

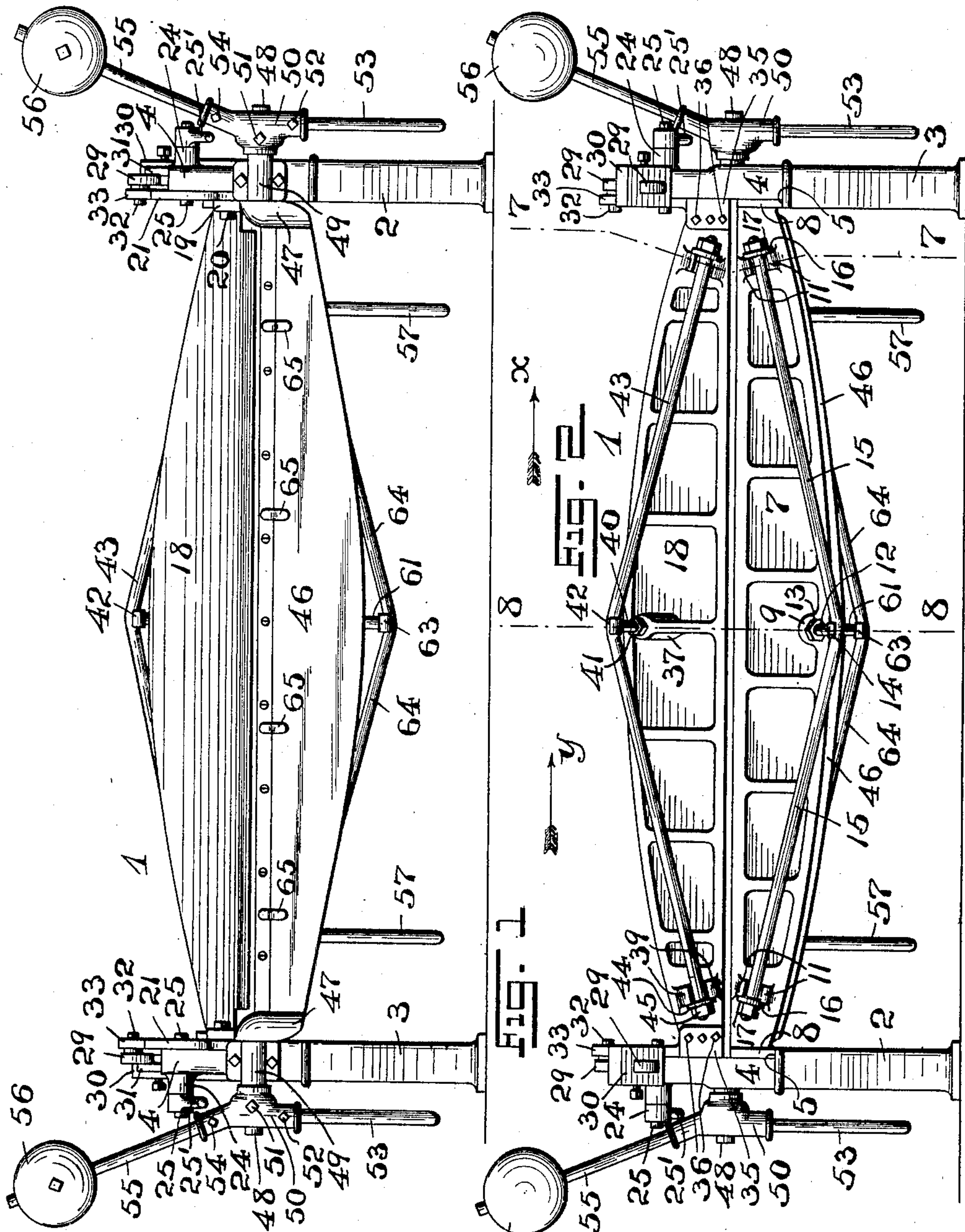
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PATENTED AUG. 28, 1906.

G. A. OHL, JR. & A. A. BERGHOF.
METAL BENDING MACHINE.

APPLICATION FILED NOV. 3, 1903.

3 SHEETS—SHEET 1.



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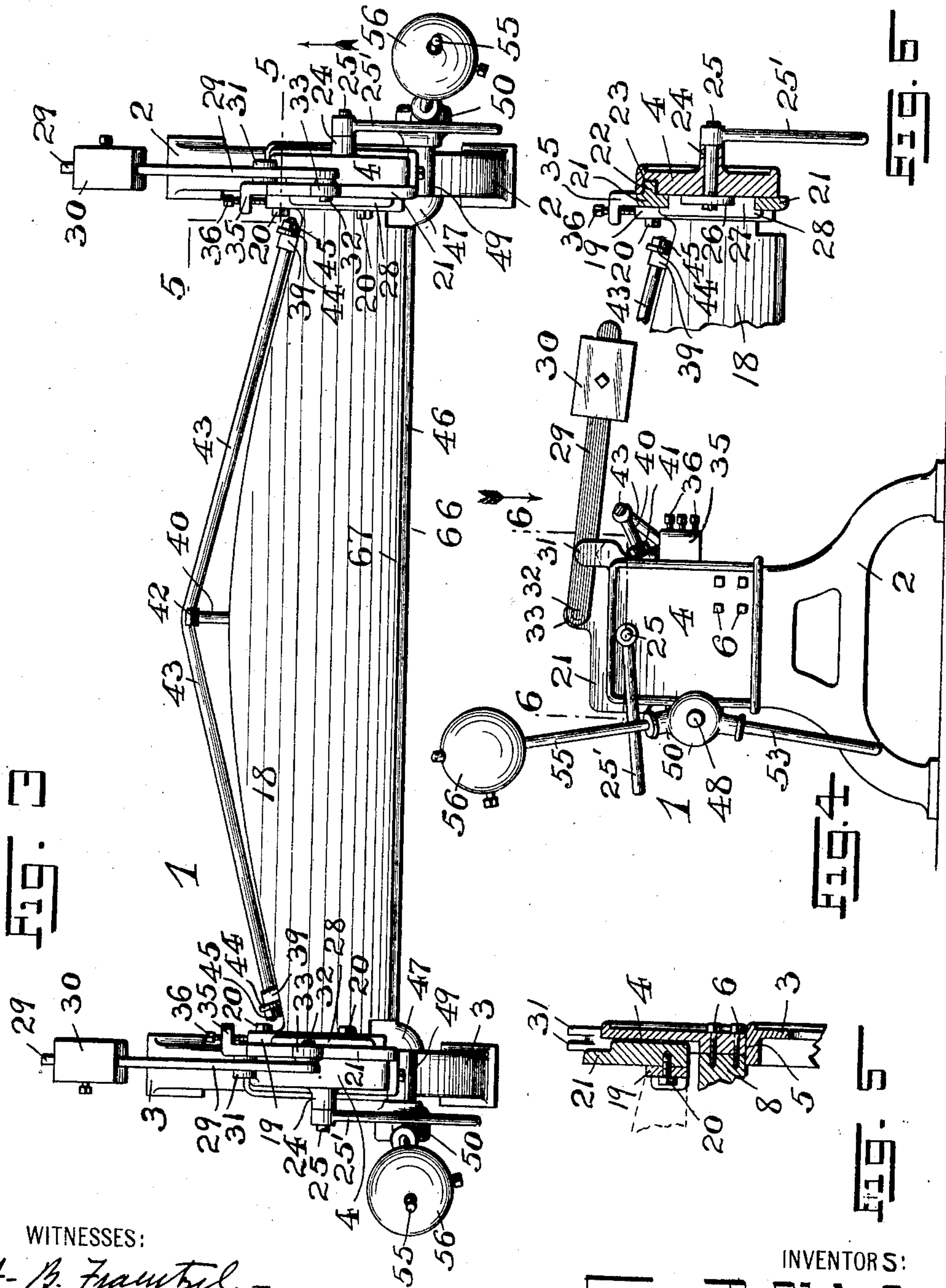
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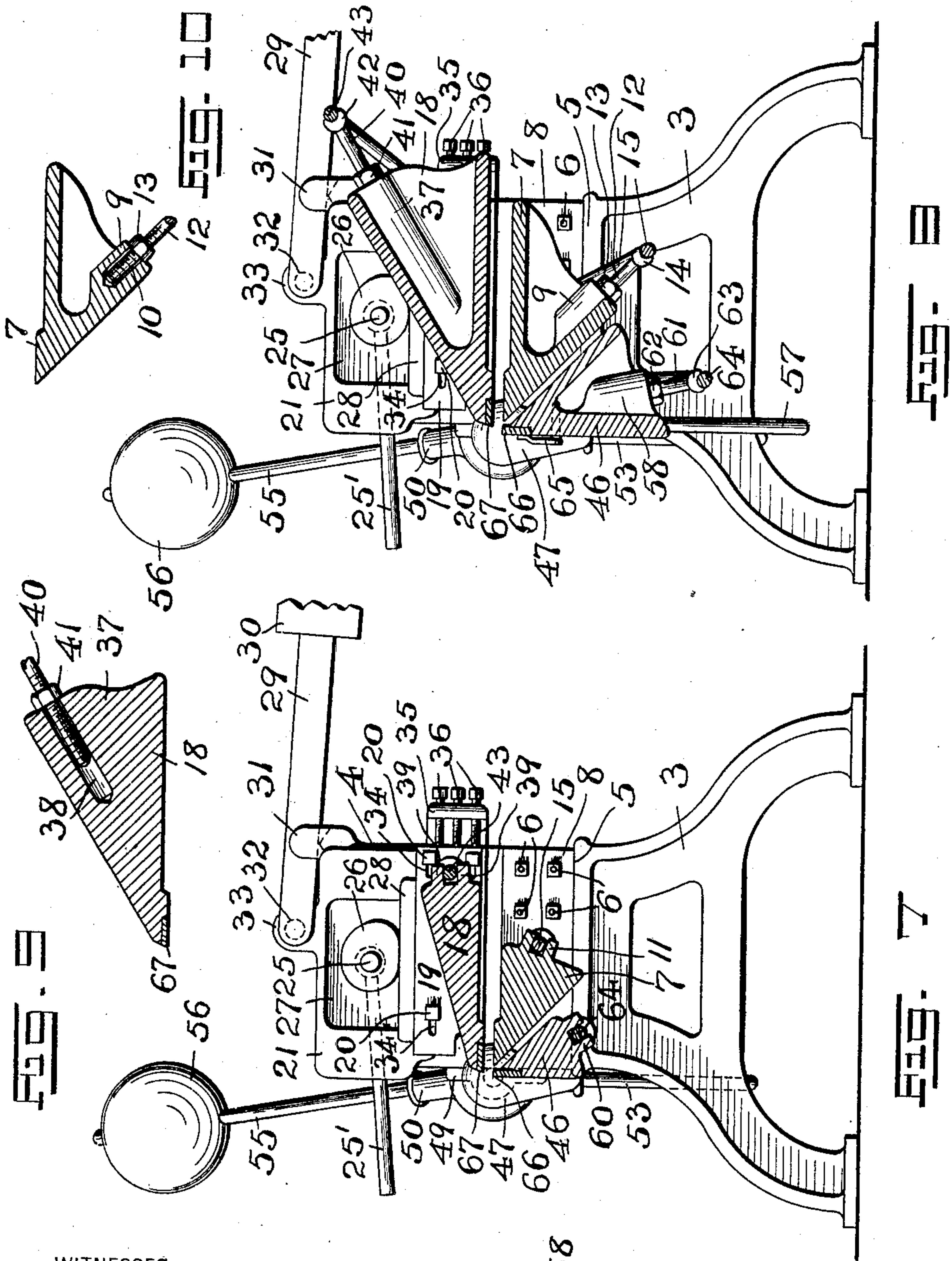
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

GEORGE A. OHL, JR., AND AUGUST A. BERGHOF, OF NEWARK, NEW JERSEY, ASSIGNORS TO GEORGE A. OHL & CO., A CORPORATION OF NEW JERSEY.

METAL-BENDING MACHINE.

No. 829,597.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed November 3, 1903. Serial No. 179 674.

To all whom it may concern:

Be it known that we, GEORGE A. OHL, Jr., and AUGUST A. BERGHOF, citizens of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Metal-Bending Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The present invention relates to improvements in machines for the bending of sheet metal, and the invention has reference more particularly to that class of machines provided with two leaves and a table or bed between which the metal which is to be bent is placed, one of said leaves being adjustable vertically above the table or bed and the other leaf being pivoted so as to be capable of a swinging movement about the edge of the reciprocating leaf, the parts being arranged to form angular bends in rapid succession and that the leaves may be used with various "formers" to be attached to the machine to produce any variety of designs or bends or moldings in the metal.

The principal object of this invention is to produce a machine of this character provided with means for the manipulation of said leaves at either end of the machine, which is of great benefit in very large machines, because the parts, which of course are very heavy, can be operated at either end by two men independently of each other, one man standing at each end of the machine in such positions most convenient for the handling of the large sheets of metal.

Another object of this invention is to provide perfectly-balanced clamping and bending leaves and to provide a balanced reciprocating clamping-leaf actuated from a cam movement which readily and immediately adjusts the said vertically-moving clamping-leaf in its clamping positions upon sheets of metal of varying thicknesses, and thereby locks the sheet of metal in place while being formed or bent into shape without having to adjust other parts of the machine, as heretofore,

such as adjustable bearings between which the leaf is suspended by means of adjusting-screws or other similar devices.

Another object of this invention is to simplify the general arrangement of parts and the details of the construction thereof, whereby the parts of the machine are assembled in less time and at a greatly-reduced cost of manufacture.

The invention consists, therefore, in the general arrangements and combination of parts, as well as in the details of the construction thereof, all of which will be fully described in the following specification and then finally embodied in the clauses of the claim, which are appended to the said specification and which form an essential part of the same.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a front view of a metal-bending machine embodying the principles of the present invention, and Fig. 2 is a rear view of the same. Fig. 3 is a top or plan view of the machine, and Fig. 4 is an end view of the same. Fig. 5 is a detail vertical section taken on line 5 5 in said Fig. 3 of the drawings, and Fig. 6 is a detail horizontal section taken on line 6 6 in said Fig. 4. Fig. 7 is a transverse vertical section of the machine, said section being taken on line 7 7 in Fig. 2 of the drawings looking in the direction of the arrow *x*; and Fig. 8 is a similar section taken on line 8 8 in said Fig. 2 looking in the direction of the arrow *y*. Figs. 9 10, and 11 are transverse vertical sections taken centrally across the vertically-moving leaf, the table or bed, and the pivoted leaf, respectively.

Similar characters of reference are employed in the said above-described views to indicate corresponding parts.

Referring now to the several figures of the drawings, the reference character 1 indicates the complete metal-bending machine, the same comprising two end standards or frames 2 and 3, each standard being provided with a suitably-constructed upper member 4, the same being preferably provided upon their inner faces with supporting-ribs 5, upon which rest and are immovably secured, preferably by means of screws or bolts 6, the end portions 8 of a peculiarly-formed table or bed 7. The said table or

bed is provided with a centrally-disposed lug or enlargement 9, in which there is a receiving-socket 10, and near the end portions of the said table or bed 7 the same is provided with bifurcated holding members 11, substantially as illustrated.

Into the socket 10 of the lug or enlargement 9 is slipped the end portion of a bar or post 12, which is screw-threaded, as shown, and has an adjusting-nut 13 arranged upon said thread the outer end of the said bar or post being made with a forked or other suitably-formed receiving portion 14. A bent rod 15 has its central portion arranged in this receiving portion 14. The respective end portions of the bent rod 15 are screw-threaded and are arranged between the bifurcated members 11, suitable washers 16 and tightening-nuts 17 being arranged on said screw-threaded end portions of the rod 15 and tightened against the said members 11, as illustrated. The proper tension is applied to said rod 15 to prevent the straining of the table or bed 7 when the machine is being operated by turning the nut 13 in the proper direction upon the screw-thread of the bar or post 12, thereby bringing the forked or other receiving portion 14 of said bar or post 12 forcibly against the rod 15 and producing a trussed table or bed, as will be clearly understood. Any slack, due to jarring with the constant operations of the machine, can easily be taken up by the proper adjustment of the said nut 13. Movable vertically above the upper and flat surface of the said table or bed 7 is a reciprocatory leaf 18, the said leaf being preferably provided with end members 19, which are secured, by means of screws or bolts 20, to a slide 21, having a guiding rib or projection 22, which is capable of a vertical movement in a guide 23, formed in the member 4 of each standard or end support of the machine. Each member 4 is also made with a bearing 24, in which is a pin or journal 25, having attached to its outer end an operating handle or lever 25' and having suitably secured to the opposite end of said pin or journal a cam 26. Each cam is arranged in a recessed portion 27, formed upon the inner face of each slide 21, and its cam-surface is such that when it is made to ride upon the part 28 the least movement of the cam will produce a correspondingly rapid downward movement of the clamping-leaf 18, which thereby accommodates itself to the varying thicknesses of sheet metal to be bent and positively locks or clamps the sheet upon the bed or table prior to the bending operation to be performed by the bending-leaf. The upward or return movement of the said clamping-leaf 18 is produced by an arm or lever 29, having a weight or counterbalance 30 at each end of the machine, each arm or lever 29 being supported so as to oscillate upon a fulcrum 31 upon each member 4 and each lever

or arm 29 being pivotally connected, by means of a laterally-extending pin 32, to a perforated bearing portion 33 upon each slide 21. The parts are perfectly balanced that the reciprocal movements of the leaf 18 and its slides 21 can be produced without the least exertion on the part of the operator or operators. That the said clamping-leaf 18 may be capable of a lateral adjustment, the bolts or screws 20 are arranged in elongated holes or slots 34 in the members 19, the slides 21 being provided with suitably-disposed brackets 35, having suitably-arranged adjusting-screws 36, which can be manipulated to adjust the said members 19 either forwardly or backwardly against the faces of the slides 21, as will be clearly evident. The said clamping-leaf is also provided with a centrally-disposed lug or enlargement 37, in which there is a receiving-socket 38, and near its end portions the said clamping-leaf is provided with bifurcated members 39. Into the socket 38 of the lug or enlargement 37 is slipped the end portion of a bar or post 40, which is made screw-threaded, as illustrated, and has an adjusting-nut 41 arranged upon said screw-thread, the outer end of said bar or post 40 being made with a forked or other suitable receiving portion 42. A bent rod 43 has its central portion arranged in the receiving portion 42, and the respective and screw-threaded end portions of said rod 43 are arranged between the bifurcated holding-member 39, suitable washers 44 and tightening-nuts 45 being arranged on said screw-threaded end portions of the rod 43 and tightened against the holding members 39, as illustrated. The proper tension is applied to said rod 43 to prevent the straining of the clamping-leaf 18 by turning the nut 41 in the proper direction upon the screw-thread of the bar or post 40, thereby bringing the forked or other suitable receiving portion 42 of said bar or post 40 forcibly against the rod 43 and producing a trussed clamping-leaf, as will be clearly evident. By means of the said nut 41 any slack, due to jarring with the constant operations of the machine, can easily be taken up by the proper adjustment of the nut and again bringing these parts into their tightened relation.

From an inspection of Figs. 7 and 8 it will be seen that the front edge of the lower surface of the clamping-leaf 18 is in alinement with the front edge of the table or bed 7, the said clamping-leaf in cross-section forming an acute angle, and in its normal initial position there is arranged directly beneath the said front edge of the clamping-leaf, with its upper surface horizontally in alinement with the upper surface of the table or bed 7, an oscillating or pivoted bending or forming leaf 46. This leaf 46 is provided at its ends with upwardly-extending members 47, (see Fig. 1,) which are provided with journals 48, arranged in bear-

ings, 49, suitably arranged upon the front edges of the members 4, or upon any other suitable portions of the end standards of the machine. Upon each journal 48 is secured, by means of a screw, bolt, or other fastening means 51, a socket device 50. Each device 50 has secured thereto by means of a suitable fastening means 52, such as a screw or bolt, an operating handle or lever 53, and by means of other fastening means 54, such as a screw or bolt, an upwardly-extending arm 55, provided with a counterbalance or weight 56. Other operating handles or levers 57 may also be connected with the main body of said leaf 46, that a pivotal or oscillating movement of said leaf 46 can be produced, as may be most convenient to the workmen standing in front of the machine. The said bending-leaf 46 is likewise provided with a centrally-disposed lug or enlargement 58, provided with a receiving-socket 59 and near its end portions with bifurcated holding members 60. In this socket 59 is slipped the end portion of a bar or post 61, which is screw-threaded, as shown, and has an adjusting-nut 62 arranged upon said screw-thread, the outer end portion of said post or bar 61 being made with a forked or other suitable receiving portion 63. A bent rod 64 has its central portion arranged in said receiving portion 63, and the respective end portions of said rod or bar 64 are arranged in and secured against the bifurcated holding members 60, as indicated in Figs. 7 and 8 of the drawings, and in the manner of securing the end portions of the rods 15 and 43 in the bifurcated holding members 11 and 35 of the table or bed 7 and the clamping-leaf 18, respectively. The proper tension can thus also be applied to said rod 64 to prevent the straining of the bending-leaf 46 when the machine is in operation by turning the nut 62 in the proper direction upon the screw-thread of the bar or post 61, thereby bringing the forked or other receiving portion 63 of said bar or post 61 forcibly against the rod 64 and producing a trussed bending-leaf, as will be understood, and any slack due to jarring with the constant operations of the machine can readily be taken up by the proper adjustment of the said nut 62.

The bending-leaf 46 is provided with suitably-constructed spring-clips, as 65, by means of which variously-shaped formers or moldings may be arranged along the bending edge 66 of the bending-leaf to provide the sheet metal with corrugations or bends of any desired cross-section.

The operation of the machine for bending sheet metal is briefly as follows: Normally the various parts of mechanism are in the relative positions indicated in Figs. 7 and 8, the sheet of metal which is to be bent being inserted between the flat surfaces of the bending leaf and table and the under flat surface of the clamping-leaf. The clamping-leaf 18

is then lowered upon the metal to clamp it fast by lifting or raising any one or both of the arms or levers 25', leaving that portion or edge of the metal sheet which is to be bent extending from between the jaws or edges 66 and 67 of the bending-leaf and clamping-leaf, respectively. Then by raising or lifting either of the arms or levers 53 or 57 at one or both the ends of the machine or by operating both levers 53 and 57 at one time a swinging movement of the said bending-leaf 46 is produced, causing its edge or jaw 66 to move about the edge or jaw 67 as a center in the manner well known in the art pertaining to machines for bending sheet metal.

Having thus described our invention, what we claim is—

1. In a metal-bending machine, the combination, with the standards of the machine, said standards being provided with rearwardly-extending supporting-ribs, of a bed immovably resting upon said ribs, a reciprocable clamping-leaf above said table, means for producing a lateral adjustment of said leaf, a cam for actuating said leaf, a fulcrumed lever and counterbalance connected with said leaf for balancing the same, and a truss device for strengthening the clamping-leaf, consisting, of a socketed lug connected with the said leaf, and holding members near the ends of said leaf, a screw-post slipped into said socketed lug and loosely arranged therein, an adjusting-nut on said post, a receiving means at the free end of said post, and a truss-rod arranged in said receiving means and having its end portions connected with said holding members, substantially as and for the purposes set forth.

2. In a metal-bending machine, the combination, with the standards of the machine, said standards being provided with rearwardly-extending supporting-ribs, of a bed immovably resting upon said ribs, a reciprocable clamping-leaf above said table, means for producing a lateral adjustment of said leaf, a cam for actuating said leaf, a fulcrumed lever and counterbalance connected with said leaf for balancing the same, and a truss device for strengthening the clamping-leaf, consisting, of a socketed lug connected with the said leaf, and bifurcated holding members near the ends of said leaf, a screw-post slipped into said socketed lug and loosely arranged therein, an adjusting-nut on said post, a forked receiving end on said post, and a truss-rod arranged in said forked receiving end of said post and having its end portions connected with said bifurcated holding members, substantially as and for the purposes set forth.

3. In a metal-bending machine, the combination, with the standards of the machine, said standards being provided with rearwardly-extending supporting-ribs, of a table immovably resting upon said ribs, a pivoted bending or forming leaf, and a reciprocable

clamping-leaf above said table, the lower front edge of said clamping-leaf being in alinement with the front edge of the table and projecting beyond the said edge of the table, the said bending or forming leaf having its upper edge arranged directly beneath the front edge of the clamping-leaf and having its upper surface normally in horizontal alinement with the upper surface of the table, means for producing a lateral adjustment of the clamping-leaf, a cam for actuating said leaf, a fulcrumed lever and counterbalance connected with said leaf for balancing the same, a truss device connected with said table, a truss device connected with said bending or forming leaf, and a truss device connected with said clamping-leaf, each truss device consisting of a socketed lug on each, the said table, said bending or forming leaf, and said clamping-leaf, and holding members near the ends of each, the said table, said bending or forming leaf, and said clamping-leaf, a screw-post slipped in each socketed lug and loosely arranged therein, an adjusting-nut on each screw-post, a receiving means at the free end of each post, and a truss-rod arranged in each receiving means, each truss-rod having its end portions connected with the holding members, respectively, of said table, said bending or forming leaf, and said clamping-leaf, substantially as and for the purposes set forth.

4. In a metal-bending machine, the combination, with the standards of the machine, said standards being provided with rearwardly-extending supporting-ribs, of a table immovably resting upon said ribs, a pivoted bending or forming leaf, and a reciprocable clamping-leaf above said table, the lower front edge of said clamping-leaf being in alinement with the front edge of the table and projecting beyond the said edge of the table, the said bending or forming leaf having its upper edge arranged directly beneath the front edge of the clamping-leaf and having its upper surface normally in horizontal alinement with the upper surface of the table, means for producing a lateral adjustment of the clamping-leaf, a cam for actuating said leaf, a fulcrumed lever and counterbalance connected with said leaf for balancing the same, a truss device connected with said table, a truss device connected with said bending or forming leaf, and a truss device connected with said clamping-leaf, each truss device consisting of a socketed lug on each, the said table, said bending or forming leaf, and said clamping-leaf, and bifurcated holding members near the ends of each, the said table, said bending or forming leaf, and said clamping-leaf, a screw-post slipped in each socketed lug and loosely arranged therein, an adjusting-nut on each post, a forked receiving end on each post, and a truss-rod arranged in said forked receiving end of each

post, each truss-rod having its end portions connected with the bifurcated holding members, respectively, of said table, said bending or forming leaf, and said clamping-leaf, substantially as and for the purposes set forth. 70

5. In a metal-bending machine, the combination, with the standards of the machine and a bed or table, of a slide connected with each standard, each slide having a recessed portion, a clamping-leaf secured between said slides, a cam movably arranged in the recessed portion of each slide, means for actuating each cam, a fulcrum on each standard of the machine, a lever arranged over each fulcrum, each lever being pivotally connected with a slide, and a counterbalance on each lever for balancing the clamping-leaf, substantially as and for the purposes set forth. 75

6. In a metal-bending machine, the combination, with the standards of the machine and a bed or table, of a reciprocable clamping-leaf above said table, means for producing a lateral adjustment of said leaf, a cam for actuating said leaf, and a fulcrumed lever and counterbalance connected with said leaf for balancing the same, substantially as and for the purposes set forth. 80

7. In a metal-bending machine, the combination, with standards of the machine and a bed or table, of a slide connected with each standard, each slide having a recessed portion, a clamping-leaf secured between said slides, means connected with said slides for producing a lateral adjustment of said leaf, a cam movably arranged in the recessed portion of each slide, means for actuating each cam, a fulcrum on each standard of the machine, a lever arranged over each fulcrum, each lever being pivotally connected with a slide, and a counterbalance on each lever for balancing the clamping-leaf, substantially as and for the purposes set forth. 85 90 95 100 105

8. In a metal-bending machine, the combination, with the standards of the machine, of a clamping leaf or member, and a truss device for strengthening the same, consisting of a centrally-arranged socketed lug connected with the said leaf or member, a bifurcated holding member extending from each end portion of the said leaf or member, a screw-post slipped into said socketed lug and loosely arranged therein, an adjusting-nut on said post, a forked receiving end on said post, and a truss-rod arranged in said forked receiving end of said post, said truss-rod having its end portions adjustably connected with said bifurcated holding members, and being slidably removable from the open portions of said bifurcated holding members, substantially as and for the purposes set forth. 110 115 120 125

9. In a metal-bending machine, the combination, with the standards of the machine, of a clamping leaf or member, and a truss device for strengthening the same, consisting of a centrally-arranged socketed lug connected 130

with the said leaf or member, a bifurcated holding member extending from each end portion of the said leaf or member, a screw-post slipped into said socketed lug and
5 loosely arranged therein, an adjusting-nut on said post, a forked receiving end on said post, and a truss-rod arranged in said forked receiving end of said post, said truss-rod having screw-threaded end portions slipped into
10 said bifurcated holding members, and a tightening - nut adjustably arranged upon each screw-threaded end portion of the truss-rod, each nut being adapted to be screwed up
15 against the side of a bifurcated holding member for securely connecting the end portions

of the truss-rod with said bifurcated holding members, and the said end portions of said truss-rods being slidably removable from the open portions of said bifurcated holding members, substantially as and for the purposes 20 set forth.

In testimony that we claim the invention set forth above we have hereunto set our hands this 31st day of October, 1903.

GEORGE A. OHL, JR.
AUGUST A. BERGHOF.

Witnesses:

JOHN S. LA BAR,
FREDK. C. FRAENTZEL.