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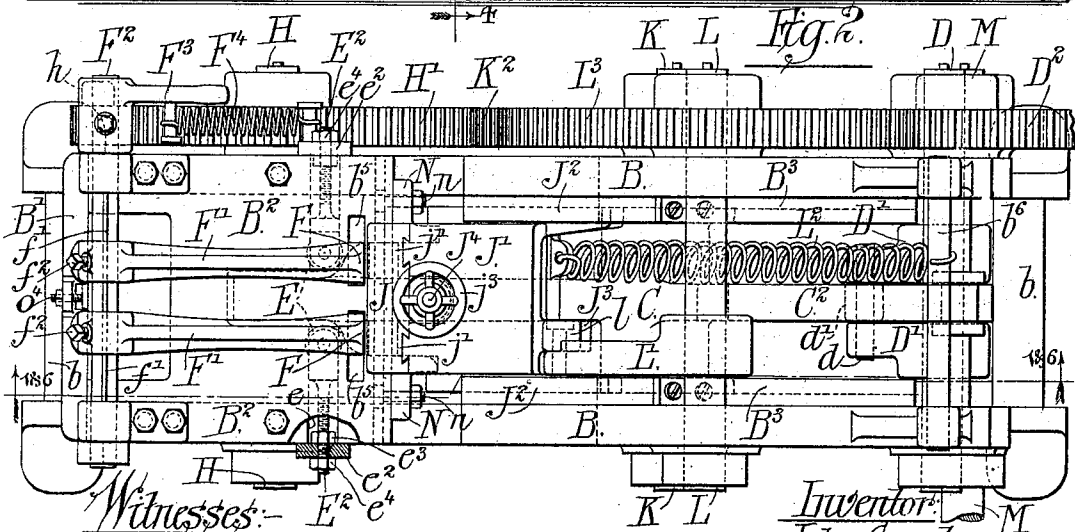
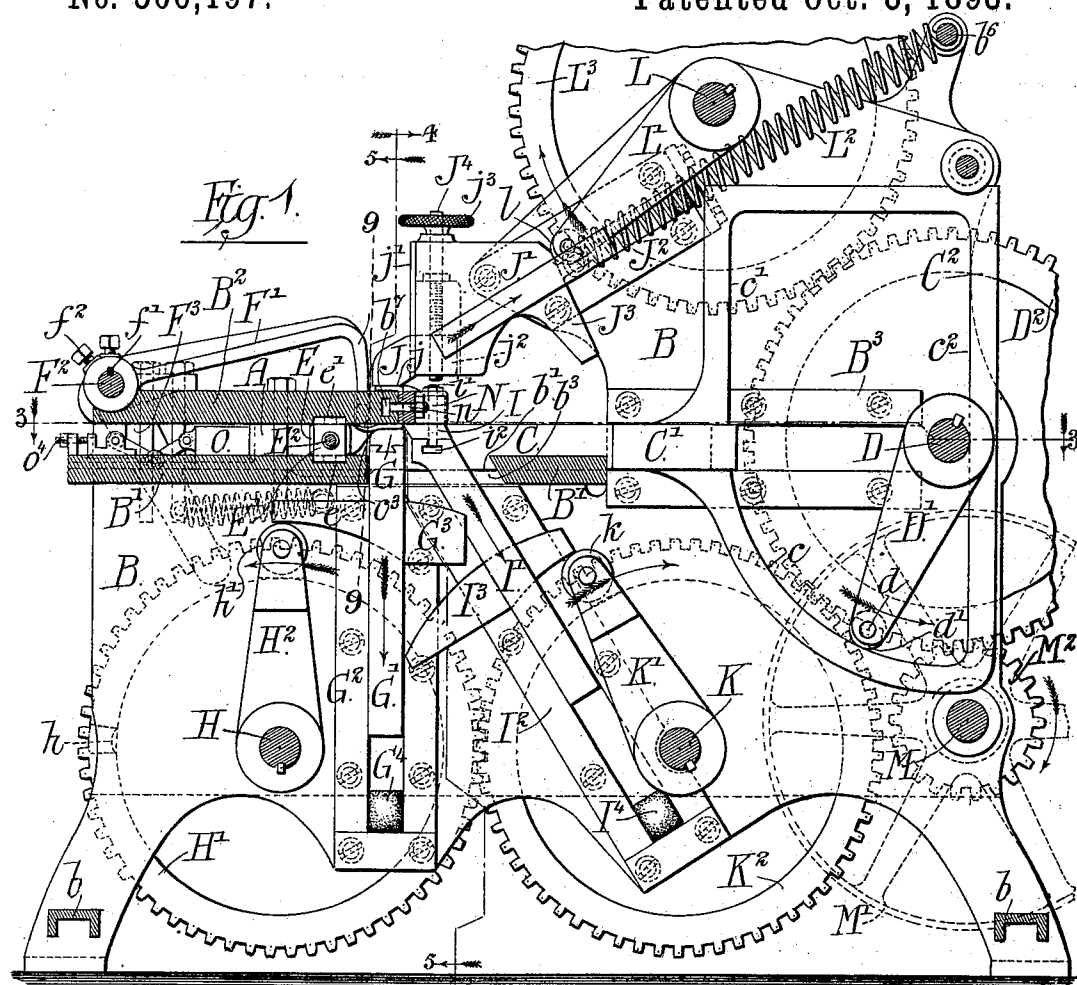
3 Sheets—Sheet 1.

J. GRANT.

MACHINE FOR MAKING BEAM HANGERS.

No. 506,197.

Patented Oct. 3, 1893.



Witnesses:
Louis M. Whitehead.
W. C. Tomlinson.

Inventor:
John Grant.
by: Dayton, Pool & Brown
his Attorneys.

(No Model.)

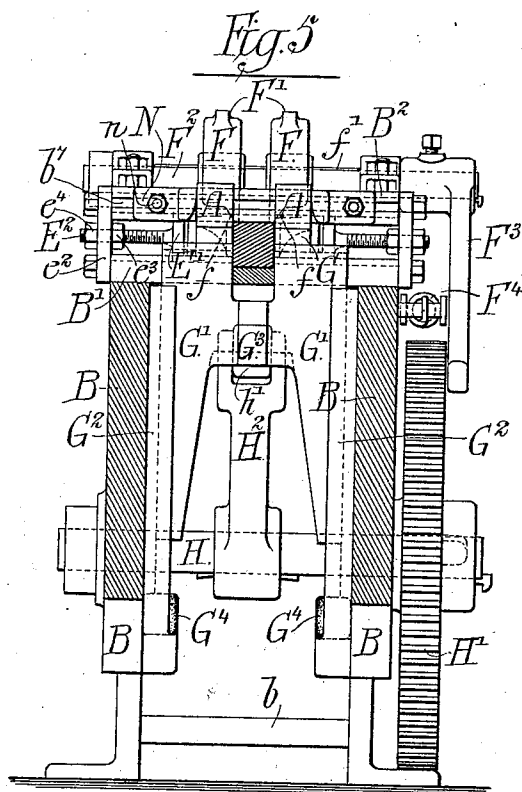
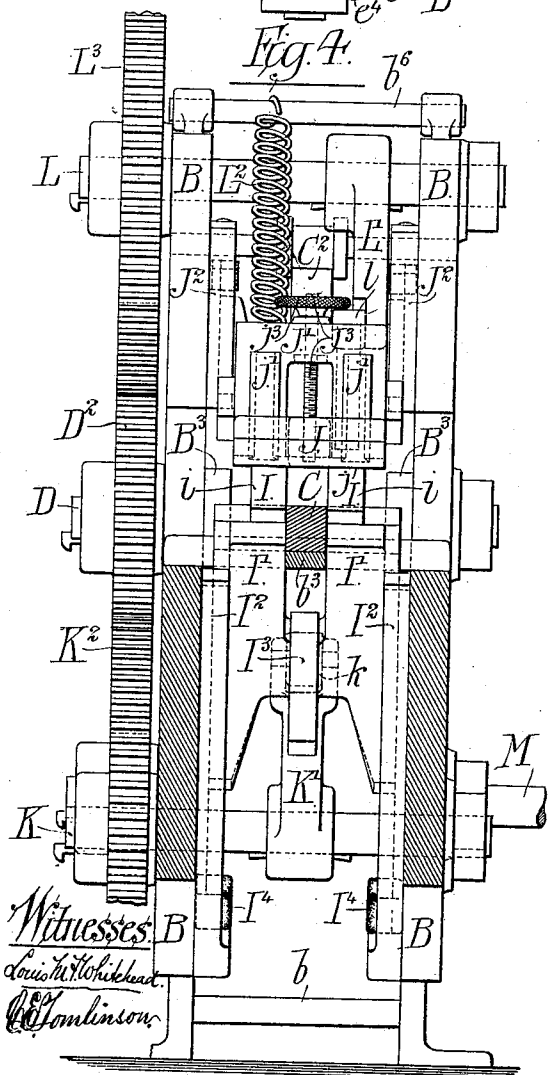
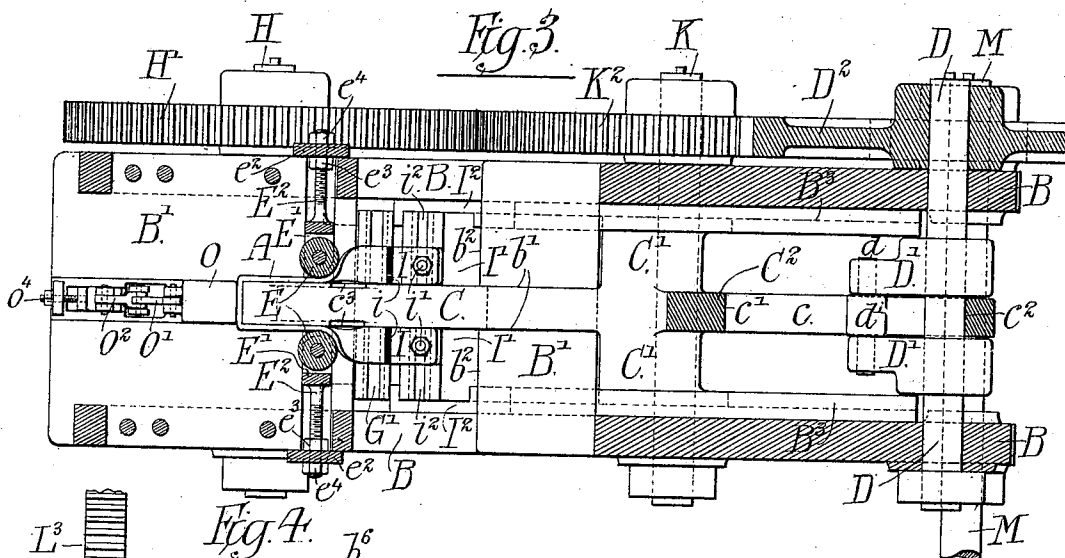
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MACHINE FOR MAKING BEAM HANGERS.

No. 506,197.

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Inventor.
John Grant.

By:- Dayton, Pook & Browne
His Attorneys.

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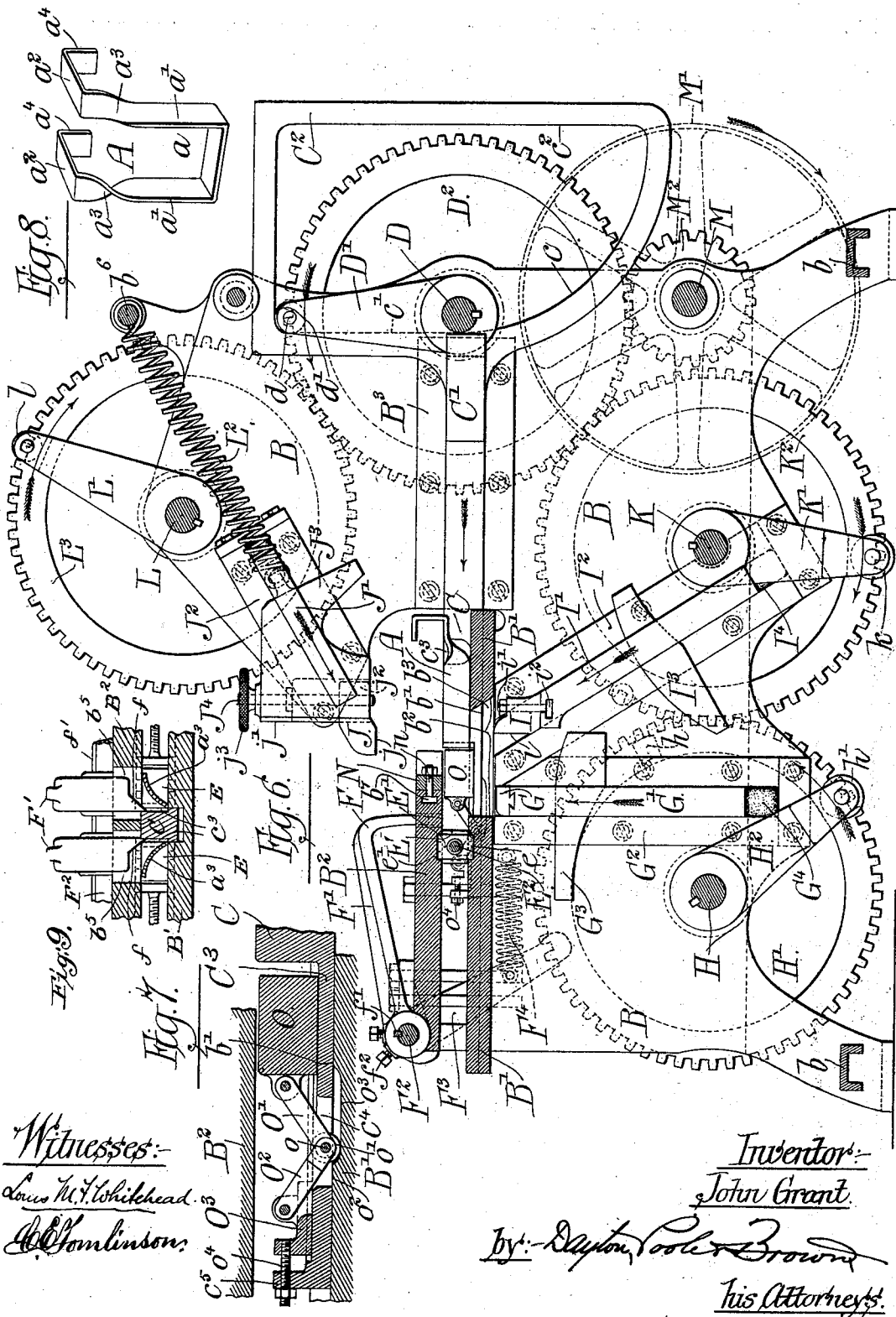
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MACHINE FOR MAKING BEAM HANGERS.

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Patented Oct. 3, 1893.



Witnesses:-
Lucas M. T. Whithead.
W. C. Tomlinson.

Inventor:-
John Grant.
Chas Brown
His Attorneys.

UNITED STATES PATENT OFFICE.

JOHN GRANT, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF AND DAVID
O. JAMES, OF SAME PLACE.

MACHINE FOR MAKING BEAM-HANGERS.

SPECIFICATION forming part of Letters Patent No. 506,197, dated October 3, 1893.

Application filed March 11, 1892. Serial No. 424,498. (No model.)

To all whom it may concern:

Be it known that I, JOHN GRANT, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Beam-Hanger Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to machines for forming stirrup irons or beam hangers, such as are used for connecting ceiling joists with their supporting timbers.

The invention consists in the matters described in the following specification and pointed out in the appended claims.

In the accompanying drawings illustrating the invention: Figure 1 is a view of a machine embodying my invention in sectional side elevation taken on line 1—1 of Fig. 2. Fig. 2 is a plan view of the machine. Fig. 3 is a horizontal or plan section thereof taken on line 3—3 of Fig. 1. Fig. 4 is a transverse vertical section taken on the line in Fig. 1 to which the arrows 4—4 are applied, showing parts seen when looking in the direction of said arrows. Fig. 5 is a transverse vertical sectional view taken upon the same line as that on which Fig. 4 is taken, as seen when looking in the direction of the arrows 5—5 applied to said line. Fig. 6 is a vertical longitudinal sectional view similar to Fig. 1, showing a changed position of the parts. Fig. 7 is an enlarged detail sectional view of the clamping device for holding the blanks. Fig. 8 is a perspective view of one of the beam hangers or stirrups which the machine is designed to make. Fig. 9 is a transverse vertical section of the machine, taken on the line 9—9 of Fig. 1, and showing the form and construction of the spreader-finger.

The machine illustrated is designed to receive a straight metal blank and to automatically, by successive operations bend, and shape said blank into a stirrup or hanger, A, (Fig. 8) having a central loop, a , to receive the end of a joist, and hooked arms, a' , a' , extending at right angles to the central loop of the hanger which latter is provided in the ends of its sides or legs with quarter twists,

a^3 , a^3 , by which the hooked arms are adapted to fit over the top of a supporting beam or stringer, while the central loop forms a socket to receive the end of a joist arranged at right angles to said beam or stringer.

As shown in the said drawings, the main frame of the machine is formed by two parallel frame plates, B, B, connected at their upper parts by a horizontal plate or table, B', and at their lower portions by suitable cross-girts, b b . Above the table B', is located a horizontal top plate, B², the rear or inner part of which constitutes a die or fixed former about which the ends of the blanks are bent to form the hooked arms a' a' of the hanger. Said top plate is separated from the said table by a space, and said table and top plate constitute guides for the horizontally reciprocating form-block, C, which slides within the space between the same and which constitutes a movable former or die about which the central part of the blank is bent to form the loop of a stirrup; the table and top-plate having grooves in their upper and lower surfaces, respectively, which extend longitudinally of the machine, and in which works the block C. Said form block has the shape of a long and narrow bar, and is attached at one end to a horizontally reciprocating plate or carriage C', which is arranged horizontally between the side plates B B, and is held or guided in its reciprocatory motion by guide grooves or ways, B³, B³, formed on the inner faces of the said frame plates at the end of the machine remote from that at which the top plate B² is located. The said form block C is preferably made of vertical depth greater than the distance between the table B' and the top plate B², and said table is provided with a longitudinal guide groove, b' , in which the said form block rests and slides; the top surface of the said form block being beneath and in contact with the top plate B².

Adjacent to and beneath the inner marginal part of the top plate B² which constitutes the form or die, the table B' is cut away, as seen at b^2 (Figs. 1 and 3) to afford room for the action of the reciprocating bending and forming dies which act in connection with the said inner part of said top plate B² in forming the final bends or hooked arms a' a' of the

stirrup, the said recesses $b^2 b^2$ extending inwardly to the side faces of the form block C so that the parts of the said table at either side of the recesses are connected only by a narrow bar, b^3 , (Fig. 4) of the same width or narrower than said form block; said bar b^3 forming with the bottom of said guide groove b^1 a continuous support or guide for the lower surface of the form block in its reciprocatory motion. Said form block and the carriage C' to which it is attached are actuated, in the construction shown, from a revolving shaft, D, mounted horizontally in the frame plates so as to extend transversely thereof at the rear of said carriage C', through the medium of arms D' on said shaft, which arms are provided at their outer ends with a crank pin, d , carrying a roller, d' , which acts upon the inner surface of a cam yoke, C^2 , attached to the carriage C'. Said yoke C^2 is provided with a segmentally curved surface, c , extending downwardly from a point horizontally opposite the shaft D, said surface forming, approximately, one quarter of a circle having the same radius as the arm D'. A vertical bearing surface, c' , extends upwardly from the upper end of said segmentally curved surface c and a second vertical bearing surface, c^2 , extends parallel with the bearing surface c' rearwardly opposite the latter. Said bearing surfaces $c c' c^2$ are adapted for contact with the roller d' during the rotation of the shaft D and are so arranged that the action of said roller upon the vertical surface c^2 effects the backward or inward movement of the carriage C, the action of said roller on the opposite vertical surface c' acts to throw said carriage forward, while the contact of the said roller with the surface c at the time the carriage C' is thrown forward, as seen in Fig. 1, holds said carriage at the forward limit of its stroke and prevents any backward or rearward movement thereof during the time said roller is traversing said surface c .

E E designate two bending rollers, which are located vertically between the table B' and top plate B² at opposite sides of the path of the form block C, said rollers being located at a distance from the sides of the form block approximately equal to the thickness of the metal strip to be bent, and operating during the forward movement of the said form block between them to bend toward and into contact with the sides of the form block the parts of the metal strip or blank which form the side portions of the central loop of the hanger.

In the particular construction shown the rollers E E are mounted in sliding blocks, E', E', which are held and guided in transverse guide grooves, e, e' , formed opposite each other in the upper surface of the table B' and in the under surface of the top plate B², in the manner illustrated in Fig. 1. For adjustably holding the said blocks in position, the same are shown as provided with outwardly extending externally screw threaded stems or rods, E^2, E^2 , which extend through plates, $e^2,$

e^2 , secured to the sides of the machine frame, and are provided at opposite sides of the said plates with nuts, e^3, e^4 , serving to hold the blocks firmly in position, and as a means of adjusting the same and the rollers mounted therein toward and from the side faces of the form block.

Devices for forming the twists or quarter turns $a^2 a^2$ in the arms of the stirrup consist of vertically reciprocating spreading fingers F F acting on the upper edges of the blank, and vertically reciprocating pressing dies, G, G, which act upon the lower surface of the blank to press the part of the same adjacent to the said bends or quarter twists flat against the under surface of the top plate B². The purpose of the spreading fingers F F is to enter between the upper margin of the blank and the side of the form block when said blank is clamped against the side of the form block by the rollers E E, and to thereby press or force said upper margins of the blank outwardly away from the form block in a manner to make partial twists or spiral bends therein. For this purpose the said spreading fingers F F are adapted to reciprocate vertically through openings or apertures, $b^5 b^5$, in the top plate B², and are adapted to pass downwardly at opposite sides of the form block, which latter is preferably provided with vertical notches, c^3, c^3 , in which the inner edges of said fingers extend, and said spreading fingers are provided with oblique or inclined outer edges or surfaces, f, f , which operate with a wedge action to force or press outwardly the upper edges of the parts of the blank which rest in a vertical position against the sides of the form block. In the particular construction shown, the spreading fingers F F are formed upon or secured to the ends of oscillating arms, F', F', which are mounted on a rock-shaft, F², extending transversely of the machine near the forward end thereof. Said rock-shaft is actuated by means of an arm, F³, which is held in position to retain the spreading fingers elevated above the surface of the form block by means of a coiled spring, F⁴, connected at one end at its other end with said arm F³ and with the machine frame, and said arm F³ is moved in a direction to depress the spreading fingers by the action thereon of a projection or stud, h , upon a revolving wheel, H', which is mounted upon a shaft, H, extending across the machine below the table B'.

The dies G G are secured to the forked or bifurcated upper end of a sliding plate, G', which is mounted between and adapted to slide vertically in guide grooves or ways, G², G², upon the inner faces of the opposite frame plates of the machine (Fig. 5). Said sliding plate G' is notched or bifurcated at its upper end in order to pass at opposite sides of the form block C when the plate is lifted to carry the dies G G toward the top plate B². Said dies G G are provided with horizontal working faces which act against the horizontal lower surface of the top-plate B² near the rear

edge of the same to press into contact with said table the parts of the blank adjacent to the twists therein and to thereby bring the end portions of the blank at right angles to the sides of the central loop thereof. The formation of said twists is therefore accomplished by the spreading fingers and the dies G G, said spreading fingers operating to spread apart the upper margins of the blank and thus bring the end portions thereof into an inclined position, and the dies serving to bring the portions of the blank which have been so thrown into an inclined position by the action of the spreading fingers, flat against the lower surface of the top plate B², and thus complete the formation of the twists in the blank.

Devices illustrated for actuating the die-carrying plate G' consist of a cam plate, G³, secured to the plate G' at right angles to the latter, and a revolving arm, H², secured to the shaft H and provided with an anti-friction roller, h', acting on the said cam plate G³ to lift the plate G' when the arm H² is moving upwardly and to allow the said plate G' to fall when said arm H² passes forward of and free from said cam-plate. Buffer springs or cushions, G⁴ G⁴, located at the lower ends of the guide ways G² G² serve to arrest the motion of the plate G' in its descent.

The final right angled bends, a⁴, a⁴ (Fig. 8), by which the hooked ends of the stirrup are completed are formed by means of reciprocating dies, I, I, J, J, which move in an oblique direction toward and from the end and top surface of the top plate B² in such manner as to first bend the end portions of the blank against the vertical rear surface of said plate and to then bend the extreme ends of the blank downwardly against the top surface of said top plate. The die I which acts upon the end face of the top plate B² is provided with a vertical working face, i, parallel with the vertical face of said top plate, and which is carried toward and from the said vertical face of the top plate by movement in a path inclined downwardly and inwardly from the said vertical surface of the top plate, and which acts upwardly against the horizontal ends of the blank to lift the same and to thereby carry said end portions of the blank into a vertical position and against the vertical surface of the top plate, against which they are pressed by the vertical working face, i of the die, to complete the right angled bends therein. Said dies I are arranged at opposite sides of the path of the form block C so as to act upon the parts of the blank which rest at opposite sides of said form block. Said dies I I are attached to a sliding plate, I', which is held at its side margins in inclined guides, I², I², formed upon the inner faces of the frame plates A A (Figs. 1 and 4). The said plate I' is provided with a central recess at its upper end giving a bifurcated or forked form to the upper part of the plate to enable the same to pass at either side of the form block C and

the connecting bar, b³, of the table. The dies I I are secured to the upper surface of the forked ends of the plate I' in such position that when the said plate is elevated the working face i of the die comes opposite the vertical face of the top plate B². Said plate I' is actuated, in the machine shown, from a revolving shaft, K, through the medium of a revolving arm, K', attached to the shaft and provided at its free end with an anti-friction roller, k, which is adapted to act upon a cam plate, I³, secured to the central part of said plate I' at right angles to the latter and in the same plane with the said roller k. The plate I' is lifted to bring the dies I I against the blank by the action of the arm K' upon the cam plate, and said plate is drawn back to be retracted by the action of gravity when the said arm in its rearward movement passes free from the cam plate I³. Buffersprings or cushions, I⁴, I⁴, are desirably provided to receive the impact of the plate I' in its descent after it has been lifted by the action of the arm K'. 90

The die J is provided with a horizontal working surface, j, which acts against the top surface of the top plate B² to bend the end portions of the blank over against the said top surface, said working face j being made of such width as to act upon both ends of the blank which are bent over or around the edge of the top plate, parallel with each other, as clearly seen in the plan view, Fig. 2. Said die J has a reciprocatory motion toward and from the top plate B² in an upwardly and rearwardly inclined path; said die acting against the ends of the blank when they stand in a vertical position so as to bend or throw the same forwardly and downwardly until brought into contact with the top plate and thrust against the same by the action of the horizontal working face of the die. Said die J is, as herein shown, attached to a sliding plate, J', mounted in guides, J², J², upon the inner faces of the side plates B, above the carriage C' in the manner illustrated. The said plate J' and the die attached thereto are advanced toward the top plate by the action of a revolving arm, L' secured to a transverse horizontal rotating shaft, L, which has bearings in the frame plates at the upper part of the machine; the free end of said arm L' being provided with an anti-friction roller, l, which acts upon a cam-plate, J³, secured to the plate J' in the same vertical plane with the said roller l. The said plate J' is drawn back or retracted by means of a coiled spring, L², which is secured at one end to the rear margin of the plate J' and at its opposite end to a cross-piece or girt, b⁶, of the machine frame. 125

The devices for actuating the several shafts D, H, K and L, consist, in the machine shown, of the gear wheel, H', which as before described, is attached to the shaft H and carries the stud, h, for actuating the spreading fingers, and three intermeshing gear wheels, D², K² and L³, secured respectively to the shafts D, K and L; motion being transmitted 130

to one of said gear wheels D^2 from a driving shaft, M , carrying a drive pulley, M' , by means of a gear pinion, M^2 , which intermeshes with said gear wheel D^2 .

5 The form block C has a reciprocatory motion through a distance sufficient to bring its forward end to a position at the rear of the top plate B^2 , as seen in Fig. 6, and in the operation of the main parts above described, 10 the straight blank is placed horizontally and transversely of the machine with its central part resting in contact with the end face of the said form block C , and said form block is then moved or carried forward until its forward end is brought between the rollers $E E$, 15 by which the end portions of the blank are bent horizontally around the angles of the blank so as to form two right angled bends therein, and is pressed against the sides of 20 the form block and held in contact with the same. When the form block has completed its forward movement, the spreading fingers $F F$ then act to bend outwardly away from the form block the upper edges of the end 25 portions of the blank and the dies G then rise and press the outwardly turned or bent parts of the blank flat against the under surface of the top plate B^2 . During this action of the lower dies the parts of the blank constituting the sides of the central loop of a 30 hanger are held against the sides of the form block by the rollers $E E$, as clearly shown in the plan view, Fig. 2, so that the adjacent parts of the blank are held in a vertical position between said rollers and the form block 35 and in a horizontal position between said dies $G G$ and the bottom of the top plate, thereby giving a twisted form to the blank in its parts located between said rollers and dies. 40 After the dies G have acted in the manner described the dies $I I$ are then lifted so as to lift and bend upwardly the end portions of the blank, which being so bent upwardly, extend in the same plane with the bottom of the 45 top plate, the said end portions of the blank being forced against the vertical face of the top plate, whereby the right angled bends, a^2 , a^3 , are formed. The die J then advances against the end portions of the blank which stand vertically above the top plate and 50 thrusts said end portions of the blank forwardly and downwardly against the top surface of the top plate thereby making the final bends, a^4 , a^4 . 55 For the purpose of holding the end portions of the blank in place laterally as they are bent against the face of the top plate by the action of the dies $I I$, guides, N, N , are secured to the rear margin of the top plate B^2 and extend rearwardly therefrom; said guides having inner parallel vertical guide surfaces arranged at a distance apart equal to the distance between the outer edges of the arms a' 60 a' of the hanger. Said guides act to hold accurately in place the ends of the blank as they are bent around the rear margin of the top plate, thereby insuring that the hooked

end portions of the stirrup shall be accurately perpendicular to the plane of the central or loop portion thereof. 70

Devices for clamping the central part of the blank against the end of the form block are provided as follows: C^3 is a bar forming a forward extension of the form block C and located below the level of the top of the table 75 B' , and resting within the guide groove b' of said table (Fig. 7). On the said bar C^3 , adjacent to the end of the form block is mounted a clamp jaw, O , adapted to slide toward and from the end surface of the form block, said 80 clamp jaw being conveniently held from lateral displacement by means of a guide rib on the bar C^3 engaging a groove in the under surface of the clamp jaw.

O' O^2 indicate the two members of a toggle 85 which are pivoted to the clamp jaw O , and to an abutment block, O^3 , mounted on the forward end of the bar C^3 . The middle joint of the toggle rests within a recess, c^4 , formed in the bar C^3 , and its pivot pin o is provided with 90 rollers, o' , which act upon a cam surface, o^2 , formed in the table B' below the level of the said bar C^3 . Said cam surface o^2 is so arranged as to lift the center joint of the toggle and thereby straighten the toggle arms so as 95 to bring the clamp jaw against the end of the form block when the latter begins its forward movement in the bending of the blank, and to allow the flexing of the toggle members as soon as the form block returns to its starting 100 point, so as to release the finished stirrup preparatory to the removal thereof from the form block. For this purpose the said cam surface o^2 is shown as provided with a depressed part or recess, o^3 , to receive rollers $o' o'$ when 105 the form block is at the rearward limit of its movement, the outer part of said cam surface o^2 being conveniently made flush with or forming part of the bottom surface of the guide groove b' . 110

To provide for differences in thickness of the blank and for adjustment of the pressure of the clamp jaw, the abutment block O is preferably made separate from and arranged to slide upon the bar C^3 , and is held in place 115 by a set screw, o^4 , which is engaged with said abutment block and with a lug, c^5 , upon the forward end of the said bar C^3 .

To provide for adjustment of the parts of the machine in order that stirrups of different 120 sizes may be made thereon, devices are provided as follows: For the purpose of making the central loop of the hanger wider or narrower, plates of the proper thickness are secured to the sides of the form block shown, 125 but the same result may be accomplished in a familiar manner by making the part of said form block over which the blank is bent, in the form of a removable block for which wider or narrower blocks may be substituted. 130

To permit of the adjustment of the spreading fingers $F F$ to correspond with such change in the width of the central loop, the arms $F' F'$ supporting the same are made

separate from each other, and are adjustable longitudinally on the shaft F^2 , which shaft is conveniently provided with a spline, f' , which serves to hold the arm from turning on the shaft, while the arms are provided with set-screws, f^2 , by which they may be secured from movement when adjusted to the proper lateral position. The slots or openings, b^5 , b^5 , through which pass the fingers $F F$ are made of sufficient length as seen in the drawings, Fig. 2, to admit of the necessary lateral adjustment of the fingers.

The dies $G G$ are connected with the upper end of the plate G' by means of dovetailed tongues or grooves allowing the dies to be shifted laterally to correspond with the width of the form block placed between them. Said dies $G G$ are made of such width as to operate in connection with the widest blank which the machine is adapted to operate upon, thus rendering unnecessary any adjustment of the said dies to correspond with the width of the said blank.

The dies $I I$ are made detachable from the plate $I' I'$ and are made adjustable laterally thereon by means of the bolts i' , which engage T-shaped slots, i^2 , in the upper ends of the lateral parts of the said plate I' . Lateral adjustment of the dies $I I$ is necessary when the central loop of the hanger is made wider or narrower, and it becomes necessary to substitute wider or narrower dies to correspond with the width of the metal blank used, for the reason that said dies I in the act of bending the blank must pass between the outer side faces of the form block and the inner faces of the guide pieces, N, N , which are attached to the rear margin of the top-plate B^2 . The bolts i' and T-slots i^2 , enable said dies to be conveniently adjusted laterally, and removed from the plate I' when desired. The guide pieces N are adapted for lateral adjustment upon the top plate B^2 by means of horizontally arranged bolts, n , which are provided on their inner ends with heads engaging a groove, b^7 , T-shaped in cross-section, in the said top plate. To provide for variations in the width of the hooked ends of the stirrup, plates of a varying thickness may be secured to the top surfaces of the top-plate B^2 so as to make wider or narrower, vertically, the vertical working face of said plate, and provision is made for adjusting the die J so as to correspond with such change in the top plate by making said die adjustable vertically upon the plate J' which supports the same. Such vertical adjustment, in the construction shown (Figs. 1 and 2) is provided for by means of vertical dovetailed guide flanges, j' , on the front surface of said plate J' , which guide flanges engage dovetailed grooves formed in the inner face of said die, and means are provided for moving the said die vertically and holding it in its changed position, consisting of a screw-shaft, J^4 , which is supported vertically in the said plate J' by means of a bearing adapted to hold the

said screw-shaft from endwise movement but to allow the free rotation thereof. Said screw-shaft is provided in its lower part with a screw-threaded part j^2 engaged with the central inwardly-extending lug or projection upon the die. A hand-wheel, j^3 , enables the screw-shaft to be easily turned for vertical adjustment of the said die J .

I claim as my invention—

1. The combination with a reciprocating form block, of means for bending the blank into contact with the sides of the form block, and means for giving a twisted form to the blank comprising reciprocating spreading fingers moving in a direction at right angles to the path of the form block, having inclined surfaces which act against the blank, a stationary plate or die having working faces at right angles to the sides of the form block, and a reciprocating die acting to press the blank against said working faces of the plate or die, substantially as described.

2. The combination with a reciprocating form block, of two bending rolls located at opposite sides of the form block, two reciprocating spreading fingers moving in a direction at right angles to the path of the form block, and provided with inclined surfaces acting on the blank, a stationary plate or die having working faces at right angles to the sides of the form block, and a reciprocating die acting to press the blank against the said working faces of the plate or die, substantially as described.

3. The combination, with a reciprocating form block, of means for bending the blank into contact with the sides of the form block, means for forming quarter twists in the blank, in its parts at the sides of the form block and means for forming right angled bends in the blank, consisting of a stationary plate located above the path of the form block and having horizontal and vertical working faces, reciprocating dies located below the said plate and moving toward and from the lower horizontal face of the die, and other reciprocating dies movable obliquely toward and from the vertical working face of said die, substantially as described.

4. The combination with a reciprocating form block, means for bending the blank into contact with the sides of the form block, means for giving a twisted form to the blank in its parts at the sides of the form block, and means for forming the hooked ends of the blank comprising a stationary die having horizontal upper and lower and vertical working faces, obliquely moving dies acting against the vertical working face of the stationary die, and other obliquely moving dies acting against the horizontal working face of said stationary die, substantially as described.

5. The combination with a reciprocating form block, of two bending rollers located at opposite sides of the form block, means acting on the end portions of the blank for throwing the same into an inclined position, a sta-

tionary plate having horizontal top and bottom and vertical working faces, vertically reciprocating dies acting against the bottom face of the said plate, obliquely moving dies
5 acting against the vertical surface of said plate and an obliquely moving die acting against the top surface of said plate, substantially as described.

6. The combination with a reciprocating
10 form block, and a plate located over the same and provided with horizontal top and bottom and vertical working faces, of rollers located at the sides of the said form block, spreading fingers having a reciprocatory motion at
15 right angles to the form block, and provided with inclined working faces, reciprocating dies acting against the bottom surface of the said plate, obliquely reciprocating dies acting against the vertical surface of said plate,
20 and a reciprocating die acting against the top surface of said plate, substantially as described.

7. The combination with a reciprocating form block and means for bending and holding the blank against the sides of the form
25 block, of spreading fingers moving at right angles to the path of the form block having oblique working surfaces, and a rock shaft provided with oscillating arms supporting
30 and actuating said fingers, substantially as described.

8. The combination with a reciprocating form block and means for bending the blank into contact with the sides of the form block,
35 of spreading fingers having oblique working surfaces, and a rock shaft provided with oscillating arms supporting said fingers, said arms being laterally adjustable on said rock-shaft, substantially as described.

9. The combination with a reciprocating
40 form block and a stationary plate or die having horizontal bottom and top and vertical working faces, of obliquely reciprocating dies acting against the vertical working face of
45 said plate, and a sliding plate carrying said

dies, said dies being detachably connected with and laterally adjustable upon said plate, substantially as described.

10. The combination with a reciprocating form block, of a stationary plate or die having
50 bottom, top and end working faces, reciprocating dies acting against the end working face of said plate, an obliquely reciprocating die acting against the top working face of
55 said plate, and a sliding plate carrying the said die last mentioned, said die having vertically adjustable connection with the said plate which supports the same, substantially as described.

11. The combination with a reciprocating
60 form block, means for bending the blank into contact with the sides of the form block, means for forming twists in the blank and means for bending the ends of the blank into
65 hooked form, of a device for actuating the form block comprising a revolving arm and a cam-yoke having surfaces against which the said arm acts to give forward and rearward movement to the form block, and a
70 curved surface by which the form block is held at the forward limit of its movement, substantially as described.

12. The combination with a form-block and a reciprocating carriage carrying the same,
75 of a clamp-jaw mounted on the carriage and movable toward and from the block, a toggle for actuating said jaw, said toggle being pivoted to the jaw and to the carriage, and a stationary cam surface on the machine frame adapted to engage the central joint of the
80 toggle for actuating the same, substantially as set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN GRANT.

Witnesses:

C. CLARENCE POOLE,
GEORGE W. HIGGINS, Jr.