower feed roll 38 is also provided with a sprocket wheel 78 over which runs a chain 79 also running over and driving a sprocket wheel 80 on the shaft 37 in the rear saddle 33, the rear of the machine being taken as the end having thereon the reel 23. With the described gearing all of the feed rolls 38 and 40 are thus driven at the same speeds.

As stated, the saddle 33[c] carries a punching mechanism and to this end the same has mounted therein the female cutting die 81 provided with a stripper plate 81[a] and alined with the slot 43[a] in the adjacent bars 43. The die 81 is carried on a support 82 in the lower part of saddle 33[c]. A punch carrying member 83 is slidable between the sides of saddle 33[c] and carries a plate 83[a] in which the punches 84 are secured. The two punches at each end of the members 83[a] are circular in cross section and arranged in staggered relation and are for the purpose of punching rivet holes in the strip 25. The central punch 84[a] is of somewhat greater width than the width of the strip 25 and has its sides somewhat concave so that it is approximately spool-shaped in cross section. Each punch 84[a] acts to sever a section from the strip 25 and thus divide said strip into the proper lengths for the hoops. The member 83[a] has a shaft 85 passing therethrough, to the ends of which are pivotally secured the upper ends of links 86, said links 86 being pivotally secured at their lower end to the cam levers 28 already referred to. The links 86 are also pivotally connected intermediate their ends to levers 87 pivoted at their rear ends by the pivots 88 to the frame members 22. The levers 87 have rollers 89 at

their forward ends engaging cams 90 and the cam levers 28 have rollers 91 at their forward ends also engaging the cams 90 at the opposite side from the rollers 89. It may be stated that a cap member 45[b] is secured to the top of saddle members 33[c] and extends between the same, said cap member being quite similar in shape to the cap members 45 but not having the bearing lug 45[a] thereon. The saddle members 33[b] have bearing blocks in their lower ends in which are journaled a shaft 92 having rolls 93 at each end and said saddle has a bearing block in its upper portion in which is journaled a shaft 94. The shaft 92 carries a gear 95 meshing with a larger gear 96 on the shaft 94. The shaft 94 has secured at each end a die-carrying disk 97 to which are secured at opposite sides stencil die plates 98 having thereon certain inscriptions which it is desired to stamp on the strips 25. The bearing blocks for the shaft 92 have secured and depending therefrom the rods 124 threaded at their lower ends adapted to pass through a transversely extending shaft or bar 125 and secured against the flattened upper portion thereof by a jam nut. The shaft 125, at each end, passes through a cam lever 126, there being one cam lever at each side of the machine, which levers are pivoted on a shaft 127 extending between the frame members 22. The cam levers 126 extend rearwardly and have cam rollers 128 at their rear ends adapted to engage cams 129 disposed adjacent the ends of cam shaft 71. The roller 93 will be elevated slightly with each actuation of cam lever 126. This movement is exceedingly small and does not interfere with the proper meshing of gears 95 and 96. The shaft 92 is driven by a chain 99 running over a sprocket secured thereto and also running over a sprocket 100 secured to shaft 37 in the central saddles 33. The bearing blocks in saddle 33[b] are held in place by cap plates 101 secured to the top of said saddles.

At the forward end of the front saddle 33 are secured outwardly projecting small brackets 102 having journaled therein on vertical axes small rollers 103, having their sides in alinement with the slot 43[a] and adapted to engage the outer edge of the strips 25. The brackets 102 are arranged to slide transversely of the machine and have inwardly projecting portions 102[a] connected at their inner ends by a tensile coiled spring 117. The rollers 103 are thus yieldingly held against the outer edge of the strips 25 or sections thereof. The forward saddles 33 also have projecting forwardly, bearing lugs 33[d] in which are journaled a shaft 104. Said shaft has arms 105 secured thereto and projecting forwardly bifurcated to receive depending rods 106. The rods 106 are threaded at the ends and have nuts on their lower ends on which rest bar 107 extending across the machine, said rods 106 being surrounded by compression springs 108 seated on top of bar 107 and engaging the underside of arms 105. The rods 106 have a pair of nuts 109 threaded thereon at their upper ends normally somewhat above the arms 105. The bar 107 has stop pins 111 threaded thereinto at their upper ends and held by a jam nut, said pins projecting below brackets 112, which brackets are carried on headed studs 113, said studs passing horizontally through the brackets 112 parallel to the members 43 and secured at their inner ends in the heads 114[a] of vertical studs 114 which are secured in the flange 33[a] of the forward saddle 33. The studs 114 pass through slots formed in the brackets 102 so that the latter can slide relatively to said studs. A coiled compression spring 115 is disposed between the head 114[a] and the bracket 112 and said bracket can be adjusted toward and from head 114 by rotation of the stud 113 which is threaded in head 114[a]. The brackets 112 are rigidly connected together by a bar 116 extending therebetween. The shaft 104 also has an arm 118 secured thereto and shown as projecting substantially vertically to the upper end of which is pivotally secured a link 119. The link 119 is pivotally secured at its rear end to a substantially vertically extending arm 120[a] of a cam lever 120 secured to a shaft 121 extending between and journaled in the side members 22. The lever 120 also has a pair of angularly disposed arms 120[b] projecting toward cam shaft 71 and having rollers 122 on their ends engaging opposite sides of the cam 123 on the cam shaft 71.

Through the mechanism described, the operation of cam lever 120 will act to depress bar 107 and stop pins 111. Attention is called to the fact that the forward section of bar 43 has its lower portion below the slot 43[a] cut away, as shown at 130. The stop pins project through the upper portion of bar 43 closing adjacent the end 130 and said stop pins have their rear sides slightly cut away, as shown in Fig. 4.

The top portion of the forward section of bar 43 continues to a point substantially tangent with a forming roll 131. The roll 131 is secured to a shaft 132 journaled in bearings formed in brackets 133 bolted to the forward end of frame members 22, as shown in Fig. 4. The shaft 132 is provided with a gear 134 meshing with gear 61 already described. The bracket 133 has a semi-cylindrical portion, as shown in dotted lines in Fig. 4 and a plurality of radially disposed threaded studs 135 are secured in said portion. Bearings 136 are longitudinally movable on the studs 135 and in which are journaled shafts 137, to each of which is secured a pinion 138, all of said pinions meshing

with gear 134. The bearings 136 may be adjusted on the studs 135 by rotatable members 139, which members are locked in adjusted position by set screws 140 passing through lugs on the bearings 136 and into contact with the members 139, said set screws having slotted heads. The forming roll 131 has its periphery shaped, as shown in Figs. 8 to 12. A section of the hoop 25^a, formed, is shown in Fig. 14, and it will be seen that said hoop comprises a groove 25^b adjacent one edge and a flatter parallel groove 25^c, said grooves forming a ridge 25^d therebetween and said hoop further having its other edge 25^e bent up at an angle, thus forming another ridge 25^f. The periphery of roll 131 is formed to fit the hoop and said roll has a groove 131^a extending thereabout, illustrated as of substantially rectangular form in cross section, at one side of which extends the flange 131^b. The roll has a ridge or bead 131^c adapted to fit in the groove 25^b of the hoop and has a flat ridge 131^d adapted to fit in the groove 25^c of the hoop. The shafts 137 carry smaller forming rolls 141, 142, 143, 144 and 145, all co-operating with the forming roll 131, said rollers being keyed to shafts 137 and held on the ends thereof by washers 146 and studs 147 threaded into the ends of said shafts. The rolls 141 to 145 have their peripheral surfaces shaped, as shown, respectively, in Figs. 8 to 11. A bracket 148 is secured to the end of each frame member 22 having a concave outer surface substantially parallel with the peripheral surface of roll 131 and said bracket 148 has formed on its concave face a wedge-shaped cam 149. It will be noted that said cam is spaced from the inner edge of the bracket and the flange 131^b on forming roll 131 passes between cam 149 and the inner edge of bracket 148. It may be stated that the forward end of bar 43 projects over the top of roller 131 and is cut away at one side to extend along side of flange 131^b.

In operation, the rolls of the flat strip metal material are mounted on the reels 23. Preferably, the ends of the strip in starting the machine, will have a pair of rivet holes punched therein by hand or a separate machine. The ends of the strips are then led over the rolls 32 under the bar 54 which normally is not pressed down by the spring 55 and then between the first pair of feed rolls 38 and 40. The feed rolls may be separated so as not to press against the strip by depression of the pedal bar 153. Such depression through the arms 150 rocks the shafts 46 and the flat portions of these shafts raise the bars 48, thus raising the upper feed rolls 40. The ends of the strips are passed under the punches 84 and 84^a which are in raised position under the feed rolls in the central saddle 33 between the members 97 and 93 and between the forward pair of feed rolls, the ends of the strips being placed against the rear faces of the stop pins 111, which stop pins then are in depressed position. Power is now applied to the machine through the driving wheel 77^a. The cam shaft 71 is thus driven, as are the various feed rolls. The gears 92 and 94, together with the forming roll 131 and the smaller forming rolls 141 to 145. As cam shaft 71 revolves, cams 90 will depress cam levers 28. This will, through the links 86, depress the punch carrying members 83 and 83^a and the strip will be severed by the punch 84^a and will have a pair of staggered holes punched therein at each side of said line of severance by punches 84. It is desired not to have the feed rolls operating on the strip while the punches are operating as this would pull the strip against the punches. When lever 28 is depressed, therefore, the cross bar 152 pulls down on the rods 151 and shafts 46 are oscillated through arms 150 thus elevating bars 48 and raising the top feed rolls 40 off of the strips. As soon as the high part of cam 90 passes roller 91 on each cam lever 28, the roller 89 on each cam lever 87 will be raised and the punch carrying members 83 and 83^a will be raised with the punches 84. When the punches have been lifted from the strip the upper feed rolls will again be depressed by the springs 50 and the strip will be advanced. Just before this point the cam 123 will swing the arm 120^a of lever 120 toward the rear, and bar 107 will be raised by the arms 105 on shaft 104 so that the stop pins 111 are raised out of the path of the ends of the strips 25. Feed rolls being in engagement with the strip, the strip will now be advanced and pass along through slot 43^a under the upper part of bar 43, over roll 131. The strips will be engaged between the forming roller 131 and roller 141. As the strip is passing between members 97 and the hardened steel roller 93, cam 129 will raise the roller 93 slightly so that the strip will be pressed against the stencil die 98 and the trade mark or other inscription which it is desired to press on the strip will be inscribed thereon. The strips are guided around the roll 131 and successively engaged by rollers 141 to 145. While the strip is progressing about roller 131, another section of strip is being moved along through slot 43^a beneath the punches 84 and 84^a and between the various feed rolls 38 and 40. As the end of one section passes under stop pins 111 cam 123 swings arms 120^a so that the arms 105 are again swung downward and the pins and bar 107 are resiliently urged downward by the arms 105 and spring 108. The pins 111 engage the rear end of the section of the strip and press the same downwardly slightly

so that the stop pins are in position to engage the forward ends of the approaching subsequent sections of strips. The strip passing around roll 131 is first engaged by the roller 141 and, as shown in Fig. 8, the roller 131 engages the strip at the top of the ridge or rib 131c. As the strip passes between rolls 131 and 141, it is urged inward by the rollers 103 and spring 117 so that its inner edge engages the side of the flange 131b. The strip is engaged between roller 141 and the ridge or bead 131c when the edge of the strip is in engagement with flange 131b. The roller 141 is formed to bend the strip slightly into the depression in roll 131 between the ridges 131c and 131d. The strip is next engaged by roller 142. This roller is shaped to bend the strip more sharply into the groove between the ridges or beads 131c and 131d and has a somewhat thicker lip extending into the groove 131a so that the inner edge of the strip is bent downwardly more about bead 131c. The strip is next engaged by the roller 143 and this roller bends the inner edge of the strip more closely against the side of the bead 131c and also forms the strip over the bead 131d. The outer edge of the strip, as shown in Fig. 10, thus being bent upwardly at an angle. The successive rollers 144 and 145 are shaped quite similarly to roller 143 having slightly thicker portions to press the inner side of the strip against the straight side of the bead 131c and pressing the strip firmly into the shape of roller 131. As the strip leaves the last roller 145, it passes around roller 131 and the inner edge thereof engages the thin pointed end of the cam 149 on bracket 148. The section which has now been formed and curved in a substantially circular form springs somewhat outwardly and is pushed laterally as it advances against the side of cam 149 and is pushed out of alinement with roller 131 so that as its end comes around the top of the roll it clears the roller 141, as shown in Fig. 4. As the section of the strip which has now been formed and rolled into substantially circular form moves out from between the rollers 131 and 141 to 145, it is discharged from the machine and dropped off to one side.

As has been stated, just before the rear end of a section passes the stop pins 111, these stop pins are depressed by a high part of cams 123 engaging the upper arms 120b. The pins thus press the rear end of the sections downward and are in position to engage the advancing front ends of the subsequent sections of the strips. As the strip comes against the stop pin 111, the cam 90 depresses the cam lever arm 28 and the punching and severing operation by punches 84 and 84a commences. Simultaneously, by action of cam lever 28, the upper feed rolls 40 are raised from the strip. This is desirable, both, as stated, to prevent movement of the strip during the punching and severing operation, and also to prevent the rolls grinding on the strip while it is stationary. Such action causes a bright spot to be rubbed on the strip, which is objectionable. The strip is only stopped for a very short time and just long enough to have the punching and severing done. The section which is cut out of the strips produces a slight separation in the severed section and the momentary halting of the severed strip allows the section engaged by the roll 131 and its co-operating rolls, to move a slight distance away from the section shown as being stopped. In practice, the sections of strip are separated between one and two inches when they enter between the rolls 131 and 141. It will thus be seen that the machine is simultaneously and continuously feeding and forming the sections. By having rotary feeding means there is practically no lost time. If a reciprocating feed were used for the strips the feeding movement would only occupy substantially half the time. With the rotary feeding means, however, the feeding is practically continuous and, as stated, the strip is only stopped long enough to be punched and severed.

The bracket 112 can be adjusted, as stated, by turning the nuts 113 so that the stops 111 can be properly positioned and the nuts on the top of the rod 106 can be adjusted to give the proper lifting movement of bar 107 and the stop pins 111. The nuts 49 on the rods 47 can also be adjusted to give the proper lifting effect on the feed rolls 40. It will be noted that the bar 54 is pushed downward when the bars 48 are raised so that when the feed rolls 40 are lifted from the strips the bar 54 will engage the same. Any retrograde movement of the strip which would naturally take place by the reverse movement of the reel and the spring of the material is prevented. The shaft 46 can be rocked at any time by the operator operating treadle 153 to lift the feed rolls from the strips.

From the above description it is seen that applicant has provided a very simple and efficient machine for automatically producing hoops from stock strips of flat material. The machine has been actually built and operates with great success to make the hoops at the rate of twenty per minute. The hoop, as set forth in applicant's co-pending application above identified, is novel and has great advantages over prior hoops.

It will, of course, be understood, that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of applicant's invention, which, generally

stated, consists in a device capable of carrying out the objects above set forth, in the novel parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. A machine of the class described having in combination, means for forming sections of uniform length from a strip of material, a forming and bending means for said sections comprising a cylindrical die and a plurality of smaller cylindrical dies arranged around the same, means for successively feeding said sections to said forming and bending means, and means partially surrounding said first mentioned die for discharging said sections laterally from said forming and bending means after they have been formed and bent into substantially circular form.

2. A machine of the class described having in combination, a forming and bending means for forming a plurality of parallel longitudinally extending grooves in a strip of flat material and bending the same into substantially circular form, means for successively feeding said strip toward said means, a guide means for said strips, a stop in advance of said first mentioned means adapted to be moved into alinement with said guide means, means for moving said stop into engagement with the rear end of one strip to depress the same and into position to be engaged by a succeeding strip, and means for rendering said feeding means inoperative after said strip engages said stop.

3. A machine of the class described having in combination, a substantially cylindrical roll having a plurality of circumferentially extending parallel grooves therein and ridges therebetween, a flange at one side of said periphery forming one side of one of said grooves, means for advancing a strip with one edge against said flange, and a plurality of smaller rolls circumferentially spaced about said roll for engaging said strip each having a side engaging the inner side of said flange, the first of said plurality of smaller rolls engaging said strip pressing the same against the ridge on said roll adjacent said flange, whereby subsequent engagement of the other of said plurality of smaller rolls will not move the strip laterally away from said flange.

4. A machine of the class described having in combination, a forming and bending means comprising a substantially cylindrical roll, a plurality of smaller rolls circumferentially spaced about said roll adapted to have a strip moved between the same and said first mentioned roll, and form a plurality of circumferentially extending grooves therein, said smaller rolls being spaced within an angle of substantially 180 degrees, and means disposed in the remaining 180 degrees about said first mentioned roll to engage said strip and move the same laterally out of alinement with said rolls.

5. A machine of the class described having in combination, forming and bending means comprising a substantially cylindrical roll having a plurality of circumferentially extending ridges in its periphery, a flange at one side of said roll the inner side of which forms one side of a groove the other side of which forms the side of the adjacent ridge, a plurality of smaller rolls spaced about said first mentioned roll each adapted to have one of its sides engage the side of said flange, each having a plurality of grooves formed therein, said grooves in said plurality of rolls progressively approaching the shape of the ridges on said first mentioned roll and said smaller rolls each having a circumferentially extending tongue at one side thereof, said tongues extending progressively farther into said groove in said first mentioned roll.

6. A machine of the class described having in combination, a forming and bending means comprising a substantially cylindrical roll having a periphery with a plurality of circumferentially extending parallel ridges thereon, a plurality of smaller rolls spaced about said first mentioned roll adapted to press a strip of material between the same and said first mentioned roll to form a plurality of circumferentially extending grooves therein, a member extending about a portion of said roll having a circumferentially extending wedge-shaped cam thereon adapted to be engaged by said hoop and force the hoop laterally out of alinement with said rolls.

7. A machine of the class described, having in combination, a plurality of reels for holding strip material supported at one end thereof, a plurality of guide means into which said strips are fed, feeding means for each of said strips for advancing the same, means for simultaneously cutting pieces from each strip to form sections and punching holes at each side of said cut out piece, a common means for rendering all of said feeding means inoperative while said punching and guiding means are operated and means for bending and forming each of said sections into substantially circular hoops having circumferential beads therein.

8. The structure set forth in claim 7, a member adapted to engage all of said strips when said feeding means are rendered inoperative to prevent retrograde movement of said strips, and means for operating said member.

9. The structure set forth in claim 7, a plurality of movable adjustable stops adjacent said bending and forming means, and

a common means for moving all of said stops to depress the ends of one set of said sections and bring said stops into alinement with the advancing ends of the succeeding set of sections.

10. A machine of the class described having in combination, means for feeding a flat strip, means for simultaneously dividing said strip into sections with spaced finished ends, punching holes adjacent said ends, means for pressing an inscription on said sections, means for forming said sections into substantially circular open hoops, said third mentioned means comprising a rotating die above said strip and a roller beneath said die and strip, and means for periodically raising said last mentioned roller to press said strip against said die.

11. A machine for making metal hoops having in combination, means for forming sections of uniform length from a strip of material, a forming and bending means for said sections, comprising a cylindrical die and a plurality of revoluble feeding and forming rolls surrounding and cooperating with said die to successively engage and form said strip and a helical means adjacent said die to discharge said formed hoop laterally by the movement given thereto by said rollers.

In testimony whereof I affix my signature.

AXEL M. WALSTROM.