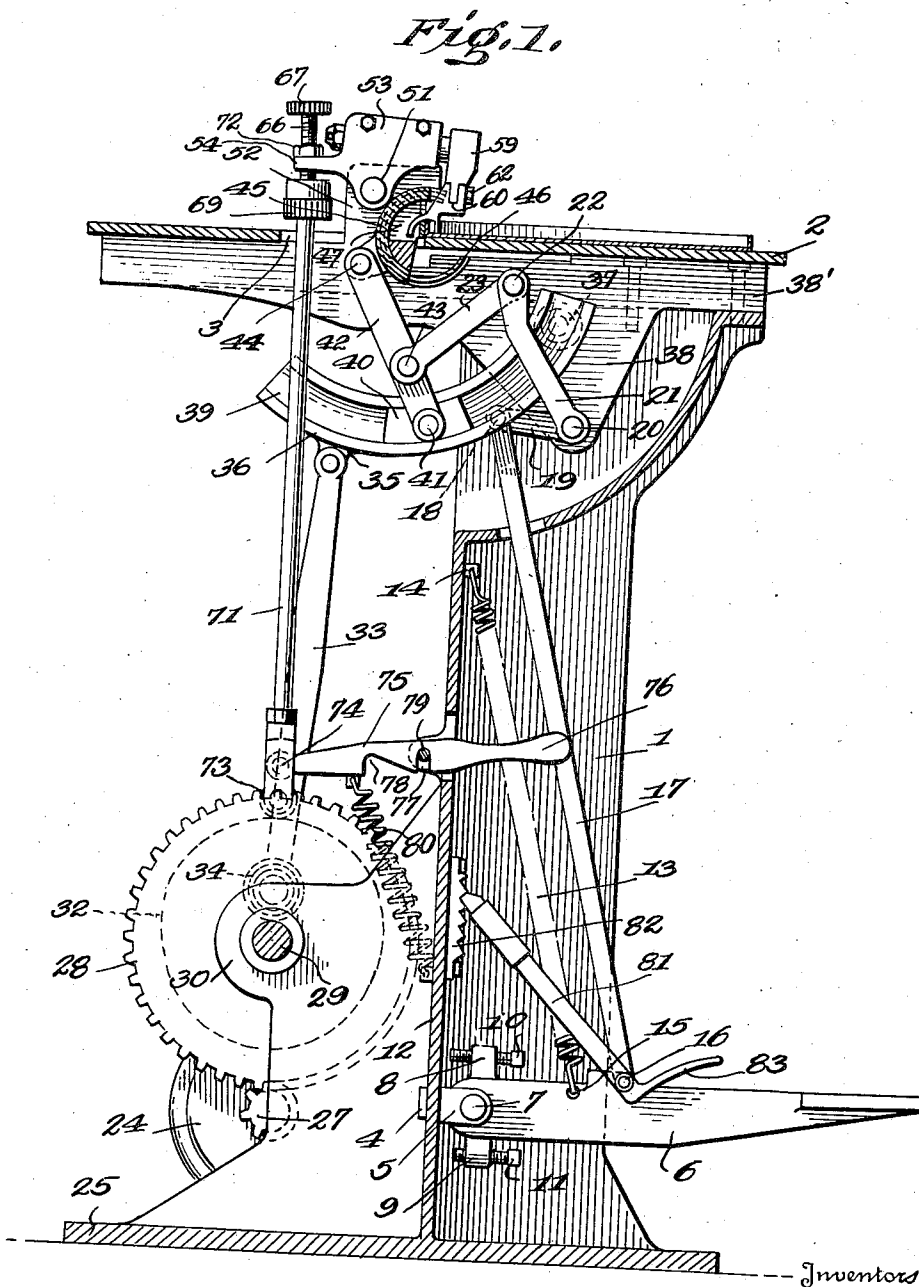


Oct. 8, 1935.

H. A. BERLINER ET AL
SHEET METAL FORMING MACHINE

2,016,981

Original Filed April 4, 1932. 6 Sheets-Sheet 1



*Henry A. Berliner and
Christian De Boer*

By *Milans & Milans*

Attorneys

Oct. 8, 1935.

H. A. BERLINER ET AL

2,016,981

SHEET METAL FORMING MACHINE

Original Filed April 4, 1932 6 Sheets-Sheet 2

Fig. 2.

Fig. 14.

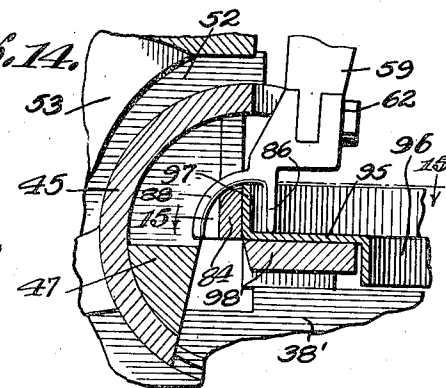
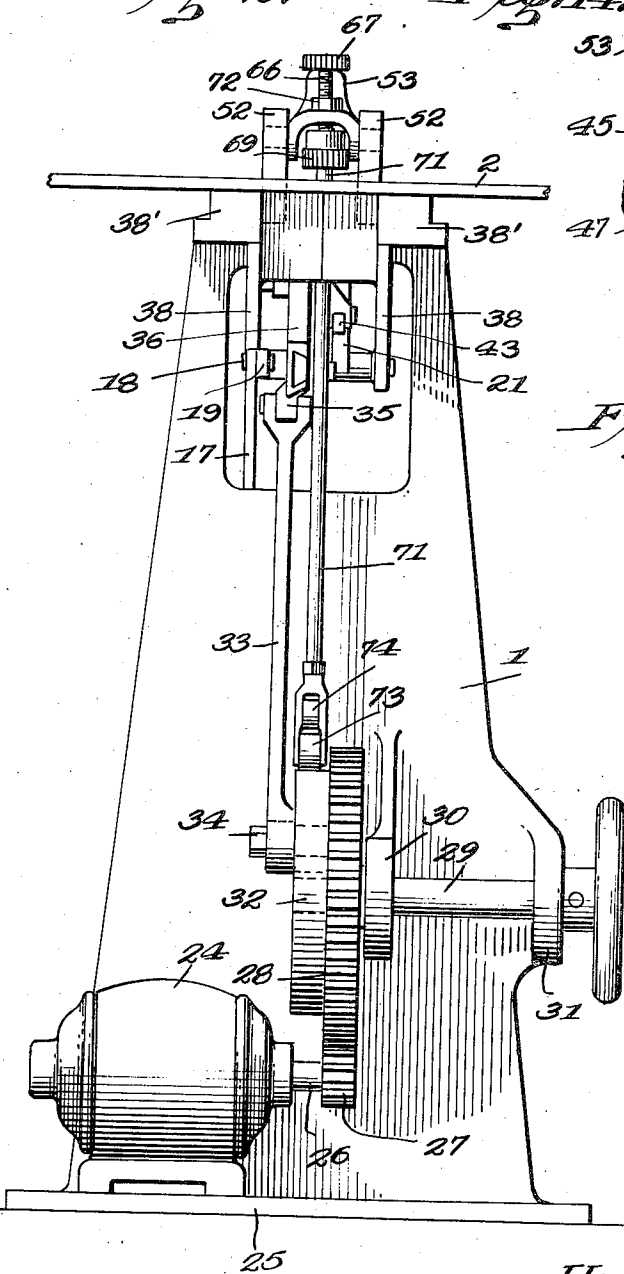
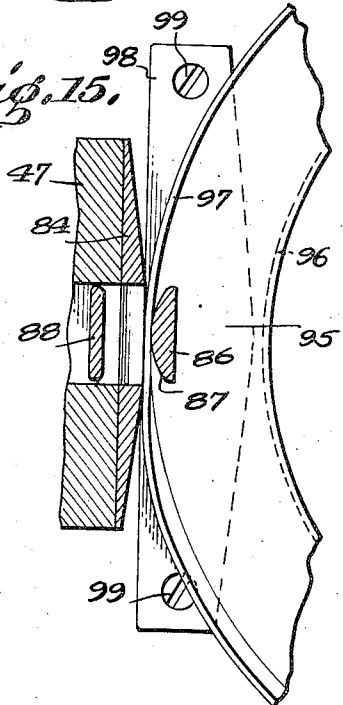


Fig. 15.



Inventors

Henry A. Berliner and
Christian De Boer

By *Milano & Milano*
Attorneys

Oct. 8, 1935.

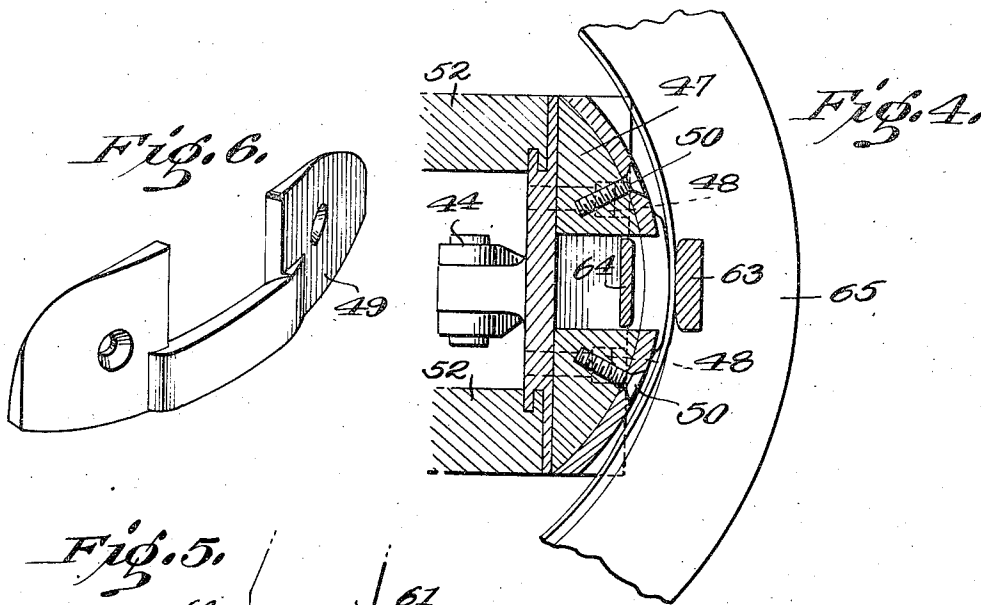
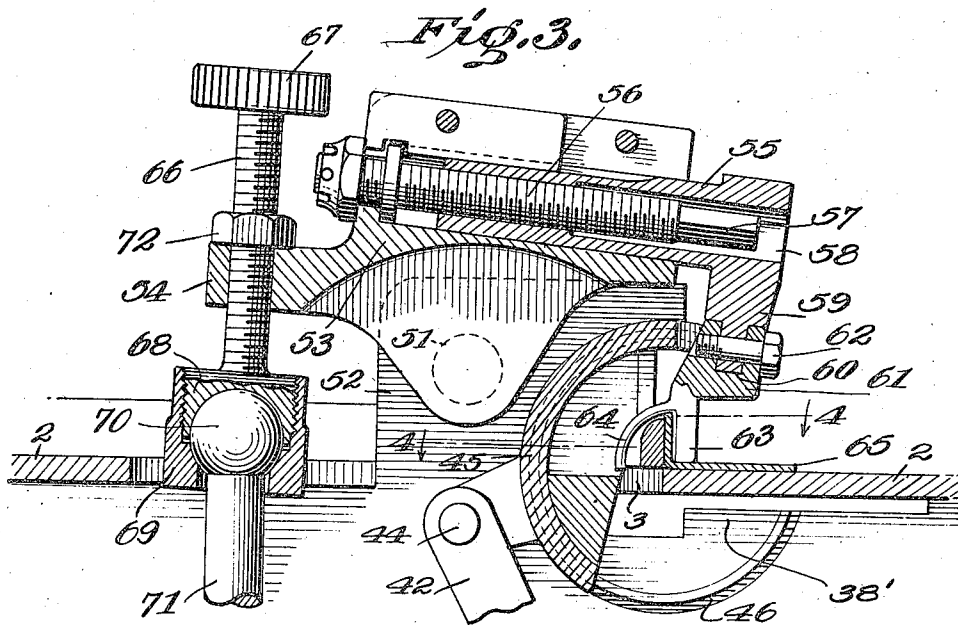
H. A. BERLINER ET AL

2,016,981

SHEET METAL FORMING MACHINE

Original Filed April 4, 1932

6 Sheets-Sheet 3



Inventors

Henry A. Berliner
and
Christian De Boer

By

Milans & Milans
Attorneys

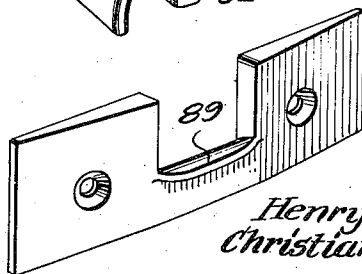
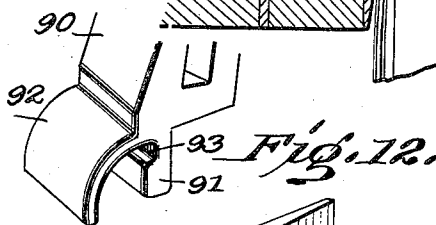
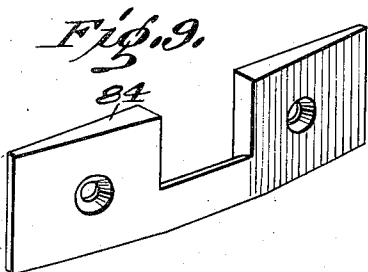
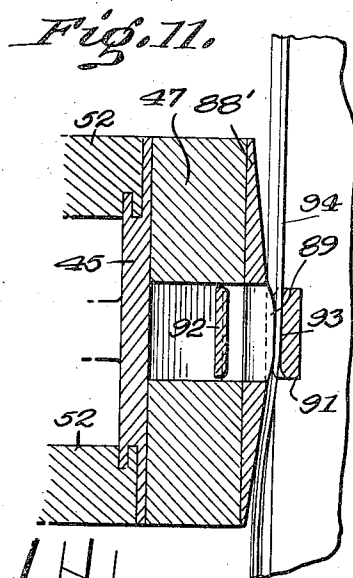
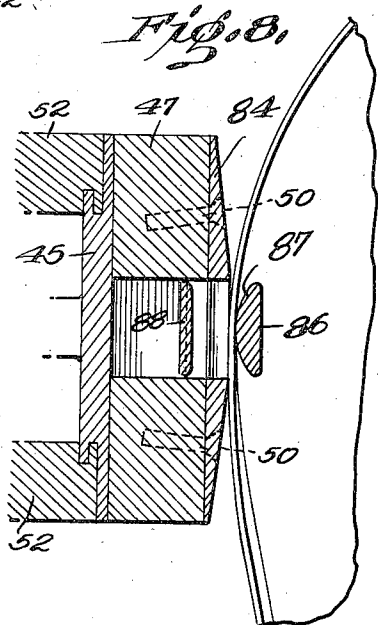
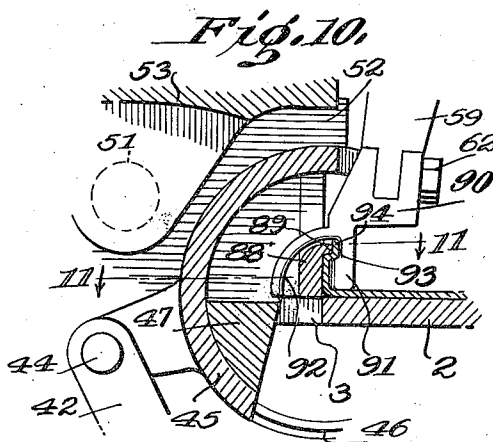
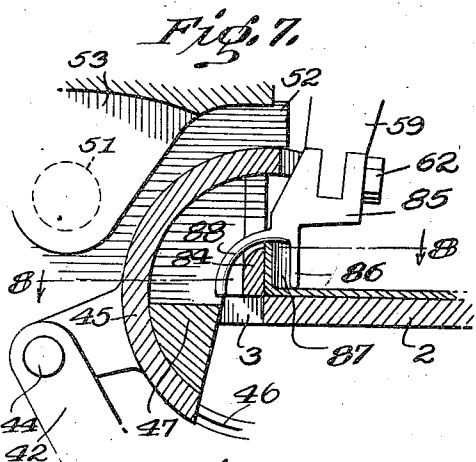
Oct. 8, 1935.

H. A. BERLINER ET AL

2,016,981

SHEET METAL FORMING MACHINE

Original Filed April 4, 1932 6 Sheets-Sheet 4



Inventors

Henry A. Berliner
and
Christian De Boer

By

Milanz & Milano
Attorneys

Oct. 8, 1935.

H. A. BERLINER ET AL

2,016,981

SHEET METAL FORMING MACHINE

Original Filed April 4, 1932 6 Sheets-Sheet 5

Fig. 16.

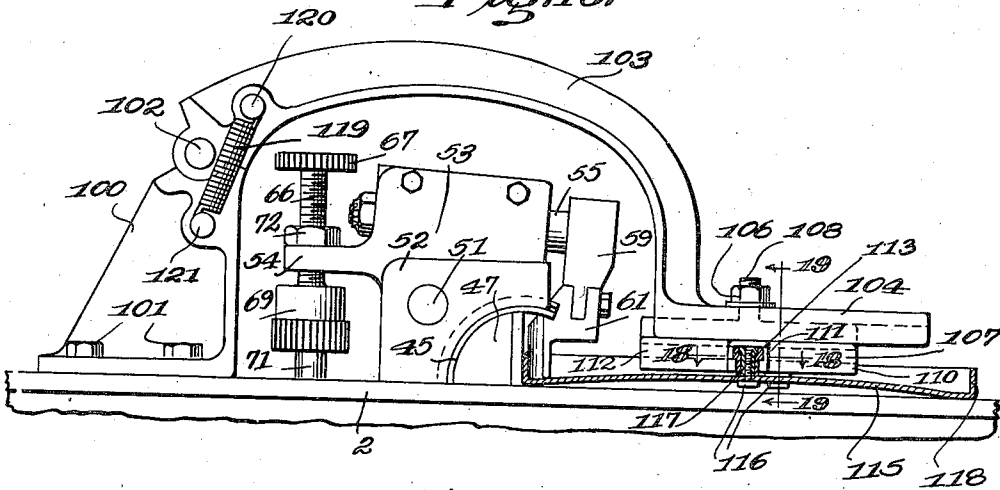


Fig. 17.

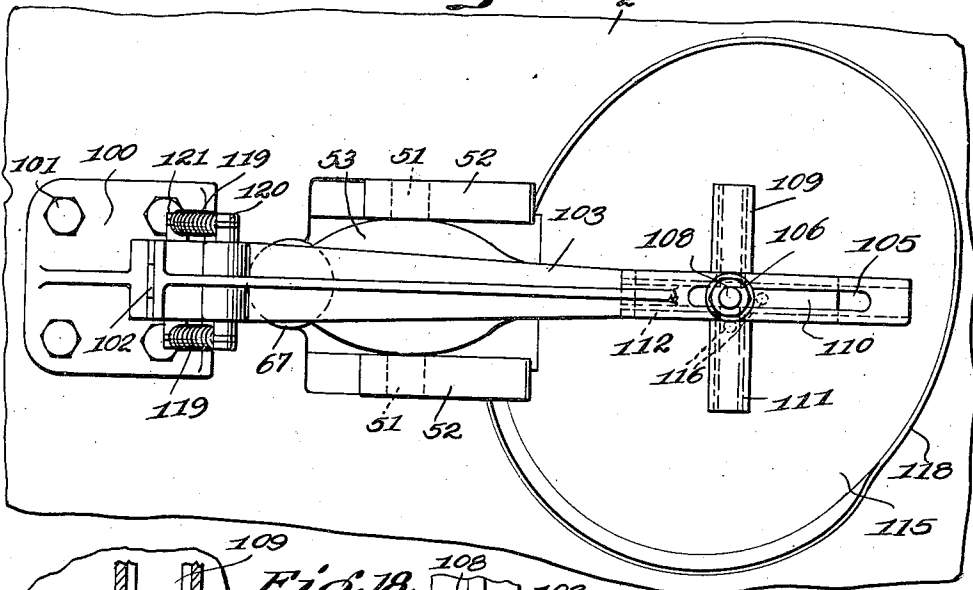


Fig. 18.

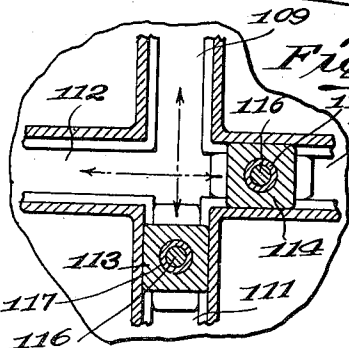
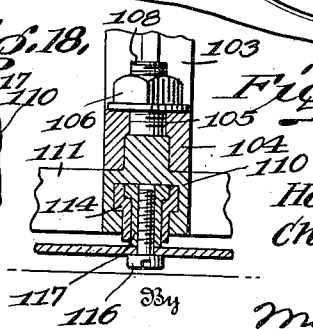


Fig. 19.



Inventors

Henry A. Berliner
and
Christian De Boer

Milano & Milano
Attorneys

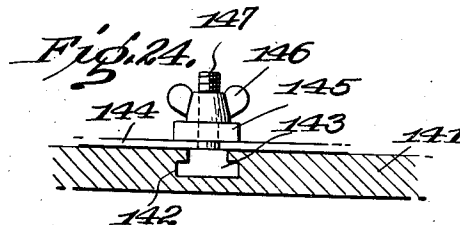
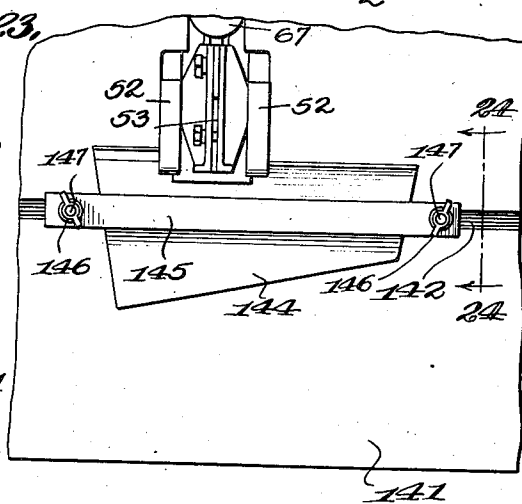
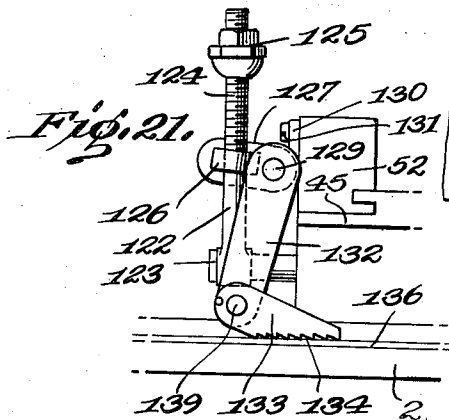
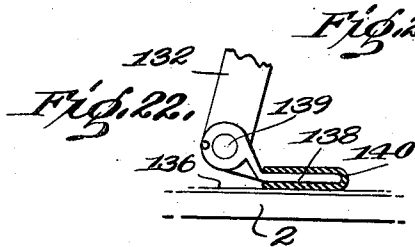
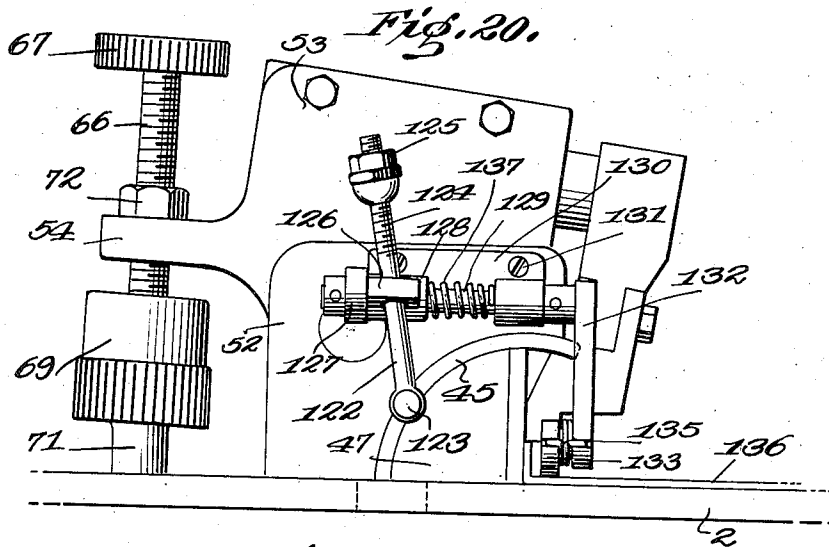
Oct. 8, 1935.

H. A. BERLINER ET AL

2,016,981

SHEET METAL FORMING MACHINE

Original Filed April 4, 1932 6 Sheets-Sheet 6



Inventors

Henry A. Berliner and
Christian De Boer

By *Milana & Milana*
Attorneys

UNITED STATES PATENT OFFICE

2,016,981

SHEET METAL FORMING MACHINE

Henry A. Berliner and Christian De Boer, Washington, D. C., assignors to The Engineering and Research Corporation, a corporation of District of Columbia

Application April 4, 1932, Serial No. 603,096
Renewed August 16, 1935

11 Claims. (CL 153—16)

Our invention relates to new and useful improvements in a machine for forming sheet metal and more particularly to a machine of this character for forming flanges on sheet metal and while primarily intended for use in aircraft construction it will be understood that it is not limited to this particular art.

The principal object of the present invention resides in the provision of a machine of the character described adapted to eliminate the use of forms which are of excessive cost and to replace skilled hand labor which is slow and expensive.

Another object of the invention resides in the provision of a forming machine including a hammer or forming member for turning a flange on the edge of sheet metal while the metal is moved relative to the hammer or forming member by the hand of the operator or mechanically.

Still another object of the invention consists in the provision of a machine of the character described having a clamping member or what might be termed a hold down member synchronized with the hammer whereby the material is clamped and held as the hammer or forming member turns the flange.

As a further object we provide in a machine of the character described means whereby the throw of the hammer or forming member may be adjusted.

As another object of the invention we provide a machine of the character described in which a flange may be formed on sheet metal without the use of any forms, a tool or member being provided for clamping or holding down the metal as the flange is formed, said tool or member being provided with an arm which acts as a gauge for positioning the metal and also acting with an extension on the tool for forming the flange to the desired height or shape.

With the above and other objects in view, which will appear as the description proceeds, our invention consists in the novel details of construction, and arrangement of parts, described in the following specification and illustrated in the accompanying drawings, and while we have illustrated and described the preferred embodiments of the invention, as they now appear to us, it will be understood that such changes may be made as will fall within the scope of the appended claims.

In the drawings:—

Fig. 1 is a longitudinal vertical section through the machine with parts shown in side elevation.

Fig. 2 is a rear view.

Fig. 3 is an enlarged detail showing a longitudinal section through the hold down arm and

associated members with parts shown in elevation.

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3 looking in the direction of the arrows.

Fig. 5 is a fragmental detail showing the hold down tool in side elevation and one step in forming the flange.

Fig. 6 is a perspective of one form of tool to be secured to the hammer or forming member.

Fig. 7 is a fragmental detail showing in section a slightly different form of hold down tool and hammer tool.

Fig. 8 is a horizontal section on the line 8—8 of Fig. 7 looking in the direction of the arrows.

Fig. 9 is a perspective showing a slightly different form of hammer tool from that disclosed in Fig. 6.

Fig. 10 is a view similar to Fig. 7 showing a still further form of hold down tool and hammer tool.

Fig. 11 is a horizontal section on the line 11—11 of Fig. 10 looking in the direction of the arrows.

Figs. 12 and 13 are respectively details of the form of hold down tool and hammer tool shown in Figs. 10 and 11.

Fig. 14 is a fragmental detail partly in section and partly in elevation showing a modified form of support for the metal being worked upon.

Fig. 15 is a horizontal section on the line 15—15 of Fig. 14 looking in the direction of the arrows.

Fig. 16 is a fragmental side elevation showing a support for a sheet of material on which an irregularly curved flange is to be formed.

Fig. 17 is a top plan of the construction shown in Fig. 16.

Fig. 18 is a horizontal section on the line 18—18 of Fig. 16 looking in the direction of the arrows.

Fig. 19 is a vertical section on the line 19—19 of Fig. 16 looking in the direction of the arrows.

Fig. 20 is a fragmental side elevation showing a mechanical feed for the material being operated upon.

Fig. 21 is a fragmental detail showing a front face view of the mechanical feeding member.

Fig. 22 is a fragmental detail showing a slightly modified form of feed member.

Fig. 23 is a fragmentary plan showing a modified form of guide for feeding the material being operated upon to the flanging mechanism; and

Fig. 24 is a section on the line 24—24 of Fig. 23 looking in the direction of the arrows.

One of the main objections to the use of sheet

metal construction in aircraft, or similar arts, has been the cost of fabrication and the relatively small production of the industry renders the use of dies somewhat prohibitive in cost while hand work is slow and expensive. To overcome the above objections the present machine has been developed to overcome the necessity of hand labor until the industries have become so large and prosperous that the use of dies will be justified. Our machine will turn up an internal flange, an external flange or any desired shaped flange for which tools to be later described are provided and as an illustration of the work which may be done with the machine we might refer to the formation of wing ribs, control surfaced ribs, longitudinals, frames and bulk heads for monocoque fuselages or pontoons, tank ends and bulk heads or the like. Of course, our machine is not limited for forming the mentioned articles but may be used wherever it is desired to turn up a flange from sheet metal.

In the drawings 1 indicates a pedestal or stand-ard carrying at its top the plate or platform 2 provided with the opening 3 for a purpose which will be later apparent.

Secured to the front face of the pedestal 1, by means of the bolts 4 or other suitable fastenings, is a bracket 5 to which a foot treadle 6 is pivotally connected at 7. This foot treadle has the upwardly extending lug 8 and the downwardly projecting lug 9 each of which is provided with a threaded opening in which operates the adjusting screws 10 and 11, the inner end of the adjusting screw 10 normally engaging the plate 12 of the pedestal for limiting upward movement of the treadle whereas the end of the screw 11, engaging the plate 12, will limit the downward movement of the treadle when the treadle is depressed. The foot treadle is normally held in its raised position by means of the coiled spring 13, the upper end of the coiled spring being secured to the pedestal at 14 while the lower end is formed with a hook portion to be received in the perforation 15 formed in the treadle. This coiled spring 13 normally holds the treadle in its raised position with the inner end of the adjusting screw 10 engaging the face of the plate 12. Also secured to the treadle 6, by means of the transversely extending pin 16, is the lower end of a rod or bar 17, the upper end of the rod or bar being connected at 18 to the arm 19 secured to the shaft 20. An arm 21 is also connected to the shaft 20 and its upper end is connected at 22 to a link 23 for a purpose which will be later brought out.

An electric motor 24 is secured to the base 25 of the pedestal 1 and secured to the end of the motor shaft 26 is a gear or pinion 27 which meshes with the relatively larger gear 28 carried by the inner end of the horizontal shaft 29 supported in the bearings 30 and 31. Secured to one face of the gear 28 is a cam disc or plate 32. Current is supplied to the motor 24 in the usual manner by a lead in conductor wire.

The lower end of a bar or link 33 is pivotally connected to the outer face of the cam disc or plate 32, eccentrically at 34, and the upper end of the bar or link is pivotally connected to the depending lug 35 formed adjacent one end of the arcuate-shaped guide or arm 36. The guide or arm 36 is pivotally connected at 37 to the depending portion 38 of a member 38' secured to the top of the pedestal, as shown more particularly in Fig. 1 of the drawings. The arcuate-shaped guide or arm 36 is provided in its inner face with

the recess 39 in which is slidably mounted a block 40 to which is pivotally connected at 41 one end of a link 42. The inner end of the link 23 is pivotally connected at 43 to the link 42 intermediate its ends as shown more particularly in Fig. 1 of the drawings. The upper end of the link 42 is pivotally connected at 44 with the arcuate-shaped member 45 which is mounted in the guide-ways 46 for oscillating or pivotal movement. Various forms of hammer tools are adapted to be secured to the arcuate-shaped member 45 depending on the type of flange adapted to be formed. In Fig. 4 of the drawings I have illustrated a casting 47 adapted to be secured to the face of the arcuate-shaped member by means of the screws 48 or other suitable fastenings and a hammer tool 49 of the shape shown more particularly in Fig. 6 of the drawings is secured to the casting 47 by means of the screws 50 or other suitable fastenings. This particular form of hammer tool is adapted for forming an internal flange in the manner disclosed in Figs. 3 and 4 of the drawings.

Pivotally connected at 51, between the up-standing portions 52 of the member 38', is a clamp or hold down arm 53 having the rearwardly directed lug or projection 54 provided with a threaded opening for a purpose to be later described. Slidably mounted in the arm 53 is a tool or hold down foot carrying member 55 adjustable by means of the screw 56. The screw has the irregularly shaped end portion 57 extending into the enlarged opening 58 of the member 55, this irregularly shaped portion 57 being engaged by a suitable tool or wrench for operating the screw. The member 55 has the depending portion or lug 59 with the reduced extension 60 to which a hold down tool or foot 61 may be secured by means of the screw 62 or other suitable fastening. The tool or foot 61 includes the depending part 63 and the arcuate-shaped arm 64, the depending part 62 being of the desired shape to cooperate with the hammer plate or tool to form the desired shaped flange. As shown the lower end of the arcuate-shaped arm 64 extends below the lower end of the extension 60 to be engaged by the edge of the strip of material 65 before the flange is turned and the arcuate-shaped arm acts as a guide for the flange as the same is being turned. In other words the material is placed beneath the extension 63, as shown in Figs. 3 and 5 of the drawings, and the end of the material will engage the lower end of the arcuate-shaped arm 64. This regulates the amount to be turned upwardly to form the flange and the curve of the arcuate-shaped arm is such as to form a guide for the material forming the flange as it is turned upwardly as shown in Fig. 5 of the drawings. The hold down tools or feet are interchangeable as is the case with the hammer plates or tools for forming different shaped flanges or flanges of different heights. A screw 66 is received and operates in the threaded opening of the lug or projection 54 and this screw is provided at its upper end with a hand grip 67 and at its lower end with an exteriorly threaded enlargement 68 to cooperate with the nut member 69 to provide a socket for the rounded end 70 of the rod 71. The rounded end 70, with the socket forms a ball and socket joint for connecting the rod 71 to the hold down arm 53. A lock nut is shown at 72. Connected to the lower end of the rod 71 is a roller 73 which normally engages the edge of the cam plate or disc 32, as shown more particularly in Figs. 1 and 2 of the drawings. Pivot-

ally connected at 74, to the lower end of the rod 71, is a lever 75 having the hand grip 76 and provided on its lower edge with the notches or recesses 77 and 78. A transversely extending rod or pin 79 is normally received in the notch or recess 77 and the lever is drawn downwardly by means of the coiled spring 80. When it is desired to quickly raise the hold down arm to release the tool or foot from the material it is only necessary to lift up on the outer end of the lever 75, by grasping the hand hold 76, and releasing the rod or pin 79 from the notch or recess 77. The coiled spring 80 will quickly draw the lower end of the rod 71 towards the face of the pedestal or from the surface of the cam disc 32 and this movement will also draw the rod 71 downwardly to raise the forward end of the hold down arm to release the tool or foot from the material. When the lever 75 is thus released the pin or rod 79 will be received within the notch or recess 78. When operation is to be resumed the lever 75 will be manipulated to force the rod 71 to its original position with the roller 73 in engagement with the edge of the cam disc or plate 32.

For holding the treadle 6 in its desired position we provide the pawl member 81, pivotally connected to the treadle by the pivotal pin 16 which also connects the lower end of the rod or bar 17 to the treadle. The upper end of the pawl member 81 is adapted to be engaged with the toothed plate 82 and the lower end of the member is provided with the extension 83 to be engaged by the foot. As the treadle is lowered the free end of the pawl member will engage the teeth of the plate 82 and hold the treadle in the desired lowered position. When it is desired to release the treadle the foot engaging portion 83 is engaged to release the end of the pawl member from the teeth of the plate 82 and the treadle will be raised by means of the coiled spring 13.

In Figs. 7 and 8 of the drawings we have illustrated a hammer plate or tool and cooperating hold down tool or foot of a shape to form an external flange on the sheet of material, the hammer tool or plate being shown at 84 and the hold down foot or tool at 85. The construction of these parts are the same as that previously described, the hold down foot 85 including the extension 86 having the curved face 87 and the arcuate-shaped arm 88. The outer face of the hammer tool or plate is of the shape shown to cooperate with the curvature 87 of the extension 86 to make the desired flange. The specific form of the hammer plate or tool 84 is shown more particularly in Fig. 9 of the drawings.

In Figs. 10 to 13 inclusive we have illustrated a hammer plate or tool and a hold down foot or tool of a shape to make what may be termed a double flange. In this form of the invention the hammer plate 88' is provided with the outwardly extending flange or lip 89 on one face and the hold down tool or foot 90 has the depending portion or extension 91 and the arcuate-shaped arm 92, the depending portion 91 formed with a recess 93 to cooperating with the lip or flange 89 to provide the inset portion 94 on the up-turned flange.

In Figs. 14 and 15 of the drawings we have illustrated a slightly different form of support for the material being flanged. In the construction shown more particularly in Figs. 1 and 2 of the drawings the work is normally supported on the table or platform 2 but this table or platform could not be used for forming an external flange on a sheet of material where an internal flange has already been formed. In Figs. 14 and 15 of

the drawings we have illustrated the sheet of material 95 as having been formed with the internal flange 96 and when the external flange 97 is to be formed the material with the depending flange 96 previously formed must be supported. In this form of the invention we remove the table or platform 2 and substitute therefor the plate or bar 98 which supports the edge of the material as shown more particularly in Figs. 14 and 15. This plate or bar 98 does not interfere with the depending flange 96 and the plate or bar may be secured to the pedestal by means of the screws 99 or other suitable fastenings.

At times it will be desirable to turn up flanges 15 of an irregular curve and in order that this may be done we provide the clamp or material holder shown more particularly in Figs. 16, 17, 18 and 19 of the drawings and have shown in Fig. 17 an elliptically-shaped flange as being formed. The 20 clamp or material support consists of the bracket 100 secured in position on the pedestal 1 by means of the screws 101 or other suitable fastenings and pivotally connected to the bracket at 102 is the arm 103 having at its outer end the 25 horizontal portion 104 provided with the longitudinally extending slot 105. Secured to the horizontal portion 104, by means of the nut 106, is a guide member denoted generally at 107 having a threaded extension 108 extending through 30 the opening 105 to receive the nut 106. The guide member 107 is in the form of a cross having the recessed arms 109, 110, 111 and 112. Blocks 113 and 114 are slidably mounted in the arms of the guide and the block 113 is adapted to slide 35 from the arm 111 to the arm 109 whereas the block 114 may be slid from the arm 110 to the arm 112. The sheet of material 115 of elliptical or oval shape is adapted to be secured to the blocks 113 and 114 by means of the screws 116 40 which engage in threaded openings formed in sleeves 117 rotatably mounted in the blocks 113 and 114. The height of the up-turned flange 118 is governed by the position or adjustments of the blocks 113 and 114 in the arms of the guide before being secured to the sheet of material. 45 When the material is connected to the blocks in the guide then by turning the same the flange will be turned upwardly on an irregular curve. As the material is turned it will be understood 50 that the blocks 113 and 114 are slid in the directions shown by the arrows in Fig. 18 of the drawings. The arm 103 of the holder or clamp may be swung on its pivot 102 to a raised position. We have shown a coiled spring at 119 55 connected at 120 to the arm 103 and at 121 to the bracket 100. When in the position shown in Fig. 16 the coiled spring tends to hold the arm in lowered position but when the arm is raised the coiled spring will be positioned on the opposite 60 side of the pivot 102 and thereby tend to hold the arm in its raised position. It will be understood that the clamp or holder just described acts as an "ellipsograph" or "trammel" or in other words feeds the sheet of material of elliptical or 65 oval shape in proper position relative to the flange turning hammer to form the proper flange. When this holder is used it is not necessary that the sheet of material be formed to exact dimensions for a raw edge might be turned, the height 70 of the flange not depending on the formation of the hold down tool or foot as is the case when the clamp or holder is not used. In certain work it is not necessary that the flange be of uniform height throughout. 75

At times it will be desirable to feed the sheet of material mechanically instead of by hand and for this purpose we have provided the construction disclosed more particularly in Figs. 20 and 21 of the drawings. In this construction a rod 122 is pivotally connected at 123 to the oscillatory arcuate-shaped member 45, the opposite end of the rod being threaded as shown at 124 to receive the nut 125. The rod 122 is slidable through a lug or projection 126 of an arm 127 carried by a sleeve 128 mounted on a rod 129 supported by the bracket 130 secured to the upwardly extending portion 62, by means of the screws 131 or other suitable fastenings. Secured to an end of the rod 129 is an arm 132 having pivotally connected, adjacent its lower end, a pawl 133, provided on its lower edge with the serrations 134. A spring 135 normally tends to hold the pawl 133 in its lowermost position in engagement with the sheet of material 136. A coiled spring 137 surrounds the rod 129, as shown more particularly in Fig. 20 of the drawings, and normally holds the arm 127 in raised position. In Fig. 20 of the drawings we have shown the arcuate-shaped member carrying the hammer tool or plate as raised and as this member 45 is lowered the nut 125 will engage the lug or projection 126 and swing the sleeve 128 with the rod 129 to in turn swing the arm 132 towards the right of the position shown in Fig. 21 and by the pawl 133 engaging the sheet of material the same will be fed forwardly. In Fig. 22 of the drawings we have shown a slightly different form of pawl for engaging and feeding the sheet of material. In this form the pawl is shown at 138 pivotally connected at 139 to the arm 132. The pawl 138 will be covered with rubber or similar material forming a frictional engagement with the sheet of material being operated upon to feed the same in the manner previously described.

At times it is necessary to operate on material not having a finished edge or in other words material with a rough edge. It is also desirable, at times, to turn up a flange of irregular heights. In order that this may be done we provide the construction disclosed in Figs. 23 and 24 of the drawings. In this form of the invention the table or support 141 is provided with the T-slot 142 in which operates a plate or strip 143. The sheet of material 144 is clamped between the strip or plate 143 and an upper strip or plate 145, the two strips being connected by the wing nuts 146 received on the threaded extensions 147 carried by the plate or strip 143. The strip or plate 143 is slidable in the T-slot 142 and when slid with the sheet of material 144 a flange will be turned upwardly parallel with the longitudinal edge of the strip or plate 145. In this form of the invention it is not necessary to use the hold down tool or foot used in the other forms of the invention for the sheet of material 144 being positioned and held as described permits the flange to be turned upwardly, as previously stated, parallel with the longitudinal edge of the strip 145.

We wish to lay particular stress on the advantages of the hold down tool or foot carried by the hold down arm. When a tool or foot of the character described is used it is not necessary to use any forms as is the case in the copending Simmons application Serial No. 585,067. As has been previously stated, the sheet of material to be flanged is positioned on the table or platform 2 and the edge thereof will be engaged with the arcuate-shaped arm of the hold down tool or

foot. In Fig. 3 of the drawings the arcuate-shaped arm is shown at 64. When the hammer is operated the hammer plate or tool shown at 49 in Fig. 6 engages the material and turns a flange upwardly, the edge of the flange at all times engaging the curve of the arm. When the flange is turned to its uppermost position it will be engaged between the inner face of the depending portion 63 of the tool or foot and the hammer plate or tool, as shown more particularly in Fig. 3 10 of the drawings. It is preferable that the flange not be turned entirely upward at one stroke but preferably it is turned up gradually as shown more particularly in Fig. 5, this being accomplished by operating the treadle 6 which regulates the position of the block 40 in the arcuate-shaped guide 36. The point at which the block is moved relative to the arm or guide 36 regulates the throw of the hammer plate or tool carrier. The height of the flange to be turned is determined by the curve of the arcuate-shaped arm of the hold down foot or tool as well as the position at which this arm is set relative to the vertical extension of the tool or foot.

With the sheet of material positioned with its edge in engagement with the arcuate-shaped arm of the hold down tool or foot the motor 24 will be started and through means of the pinion 27 will operate the gear 28 and cam disc 32 associated therewith. This movement of the cam disc 32 will cause the hold down arm 53 and the arcuate-shaped hammer member 45 to be operated simultaneously through means of the bar 33 and rod 71. As the hammer plate or tool engages the sheet of material to turn the flange the hold down arm will be positioned so that the hold down tool or foot will be clamping the sheet of material on the table or platform 2. Then when the hammer tool carrying member is lowered the hold down tool or foot will be raised to permit movement of the sheet of material. As previously stated, the throw of the hammer tool or plate carrying member is regulated by the position of the block 40 in the guide or arm 36, this position being determined by the position of the treadle 6 which operates the block through means of the bar 17, arms 18 and 21 and links 23 and 42. The treadle 6 may be held to provide a predetermined throw of the hammer tool carrying member by means of the pawl member 81 engaging the teeth of the plate 82 and may be released by engaging the foot portion 83 when desired. As also previously stated, to quickly release the hold down tool or foot from the sheet of material being operated upon the roller 73 carried by the rod 71 may be released from the edge of the cam disc 32 by manipulating the lever 75.

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

1. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereon, and means for clamping the material onto the support as the flange is being turned and guiding the flange, said means including an arm pivotally mounted, an extension depending from the arm, and a member detachably connected to the extension.

2. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereof, and means for clamping the material on the support and

guiding the flange as it is turned, said means including a pivotally mounted arm, a member adjustable relative to the arm, and a tool detachably connected to the adjustable member, said tool having a vertically extending portion engageable with the material and an arm forming the guide for the flange as it is turned.

3. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereon, and means for clamping the material on the support and guiding the flange as it is turned, said means including a pivotally mounted arm, a member adjustable relative to the arm, and a tool detachably connected to the adjustable member, said tool having a vertically extending portion engageable with the material and an arcuate-shaped arm forming the guide for the flange as it is turned.

4. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereon, an adjustable treadle operable to regulate the throw of the flange turning member, and means for locking the treadle in its different positions of adjustment.

5. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereon, a member engageable with the material for clamping the same upon the support as the flange is being turned, a cam, a member engageable with the cam for operating the clamping member, and means for disengaging the cam engaging member from the cam to release the clamping member from the material.

6. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereon, and means independent of the support and directly engageable with the material for feeding the material relative to the flange turning member, said feeding means being operated by the flange turning member.

7. A machine of the character described including a support for the material to be operated upon, a member engageable with the material for turning a flange thereon, and means for feeding the material relative to the flange turning member, said feeding means including strips

between which the material is clamped, the flange being turned parallel to a longitudinal edge of the strips.

8. A machine of the character described including a support for the material to be operated upon, a member adapted to be engaged with the material for turning a flange thereon, and a clamping member adapted to be engaged with the material to clamp the same upon the support, said clamping member including a portion adapted to be initially engaged by the edge of the material and forming a gauge to determine the height of the flange to be turned and a guide for the edge of the flange as the flange is turned.

9. A machine of the character described including a support for the material to be operated upon, a member adapted to be engaged with the material for turning a flange thereon, and a clamping member adapted to be engaged with the material to clamp the same upon the support, said clamping member including an arcuate-shaped arm adapted to be initially engaged by the edge of the material and forming a gauge to determine the height of the flange to be turned and a guide for the edge of the flange as it is turned.

10. A machine of the character described including a support for the material to be operated upon, a member adapted to be engaged with the material for turning a flange thereon, and a movable clamping member adapted to be engaged with the material to clamp the same upon the support, said clamping member including an arcuate portion positioned relative to the support so that an edge of the material placed upon the support in flat condition will engage the same to determine the height of the flange to be turned and follow the arc as the flange is turned.

11. A machine of the character described including a support for the material to be operated upon, a member adapted to be engaged with the material for turning a flange thereon, and a readily removable and interchangeable pivotally mounted clamping member adapted to be engaged with the material to clamp the same upon the support, said clamping member including a portion positioned relative to the support so that an edge of the material placed upon the support in flat condition will engage the same to determine the height of the flange to be turned.

HENRY A. BERLINER.
CHRISTIAN DE BOER.