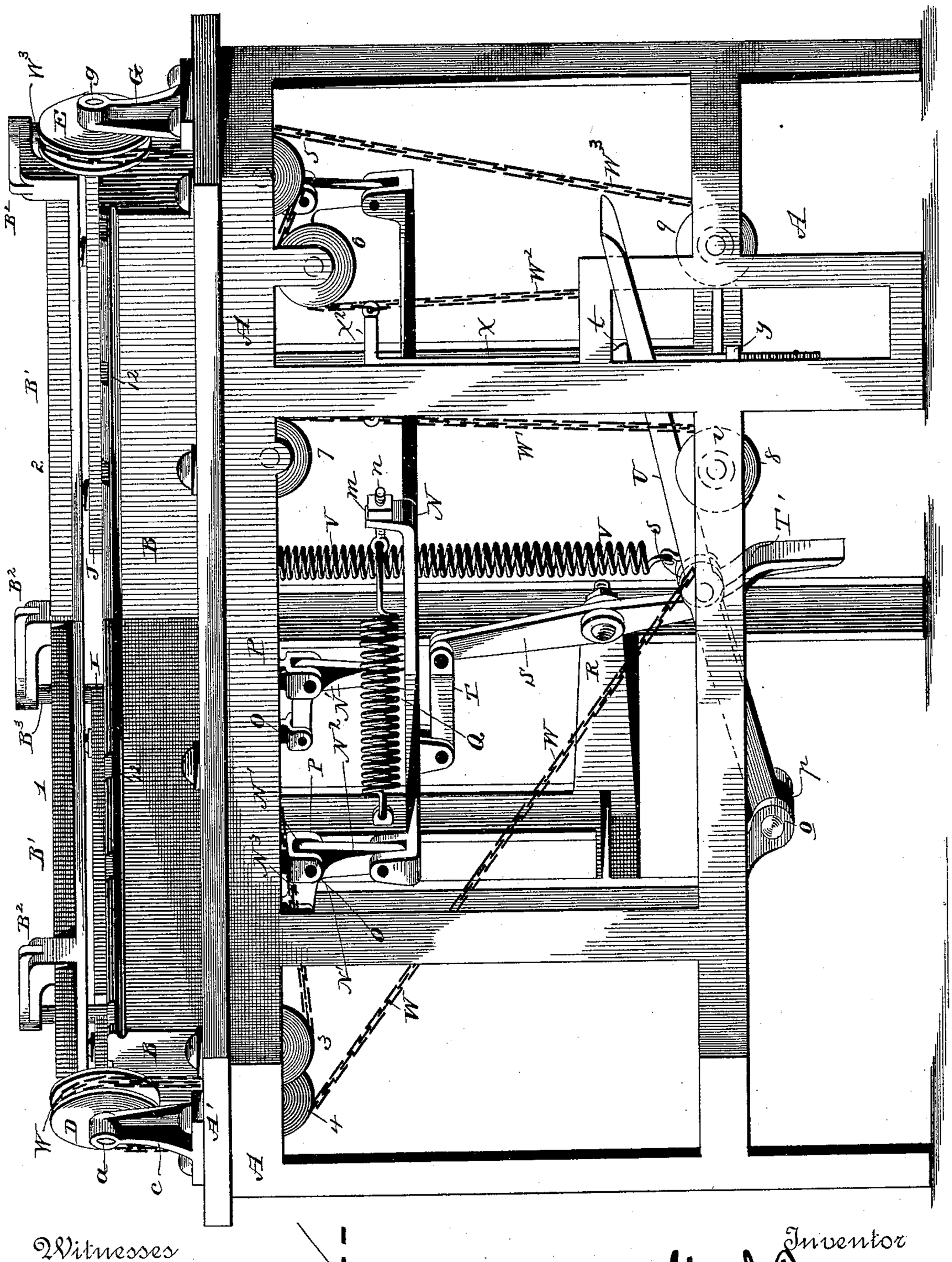
(No Model.) 7 Sheets—Sheet 1.

W. J. TURNER.

MACHINE FOR EDGING SHEET METAL.

No. 389,912. Patented Sept. 25, 1888.



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(No Model.) 7 Sheets—Sheet 2.

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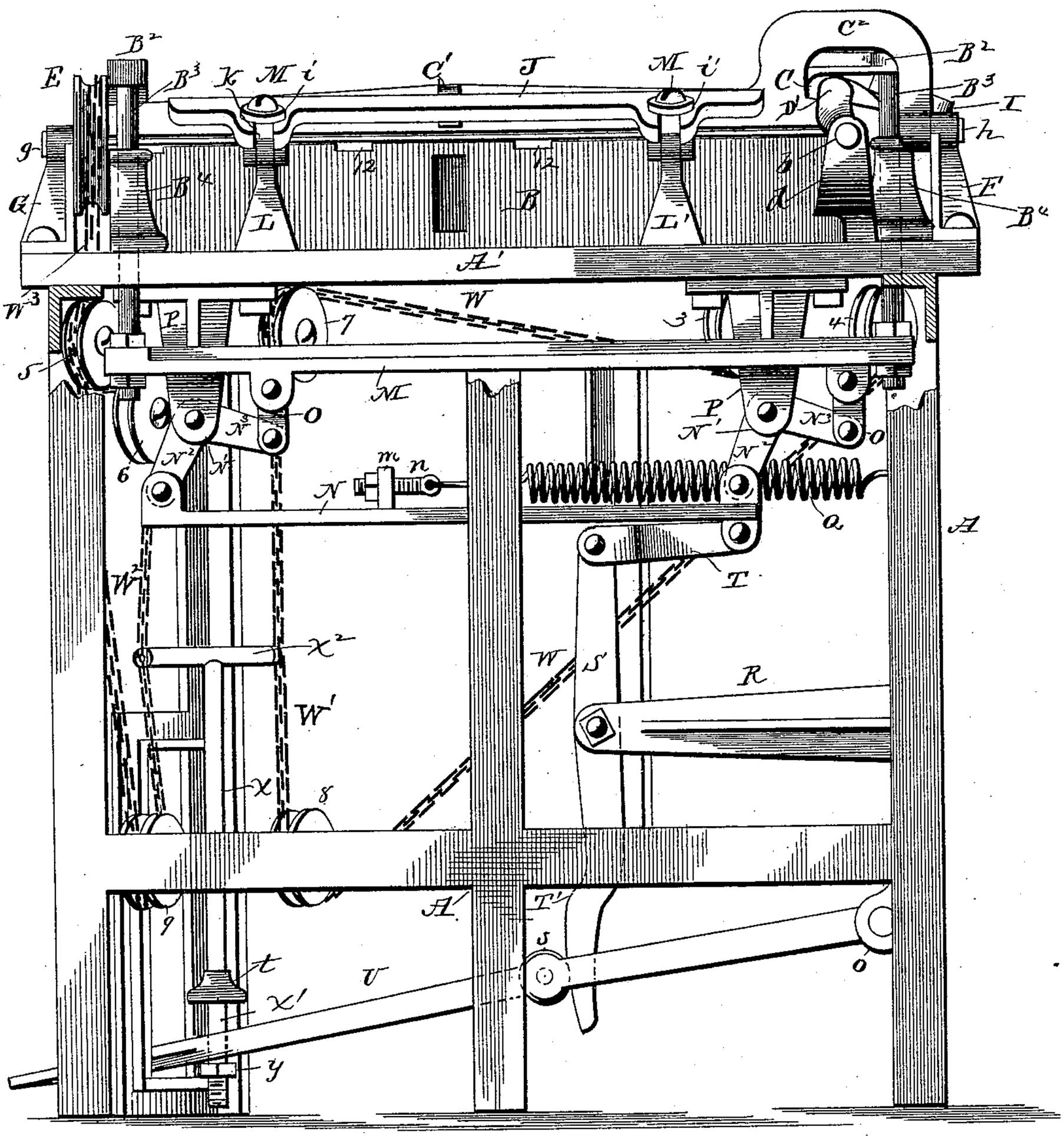

FIG. 2.

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(No Model.) 7 Sheets—Sheet 3.

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MACHINE FOR EDGING SHEET METAL.

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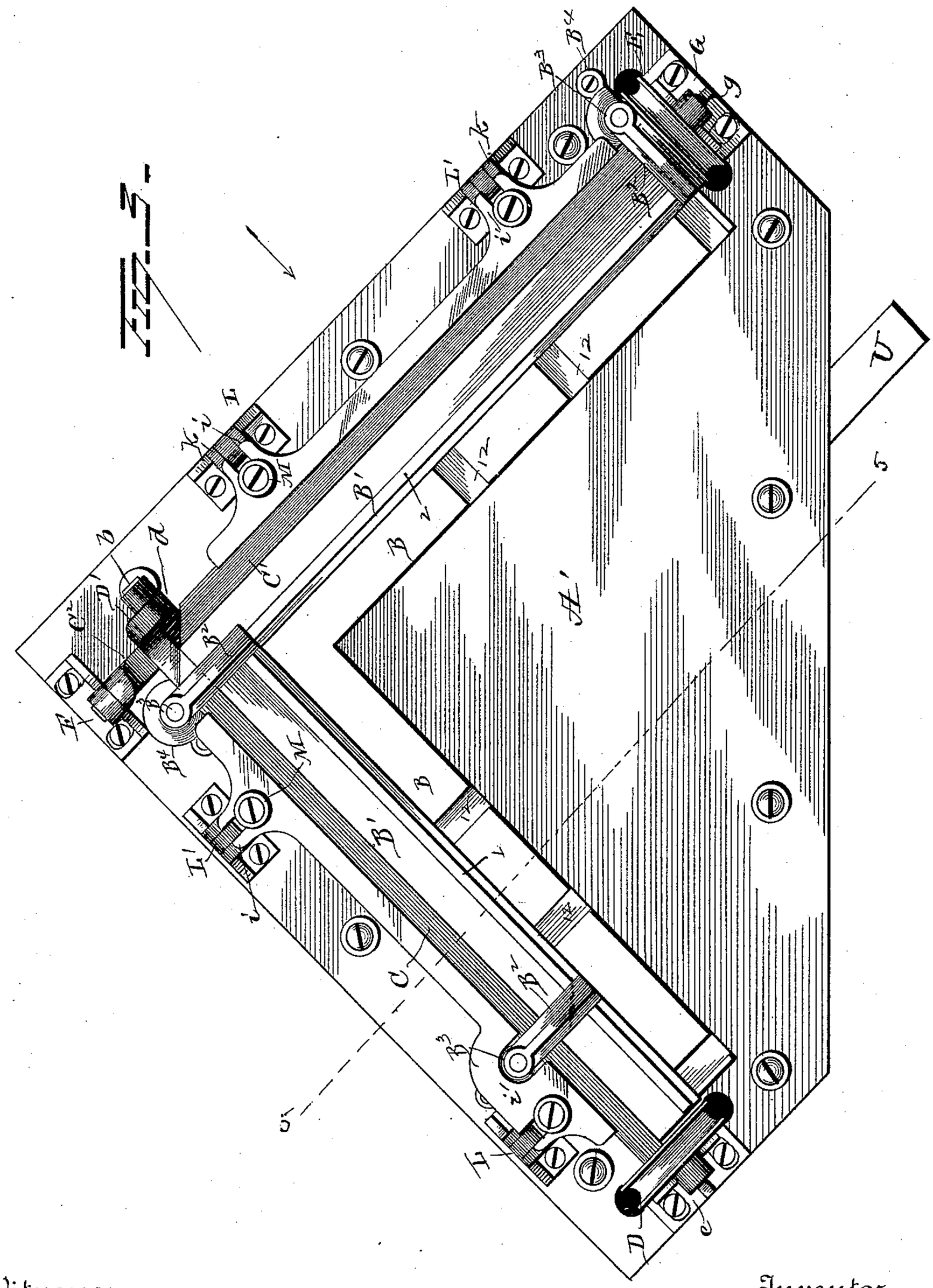

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(No Model.) 7 Sheets—Sheet 4.

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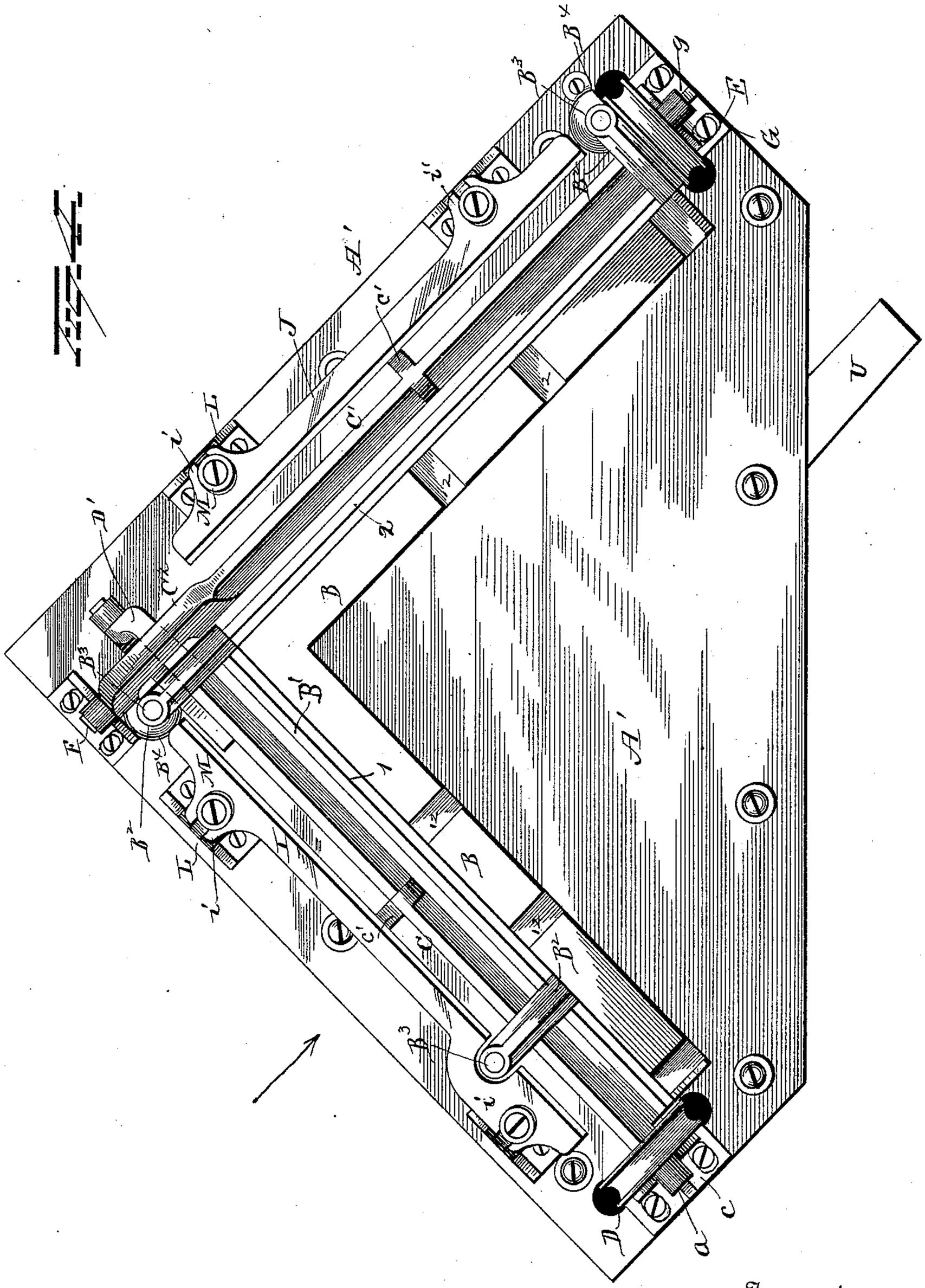
MACHINE FOR EDGING SHEET METAL.

No. 389,912. Patented Sept. 25, 1888.



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(No Model.) 7 Sheets—Sheet 5.

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MACHINE FOR EDGING SHEET METAL.

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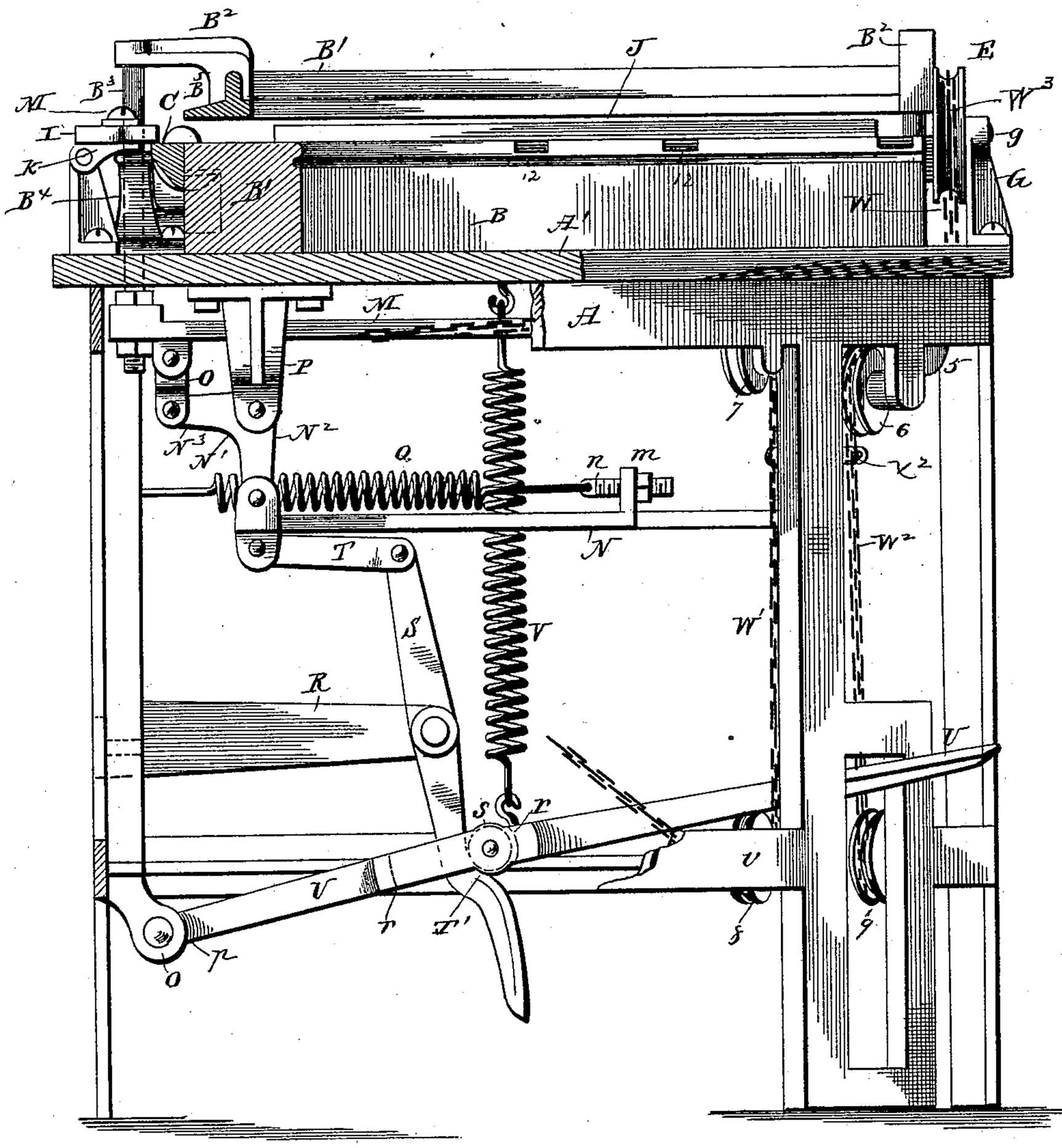

FIG. 5.

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(No Model.) 7 Sheets—Sheet 6.

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MACHINE FOR EDGING SHEET METAL.

No. 389,912. Patented Sept. 25, 1888.

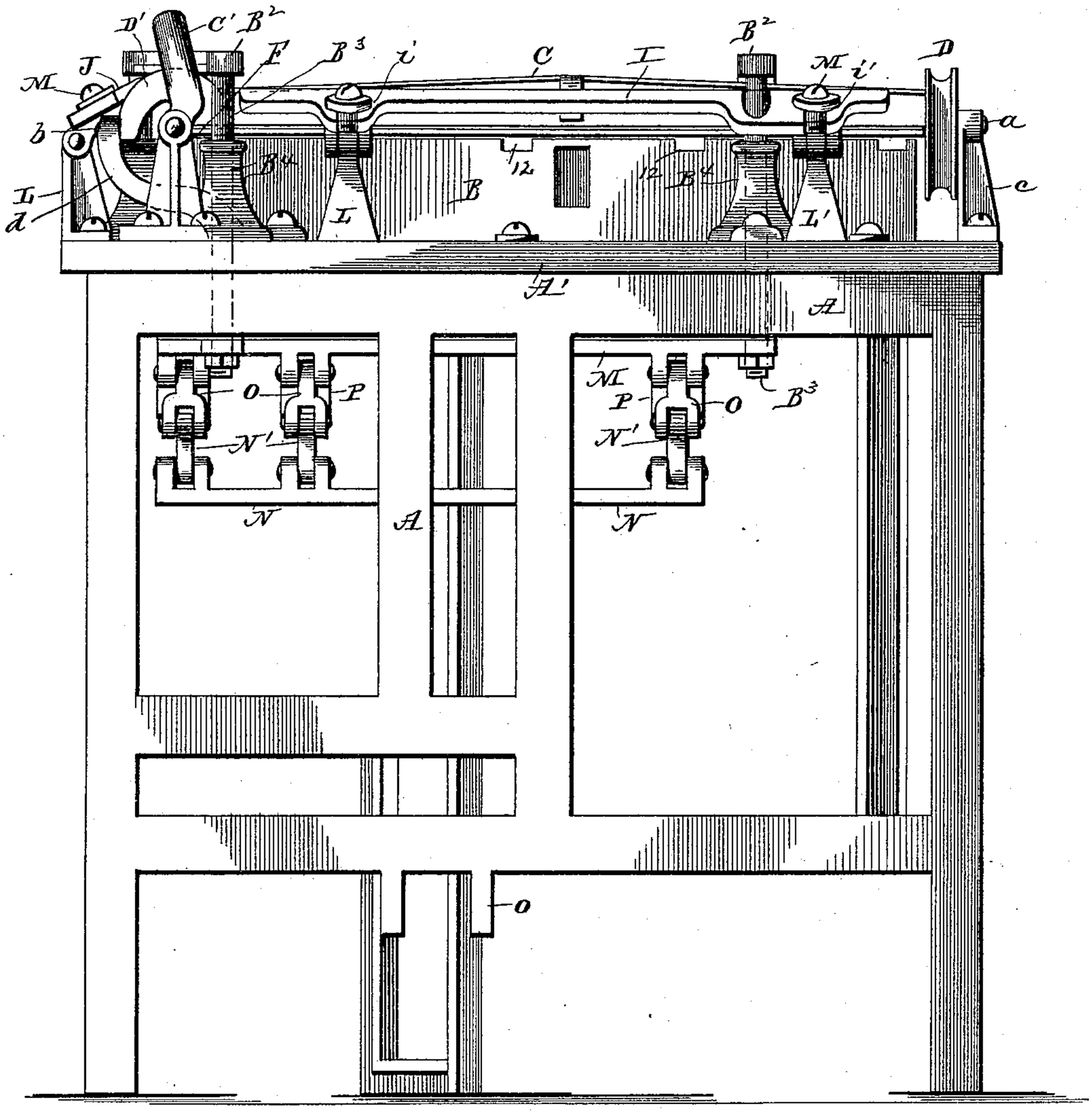

FIG. 6.

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(No Model.) 7 Sheets—Sheet 7.

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MACHINE FOR EDGING SHEET METAL.

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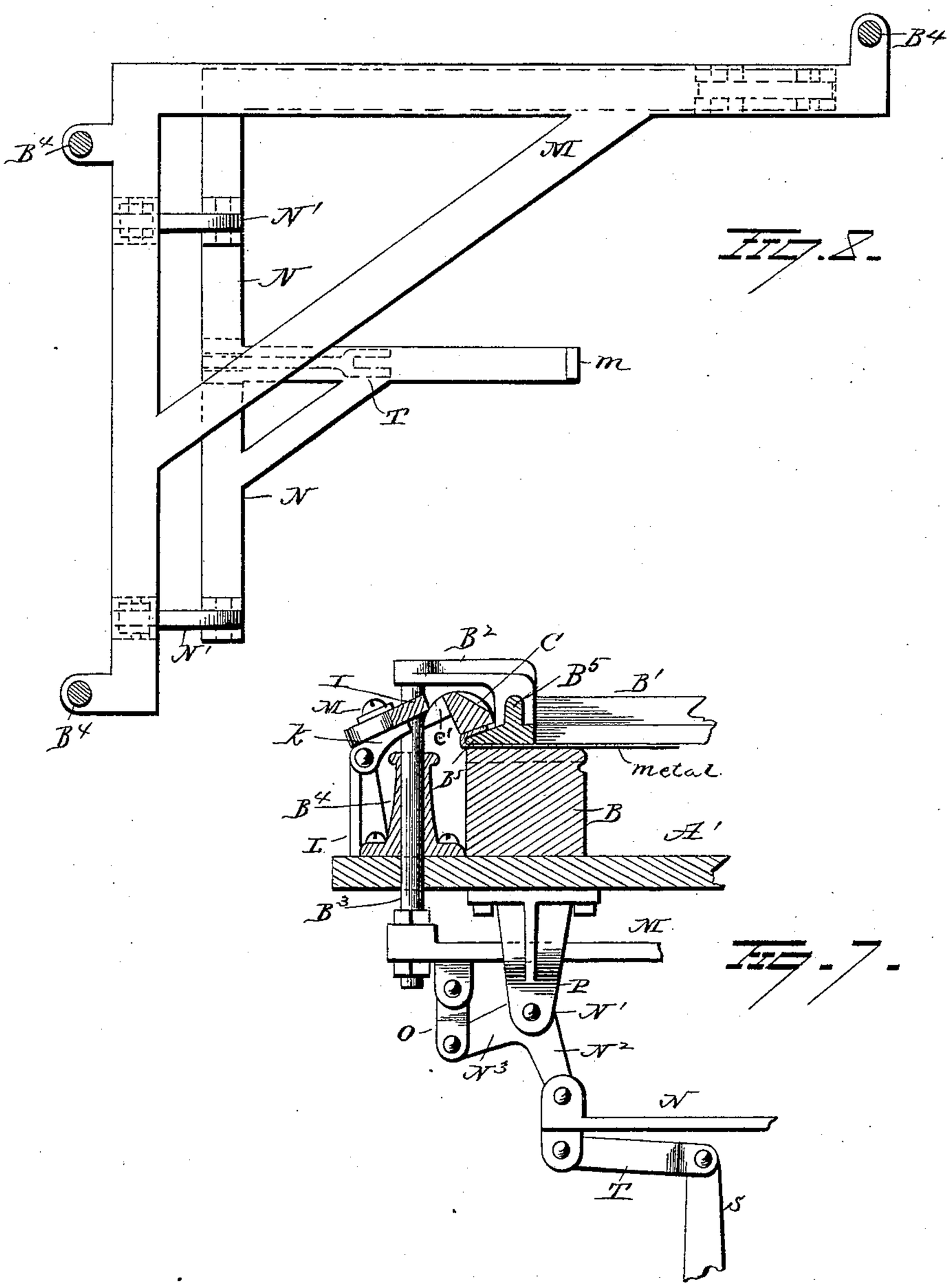

Fig. 8.

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILLIAM JAMES TURNER, OF TEMPLETON, MASSACHUSETTS.

MACHINE FOR EDGING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 389,912, dated September 25, 1888.

Application filed January 5, 1888. Serial No. 259,919. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JAMES TURNER, a resident of the village of Baldwinsville, in the town of Templeton, county of Worcester, and State of Massachusetts, have invented a new and useful Improvement in Machines for Folding the Edges of Tin-Plate or other Sheet Metal; and I hereby declare the following to be a full, clear, and exact description of the same and its manner of operation.

The object of my present invention is to provide a simple, compact machine by the use of which sheet metal of angular form may be turned or folded upon two adjacent edges at an angle to each other at one operation.

With this object in view my invention consists in certain features of construction and combinations of parts that will be hereinafter described, and pointed out in the claims.

Referring to the drawings, Figure 1 is an elevation, in perspective, showing the machine from its feeding side, the parts being shown in position to receive a metal sheet to be folded on its edges. Fig. 2 is a side elevation looking in the direction of the arrow in Fig. 3, showing the parts in the position they assume when a sheet has been folded. Fig. 3 is a plan view of the device, showing the folding brakes and sheet-clamps in position to receive a sheet to be folded. Fig. 4 is a plan view of the machine in position assumed when a sheet of metal has been operated upon to fold its two adjacent edges. Fig. 5 is a side elevation, in section on line 5 5, Fig. 3, of the folding mechanism ready to receive a sheet of metal to be folded. Fig. 6 is a rear side elevation looking in the direction of the arrow in Fig. 4 of the folding mechanism after a sheet has been folded and before its removal from the machine. Fig. 7 is a detail side elevation, in section, showing the position assumed when a sheet of metal has been operated upon. Fig. 8 is a detached view of the tables M and N.

A is the frame of the machine, constructed, preferably, of metal triangular in plan, although its form is not restricted to this shape. A table, A′, is secured to the top of the frame A. This table has at least two of its edges at right angles to each other. Upon the table A′ a raised platen, B, is secured. This platen is preferably made with two sides at right angles to each other or L-shaped. These sides corresponding to the edges of the table A′ in position are so situated in relation thereto as to allow a proper portion of the top surface of the table to intervene between their vertical-face walls and the edges of the table to afford room for the folding appliances that are located thereon. The top surface of the platen B is faced with a steel plate made true on its upper side and also on its edges to conform to the side surfaces of the platen and in effect form a portion of the same. Transverse grooves 12 are formed in the upper face of this platen B at irregular intervals, their object being to receive the seams in cases where sheets of material have been joined before the process of flanging.

A device to clamp the tin-plate or other sheet metal to be folded consists of an L-shaped bar, B′, which is of a size to correspond at its outer edges to the outer vertical walls of the platen B. This clamping-bar B′ is provided with three integral arms, B^2, that project outwardly, one of these arms being located near each end and the third at the vertex of the right angle formed by the junction of the two limbs 1 2 of this L-shaped bar.

The arms B^2 overhang the outer edges of the clamping-bar B′ a proper distance, and at their outer ends have bosses, to which are rigidly attached the depending rods B^3, that are inserted in perforated guiding-stands B^4, which latter are secured upon the top surface of the table A′. These rods B^3 working freely but neatly in the stands, are simultaneously actuated from below the table by devices that will be described, a limited vertical movement being thus given to the clamping-bar B′ to lift it parallel to and sufficiently away from the platen B and return and clamp it upon a sheet of metal inserted between the bar and platen.

Two sheet folding or braking beams, C C′, are provided to fold the edges of the sheet metal which has been clamped by the bar B′. These consist of metallic bars having two faces formed at a right angle to each other.

The brake-beams C C′ are each supported at their ends on integral journals in a peculiar manner to allow their bodies to hang pendent with one of their faces in contact with the adjacent vertical wall of the platen B, while the

other faces of the beams are in a horizontal plane in exact line with the top surface of the platen. In construction the brake-beams C C′ have the general features of each made similar, with the exception of the portion that gives rocking support to their adjacent ends at the angle of the platen.

The brake-beam C, which is located directly opposite the edge of the limb 1 of the rectangular clamping-bar B′, is of a proper length to have its bearing-face of the same length as that of the side wall of the platen, against which it rests. At the outer end of the beam C a disk, D, grooved on its periphery, is integrally formed, the center of this disk or grooved wheel corresponding with the vertex of the angle formed by the rectangular sides of the beam, so that a journal, *a*, formed on the outside surface of the wheel D at its center, will have its center in line with this angular edge of the beam. The opposite end of the beam C has a bent arm, D′, formed on it. This arm curves outwardly and upwardly from the lower edge of the beam C a proper distance beyond the termination of its angular edge to afford a clearance for the end of the other beam, C′, when the two beams are in position of folded adjustment, as will be explained. The outer end of the curved arm D′ terminates in a journal, *b*, which is in an axial line with the angular edge of the beam C and the journal *a* at its other end.

The beam C is supported by the insertion of its journaled ends into perforated bracket-supports, the journal *a* resting in the upper end of the bracket *c* and the other journal, *b*, loosely engaging the outer free end of a curved bracket-arm, *d*, which latter is made to clear the bent arm D′ of this beam. The other brake-beam, C′, that is opposite the limb 2 of the bar B′, is provided with a grooved wheel, E, similar in size to the wheel D on beam C, and located with its center in line with the angular edge of the beam C′, so that the journal *g*, which is centrally projected from its outer face, will be axially coincident with this edge. At the opposite end of the brake-beam C′ a U-shaped bent arm, C^2, is integrally formed, which projects outwardly, the bent portion of its body near the center of length of the same being sufficiently raised to afford a proper clearance for the semi-revolution of this arm beneath the bracket *d*, that supports the curved journaled arm D′ of the brake-beam C.

The bent arm C^2 just mentioned has its journal *h* supported to revolve in the upper perforated end of the bracket F, that is adjustably secured in place upon the top of the table A′. The journal *g*, which projects from the outer face of the grooved wheel E, is supported loosely in the perforated upper end of the bracket G, that is also adjustably affixed in position on the table A′ at the edge opposite to the location of bracket F.

The brake-beams C C′, being sustained by the insertion of their journal ends in the adjustable brackets, are adapted to be moved on the table A′. These beams may thus be adjusted toward or from the adjacent edge of the L-shaped platen B, which provision will afford a means for the proper adjustment of the angular edges of the beams with regard to the adjacent edges of the platen and clamping-bar to permit sheets of metal of different thicknesses to be folded properly without binding the beams, which would be the result if the beams were too close to the edges of the platen B. The adjacent ends of the brake-beams C C′ are mitered or cut off at an angle of forty-five degrees to the faces of the same, which are adjacent to the vertical walls of the platen B when these beams are in normal position or the machine is not in use. (See Fig. 3.) This construction of the adjoining ends of the beams C C′ is designed to permit the beams to be turned on their pivotal ends and join these beveled ends closely when the machine is operated to fold sheet metal.

The top surface of the L-shaped clamping-bar B′ is reduced or sloped from an upwardly-projecting stiffening-rib, B^5, toward the outer edges, to render these edges thin, so that when the brake-beams C C′ are upwardly rocked their faces will lie upon these beveled surfaces of the clamping-bar.

In order to regulate the width of the folded edges of the sheet metal operated upon by the machine, two adjustable gage-strips, I J, are furnished. These strips are made straight on the edges that are adjacent to the edges of the clamping-bar B′, and each have two widened portions, *i i′*, which are slotted at right angles to the straight edges mentioned. The slotted portions *i i′* are adjustably secured by screws, which are inserted through their slots into threaded holes made in bifurcated arms *k*, which project at right angles inwardly from the upper ends of the bracket-stands L L′, to which they are pivoted, so as to permit free vertical vibration of the gage-strips I J, that rest with their lower surfaces upon the horizontal faces of the brake-beams C C′ when these beams are in a position of rest, or the machine is adjusted to receive a sheet of metal to be folded.

To adjust the gage-strips I J to fold wider or narrower hooked edges on the sheet metal, the set-screws M, which secure the strips to the pivoted arms *k*, are loosened and the strips set in proper relative position with regard to the edges of the platen, the regulation of distance for the insertion of the edges of the sheet beyond the edges of the clamping-bar determining the width of the folded edges of the sheets of the plate or other metal operated upon.

The mechanism that is located below the table A′, that is provided to actuate the clamping-bar and brake-beams, will now be described.

The rods B^3, which are connected to the arms B^2 of the clamping-bar B′, extend downwardly, as previously mentioned, and have their lower ends secured adjustably to laterally-projecting ears of the braced triangular

skeleton frame M, which is thus supported in a plane parallel to the lower surface of the table A′. A second skeleton triangular frame, N, which is similar in form to the frame M, is provided, and the lower ends of the vertical limbs of the bell-crank levers N′ are pivoted in ears attached to the top surface of the frame N. The terminations of the horizontal limbs N^3 of the three bell-cranks N′ are pivoted to the slotted lower ends of the short links O, the upper ends of these links being pivotally secured to downwardly-projecting ears formed on the lower surface of the upper triangular skeleton frame, M. Two of these points of connection of the bell-cranks N′, between the frames M N, are near the ends of the frames, the other one near the angles of these frames. The three bell-crank levers N′ are pivoted at the junction of their limbs N^2 N^3 to depending bracket arms P P P, which are firmly affixed to the under side of the table A′, and it will be apparent that from this form of construction the rocking of the bell-cranks will elevate or depress their horizontal limbs and cause the clamping-bar B′ to be correspondingly moved in its guides, and thus impinge upon the platen or be elevated from it. A spiral spring, Q, is attached to a horizontal limb, *m*, of the lower frame, N, the other end of this spring being secured to an opposite part of the supporting-frame A, a tension-screw, *n*, being provided to allow the force of the spring to be regulated. This spring Q normally holds the frame M and the attached clamping-bar B′ at their highest point of adjustment.

A rigid horizontal arm, R, is made to project from the side of the inner face of the frame A a proper length to afford support to the vibrating lever S, which is pivoted to its end, this point of pivotal connection being near the center of the vertical lever S, as shown. The upper end of the lever S is pivotally attached to a forked end of the link T, the other end of this link having a pivoted connection to ears which are formed on the lower surface of the frame N, near its rear edge. Midway between the lower end and point of pivotal suspension of the vertical lever S a cam-projection, T′, is formed on the front edge of this lever, which curves outwardly and downwardly to produce a rounded offset.

On the lower bar of the rear side of the frame A inwardly-projecting ears *o* are formed, which receive the rounded lugs *p*, that terminate the rear end of the horizontal treadle-bar U, these lugs *p* being pivoted to the ears *o* to allow the treadle U to be vibrated vertically.

The treadle-bar U is of such a relative length as to project a suitable distance beyond the frame A through a slot in the same to allow the foot of the operator to engage the top surface of this end of the treadle, and at a proper point between the foot and rear ends of the treadle-bar U a slot is made through its body vertically to receive and permit the free vibration therein of the vertical lever S. In the slot *r* of the treadle-bar U a roller, *s*, is journaled on a cross-shaft, which is affixed with its ends in the parallel walls of the slotted portion of the treadle-lever, this loose roller having a bearing upon the cam-edge of the vertical lever S, so that a depression of the treadle-bar U will vibrate the lower end of the cam-lever S rearwardly, and in consequence draw the frame N and the lower limbs of the bell-cranks N′ forwardly, which motion will depress the horizontal limbs of these bell-cranks and draw the clamping-bar B′ down forcibly upon the platen B. A spiral spring, V, is connected by its ends to the treadle-bar U and under side of the table A′, the contractile force of said spring holding this treadle just above the cam-swell on the lever S.

In order to give a partial rotative movement to the brake-beams C C′, two flexible chains or wire ropes, W W^3, are provided, which are adjusted to lie in the grooved wheels D and E of the brake-beams C C′. The endless chain or rope W W′ is strung over wheel D and thence around sheaves 3, 7, 8, and 4. In a similar manner the chain or rope W^2 W^3, after being strung around wheel E, passes around sheaves 5, 6, and 9.

It will be seen that the two vertical strands W′ W^2 of the chains or wire ropes W W^3, which extend between the grooved sheaves 8 7 6 9, are located near the side edges of the treadle-bar U, and this bar is loosely attached to them by a T-shaped connecting-bar, X, which latter has its vertical stem X′ inserted through a slot in the treadle just inside of the frame A, its cross-bar X^2 extending to engage the strands W′ W^2 of the chains or wire ropes W W^3 and be secured thereto. The lower end of the vertical stem X′ of the connecting-bar X has a collar, *t*, formed on it at a proper point to engage with its rounded lower surface the top surface of the treadle-bar U when this bar is at rest or has its free end thrown up by the action of the spring V, and is downwardly extended below this collar *t* to allow the treadle-bar U to be depressed a certain distance before it engages the abutment *y*, which is adjusted upon the threaded body of the stem X′, to regulate the depression of the connecting-bar X, so as to operate the brake-beams C C′ at a proper instant of time and cause them to fold the edges of the sheet metal that has been inserted between the clamping-bar and platen.

As it is necessary for the proper operation of the device that the sheet of metal that is to be folded on its adjacent edges should first be securely clamped by the bar B′, the slotted connection of the treadle U with the connecting-bar X will permit the firm compression of the clamping-bar B′ upon an inserted sheet before the lower abutment, *y*, is engaged by the under side of the treadle. When this occurs the vertical strands W′ W^2 of the wire ropes or chains W W^3 are pulled downwardly, and this motion being transmitted to the eccentric grooved wheels D and E, to which the

strands of the chains W W³ are attached, the beams are rocked in their bracket-supports so as to cause the sides that were horizontal to be carried around sufficiently to cause them to bear firmly upon the top of the clamping-bar B′. The action just described will raise the gage-strips from their position and rock them rearwardly, as the under sides of these gage-strips will have contact with rounded projections C′, made on the brake-beams at a proper point near their center of length, to effect such a clearance of the gage strips and hold them rearwardly rocked until the folding operation just mentioned is completed. The elevation of the clamping-bar B′ and change of relative position of the operating mechanism below the table will restore the gage-strips I J to their normal position to permit the next sheet which is inserted below the clamping-bar B′ to be gaged as to the width of its material which is to form the folded edges of the same.

The operation of folding the sheets of metal is as follows: The sheets one at a time are inserted to have their two edges, which are adjacent to the gage-strips, made to bear against these strips. A depression of the treadle-bar U is then effected by the foot of the operator. This will depress the clamping-bar B′ and cause it to firmly bear upon the sheet to be folded. The edges of this sheet extending over the brake-beams C C′ are in contact therewith, so that the upward rocking of these beams which carries their bodies over the clamping-bar will fold the edges of the sheet metal upon the top surface of this bar B and form the "hooks" on the edges of the sheet, as desired. When completed, the sheet may be withdrawn, another inserted, and the operation repeated.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of folding brake-beams with a clamping-bar, a platen supported on a table, and a lever and connected mechanism adapted to depress the clamping-bar and rock the beams simultaneously after the clamping-bar has been depressed, substantially as set forth.

2. The combination, with a table, a platen having a rectangular edge, and a rectangular clamping-bar the edges of which are designed to move in alignment with the edges of the platen, of rocking brake-beams and a lever and connected mechanism to depress the bar and rock the beams after the bar is clamped upon the platen, substantially as set forth.

3. The combination, with a table, a platen having rectangular edges and a reciprocating rectangular clamping-bar, of a pair of rocking brake-beams, and also a pair of adjustable gage-strips at right angles to each other, and an operating-lever and connected mechanism to depress the bar and rock the beams after the bar is clamped upon the platen, substantially as set forth.

4. The combination, with a frame, a table placed on this frame, and a platen having its faces at right angles to each other, of a pair of brake-beams at right angles to each other, a rectangular clamping-bar and adjustable gage-strips, and mechanism to move the clamping-bar vertically preceding the rocking of the brake-beams and afterward rock the brake-beams toward the edges of the platen simultaneously, substantially as set forth.

5. The combination, with a frame, a table placed on the frame, and a platen having vertical sides mounted on the table, of two brake-beams pivoted to partially rotate, a clamping-bar, two adjustable gage-strips arranged to be lifted by the action of the brake-beams, and mechanism to clamp the bar onto the platen and then rock the brake-beams over upon the edges of a clamped sheet of metal, substantially as set forth.

6. The combination, with a platen, a clamping-bar and a brake-beam adapted to turn the edge of a sheet of metal over onto the edge of the clamping-bar, of a gage-strip supported behind the brake-beam and arranged to be turned up out of the way by the rocking upward and inward movement of the brake-beam, substantially as set forth.

7. The combination, with a platen, a clamping-bar, and a brake-beam adapted to turn the edge of a sheet of metal over onto the top surface of the clamping-bar, of an edgewise-adjustable gage-strip supported behind the brake-beam and arranged to be turned up out of the way of the brake-beam by its upward and inward rocking movement, substantially as set forth.

8. The combination, with an angular platen and a correspondingly-shaped reciprocating clamping-bar having its edges made to line with the edges of the platen and arranged to rise and fall upon this platen and brake-beams, of a pair of gage-strips pivoted at angles to each other and in position to be rocked upward and inward by the engagement of the brake-beams therewith, substantially as set forth.

9. The combination, with a supporting-frame, a table, an angular-shaped platen, a correspondingly-shaped clamping-bar, and a pair of brake-beams pivoted at their ends at an angle to each other, of a flexible connection arranged to rock the beams simultaneously by the action of the treadle-bar, and means connected to the treadle-bar adapted to give a limited rise-and-fall motion to the clamping-bar previous to the rocking of the beams, substantially as set forth.

10. The combination, with two skeleton frames connected by bell-crank levers, a cam-lever connected to the lower frame, and a treadle-bar, all supported in a proper frame, of a table, an angular platen, and a correspondingly-shaped clamping-bar, two brake-beams journaled at angles to each other, and chains or other flexible connection, whereby

the clamping-bar is moved vertically and the brake-beams are rocked simultaneously, substantially as set forth.

11. The combination, with brake-beams at angles to each other, these beams having grooved wheels affixed to their ends, an angular clamping-bar, and endless chains or wire ropes passing around the wheels and connected with a treadle-bar, of a supporting-frame, triangular skeleton frames, one of which is connected with the clamping-bar, bell-crank levers connecting these skeleton frames, a spring secured to one of the skeleton frames, a cam-lever connected to the lower frame and pivoted to swing vertically, and a spring-supported treadle-bar that gives motion by its depression to the clamping bar and brake-beams, substantially as set forth.

12. The combination, with a table, an angular platen, and a correspondingly-shaped reciprocating clamping-bar, of a pair of skeleton frames, one of which is connected directly with the clamping-bar, bell-crank levers pivoted to these frames, a cam-lever loosely connected to one of these frames, an operating treadle-bar, and springs for normally holding the parts in position to be operated upon, substantially as set forth.

13. The combination, with a table, an angular platen thereon, a correspondingly-shaped reciprocating clamping-bar, brake-beams having wheels on their ends, and adjustable gage-bars, of a pair of skeleton frames, bell-crank levers connecting these frames, and one of said frames connected with the clamping-bar, an operating-treadle, connected links and a cam-lever, chains strung over the wheels on the clamping-bars, and a bar connecting said chains with the operating-treadle, substantially as set forth.

14. The combination, with a supporting-frame, a table, an L-shaped platen, an L-shaped clamping-bar, vertical rods that work in guides which rest on the table and are attached to the clamping-bar, and two brake-beams pivotally supported in the same plane at right angles to each other, so as to line their edges with the edge of the platen and clamping-bar, of an upper skeleton frame, a lower skeleton frame, bell-cranks pivoted to brackets at their centers and to the skeleton frames by their ends, a spiral spring attached by its ends to the lower skeleton frame and the supporting-frame of the machine, a link pivoted between the lower skeleton frame and a pivoted vertical cam-lever, a spring-supported treadle-bar that is adapted to move the cam-lever, and endless chains or wire ropes connected to the ends of the brake-beams and the treadle-bar, whereby the vertical vibration of this bar will first depress the clamping-bar and then simultaneously rock the brake-beams to fold the adjacent edges of a piece of sheet metal, substantially as set forth.

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