No. 811,975. PATENTED FEB. 6, 1906.

W. VOLLMER.

MACHINE FOR BENDING ANGLE IRONS.

APPLICATION FILED MAR. 8, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

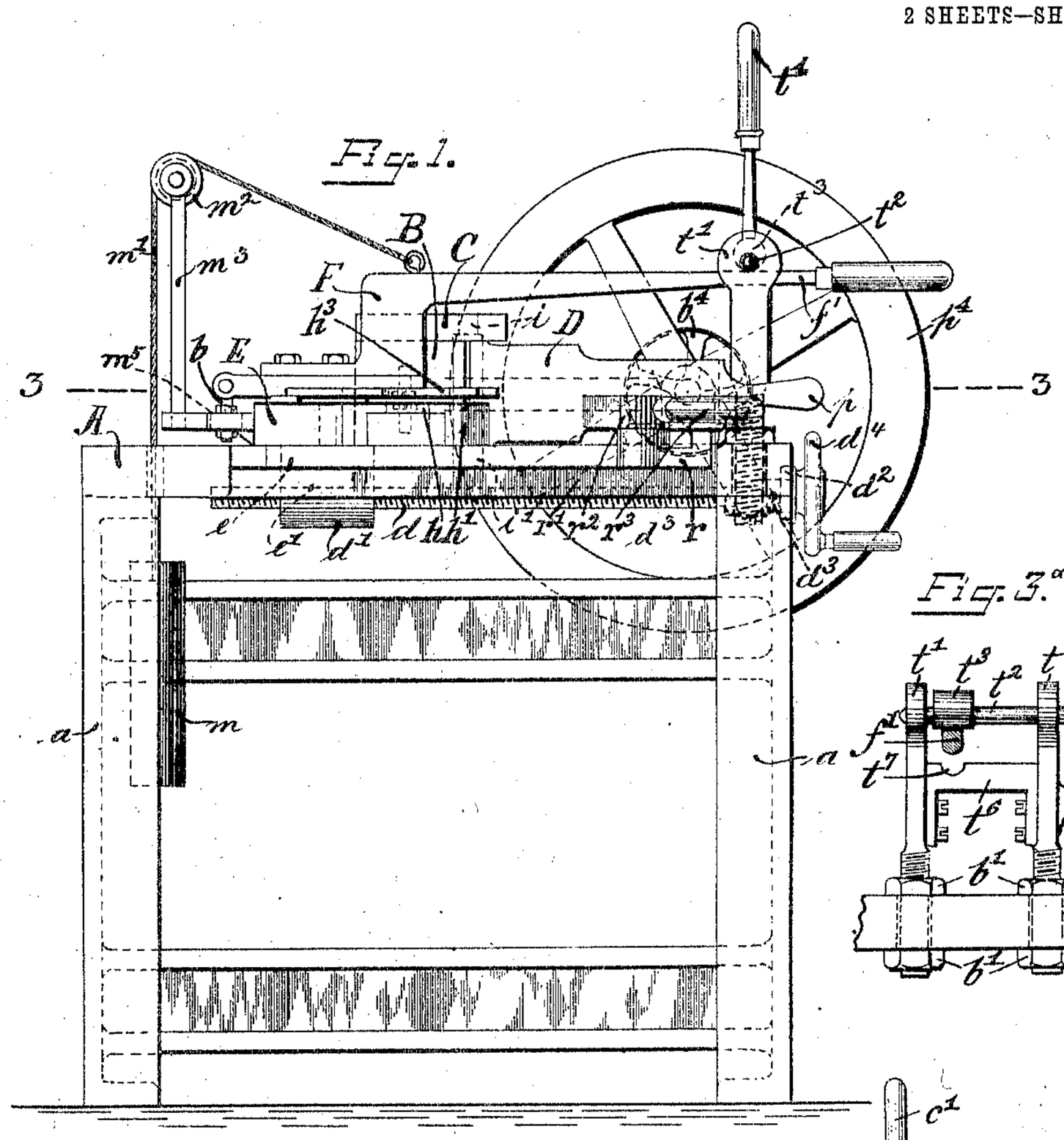

Fig. 3.ª

Fig. 2.ª

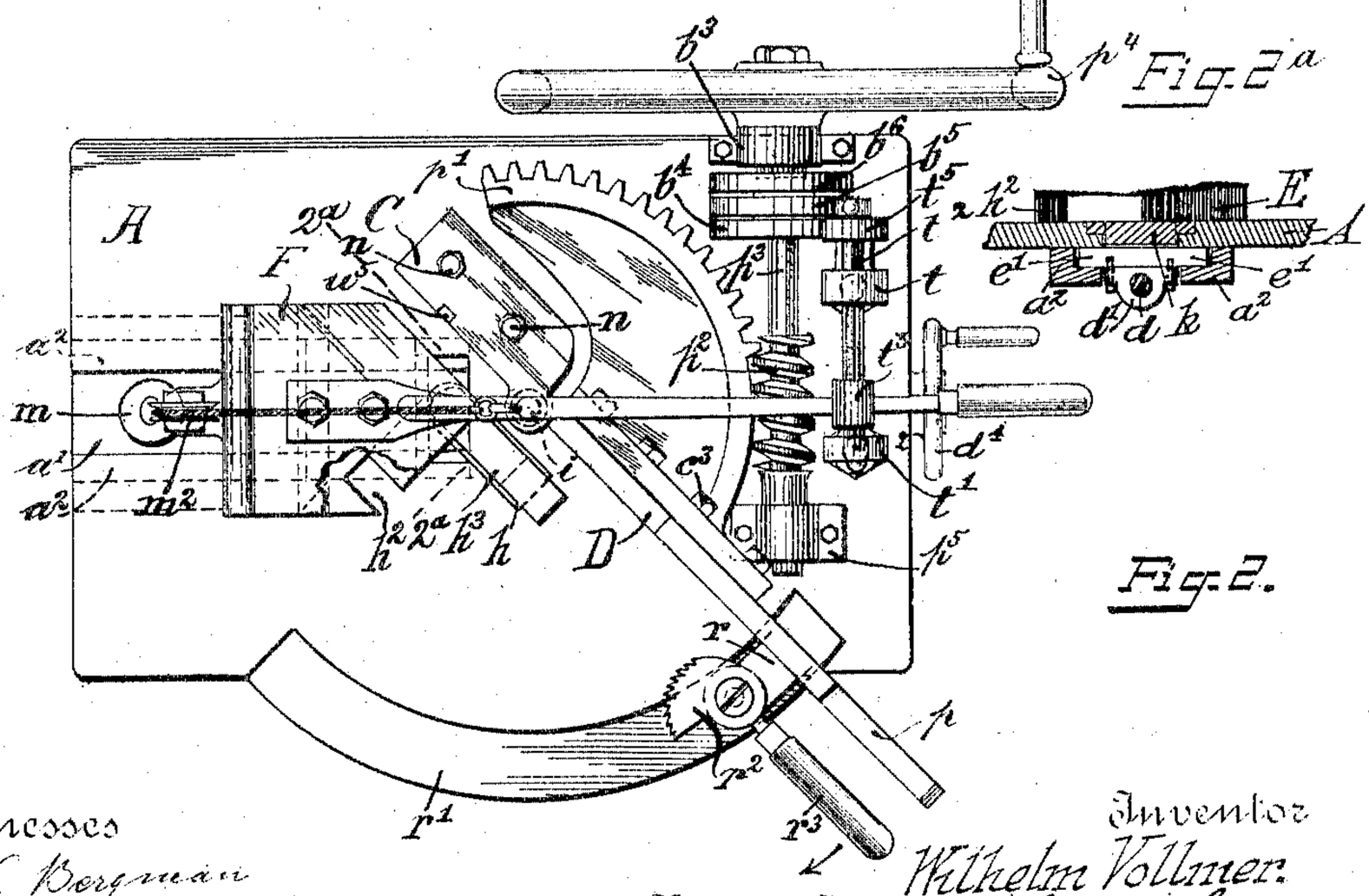

Fig. 2.

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2 SHEETS—SHEET 2.

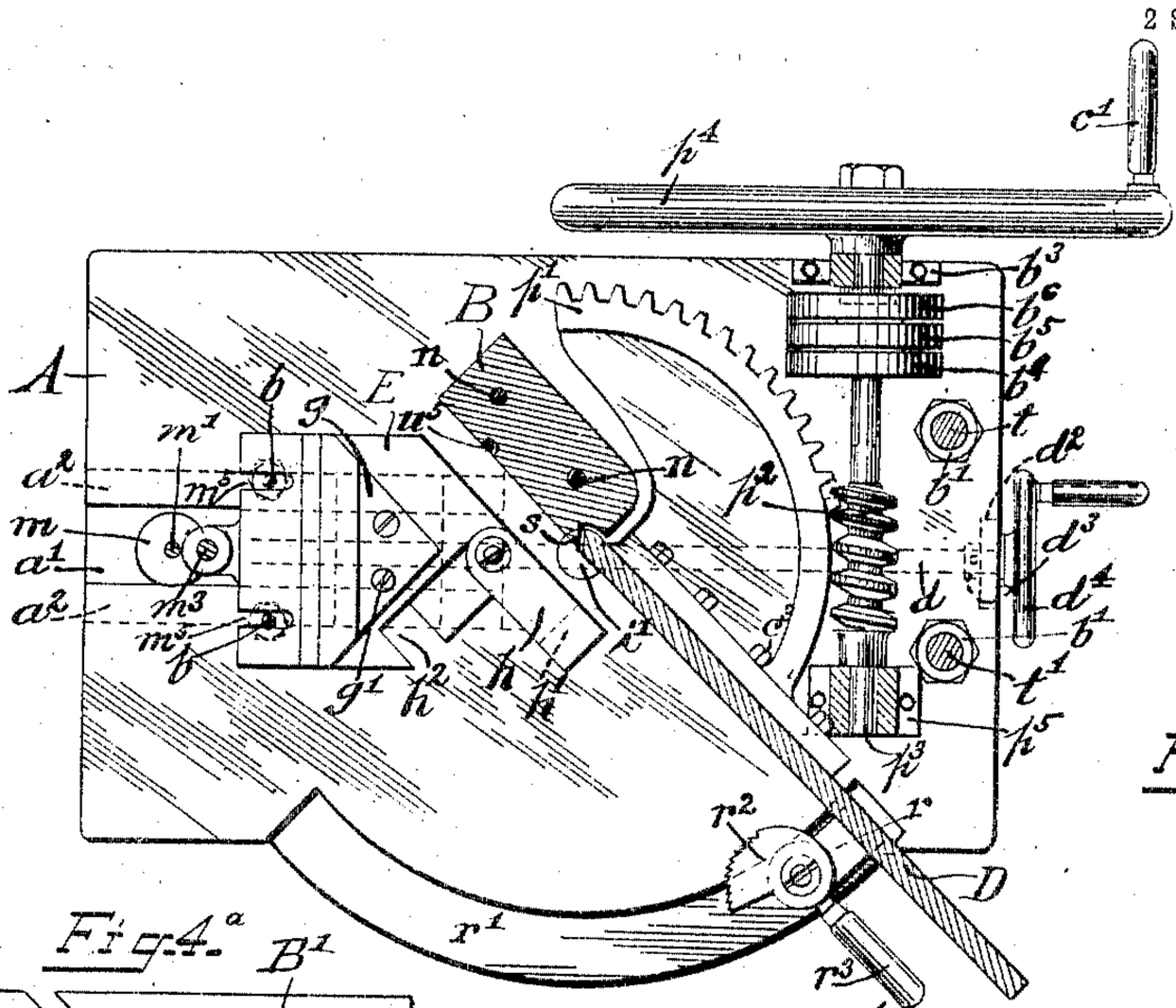

Fig. 3.

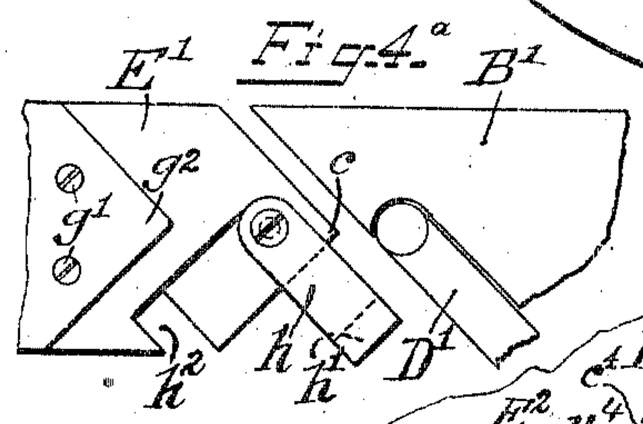

Fig. 4a.

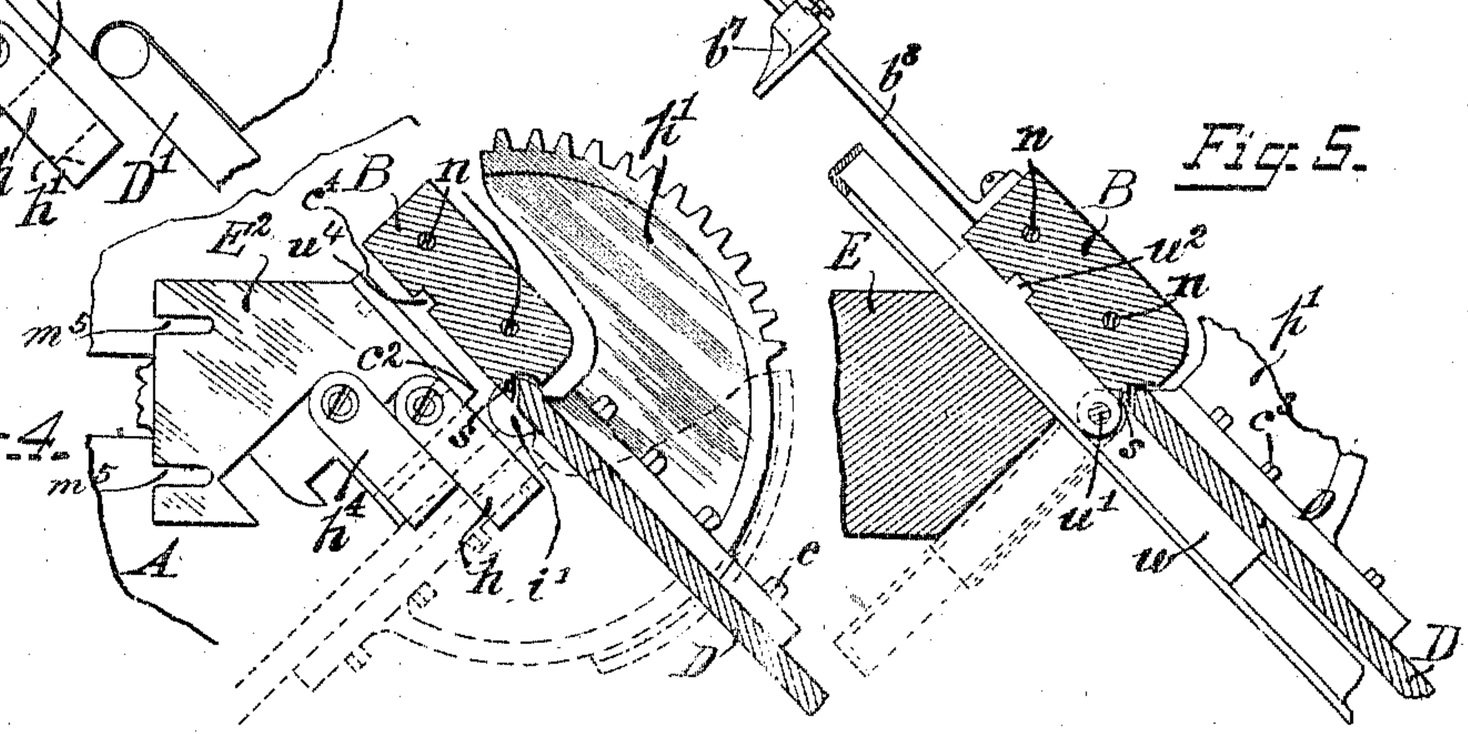

Fig. 4.

Fig. 5.

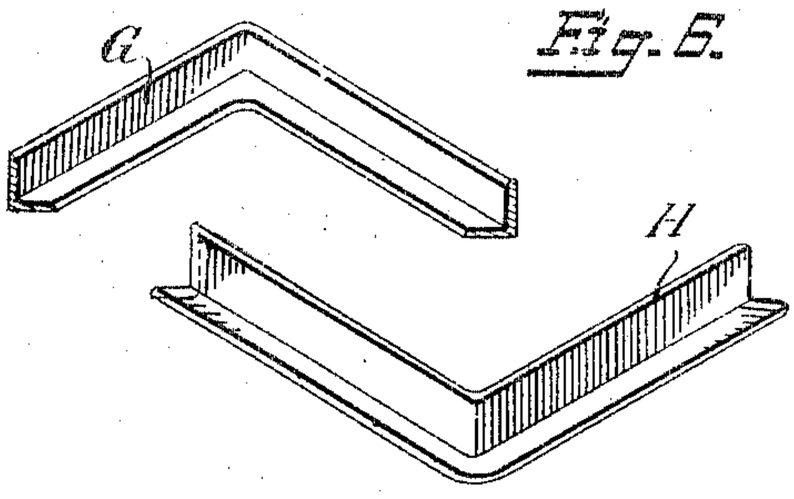

Fig. 6.

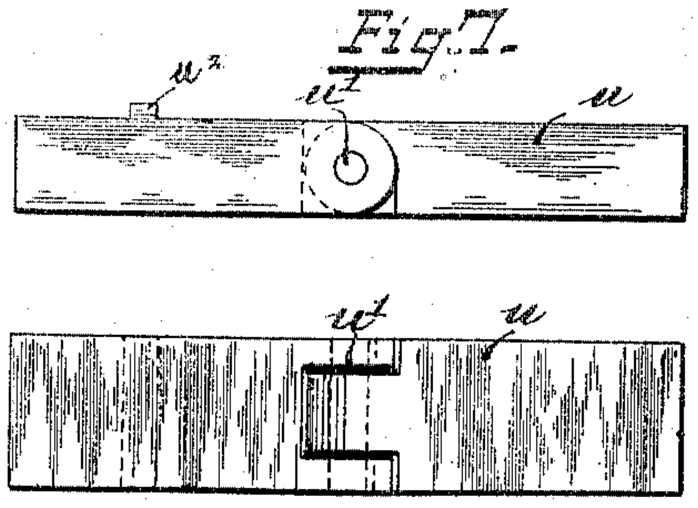

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILHELM VOLLMER, OF WINFIELD, NEW YORK.

MACHINE FOR BENDING ANGLE-IRONS.

No. 811,975. Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed March 8, 1905. Serial No. 249,059.

To all whom it may concern:

Be it known that I, WILHELM VOLLMER, a citizen of the United States, residing in Winfield, in the county of Queens and State of New York, have invented certain new and useful Improvements in Machines for Bending Angle-Irons, of which the following is a specification.

This invention relates to improvements in bending-machines of the general type shown in United States Letters Patent heretofore granted to me and numbered and dated as follows: No. 699,858, May 13, 1902; No. 709,282, September 16, 1902; No. 709,283, September 16, 1902.

The objects of the invention are to provide improved means for supporting the metal during bending and improved means for operating the bending devices.

The invention consists in certain combinations of parts and in certain details of construction, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved machine. Fig. 2 is a top view of the same. Fig. 2ª is a detail vertical section through a portion of the machine on line 2ª 2ª, Fig. 2, with parts omitted. Fig. 3 is a plan view, partly in horizontal section, on line 3 3, Fig. 1. Fig. 3ª is a detail elevation of a portion of the machine. Figs. 4 and 4ª are plan views showing certain modifications in supporting devices for the iron, Fig. 4 being partly in horizontal section. Fig. 5 illustrates the application of a bending-block for use in bending angle-iron in outward direction. Fig. 6 is a perspective view showing an inwardly-bent angle-iron and an outwardly-bent angle-iron; and Fig. 7 shows in top view and side elevation a bending-block such as seen in place in Fig. 5.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A indicates the bed of the machine, which is supported on suitable legs *a* and provided at one end with a longitudinal groove or guide-slot *a'* and with guideways a^2 at each side of the slot at the under side of the bed. Upon the bed is mounted a guide-block B, to which is secured a top plate C. Said guide-block and top plate are secured to the bed A by bolts *n* or by any other suitable means. Between the bed A and top plate C is pivoted, by means of suitable trunnions *i i'*, a bending-lever D. E indicates a forming-block. Said block is mounted on the bed and provided with a downwardly-extending shank *e* and a flange *e'*, adapted to slide in the guideways a^2, whereby the block is guided. For adjusting and retaining the guide-block in position a screw *d* is provided, which engages a threaded sleeve *d'*, secured to the lower portion of the block E. Said screw passes through a bearing d^2 of the bed and is provided at one side of the same with a collar d^3 and at the other side with a hand-wheel d^4. To the forming-block is secured an abutment *g* for the iron being bent. Said abutment is preferably secured by means of screws *g'*, whereby the same is removable, so that a plate of different size or form may be substituted, according to the dimensions of the metal being bent. The point of said plate *g* is preferably slightly rounded, as indicated, so as to provide room for the metal upset at the bend.

F indicates a presser-plate. Said plate is hinged at its rear portion to the forming-block by means of eyebolts *b*, whereby vertical adjustment of the presser-plate at its rear portion is permitted. Said eyebolts pass through slots m^5 in the rear portion of the forming-block, whereby longitudinal adjustment of the presser-plate is permitted. The presser-plate F is provided with a forwardly-extending arm *f'*, having at its forward end a suitable handle whereby the presser-plate may be manipulated by the operator so as to exert the desired amount of pressure on the horizontal flange of the iron being bent, said flange during the operation of bending being thereby clamped between the forming-block and the presser-plate.

For securing the desired pressure of the presser-plate and for retaining the same in position means are provided comprising standards *t t'*, Fig. 3ª, threaded at their lower ends and secured adjustably in the bed A by nuts *b'* above and below the bed. Said standards support at their upper portion a rock-shaft t^2, carrying an eccentric or cam t^3, adapted to bear upon the arm *f'* of the presser-plate. An operating-handle t^4 is attached to said rock-shaft. By rotating the rock-shaft the cam is caused to bear upon the arm *f'*, and thereby depress the presser-plate. The operator is thereby enabled to control minutely the pressure exerted. The friction between the cam and arm is normally sufficient to retain the parts in the position in which they are set by the operator; but in

case this pressure should be insufficient the operator may by the handle t^4 retain the parts in the position desired. The cam t^3 is arranged adjacent an end of the shaft t^2, whereby the shaft may be withdrawn in the direction of the arrow in Fig. 3ª, thereby permitting the arm f' to be raised. For aiding in the support of the shaft t^2 when thus withdrawn the standard t is provided with a bracket t^5, through which the shaft passes. For aiding in the prompt return of the shaft into position the outer end of the same is preferably rounded or pointed, as indicated. A brace t^6 extends between the standards $t\,t'$, whereby to strengthen the same. To guide the presser-plate while being depressed and to lock it at its forward portion against lateral movement after depression, said brace t^6 is provided with a recess t^7, adapted to receive the arm f' when the same is depressed. The presser-plate is automatically raised when released and retained in raised inoperative position until again depressed by means of a weight m, connected with the arm f' of the presser-plate by a cord m', passing over a pulley m^2, supported on a post m^3, rising from the forming-block.

For securing the metal being bent to the bending-lever D and for assisting in the support of the metal a rest r is provided, extending laterally from the lever adjacent the outer portion or handle p of the same, said rest being guided during operation of the lever along a depressed curved guideway r' at the front portion of the bed and being of such thickness that the upper surface of the rest r is at substantially the same horizontal plane with the upper surface of the bed. Said rest r carries a hand-clamp comprising a cam r^2, provided with a handle r^3, adapted to be operated in the direction of the arrow, Figs. 2 and 3, for clamping the metal to be bent between said clamp and the bending-lever. The metal is thereby firmly held against longitudinal movement toward the outer end of the bending-lever. Said rest may be cast integral with the bending-lever or formed separately therefrom and bolted or otherwise secured thereto. For locking the metal against movement in the opposite direction an adjustable stop may be provided, as indicated in Fig. 5, in which b^8 represents an arm projecting rearwardly from the guide-block B, and b^7 a shoe adjustable on said arm and extending into the path of the metal clamped for bending.

For sharply bending angle-iron the guide-block B is provided with a lug or projection s, (clearly shown in Figs. 3, 4, and 5,) said lug extending between the trunnions of the bending-lever to approximately the axis of the same. The guide-block is recessed back from this point, providing a recess for receiving the inner end of said lever. The projection s thereby affords a support between the trunnions against outward bending of the metal.

For supporting the angle-iron being bent the forming-block E is provided at its forward portion with a laterally-swinging bending-finger h, extending horizontally therefrom, and provided at its outer end with a foot h', bearing upon the bed-plate for supporting the same, said foot being adapted when the finger is swung into closed position to enter a recess h^2 in the forming-block. The finger h is pivoted in a recess of the forming-block, so that its upper surface is flush with the upper surface of the forming-block. The presser-plate F is provided at its forward portion with a swinging bending-finger h^3, adapted to coact with the swinging finger h and arranged in a recess of the presser-plate, so that its lower surface is approximately flush with the lower surface of the presser-plate. Said fingers are preferably pivoted on the median line of the machine—*i. e.*, a line extending through the axis of the trunnions and the point of the forming-block. During the bending operation the horizontal flange of the angle-iron is retained between the upper face of the finger on the forming-block and the lower face of that on the presser-plate while the lever D is moving from the position shown in full lines in Fig. 4 to that shown in dotted lines. As the bending-lever describes this movement these bending-fingers are of course swung back laterally against the forming-block and presser-plate, acting in the capacity of a swinging support for said flange. During this movement, in which this flange would buckle in a vertical direction—viz., upwardly or downwardly—if no support were provided, it is thus firmly retained and such buckling entirely prevented. For bending iron having a horizontal flange of greater width than a single bending-finger a plurality of such fingers may be employed, as indicated at $h\,h^4$ in Fig. 4, and the presser-plate may be similarly provided with a plurality of bending-fingers. In Fig. 4 E^2 indicates the forming-block.

For securing a sharp bend the bending-finger may be located back of the bending-point c of the forming-block, as indicated in Fig. 4ª, and thereby a sharp point secured for the forming-block. Such construction may be employed to advantage when bending small sizes of angle-iron. When desired, the bending-lever may be of the full width of the trunnions, as indicated in Fig. 4ª. In this figure, E′ is the forming-block; B,′ the guide-block; D′, the bending-lever, and g^2 the abutment.

G, Fig. 6, indicates an inwardly-bent angle-iron. For bending angle-iron in outward direction, as indicated at H, Fig. 6, a bending-block u is provided, comprising two closely-hinged portions of approximately the height and breadth of the iron to be bent. For bending, the angle-iron is inserted in the ma-

chine (see Fig. 5) between the forming-block E and the guide-block B, the horizontal flange of the iron being at the bottom upon the bed-plate and the vertical flange against the forming-block. The bending-block is placed upon the horizontal flange with the pivot u' of said block arranged on the median line of the machine between the bending-lever and the forming-block. For retaining the bending-block in position the same may be provided with a projection u^2, adapted to engage in a recess u^4 in the guide-block B. Said recess may be filled when the bending-block is not employed by a small plate u^5, secured in said recess by screws or other means.

When bending angle-iron outwardly, as described, the inner portion of the guide-slot a', which is in such case exposed between the forming-block and guide-block, is preferably closed by a removable plate k, Fig. 2^a.

When bending angle-iron inwardly, the presser-plate F is normally so positioned that its front edge is in line with the front edge of the forming-block; but when bending angle-iron outwardly, as indicated in Fig. 5, said presser-plate is previous to bending moved longitudinally in forward direction by shifting the eyebolts b forward in the recesses m^5, so that the presser-plate projects beyond the forming-block and presses upon the vertical flange of the iron, thereby retaining the metal during bending.

For vertically positioning the presser-plate the nuts b' of the standards $t\ t'$ may be operated, thereby affording a minute and exact adjustment. This adjustment, in connection with the like adjustment of the presser-plate at its rear end by means of the nuts of the eyebolts b, provides means for retaining the parallelism of the plate and forming-block when adjusting for wear and for the bending of metal of different dimensions.

To the bending-lever D is removably attached, by means of screw-bolts c^3, a segment-gear p'. Said gear meshes with a worm p^2, mounted on a worm-shaft p^3, supported in suitable blocks b^3 p^5 and provided at one end with a fly-wheel p^4 and with two loose pulleys b^4 b^6 and an intermediate tight pulley b^5. To the pulleys may be applied a straight and a crossed belt for thereby operating the worm-shaft in either direction in the usual manner. The segment-gear p' is preferably of such dimensions that its teeth are out of engagement with the worm at each end of the movement of the bending-lever. When it is desired to operate the bending-lever by power, the belts are so shifted as to rotate the shaft p^3 in forward direction, and then the bending-lever D is swung by the operator in bending direction until the first tooth of the gear p' engages the rotating worm. When the segment arrives at the end of its movement, the last tooth passes out of engagement with the worm, and thereby the bending-lever is brought to rest. The bent iron having been removed, the belts are shifted so as to rotate the worm-shaft in the opposite direction. The operator then moves the bending-lever in return direction until the end tooth of the segment p' engages the worm, when the bending-lever is returned to bending position by the operation of the worm, the first tooth of the segment passing finally out of mesh with the same.

The machine may be operated by hand by means of a handle c', applied to the fly-wheel p^4, or the segment p' may be removed and the bending-lever operated directly by means of its handle p.

For aiding in the sharp bending of angle-iron a strip of flat iron c^4 may be arranged in front of the forming-block, as indicated in Fig. 4, whereby an angular bending-point c^2 is produced in advance of the bending-finger, said strip being held in position by the clamping of the same together with the angle-iron between the forming-block and the guide-block B.

The machine is not limited in use to angle-iron, but may be employed for bending flat iron, round iron, or metal of any other suitable shape.

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

1. In a machine for bending angle-iron, the combination of a bed, a forming-block mounted thereon, means for bending the angle-iron against the said block, and a presser-plate hinged to said forming-block and adjustable therealong at its hinged end.

2. In a machine for bending angle-iron, a bed, a forming-block mounted thereon, a guide-block also mounted thereon, a bending-lever, a presser-plate hinged to said forming-block, and means mounted on said bed, independent of said guide-block, for adjusting the free end of said presser-plate.

3. In a machine for bending angle-iron, a bed, a forming-block mounted thereon, means coöperating with said forming-block for bending the angle-iron against the same, a presser-plate hinged to said forming-block, means for locking the free end of said presser-plate in operative position, and automatic means for returning said presser-plate to inoperative position upon the release of said locking means.

4. In a machine for bending angle-iron, a bed, a forming-block mounted thereon, means for bending the angle-iron against said forming-block, a presser-plate hinged to said forming-block and counterweighted so as to normally rest in inoperative position, and means for locking the free end of said presser-plate in operative position.

5. In a machine for bending angle-iron, a forming-block, means for bending the angle-iron against the same, a presser-plate hinged

to said forming-block, standards, a shaft carried by said standards and shiftable into and out of the path of said presser-plate, and means on said shaft to position said presser-plate.

6. In a machine for bending angle-iron, a forming-block, means for bending the iron against the same, a presser-plate hinged to said forming-block, standards, and a shaft journaled in said standards and provided with a cam adapted to engage the free end of said presser-plate, said shaft being shiftable into and out of the path thereof.

7. A machine for bending angle-iron comprising in its construction a forming-block, means for bending the angle-iron against the same, a presser-plate hinged to said forming-block, standards, a brace extending between said standards, and a shaft journaled in said standards and carrying a cam adapted to cooperate with said brace in positioning the free end of said presser-plate.

8. A machine for bending angle-iron comprising in its construction a forming-block, means for bending the iron against the same, a presser-plate hinged to said forming-block, vertically-adjustable standards, and a shaft carried by said standards and provided with means to position the free end of said presser-plate.

9. In a machine for bending angle-iron, a bed, a forming-block mounted thereon, a guide-block likewise mounted thereon, a bending-lever pivoted laterally to said guide-block, and a bending-finger carried by said forming-block for retaining the horizontal flange of the angle-iron against buckling in a vertical direction.

10. In a machine for bending angle-iron, the combination of a forming-block, a pivoted bending-lever coöperating therewith, and a finger pivoted to said forming-block in the same plane as said bending-lever is pivoted, and serving to maintain one flange of the iron against buckling.

11. In a machine for bending angle-iron, the combination of a forming-block, a superposed presser-plate, a bending-lever coöperating with said block and plate, and a buckle-preventing finger pivoted to said presser-plate and movable in the same direction as said bending-lever.

12. In a machine for bending angle-iron, a forming-block, a superposed presser-plate, means for bending the iron against said forming-block, and coöperating means carried by said forming-block and presser-plate for preventing the buckling of one flange of the angle-iron while the same is being bent.

13. In a machine for bending angle-iron, the combination of a forming-block, a superposed presser-plate, a laterally-pivoted bending-lever, and laterally-swinging buckle-preventing fingers carried by said presser-plate and forming-block.

14. In a machine for bending angle-iron, a forming-block having a laterally-swinging buckle-preventing finger the upper face of which is flush with that of said forming-block, a presser-plate superposed on said forming-block and carrying a similar finger adapted to coöperate with the first, the lower face thereof being flush with that of said presser-plate, and a laterally-pivoted bending-lever coöperating with said forming-block and presser-plate.

15. In a machine such as described, a bed, a forming-block mounted thereon and having a recess at the forming end, a laterally-pivoted bending-lever, a buckle-preventing finger laterally pivoted to said forming-block, and a foot carried by said finger and engaging the bed, said foot being movable into the recess of said forming-block.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WILHELM VOLLMER.

Witnesses:
JOSEPH H. NILES,
PAUL GOEPEL.