

No. 843,910.

PATENTED FEB. 12, 1907.

G. F. PROSS.
BENDING MACHINE.
APPLICATION FILED JAN. 22, 1906.

4 SHEETS—SHEET 1.

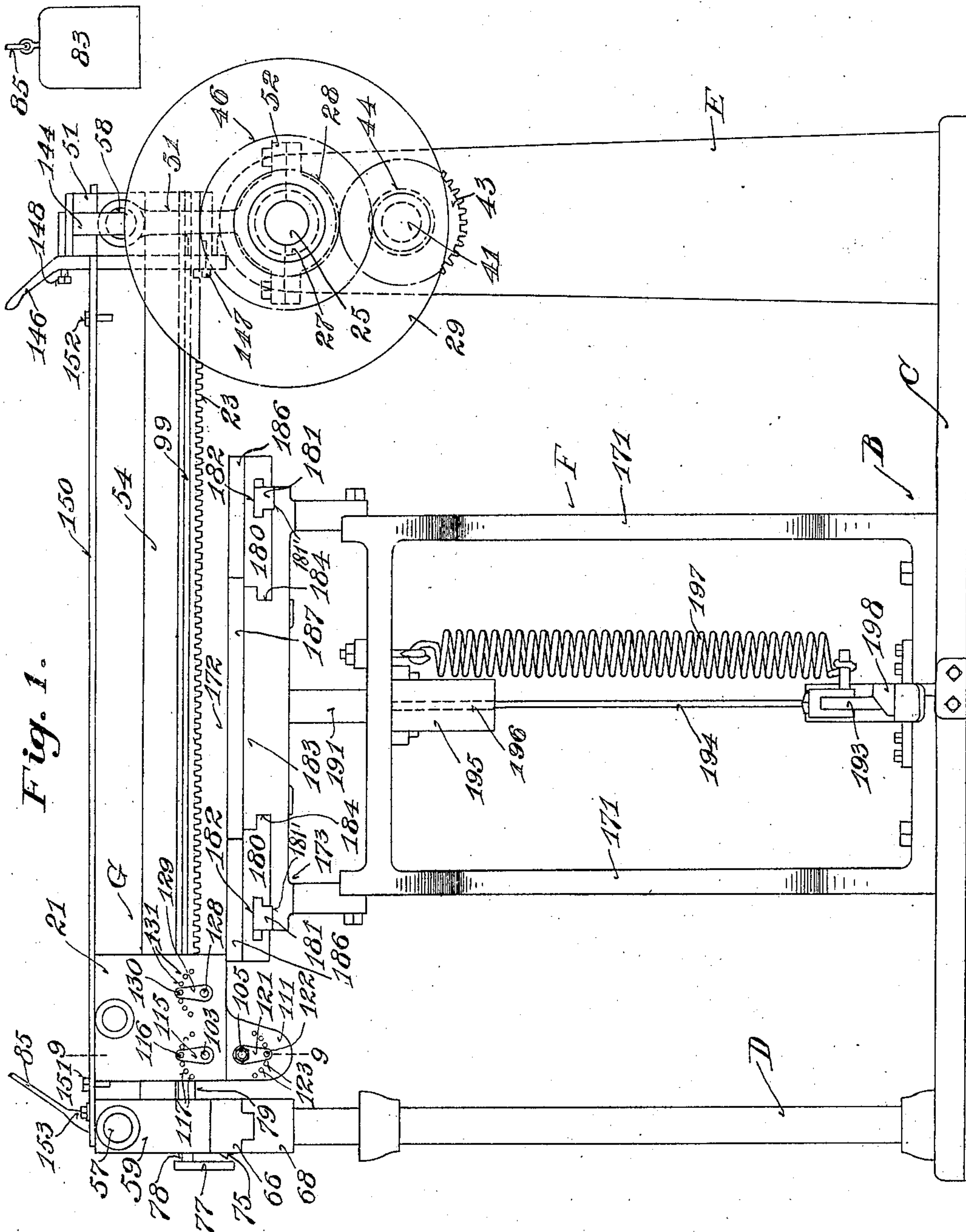


Fig. 1.

Witnesses.

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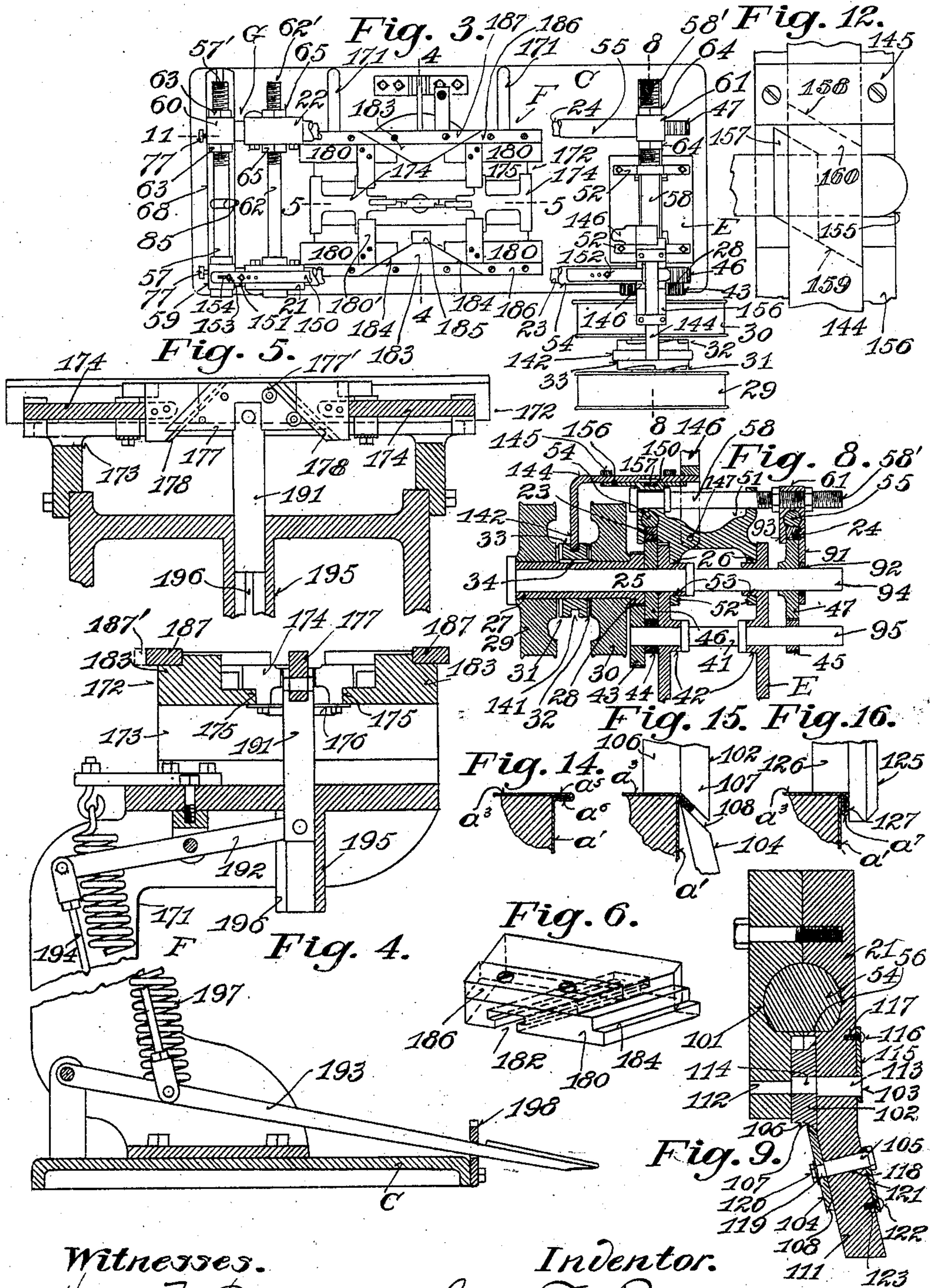
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 19.

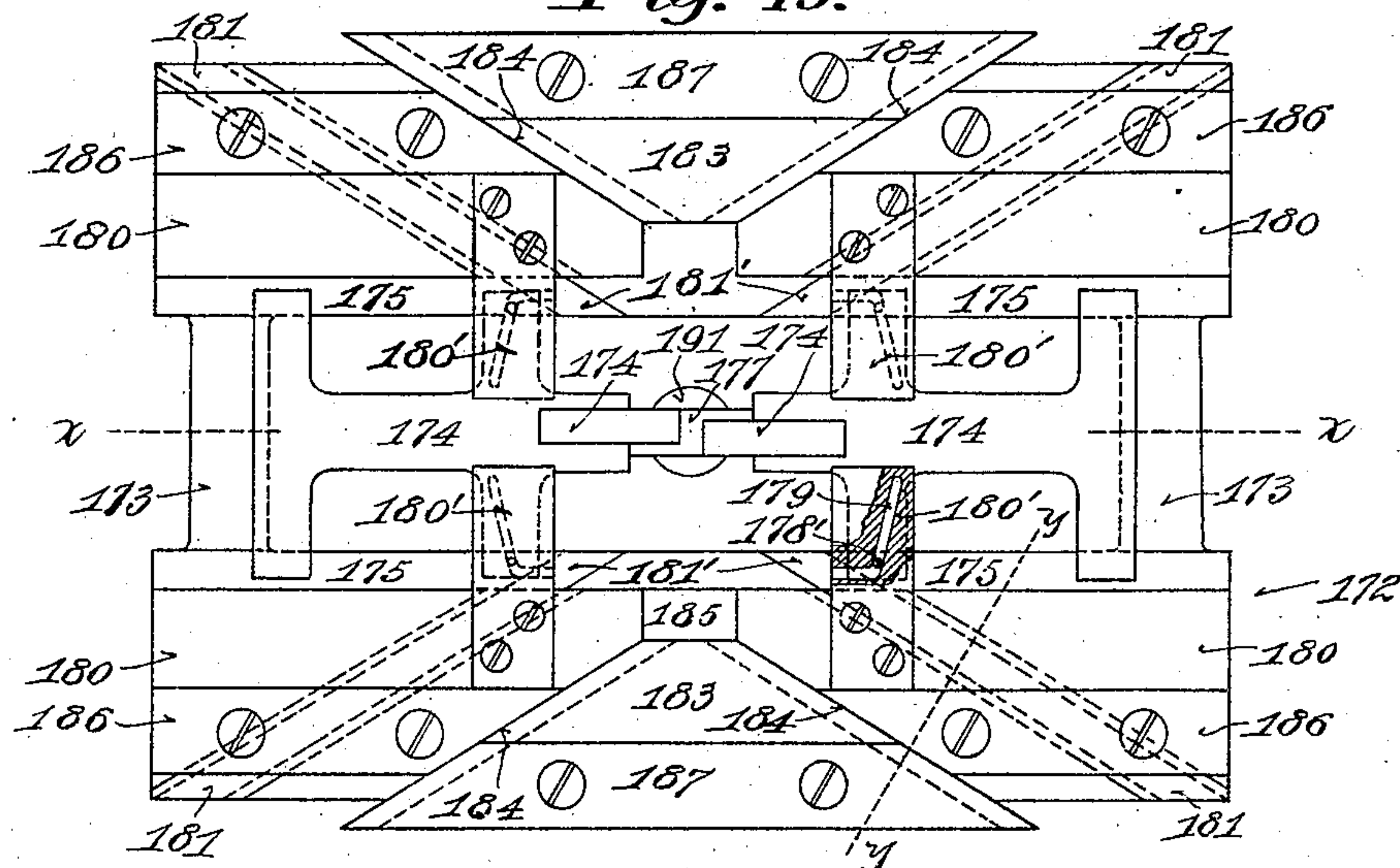


Fig. 20.

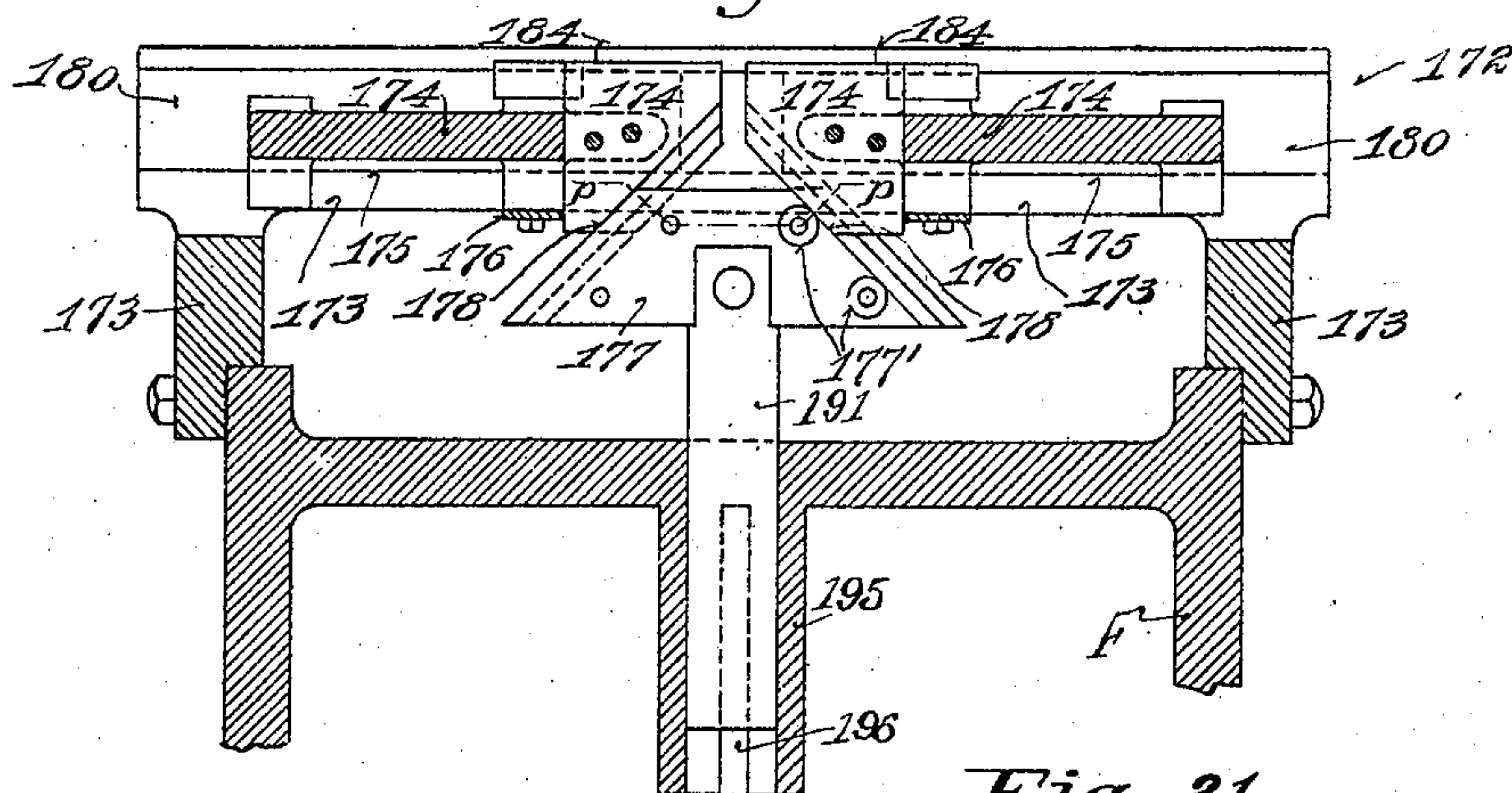


Fig. 22.

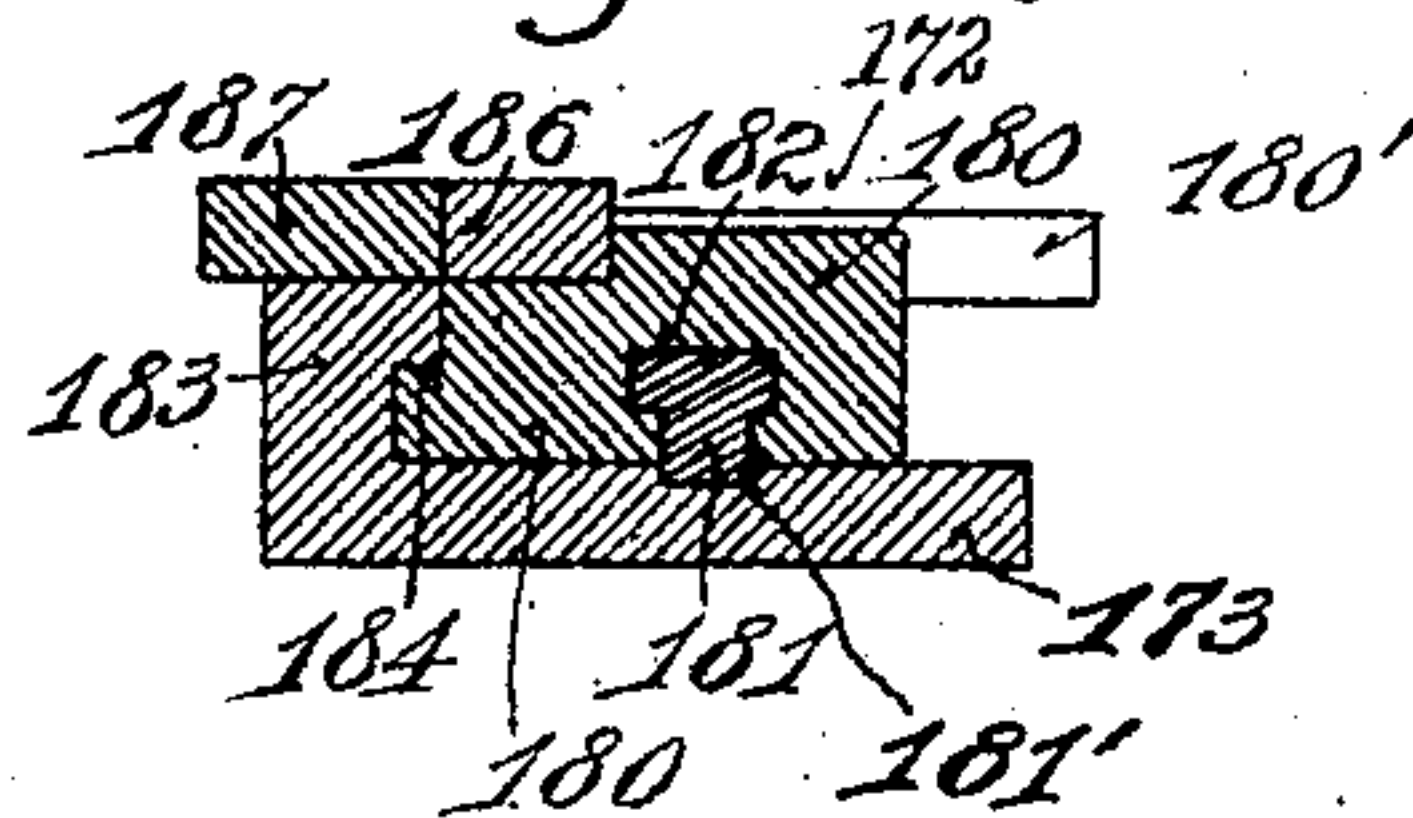
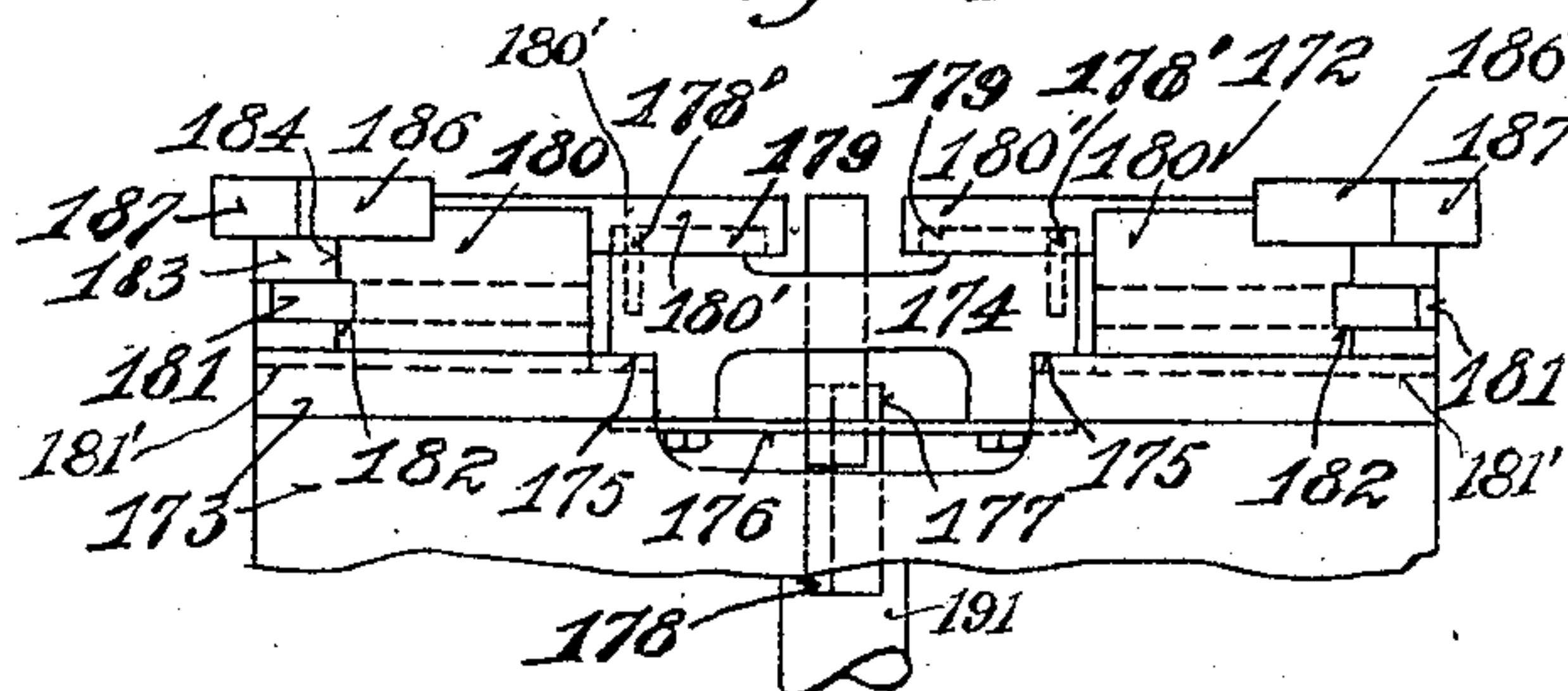


Fig. 21.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE F. PROSS, OF CINCINNATI, OHIO, ASSIGNOR TO ERNST H. HUENEFELD, OF CINCINNATI, OHIO.

BENDING-MACHINE.

No. 843,910.

Specification of Letters Patent.

Patented Feb. 12, 1907.

Application filed January 22, 1906. Serial No. 297,227.

To all whom it may concern:

Be it known that I, GEORGE F. PROSS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Bending-Machines, of which the following is a specification.

It is the object of my invention to provide a new and improved bending-machine provided with novel means for mounting and operating the bending-tools and for supporting the stock to be operated on, and the invention will be readily understood from the following description and claims and from the drawings, in which latter—

Figure 1 is a side elevation of my improved device, showing the bending devices in depressed position and the work-support in spread relation. Fig. 2 is a side elevation of my improved device, partly broken away, showing the bending mechanism in elevated position and the work-support in retracted relation. Fig. 3 is a plan view of my improved device, partly broken away. Fig. 4 is a central transverse section of the same, taken on the line 4 4 of Fig. 3. Fig. 5 is a longitudinal section of the work-support on the line 5 5 of Fig. 3. Fig. 6 is a perspective view of the corner-block of the work-support. Fig. 7 is a plan view, partly broken away, showing the corner-block of the work-support in spread relation in full lines and in retracted position in dotted lines. Fig. 8 is a vertical section showing the means for reciprocating the bending-heads, taken on the line 8 8 of Fig. 3. Fig. 9 is a cross-section of the bending-head, taken on the line 9 9 of Fig. 1. Fig. 10 is a detail showing the manner of adjusting the movable catch-block for the bending-head. Fig. 11 is a section of the securing means for the swinging frame, taken on the line 11 of Fig. 3. Fig. 12 is a plan detail showing the shifting connection between the tappet and shifter-arms. Fig. 13 is a perspective view of the oven exemplified as an article to be double-seamed on the machine. Figs. 14-18 are details showing manner of operation of the bending-rolls. Fig. 19 is a plan view of the table and its support with the movable platen-blocks in retracted relation. Fig. 20 is a vertical section of the same on the line *x x* of Fig. 19. Fig. 21 is an end elevation of the table and its support, showing the movable platen-blocks

in retracted relation; and Fig. 22 is a detail of the same in section on the line *y y* of Fig. 19. Fig. 23 is a detail in section on the line *p p* of Fig. 20, showing the slideway connection between the plunger and side slides.

My improved device is especially applicable for what is technically known as "pinning" and for seaming or preferably doubling seaming the edges of sheet-metal ovens or the like adapted to be used in connection with gas, gasoline, or other vapor stoves; but it is obvious that it may also be employed for other purposes. Ovens of the character mentioned, as see the oven A, are usually provided at their side with a door-opening of less extent than the side of the oven, as see the opening *a*, and in order to provide a backing-bed or table on the inside of the oven during performance of the bending operation, I provide a novel construction of collapsible table or backing-bed capable of being received by the door-opening when the table or bed is in collapsed relation and arranged for being spread to cover the upper area of the interior of the oven when the pinning or seaming operation takes place.

B represents the frame of the machine, which comprises a base C and pedestals D E, between which latter table-pedestal F is located.

G is a swinging frame upon which the bending-tools reciprocate, the latter preferably comprising a pair of heads 21 22, from which racks 23 24 extend longitudinally of the swinging frame and by means of which the bending-heads are reciprocated upon the swinging frame.

25 is a shaft having bearings 26 in the pedestal E. A sleeve 27 rotates loosely about the shaft and has a pinion 28 either integral therewith or rigidly secured thereto. For rotating the sleeve in reverse directions I prefer to mount thereon a pair of pulleys 29 30, arranged to loosely rotate thereon in opposite directions.

Clutches 31 32 are provided for alternately causing rotation of the sleeve in opposite directions with the respective pulleys. I have shown these clutches as comprising a collar 33, having spline connection 34 with the sleeve, with clutch-teeth on either side thereof arranged to engage corresponding clutch-teeth adjacent thereto on the respective pulleys. A shaft 41 is journaled in bearings 42

in the pedestal E and has a gear 43 secured thereto, which meshes with pinion 28, while pinions 44 45, also secured to said shaft, engage with gears 46 47 on shaft 25. The gears 46 47, respectively, mesh with the racks 23 24 for imparting alternate forward and backward travel to the racks in a manner which will be readily understood.

The swinging frame G comprises a yoke 51, having bearings 52 pivoted on lugs 53 on the pedestal E for forming a pivot for the swinging frame, whose axis is coincident with the rotary axis of the gears 46 47, so that the racks will remain in mesh with said gears irrespective of the swinging position of the swinging frame. The swinging frame further comprises longitudinal rods 54 55, upon which the heads 21 22 are adapted to ride, the racks 23 24 in the preferred construction being under said rods, with the rods flattened, as shown at 56, for accommodating said racks. The pivotal frame also preferably comprises cross-rods 57 58. The cross-rod 57 preferably connects the blocks 59 60, to which the longitudinal rods 54 55 are respectively secured at their swinging end. At their pivotal end these longitudinal rods are respectively connected to the yoke 51 and to a block 61. The distance between these longitudinal rods and bending-heads is preferably adjustable for permitting bending of work of various sizes. Thus the cross-rods 57 58 are provided with threaded ends 57' 58', and the heads 21 22 are connected by rod 62, having threaded end 62'. Nuts 63 engage either side of block 60, nuts 64 engage either side of block 61, and nuts 65 engage either side of head 22 for regulating the distance between the longitudinal rods and the bending-heads. The bending-heads with their cross-rods and longitudinal racks form a bending-frame.

Catch-blocks 66 67 are secured to a cross-bar 68 of pedestal D. The block 66 is preferably stationary on said pedestal, while the block 67, which is under the block 60, is permitted to be adjusted crosswise of the machine, according to the position to which the blocks 59 60 are adjusted, this adjustment of catch-block 67 being preferably accomplished by having a T-bolt 69 received by a T-slot 70 in said cross-bar for securing said catch-block 67 in adjusted position. These catch-blocks 66 67 are each provided with a pin 71, adapted to engage the walls of a socket 72 in the respective blocks 59 60 for positioning said latter blocks and preventing sidewise displacement thereof when the swinging frame is in lowered position.

For retaining the swinging frame in lowered position during the bending operation and releasing it at the end of the bending operation I provide each of the blocks 66 67 of pedestal D with a keeper 75, adapted to be received by an opening 76 in a catch-

plate 77 at the end of a stem 78, having an enlargement 79 (see Fig. 11) located in an aperture 80 in each of blocks 59 60, a spring 81 being located between a shoulder 82 in said aperture and the enlargement 79 of said stem normally pressing said catch-plate toward said keeper for normally causing engagement therewith when the swinging frame is in its down position. The stems extend rearwardly and at the end of the forward or bending movement of the bending-heads are adapted to be engaged by the bending-heads for forcing the catches out of engagement with the keepers and permitting the swinging frame to be readily swung upwardly. For counterbalancing this swinging frame I prefer to connect it with a weight 83 by means of a flexible connection or cable 85, secured to the swinging end of the swinging frame and passing over suitable sheaves for locating the weight in an out-of-the-way position.

For readily locating the gear 47 upon lateral adjustment of the longitudinal rod and preventing the raising of the rack away from the gear during the bending operation I prefer to provide the block 61 with a hanger 91, having a bearing 92 about the shaft 25, the said block also having a flange 93, between which and the hanger 91 the gear 47 is laterally positioned, the said shaft overhanging, as shown at 94, for permitting lateral adjustment of the gear thereon, the shaft 41 having a similar extension 95, along which the pinion 45 may be adjusted and secured in suitable manner.

The bending-heads are similarly but reversely constructed, and description of the one will answer for both. The head has a longitudinal opening 101, upon the walls of which it finds bearing upon the longitudinal rod. A roll 102 is journaled on a stud 103, and a roll 104 is journaled on a stud 105. The roll 102 has a substantially cylindrical face 106 and a slanting face 107, whereas the roll 104 has an oppositely-flaring face 108. The bending-head has an outwardly-slanting apron 111, upon which the roll 104 is located. The stud 103 has concentric journals 112 113, located in bearings in the head, and an eccentric journal 114, upon which the roll 102 rotates. This stud also has an arm rigidly secured thereto, by means of which it is adapted to be rotated on its concentric journals for changing the bending position of the roll 102, a screw 116 extending through said arm and being arranged to be received by any of a series of threaded apertures 117 for adjusting and positioning the stud. The stud 105 has a journal 118 in a bearing in apron 111 and an eccentric journal 119, upon which the roll 104 rotates, a nut 120 on said stud retaining said roll in place and an arm 121 being provided for adjusting said stud, and consequently the position of the

roll 104 with relation to its mate 102, a screw 122 being received by any of the apertures 123, shown arranged in arc form, for securing the stud in adjusted position. The operation of these bending-rolls is followed by the bending-roll 125, (located in rear of roll 102 on the bending-heads,) which roll 125 has a substantially cylindrical face 126 and a substantially right-angular face 127. It is mounted on a stud 128, constructed and mounted similarly to the stud 103, the roll 125 rotating on an eccentric journal thereon similar to the eccentric journal 114. This stud also has an arm 129, through which a screw 130 extends into threaded apertures 131 in the head.

In oven construction the sides a' of the oven are provided with a lateral flange a^2 and the top a^3 and bottom a^4 , respectively, with lateral extensions a^5 and a reversely-bent part a^6 , between which lateral extension and reversely-bent part the lateral flange is loosely received in setting up the oven, as seen in Fig. 17. The clamping of the lateral flange between said extension and bent part, known as "pinning," may be accomplished by a separate operation or additional rolls in advance of the rolls 102 104, the parts after being so pinned being in the relation shown in Fig. 14. The operation of the rolls 102 104 upon the parts leaves them in the relation shown in Fig. 15, and the operation of the roll 125 upon the parts leaves them in completed form, as shown in Fig. 16. If desired, the pinning and part of the bending may be accomplished by a single set of differently-shaped rolls, as see the rolls 134 135 in Fig. 18, the bending being finished by the roll 125. The double seams a^7 between the sides and the top and bottom of the oven are thus formed.

The clutch-collar 33 is provided with an annular groove 141, with the walls of which a fork 142 of a shifter-bar 144 engages, the shifter-bar being in bearings 145 and manually operated by a lever 146, pivoted at 147 to the swinging frame and articulated with the bar at 148. For automatically throwing the clutch out of operation at the end of each forward- and -backward movement of the bending-heads I provide a tappet-bar 150, to which tappets 151 152 are adjustably secured, the tappet-bar sliding longitudinally and being guided at the swinging end of the swinging frame by a bolt 153, extending into block 59 through slot 154 in said bar and at the pivotal end of said swinging frame being guided in a groove 155 (see Fig. 12) of plate 156, secured to yoke 51. This tappet-bar has an inclined block 157 secured thereto, which has engagement with correspondingly-inclined walls 158 159 of inclined groove 160 in the shifter-bar 144. This inclined groove is wider than the inclined block for permitting either face of the clutch to be thrown in

manually while the shifting bar operates to throw out the clutch automatically at the end of the advancing or retreating travel of the carriage. Thus in Fig. 1 the bending-heads are shown as at the end of their advancing travel. In this relation the clutches 31 32 are out of engagement, as shown in Fig. 8, and the inclined block 157 is in its extreme forward position, as shown in Fig. 12. This latter figure discloses a space between the inclined block 157 and the inclined wall 158 of inclined groove 160. When now the shifter-bar 144 is shifted by means of the lever 146, the wall 158 will engage the inclined block 157. At the same time the clutch 31 will be brought into engagement for causing the bending-heads to retreat or move toward the pedestal E. As soon as the tappet 152 (see Fig. 1) is struck by the retreating head the tappet-bar 150 will be shifted, thereby shifting the inclined block 157 rearwardly with it, (see Fig. 12,) and by reason of the engagement of the latter with the inclined wall 158 will cause reverse movement of the shifter-bar 144 for disengaging the clutch 31, and thereby stopping the movement of the bending-heads. In this relation of the parts there will be space between the inclined block 157 and the inclined wall 159 of an inclined groove 160. When now the shifter-bar 144 is manually moved in the opposite direction by the lever 146, the clutch 32 will be engaged for advancing the bending-heads.

As already stated, the table-pedestal is preferably so arranged as to receive a metal oven or similar device for the purpose of seaming the same, and I prefer to form this table-pedestal of godseneck form having a receding standard 171 for forming substantial clearance under the overhanging table 172, corresponding with the range of adjustment between the bending-heads, thus permitting the oven to be placed with its top flat upon the table and its bottom projecting under the table. A housing 173 is supported by the pedestal and suitably secured thereto, as by having depending sides resting upon and attached to the pedestal. Upon the housing a pair of side slides 174 is arranged to reciprocate on guides 175, being held against upward movement on the housing by gibbs 176. These side slides are caused to separate in suitable manner. Thus a wedge-piece 177 has sliding connection with said side slides, as by means of inclined guide-ways 178, having interengaging tongues 278 278', (see Fig. 23,) the tongues 278 being on the wedge-piece and the tongues 278' on the side slides. This construction causes the side slides to move outwardly upon upward movement of the wedge-piece and to move inwardly upon downward movement of the wedge-piece. For aiding in the outward movement of the side slides the wedge-piece is provided with preferably countersunk an-

tifrication-rolls 177', adapted to engage the inclined faces of the side slides. The side slides are respectively provided with upwardly-projecting pins 178', received by diagonal slots 179 (see Figs. 7, 19, and 21) of ears 180' of diagonally-moving corner-blocks 180, the latter having diagonally-sliding connection with the housing, as by having T-blocks 181, secured in slots 181' in the housing. (See Figs. 1, 2, 19, 21, and 22.) T-slots 182 are diagonally arranged in said corner-blocks. The walls of these T-slots engage the T-blocks 181 for guiding the direction of travel of the corner-blocks 180. Stationary platen-blocks 183 are a part of the housing and have diagonal slideways 184 between them and the respective movable corner-blocks. A stop 185 is provided for limiting the inward movement of said movable platen or corner blocks. The movable corner or platen blocks may be provided with platen-strips 186 and the stationary platen-blocks with platen-strips 187 for receiving the impact force of the bending-rolls. These platen-strips preferably overhang their respective blocks. If desired, the platen-strips 186 187 adjacent the adjustable bending-head may be removed and others of different widths substituted, as see the strips 187', indicated in dotted lines in Fig. 4, and for accommodating the different adjustments to distance between the bending-heads.

The wedge-piece 177 may be connected to a rod 191, forming a plunger, with which a lever 192, pivoted to the pedestal, is articulated. The lever 192 is articulated with a lever 193, shown as a foot-lever pivoted on the base and having connection with said lever by means of a link 194. For guiding the rod 191 in its movements it has bearing in a barrel 195, the lever 192 extending through one side of said barrel through a slot 196. For retracting the wedge-piece at the end of the crimping movement a spring 197 is provided, the spring having connection with the pedestal and the foot-lever. For holding the moving platen-blocks in distended relation a hook 198, secured to the base and under which the foot-lever is adapted to be received, is provided. There is sufficient spring in the metal of lever 193 and play in its pivot to readily permit said lever to be received under said hook.

In operation the oven is placed upon the table while the corner or movable platen blocks are in retracted position, as shown in Figs. 2, 19, 20, and 21, for permitting the table to be received by the oven-opening, and the swinging frame is in raised position, as shown in Fig. 2, the foot-lever being also in raised position. After the oven is upon the table the foot-lever is lowered and brought under the hook 198, thereby moving the movable platen-blocks outwardly and bringing the platen-strips of said movable platen-

blocks in line with the platen-strips of the stationary platen-blocks. The swinging frame is then lowered, the catches 77 engaging the keepers 75 for holding the swinging frame in down position against the action of the bending-rolls. The clutch-lever is then shifted, causing the bending-heads to move across the face of the work—i. e., across the work-supporting table. At approximately the end of the forward movement of the reciprocating bending-frame it strikes the tappet 151 on the tappet-bar, thereby throwing the clutch out of operation and stopping the forward movement of the bending-frame, which latter has also meanwhile struck the enlargements 79 of stems 78 for moving the catch-plates out of engagement with their keepers for permitting said swinging frame to be raised, when the clutch-shifter may also be moved manually for retracting the bending-frame to initial position, as shown in Fig. 2.

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

1. In a bending-machine, the combination with a stationary frame, of a swinging frame, bending-heads having bending-tools thereon arranged to reciprocate upon said swinging frame, and means actuated from the stationary frame for reciprocating said heads, substantially as described.

2. In a bending-machine, the combination with a stationary frame, a work-support thereon comprising a collapsible table arranged to be received by an opening in the work to be operated on, and means for distending said table within the work to be operated on, said opening being smaller than said table when distended, a swinging frame pivoted on said stationary frame, a bending-frame arranged to reciprocate on the latter, and operating means for the latter on said stationary frame having its rotary axis coincident with the pivotal axis of said swinging frame, substantially as described.

3. In a bending-machine, the combination with a stationary frame, a work-support thereon comprising a collapsible table arranged to be received by an opening in the work to be operated on, and means for distending said table within the work to be operated on, said opening being smaller than said table when distended, a swinging frame pivoted on said stationary frame, a bending-frame arranged to reciprocate on the latter, and operating means for the latter on said stationary frame having its rotary axis coincident with the pivotal axis of said swinging frame, said bending-frame comprising bending-heads and means for adjusting the distance between them, substantially as described.

4. In a bending-machine, the combination with a frame, a swinging frame on said frame

comprising longitudinal rods, bending-heads having sliding movement on said rods, longitudinal racks secured to said bending-heads, a shaft, gears thereon meshing with said racks, said swinging frame pivoted about said shaft, and means for driving said shaft.

5. In a bending-machine, the combination with a frame, of a swinging frame thereon, said swinging frame comprising longitudinal rods, bending-heads having sliding movement on said rods, longitudinal racks secured to said bending-heads, a shaft, gears thereon meshing with said racks, said swinging frame pivoted about said shaft, means for driving said shaft in reverse directions, and shifting means for the latter comprising a tappet-rod having tappets thereon arranged for automatically operating said shifting means, and manual controlling means for said shifting means.

6. In a bending-machine, the combination of a work-support comprising an overhanging pedestal, lateral slides thereon, corner-slides having diagonal slideway connection with said pedestal and with said lateral slides, with a swinging frame, and bending-heads reciprocating thereon and arranged to be swung into position adjacent to said work-support, substantially as described.

7. In a bending-machine, the combination of a work-support comprising an overhanging pedestal, lateral slides thereon, corner-slides having diagonal slideway connection with said pedestal and with said lateral slides, with a swinging frame, bending-heads reciprocating thereon and arranged to be swung into position adjacent to said work-support, a plunger on the pedestal, said plunger and side slides having inclined guide-ways between them, and means for operating the plunger, substantially as described.

8. In a bending-machine, the combination of a frame comprising a pedestal at each end thereof, and an intermediate work-supporting table-pedestal, said last-named pedestal comprising a work-supporting table with the pedestal thereof having clearance on three sides of and underneath said table, a swinging frame extending from one to the other of

said first-named pedestals across said table-pedestal, bending-heads reciprocating on said swinging frame across said table-pedestal, a rack having connection with the latter, a gear meshing with said rack, a shaft about which said gear is mounted in one of said first-named pedestals, said swinging frame having bearings taking about said shaft, and means for clamping said swinging frame to the other of said first-named pedestals, substantially as described.

9. In a bending-machine, the combination of a bending-head comprising a housing, a stud mounted therein, said stud having a supporting-journal and a roll-journal eccentric to said supporting-journal, a bending-roll on said eccentric journal, an arm secured to said stud, said housing and arm having a series of engaging means between them, and constructed and arranged for swinging said stud upon its supporting-journal for adjusting said eccentric journal and the position of the roll upon said housing.

10. In a bending-machine, the combination of a bending-head comprising a housing having an outwardly-flaring inclined apron, a bending-roll journaled in said housing and a bending-roll journaled on said apron, with means for adjusting the distance between said rolls, substantially as described.

11. In a bending-machine, the combination with a frame and work-support, of a swinging frame comprising a transverse rod at each end thereof and longitudinal rods extending therebetween, with means for adjusting said longitudinal rods upon said transverse rods, bending-heads having sliding connection on said longitudinal rods, means for adjusting the distance between said heads, and means for reciprocating said heads with their adjusting means upon said longitudinal rods, substantially as described.

In testimony whereof I have signed my name hereto in the presence of two subscribing witnesses.

GEORGE F. PROSS.

Witnesses:

CORDELIA O'HEARN,
ADAM DLUGOKINSKI.